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CHRONICLE

OBITUARIES

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EDITOR'S NOTE

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The transliteration of Ukrainian and Russian geographic and personal names is from the Ukrainian (with a few exceptions that are well-known in the West) and from the Russian, respectively, according to the modified Library of Congress system. The term "the Ukraine" is often used in the volume to designate "the Ukrainian SSR." The acronym for the latter in Ukrainian is "UR(adians'ka)SR" and in Russian "US(ovetskaia)SR." To avoid confusion with the English abbreviation for the Soviet Union, the terms "UkRSR" and "UkSSR" are used.

Ukrainian Economics in Scholarly and Public Thought in the 19th-20th Centuries

OLEKSANDER OHLOBLYN*

In the study of the history of the Ukrainian national economy, the development of the concept of Ukrainian economics is of basic importance. Research on this subject leads us logically to its historiographic and historical beginnings; that is, to the history of Ukrainian economic thought and the history of the national economy of the Ukraine. Even today the subject of Ukrainian economics remains unsettled in scholarly journals and public opinion. For centuries the Ukraine was under foreign economic and political domination and this undoubtedly had an impact on Ukrainian economic thought. Since the Ukraine at first had a close bond with the Polish Commonwealth and later with the Muscovy Tsardom (which became the Russian Empire), it was for a long time completely dependent on them and was deprived of any autonomy. The Polish and Russian public and their scholars became accustomed to the Ukraine as an inseparable part of their political and economic territories. In subordinating Ukrainian economic life to their own economic centers, Russia and Poland assumed the absence of an independent economic territory with its own economic centers in the Ukraine. Therefore, we must consider first of all how scholarly and public thought in the Ukraine approached the concept of Ukrainian economics. But our goal is also to establish how Ukrainian economic thought defined the importance of the Ukrainian national economy within the world economy, especially in its relationship with Russian and Polish economies. The prob-

* This article was an introductory lecture in the course on history of the Ukrainian economy delivered by the author at the Kiev Institute of National Economy during 1927/28 academic year. It was published in the Kharkiv journal *Chervonyi Shliakh*, 1928, nos. 9—10, under the title "Problema ukrains'koi ekonomiky v naukovi ta hromads'kii dumsti XIX-XX v." In their remarks, the editors of *Chervonyi Shliakh* expressed the wish "to continue the discussion of this topic." But the situation changed so that not only discussion, but even the posing of such a problem became impossible. In 1953—54 the article, with certain changes and cuts primarily of an editorial nature, was reprinted in the New York journal *Visnyk*. The present translation was made from the latter version.

The Editor is grateful to Mrs. Larvssa Lozynsky-Kyj, Columbia University, for making this translation. Notes have been supplied by the Editor.

lem of development of a national economy in the Ukraine was very complicated.

The subject of Ukrainian economics emerges on the purely pragmatic grounds of the economic interests of the Ukraine, under conditions of the economic struggle for the Ukrainian market taking place among Russia, Poland, and Western Europe (mainly Germany) at the beginning of the 19th century. Up until the end of the 18th century, the Ukraine was not closely tied with Russia. The Left Bank of the Ukraine (except the Slobids'ka Ukraine)¹ formed an autonomous national unit—the Hetman State—which had certain political and economic ties with the Russian Empire. Almost all the entire Right Bank (the province of Kiev, without the city of Kiev and its suburbs which belonged to the Hetman State, Volhynia, and Podillia) belonged to the Polish Commonwealth and was under the direct influence of the Polish economy. Finally, the Southern Ukraine (later called Kherson, Katerynoslav, and Northern Tavria provinces) at that time made up the territory of the Zaporizhzhia lands (Sitch and surrounding regions), or the unpopulated steppes, “wild lands,” which either belonged to the holdings of the Crimean Khan, or, like the strip of the northern coastline of the Black and Azov Seas, belonged partially to the Ottoman Empire. In the economic life of all these lands Tartar-Turkish influences were felt. It is clear, therefore, that the 18th-century Ukraine was divided both politically and economically, and only a part of it was tied to the Russian Empire. But, when the northern coastline of the Black and Azov Seas was taken over by Russia, and the Russian government started to build ports here (Kherson, and later, Odessa), the economy of the Right-Bank Ukraine (especially its southern part—Bratslav and Podillia provinces) started to look in a southern direction. This was also favored by the tariff policies of the Russian government which bestowed certain privileges on the Right-Bank trade, wishing to steer it toward the Russian ports on the Black Sea. After the last two partitions of Poland (1793 and 1795), the Right-Bank Ukraine also became incorporated into the Russian Empire. This was a very important event—the unification of the separated parts of the Ukrainian territory under the scepter of the

¹ The Left Bank refers to the Ukraine's territory east of the Dnieper River, while the Right Bank comprises territories west of this river, except for the West Ukraine (Volhynia, Galicia, Carpatho-Ukraine, Bukovyna, and the Ukrainian part of Bessarabia). Slobids'ka Ukraina or Slobozhanshchyna refers to the most eastern part of the Ukraine and comprises the present Kharkiv and parts of Sumy, Donetsk, Voroshylovhrad, Voronizh, and Kursk oblasts. The latter two are now included in the RSFSR.

Russian Empire. But this did not sever all the old interests and ties. The Right Bank still maintained relations with the Polish market, used transit through Poland to Baltic ports, and traded with Polish industry; for some time this part of the Ukraine still looked toward Poland. This was aided by the attitude of the economic interests of Central Europe which saw their advantage in the weakest ties of this territory with the Russian Empire. In Europe, Poland's views on the situation in the Right-Bank Ukraine prevailed; Russian rule here was considered a temporary military occupation. Still, the unification of the Right Bank with the Left Bank and the Steppe region at the end of the 18th century was more than an ordinary union of various parts under one political and administrative regime. This was the unification of previously dispersed parts, once separated by force, of one economic organism of the Ukraine. Of course, the process of consolidating the Ukrainian economy was slow and complicated because of the political and economic conditions of that time. At first there was a fierce battle between German (Prussian, Austrian) and Russian capital for the Right-Bank Ukraine. German capital, which had captured the Right-Bank market during the Polish rule, tried to maintain its position here. The Right-Bank Ukraine was important for Germany as a source of natural resources, as a market for German industrial products, and finally as a route toward the East. But this was in conflict with the interests of Russian capital which, basing itself on its political advantage, strongly resisted these intentions of German capital. In the course of this battle, a third younger power—Polish capital—appeared. Naturally, the least consideration was given there to the economic interests of the Ukraine itself. This subject could not arise in Russian, Polish, or German circles. But this economic struggle was of primary importance for the economic life of the Ukraine; its influence, both negative and positive, is very evident. On the one hand, this struggle prevented the Ukrainian national economy from developing normally. Its positive influence is reflected in the fact that this struggle did not allow Russian (and Polish) or German capital to dominate the Ukrainian economy completely. In spite of everything, during this struggle between the opposing capitalistic interests, the question surfaced of the orientation of Ukrainian economic interests and whether or not they were in accord with those of the Russian national economy or the Polish national economy. In this manner the complicated international economic and political situation in the Ukraine during the first quarter of the 19th century facilitated to a

certain extent the posing, as an order of the day, of the problem of Ukrainian economics.

During the struggle of Russian (and Polish) and German capital, there was a significant change in the custom duties policies of the Russian Empire. The new tariff of 1822 introduced a system of protectionism. Considerable tariff was imposed on foreign products and many of them could not be imported at all. In contrast, the export of goods from the Empire was encouraged. Privileges given to Polish industry and trade in 1819 was affirmed. Indisputably, all these measures were taken against the interests of other foreign countries, especially against Germany. The tariff of 1822 had a harmful effect on the Ukrainian national economy. This was primarily reflected in Ukrainian foreign trade. The effects of the new tariff were especially felt by the merchants of Odessa. Odessa's trade before 1822 was growing at an unusually rapid rate. After 1822 this trade began to decline; the import of foreign goods declined. A decrease in imports had obviously to be reflected in exports which, together with the prevailing unfavorable conditions on the world market for grain, created difficulties for export of Ukrainian grain.

This hurt the merchants of the Southern Ukraine who were chiefly engaged in foreign trade. Among them the first sharp reaction against the tariffs was already being heard in 1822. Naturally, these protests could not have been widely expressed, but some of them can be found on the pages of the Russian economic press, especially in *Kommercheskaia gazeta* between 1820–30. The paper stated in 1826: “. . . it is argued that we cannot sell anything, because we do not buy anything from foreigners, everything is forbidden or taxed excessively.” Stressing that “. . . these thoughts quickly find supporters . . .” the paper goes on: “The main source of this view can be found in the complaints of local merchants who do not respect the interests of the whole.” However, even the official communication of the Ministry of Finance had to agree that “. . . if we went back to the tariffs of 1819 or to more limited ones, then naturally the Black Sea ports would gain a great deal. A large volume of products would come in; trade benefits and profits would be excellent for the residents.” The advocates of Russia's interests kept stressing that the interests of one region of the country must be subordinated to the interests of the entire country.

The voice of Odessa merchants sounded strongly also because it expressed to a certain extent the interests of the Southern Ukraine's landowners, who had suffered as a result of the tariff of 1822. West-

ern Europe reacted to this tariff with great hostility. These hostile feelings, both in the Ukraine and abroad, especially after the events of December 1825, were so threatening that the Russian government was forced to make certain concessions. The Odessa transit was restored and portofranco² in Odessa would go on. Therefore, in the aftermath of the tariff of 1822, the thought arose for the first time that the interests of the Ukrainian national economy might not develop in the same direction as did the interests of Russia; they might even develop in the opposite direction. Thus the subject of Ukrainian economics emerged for the first time on a purely practical basis. Of course, this subject could not suddenly present a well-defined outline and be firmly imbedded in public and intellectual thought. Some time was required before a concept of Ukrainian territorial economics could be shaped.

The first attempts to form the concept of Ukrainian territorial economics were made in connection with the activity of a scientific institution active in Kiev in the 1850s. This was the "Commission for the Description of Provinces of the Kiev Educational District," in existence between 1850 and 1864. Its area of activity was the Kiev school district which consisted of three Right-Bank provinces and two Left-Bank provinces (Chernihiv and Poltava). In other words, it comprised the territory of the East-Central Ukraine. In the revolutionary era of the 1840s the spirit of nationalism started to spread in Poland. Increased revolutionary activity in Poland and among Polish émigrés undoubtedly reopened the question of the Right-Bank Ukraine. The Russian government had to prevent this. In 1850 Russia abolished the customs border between the Russian Empire and the Polish Kingdom, and Polish products (basically textiles) could flow freely into the Ukraine after that time. This also had an effect on the sugar market. Polish refined sugar (or from Poland) appeared in large quantities on the Right Bank. The volume was so large that Ukrainian refined sugar was forced to look for new markets in Russia and even in Siberia. Even though the Polish sugar industry was hardly equal to that of the Ukraine, nevertheless favorable customs and trade conditions served well the interests of the Polish sugar industry and Polish trade. In connection with this, Polish economic, political, and cultural influence started to spread in the Ukraine and this complicated the position of the Russian government on the Right Bank. Of a number of measures undertaken by the Russian government, in view of this

² Free of custom duties.

increased Polish activity on the Right Bank, not the least important was an attempt to study the Right Bank in its several aspects (in comparison to those on the Left Bank) and to prove that this region is not Poland but a "Russian land." As a result, the subject of Ukrainian economics again came up on the daily agenda. The task of the Commission was to collect and systemize material about the natural, geographic, and demographic conditions, about economic and social administration, about the cultural and everyday life of these provinces, and also to compile and publish an appropriate description of them. This Commission was made up of Kiev university professors, government officials, local researchers, laymen, and, what is very important, Ukrainian landowners. The Commission was very bureaucratic in its character; it was under the direct control of high administrative organs in Kiev. But regardless of this bureaucratic nature, the Commission went beyond the scope of its official tasks. Its liaison with the public at large gave it a certain connotation, as did also the direction to its activity. Its adherence to the task set for it by the Russian government was becoming of rather secondary importance.

The Commission prepared an agenda for the future ("A Plan for a Statistical Description of the Provinces of the Kiev Educational District"). The author of this plan was the secretary of the Commission, the prominent Ukrainian statistician D. P. Zhuravs'kyi, who wrote a major work, in three volumes, entitled *Statisticheskoe opisanie Kievskoi gubernii*.³ In this "Plan" main attention was given to economic questions. The Commission did not complete its work and did not publish definite economic description of the Ukraine. But among its publications there were a few works devoted to the specific aspects of contemporary Ukrainian economics, for example, the work of a well-known Ukrainian economist, Professor M. Bunge,⁴ *O zheleznoi promyshlennosti v guberniiah Kievskogo uchebnogo okruga*. It is interesting to note that in these studies there are references to the Ukrainian economy of the past. After the Crimean War, when preparations were made for peasant reforms, the Commission tried to get in touch with these new interests and currents, and to broaden its scope. There was an unsuccessful attempt to change the Commission into a chapter of the Russian Geographic Society. In the 1860s, the Commission proposed changing its charter. But the government suspected a certain danger in this, and the work of this Commission was terminated in

³ 1810–56; his book was published in 1852.

⁴ M. Kh. Bunge, 1823–95, economist and state official.

1864. In the 1850s, the Commission not only formulated the outline of the study of Ukrainian economics, but also started to shape the concept of Ukrainian territorial economics and initiated a certain tradition that later, in the 1870s, found fertile ground in the activities of the South-Western Chapter of the Russian Geographic Society.

The South-Western Chapter of the Russian Geographic Society, established in 1873, worked under new conditions. This organization was founded by the Ukrainian *intelligentsia* in Kiev, grouped around the so-called Kiev *Hromada* (Community). Even though some members of the Commission of the 1850s entered this Society, the new organization was actually in the hands of *Hromada's* members, of the older as well as the younger generations, V. Antonovych, P. Zhytets'kyi, M. Drahomanov, M. Ziber, O. Rusov, F. Vovk, and others.⁵ In the work of the South-Western Chapter therefore were sharply mirrored the Ukrainian social, political, and scholarly interests and desires. Interest in Ukrainian economic questions could be clearly seen in the activity of the Chapter. Typically, even ethnographic works directed their attention to the economic problems. Two basic features appeared in the relevant studies of the Chapter's members: interest in the history of the different sectors of the Ukrainian economy (it is sufficient to mention the work by V. Antonovych, *O promyshlennosti Iugo-Zapadnogo Kraia v 18 v.*), on the one hand; and careful attention to the current problems of Ukrainian economics in general (the works by F. Vovk, Chubyns'kyi, and especially M. Iasnopol's'kyi).⁶ Unfortunately, the South-Western Chapter did not have enough time to expand its activities. The Russian government became fearful of its national-political interests and closed this institution in the ominous year 1876.⁷ But the members of the Chapter did not stop their work. By that time the Ukrainian *intelligentsia* had divided into two camps, the "old" and the "new" *Hromada*. The "new" *Hromada*, led by M. Drahomanov and S. Podolyns'kyi,⁸ transferred its work abroad. The members of the "old" *Hromada* continued to work in the territory of the Russian Ukraine. The watershed year was 1876. These two

⁵ V. B. Antonovych, 1834–1908, Ukrainian historian; P. H. Zhytets'kyi, 1837–1911, Ukrainian philologist; M. P. Drahomanov, 1841–95, Ukrainian social scientist; M. I. Ziber, 1844–88, Ukrainian economist; O. O. Rusov, 1847–1915, Ukrainian ethnographer; F. K. Vovk, 1847–1918, Ukrainian archeologist and anthropologist.

⁶ P. P. Chubyns'kyi, 1839–84, Ukrainian ethnographer; M. P. Iasnopol's'kyi, 1846–1920 (?), Ukrainian economist.

⁷ In this year the so-called Ems Order was issued by Tsar Alexander II. It prohibited the use of the Ukrainian language in publications, theater, etc.

⁸ S. A. Podolyns'kyi, 1850–91, Ukrainian economist.

groups continued to develop Ukrainian economic thought and thus the problem of Ukrainian economics was further expanded, studied, and synthesized.

The second half of the 19th century in the history of the Ukrainian economy is characterized by the lively growth of capitalist elements, which developed quite a strong capitalist system between the third and the fourth quarters of the century. It is understandable that under conditions of rapid economic development in the Ukraine, the contradictions of this development unavoidably arose and were sharpened. They were bound to have an effect on economic thought. Ukrainian economic life of the second half of the 19th century, as in the preceding era, did not develop isolated from the influence of the economies of the neighboring countries, Russia and Poland, or, in a broader sense, from the economies of all Europe. These processes in the Ukraine, therefore, were quite complicated. Their nature and tempo often were in sharp conflict with the interests and requirements of Russia and Poland in the Ukraine. The economic battle between these two countries continued into the second half of the 19th century and found its reflection in the national, political, and cultural life.

What were the basic features and factors of the economic life of that time? First of all, the reform of 1861⁹ created suitable conditions for the free supply of and the demand for labor, and thus facilitated the expansion of the labor market. Of course, the 1861 reform, whose main purpose was to serve the interests of industrial capital (because these interests in fact determined the whole course of reform), also had an effect on all sectors of the Ukrainian economy. On the other hand, at the very time when transportation provided by serfs was done away with, under pressure of keen competition between Russian and European industrial capital, a burning need appeared to increase the transport capabilities in the Ukraine—obviously not through improvement of the old *chumak*¹⁰ roads but by the building of railroads. Therefore, during the period of the implementation of the Peasant Reform, the first railroads were built in the Ukraine, and their network grew rapidly, especially in the last quarter of the 19th century. The third factor important for the Ukrainian economics of the second

⁹ The emancipation of peasants.

¹⁰ Peasants—merchants engaged in trade of salt, dried fish, and grain between the Black Sea and Don River and the rest of the Ukraine, between the 15th and 19th centuries.

half of the 19th century was the development of the Donets' industries.

The natural resources of the Donets' Basin had been known even earlier (in the 18th century), but under feudalism there was no economic justification for opening large and strong industrial centers. This fact requires further elaboration. The development of Donets' industry initiated a real revolution in the Ukrainian economy of that time, and this is clearly reflected in contemporary economic thought. In the first half of the 19th century, the situation of the Donets' industries was indeed bleak. At that time only the coal deposits were known in the Donbas, and this coal was mined in very small quantities, because there was no demand for it. The few existing factories used the old-fashioned source of energy, wood; coal, which was very difficult to mine at that time (since contemporary technology was quite primitive), was expensive and could not compete with wood. The main coal consumers at that time were the ports on the Black and Azov Seas and the fleet. But there also was a strong competitor—English coal was brought to the Ukraine in large quantities, in ships which took back wheat and other agricultural products. The price of that coal in Odessa and Tahanrih was relatively low. Transport costs (there was no railroad in the Ukraine during the first half of the 19th century) were so high that carrying Donets' coal was very expensive. Therefore, this coal from the Donets' area could not be marketed cheap. But the development of the Donets' coal industry was mainly limited by the lack of metallurgical industries. During the first half of the 19th century, a view prevailed in the Ukraine as well as in Western Europe that there was no iron ore in the Donbas. The work of the Demidov expedition of 1837 (its conclusions were written by Le Play) came up with this assertion: In the Ukraine iron ore deposits were believed to be very limited.¹¹ In 1841 a German traveler, Kohl, wrote: "In all of Southern Russia, there is no place where one can get any metal. This is a vast area of Europe deprived of any metal; not enough iron can be found to make one nail."¹² Naturally, this was a great exaggeration, since small metallurgical enterprises did exist in the Ukraine (mainly in Polissia) for a long time. However, and correctly, there were no large metallurgical industries in the Ukraine due

¹¹ Geological and economic expedition organized and financed by the Demidov family, well-known Russian industrialists and landowners. Frederic Le Play, 1806–82, French geologist.

¹² J. G. Kohl, 1808–78; the book referred to is, *Reisen in Suedrussland* (Dresden und Leipzig, 1841).

to the fact that the known iron ore deposits were small and of low grade. The Ukrainian iron market was subordinated to the Russian and partially to Polish iron (the Right Bank). Casting in the Ukraine depended on the import of Russian pig iron. Therefore, the foundry in Luhans'k (in Donbas)¹³ that supplied the military needs of the Empire and the free market (it manufactured various agricultural and industrial machinery and even steam engines) worked on Ukrainian coal and Russian pig iron. And this pig iron had to be brought over thousands of kilometers from the foundries in the Urals. This unquestionably dampened the development of the Donets' industries.

But in the second half of the 19th century an important event took place in the history of this industry and in the history of the Ukrainian economy in general that completely changed the relationship between the Ukrainian economy and the economy of Russia. This was the discovery in the 1880s of iron ore deposits in Kryvyi Rih. Under the influence of Western European capital (French) a large-scale metallurgical industry was organized in Kryvyi Rih and it continued to grow rapidly. It was the final factor that united the economics and politics of that time. The aggressive foreign policy of the Russian Empire in the Balkans in the second half of the 19th century, which culminated in the Russo-Turkish War of 1877-78, had considerable influence on the Ukrainian economy which in turn, began to play a significant role in imperial designs. From that time on, Ukrainian industrial circles showed an interest in the markets of the Near and Middle East (the Balkans, Turkey, and Persia).

All these salient events in Ukrainian economic life of the second half of the 19th century found their expression in Ukrainian economic thought. The general conditions in the development of Ukrainian capitalism also determined the development of economic thought. Actually, in order to develop and to define the concept of Ukrainian economics, not only was the growth of a Ukrainian economy indispensable, but also the sharpening of tensions between this development and the interests of certain other countries adjacent to the Ukraine, first of all, Russia and Poland, and recognition of these conflicts, had to be considered. Here the obvious political and economic dependency of the Ukraine on Russia, on the one hand, and its economic dependence on Poland, on the other, undoubtedly had an effect on Ukrainian economic thought. This tension became

¹³ Now Voroshylovhrad.

very apparent in the matter of railroad construction in the Ukraine. Railroad building in the territories of the former Russian Empire began in Russia proper. In the Ukraine, railroads appeared about twenty years later. The main question that concerned Ukrainian economic circles was the direction of the railroad trunklines in the Ukraine. The interests of the Ukrainian economy required that railroads should be first built from the Ukrainian centers to ports on the Black Sea (Odessa) and also toward the western border of the Empire with Austria and Prussia (through Poland). The Imperial Russian government, under the influence of the Russian business interests, decided on a different direction of the first Ukrainian railway (in the first place, Moscow–Kharkiv–Feodosiia). This direction, as the central one, was inconvenient for the Ukrainian national economy, because it hindered the construction of other railroads in the Ukraine. This question about the direction of railroad lines caused a sharp discussion that brought out the conflicting interests of the Ukraine and Russia. Even an official Russian publication (of the Central Statistical Committee of the Ministry of Internal Affairs) stated in 1864 in a pamphlet; “About the Direction of Railroad Trunklines in South-Western Russia” that “. . . after the end of the Crimean War, all the resources of the state were utilized for the building of railroads in the north, and the south—the most productive part of Russia—was forgotten. . . . Southern Russia began to realize more and more that her interests were secondary for the government and that the income of the entire state was in general used for the profit and comfort of the northern part. The adopting of such a conviction can cause a complete break between the interests of north and south.” In contemporary economic literature, the Civil War in the United States was mentioned in no uncertain terms. Apologists of Russian capitalism rejected this notion, generally dismissing all the evidence by stressing that “the interests of the whole” were above “the interests of parts.” No attention was paid to protests from the Ukrainian side against these projects. The projects were implemented and the first railroads laid in the Ukraine were those convenient for Russia’s trade and industrial capital. Only later were built those of significance for the Ukrainian economy. This controversy unquestionably stimulated Ukrainian economic thought and on the basis of specific problems sharpened the idea that the requirements of the Ukrainian economy during a certain period of time might not agree with, but, on the contrary, might even be opposed to the interests of the Russian economy.

Against this background appeared the first works devoted to the problems of Ukrainian economics. The influence of the pragmatic interests of the national economy at that time can be clearly seen in these works. Indisputably, first mention here belongs to Professor Mykola Iasnopol's'kyi. A scholar of the Ukrainian national economy and a university professor of political economy and statistics, Iasnopol's'kyi contributed a great deal to the study of the history of the Ukrainian national economy, writing several works about the contemporary Ukrainian economy. Two of these works are of special interest to us—"Ekonomicheskaiia budushchnost' Iuga Rossii i sovremennaia ego otstalost'" and *O geograficheskoi raspredelenii gosudarstvennykh dokhodov i raskhodov Rossii* (Kiev, 1890, 1897). The former work is a long article published in 1871 in *Otechestvennye zapiski*. In it Iasnopol's'kyi gave an accurate survey and analysis of the Ukrainian economy, concentrating chiefly on the economy of the Southern Ukraine. Here the author foresaw a way out of the impasse into which the Ukrainian economy had been led by the colonial policies of the Empire. It is interesting to note that as late as 1871 Kryvyi Rih was not yet an industrial center and the Donets' industries were in general not well developed. Regardless of this, Iasnopol's'kyi foresaw the future growth of Donets' industries and predicted that because of this development the importance of Ukrainian economics would inevitably grow. He ended his work, which consisted of precise statistical calculations and an accurate description of the different branches of Ukrainian industry and, indeed, of the entire Ukrainian economy, with the following interesting statement:

When the industrialization of Southern Russia develops and together with it the agricultural development, when one of the main trading routes crosses Southern Russia (i.e., Ukraine—O.O.) and the trade in general begins to grow, when the population density in the southern steppes becomes appropriate to their natural wealth, then these economic successes will completely change the importance of Southern Russia with respect to other parts of our state (i.e., Russia—O.O.). The present superiority of Russia's north is due to a large extent to its economic superiority, but when the latter will be transferred south, its population under these changed conditions develops its natural potential, then Southern Russia (i.e., Ukraine—O.O.) will emerge from its present passive role and will acquire the position commensurate with the natural endowment of the country and its inhabitants.

The pragmatic economist in Iasnopol's'kyi foresaw the inevitable growth of the Ukrainian national economy under the influence of the factors already described in the Ukrainian economic process during the second half of the 19th century.

Characteristically, in Iasnopol's'kyi's later works, even when he stood apart from Ukrainian political circles, we can find the influence of those currents and ideas which had characterized his early work on Ukrainian economics. In his well-known work on the geographical distribution of the imperial budget, Iasnopol's'kyi analyzing the Empire's revenues and expenditures, ascertained the position of the Ukraine in the financial system of the Empire. His figures, the figures of an objective researcher, brilliantly revealed a system of colonial exploitation and national deprivation that the Russian government imposed on the Ukraine. This work complemented Iasnopol's'kyi's previous writings. Together with the research of other contemporary economists, these studies became the basis for further work on Ukrainian economics and were influential in the formation of appropriate programs by Ukrainian political forces.

The concept of Ukrainian economics, as territorial economics, could not have remained for long in its earlier form. The collision between the economic interests of the Ukraine and its contemporary political status (understanding of this is to a certain extent evident in Iasnopol's'kyi) helped to transform the concept of territorial economics into the concept of national economics. Therefore, it is not surprising that as early as the beginning of the 1880s the problem of Ukrainian economics appeared in a national context. For this we are indebted to Serhii Podolyns'kyi, a noted Ukrainian political leader in exile. A scholar of the Ukrainian national economy and also of its historical development, acquainted with the economic life of Western Europe at that time, he was the first to stress the manifold importance of Ukrainian capitalism. He did this at a time when the problem of the capitalistic stage in the development of Eastern Europe was considered controversial. Podolyns'kyi published his study *Remesla i fabryky na Ukraini* in Geneva in 1880. In it was presented for the first time a general survey of the development of Ukrainian artisan and factory industry. This work is interesting not only for its analysis of industrial capitalism in the Ukraine; its importance also lies in the fact that Podolyns'kyi saw the Ukraine as a separate economic entity in which the same economic processes had been taking place as in Western Europe.

At the end of the 19th century, the subject of Ukrainian economics arose on the basis of sharp economic conflict between Russian and Polish capital for the Ukrainian market. The struggle of Moscow and Łódź industrialists for the Ukrainian market left its imprint on Ukrainian economic thought. Moscow textile producers constantly shouted danger, foreseeing a great threat for themselves in the development of Polish industries. In the 1880s this voice was very loud. In this situation the problem of the Ukrainian market could not be avoided. The question had to be solved about the relationship between the Ukrainian market and Russian industry, between Moscow cotton textiles and Łódź cotton textiles. This naturally brought to light the entire problem of the Ukrainian economy. The conditions of social and political life of Ukrainians within the borders of the Russian Empire were such that this work could only be undertaken abroad, specifically in Galicia. An attempt to solve the problem was made by a well-known politician in Galicia, Iulian Bachyns'kyi,¹⁴ in his work *Ukraina irredenta* (first published in L'viv in 1895). Here Bachyns'kyi brought out the relationships among the Ukrainian, Polish, and Russian economies. Acknowledging that on the territory of the Russian Empire was taking place the process of capitalistic development ("economic Europeanization of Russia"), he saw as inevitable the "political Europeanization of Russia," which, among other matters, would mean inclusion of Russia into the circle of bourgeois-constitutional countries, growth and victory of national self-determination movements, and finally the collapse of the Russian Empire. It became, therefore, necessary to clarify the position of the Ukraine within the Russian Empire. Bachyns'kyi solved the problem by relying on the specific economic peculiarities of the three countries—the Ukraine, Russia, and Poland. He was the first to state clearly the problems of three well-defined economic centers located on the territory of the Russian Empire—Polish (Warsaw-Łódź), Great Russian (Moscow-Iaroslav), and Ukrainian (Karkiv). Bachyns'kyi wrote: "The economic distinctiveness of these territories depends, on the one hand, on the uneven, different level of economic development of individual regions and, on the other hand, on the fact that all three tried equally to develop the same branches of production." Bachyns'kyi argued that ". . . because of the lack of agreement among the interests of the individual economic territories of Russia, and without Russia functioning as one economic

¹⁴ Born in 1870. Arrested in the USSR in the 1930s; date of death unknown. Ukrainian political leader and writer.

unit, it is difficult to think that its political unity can survive." He continued: "Political independence of the Ukraine is a *conditio sine qua non* for its economic and cultural development, indeed the condition of its possibility to exist in general."

Basic achievements in the development of the problem of Ukrainian economics in the 19th century were, on the one hand, research by respected Ukrainian economists of that period which showed that the Ukraine constitutes a separate economic territory whose economic interests should not be overlooked, and, on the other hand, the activity of Ukrainian political groups at that time. The territorial problem of Ukrainian economics is interrelated with the national and social interests of the Ukrainian movement. The Ukrainian community of the 19th century recognized the conflict that existed between the economic interests of the Ukraine and its political position. Ukrainian political circles found a way out of this: national liberation for the Ukraine. The problem of Ukrainian economics was consolidated as a concept of national economics which could find its solution through revolution.

The first quarter of the 20th century is important in the development of Ukrainian economic thought. The concept of Ukrainian economics at this time emerged as an issue in scholarly and public discussion. The rapid pace of agricultural and industrial development, and the continuous inflow of foreign capital into the Ukrainian economy, resulting in increased foreign domination and exploitation, influenced the development of Ukrainian economic thought. Two facts must be emphasized: the spread of influence of foreign capital in the Ukraine, especially of Franco-Belgian capital, and the economic, political, and national exploitation that the Ukraine experienced under the Russian Empire. West-European capital had appeared in the Ukrainian economy, mainly in industry (first in Donets' industry) in the second half of the 19th century, but its influence was felt only at the end of the 19th century during the period of industrial growth in the 1890s. As early as the beginning of the 20th century, West European capital in the Ukrainian economy was active as financial capital, and on the eve of World War I this process in the Southern Ukraine was probably concluded. The Ukraine then became a certain battleground between Russian and foreign capital; the problem of Ukrainian economics therefore assumed international significance. But the participation of Russian capital in Ukrainian industry was undoubtedly smaller than that of West European capital. Yet the political influence

of Russia was obviously much greater. Russian rule in the Ukraine at the beginning of the 20th century amounted to open economic, political, national, and cultural repression. The conflict between the Ukraine's vigorous economic development and Russia's political and national discrimination against the Ukraine contributed to a resistance by the Ukrainian population that could not go unnoticed by Western Europe.

This mood spread widely among the Ukraine's population. Again, as had happened earlier during the first quarter of the 19th century, Ukrainian (territorial) economic circles (chiefly in the Southern Ukraine) raised in their numerous meetings and conferences (sometimes these were even conspiratorial) the fact that the economic and the national policy of Russia were in direct conflict with the interests of the Ukraine's economy. An idea was floated of creating an autonomous Black Sea republic with Odessa as its capital. This idea did not come from Ukrainian circles but from the cosmopolitan business community that had already established a firm base in Odessa. Similar ideas were expressed by Donets' industrialists.

At that time, interest in Ukrainian economics spread also to Ukrainian national circles which not only protested against the economic policy of Russia toward the Ukraine, but also expressed certain national and political demands, putting forth as an order of the day demands for autonomy and in certain cases for the complete independence of the Ukraine. The subject of Ukrainian economics was treated as a national problem in the political programs and polemical publications of Ukrainian political parties (both liberal and socialist), in the numerous publications of their leaders, and in scholarly works of Ukrainian economists. Considering the fact that the Ukraine is a separate economic region—a complex economic organism—Ukrainian politicians and scholars argued that the interests of the Ukrainian economy required a new, independent form of political life for the Ukraine. In his polemical writings, M. Hrushevs'kyi¹⁵ often discussed the subject of Ukrainian economics. In an article dealing with the Ukraine,¹⁶ he stressed not only the cultural and national conditions, but also the purely economic situation of Ukrainian life. Hrushevs'kyi believed that conditions were such that “. . . they demand independent economic policy for the Ukraine, considering that

¹⁵ 1866–1934, Ukrainian historian and political leader.

¹⁶ “Ukraintsy,” in A. I. Kastelianskii (ed.), *Formy natsional'nogo dvizheniia v sovremennykh gosudarstvakh* (St. Petersburg, 1910).

these conditions are fundamentally different from those of North-Eastern Russia." Later, several works were published on general and specific problems that existed at that time in the Ukrainian economy.

One of the leaders of the Ukrainian Social-Democrats, M. Porsh,¹⁷ studied specifically the development of the Ukrainian labor market ("Robitnytstvo Ukrainy" and other articles). Another economist, Stasiuk,¹⁸ in his article "Ekonomichni vidnosyny Ukrainy" collected a large volume of interesting material that could be used for explanation of the specific weight of the Ukrainian economy within the boundaries of the Russian Empire and its relations with the Polish economy. Several other works were written by Ukrainian economists (Matviiv, Hekhter, and others).¹⁹

This lively development of Ukrainian economic thought was quickly noticed by the Russians and caused a certain amount of discussion. A noted Russian economist P. Struve²⁰ in his articles (e.g. "Obshcherusskaia kul'tura i ukrainskii partikularizm") referred several times to the Ukrainian question, particularly to the Ukrainian economy. Struve was mainly interested in the relationship between Ukrainian economics and the political and cultural situation in the Ukraine. He wrote that ". . . capitalism talks and will talk not in Ukrainian but in Russian." This position clearly represented the ideology of Russian imperialist circles. On the other hand, in his scholarly works devoted to the history of the Russian national economy (e.g., "Krepostnoe khoziaistvo") Struve attempted to prove that there had always existed a bond between the economies of the Ukraine and Muscovy. The Ukrainians published several rebuttals of this view. An article by Hordienko (M. Porsch), "Kapitalizm i ruskaia kul'tura na Ukraine," contained systematic refutation of Struve's views. Hordienko argued that capitalism in the Ukraine in its further development would bring about the spread of the national movement in the Ukraine and would include a large part of the population in the movement. Hordienko wrote: "So long as Ukrainian peasants speak Ukrainian, till then capitalism in the Ukraine will not speak Russian, but Ukrainian."

The 19th and the beginning of the 20th century contributed much toward the creation and formulation of the concept of Ukrainian

¹⁷ 1879-1944.

¹⁸ M. M. Stasiuk, Ukrainian economist and political leader.

¹⁹ M. Hekhter, 1885-1947, Ukrainian economist.

²⁰ P. Struve, 1870-1944, Russian economist, historian, and philosopher.

economics; but this concept was discussed either within the framework of pragmatic economic activity in the Ukraine, in the works of Ukrainian economists, or, finally, in the programs of Ukrainian political parties. The subject of Ukrainian economics was of a practical nature, because it was tied to current economic or to current political life. Scientific research on this subject began only in the 1920s, in connection with the study of Ukrainian economics within its historical perspective.

Human Losses in the Ukraine in World War I and II

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Dzieci, nie pozwalajcie
starszym bawić się ogniem!

(Children, do not allow
adults to play with fire!)

—Stanislaw J. Lec: Unkempt Thoughts

INTRODUCTION

A critical reader of scholarly historical literature published in the last decade will have noticed an unusual revival of interest in questions relating to World War II and, surprisingly enough, to World War I as well. An enormous number of publications of various kinds on these subjects reached the book market in the late 1960s and early 1970s. The quality of these publications has been quite uneven; biographical material on more or less well-known political and military leaders has been prevalent, and many popular pictorial compendia have been issued by publishers, frequently in the form of periodical serials (in weeklies or monthlies). Analytical studies are not so numerous. The official multi-volume histories of World War II have not yet been finished either in the USA or in Great Britain; the publication of a much-advertised Soviet ten-volume history of World War II started only very recently.¹ Work on a German history of World War II is still in the stage of planning and preparation. What is still more striking is that extremely few serious studies exist that venture to give verified statistics concerning either World War I or World War II. General numerical data are given on the manpower involved in combat, or on the volume of military production and procurements of that time. Evaluations in monetary terms of damages caused by the war in various areas are also to be found. There are, however, no exact, differ-

¹ *Istoriia vtoroi mirovoi voiny* (v 10 tomakh) (Moscow, 1974). In 1974–76 the first 6 volumes were published. Disproportionately, about 70 percent of their content, is devoted to German-Soviet campaigns. The projected size of the series was recently enlarged to 12 volumes (see *Vestnik AN SSSR*, 1976, no. 6, pp. 3–11). An English edition is also planned.

entiated official data published to date on human losses, particularly those of World War II.

The author of the present paper has set himself the task of investigating the possibilities for estimating (from the point of view of population dynamics) one integral part of these human war losses; namely, the losses of Ukrainian population. Since the data of official Soviet statistics (as included, for example, in the annual handbooks, *Narodnoe khoziaistvo SSSR* or *Narodne hospodarstvo Ukrains'koi RSR*) are too sparse to serve as a basis for analysis, this author will discuss other relevant Soviet and Western publications in which scattered, yet valuable information on the subject can be found. An effort will be made to compare this information critically and to assess the credibility of the data.

The demographic situation in the Ukraine was little studied in the past. In fact, it is difficult to trace any such studies very far back. All that is available prior to the 1920s are a few population censuses, which in the early days were conducted by occupying governments with a single purpose in mind, that of imposing taxation on the population. There are sources which support a statement that the first census on Ukrainian territory was conducted by the Tartars during their invasion in the 11th and 12th centuries. There are only a few, rather scattered data available on the situation in ensuing centuries. The first more or less complete and reliable data are to be found in the so-called revision censuses (*revizii*), of which ten altogether were conducted between 1719 and 1857 by the Tsarist regime; they covered, however, only those regions of the Ukraine that had been annexed to Moscow by conquest and by the treaties of that period.² The first truly scientifically conducted census in the Ukraine (and in the whole Russian Empire), took place in 1897; this was the only complete population census in the prerevolutionary period. The western parts of the Ukraine, which belonged to the Austro-Hungarian Empire up to 1918, were covered by the Austro-Hungarian 1900 census. Thus, only on the eve of the 20th century do we have a total picture of the

² The process of intensified annexation started after the battle of Poltava, bringing the step-by-step annihilation of the independent Ukrainian administration known as the "het'manat." It culminated at the end of the 18th century with the additional occupation of the Dnieper right-bank Ukraine, which fell prey to Moscow after Poland's collapse. It can be assumed that the fifth to tenth revision censuses in 1795-1857 cover a great part of the central and eastern Ukrainian lands of that time. The western parts of the Ukrainian national territory were made an autonomous province of Austro-Hungary (Galicia and Lodomery, Bukovyna).

demographic situation in the Ukrainian territory. Soviet censuses were taken in 1920 (a preliminary census), and in 1926, 1937 (interrupted and canceled), 1939, 1959, and 1970; the results of the main censuses were published in multi-volumed compendia.

Significant scientific study of demographic problems in the Ukraine may be said to have begun on January 1, 1919, when the Demographic Institute of the Ukrainian Academy of Sciences was established in Kiev,³ constituting one of the first scientific institutions of this kind in the world. The men who founded the Institute were Mykhailo Ptukha, Iurii Korchak-Chepurkivs'kyi, Petro Pustokhid, and Mykhailo Tratsevs'kyi. The studies conducted there in the subsequent twenty years resulted in fourteen large volumes of proceedings and numerous special publications; they represent major contributions to demographical research, not only with regard to the Ukraine, but with regard to world scholarship in general.⁴ The projects of the Institute were directed and coordinated by scientists of international reputation such as M. Ptukha (1884–1961), mentioned above, who became an Academician in the 1920s, Iu. Korchak-Chepurkivs'kyi (1896–1967), and S. Tomilin (1887–1952). The results of the Ukrainian Institute's work no doubt would have become still more significant had it not been for the tragic event of the Soviet purges in 1936–38, to which almost all of the staff members of the Demographic Institute of the Ukrainian Academy of Sciences fell victim. Scientists such as Ptukha, Korchak-Chepurkivs'kyi, S. Ostapenko, A. Khomenko, P. Pustokhid, V. Piskunov, P. Golovin, M. Tratsevs'kyi, and many others, were banned from Kiev. Some were "evacuated" to Moscow, some to Central Asia, and all were lucky in

³ Andrii Lepkan', "Nevtomnyi spodyvzhnyk nauky," *Visti z Ukrainy*, September 27, 1970. It is interesting to note that demographic studies in Russia proper, if the very minor activity of the chair of demography at Leningrad University is disregarded, practically did not exist in the 1920s and 1930s. In that era, the USSR was represented at all the international conferences in this field by Ukrainian scientists. It may be entirely accidental, but it is still striking that the most prominent "Russian" demographers of today are actually not Russians at all: Uralnis (Boris Tsezarovich) is a Latvian; Kabuzan (Vladimir Maksimovich) is a Moldavian; S. I. Bruk is of Dutch origin; Iu. V. Bromley is obviously of English parentage; P. I. Kushner, Bednyi (Moisei Semenovich) and Boiarskii (Aaron Iakovlevych) are Jewish scientists.

⁴ We cannot help but admire the skills and scientific vision of Ukrainian demographers such as V. P. Peulenko and A. Tkachenko, who as early as the 1920s were publishing pioneering studies on the impact of carcinogenic agents in the atmosphere on the health of the population, or on stress as a psychological-demographic factor in modern industrial society.

that they survived the deportation.⁵ All discontinued their research on Ukrainian population problems, and switched over to Russian or Asian themes. Thus, after the official closing of the Demographic Institute in June 1938, Academician Ptukha, evidently acting on a hint from Moscow, wrote in 1939–52 his well-known *Ocherki po istorii statistiki XVII–XVIII vekov* (Moscow, 1945) and *Ocherki po istorii statistiki v SSSR*, Vol. 1 and 2 (Moscow, 1955 and 1959). Korchak-Chepurkivs'kyi was deported initially to the Samarkand district in Uzbekistan and later to the notorious Evenki region in Siberia. Tomilin was instructed to restrict his research to purely medical problems (in the Institute of Epidemiology and Microbiology in Kiev).

The "black years" of 1938–55 brought a complete standstill in Ukrainian demographic studies. Only in the late 1950s do we witness some revival of demographic research in the Ukraine: a Department of Demographic Statistics was established at the Institute of Economics of the Ukrainian Academy of Sciences. Scientists who survived the terror and persecutions of the late 1930s and 1940s revived the program of demographic research, on a much smaller scale, however, than in 1919–34. Certain periodicals started to reappear: e.g., *Demografichni doslidzhennia* (1970, no. 1, 1971, no. 2, 1975, no. 3 in Ukrainian) or *Demograficheskie tetradi* (also three issues, in Russian). Of definitely beneficial and reassuring effect has been the republication in the 1970s of classical studies by Ukrainian demographers. Selected papers by Ptukha were published in 1971,⁶ as were those by Korchak-Chepurkivs'kyi⁷ and S. A. Tomilin.⁸ In the late 1960s and

⁵ As early as 1934, the Institute was limited to the study of sanitary statistics. Ptukha himself was relieved of his duties as director of the Institute on February 21, 1938. See his preface to the volume, M. V. Ptukha, *Ocherki po statistike naseleniia* (Moscow, 1960).

⁶ M. Ptukha, *Vybrani pratsi*, serii Vydadni vcheni Ukrain's'koi RSR (Kiev, 1971). It is to be noted, however, that, regretfully, the papers in this collection do not include the most important studies by Ptukha; those are rather to be found in the volume published in 1960 in Moscow, entitled *Ocherki po statistike naseleniia*. We have in mind here the paper, "Narodonaselenie Ukrain'skoi SSR do 1960 goda," in which a prognosis of population growth was given for the period of the Second Five Year Plan up to 1938. The famine of 1933 and the terror of 1934–38 took an extremely heavy toll in the Ukraine and we can check the real state of affairs in 1938 (or in 1939, the year of the all-union census) against Ptukha's prognosis. Not included in the Ukrainian collection is Ptukha's paper, "Smertnist'v Rosii i na Ukraini"; only the introduction is reprinted. However, the Russian collection includes a translation of the whole paper (pp. 173–452).

⁷ Iu. Korchak-Chepurkivs'kyi, *Izbrannye demograficheskie issledovannia* (in Russian translation), (Moscow, 1970). Also his famous paper, "Vidtvorennia naseleniia Ukrain's'koi RSR do pochatku pershoi p'iatyrichky," written in May 1934, was published for the first time 41 years later in *Demografichni doslidzhennia*, 1975, no. 3, pp. 78–114.

⁸ S. Tomilin, *Demografiia i sotsial'naia gigiena* (Moscow, 1973).

early 1970s, we also find some papers on demographic problems of the Ukraine published in periodicals and collections of affiliated areas of scientific discipline such as *Ekonomichna heohrafiia* (semiannual), *Ukrains'kyi istoryko-heohrafichnyi zbirnyk* (1970, no. 1, 1971, no. 2) and several others.

The tempo of Ukrainian demographic studies most unfortunately has slowed down in the years since the 1972 purge in Kiev. The work of scientists gets diverted more and more from Ukrainian problems and directed mainly towards all-union issues, such as manpower problems, only exceptionally towards historical demographic themes. Still, in this field some interesting publications have recently been issued.⁹ Another very disturbing feature of present-day studies in Kiev is that they refer exclusively to total, nationally mixed populations of certain selected areas of the Ukrainian territory. Studies of Ukrainians as a nation are extremely rare (typical in the existing political situation in the USSR); these are published not in Kiev but in Moscow.¹⁰ Moreover, the predominant majority of studies are issued in the Russian language. In Kiev, demographic research is conducted almost exclusively in the Institute of Economics of the Ukrainian Academy of Sciences, with only occasional papers published by scholars working with the Research Institute of the Ukrainian State Planning Commission or Kharkiv University (M. V. Kurman), while research in Moscow is conducted by a great many institutions, including the Central Economic-Mathematical Institute of the Academy of Sciences of the USSR (the demographic laboratory), the Research Institute of the Central Statistical Office of the USSR, the Institute of Economics of the Academy of Sciences of the USSR (B. Ts. Uralnis heads the research), the Institute of Ethnography of the same Academy (V. V. Pokshishevskii, V. I. Kozlov), the Institute of the International Workers' Movement (V. I. Perevedentsev), and, directly, the all-union Ministry of High and Special Education (seksiia narodonaseleniia—D. I. Valentei).

The general result of the developments described above is that work in the area of demographic research over the last two decades in the Ukraine (1955–75) has been far from comprehensive or exhaus-

⁹ M. I. Dolishnii, *Trudovi resursy promyslovosti, na prykladi zakhidnykh oblastei Ukrain-s'koi RSR* (Kiev, 1975); *Demograficheskoe razvitiie v Ukrainskoi SSR* (Kiev, 1977); V. P. Kopchak and S. I. Kopchak, *Naselenie Zakarpattia za 100 let (1869–1970)* (L'viv, 1977); E. A. Iankovskaia, *Organizatsiia pereraspredeleniia trudovykh resursov* (Kiev, 1977).

¹⁰ L. V. Chuiko, *Braki i razvody, demograficheskoe issledovanie na primere Ukrainskoi SSR* (Moscow, 1975).

tive. This research, in fact, is evidently severely circumscribed and limited to rather few permissible, or, one might say, tolerated demographic subjects. Yet the science of demography itself would urge that demographic problems can be treated in many ways and can encompass numerous questions.¹¹ Thus studies may be conducted in historical demography, geographic demography, in mathematical models of population changes, in demographic forecasting, in social demography. Meanwhile, present-day Ukrainian research has concentrated heavily on classical demographic statistics. Studies on reproduction of population and on migratory processes are the most frequent and the best presented. In this area, there has been some excellent work by present-day Ukrainian demographers, such as V. S. Steshenko, V. P. Piskunov, V. I. Tovkun, A. F. Zahrobs'ka, H. M. Marchenko, O. I. Bereziuk, A. N. Klok, among others. Even here, however, many gaps are evident. Thus it is in the context of a general scarcity of scholarly studies that the present author has undertaken to review and analyze the available information on Ukrainian human war losses, specifically, the losses suffered in World Wars I and II.

WORLD WAR I LOSSES

The losses of Ukrainian population resulting from World War I and World War II have, thus far, never been systematically studied and evaluated. Admittedly, in the short period of comparative freedom of research (1919–31), some very interesting studies on problems related to World War I losses in the Ukraine were published in Kiev.¹² Of main interest are the studies conducted in 1925–28 on the reproductivity of Ukrainian women as well as on the death rates of small children. These studies add considerably to our understanding of the

¹¹ Even standard Soviet textbooks emphasize the variety of research. See, for example, A. Ia. Boyarskii and A. P. Shuskerin, *Demograficheskaia statistika* (Moscow, 1955). Quite a good selection of topics is given, also, in a collective volume published by the Ukrainian Academy of Sciences under the title: *Vliianie sotsial'no-ekonomicheskikh faktorov na demograficheskie protsessy* (Kiev, 1972) in which the impact of difficult living conditions in the USSR (apartment shortages) and the negative aspects of urbanization are discussed in detail, as well as such demographic phenomena as divorces, excessive employment of married women (with children), the ever-increasing number of aged people, and the erosion of the economic efficiency of the population as manpower by the above-mentioned phenomena.

¹² We will not try here to cite all the works by M. Ptukha, S. Tomilin, Iu. Korchak-Chepurkivs'kyi, A. P. Khomenko, A. Hirshfel'd, and S. Ostapenko, but we would strongly recommend that those who would like to analyze the growth of the Ukrainian population in the 20th century familiarize themselves with these studies.

impact of the war losses of 1914–20 on subsequent population dynamics. The losses of 1939–45 have yet to be discussed in a scientific manner in the USSR. No reliable or sound pertinent statistical data have been published, either in the Ukraine or in the USSR.

War losses, of course, properly include not merely army losses in action or the total number of servicemen who died of wounds, but also losses of military personnel who perished in prisoner-of-war camps and soldiers who died of various diseases and deprivations caused by war. In addition, we can count as war losses all those of the civilian population who died or were killed as a result of direct war activities, such as the bombing of cities and reprisals, also those who were victims of hunger, malnutrition, and outbreaks of epidemics conditioned by war shortages. Finally, there are the losses in the future of the country's population due to the decline of the natural reproduction potential of the population.¹³

The real magnitude of war losses in the Ukraine in 1914–18, as already mentioned, has not been satisfactorily analyzed. The published data are few in number, uncoordinated, and scattered about in varied, frequently unrelated and obscure periodicals or serial publications. The well-known Soviet demographer, Boris Ts. Urlanis, in his study on the subject, deals with the war losses of all the major European powers, but he treats the losses of Russia (or the Soviet Union) rather briefly, with the excuse that most reports on the subject are controversial and unreliable.¹⁴ Urlanis does not even attempt directly to investigate the World War I losses of the Ukraine.

One possible approach is to deduce roughly the Ukrainian losses on the basis of the losses of the former Russian Empire as a whole, with an estimate of the share of Ukrainian losses. According to the 1897

¹³ One unresolved issue is whether emigration in the period following directly after the war and resulting from damages to industry and agriculture caused by the war should be included in the total war population losses of a particular country. Here we should mention that France alone received in the period 1919–32 600,000 people from Poland, 70,000 from Czechoslovakia, and 80,000 from Yugoslavia, Rumania, and Bulgaria. It has been estimated that nearly half of the emigrants from Poland and about 30 percent of those from Czechoslovakia were actually Ukrainians who suffered from particularly adverse economic conditions in these countries.

¹⁴ Urlanis. *Voiny i narodonaselenie Evropy* (Moscow, 1960), p. 141. Urlanis' book concentrates on military losses (the subtitle of his book reads: *Liudskie poteri voo-ruzhennykh sil Evropeiskikh stran v voynakh XVII–XX vv.*) and the sources he cites deal with military losses exclusively. On the USSR losses in World War II, Urlanis has almost no discussion. Exactly two pages (pp. 224–25) of his total of 565 pages are devoted to this subject, with no figures given. Obviously, at the time the book was printed (1960) scholars were still not permitted to disclose any figures.

census, the population of the former Russian Tsarist Empire was 124,600,000, and the Ukrainian population within the borders of the empire was 22,381,000. These data allow us to estimate the Ukrainian share.¹⁵ Most unfortunately, however, estimates of the total losses of the Russian Empire in 1914–18 vary considerably, ranging from as low as 908,000 killed in action,¹⁶ to 1,700,000,¹⁷ 2,500,000,¹⁸ or even 4,010,200 dead.¹⁹ Offering some not very persuasive criticism of these figures (and their sources), Urlanis accepts a figure of 1,200,000 killed in action (so called “direct army personnel” losses); it still remains unclear to what extent this figure covers those who died of wounds and those missing in action. Examining Western sources, we come to the conclusion that Urlanis’ cautious figure is probably too low. We are inclined to assume that the authors who studied the problem during or shortly after the end of World War I had access to more complete information than those who worked later from disrupted archives after the revolution (some military records were taken abroad by high-ranking Tsarist émigré officers). A figure of 1,700,000 casualties, cited in several Western and Soviet sources, seems to be closer to the actual number. To this figure should be added the numbers of soldiers who died from epidemics, diseases, and accidents. Thus the total estimate for military losses will amount to approximately 2,500,000 people. Since the Ukrainian population within the borders of the former Russian Empire represented about 18 percent of its total population, Ukrainian losses in the armed services may be some 450,000, as shown in Table 1 (item 2).

¹⁵ E. Z. Volkov, *Dinamika narodonaseleniia za vosemdesiat let* (Moscow, 1930). Volkov’s estimate of the population of the USSR territory (pre-1939 borders) in 1914 is 140,405,000 people. Thus the share of the Ukrainian population was 19.3 percent in 1914. Soviet statistical handbooks estimate the population of the USSR territory in 1913 as having been 159,000,000. This figure, however, applies to the territory of the USSR in post-World-War-II borders. In view of these differences, we prefer to base our estimates on the safer 1897 census figures. It is debatable whether it is truly correct to assume the military losses of a part of the country to be proportional to the share of the population of this part in the total population. There are statements to be found to the effect that the Ukrainian territories were actually affected worse by war actions in both World War I and World War II than were the other parts of the Russian Empire and the Austro-Hungarian Empire. This assumption may immensely complicate any type of loss estimates. We are of the opinion that the theory of equal burden of all the strata of the population in the involved country stands well with the critics and simplifies calculations.

¹⁶ Urlanis, *op. cit.*, p. 146.

¹⁷ Volkov, *op. cit.*, p. 52.

¹⁸ C. Döring: *Die Bevölkerungsbewegung im Weltkrieg*, Teil III (Copenhagen, 1921), p. 4.

¹⁹ E. L. Bogart, *Direct and Indirect Cost of the Great World War* (New York, 1920), p. 292.

Table 1
Estimates of Direct World War I Population Losses
in the Ukraine

1.	Losses within the former Russian Empire:	
	a. Ukrainian village losses	285,000
	b. Ukrainian town losses	137,500
	Total	422,500
2.	Alternate estimate derived as a share of all military losses of the former Russian Empire	
	Total	450,000
3.	Losses of Ukrainian population outside the former Russian Empire	
	a. Losses of Western Ukrainian lands (within Austro-Hungary)	80,000
	b. Losses of the Ukrainian Galician Army (in the war for independence, 1917–20)	40,000
	TOTAL	570,000

Sources and Notes:

1. a. *Materialy o sotsial'no-gigienicheskom sostoianii Ukrainskoi derevni* (Kharkiv, 1924), p. 35.
- b. Estimated at 2.5 percent of total urban population by Z. H. Frenkel', *Griadushchoe proiavlennie demograficheskikh posledstviï voïny 1914–1918* (Moscow, 1924), pp. 79–82.
2. Derived by applying the Ukrainian share (about 18 percent) in the total population of the Russian Empire to the empire's total direct military losses, estimated at 2.5 million people.
3. a. Derived by applying the estimated share of the Ukrainian population (7.2 percent) in the total population of Austro-Hungary to the total military losses of Austro-Hungary estimated at 1.1 million people.
- b. A rough estimate from Ukrainian Galician Army data given by O. Dumin, *Entsyklopediia Ukrainoznavstva*, vol. 3 (Munich–New York, 1949), p. 1183.

Further data for estimating World War I losses are offered by a count of military losses in the Ukraine conducted by Ukrainian demographers in 1923. Actually, this study covered losses in the Ukrainian villages, the population of which was 21.7 million in 1913 and 21.9 million in 1923. (In both years the villages represented 81 per-

cent of the total population of the Ukraine.)²⁰ In the autumn of 1923, 263,564 men were interviewed in various, randomly selected Ukrainian villages and the results of this research indicated that those killed in the army or missing (having not returned home) represented 1.30 percent of the total village population, which means about 285,000 men.²¹ When we add to this figure the military losses from Ukrainian towns (total population 5.5 million in 1913), which were heavier than those of the villages, we arrive very close to our rough estimate above (about 450,000). These estimates are presented and documented in Table 1 under item 1.

To these losses of Ukrainians within the Russian Empire must also be added losses of Ukrainians who served in the ranks of the Austro-Hungarian army. The total military losses of the Austro-Hungarian monarchy in World War I have been estimated at 1.1 million people.²² According to V. I. Naulko,²³ there were 3,385,200 Ukrainians in Austro-Hungary in 1900–10. This figure may be too low, however. Other sources report 3,208,092 Ukrainians living in Galicia alone at the beginning of World War I,²⁴ while the number of Ukrainians in Bukovyna and Transcarpathia was close to 600,000. These figures represent some 7.2 percent of the total population of Austro-Hungary at that time. Accordingly, Ukrainian losses of enlisted men may be estimated around 80,000. In addition, a large Ukrainian Galician Army consisting of close to 90,000 men, took part in fierce fighting for Ukrainian independence in 1918–20. Its losses were heavy and have been estimated at about 40,000, including victims of typhus epidemics in 1920.²⁵ The estimates are presented in Table 1, item 3.

As noted, the figures above represent direct military losses. Thus the estimates summarized in Table 1 do not adequately reflect war losses in the full meaning of the term. Under war losses are meant total losses suffered by the country as a result of war. There is only one way to estimate this in full magnitude: this is to project the popu-

²⁰ *Narodne hospodarstvo Ukrain's'koi RSR 1973* (Kiev, 1974), p. 4.

²¹ *Materialy o sotsial'no-gigienicheskoi sostoianii ukrain's'koi derevni* (Kharkiv, 1924), p. 35.

²² L. Grebler and W. Winkler, *The Cost of World War I to Germany and Austro-Hungary* (New Haven, 1940), p. 48.

²³ V. I. Naulko, *Etnichnyi sklad naselennia Ukrain's'koi RSR* (Kiev, 1965), p. 40.

²⁴ A. Von Guttry, *Galizien, Land und Leute* (Leipzig: G. Muller Verlag), p. 55.

²⁵ According to O. Dumin in *Entsyklopediia Ukrainoznavstva*, vol. 3 (Munich-New York 1949), p. 1183, the number of enlisted men was 75,000 in the winter of 1918, and only 18,000 in March 1920. A part of the army survived, however, in POW camps and as demobilized civilians in the Soviet Ukraine.

lation of a given territory (or nation) from the situation before the war either to the date (year) after the war ended, or, better still, to a date five to ten years after the war and then to compare these projected figures with actual results of censuses on those dates. This is the method used by such prominent demographers as F. Lorimer, F. W. Notstein, E. Z. Volkov, V. K. Voblyi, P. I. Pustokhid, E. Kulisher, J. H. Simpson, and others. The best summary of estimates regarding World War I is given in Lorimer's well-known study.²⁶ It is shown that purely military losses actually represented only a small fraction of the total population loss caused by the war.

A detailed analysis of the changes of population in the USSR (or the corresponding territory of the former Russian Empire) between 1914 and 1926 implies a figure of about 28 million people lost in that span of time. Thus the army losses as estimated by Uralnis, even his higher estimates, represent only 9 percent of the total losses. The war took its largest toll among the ranks of the civilian population (about 14 million dead). Another large portion of loss is attributable to a birth deficit caused by the failure of the population to reproduce normally (about 10 million). Finally, the loss of people who left the country has to be included. Political mass emigration amounted to some two million. With respect to civilian population losses, severe famine in 1921-23 and numerous epidemics played an important role. Typhus, typhoid, dysentery, and cholera epidemics alone took a toll of 3,327,000 lives during 1914-23. In 1919-22, there was one of the worst outbreaks of typhus in the Ukraine. The number of cases per 10,000 population rose sharply from about 20 in the beginning of 1919 to 120 in December of 1919, and close to an unbelievable 200 in January of 1922.²⁷ The typhus epidemic in the southern Russian regions had a slightly milder course: 105 cases in February 1919, and 160 at the peak in November 1921. In 1924, the epidemics finally abated; in January 1924, only 4 cases per 10,000 population were

²⁶ F. Lorimer, *The Population of the Soviet Union, History and Prospects* (Geneva: League of Nations, 1946), pp. 29-43.

²⁷ All figures here are from Ivan Herasymovych, *Holod na Ukraïni* (Berlin, 1922). In 1975, another interesting booklet on this famine was published, Iu. A. Poliakov, *1921—pobeda nad golodom* (Moscow, 1975). This work states that the number of people suffering from the famine in 1921-22 reached 23,434,000 in the RSFSR, and 8,280,000 in the Ukraine. It remains a mystery as to why, after half a century, the Soviet government finds it necessary to publish still another book on the horrors of famine. There were many books and papers published on this subject years ago. Does this mean that Moscow wants to "remind" the people of the USSR that the situation after the 1975 crop failure is far from as bad as the situation in 1921?

registered on the average. These epidemics, without doubt the result of war conditions and shortages, took an enormously high toll of the Ukrainian population, and this toll obviously has to be added to the total population losses of World War I.

In addition to typhus epidemics, there was a sharp increase recorded in the incidence of other diseases caused by the miseries of war, notably diphtheria (in the Kherson area) and malaria largely in the North Caucasus and adjoining areas. Of malaria there were 190 cases registered per 10,000 population in the middle of 1922, and 140 in October 1923. In 1925–27, the figure dropped to 45. The risk of contracting malaria in those regions remained high even in the late 1930s. Contagious diseases continued into the late 1920s in the Ukraine, even in urban areas. Deaths caused by them in 1925 represented a full 14 percent of the total deaths, as compared with 4.7 percent in Germany or only 2.2 percent in France. The share in the RSFSR was also lower, 10.5 percent.

To determine the total losses of the Ukrainian population, we must follow the same procedure as applied to estimate direct military losses. Thus we take for the Ukraine the share that was represented by its population in the total population of the USSR. In this way we obtain a loss of 5,400,000 people for the Ukraine in the 1914–26 period. We would like to repeat here that this figure represents the absolute total loss of human life due to the war and all its results. This loss is valid for those Ukrainian territories which were incorporated in the USSR. The losses in the western Ukrainian regions were considerably lower than in the lands belonging to the Russian Empire. Although there was an evident worsening in the food supply situation in the western regions in the 1914–22 period, as well as an increase in the incidence of some diseases, there was no actual famine there, and none of the extreme losses caused by epidemics were registered. The losses of civilian population there may have reached, according to conservative estimates, the neighborhood of a few hundred thousand. Taking this fact into account we can make an approximation that the total World War I population losses of the Ukraine amount to some six million people.

WORLD WAR II LOSSES

The task of estimating the losses associated with World War II is much more difficult. While the Tsarist authorities and the Soviet

scholars of the 1920s tried honestly to collect all the available data on World War I losses and to evaluate their impact, the World War II losses of the USSR have never been discussed at length and in detail in any postwar Soviet publication. Indeed, the data remain to this day suppressed and inaccessible to both external and internal research. It is strange to realize that while the material losses of the USSR have been calculated in monetary terms with incredible (and, we would add, absurd) exactitude and these super-exact figures (in physical as well as monetary terms) have been published on numerous occasions and in many Soviet sources (starting as early as the Nuremberg trial papers), human losses have been treated only in very vague terms; exact figures never being cited.

Here and there in the non-scientific literature there have emerged some rare general indications and hints of the magnitude of Soviet losses and sufferings. These, however, lack documentary character. Only during the Khrushchev era, more precisely in its early days of liberalization, did a few Soviet statements venture to indicate the approximate scope of the direct losses of the USSR in World War II. On a few occasions, the figure of about 20 million dead for the USSR as a whole was mentioned. This figure has also reappeared in some of the most recent publications.²⁸ The human losses of the Ukraine, however, or of any individual Soviet republic, remained conjectural.

It was not until 1969 that more detailed figures were given for the first time in the comprehensive three-volume history of the war.²⁹ It might especially be noted that Marshals A. A. Grechko and I. G. Iakubovskii were members of the editorial board of this series. In the third volume of this work we find a brief section (pp. 148–57) dealing with losses in the Ukraine, including human losses. According to a table on page 150, from which some data are shown in our Table 2, item 1, there were 3,898,457 killed in the ranks of the civilian population, 1,366,588 perished in military service and prisoner-of-war camps, and about 2,244,000 were taken as forced labor to Germany. We are skeptical, however, as to the precision of these figures. The authors of the report start, in fact, with figures for all the Ukrainian oblasts (districts) separately, and then they tally them up. Some of the oblast figures obviously represent very rough estimates (Kirovohrad,

²⁸ See the *Great Patriotic War* (Moscow, 1975), p. 50.

²⁹ *Ukrains'ka RSR u velykii vitchyznians'kii viini Radians'koho Soiuzu 1941–1945 rr.* (Kiev, 1967–69).

Table 2
 Estimates of Direct World War II Population Losses
 in the Ukraine

Source	Estimate
1. <i>Ukrains'ka RSR v velykii vitchyz'nianii viini</i> , vol. 3 (Kiev, 1969), p. 150.	
Civilian population losses	3,898,457
Military personnel killed or died as POW	1,366,588
Losses of Zakarpattia and Crimea	250,059
Total	5,515,204
2. a. Iu. V. Arutiunian, <i>Sovetskoe krest'ianstvo v gody velikoi otechestvennoi voiny</i> (Moscow, 1963), pp. 390, 392.	
Losses in Ukrainian villages (working population)	2,500,000
b. Akademiia Meditsinskykh Nauk Ukrainskoi SSR, <i>Otchet komissii po obsledovaniiu poter i sanitarnykh posledstviiv voiny</i> (Kiev, 1946), pp. 18, 19.	
Losses in Ukrainian towns	3,500,000
Total	6,000,000
3. V. V. Shcherbyts'kyi, <i>Radians'ka Ukraina</i> , October 18, 1974.	
Total	6,750,000
4. M. M. Palamarchuk, <i>Ekonomichna heohrafiia Ukrains'koi RSR</i> (Kiev, 1975), p. 80.	
Total "more than"	5,000,000

Donets'k, Volyn'), but the data for others are suspiciously (implausibly, from the point of view of statistics) exact. For example, the number of people killed in Vinnytsia Oblast is given as 204,781, in

Chernivtsi as 127,778, etc. Therefore, the precision of the totals is spurious; they are the result of a statistically unacceptable mixture of rough estimates and red-tape counts, most probably undertaken by local authorities (or groups of amateurs) in 1945–46.³⁰

That these figures were far from exact or verified is suggested by more recent Soviet compilations. In 1975, a book dealing with the war in the southwestern Ukraine was published. In it are found data on war losses for the three Ukrainian oblasts L'viv, Stanislav, and Ternopil'.³¹ These data differ considerably from the data given in the 1969 work with which they are compared in Table 3.

Table 3

Population Losses during World War II in the Western Ukraine

	1.	2.
L'viv Oblast		
Civilian population losses	679,804	508,867
Enlisted men and POW losses	182,104	251,053
Deported to Germany*	170,370	255,000
Ternopil' Oblast		
Civilian population losses	256,040	ca 200,000
Deported to Germany*	164,046**	119,046**
Stanislav (now Ivano-Frankivs'k) Oblast		
Civilian population losses	239,920**	223,920**

Notes:

* See Note 35.

** Similarities in the last three digits in these figures lead us to suspect either misprints or miscalculations, or possibly the admixture of round figure estimates or adjustments with purportedly precise counts.

Sources:

Column 1: *Ukrains'ka RSR u velykii vitchyzniani vinni Radians'koho Soiuzu 1941–1945 rr.*, vol. III, (Kiev, 1967–69), p. 150.

Column 2: *God 1941—Iugo-zapadnoi front* (L'viv, 1975), p. 319.

³⁰ We have also emphasized the existence of the large discrepancies in these Soviet statistics because some Ukrainian scholars hastened to accept the data from this history as final, and have used them in their papers, without question.

³¹ *God 1941—Iugo-zapadnoi front* (L'viv, 1975), p. 319.

The differences are large and puzzling. We have no basis on which to judge which figures are closer to the truth; rather, we are inclined to distrust both. Oddly enough, both sources have top-ranking military men among their editors (*God 1941—Iugo-Zapadnoi front* (L'viv, 1975) has Gen. Major I. S. Mel'nikov, Gen. Major G. L. Rybalko, among others). These military men may have functioned, however, largely as “decoration” on the editorial boards (which consist mainly of Party officials) and we cannot hold them responsible for the striking statistical inconsistencies.

One further aspect of Ukrainian World War II losses, for various reasons, remains unclarified and sometimes even mysterious. We have in mind here the fighting in the Ukraine by partisan units and resistance forces. After World War I, a similar situation existed in the Ukraine in 1921–24 when several forces, including some large units, of anti-Soviet elements were engaged over a prolonged period of time in minor battles with the Red Army and militia units. It is regrettable indeed that, although hundreds of volumes were published by both sides, there is not a single serious, well-documented study available on the actual size of the forces involved and there are absolutely no reliable data on the human losses of these forces. The most prominent Soviet Ukrainian historians, specialists on the 1917–22 period, managed to produce exhaustive studies of the post-World War I civil war in the Ukraine without any statistical data.³²

The situation on the analogous fighting during World War II is even more complicated in this respect. Whereas we can assume that losses of the Soviet partisan movement in the Ukraine are included either in the losses of civilian population or in those losses which Soviet historians list under the code of “POW-murdered,” little is known about the losses of the Ukrainian underground armed forces that opposed the advance of the Red Army front. Large units of the so-called Ukrainian Insurgent Army (UPA) fought battles with Soviet

³² See A. V. Lykholat, *Rozhrom natsionalistychnoi kontrrevoliutsii na Ukraini* (Kiev, 1955); I. K. Rybalka, *Rozhrom Dyrektorii na Ukraini* (Kharkiv, 1962); M. Suprunenko, *Ukraina v period inozemnoi interventsii* (Kiev, 1951). The insurgent units they speak of are mainly those led by Struk, Shepel', Zabolotnyi, Hal'chevs'kyi, Orlenko, Khmara, Lykho, and others. It is important to know that the first Soviet (Bolshevik) armed units are regarded even by official Soviet historians as partisan units (*chastyny z partyzans'kykh i povstanchykh zahoniv*). The size of the Soviet Ukrainian army as late as December 7, 1918, was only 17,700 people (see I. Dubyns'kyi and H. Shevchuk, *Chervone kozatstvo* (Kiev, 1961), p. 150).

units, particularly in the Volyn' and Polissia regions in the 1943–45 period. Some UPA units were active even as late as 1946–50 in Carpathian and sub-Carpathian forest areas. The losses of these units were usually very high because little mercy was offered by Soviet authorities, and members of the UPA frequently preferred death in battle to a firing squad or long-term imprisonment in Siberian forced labor camps.

The losses of the regular Ukrainian army units that constituted a part of the German army (the so-called Divisions No. 1 and No. 2, which were transformed in the final period of World War II into Ukrainian National Army [UNA]) were also high, since the bulk of the first division was encircled by Soviet armies in the Brody-Kniazhe kettle in 1944, and was destroyed or taken prisoner. Once again, we must fall back on the assumption that such losses have somehow been counted in the official statistics for the Ukraine as part of "civilian population losses." Estimates offered in some émigré publications usually lack any statistical or scientific basis and thus cannot easily be accepted.³³

Be that as it may, the number of people who perished in the Ukraine in 1941–45 amounted, according to our 1969 source, to 5,515,204 (see Table 2, item 1), or in close approximation to five and a

³³ There is an example of such irresponsible statements in a magazine *Nash holos* (Trenton), April 1976, p. 10. An unsigned note states that UPA losses, including the cases of long-term detention, ran close to one million people "plus two million hypothetical children that might have been parented otherwise." The best-known and most recent record of the mutual atrocities of UPA-Soviet unit battles, with some documented random statistics of human losses included, is given in *Pogranichnye voiska SSSR, 1945–1950; Sbornik dokumentov i materialov* (Moscow, 1975). What this compilation of documents (military records) reveals, unintentionally and accidentally, is that all the special Soviet army units and their commanders were ethnically almost 100 percent of Russian origin. On the other hand, the UPA units were totally of Ukrainian origin. This shows that the campaign was of a national character, not of a social nature as some Soviet sources try in vain to indicate. Some information on UPA losses may be found in the surprisingly numerous recent Polish publications on the Ukrainian resistance movement in 1944–50. We note, for example, the following: *W walce ze zbrojnym podziemiem 1945–1947*, edited by M. Turlejska, papers by L. Grot, M. Redziński, W. Piathkowski, M. Tyliczszak (Warsaw, 1972); also illuminating is M. Juchniewicz, *Polacy w radzieckim ruchu partyzanckim 1941–1945* (Warsaw, 1975). The data presented are rather fragmentary. Of greater value are the statistics on the forced evacuation of the native Ukrainian population from areas annexed by Poland in 1945 (the so-called Zakerzonia, mainly Lemkivshchyna) to the USSR (see Turlejska, op. cit., pp. 154–59).

half million,³⁴ in addition to two and a quarter million deported or evacuated to Germany.³⁵

That this estimate was too low is indicated by the later announcement of yet larger figures. One of these was provided by the First Secretary of the Ukrainian Communist Party, V. V. Shcherbyts'kyi. In his well-known speech on October 18, 1974, celebrating the 30th anniversary of the defeat of the Germans, Shcherbyts'kyi stated that in World War II the Ukraine lost every sixth man of its population. Taking into account the size of the Ukrainian population in 1940, we arrive at a figure of six and three-quarters million dead, a figure much higher than the one published in 1969.³⁶ (Compare items 1 and 3 in Table 2.)

There is a very laborious and time-consuming possibility of assembling detailed data on war losses in separate Ukrainian towns and villages. These data are to be found dispersed in many varied publications (mostly newspapers) issued in the Ukraine over the last thirty

³⁴ This figure evidently does not include losses of Ukrainians serving in the army in the campaign of 1939–41 (the annexing of the Western Ukraine, the occupation of the Baltic states, the Finnish war). Those losses were also quite high. We lack the exact figures on Ukrainians enlisted in the Soviet army in 1940–45. One way of deducing that figure may be based on the number of Ukrainian soldiers who received medals and distinctions; they numbered 1,700,000 (see *Istoriia Ukrain's'koi RSR*, vol. II (Kiev, 1958), p. 600). In fact, the total mobilization announced on June 12, 1941, drafted all males born in 1905–18 (ibid., p. 523). It is interesting to note here that although it is an extremely pro-Soviet account, the said history talks of the participation of *Ukrainians* (and not of the *Ukrainskaia SSR*) in the "Great Patriotic War" (see pp. 569, 582, 539, 553; see also headings of chapters).

³⁵ Soviet sources always speak of people "taken by force" to Germany. Whereas there is no doubt that German occupying "employment" authorities summarily deported a great number of young people (both men and women) to labor camps of the German industrial enterprises, as well as auxiliary labor for German agriculture, there was also a great voluntary exodus of various classes of Ukrainians to Germany (and later, mainly, to the United States and Canada). This was a deliberate exodus of people who otherwise would surely have become victims of Russian reprisals for actual or hypothetical "collaboration" with the German administration in the Ukraine. All these deported people and voluntary emigrants represent a loss in population in the present-day Ukraine; however, we cannot classify them, as Soviet authors do, as people who "perished" in World War II.

³⁶ *Nota bene*, the table cited above from p. 150 of *Ukrains'ka RSR u velykii vitchyzniani vimi Radians'koho Soiuzu* (see note 29) gives a total of 3,898,457 as losses for the civilian population, but on previous pages we find, for some reason, separate figures for Crimea and Zakarpats'ka Oblasts. Civilians killed in the former amounted to 135,177 people; 85,447 were deported. In the latter area, 114,982 civilians were killed and 70,895 deported. Why the Soviet Ukrainian authorities do not add these losses to the total losses of the Ukrainian SSR is not clear. They seem to consider formally only the territory that was included in the Ukrainian SSR as of 1941 as being part of the Ukraine. Zakarpattia became a part of the Ukrainian SSR in 1945 and the Crimea in 1954.

years. We will give only a few examples here of the kind of data we have in mind. A certain V. Mikhailivs'kyi, a local correspondent for the village of Novosilka (Chernivtsi Oblast), mentions the loss of 178 young people of the village killed in action. In another report on a small village, Hrebeni, a figure of 68 killed in battle and another 24 civilians killed during the German occupation is cited.³⁷ Another example is the situation in a large village, Seredne (Zakarpats'ka Oblast). Out of a population of 2,552 in 1939, it lost 560 people during World War II, or 21.9 percent. This latter information is found in one of the volumes of the monumental *Istoriia mist i sil Ukrain's'koi RSR*.³⁸ There were 26 volumes published in 1967–74 and these contain hundreds of data on wartime human losses in various Ukrainian towns and villages. Searching for this type of information in this historical work represents a project in itself (the average volume contains 800 pages). Numerous figures from it, although the author has thus far collected them on a random basis, seem to support in a very convincing manner the magnitude indicated by Shcherbyts'kyi.

Other sources also exist which give us a picture of the extent of Ukrainian war losses, although not directly. For example, the population of all kolkhozes in the Ukraine in 1940 was 14,187,000, but in 1944 this figure fell to 12,533,800. This means that Ukrainian villages alone, in that span of time, registered a loss of 1,653,200 people. Moreover, further analysis shows that those living in the villages in 1944 were in the great majority old people and children, and perhaps also non-working women. The number of the working population in the Ukrainian countryside fell from 7,246,000 in 1940 to a mere 4,734,100 in 1944. This would mean that the losses of men and working women in the age bracket of 18–60 years amounted to the enormous figure of 2,511,900.³⁹ A rounded figure from this estimate is included in Table 2, item 2a.

³⁷ These reports are taken from nos. 28 and 37 of a weekly *Visti z Ukrainy*, 1975. There have been literally thousands of these kind of reports published in Soviet Ukrainian papers in the 1945–75 period. To collect and evaluate all those reports would entail a separate major research project.

³⁸ *Istoriia mist i sil Ukrain's'koi RSR, Zakarpats'ka oblast'* (Kiev, 1969), p. 677.

³⁹ Iu. V. Arutiunian, *Sovetskoe krestianstvo v gody velikoi otechestvennoi voiny* (Moscow, 1963), pp. 390, 392. We cite Arutiunian here because he gives extensive statistics on village population in the USSR. The equivalent Ukrainian publication by S. P. Lauta, *Kolhosyne selianstvo Radians'koi Ukrainy u roky velykoi vitchyznianoï viiny* (Kiev, 1965), is rich in factual material, but its statistical data are not well organized and badly dispersed. Lauta concentrates, paradoxically, not so much on people as on the cattle and the farming situation in the Ukraine in 1939–45. He nonetheless succeeds in drawing quite a detailed picture of the contributions of evacuated Ukrainians in the areas of temporary wartime settlement (Volgograd and Saratov Oblasts, Urals, Central Asia).

The losses of Ukrainian towns were even greater than those of the villages. One illustration of those losses are the German statistics on the population of Ukrainian cities in 1942-43,⁴⁰ shown in Table 4. As can be seen, the population of Ukrainian cities at the beginning of 1943 was in most cases half or an even smaller fraction of its 1939 level. In general, the bigger the city, the heavier the losses.

Table 4
Ukrainian Urban Population, 1939 and 1942-43

City	Population in thousands	
	January 17, 1939	1942-43
Kiev	846	330
Odessa	604	300
Dnipropetrovs'k	501	152
Zaporizhzhia	289	120
Mariupil'	222	178
Kryvyi Rih	198	125
Mykolaiv	167	84
Dniprodzerzhyns'k	148	75
Poltava	130	75
Kirovohrad	100	63
Kherson	97	59
Zhytomyr	95	42
Vinnysia	93	42
Melitopol'	76	65

Sources: *Deutsche Ukraine Zeitung* (Luts'k) February 2, 1943, and *Novoe slovo* (Kiev), July 22, 1942.

Many Western scholars, challenged by the continuous inconsistencies in Soviet estimates of human losses during World War II, have tried to solve this problem themselves. Some have had considerable institutional help and scientific background at their disposal; efforts of others have been individual. Strangely enough, scholars associated with renowned research institutions often lack intimate knowledge of

⁴⁰ *Deutsche Ukraine Zeitung* (Luts'k), February 2, 1943, and *Novoe Slovo* (Kiev), July 22, 1942.

the situation in the USSR, frequently due to an almost complete lack of knowledge of the Russian or Ukrainian languages. Thus they must confine the scope of their primary study sources to the few publications which exist in English translation. On the other hand, the real eyewitnesses of the demographic changes in the USSR often have not adequately mastered the Western scientific methodology necessary for sound research.

However, all efforts made with good will deserve attention. First, let us return to the celebrated volume by F. Lorimer.⁴¹ Since the book was published in 1946 (all the editorial work actually finished as of September 1945), its analysis of World War II losses is, naturally, far from complete, and much less detailed and comprehensive than is Lorimer's treatment of World War I. Lorimer estimated the total World War II population losses of the USSR (including losses due to the deficit in births and to excessive civilian deaths) as close to 20 million. Here, however, he accepts estimates of military personnel losses as only 5 million. This figure is obviously much too low, as became apparent three decades later on the basis of new sources. We know that Stalin gave a figure of 4,200,000 dead and missing after the first two years of the war;⁴² but even when we assume that the subsequent years cost the Soviet Union fewer deaths,⁴³ the military losses must have approached the range of 9 to 10 million.⁴⁴

Another wartime demographic phenomenon that requires study is the forced evacuation of millions of people from the Ukraine into the backlands of the USSR conducted in 1941–42 by Soviet authorities. According to official sources, by the month of December 1941 as many as 17 million people had been evacuated from war-endangered

⁴¹ Lorimer, *op. cit.*, pp. 175–84.

⁴² *Pravda*, June 22, 1943.

⁴³ This assumption is rather shaky, as we know that the most bloody battles (around Stalingrad and in the Kursk area, as well as the battles on the left-bank Ukraine, e.g., the Korsun'-Shevchenkiv's'kyi operation) were fought in the second half of the war; see *Korsun'-Shevchenkiv's'ka bitva* (Kiev, 1974).

⁴⁴ This not considering the subsequent birth deficits in the years following 1945, nor casualties of disease and famine accompanying war actions. As late as 1974 we finally find scholarly support of the figure given. B. Ts. Uralnis in his *Problemy dinamiki naseleniia SSSR* (Moscow, 1974), pp. 324–25, while criticizing F. Lorimer for his inflated prognoses of population growth in the USSR for 1970 (see also text, p. 29), states clearly that the military losses of the USSR in World War II were 10 million men, and that the losses of the civilian population directly in World War II were also 10 million dead. Uralnis also finds Lorimer's estimated deficit in births in the postwar period in the USSR (6 million) much too low and indicates that it might have been almost twice as high.

territories in the USSR.⁴⁵ These included urban and rural population from the Ukraine as well as from the Moscow and Leningrad areas. Whereas the people shifted from the Moscow and Leningrad districts were chiefly scientific and research institution staffs, management of industry, and high party and administration officials, with their wives and the majority of their children, wholesale masses of population from the Ukraine were moved to the Volga region and behind the Urals. These included the bulk of the workers of the most important plants and factories as well as millions of peasants who were to “accompany” grain echelons, large herds of cattle, and agricultural machinery.

Of the 17 million reshuffled people, only seven and one-half million “settled” temporarily in the eastern parts of the USSR. All the rest were moved continuously from one place to another, becoming a sort of gypsy population that represented an enormous unattached reservoir of auxiliary manpower, used (or rather abused) in numerous wartime industrial and military projects, mostly construction. It would be redundant to emphasize the extreme misery of these people, their high rate of mortality, the millions of broken families, hundreds of thousands of lost children.

When we discuss the population losses in the Ukraine, we must take into account also a permanent loss of Ukrainian children whose parents perished in the war.⁴⁶ These children were in large part adopted by non-Ukrainian families in Asian areas of the USSR. Moreover, this action was encouraged by the authorities as one of the methods of denationalization. Thus, these children were brought up as “new all-Soviet people,” or simply as Russians.⁴⁷

Further estimates of Soviet evacuation measures also appear in other publications. The most reliable seem to be the German reviews. The number of people who had been evacuated from the territories occupied by the German army by the end of 1941, according to a German demographer and war reporter, F. Radmer, was about 12.5

⁴⁵ *Eshelony idut na Vostok* (Moscow, 1966), p. 13.

⁴⁶ The detailed description of the evacuation given in *Ukrains'ka RSR u velykii vitchyzniani vinni*, vol. 1, pp. 275–98, does not give the number of persons evacuated from the Ukraine, but still it supplies a picture of the enormous dislocations of Ukrainian industry, agriculture, and administration. From Kharkiv alone the authorities evacuated more than 100,000 women and children (G. A. Kumanev, *Sovetskie zheleznodorozhniky v gody velikoi otechestvennoi voiny* (Moscow, 1963), p. 61. Soviet evacuation supervisors (as a rule, personnel of the NKVD) evacuated women (mothers) and children separately; the men (husbands) were drafted in the first days of World War II or had left earlier for the East with dismantled Ukrainian factories.

⁴⁷ *Istoriia velikoi otechestvennoi voiny Sovetskogo Soiuz, 1941–1945*, vol. II, p. 548.

million.⁴⁸ This territory encompassed all of the Ukraine, Belorussia, and the Baltic countries. Another German analyst, F. Habicht, mentions 15 million as a maximum figure.⁴⁹ These figures are close to the Soviet estimate of 17 million, which included those who were evacuated from front territories that were not yet occupied by German armies around the end of 1941. We have to agree with a statement by the German General K. Tippelskirch, according to whom the Soviet authorities succeeded in evacuating practically all the people fit for active army duty from territories lost to the Germans in 1941–42.⁵⁰

To single out from these estimates the number of people evacuated from the territory of the Ukraine alone seems a difficult task. We suspect that inaccessible party archives in Kiev may contain the information in question, but it has never been made public. Still more difficult would it be to estimate the number of Ukrainians moved in 1941–42 to the East. Fortunately, we possess data collected by the Ukrainian Academy of Medical Sciences in 1944–46 on Ukrainian cities;⁵¹ these data show a permanent loss of 25 percent of their pre-war population. (This is a mean value for 93 large cities; actually some large cities, particularly in the Dnieper and Donets' areas, lost close to 50 percent of their population.) The report of the Academy distinguishes between losses due to direct battle and those due to hunger and diseases, and emphasizes the number of those evacuated by German authorities.⁵² Since 93 Ukrainian cities represent a good sample

⁴⁸ *Reicharbeitsblatt*, March 5, 1942.

⁴⁹ *Reicharbeitsblatt*, November 12, 1942.

⁵⁰ K. Tippelskirch, *Geschichte des 2-ten Weltkrieges*, in Russian translation, *Istoriia vtoroi mirovoi voyny* (Moscow, 1956), p. 228.

⁵¹ Akademiia meditsynskikh nauk Ukrainskoi SSR, *Otchet Komissii po obsledovaniiu poter i sanitarnykh posledstviu voyny* (Kiev, 1946), pp. 18–19. This Academy, which was established as a war period concession of the Moscow government to Kiev circles, existed in 1944–46 only. In 1947 it ceased to exist as a separate institution, and was incorporated in the all-union Academy of Medical Sciences of the USSR (AMN SSSR).

⁵² According to Eugene M. Kulisher, "Population Behind the Iron Curtain," *The Annals of the American Academy of Political and Social Sciences*, September, 1950, pp. 110–11, 3 million people left the USSR during and after World War II, including Ukrainians. Balts, Germans, Poles, and others, and excess mortality accounts for a loss of more than 2 million, including 1.3 million exterminated Jews. Altogether, the occupied territories of the USSR had suffered a loss of nearly one-fourth of their population. The vacuum, particularly in the Western provinces and in the Baltic areas, was filled in 1946–50 from the outside, predominately with Russians from the central provinces. Deserted farms, restoration of industry, housing facilities which, in spite of war ravages, were much better than in Russia proper, attracted these settlers. More than a million displaced persons (those taken or evacuated by the Germans from the USSR) refused to return home and gained their freedom, together with other wartime and immediate postwar refugees. See S. G. Prociuk, "Problemy potentsiialu ukrains'koho naseleennia," part II, *Suchasnist'*, July 1961, pp. 78–79.

of the total urban population of the Ukraine, we can, for practical purposes, assume that the losses of these cities are characteristic of all the towns of the Ukraine. The urban population in the Ukraine was 14 million in 1940; thus the loss of 25 percent represents about three and half million people (Table 2, item 2b).

When we add these figures to the figure reflecting the losses of the Ukrainian villages (2,500,000, see Table 2, item 2a), we arrive at a total of around 6 million (Table 2). This figure stands between an estimate of 5,690,000 total World War II population losses as offered by this author in 1961, and the figure that may be deduced from Shcherbyts'kyi's statement in 1974 (6,750,000, Table 2, item 3). Obviously, all these figures are approximate estimates, but we are on quite sound ground today when we describe the direct population loss of the Ukraine in 1941–45 as being in the range of 6.0 million people or even more. Following the example of demographers associated with Moscow institutions (such as B. Uralnis or V. Kozlov), some Ukrainian authors also now feel "safe" in quoting a figure of "more than five million" as killed in the Ukraine in 1941–45.⁵³ Soviet sources mentioning human losses in World War II typically refer to them as "people destroyed by fascists," belying the fact that the overwhelming majority actually died of causes other than combat action.

We should stress once again that the discussion above has referred only to the direct World War II losses. Thus the estimates presented thus far do not include losses due to the deficit of births in the subsequent postwar years, nor the losses caused by the outbreaks of diseases due to hunger during 1944–47.

To estimate the total losses, our first approach may be to project the population of the Ukraine from its 1941 level under the assumption that no war losses were inflicted and that the reproduction rate remained in the range of the trend indicated from the 1936–41 period. This projected figure, say for 1950, compared with the actual level in 1950, will give some idea on the magnitude of losses. We must keep in mind that the 1941 birth rate, on which the Lorimer projections for World War II were based, had decreased by 30 percent by 1970. Undoubtedly a major factor in the lower birth rate was the male-female ratio in the 1945–55 period. For each 100 males (in the work-

⁵³ "... v period Vitchyz'nianoi viiny fashysts'ki okupanty znyshchly (na Ukraini) ponad 5 milioniv liudei," M. M. Palamarchuk, *Ekonomichna heohrafiia Ukrain's'koi RSR* (Kiev, 1975), p. 80.

ing population group) in the villages there were 180 females in 1950, 191 in 1951–52, and 185 in 1953. In areas particularly badly affected by the war, such as Chernihiv or Kharkiv Oblasts, the ratio of women to men in 1950 was more than 210, which means that not even every second woman could count on getting married and having children. As late as in July 1972, there were 5.5 million more women than men in the Ukraine.

This situation tells us that in spite of a decline of birth rates in the USSR in the 1914–40 span, the share of losses due to birth deficit in the total losses of the Ukraine in World War II was actually higher than that in World War I. A rough comparison of census data in the Ukraine in 1939 and in 1950 proves this fact. The Ukrainian population was 41.3 million in 1939 and only 36.6 million in 1950, whereas according to projection based on reproduction trends in 1935–39 (following Lorimer's method) it should have been 47.4 million. Thus the total loss of the Ukraine in World War II amounts to nearly eleven million people.

As an alternate approach we may also follow Lorimer's procedure of first estimating total World War II losses for all of the Soviet Union and then deducing the magnitude of Ukrainian losses on the basis of the share of the Ukrainian population in the general USSR population as of 1941. Lorimer's method of estimating total losses in the country due to World War I cannot be applied here without reservations, because the size of losses due to famine and diseases in the USSR in World War II was considerably smaller than that of World War I. Nevertheless, a very cautious estimate of the difference between the USSR's population as projected from the late 1920s situation and its actual level and 1951 gives the incredible figure of 74 million people;⁵⁴ those are the losses suffered over the whole 1930–50 span.

To be more realistic in assessing losses attribute to war, we should project the growth of the USSR population not from the situation as of the late 1920s, but rather from that of the late 1930s, because it is obvious that the famine of 1933 in the Ukraine and in the Don and Kuban' areas, and the misery of women as mothers in the USSR in the years of repeated political purges had already considerably reduced the reproduction rate of population in the prewar decade of 1931–

⁵⁴ Uralnis, *Problemy dinamiki*, p. 319. The author cites prognoses projected by S. A. Novosel'skii and V. V. Paevskii.

41.⁵⁵ Another American demographer, F. Notstein, tried to make prognosis on that basis in 1944, predicting a population of 203 million for the USSR in 1950.⁵⁶ In this case, the difference between Notstein's prognosis and the actual population in 1950 amounts to "only" 38 million. Since the population of the Ukraine on the eve of World War II represented about 19 percent of the total of the USSR, the Ukrainian losses may here be taken as 7.4 million. Both figures, that of 11 million and that of 7.4 million, are hypothetical, because they are based on assumptions that a certain rate of reproduction of population in the Ukraine would have taken place if the war had not occurred. We are inclined to accept the total loss in the Ukraine due to World War II as approaching the higher figure of the two because of the obvious severity of the war action in Ukrainian territory, and its prolonged endurance, as compared with the action in Russian territories.

A reduction by about 30 percent in the number of children under five years of age, who otherwise would have been expected to be counted in 1945, and a loss of around two and a half million children due to the deficit of births and to the excessive infant mortality rate caused by the war (and this is a very conservative estimate) are the worst indirect population losses for the Ukraine following World War II. We now possess complete data on the tragic decrease of fertility and the reproduction rate of the population of the Ukraine in the time span of 1940–75, and there can be no better proof of the magnitude of the war's demographic effects in the Ukraine. The projections for even the far 1980s and 1990s will still bear the mark of the wartime population losses in 1940–45. This demographic aftermath of war deserves, however, to become the subject of separate, extensive research.

CONCLUDING REMARKS

Our present estimates on total war losses in the Ukraine should in no way be considered as exact or final. No doubt more publications and findings on the subject will appear far into the future. Quite recently, in connection with the thirtieth anniversary of the war vic-

⁵⁵ The birth rate in the USSR fell from 44.0 per 1,000 population in 1926, to 31.2 in 1940; in the Ukraine, to as low as 27.3, *Narodne hospodarstvo Ukrain's'koi RSR v 1971 r.* (Kiev, 1972), p. 39; *Narodnoe khoziaistvo SSSR v 1964 g.* (Moscow, 1965), p. 34.

⁵⁶ F. W. Notstein and others, *The Future Population of Europe and the Soviet Union; Population Projections* (Geneva, 1944), pp. 312–13.

tory in 1945, several facts on the direct and indirect human war losses, hitherto unknown to students of Soviet affairs, have belatedly emerged. In particular, more detailed data have recently been published on the type and classification of military losses, on the number and kind of wounds, and on the share of fatal cases, on the diseases that infected the army, and on the far-reaching effects of disabilities among discharged army personnel, which became a heavy burden to Soviet postwar society.⁵⁷

Even a superficial glance at the magnitude of the USSR's losses suggests appalling indifference of the Soviet leadership toward their very own army, and toward the civilian population as well. It is beyond our scope here even to outline all the callous measures that the Soviet government and military command applied continuously and ruthlessly during the war. Suffice it to say that an enormous number of human lives were sacrificed unnecessarily and without any obvious reason. Almost all the memoirs on the war written by both German and Soviet commanders prove this thesis beyond any doubt.

Analysis of the Ukrainian population losses, according to this author's estimates,

World War I	6 million people
World War II	11 million people

helps us better to understand the highly unfavorable and unusual present demographic situation in the Ukraine, and the situation which may exist there in the future, the period of 1980–2000. These extremely heavy losses have been a factor in the rapid decline of birth rates among ethnic Ukrainians from 41.3 per thousand in 1927 to merely 15.8 in 1959–69.⁵⁸ The number of Ukrainians increased between 1959 and 1970 by only 9.4 percent (as compared with 13.1 percent for Russians and as high as 50–53 percent for Central Asian nations), and this slow rate of demographic growth will persist into

⁵⁷ Particularly rich in such data are the 1975 issues of *Voенно-медицинский журнал*, devoted to the 30th anniversary of war victory (see papers by I. A. Iurov, T. E. Boldyrev, M. T. Shmatikov, M. A. Marchenko, M. M. Rudnyi, O. S. Lobasov, P. V. Morozov). Soviet scholars, incidentally, occasionally make it understood that military archives in the USSR are still under seal and that historians need a special permit to use their files. In addition, they must submit all their research findings to security authorities to obtain clearance for publication.

⁵⁸ To be distinguished from the birth rate of the total population of the geographical Ukraine, which decreased from 40.3 in 1927 to 17.0 average in 1959–69; *nota bene*, a proof that the birth rate of Ukrainians proper dropped more rapidly than that of the other national minorities there, see Uralnis, *Problemy dinamiki*, pp. 129, 132.

the future. There appears to be a sound basis for Alf Edeen's statement at the meeting of Sweden's Royal Academy of Military Science on November 13, 1975, where he stirred the scientific community with his forecast that the population of the European part of the USSR will increase over the entire 1985-2000 period by merely 5 million people.⁵⁹

The Soviet government has tried various measures to stimulate the growth of the birth rate in the USSR. Some of these policies (mostly in the form of financial support) have been extensively applied in the Ukraine, unfortunately with little or no result. Distinguished demographers have come to the pessimistic conclusion that the general "social climate" in the USSR is adversely affecting the "microclimate" of the family, and they have emphasized an urgent need to design governmental incentive measures that will accord perfectly with the views and wishes of parents.⁶⁰ It is doubtful however, whether a socialistic or communist society will ever be able to create such a "climate." Whatever their success or failure, it seems clear that another war, a World War III, irrespective of whether it brought defeat or victory, would be equivalent to a death sentence for the USSR population.

⁵⁹ *ABN-Correspondence*, vol. XXVI, No. 6, November-December 1975, pp. 12-13.

⁶⁰ It is important to mention here that the rather pessimistic views of most prominent demographers in the USSR (Uralnis, Perevedentsev, Pokshishevskii, Steshenko, et al.) differ from the stereotypes to be found in official party-inspired publications (see "Semia—mikrosreda etnicheskikh protsessov," in *Sovremennye etnicheskie protsessy v SSSR* (Moscow 1975) pp. 430-57, or the infamous paper by T. V. Riabushkin, "Zadachi issledovaniia narodonaseleniia," presented at the meeting of the section *Problemy narodonaseleniia* of the Academy of Sciences in March 1976, in which he reminds Soviet demographers that their main task is to outline such methods of full manpower use in the USSR as will secure higher industrial productivity (see *Vestnik AN SSSR*, 1976, no. 8, pp. 127-30). The need to establish a favorable special "climate" for young married couples, for young mothers especially, as the only remedy for the decrease of the birth rate, is emphasized strongly not only in the USSR but in other socialist countries as well (see papers by Polish demographers J. Szejnoch, *Kultura*, October 24, 1976, or M. Latuch, *Zycie Warszawy*, September 30, 1976).

Effects of Urbanization in the Ukraine

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SCOPE OF THE PROBLEM

The author takes a positive attitude toward the problem of urbanization. Urban centers perform an important function in a national economy. They are the focal points of such nonagricultural activities as trade, manufacturing, and communication. In addition, they act as administrative, cultural, and recreational centers. A lack of urban outlets and weak hierarchical differentiation in a region are always indicative of a low level of economic development.

The subject of urbanization has been widely discussed by scholars in the Ukraine. The most comprehensive works are the monographic study by Iu. Pitiurenko¹ and an elaborate essay by N. Blazhko.² In addition there are numerous shorter articles dealing with urban problems which are regularly published in the journal of the Kiev University *Ekonomichna heohrafiia*. The best known contributors besides Pitiurenko are L. Hanechko, M. Kovtoniuk, S. Mokhnachuk, and E. Shypovych.³

¹ Iu. Pitiurenko, *Rozvytok mist i mis'ke rozselennia v Ukraini' hii RSR* (Kiev, 1972). For a review of this book, see E. Shypovych, "Problemy rozvytku mist Ukrain'skoi RSR," *Ekonomichna heohrafiia*, vol. 15, 1973.

² N. Blazhko, "Kolichestvennye metody izucheniia sistemy gorodskikh poselenii," in *Geografiia naseleniia i naselennykh punktov SSSR* (Leningrad, 1967).

³ Iu. Pitiurenko, "Terytorial'ni systemy mis'kykh poselen', zahal'ni zakonmornosti ikh rozvytku i suchasna struktura (na prykladi Ukrain'skoi RSR)," vol. 10, 1971; Iu. Pitiurenko and L. Hanechko, "Osoblyvosti ta problemy nozvytku mis'kykh poselen'—tsentriv hirnychorudnoi promyslovosti Donets'ko-Prydniprov'skoho raionu RSR," vol. 12, 1971; Iu. Pitiurenko, "Osoblyvosti i problemy rozvytku mis'kykh poselen' pivdennoho ekonomichnoho raionu," vol. 14, 1973; Iu. Pitiurenko and M. Iakymova, "Metodychni pytannia vydilennia terytorial'nykh system mis'kykh poselen' i vyznachennia ikh mezh," vol. 16, 1974; L. Hanechko, "Pytannia rozvytku mis'kykh poselen' na bazi vydobutku i pererobky nerudnoi syrovyny (na prykladi Donets'ko-Prydniprov'skoho ekonomichnoho raionu)," vol. 13, 1972; L. Hanechko, "Mistoformuiuche znachennia hirnychodobuvnoi promyslovosti ta ii vplyv na rozselennia," vol. 15, 1973; M. Kovtoniuk, "Do pytannia matematychnoho analizu sitky mist Rovens'koi oblasti," vol. 10, 1971; S. Mokhnachuk, "Matematychni metody v heohrafiu naseleniia," vol. 12, 1972; E. Shypovych, "Zrushennia v rozvytku i rozmishchenni mis'kykh poselen' Ukrain'skoi RSR za roky Radians'koi vlady," vol. 17, 1974.

Distinctive features of these inquiries are their regional character, their preoccupation with problems of classifying urban centers, their recognition of spatial ties, and their projections of urban growth. The methodology is largely that of an inductive geographic analysis. The studies lack, however, deeper insights of an integrated approach in evaluating the functional and hierarchical dependence. This is a weakness which cannot be attributed exclusively to Ukrainian scholars but is also characteristic of urban research in the USSR.⁴

When dealing with the global aspects of urban development in the Ukraine, the studies are highly political in nature; they stress the historical achievements of the Soviet administration, carefully avoiding comparative evaluations in regard to other regions and countries. Thus they omit important criteria of appraisal which, as one might suspect, are not entirely favorable for the Ukraine.

The aim of this study is precisely the opposite. Primary attention is devoted to the general aspects of urbanization in the Ukraine, deferring detailed analysis of regional problems to future publications.⁵ Attempts are also made to employ comparative evaluation. An important benchmark for this appraisal will be supplied in contrasting the urbanization process in the Ukraine with that of the Russian Republic. Statistical evidence in this field confirms that the Ukraine trails the Soviet Union and the Russian Republic, and it appears that the gap developed does not narrow, but progressively widens. Special attention is paid here to this problem by estimating the global deficits at various time periods and allocating them to various sizes of urban centers.

In addition to the backward characteristics of the global situation, the regional distribution of urban centers in the Ukraine is characterized by widely polarized differences. On the one hand, it records an abnormally high agglomeration of urban communities in the southeastern region, which is associated with coal and iron mining; on the other hand, it reveals the underdeveloped areas in the west, which barely meet the minimum level of urbanization. The attempt here is to illustrate this point in the form of suitable statistical tables and maps comprising six basic sizes of urban centers and twenty-five provinces (oblasts).

⁴ See individual publications of: P. Alampiev, V. Davidovich, B. Khorev, O. Konstantinov, G. Lappo, A. Mints, V. Pokshishevskii, and others.

⁵ This author is presently working on the subject of "The Hierarchy of Urban Systems in the Western Ukraine."

Attention will be paid to the most recent rates of growth in order to assess future effects of urbanization. This evaluation will concern not only developments in the Ukraine versus Russia, but will also apply to internal differences. It will be of interest to follow the extent to which regional inequalities have a tendency either to disappear or to become more pronounced.

Special consideration will be extended to a few dozen principal centers in the Ukraine; these will be appraised individually from various points of view. First, an attempt will be made to assess their relative status of development under the present level of urbanization; in other words, they will be compared with the "standardized" values derived from equalized rural-urban conditions. In the second approach, selected centers will be evaluated on the potential strength which they might have attained if the Ukraine had reached a level of urbanization under conditions of optimal economic development. For this purpose, the author assumes an urban population of 75 percent which closely approximates the present rates in Western Europe.⁶

GENERAL EVALUATION

DEFINITION OF URBAN CENTERS. There are two principal ranks of urban centers in the Ukraine and in the other republics of the Soviet Union: cities and towns, the latter officially called "settlements with urban character." To become a city, a community must have at least one thousand inhabitants, 75 percent or more of whom must be employed in nonagricultural activities. Compared with this, the town may have a lower rate of nonagricultural occupations, though not less than 60 percent. However, this is compensated for by the requirement of a higher minimum population, a figure is now raised to 2,000 persons.⁷

There are also two additional subdivisions of cities: middle-size and large. These are cities which are directly subordinated to the provinces and the republic. In practical terms, they do not belong to the district area administration but constitute autonomous urban districts

⁶ U.N., *Demographic Yearbook 1973* (New York, 1974) listed the following percent rates of urbanization for Western Europe: England 77.9 (1972), France 70.0 (1968), Netherlands 77.4 (1973), Belgium 87.1 (1973), Sweden 81.4 (1970), Denmark 79.9 (1970), East Germany 74.3 (1973); see tables and definitions on pp. 118-22.

⁷ Akademiia Nauk UkrRSR, *Ukrains'ka Radians'ka Entsyklopediia* (Kiev, 1959-1965), Volume 9, pp. 238-40 and Volume 13, p. 33; *Entsyklopediia narodnoho hospodarstva Ukrain's'koi RSR* (Kiev, 1972), vol. 4, p. 50.

or provinces. There were 111 centers in the first category in 1970; their minimum size oscillated around 35,000 inhabitants, depending upon their location and upon the degree of urbanization in a given province. The second category, cities of republican importance, is comprised of two centers: the capital city of Kiev, with a population of 1,632,000 in 1970, and the city of Sevastopol'. One should add that the exclusion of the latter center from provincial jurisdiction, unlike that of the capital city, was not conditioned by its size (population 229,000 in 1970), but by political considerations (the military significance of harbor facilities).

It is customary to classify urban communities into various sizes measured by the number of local residents. Lately, this procedure has been standardized internationally and can easily be applied to Ukrainian conditions. Table 1 shows the two-fold distribution of urban cen-

Table 1
The Grouping of Cities and Towns in the Ukraine
by Size of Population, 1970

Population (000)	Cities				All Centers	Total Popu- lation (000)
	Repub- lican	Provin- cial	District	Towns		
1,000.1 & over	1	1			2	2,855
500.1-1,000.0		6			6	4,417
200.1-500.0	1	10			11	3,255
100.1-200.0		22			22	2,952
50.1-100.0		38			38	2,535
20.1-50.0		32	64	2	98	2,950
10.1-20.0		2	138	63	203	2,812
5.1-10.0			52	299	351	2,434
3.1-5.0			13	246	259	1,023
Under 3.0			5	247	252	456
Total	2	111	272	857	1,242	25,689

Sources: SSSR, *administrativno-territorial'noe delenie soúznykh respublik* (Moscow, 1974), pp. 254-335; *Itogi usesoiuznoi perepisi naseleniia 1970 goda*, vol. 1 (Moscow, 1972), pp. 63, 102-03.

ters in the Ukraine in 1970, by size and by the legal designations mentioned.⁸

The statistical listings show the numerical predominance of towns, which amount to two-thirds of all centers. Regarding population strength, the median value of district cities is three times higher than that of towns (13,700 vs. 4,400) and the provincial cities in turn are approximately five times larger than the district cities (median value 66,500). It is interesting to note that the smallest size centers (under 3,000 persons) comprise less than 2 percent of cities (5 centers) and more than a quarter of all towns. On the other hand, the 41 largest centers with over 100,000 inhabitants contain more than half the urban population of the Ukraine. Fewer than one-third of all centers have more than 10,000 inhabitants each, and together these centers account for more than five-sixths of the total urban population.

GLOBAL EFFECTS OF URBANIZATION. Table 1 shows that 25,689,000 persons resided in the urban centers of the Ukraine in 1970; this amounts to 54.5 percent of the total population of 47,127,000. Although this ratio of urban to rural population is quite impressive, how does it compare with that of the entire USSR or of, say, its largest component, the Russian Republic?

In the USSR as a whole, the share of urban population is 56.7 percent while in Russia it reaches 62.3 percent. Should one apply the latter number as a desirable yardstick of urban development in the Ukraine, then one cannot help but point to a global deficit of 3,650,000 urban dwellers. Since, under normal conditions, the process of urbanization is a progressive reduction of rural occupations and their transfer into urban employment, this figure can also be interpreted as a relative surplus of rural population. When associated with the total number of 21,438,000 rural residents, this yields an excess of 17 percent.

The conditions described above are not very satisfactory from the point of view of economic development in the Ukraine. One might speculate that they have been similar in the past and that definite progress has recently been made to close the existing gap. A closer evaluation of historical records, however, reveals an entirely different picture. The relative standing of the Ukraine in the field of urbanization has not improved, but has continuously deteriorated over the last few decades.

⁸ *Itogi usesoiznnoi perepisi naseleniia 1970 goda* (Moscow, 1972), vol. 1.

Table 2 shows that in 1913 the Ukraine was more urbanized than was Russia. Although the shares of urban population in both republics were relatively very low (below 20 percent), the Ukraine recorded a surplus of 654,000 persons, equivalent to 10 percent of the urban population, as compared with Russia.

Table 2
Historical Evaluation of the Urbanization Process
in the Ukraine and Russia, 1913-1980

	1913	1939	1959	1970	1980 ¹
<i>Ukraine:</i>					
Population, urban (000)	6,790	13,569	19,147	25,689	32,676
Population, rural (000)	28,420	26,900	22,722	21,438	19,801
Population, total (000)	35,210	40,469	41,869	47,127	52,477
Growth rate, urban (percent) ²	—	2.70	1.74	2.71	2.44
Growth rate, rural (percent)	—	-.21	-.85	-.53	-.80
Growth rate, total (percent)	—	.54	.17	1.08	1.08
Degree of urbanization (percent)	19.3	33.5	45.7	54.5	62.3
Surplus or deficit (000)	654	16	-2,800	-3,650	-4,278
vs. rural population (percent)	2.3	.1	-12.3	-17.0	-21.6

<i>Russia:</i>						
Population, urban (000)	15,667	36,295	61,611	80,981	100,445	
Population, rural (000)	74,235	72,082	55,923	49,098	42,197	
Population, total (000)	89,902	108,377	117,534	130,079	142,642	
Growth rate, urban (percent) ²	—	3.28	2.68	2.52	2.18	
Growth rate, rural (percent)	—	-.11	-1.28	-1.19	-1.53	
Growth rate, total (percent)	—	.72	.41	.93	.93	
Degree of urbanization (percent)	17.4	33.5	52.4	62.3	70.4	
Surplus or deficit (000)	-1,670	-43	7,861	10,075	11,621	
vs rural population (percent)	-2.3	-.1	14.1	20.5	27.5	

Notes:

¹ Estimated projections.² Calculated on the annual basis.Source: *Itozi*, pp. 8-9.

The following quarter century is characterized by a higher rate of growth of urban population in Russia than in the Ukraine, until the shares of urban population in both countries became almost identical. This period was also characterized by a higher rate of decline in the rural population of the Ukraine; this unfortunately cannot be attributed to the process of urbanization but rather to physical losses during World War I and to famine during the period of collectivization. The varying magnitudes of urban and rural changes in both countries have produced different rates of overall growth. It is evident that Russia has been a gainer in this regard; her annual rate of growth exceeded growth in the Ukraine.

The next twenty years, which cover the periods of World War II and reconstruction, were characterized by low rates of overall growth in both countries, with particularly unsatisfactory results for the Ukraine. The total population of the country hardly changed. Its annual rate of growth was 2.5 times lower than that of Russia. The most significant feature of this period was the still very high rate of urban growth, counterbalanced by the corresponding decline in rural population. Unfortunately for the Ukraine, both these rates approximated only two-thirds of the levels applicable to Russia. The final outcome of this process was the urban advance of Russia, which overtook the Ukraine and created a negative gap of 2,800,000 persons.

Compared with this development, the following decade appeared to contain some corrective factors. For the first time in the period analyzed, the urban and total rates of growth in the Ukraine reached or even slightly exceeded those of Russia. What is interesting, however, is the significant difference in the rates of decline of rural population: it was much lower in the Ukraine than in Russia. When interpreting these results, one cannot help but conclude that the urbanization in the Ukraine in the 1959-70 period was not entirely sustained by the process of rural-urban transformation, but depended also on an urban influx from outside the republic. It appears that about one-third of the urban growth (6,542,000 persons) was attributed to the immigrants mainly from Russia, a fact which can easily be supported by reference to the increase in the Russian population in the Ukraine in the same period.⁹

⁹ In the Ukraine, the Russian population, which is predominantly urban, has increased from 3,055,000 (8.1 percent of the total population) in 1926 to 7,091,000 (16.9 percent) in 1959, to 9,126,000 (19.4 percent) in 1970; see *Itogi vsesoiuznoi perepisi naseleniia* in 1926, 1959, and 1970.

It is obvious that the projected data for 1980 are less reliable than those of the previous years, since they represent only very general approximations. They might be regarded as somewhat speculative but still highly probable. The forecasts for both countries are based on the 1959-70 annual rates of growth for the total population, and these may or may not be entirely true. Estimates of urban and rural residents are undertaken separately from past trends and then adjusted within the framework of global figures. The results show slightly lower rates of growth for urban population, and higher rates of decline for rural population than in the previous years. Thus the projection incorporates some tendency to continue with the self-sustained processes of urbanization within each of the republics, and reduces the effects of interregional rural-urban migrations.

It is interesting to note that in spite of somewhat larger rates of growth of urbanization in the Ukraine, the country does not reduce the existing gap, both absolutely and relatively. The deficit of 3,650,000 persons in urban centers in 1970, which amounted to 17.0 percent surplus in the rural population, increases to 4,278,000 persons and 21.6 percent in 1980. The urbanization backlog in the Ukraine can be expressed in terms of ten years of development. It can be seen from the table that 62.3 percent, which is the projected share of urban population in 1980, is exactly the same as that of Russia in 1970.

RANK-SIZE RELATIONSHIP OF URBAN CENTERS. The next objective of this study is to look into the distribution of urban centers by size, and to evaluate their structural composition. What one does expect is a reasonable mix, a balanced distribution of all sizes. The urban analyst should be able to spot the inherent strength or weakness of size distributions as they apply to two separate economic political regions or to various historical time intervals.

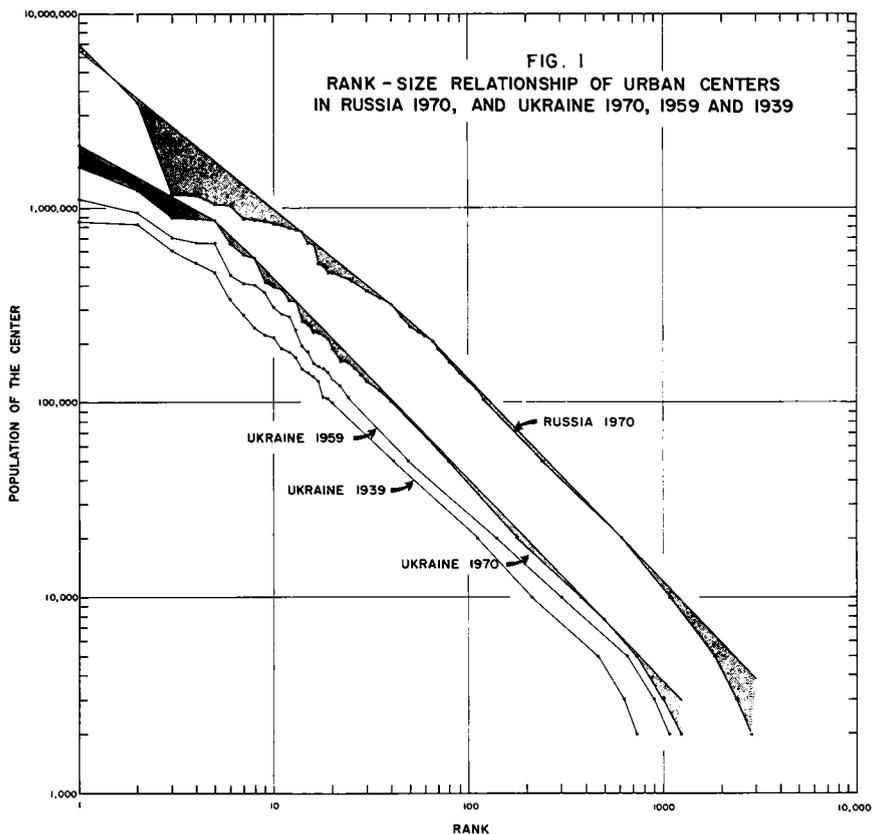
The customary technique is to use a two way logarithmic graph of urban sizes and their numerical frequencies known under the name of Zipf's rank-size relationship of urban centers.¹⁰ The following statistics (Table 3) and diagram (Figure 1) show the urban distribution patterns of the Ukraine in 1939, 1959, and 1970, in comparison with that of Russia in 1970. When evaluating the empirical results, one should concentrate on the slope and linearity of the existing relations.

¹⁰ G. K. Zipf, *National Unity and Disunity: The Nation as a Bio-Social Organism* (Bloomington, Indiana: The Principia Press, 1941). G. K. Zipf, *Human Behaviour and the Principle of Least Effort* (Reading, Massachusetts: Addison-Wesley, 1949).

Table 3
Size-Rank Distribution of Urban Centers in Russia, 1970 and in
the Ukraine, 1970, 1959, and 1939

Population (000)	Individual Frequency			Cumulative Frequency		
	Russia 1970	Ukraine 1970	Ukraine 1939	Russia 1970	Ukraine 1970	Ukraine 1939
5,000.1 & over	1			1		
2,000.1-5,000.0	1			2		
1,000.1-2,000.0	4	2		6	2	1
500.1-1,000.0	11	6	4	17	8	5
200.1-500.0	48	11	8	65	19	13
100.1-200.0	59	22	11	124	41	24
50.1-100.0	114	38	25	238	79	49
20.1-50.0	368	98	91	606	177	140
10.1-20.0	476	203	161	1,062	380	301
5.1-10.0	761	351	357	1,843	731	658
Under 5.0	995	551	418	2,838	1,242	1,076

Source: *Itogi*, pp. 62-63.



They can be detected as an approximation through a general observation or defined in more specific terms by mathematical methods of fitting a regression line.

For this particular study, the use of free-hand straight lines, tangent to the empirical curves, is preferred. They apply to 1970 urban structures in the Ukraine and Russia. The characteristic feature of these "evaluation" lines is their origin in the convex point of small centers in which these centers start rapidly to decline in strength. This mark is then joined in the form of a tightly fitting line with a suitable distribution of large centers. When selecting the other benchmark, one should minimize the discrepancies between the actual curve and the trend line. Since distribution patterns become irregular as one moves

up toward larger sizes, one or two additional designations may be required to extend the tangent lines to all centers. While plotting the successive lines in the northwest corner, one should not allow their slopes to exceed the preceding lines, since this would constitute departure from the requirement of the best fit. This qualification, however, does not apply to the largest center. In other words, the ultimate line does not need to end at the point of origin of the first center if this is excessively large.

In evaluating the distribution of urban centers in Russia, it can be observed that the strength of Moscow fits ideally into the existing pattern of hierarchical relationship (5 percent larger than the required population). This is not so, however, in the case of the Ukraine. There is a pronounced leveling off among the top centers, with the apparent weakness of the capital city, Kiev.¹¹ To make proper use of the methodology, the strength of the first center had to be upgraded by extrapolating it from the relationship between the second and third ranking centers (Kharkiv vs Odessa). Its theoretical location then became the termination point of our tangent lines. This was justified, since the final slope of urban distribution in the Ukraine was smaller than the preceding ones. Under reverse conditions, one would have had to position the line between the actual and the theoretical designation of the first center.

Having completed the drawing of the tangent lines, one might then ask for the interpretation of the results, which are focused in the shaded areas of the graphs. They represent the actual variations of urban structures in the Ukraine and Russia in 1970 from the imposed pattern of minimal linearity characterized by certain similarities and differences. Thus both urban groupings have a tendency to terminate (diminish numerically) at a certain size. In Russia, this comes quite early, at about 15,000 population, while in the Ukraine it does not appear until the 6,000 population mark. In practical terms, it means that the Ukraine has a relative surplus (stronger representation) of small urban centers.

¹¹ This fact was pointed out by Chauncy D. Harris, *Cities of the Soviet Union*, Studies in Their Functions, Size, Density, and Growth (Chicago: Rand McNally & Co., 1970). He was extrapolating the potential strength of the main centers from the numerical order of the last 10,000 population center. We do not, however, concur with these findings; they appear to be greatly exaggerated; 3,000,000 persons were projected for Kiev in 1959 (p. 134). We also find unrealistic his forecast for Moscow of 15,760,000 persons in the same year (p. 137). The main reason for these results is the acceptance by Harris of the theoretical (harmonic) slope for all urban sizes.

The distribution between 10,000 and 100,000 persons is characterized by a concave curve which is almost invisible in Russia but very strongly pronounced in the Ukraine. Its deepest penetration applies to the urban centers of between 15,000 and 30,000 persons, and disappears at 10,000 and 50,000 persons. This characteristic must lead one to conclude that there is a lack of development in such centers which one can interpret in terms of the missing population strength and/or numerical representation. In Russia the same feature in a very mild form applies to centers of between 10,000 and 50,000 persons.

The large-size centers of the Ukraine are characterized by an uneven distribution, a zig-zag pattern of size-rank relationship. In most cases, it is a natural phenomenon attributed to the individual variations among centers. In this general irregularity, however, one can discern a tendency toward a somewhat permanent deficit among the centers between 150,000 and 300,000 persons and then an abnormal strength erosion of the first four centers (Kiev, Kharkiv, Odessa, and Donets'k). Compared with these results, the two principal cities of Russia (Moscow and Leningrad) are very well developed. These favorable conditions, however, do not apply to the successive urban ranks, which show a deep concave for one million population centers and a similar but less pronounced drop for the 500,000 population centers.

Qualifying these findings, one should add that they represent the structural features and resulting abnormalities which were derived from the general characteristic of each urban distribution separately. No attempt has been made to mix the results together and to tie up one set of data with other. In other words, they do not show which country has a more developed (dense) network of urban centers. A look at the slopes for the two countries, particularly those applicable to the upper-size centers, leads one to certain expectations and conclusions which cannot be properly substantiated. The main reason for this is the varying scale of the two distributions (1,242 vs. 2,838 centers), which in turn reflects the ratio of population in both countries (47 vs. 130 million). In order to overcome this obstacle, one has to reduce the differences in size between the two countries; this can be done by comparing the strength of successive urban sizes with the appropriate shares of the population on farms and in lower ranking centers. Since the latter are normally located in some proximity to the larger centers, they may be justifiably identified as the tributary cen-

ters, and their population as that of the tributary areas. The method of this analysis is exemplified in Table 4 and Figure 2.

The graphic presentation shows a more developed status of the urban centers in Russia, exceeding the strength of their counterparts in the Ukraine. Closer inspection reveals that the same tributary area yields varying levels of urban population in comparable ranks. The greatest gap appears to apply to the centers with 20,000 persons (matched in Russia by 30,000 persons) and to the principal city of Kiev (population 1,632,000); it is lacking approximately an additional 1,000,000 persons. It is interesting to note that both countries have

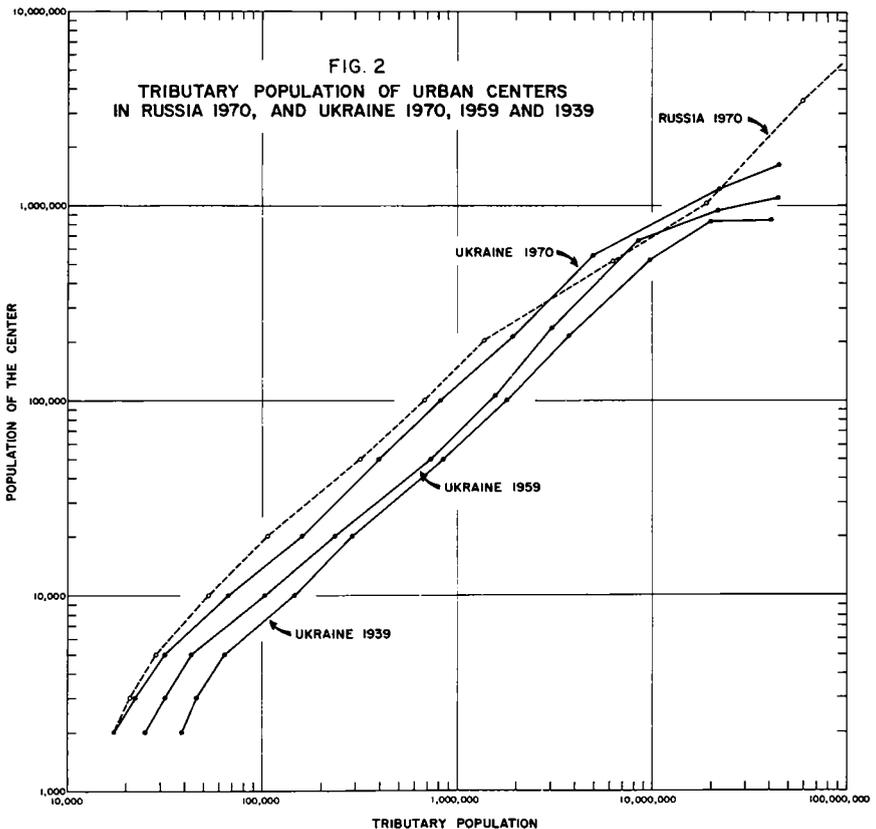


Table 4
Population of the Tributary Areas by Size of Urban Centers in
Russia, 1970 and the Ukraine 1970, 1959 and 1939

Population of the Center (000)	Total Tributary Population (000) ¹			Tributary Population per Center (000) ²		
	Russia 1970	1970	Ukraine 1959 1939	Russia 1970	1970	Ukraine 1959 1939
5,000.1 & Over	123,126	—	—	123,126.0	—	—
2,000.1-5,000.0	119,613	—	—	59,806.0	—	—
1,000.1-2,000.0	115,212	44,272	44,937	19,202.0	22,136.0	44,937.0
500.1-1,000.0	106,836	39,885	41,982	6,284.0	4,982.0	8,396.0
200.1-500.0	91,553	36,600	39,315	1,387.0	1,926.0	3,024.0
100.1-200.0	83,521	33,648	37,688	673.6	820.7	1,570.0
50.1-100.0	75,613	31,113	35,790	317.7	393.8	730.4
20.1-50.0	64,047	28,163	32,439	105.7	159.1	235.3
10.1-20.0	57,430	25,351	30,723	53.1	66.7	102.1
5.1-10.0	52,100	22,917	28,179	28.3	31.4	42.8
Under 5.0	49,087	21,438	26,901	17.3	17.3	25.0

Notes:

¹ Total population less population of the corresponding top centers.

² Total tributary population divided by the cumulative number of higher ranking centers.

Source: *Itozi*, pp. 8-9, 62-63, 76-77, 102-03.

the same share of farm population per center (17,300 persons).¹² The relative weakness of urban structure in Russia, when applied to centers with 500,000–1,000,000 persons, is confirmed again in the new graph. It is below the development level of similar size centers in the Ukraine.

The historical comparison of urban densities in the Ukraine in 1959 and 1970 shows a significant increase for centers in the middle-level range (30,000 vs. 50,000 persons, 60,000 vs. 110,000 persons) and the lower portion of the large centers (100,000 vs. 175,000 persons, 200,000 vs. 300,000 persons). It is less pronounced for the largest centers, with the exception of Kiev which records a considerable gain of 500,000 persons. A similar evaluation of 1939 and 1959 distributions reveals somewhat reverse tendencies, with the smallest increases recorded for intermediate size centers and more satisfactory growth for large centers. Overall, the total growth in this period appears to be less impressive when one takes into account that it was distorted by the effects of war and economic reconstruction.

The development of larger-size centers within the same tributary population can also be interpreted as an improvement in urban densities. Reversing the relationships discussed, we can observe that the same size urban centers require smaller tributary areas in Russia than in the Ukraine. Similar conditions can be validated historically. In practical terms, this means that the region or period which records higher densities (more developed status of urban centers) must have achieved this through other factors than the provision of service to people in the tributary areas. The most likely and logical conclusion is that the effects of industrialization add to the population agglomeration in the center and widen its reach beyond the borders of the traditional tributary area. Interpreted along this line, one can see that the Ukraine is still unable to catch up to the economic (urban) development in Russia in spite of impressive growth in the 1959–70 period.¹³

¹² In view of a previous statement about the shortcoming of urbanization in the Ukraine (54.5 percent) vs. Russia (62.3 percent), this proves that the deficit of 3,650,000 persons does not apply to the centers but to their undeveloped strength.

¹³ An interesting conclusion can be drawn from the information which was published in the economic yearbook of the Ukrainian Republic for 1973. (*Narodne hospodarstvo Ukrain's'koi RSR 1973*, p. 38–39). It shows the participation of the country in various types of industrial production in the Soviet Union which can be measured in terms of the specific weights (percents). They are listed in brackets following the designation of the particular industry. In evaluating the republic's performance, one should keep in

STATISTICAL ANALYSIS: UKRAINE—RUSSIA COMPARISON. One can effectively undertake the appraisal of contemporary urban structures by means of percentage shares applicable to populations in various size centers. Such results are free of the physical dimensions in the two countries, exposing only the inner composition of the urban groupings. By applying the standard of one region to the other (that of Russia to the Ukraine), one should be able to figure out the exact differences in structures which can be interpreted as specific deficits or surpluses.

Table 5 shows significant deficits for the urban population in three principal sizes: centers above 1,000,000, 200,000–500,000, and 20,000–50,000 persons. They amount to approximately two-thirds, one-half, and one-quarter of the present population in these classifications. The total deficiencies of 4.2 million persons are balanced by identical surpluses which apply primarily to the small-size centers and to one or two large-size urban groups. The three last classes of centers (under 20,000 persons) record a population excess ranging from 25 percent to 35 percent and account for approximately one-half of the total surplus. Compared with this effect, the large-size category of 500,000–1,000,000 persons shows an excessive strength of 40 percent, which is equivalent to 1.8 million persons. A relatively small surplus of 400,000 persons applies to centers with 100,000–200,000 persons. In terms of inner strength, this excess is less than 15 percent of the population in this group.

These results, which deal with the surpluses and deficits of population for various size centers, can easily be transformed into a similar analysis applicable to the number of centers. To accomplish this, one

mind the overall share of population which amounts to 19 percent and can be used as a yardstick of assessment for specific industrial development, or the lack of it. Thus it appears that the primary strength of the Ukraine lies in extractive-type activities: coal mining (32), natural gas production (29), iron ore mining (56), steel production (39). Also important are heavy machinery industries, such as production of locomotives (73), box cars (54), ploughs (53), seeders (49), and roofing materials (64). Next in line is the processing of agricultural products: sugar refining (59), butter production (33), and meat production (27). Compared with these shares, there is almost a complete lack of paper production (4) and cotton manufacturing (4). About half of the required share belongs to chemical production (12), automobiles (9), silk (11), woolen products (10), radios (8), washers (8), refrigerators (11), and photographic cameras (11). Surprisingly enough, the production of television sets is quite high (33). In general, the Ukraine lacks the bulk of manufacturing, which contributes to urban employment. The activities in which she leads are highly capital-intensive, and they have a tendency to concentrate in certain regions (extractive industries) or even rural areas (agricultural processing).

Table 5
Evaluation of Urban Structures in the Ukraine and Russia, 1970

Population of the Center (000)	Shares of Population Ukraine	Population Russia	Difference	Percent of Actual Distribution ¹	Deficit or Surplus in Persons ² (000)	Population per Center ³ (000)	Deficit or Surplus of Centers ⁴
1,000.1 & over	11.1	18.3	-7.2	-65.1	-1858	2,122.0	-9
500.1-1,000.0	17.2	10.3	6.9	39.8	1760	758.0	2.3
200.1-500.0	12.7	18.9	-6.2	-48.9	-1593	306.0	-5.2
100.1-200.0	11.5	9.9	1.6	13.7	403	137.0	2.9
50.1-100.0	9.9	9.8	.1	1.0	27	69.1	.4
20.1-50.0	11.5	14.3	-2.8	-24.5	-722	30.8	-23.4
10.1-20.0	10.9	8.2	2.7	25.4	714	13.8	51.7
5.1-10.0	9.5	6.6	2.9	30.6	745	7.0	106.4
Under 5.0	5.7	3.7	2.0	35.4	524	2.9	180.7
All centers	100.0	100.0	—	—	—	—	314.9

Notes:

¹ Difference in shares expressed as a percent of the actual shares of urban population in the Ukraine.

² Difference in shares multiplied by the total urban population of 25,689,000 persons.

³ Population in various urban ranks divided by the corresponding number of centers.

⁴ Deficits or surpluses in persons divided by the average population of the center.

Source: Same as in Table 4.

needs only to divide the previous population findings by the average size population in each urban size category. Having undertaken this step, we observe the lack of one center in the category of cities with population over 1,000,000 persons. Alternatively this means an insufficient level of development for Kiev and Kharkiv, which are able to absorb between themselves the size of an additional center in this category. The urban classification of 200,000–500,000 needs 5 more centers added to the presently existing 11 centers, while the group with populations of 500,000–1,000,000 has an excess of 2 out of 8 centers. A moderate surplus of 3 out of 22 centers exists in the size of 100,000–200,000 persons. One can see that the mutual transfers of credits and debits among the top four urban classifications reduce the magnitude of total variation to one center only. This still leaves, however, a very significant deficit of population of almost 1.3 million persons. There is also a shortage of 23 centers in the group of 20,000–50,000 persons, which is represented by a total of 98 centers. The smaller center ranks show considerable surpluses of centers which outweigh the cumulative deficits many times. Thus, the surpluses and deficits of population, when balanced within a total of 25,689,000 urban residents, yield a net surplus of 315 out of 1,242 centers. This is exactly 25 percent of the total.

These results appear to be in conflict with the figures in Table 4. The statistical analysis undertaken previously acknowledged that both republics, the Ukraine and Russia, had exactly the same average share of farm population per center in the tributary area (17,300 persons). If this is the case, then one cannot speak about surpluses of centers in the Ukraine but must refer to equal urban densities in both countries.

This statement is correct as far as it concerns the total number of centers, but it does not apply to their individual ranks (see details in Figure 2 and Table 4). Therefore, one should qualify the global results in terms of varying strength of the centers. For this purpose, one should recall that the proportion of urban population in the Ukraine amounted to only 54.5 percent, whereas in Russia it was 62.3 percent. If the Ukraine maintained the same ratio of urban to rural population as Russia, based on its 1970 rural population of 21,438,000 persons and 1,242 existing urban centers, then it would have required an urban population of 35,359,000 instead of 25,689,000. Thus 9,670,000 persons need to be added to the existing urban centers to match the Russian rural-urban ratio. This could have been achieved if the Ukraine's total population approximated 56.8 million and not 47.1 million persons.

One can also interpret the same issue in much simpler terms. The average urban population per center in Russia amounts to 28,534 persons, while in the Ukraine it reaches only 20,684 persons. The differential of strength equals 37.6 percent when considering the Ukraine as the basis for comparison. Thus one needs to increase the urban population of the Ukraine by the above percentage in order to eliminate the gap in community strength. (This yields the same result of 9,670,000 persons.) It is obvious that reversing the problem and applying the Russian strength of centers to the present urban population in the Ukraine must yield a reduced number of centers, as was shown in Table 5.

Under normal conditions, one does not import urban residents from outside a country, but relies on the transfer of rural population into urban settlements. Following this road of development, the level of urbanization in the Ukraine, comparable with that of Russia, can be achieved with a much smaller deficit, namely 3,650,000 persons (see Tables 2 and 6). An increase in the urban population to 29,339,000 is counterbalanced here by the same decrease in the rural population (down to 17,788,000). It is interesting to note that there are changes in deficits and surpluses for various urban sizes under the new assumed conditions. While they retain the same overall pattern, they show new numerical dimensions. All deficits get more intensified and the surpluses are reduced. One of the groups, 50,000–100,000 persons, which was adequately represented before, now falls short of the required share and the classification with 100,000–200,000 persons loses all its previous surplus.

The other feature which is recorded in Table 6 is the column of cumulative deficits. Starting this calculation with the evaluation of the largest center (over 1,000,000 persons) and proceeding downward toward smaller sizes, one can observe an almost continuous chain of increments. It reaches its cumulative peak of 4,956,000 persons at the level of centers with 20,000–50,000 persons. This amounts to 26.1 percent of the associated urban population, which is significantly more than the 14.2 percent applicable to the global cumulative deficit. The fact that the latter is smaller numerically is due to the offsetting results (surpluses) of urban centers in the last three size categories (under 20,000 persons).

HISTORICAL ANALYSIS. The comparison of 1970, 1959, and 1939 data discloses not only the general increase in the urban population, but also some significant changes in its structure. These can best be

Table 6
Allocation of Surpluses and Deficits to Various Sizes
of Urban Centers in the Ukraine, 1970

Population of the Center (000)	Actual Population (000)	Estimated Population* (000)	Deficit or Surplus (000)	Percent of Actual Population	Cumulative Actual Population (000)	Cumulative Deficits (000)	Percent of Actual Population
1,000.1 & over	2,855	5,379	-2,524	-88.4	2,855	-2,524	-88.4
500.1-1,000.0	4,417	3,034	1,383	31.3	7,272	-1,141	-15.7
200.1-500.0	3,255	5,536	-2,281	-70.1	10,527	-3,422	-32.5
100.1-200.0	2,952	2,911	41	1.4	13,479	-3,381	-25.1
50.1-100.0	3,535	3,867	-332	-13.1	16,014	-3,713	-23.2
20.1-50.0	2,950	4,193	-1,243	-42.1	18,964	-4,956	-26.1
10.1-20.0	2,812	2,397	415	14.8	21,776	-4,541	-20.9
5.1-10.0	2,434	1,931	503	20.7	24,210	-4,038	-16.7
Under 5.0	1,479	1,091	388	26.2	25,689	-3,650	-14.2
All centers	25,689	29,339	-3,650	-14.2			

Note:

* Derived from the 62.3% level of urbanization in Russia and size composition of urban centers in that country as shown in Table 5.
Source: Same as in Table 4.

illustrated in the annual rates of growth applicable to two separate time intervals (1959 vs. 1939, 1970 vs. 1959) and the entire period (1970 vs. 1939).

The best approach for the evaluation of the structural changes is the comparison of the annual rates of growth for various size centers with the overall rate applicable to all centers. The derived differences should indicate growing strength when the rates of certain groups are high, and a weakening when they trail behind the general averages. These results become even more conclusive when one attempts to couple them with the formerly discussed deficits and surpluses of the individual group classifications (see Table 7).

Viewed from this perspective, the upper group of centers (over 500,000 persons) records a favorable development; its rate of growth between 1959 and 1970 is twice as high as that of all centers and is still very significant when measured over the entire 1939-70 period (50 percent higher). This means that the deficiency of urban population in high-ranking centers has been gradually reduced, although not yet fully eliminated. A similar pattern applies to centers with 100,000-

Table 7
Structural Growth of Urban Population in
the Ukraine, 1939-70

Population of the Center (000)	Urban Population			Annual Rate of Growth		
	1939 (000)	1959 (000)	1970 (000)	1939-59	1959-70	1939-70
500.1 & over	2,762	4,065	7,272	1.95	5.43	3.17
200.1-500.0	1,739	2,667	3,255	2.16	1.83	2.04
100.1-200.0	1,371	1,628	2,952	.85	5.57	2.50
50.1-100.0	1,506	1,898	2,535	1.16	2.66	1.69
20.1-50.0	2,171	2,841	2,950	1.35	.34	.99
10.1-20.0	1,368	2,226	2,812	2.47	2.15	2.35
5.1-10.0	1,748	2,544	2,434	1.90	-.40	1.08
Under 5.0	904	1,278	1,479	1.75	1.34	1.60
All centers	13,569	19,147	25,689	1.74	2.71	2.08

Source: *Itogi*, p. 63.

200,000 persons, which are currently well represented in the urban structure of the Ukraine. Their rate of growth in the 1959–70 period was two times as high as the average but they had a less pronounced differential in 1939–70 (25 percent higher).

The negative effects of growth can be observed for the group of centers with 20,000–50,000 persons. Belonging to the deficit category, they show a very low rate of growth for the 1939–70 period (50 percent of the average) turning literally into stagnation in the last decade (one-tenth of the general rate). Similar qualifications, though not so marked, apply to the other deficit group, 200,000–500,000 persons. Its rate of growth over the entire period is at the average level, but in 1939–70 it reached only two-thirds of the general growth. This means that the previously discussed gap in the urban population of the Ukraine was not narrowed over time but was actually widened.

Regarding small centers, their population growth is far from uniform. The largest size group among them (10,000–20,000), which might be considered as the closest substitute for missing centers in the category of 20,000–50,000 persons, experienced an average or above average development. The next size (5,000–10,000) showed a long-term rate of growth approximating 50 percent of the general increase and was also characterized by an absolute decline in the 1939–70 period. This is an economically desirable pattern when one refers to the previously discussed population surplus in this group. The centers under 5,000 persons had a rate of growth lower than the average but significantly higher than the preceding size group. It reached 80 percent of the overall rate applicable to the entire period, and 50 percent of the rate characterizing the last decade.

The bulk of the growth for smallest centers must be attributed to the legal conversion of rural settlements into urban communities. An inspection of Table 3 reveals a 22.2 percent increase in centers under 5,000 persons (511 vs. 418) between 1959 and 1970 while the population increase in the same period (Table 7) amounts to only 15.7 percent. Compared with these results, the centers with 5,000–10,000 population had no increase in urban units (351 vs. 357) and no increase in population—in fact, they showed a 4.5 percent decline. The largest size group of small centers (10,000–20,000), in turn, is characterized by a 26.1 percent growth of centers (203 vs. 161) and a similar growth of population (26.3 percent).

Summarizing the findings, one can see the positive and negative effects of historical changes. The high rate of growth for large-size

centers appear to be helpful in correcting the inherited deficiencies of their underrepresentation. Similarly the arresting of growth for small-size centers (5,000–10,000) reduces their numerical surpluses. However, these offsetting changes do not refer to the deficient middle-size centers (20,000–50,000) which fare very badly, nor to the smallest-size urban centers, the number of which is still growing.

REGIONAL PATTERN OF URBANIZATION

In addition to global and size comparison, this study evaluates the regional distribution of urban centers and urban population. It illustrates this by means of urban density, i.e. the number of persons in the tributary areas. In other words, we incorporated the same conceptual framework that has been used in the Ukraine—Russia rank-size comparisons (see Figure 2 and Table 4), but abstained from the graphical illustration. The magnitude of analyzed regions (25 provinces) made its use fully impractical. Instead of this, we then concentrated our attention on the selected urban sizes represented by populations under 5,000 and over 5,000, 10,000, 20,000, 50,000, and 100,000. We calculated the population of their tributary areas, which was composed of rural residents, for centers under 5,000 persons, and the appropriate shares of the urban population as one moved along the scale of community sizes. In other words, we followed the concept of hierarchical structure, which was not necessarily confined in practice to the classifications mentioned.

The uneven dispersal of various center ranks was evidenced in the presence of a low or high number of persons in the tributary areas. The lower the figure, the denser was the distribution of urban centers considered to be and, in reverse, a higher concentration of residents in the associated areas was identified with the lack of urban centers. The detailed results of urban densities for individual provinces, and the underlying statistical information, are listed in Tables 8 and 9.

It becomes apparent that the outcome of our calculations does not lend itself to general evaluation. The findings are much too polarized, so that it is difficult to comprehend them in a meaningful fashion. To facilitate this objective, one has to abstract them, to reduce the individual variations and confine them into a pattern through some suitable grouping. This task was accomplished by using the method of quartile distribution. The characteristic feature of this statistic is the splitting of analyzed units into four equal parts.

Table 8
Rank-Size Distribution of Urban Centers in the Ukraine by Province, 1870

Province	Individual Frequency Population of the Centers (000)					Cumulative Frequency Population of the Centers (000)						
	100.1 and over	50.1-100.0	20.1-50.0	10.1-20.0	5.1-10.0	Under 5.0	100.1 and over	50.1-100.0	20.1-50.0	10.1-20.0	5.1-10.0	Under 5.0
1. Cherkasy	1	2	1	11	8	1	1	3	4	15	26	34
2. Chernihiv	1	2	-	8	23	-	1	3	3	11	23	46
3. Chernivtsi	1	-	-	3	6	1	1	1	1	4	12	18
4. Crimea	3	3	3	6	17	3	3	6	9	15	33	50
5. Dnipropetrovsk	4	2	8	11	32	4	6	14	14	25	43	75
6. Donetsk	7	8	16	30	96	7	15	31	31	61	90	186
7. Ivano-Frankivsk	1	1	2	4	20	1	1	1	3	7	19	39
8. Kharkiv	1	1	8	14	28	1	2	2	10	24	48	76
9. Kherson	1	-	3	6	14	1	1	1	4	10	24	35
10. Khmel'nyts'kyi	1	1	4	5	16	1	2	2	6	11	16	32
11. Kirovohrad	1	1	2	9	12	1	2	2	4	13	23	35
12. Kiev	2	-	7	14	7	2	2	2	9	23	41	48
13. Lviv	1	1	4	9	40	1	2	2	6	15	35	75
14. Mykolaiv	1	1	2	4	10	1	2	2	4	8	18	25
15. Odessa	1	1	5	6	12	1	2	2	7	13	25	39
16. Poltava	2	-	2	10	7	2	2	2	4	14	25	32
17. Rovno	1	1	2	3	12	1	1	1	3	6	13	25
18. Sumy	1	2	4	6	11	1	3	3	7	13	24	36
19. Ternopil'	-	1	-	5	10	-	-	1	1	6	16	29
20. Transcarpathia	1	-	3	2	4	-	-	1	5	7	19	23
21. Vinnytsia	1	-	4	6	9	1	1	1	5	11	27	36
22. Volyn'	-	1	3	1	20	1	1	1	4	4	11	31
23. Voroshyl'ovhrad	5	7	11	16	64	5	12	23	39	74	138	
24. Zaporizhzhia	3	2	9	9	9	3	3	5	14	23	32	47
25. Zhytomyr	1	2	2	5	24	1	1	3	5	10	23	47
Ukraine	41	38	98	203	511	41	79	177	380	731	1,242	

Source: "Itogi," pp. 102-10.

Table 9
Population of the Tributary Areas by Size of Urban Centers and Provinces in the Ukraine, 1970

Province	Total Tributary Population Population of the Centers (000)					Tributary Population per Center Population of the Centers (000)						
	100.1 and over	50.1-100.0	20.1-50.0	10.1-20.0	5.1-10.0	Under 5.0	100.1 and over	50.1-100.0	20.1-50.0	10.1-20.0	5.1-10.0	Under 5.0
1. Cherkasy	1,376	1,258	1,230	1,061	996	972	1,376.6	419.2	307.5	70.8	38.3	28.6
2. Chernihiv	1,401	1,287	1,287	1,183	1,094	1,020	1,401.0	1,401.0	427.1	107.6	47.6	22.2
3. Chernivtsi	658	658	658	625	570	553	658.1	658.1	658.1	156.1	47.5	30.7
4. Crimea	1,209	1,001	912	837	714	667	402.6	166.9	101.3	55.8	21.6	13.3
5. Dnipropetrovsk	1,556	1,415	1,164	1,009	877	794	388.9	235.8	83.2	40.4	20.4	10.6
6. Donetsk	2,490	1,933	1,488	1,040	839	616	355.7	128.9	48.0	17.0	9.3	3.3
7. Ivano-Frankivsk	1,144	1,144	1,063	1,011	930	865	1,144.3	1,144.3	354.2	144.4	48.9	22.2
8. Kharkiv	1,603	1,552	1,323	1,128	958	868	1,603.3	755.8	132.3	47.0	20.0	11.4
9. Kherson	769	769	682	603	509	475	769.3	769.3	170.4	60.3	21.2	13.6
10. Khmel'nyts'kyi	1,502	1,445	1,337	1,271	1,233	1,184	1,502.4	722.7	222.8	115.5	77.0	37.0
11. Kirovohrad	1,071	1,002	940	818	749	707	1,070.6	500.6	234.9	62.9	32.6	20.2
12. Kiev	1,725	1,725	1,510	1,328	1,202	1,179	862.7	862.7	167.8	57.7	29.3	24.6
13. Lviv	1,875	1,819	1,664	1,538	1,398	1,280	1,875.4	909.7	277.4	102.5	39.9	17.1
14. Mykolaiv	819	758	690	635	565	543	817.1	378.8	172.5	79.4	31.4	21.8
15. Odessa	1,427	1,427	1,283	1,196	1,104	1,055	1,497.5	739.0	183.3	92.0	44.2	27.0
16. Poltava	1,338	1,338	1,269	1,131	1,050	1,027	669.1	669.1	317.3	80.8	42.0	32.1
17. Rovno	932	932	885	842	798	759	932.0	932.0	295.1	140.3	61.4	30.4
18. Sumy	1,346	1,213	1,067	974	896	850	1,345.5	404.2	152.4	74.9	37.3	23.6
19. Ternopil'	1,153	1,068	1,068	995	925	884	3,028.1*	1,068.0	1,068.0	165.8	57.8	30.5
20. Transcarpathia	1,057	935	863	837	757	743	2,201.1*	467.4	172.6	119.5	39.8	32.3
21. Vinnytsia	1,920	1,920	1,808	1,728	1,621	1,590	1,920.3	1,920.3	361.5	157.1	60.0	44.2
22. Volyn'	974	881	778	765	725	661	1,906.5*	880.6	194.4	152.9	65.9	21.3
23. Voroshyl'ovhrad	1,887	1,414	1,095	882	643	480	377.5	117.8	47.6	22.6	8.7	3.5
24. Zaporizhzhia	880	880	824	701	637	608	293.3	293.3	164.7	50.0	27.7	19.0
25. Zhytomyr	1,466	1,338	1,276	1,216	1,128	1,059	1,465.7	446.1	255.2	121.6	49.0	22.5
Ukraine	33,647	31,113	28,163	25,351	22,917	21,438	820.7	393.8	159.1	66.7	31.4	17.3

Note: * Due to the lack of appropriate centers, the tributary areas have been derived from the population total of the province and the tributary area of the neighboring center, such as: Lviv, Ivano-Frankivsk, and Rovno.

Source: "Itogi," pp. 14-17, 102-11.

In the case of the regional density data, the employment of this method encountered certain difficulties. These were due to the uneven sizes of individual provinces and the extreme variations of their urbanization. To overcome these obstacles, the weighted values of the upper and lower quartiles and the median applicable to the equally divided tributary populations were used. In this way, the varying sizes of individual provinces were standardized, but the internal variations within the groups, which yielded significant effects of skewness, were not eliminated. This was undertaken in the next step, when the calculated values were adjusted for a more balanced distribution within a framework of empirical totals. As a last step, the three dividing marks were applied to the individual distribution in order to secure the best possible fit. This resulted occasionally in some slight alteration of the derived results, which provided, in turn, a more logical division of the four groups.

The summary results of the analyzed data (see Table 10) unfold certain features of urban densities which can be identified throughout all the stages of statistical processing. Thus, the comparison of actual means with medians (modified means) shows a significant pattern of skewness which applies to all center ranks. Tilted toward the areas with a high level of agglomeration (see also individual results in Tables 8 and 9), it is most pronounced for centers over 50,000 and least for centers above 5,000 persons. This can be observed in the magnitudes of mean to median ratios.

The evaluation of quartile values reflects a wide range of dispersion measured by the coefficient of variation. It shows the percent relationship between quartile range (Q_3-Q_1) and the sum of the quartile values (Q_3 and Q_1). Since the original data did not produce equal class intervals and the coefficient of variation exceeded 50 percent, it was necessary to go through the successive stages of adjustment as is shown in Table 10. It is interesting to note that the common feature for all results is the relatively narrow amplitude of variation in urban densities for small centers (over 5,000 persons and 2,000 persons) when compared with the middle-size and large centers.

The most rewarding results, however, were secured through the transfer of the grouped information material into maps. This was undertaken separately for each of the analyzed community ranks, as shown in Figures 3-8. We must abstain from a detailed discussion of the individual distributions and concentrate more on the evaluation of the summary results.

Table 10
 Characteristics of Urban Densities (Tributary Populations)
 in the Ukraine by Size of the Centers, 1970

Population of the Center (000)	Median (000)	Mean (000)	Percent Ratio	Quartiles		Coefficient of Variation
				Upper (000)	Lower (000)	
A. Original data:						
Over 100	1,084.5	820.7	75.7	1,924.7	521.5	57.4
Over 50	575.1	393.8	68.5	899.0	252.2	56.2
Over 20	212.0	159.1	75.0	326.0	105.2	51.2
Over 10	96.2	66.7	77.3	126.4	45.3	47.2
Over 5	40.1	31.4	78.3	52.8	22.3	40.6
Over 2	23.9	17.3	72.4	30.7	12.0	43.8
B. Adjusted for skewness:						
Over 100	1,150.8	820.7	71.3	1,709.6	592.0	48.6
Over 50	583.2	393.8	67.5	872.7	293.6	49.7
Over 20	213.8	159.1	74.4	320.3	107.3	49.8
Over 10	86.0	66.7	77.6	126.4	45.6	47.0
Over 5	39.0	31.4	80.5	52.8	25.2	35.3
Over 2	22.8	17.3	75.9	30.7	14.8	35.0
C. Adjusted for mapping:						
Over 100	1,150.8	820.7	71.3	1,685.3	616.2	46.5
Over 50	583.2	393.8	67.5	826.8	339.5	41.8
Over 20	213.8	159.1	74.4	320.0	107.6	49.7
Over 10	86.0	66.7	77.6	129.1	43.0	50.0
Over 5	39.0	31.4	80.5	53.3	24.6	36.8
Over 2	22.8	17.3	75.9	29.9	15.7	31.1

Source: Same as in previous tables.

It is apparent from all the maps that the highest density of urban population (lowest level of population in the tributary areas) applies to the southeastern Ukraine; it is concentrated in the provinces of Donetsk, Voroshylovhrad, Dnipropetrovs'k, Crimea, and Zaporizhzhia. The first three of these exceed the limits of the lower

FIG. 3: TRIBUTARY POPULATION OF URBAN CENTERS OVER 2,000 PERSONS IN THE UKRAINE, 1970

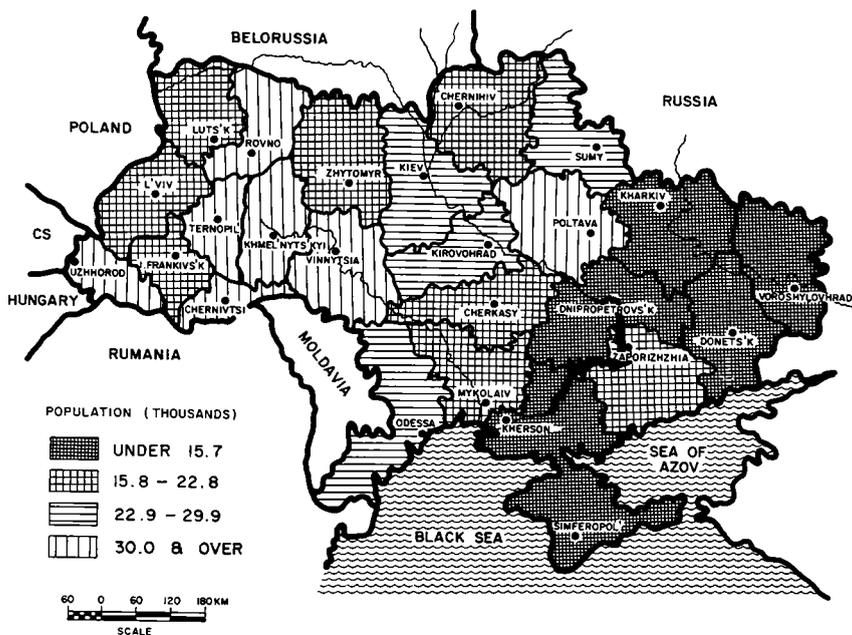


FIG. 4: TRIBUTARY POPULATION OF URBAN CENTERS OVER 5,000 PERSONS IN THE UKRAINE, 1970

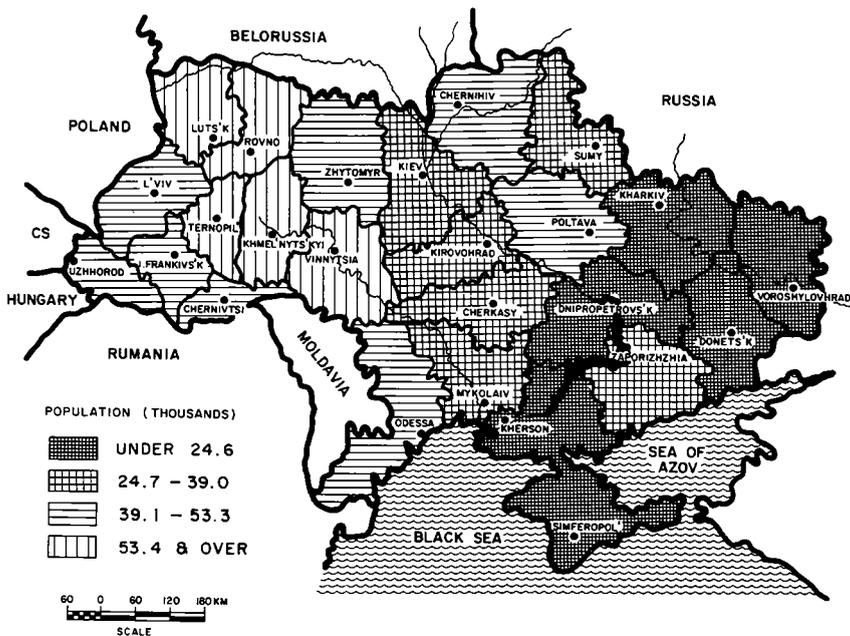


FIG. 5: TRIBUTARY POPULATION OF URBAN CENTERS OVER 10,000 PERSONS IN THE UKRAINE, 1970

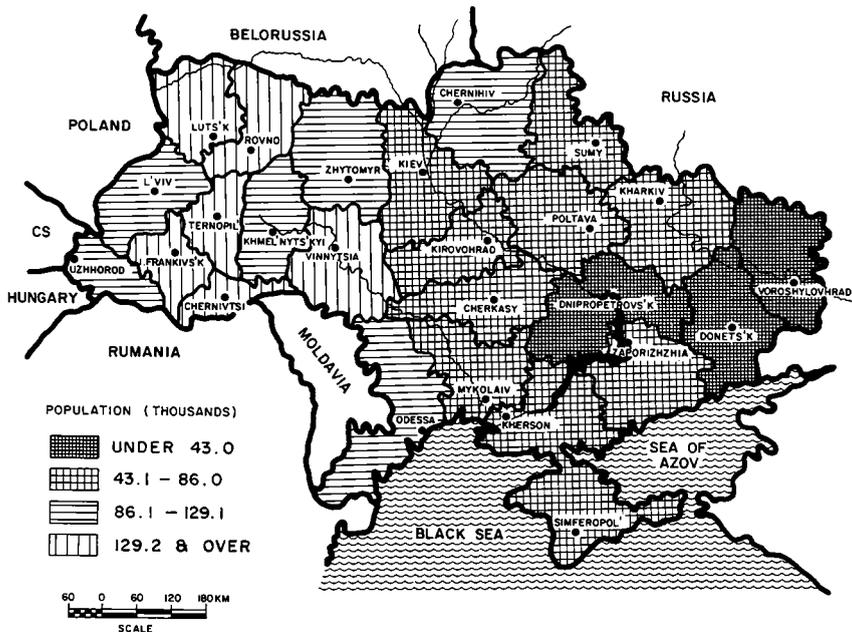


FIG. 6: TRIBUTARY POPULATION OF URBAN CENTERS OVER 20,000 PERSONS IN THE UKRAINE, 1970

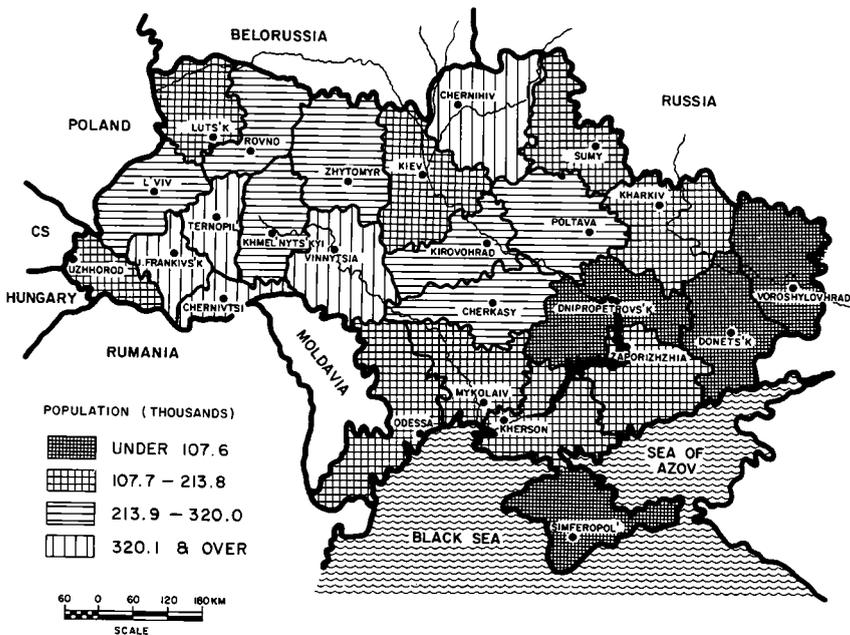


FIG. 7: TRIBUTARY POPULATION OF URBAN CENTERS OVER 50,000 PERSONS IN THE UKRAINE, 1970

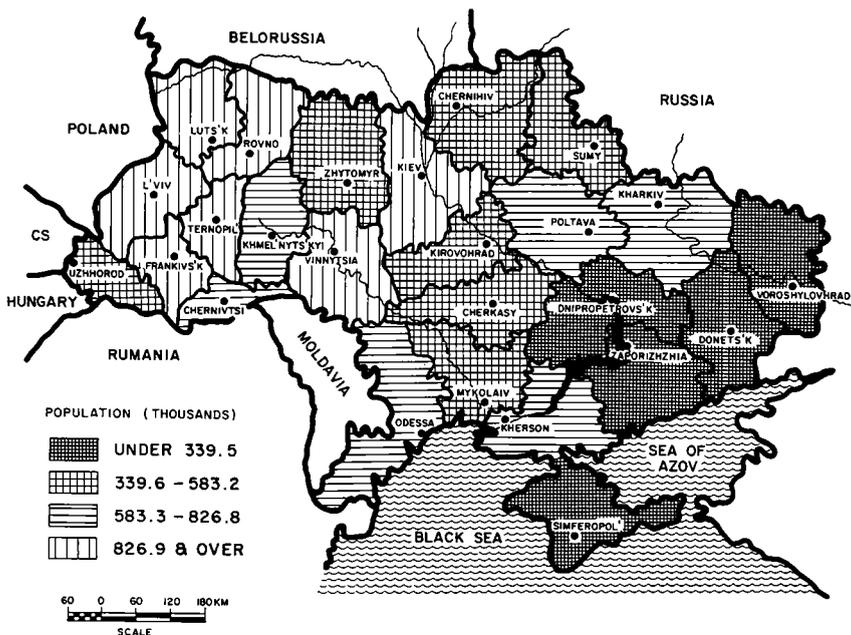
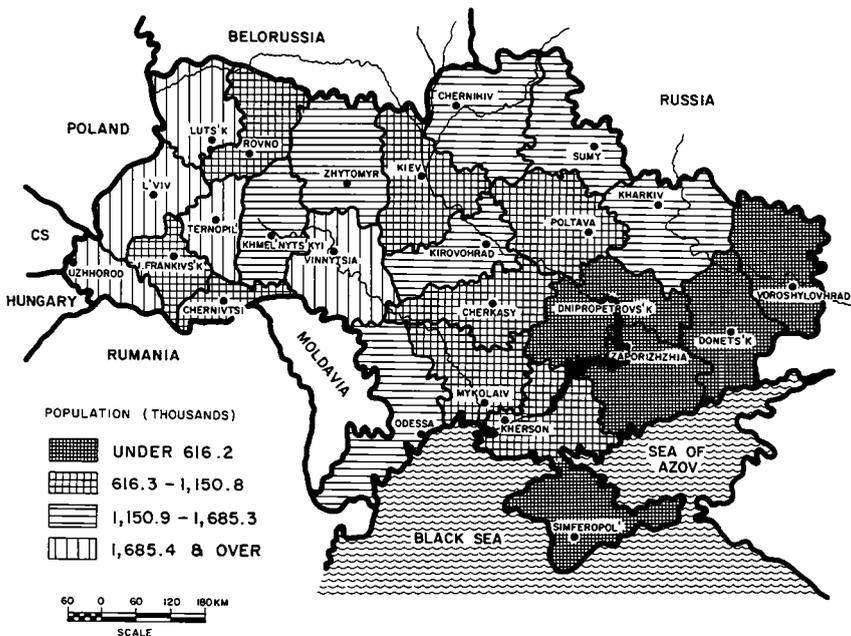


FIG. 8: TRIBUTARY POPULATION OF URBAN CENTERS OVER 100,000 PERSONS IN THE UKRAINE, 1970



quartile in all community sizes; the province of Crimea weakens somewhat for centers above 10,000 persons, while the administrative area of Zaporizhzhia shows a definite split along the line of small and large centers. It is very strongly developed at the level of centers above 50,000 and 100,000 population (Zaporizhzhia, Melitopol', and Berdians'k) and retains only about-average strength for all other urban categories.

The second group of territorial units which appear to exceed the median strength consists of seven surrounding provinces. They are the areas of Kherson and Kharkiv, which are very strongly represented by centers above 5,000 and 2,000 persons, but lack suitable development of large centers. Both provinces record the shortfall of communities in the 50,000–100,000 persons classification and the Kharkiv region shows the same effect for centers over 100,000 persons. Appearing to be a paradox at first (consider the size of Kharkiv city), the latter result must be attributed to the existence of one large center within a relatively large tributary area. These urban sizes push down the particular ranking of the provinces into the category of below-median strength.

The two neighboring areas of Mykolaiv and Kirovohrad have a uniform rating which exceeds the average (median); the only exception is the weakening of the urban classification over 20,000 persons, in the administrative unit of Kirovohrad (below the average strength). The three additional provinces, Cherkasy, Kiev, and Sumy, show the same below-average development of small centers, over 2,000 persons. The administrative divisions of Cherkasy and Sumy also earn the same rating for the principal centers over 100,000 persons. The province of Kiev, in turn, appears to be very weak (lowest rating classification) in centers over 50,000 persons, while the Cherkasy area is deficient (below-average strength) in centers over 20,000 persons.

Summarizing the effects of the second strongest urbanized areas, we can observe that they closely adjoin the primary developed region in both western and northern directions. They appear to stop exactly along the Kiev-Odessa axis. An exception to this pattern is the exclusion of two provinces, Poltava and Chernihiv, which split this region into two parts (Kharkiv and Sumy vs. Kiev, Cherkasy, Kirovohrad, Mykolaiv, and Kherson). They appear to be somewhat less developed and belong to the third ranking (below-average) category.

A characteristic feature of the Poltava and Chernihiv urban distributions is their haphazard variation of ranks. Thus the Poltava

region shows above-average strength for large centers over 100,000 persons (effect of Poltava and Kremenchuk) and centers over 10,000 persons. Compared with this, the representation by small centers, over 2,000 persons, is very weak. The Chernihiv area, in turn, has a relatively sufficient number of small centers over 2,000 persons (above-average rating) and centers in the category of 50,000–100,000 persons (Pryluky and Nizhyn). This beneficial effect is offset by the lack of centers above 20,000 persons which have the lowest level of rating.

The two provinces bordering in the west are Zhytomyr and Odessa. The first of them shows below-average strength for most of the community sizes, excepting the two groups, 2,000–5,000, and 50,000–100,000 persons, which exceed the median urban density (have the tributary population below the middle mark). The latter effect is attributed to the relative strength of two cities, Berdychiv and Korosten'. The second administrative area of Odessa shows a below-average density throughout the five center categories, with the exception of centers between 20,000 and 50,000 persons which yielded a higher than average rating. This is due to the existence of such centers as Kotovs'k, Bilhorod, Kiliia, and Balta.

The next subgroup in this category of urban densities consists of three southwestern provinces: L'viv, Ivano-Frankivs'k, and Transcarpathia. The first two can be characterized by an above-average development of small centers under 5,000 persons with the latter showing an opposite effect (lowest rating). The province of L'viv appears to be deficient in the number of large centers over 100,000 and 50,000 persons. There is only one of them in each of these two categories, L'viv and Drohobych, and this does not appear to be enough when considering the size of the tributary population. In Ivano-Frankivs'k, the rating of the principal center over 100,000 persons improves to above-average standing, while the three successive groups, over 50,000, 20,000, and 10,000 persons, drop into the lowest possible ranks. Transcarpathia, in turn, considering its population magnitude, has the undeveloped capital center and the relatively strong (above average) distribution of centers at the level of 50,000 and 20,000 persons.

Thus the third ranking area of urbanization (below-medium strength) consists of four separate pockets of administrative groups. Three of them, Poltava-Chernihiv, Zhytomyr, and Odessa, directly adjoin the region which was classified as the second highest in the

country. The fourth component, L'viv, Ivano-Frankivs'k, and Transcarpathia, appears to have an independent origin; it is quite remote from the others and isolated when considering its extreme location.

The last and least urbanized area consists of six provinces which merge into one territorial expanse that separates the previously discussed southwest region from the core of the Ukrainian territory. They are the administrative units of Ternopil', Vinnytsia, and Khmel'nyts'kyi (the geographic region of Podillia), Rovno and Volyn' (traditional territory of Volhynia), and Chernivtsi (historical Bukovyna).

The smallest amount of urbanization is found in the provinces of Ternopil' and Vinnytsia; they have a density below the value of the lower quartile in all six community groupings. The area of Khmel'nyts'kyi appears to be stronger in the urban sizes of over 10,000, 20,000, 50,000, and 100,000 persons. In the case of Volyn' province, the lowest grades (communities over 5,000, 10,000, 50,000, and 100,000 persons) are mixed, with standings exceeding the general average (urban sizes under 5,000 and over 20,000 persons). The latter outcome is due to the existence of such cities as Novovolyns'k, Kovel', and Volodymyr. The area of Rovno has a higher-than-average strength in centers over 100,000 persons (consider the effect of Rovno) and a below-average strength in centers over 20,000 persons (refer to Dubno and Zdolbuniv), while all other sizes fall into the least-developed category. Compared with these results, the province of Chernivtsi is well represented by a center over 100,000 persons (density above the average), has a relatively weak distribution in groups over 50,000 and 5,000 persons (below-average) and a very weak urban representation in sizes over 20,000, 10,000, and 2,000 persons.

After having observed the extreme variations in the regional location of urban centers in the Ukraine, one wonders to what extent they are permanent or transitional. How did historical development affect them? Are the recent changes such that they minimize the evident spread, or perpetuate the inherited inequalities?

The answer to these questions can be derived from the statistical material listed in Table 11. It divides the country into two regions: the advanced and the undeveloped urban areas. Since we were concerned with the urbanization effect of all community sizes, we used the percent of urban population as a common denominator. The resulting grouping is very similar to the one discussed under densities, with two

or three exceptions. The provinces of Odessa and L'viv, which belonged to the less-developed regions (below the medium density), have now moved into the category of advanced areas. This was mainly due to the impact of their relatively strong and well-developed principal centers. The province of Cherkasy, in turn, which has a well-developed network of urban centers (higher-than-average density) but a small size in the primary center, slipped back into the lower urban classification.

The historical progress over the years was not measured by the growth in urban population but by the relative changes in urbanization. Instead of calculating the annual rates of additions to the urban sector, which was isolated from the community at large, we preferred to evaluate the urban shares in 1939, 1959, and 1970. This yardstick of assessment appeared to be more suitable than the other one, since it was able to take into account the growth of the rural population and the intensity of the rural-urban transformation.

The numerical results show a significant spread in urbanization or both advanced and undeveloped areas in 1970; this exceeds a 2:1 ratio (66.9 percent vs. 31.5 percent). Due to a skewness of distribution (agglomeration of urban population in certain provinces), the overall average of the republic is higher (55.1 percent) than the interpolated middle point (48.8 percent). The chronological set of figures for 1959 and 1939 reveals 46.1 percent and 33.5 percent as comparable levels of urbanization in the Ukraine. This amounts to a 12.6 point increase in the period of 1939 to 1959 (.63 per year) and a 9.0 point increase between 1959 and 1970 (.82 per year).

Taking these findings into consideration, one might formulate the hypothesis that the inequality in the urban distribution would diminish if the rates of growth behaved inversely to the levels of urbanization. This would mean a lower-than-average growth for advanced areas and a higher-than-average increase for undeveloped areas. But inspection of the cumulative growth in the 1939-70 period repudiates this hypothesis. It shows that the majority of the provinces in the upper category exceeded the general level of increments. An exception to this pattern can be observed for the provinces of Donets'k, Voroshylohrad, Kharkiv, and Crimea. The slowdown of their urbanization is particularly apparent in recent years (1959-70). Two other provinces, Odessa and L'viv, also grew less than the average in the 1939-70 period. This should not, however, be very surprising

Table 11
 Historical Effect of Urbanization in the Ukraine,
 by Provinces, 1970, 1959, 1939

Province	Percent Urbanization			Increments in Urbanization		
	1970	1959	1939	1939-59	1959-70	1939-70
A. Advanced urban areas:						
Donets'k	87.4	85.8	78.0	7.8	1.6	9.4
Voroshylivhrad	83.6	79.3	65.8	13.5*	3.3	16.8
Dnipropetrovsk	76.2	70.2	53.0	17.2*	6.0	23.2*
Kharkiv	69.3	62.5	52.6	9.9	6.8	16.7
Kiev	66.0	54.8	41.4	13.4*	11.2*	24.6*
Zaporizhzhia	65.7	56.6	39.3	17.3*	9.1*	26.4*
Crimea	63.2	64.5	52.1	12.4	-1.3	11.1
Odesa	55.9	46.9	38.0	8.9	9.0*	17.9
Kherson	53.8	40.4	22.4	18.0*	13.4*	31.4*
Mykolaiv	52.7	39.6	27.0	12.6*	13.1*	25.7*
L'viv	47.3	38.9	31.7	7.2	8.4	15.6
Kirovohrad	43.9	30.4	18.7	11.7	13.5*	25.2*
Sumy	43.5	32.4	18.7	13.7*	11.1*	24.8*
Subtotal	66.9	59.7	45.5	14.2	7.2	21.4

B. Undeveloped urban areas:

Poltava	39.8	29.7	20.1	9.6	10.1*	19.7
Cherkasy	36.7	23.0	14.1	8.9	13.7*	22.6*
Zhytomyr	34.9	26.0	20.5	5.5	8.9	14.4
Chernivitsi	34.6	26.2	20.5	2.7	8.4	14.1
Chernihiv	34.6	22.4	15.9	6.5	12.2*	18.7
Volyn'	32.1	25.9	16.4	9.5	6.2	15.7
Ivano-Frankivs'k	30.8	22.8	22.9	-1	8.0	7.9
Transcarpathia	29.7	28.8	—	—	.9	—
Rovno	27.5	17.1	13.2	3.9	10.4*	14.3
Khmel'nyts'kyi	26.7	19.0	11.7	7.3	7.7	15.0
Vinnitsia	25.4	17.0	11.9	5.1	8.4	13.5
Ternopil'	23.3	16.5	14.5	2.0	6.8	8.8
Subtotal (1)	31.4	22.5	—	—	8.8	—
(2)	31.5	22.2	16.2	6.0	9.3	15.3
Ukraine (1)	54.5	45.7	—	—	8.8	—
(2)	55.1	46.1	33.5	12.5	9.0	21.6

Notes:

Case 1 covers all present territory while Case 2 excludes Transcarpathia.

Asterisks indicate significant increases in urbanization (exceeding the general average).

Source: *Itoqi*, pp. 14-17.

when considering that their center distribution qualified them for the category of undeveloped areas.

Among the twelve provinces in the second classification, only one administrative unit ranks above the general average; this is Kirovohrad, which could have been equally well considered under the first classification. Thus, the discussed results of 1939–70 disclose trends which are contrary to the process of urban equalization. With some slight exceptions, this period has enhanced the regional differences of urbanization in the Ukraine.

A positive trend of reversal, however, appears to have taken place in the last decade (1959–70). The statistical information shows that four additional provinces have reached or surpassed the general average of urbanization. They are Poltava, Chernihiv, and Rovno in the undeveloped sector of the republic, and Odessa, which is the border case of the classification. The remaining administrative areas in the "B" category trail behind the required standard but not by very much. Only three provinces, Transcarpathia, Volyn', and Ternopil', record a weak urban growth.

PRINCIPAL CENTERS

PRESENT CONDITIONS. It may be worthwhile to direct our attention to the principal urban centers in the Ukraine and to assess their present status of development before their possibilities of future growth are explored.

The first question arising here is that of selection. Statistical evidence in 1970 indicated the presence of 41 communities with population exceeding 100,000 persons. Is such a delineation satisfactory? Do we not miss some important centers below the specified minimum standard? Common sense implies that this is evidently the case. The population of urban centers taken in isolation is not the true yardstick of their importance. In view of the excessive urban agglomerations and dispersions, centers of the same absolute size may merit very different ranks in their respective spheres of influence. To evaluate the real role of such centers, one has to eliminate the differences between regions—an unsurmountable task. The closest approach we can devise is to relate the activity of urban centers to the rural population in the surrounding areas, in other words, to evaluate these centers as units consisting of two components—an urban and a rural component. This method possesses a self-correcting mechanism since usually the industrial centers, which are big, have a small tributary

rural population, and centers in rural areas, which are small, provide services to relatively large populations.

As a first step of analysis, we had to apportion the rural population in each province to the existing urban centers. This was done with the help of harmonic numbers, which are reciprocal equivalents of the numerical ranks. For example, ranks 1, 2, 3, and 4 correspond to the harmonic numbers 1.00, .50, .33, and .25. It is of practical importance that one can add the harmonic measures for individual ranks into cumulative totals, e.g. 1.00, 1.50, 1.83, and 2.08. This, in turn, lends itself perfectly to allocation of the rural population in the given area to the existing urban centers. One can observe that their share of the tributary rural population will depend largely on two factors: total size of the rural population and the number of urban centers, one of which has a magnifying and the other a diminishing effect. This can best be exemplified by two extreme cases: Donets'k and Vinnytsia:

	<i>Donets'k</i>	<i>Vinnystia</i>
urban population of the city	878,600	211,600
rural population of the province	616,400	1,589,800
number of urban centers	186	36

The allocation of rural population to Donets'k yields 106,200 persons (total 984,800), while it adds 380,800 persons to Vinnytsia (total 592,400).

Similar calculations for majors centers in each province helped to standardize the variances in the rural-urban relationship and made possible the evaluation of relative ranks of the centers in the republic. One could have stopped at this point if the objective mentioned had been the ultimate goal. Carefully assessing the results, we found it beneficial to undertake a second stage of standardization.

Up to this point, tributary populations were allocated within the confines of administrative areas. While this can be considered as satisfactory for most centers, it did not prove to be correct for major centers, the economic importance of which extends beyond these limits (e.g. Kiev, Kharkiv, Odessa, Dnipropetrovs'k, L'viv, etc.). To take account of this, we had to adjust the regionally standardized results to the level of a uniformly distributed urban-rural population. This meant extracting the rural component of 45.5 percent from the population totals of the centers in question and reallocating it to them again by using the harmonic total of 1242 centers. Later on, we adjusted the results by reducing them to the urban population.

Having conducted this analysis for some 100 centers, we then had to adopt a practical, if arbitrary, definition of principal centers. Starting from the premise of the existence of 41 centers with a population of 100,000 persons and over (the weakest of which are Konstantynivka and Krasnyi Luch in the Donets'-Basin), we found that 29 smaller centers entered into this group, due to their relative strength in the surrounding areas. Thus, we ended with a selection of 70 principal centers. This appears to be numerically manageable for the purpose of tabulation and discussion.

As a final practical step in this analysis, we used the standardized urban population as a benchmark for the evaluation of the actual population. This is recorded under a development index in Table 12. The individual results show deficits and surpluses which range widely in both directions. There are 30 centers which exceed the standardized population estimates and 40 centers which fall short of them. It is interesting to note the relatively high deficit, which is one-quarter of the present population, for Kiev, Poltava, Zhytomyr, Rovno, and a 50 percent backlog of development for Khmel'nyts'kyi, Uzhhorod, Kamianets', etc. Compared with these results, the centers in the Donets'-Basin have a surplus ranging from 50 percent (Donets'k) to 100 percent (Horlivka).

The lack of major centers in the Ukraine and their weak development were discussed in comparing the effects of urbanization in the Ukraine and Russia. There is, however, a significant difference between the two approaches. The first findings, which showed a 25 percent surplus of urban centers in the Ukraine, were derived from an adaptation of the urban distribution in Russia to that of the Ukraine. The latter was characterized by a significant population agglomeration in the upper sizes of centers. The present, second, approach attempts to equalize the distribution for the "undeveloped" level of urban services in the Ukraine, taking into consideration the existence of surplus centers. This is closely comparable to fitting a mathematical trend line to the actual structure, which has a lower slope than that of Russia. At the same time, it alters the ranks of individual centers by taking into account regional needs.

One should be very careful in interpreting the derived findings. They are hypothetical to a great extent, since they assume a uniform rate of urbanization throughout the country. This is contrary to the

Table 12

The Effect of Standardization on Principal
Urban Centers in the Ukraine, 1970

Center	Standardized Population (000)	Actual Population (000)	Devel- opment Index	Annual Rate of Growth 1959-70
1. Kiev	2,080.7	1,631.9	78.4	3.57
2. Kharkiv	1,174.5	1,222.9	104.1	2.30
3. Odessa	844.2	891.5	105.6	3.71
4. Dnipropetrovs'k	683.6	862.1	126.1	2.45
5. Donetsk	596.1	878.6	147.4	1.98
6. L'viv	494.9	553.5	111.8	2.75
7. Zaporizhzhia	456.7	657.9	148.0	3.53
8. Kryvyi Rih	384.0	573.2	149.3	3.31
9. Vinnytsia	344.6	211.6	61.4	5.14
10. Mykolaiv	285.4	331.0	116.0	3.15
11. Poltava	285.3	219.9	77.1	3.98
12. Zhdanov	261.2	416.9	159.6	3.57
13. Voroshylovhrad	261.2	382.8	146.6	3.07
14. Makiivka	235.4	392.5	166.7	.51
15. Khmel'nyts'kyi	221.4	113.0	51.0	5.53
16. Zhytomyr	213.6	160.9	75.3	3.91
17. Symferopol'	207.2	249.1	120.2	2.68
18. Cherkasy	201.5	158.3	78.6	5.84
19. Chernihiv	195.7	158.9	81.2	5.35
20. Kherson	187.4	260.7	139.1	4.66
21. Sumy	180.0	159.2	88.4	4.51
22. Horlivka	176.4	335.1	190.0	.77
23. Kirovohrad	172.7	188.8	109.3	3.32
24. Chernivtsi	165.7	186.8	112.7	1.88
25. Rovno	154.1	115.5	75.0	6.78
26. Ivano-Frankivs'k	150.0	105.0	70.0	4.24
27. Ternopil'	147.7	84.7	57.3	4.49
28. Sevastopol'	144.2	228.9	158.8	3.99
29. Dniprodzerzhyns'k	135.8	227.0	167.2	1.43

Table 12 Continued

Center	Standardized Population (000)	Actual Population (000)	Devel- opment Index	Annual Rate of Growth 1959-70
30. Kremenchuk	132.2	148.1	112.0	5.00
31. Uzhhorod	127.2	64.6	50.8	2.85
32. Luts'k	124.1	93.9	75.7	4.86
33. Bila Tserkva	117.6	108.5	92.3	3.98
34. Zhmerynka	112.0	36.2	32.3	1.92
35. Melitopol'	106.3	136.9	128.8	3.41
36. Kamianets'	102.4	57.1	55.8	3.22
37. Ismail	98.7	70.3	71.2	3.51
38. Berdychiv	96.6	71.5	74.0	2.72
39. Drohobych	94.4	56.0	59.3	2.63
40. Uman'	91.4	63.4	69.4	3.26
41. Kadiivka	91.2	137.1	150.3	1.00
42. Kerch	87.9	127.6	145.2	2.41
43. Kramators'k	85.4	149.8	175.4	2.40
44. Nikopol'	82.9	125.0	150.8	3.79
45. Mukacheve	79.6	57.4	72.1	1.95
46. Oleksandriia	78.2	69.4	88.7	3.28
47. Pryluky	77.6	57.5	74.1	2.52
48. Konotop	77.5	68.4	88.3	2.16
49. Nizhyn	76.0	56.3	74.1	1.81
50. Komunars'k	75.8	122.8	162.0	2.12
51. Berdians'k	74.4	100.1	134.5	3.97
52. Shostka	73.5	64.4	87.6	4.70
53. Slovians'k	70.8	124.2	175.4	2.11
54. Izium	69.4	51.6	74.4	2.92
55. Lysychans'k	69.3	117.8	170.0	1.12
56. Koziatyn	67.8	26.7	39.3	1.43
57. Mohyliv	67.6	26.1	38.6	1.89
58. Shepetivka	66.6	38.7	58.1	1.77
59. Korosten'	65.7	55.8	84.9	3.54
60. Stryi	65.6	48.0	73.2	2.60
61. Smila	64.7	55.5	85.8	2.02
62. Pervomais'k	63.1	59.4	94.1	2.70

Table 12 Continued

Center	Standardized Population (000)	Actual Population (000)	Devel- opment Index	Annual Rate of Growth 1959-70
63. Fastiv	63.1	42.3	67.0	3.10
64. Kolomyia	60.9	41.1	67.5	2.50
65. Kalush	60.8	40.7	66.9	11.04
66. Dubno	60.0	25.4	42.3	2.86
67. Lubni	59.9	40.4	67.4	2.92
68. Novovolyns'k	58.9	41.2	69.9	5.07
69. Konstantynivka	57.7	105.4	182.7	1.58
70. Krasnyi Luch	57.6	102.6	178.1	.83
All centers	14,353.6	15,043.4	95.4	2.92

Source: *Itogi*, pp. 43-49.

facts. Therefore, our development targets for individual centers are not concrete goals but only theoretical yardsticks for assessing the effects of historical development by showing the magnitude of real variations from the "ideal" model. There is no doubt that many of the inherent deficiencies can be corrected and altered to a great extent if properly recognized, but they can only rarely be fully eliminated. Already existing urban agglomeration cannot be dispersed but only slowed down, while weak centers can be helped through accelerated growth which, however, may still be insufficient to yield them the desired strength. This leads to the next section of the study, which deals with the rates of development of principal centers in past years.

It would be useful to test how the levels of development and the growth rates of principal centers relate to each other. This is demonstrated in Table 13. The first observation one can make is that there is a somewhat higher rate of growth (median value 2.92 percent) for this group than for all urban centers (2.71 percent). With regard to the regional differences of urbanization, favorable results can be expected from the inverse behavior of the developed (low rate of growth) and undeveloped centers (high rate of growth). Ideally, the best possible distribution could be achieved if the corresponding groups were concentrated in the "northwest" and "southwest" corners

Table 13
 Relationship between the Development Level of
 Principal Centers in the Ukraine (1970) and
 the Annual Rate of Growth (1959-70)

Develop- ment Index	Summary Results			
	High (2.93 percent and over)		Low (under 2.92 percent)	
	Annual Rate of Growth			
High (100.0 and over	No. of centers:	12	No. of centers:	18
	Median population:	245,000	Median population:	207,000
	Average population:	296,000	Average population:	377,000
	Development index:	139.3	Development index:	127.8
	Rate of growth:	3.60 percent	Rate of growth:	2.05 percent
Low (under 100.0)	No. of centers:	23	No. of centers:	17
	Median population:	95,000	Median population:	55,000
	Average population:	168,000	Average population:	49,500
	Development index:	74.8	Development index:	63.3
	Rate of growth:	4.15 percent	Rate of growth:	2.35 percent

Source: Same as in previous tables.

of the matrix. Inspecting the numerical distribution, we find that this pattern applies to 41 out of 70 centers. In other words, it is confirmed as a trend, but not overwhelmingly so. It is also interesting to note that the undeveloped centers are smaller in size than the developed ones, as can be deduced from the values of the median and mean population in each classification.

The individual centers, which appear to be scattered haphazardly over the four squares of the matrix (Table 14) merge into certain coherent groups when properly scrutinized. They show the geographic differentiation of strength previously discussed, and patterns of growth which are more pronounced than was evident in the regional analysis.

The well-developed centers, which record a slowdown in growth, are found in three or four definite clusters. One of them consists of the top ranking centers in the Ukraine: Kharkiv, Odessa, Dnipropetrovsk, and Lviv. The second group includes all the urban centers of Donets'-Basin (Donetsk, Makiivka, Horlivka, Kramatorsk, Kadiivka, Sloviansk, Komunarsk, Lysychansk, Konstantynivka, and Krasnyi Luch) except Voroshylovhrad which shows a rate of growth slightly higher than the average. The third classification embraces two cities of the highly urbanized Crimea (capital city Symferopol' and harbor city Kerch) and the metallurgical center of Dniprodzerzhynsk, which is located in close proximity to Dnipropetrovsk. The remaining link in the "northeast" square of the matrix is Chernivtsi, capital of Bukovyna. Generally, the slowdown of growth in all these centers may be regarded as socially beneficial; it releases human and capital investments for the support of weak centers.

The well-developed and fast-growing centers are made up of two principal groups. They are the seaports Zhdanov, Mykolaiv, Kherson, Sevastopol', and Berdiansk, and the metallurgical-industrial centers of Zaporizhzhia, Kryvyi Rih (iron ore), Nikopol' (manganite), Kremenchuk, Kirovohrad, and Melitopol'. They are joined by the previously mentioned mining center of Voroshylovhrad, which is also the provincial capital.

The category of undeveloped centers with high rates of growth is dominated by the political administrative centers including the main city of the republic, Kiev. Here, also, belong the provincial capitals of Poltava, Vinnytsia, Zhytomyr, Sumy, Chernihiv, Cherkasy, Rovno, Khmel'nyts'kyi, Ivano-Frankivsk, Luts'k, and Ternopil'. An exception to this pattern is the relatively low rate of growth of Uzhhorod,

Table 14
 Relationship between the Development Level of Principal Centers in the Ukraine (1970)
 and the Annual Rate of Growth (1959-70)
 Individual Centers

Develop- ment Index	Annual Rate of Growth	
	High (2.93 percent and over)	Low (under 2.92 percent)
Zaporizhia	658/148/3.5	1223/104/2.3
Kyyiv Rih	573/149/3.3	892/106/2.7
Zhdanov	417/160/3.6	879/147/2.0
Voroshyl'ovhrad	383/147/3.1	862/126/2.5
Mykovaiv	331/116/3.2	554/112/2.8
Kherson	261/139/4.7	393/167/.8
Sevastopol'	229/159/4.0	335/190/.8
Kirovohrad	189/109/3.3	249/120/2.7
Kremenchuk	148/112/5.0	227/167/1.4
Melitopol'	137/129/3.4	187/113/1.9
Nikopol'	125/151/3.8	150/175/2.4
Berdians'k	100/135/4.0	137/150/1.0
Kharkiv		
Odessa		
Donets'k		
Dnipropetrovs'k		
L'viv		
Makiivka		
Horlivka		
Symferopol'		
Dniprodzerzhyns'k		
Chernivtsi		
Kramators'k		
Kadiivka		
Kerch		
Slov'ians'k		
Komunars'k		
Lysychans'k		
Konstantynivka		
Krasnyi Luch		
128/145/2.4		
124/175/2.1		
123/162/2.1		
118/170/1.1		
105/183/1.6		
103/178/.8		
Kharkiv	85/57/4.5	72/74/2.7
Berdychiv	70/71/3.5	68/88/2.2
Konotop	69/89/3.3	65/65/2.9
Uzhhorod	64/88/4.7	59/94/2.7
Penvomais'k	63/69/3.3	58/74/2.5
Pryluky	57/56/3.2	57/72/2.0
Mukacheve	56/85/3.5	56/74/1.8
Nizhyn	42/67/3.1	56/59/2.6
Drohobych	41/70/5.1	56/86/2.0
Smila	41/67/11.0	52/74/2.9
Izium	40/67/2.9	48/73/2.6
Stoji		41/68/2.5
Kolomyia		
Ternopil'	1632/78/3.6	
Ismail	220/77/4.0	
Oleksandriia	212/61/5.1	
Shostka	161/75/3.9	
Uman'	159/88/4.5	
Kamianets'	159/81/5.4	
Korosten'	158/79/5.8	
Fastiv	116/75/6.9	
Novovolyns'k	113/51/5.5	
Kalush	109/92/4.0	
Lubni	105/70/4.2	
Luts'k	94/76/4.9	
Kiev		
Poltava		
Vinnitsia		
Zhytomyr		
Sumy		
Chernihiv		
Cherkasy		
Rovno		
Khmel'nyts'kyi		
Bila Tserkva		
Ivano-Frankivs'k		
Luts'k		
39/58/1.8		
36/32/1.9		
27/39/1.4		
26/39/1.9		
25/42/2.9		

Note: The three successive sets of numbers represent: population in thousands of persons, development index, and annual rate of growth.
 Source: Same as in Table 12.

the administrative center of Transcarpathia which can be found in the last, least favorable, classification. Other centers in the analyzed division are Izmail, the harbor city on the Dunai (Danube), Bila Tserkva (administrative "substitute" center in the province of Kiev) and the industrial cities of Shostka (chemical), Novovolyns'k (newly established coal-mining center), Kalush (potash), and Oleksandriia (brown coal processing). The final group in this classification consists of a few strongly secondary centers in the provinces, which are predominantly rural in character: Uman', Kamianets', Korosten', Fastiv, and Lubni.

The most neglected urban centers, underdeveloped and slow growing, are the remaining secondary hierarchies in the rural areas: Mukacheve, Drohobych, Stryi, and Kolomyia in southwestern Ukraine; Berdychiv, Shepetivka, Dubno, Zhmerynka, Koziatyn, and Mohyliv in the historical regions of Volyn' and Podillia; Konotop, Pryluky, and Nizhyn in northeastern Ukraine; Smila in the vicinity of Cherkasy and Izium in the Kharkiv province.

In sum, the analysis of principal centers reveals definite patterns of differentiation, which are much more pronounced than in the regional evaluation: the slowed-down growth of the well-established coal mining centers in the Donets'-Basin, counterbalanced by an expansion of undeveloped administrative centers. These desirable developments have been accompanied by an enhanced growth of already strong seaports and a complete disregard for the upgrading of secondary centers in the agricultural regions.

ADVANCED URBANIZATION. Analyzing the development status of major urban centers in the Ukraine and their past rates of growth, one cannot help but ponder the question of their future. What could be their ultimate strength and how long would it take to reach this objective? To tackle these problems, we have had to make a certain number of basic assumptions.

First, it was necessary to define the optimal level of rural-urban transformation. It appears that a 25:75 ratio could be regarded as quite satisfactory for the republic which is richly endowed with both agricultural and mineral resources. To reach this ratio, considerable time is needed. Estimates in Table 2, which incorporated the leveling-off effects of urban growth, did not envisage realization of this target for the Ukraine before 1995 and for Russia before 1985. Zeroing in on the latter date, we posed the question: commencing the intensified urbanization process in 1970, would it be possible for the Ukraine to catch up to Russia in a period of fifteen years?

Table 15
 Surplus Estimate of Rural Population in the Ukraine by Provinces
 at 75 Percent Level of Urbanization, 1970

Province	Actual Population (000)	Equalized Distribution ¹ (000)	Retained Population ² (000)	Surplus (000)	Percent of Actual Rural Population
1. Cherkasy	971.9	735.2	469.1	502.8	51.7
2. Chernihiv	1,020.0	1,058.8	578.7	441.3	43.3
3. Chernivtsi	552.6	267.1	225.2	327.4	59.2
4. Crimea	666.7	896.7	429.6	237.1	35.6
5. Dnipropetrovs'k	794.0	1,203.7	549.0	245.0	30.9
6. Donets'k	616.4	966.5	435.0	181.4	29.4
7. Ivano-Frankivs'k	865.0	458.5	363.7	501.3	58.0
8. Kharkiv	867.9	1,151.0	554.8	313.1	36.1
9. Kherson	475.5	993.2	403.6	71.9	15.1
10. Khmel'nyts'kyi	1,183.7	742.3	529.3	654.4	55.2
11. Kirovohrad	707.0	974.9	462.2	244.8	34.6
12. Kiev	1,179.2	953.2	585.9	593.3	50.3
13. Lviv	1,280.2	719.0	549.4	730.8	57.1

14. Mykolaiv	542.8	970.9	416.0	126.8	23.4
15. Odessa	1,054.6	1,224.7	626.3	428.3	40.6
16. Poltava	1,026.8	1,039.7	567.8	459.0	44.7
17. Rovno	759.3	663.0	390.8	368.5	48.5
18. Sumy	849.6	837.3	463.6	386.0	45.5
19. Ternopil'	883.9	503.2	381.2	502.7	56.9
20. Transcarpathia	742.8	422.1	320.1	422.7	56.9
21. Vinnytsia	1,589.8	965.1	702.1	887.7	55.8
22. Volyn'	661.4	666.2	364.8	296.6	44.8
23. Voroshylohrad	479.7	939.1	389.8	89.9	18.7
24. Zaporizhzhia	608.5	1,073.4	462.2	146.3	24.0
25. Zhytomyr	1,058.6	986.2	561.9	496.7	46.9
Ukraine	21,437.9	21,437.9	11,782.1	9,655.8	45.0

Note:

¹ Redistributed rural population was derived from regional relationships in total land and farmland area.

² Retained population represents 25.0 percent of the total population which is equivalent to 55.0 percent of the rural population. Provincial totals are made up of two equal parts (27.5 percent) from the actual and hypothetical data.

Sources: *Itogi*, pp. 14-17; *Narodne hospodarstvo Ukrainy: koï RSR v 1973 r.*, pp. 9, 197.

In the following projections, we have assumed an overall rate of urban and rural growth of 1 percent per annum. This would yield 54,713,000 persons for the Ukraine in 1985 as compared with 47,127,000 in 1970. The urban sector (75 percent) would require a 3.17 percent annual rate of growth. This is a higher level of aggregate development than the 2.71 percent experienced in the past, or the 2.44 percent projected for the future. This appears, however, to be quite realistic and attainable when compared with the individual performance of some large centers. At least it is plausible enough to be considered a variant of the theoretical model. Out of the projected urban increase of 15,346,000 persons (roughly one million persons per year), one-third could be considered as natural growth, while two-thirds would depend on rural transfers.

This leads next to the question of identifying the regional conditions for population movements. It is obvious that in view of varying rural densities, the outflow into urban centers would not be the same in all provinces. It would be more intense in the overpopulated areas and less so in the sparsely settled zones. This, in turn, would influence the urbanization process, resulting in an accelerated growth or a relative stabilization of existing centers. While these effects would be evident in all community sizes, they would particularly relate to small urban centers. The large centers have enough strength to attract the incremental population from wide tributary areas and therefore are less vulnerable to rural changes in the immediate surrounding.

Table 15 presents a tentative estimate of the rural surplus and its allocation to individual provinces. It is based on general approximations which lack the specifics of the agricultural conditions of farming and soil data. The actual distribution of rural population is compared with the equalized shares which were derived from the regional relationships in farmland (arable land and pastures) and total land areas (including forest).¹⁴ Since these two factors were also a subject of significant variations, they were properly adjusted to incorporate the most beneficial conditions for each province. The two patterns of population allotment (actual and hypothetical) were then assumed to contribute equally to the retained portion of the rural population (27.5 percent each). This yielded an overall surplus of 45.0 percent, varying considerably in individual cases. An inspection of the table shows that all the western provinces have a rate exceeding this

¹⁴ The most recent statistical information is available in the yearbook mentioned above, p. 9, 197.

yardstick while the southeastern and southern provinces fall below it. These findings appear to be quite realistic notwithstanding the fact that they were derived by means of a crude analytical technique.

The next point to be considered is the estimate of new urban centers. There is no doubt that the intensified urbanization process, which would require an exodus of 9,656,000 from rural areas, would also add to the number of existing urban centers. This appears to be a logical conclusion, despite previous statements about their relative excess at the present, when compared with urbanization in Russia. They will be needed particularly in areas which show a significant surplus of rural population. Their prediction in global terms (for the entire republic) does not cause any significant difficulty; it can be easily extrapolated from the past trend.

Table 16 shows urban populations of the Ukraine and Russia in 1959 and 1970, together with the corresponding numbers of existing centers. Taking into account the minimal size of an urban center, 2,000 persons, which is also contained in each larger center, we can estimate the core populations for both countries. In 1970, these were 9.7 percent in the Ukraine and 7.0 percent in Russia. Their differences reaffirm once more the previously mentioned advanced level of

Table 16
Population Effect of Incremental Communities
for the Ukraine and Russia, 1959-70

Country	Year	Urban Population (000)	Number of Centers	Core Population (000)	Percent of Core Population
Ukraine:	1970	25,688.6	1242	2,484.0	9.7
	1959	19,147.4	1076	2,152.0	11.2
		6,541.2	166	332.0	5.1
Russia:	1970	80,981.1	2838	5,676.0	7.0
	1959	61,611.1	2372	4,744.0	7.7
		19,370.0	466	932.0	4.8

Source: *Itogi*, pp. 62-63.

Table 17
 Estimate of Urban Centers in the Ukraine by Provinces
 at a 75 Percent Level of Urbanization, 1970

Province	Existing Centers	Standardized Requirements	Excess Centers	Incremental Centers	Total Demand	Percent of Present
1. Cherkasy	34.0	34.0	—	14.5	48.5	142.6
2. Chernihiv	46.0	40.8	5.2	12.7	53.5	116.3
3. Chernivtsi	18.0	14.0	4.0	9.4	23.4	130.0
4. Crimea	50.0	48.9	1.1	6.8	55.7	111.4
5. Dnipropetrovs'k	75.0	75.0	—	7.1	82.1	109.5
6. Donets'k	186.0	186.0	—	5.2	191.2	102.8
7. Ivano-Frankivs'k	39.0	32.3	6.7	14.4	46.7	119.7
8. Kharkiv	76.0	72.4	3.6	9.0	81.4	107.1
9. Kherson	35.0	31.4	3.6	2.1	35.0*	100.0
10. Khmel'nyts'kyi	32.0	30.5	1.5	18.8	49.3	154.1
11. Kirovohrad	35.0	33.4	1.6	7.0	40.4	115.4
12. Kiev	48.0	47.6	.4	17.1	64.7	134.8

13. L'viv	75.0	64.8	10.2	21.1	85.9	114.5
14. Mykolaiv	25.0	23.4	1.6	3.6	27.0	108.0
15. Odessa	39.0	38.4	.6	12.3	50.7	130.0
16. Poltava	32.0	30.5	1.5	13.2	43.7	136.6
17. Rovno	25.0	20.6	4.4	10.6	31.2	124.8
18. Sumy	36.0	36.0	—	11.1	47.1	130.8
19. Ternopil'	29.0	22.8	6.2	14.5	37.3	128.6
20. Transcarpathia	23.0	21.3	1.7	12.2	33.5	145.7
21. Vinnytsia	36.0	33.7	2.3	25.5	59.2	164.4
22. Volyn'	31.0	25.7	5.3	8.5	34.2	110.3
23. Voroshylovhrad	138.0	138.0	—	2.6	140.6	101.9
24. Zaporizhzhia	32.0	29.9	2.1	4.2	34.1	106.6
25. Zhytomyr	47.0	42.6	4.4	14.3	56.9	121.1
Ukraine	1,242.0	1,174.0	68.0	277.8	1,453.3	117.0

Note: * Retained at the maximum level of the presently existing centers.
Sources: Same as in previous tables.

urban development (dominance of large-size centers) in Russia. It is interesting to observe, however, that the shares of incremental centers in the incremental population are almost identical (5.1 percent vs. 4.8 percent). By applying the past rate of growth in urban centers to the projected transfer of rural population, we arrive at the global need of 278 new centers.

Table 17 allocates the requirement to individual provinces. It simply relates the national 5.1 percent rate to the rural surpluses in each administrative unit (see third last column in Table 17). Preceding this step, we attempted to assess the excess of the existing centers by comparing the standardized requirements with actual conditions. This procedure yielded 68 centers which were subtracted from the incremental needs before arriving at the total urban demand. The final result is 1,453 centers, a number which is 211 more than the 1970 level of 1,242. The highest numerical increases (in absolute and relative terms) apply to the provinces of Vinnytsia, Khmel'nyts'kyi, Transcarpathia, Cherkasy, Poltava, Kiev, Chernivtsi, Odessa, Sumy, Rovno, and Ternopil'. Significant needs, which have been offset to a large extent by the present excess of urban centers, are also apparent in L'viv, Ivano-Frankiv'sk, and Volyn'. The lowest increases relate to the southeastern and eastern regions of the Ukraine.

Estimating population for principal centers did not cause any difficulties. It simply involved the allocation of 9,656,000 persons to 1,453 settlements by means of harmonic numbers. Pursuing this task, we considered the relative ranks of the communities reflected in the standardization process of Table 12. Allowances were made, however, for variations in the projected levels of regional urbanization. Thus centers located in areas with a high surplus of rural population were beneficiaries of additional growth, while allotments for their counterparts were correspondingly scaled down. These increments were added to the resident population of principal centers in 1970. As a last step in the analysis, these estimates were increased by 16.1 percent, which is the compound total of a 15-year projected growth (1 percent annum) for 1985. The results thus arrived at are listed in Table 18.

Comparing Tables 18 and 12, one can notice significant differences in individual ranks. Vinnytsia, for instance, has dropped from 9th to 14th position, and Khmel'nyts'kyi from 15th to 25th. This is understandable when we realize the scope and objectives of both analyses. Unlike the standardization schedule, which assumed a theoretical reallocation of the total urban population, the present forecast in-

Table 18
The Projected Effect of 75 Percent Urbanization
on Principal Centers in the Ukraine, 1985

Center	1985 Population (000)	1970 Population (000)	1970 Devel- opment Index	Annual Rate of Growth 1970-85
A. Successive ranks:				
1. Kiev	3,271.3	1,631.9	78.4	4.75
2. Kharkiv	2,085.0	1,222.9	104.1	3.62
3. Odessa	1,477.0	891.5	105.6	3.42
4. Dnipropetrovs'k	1,316.0	862.1	126.1	2.86
5. Donets'k	1,274.1	878.6	147.4	2.51
6. Zaporizhzhia	924.9	657.9	148.0	2.30
7. L'viv	906.3	553.5	111.8	3.34
8. Kryvyi Rih	823.1	573.2	149.3	2.44
9. Zhdanov	584.0	416.9	159.6	2.27
10. Makiiivka	546.6	392.3	166.7	2.24
11. Voroshylovhrad	528.1	382.8	146.6	2.17
12. Mykolaiv	481.4	331.0	116.0	2.53
13. Horlivka	446.4	335.1	190.0	1.93
14. Vinnytsia	436.1	211.6	61.4	4.94
15. Poltava	383.7	219.9	77.1	3.78
16. Symferopol'	354.0	249.1	120.2	2.37
17. Kherson	333.7	260.7	139.1	1.66
18. Sevastopol'	306.7	228.9	158.8	1.97
19. Dniprodzerzhyns'k	302.0	227.0	167.2	1.92
20. Chernivtsi	298.0	186.8	112.7	3.16
21. Zhytomyr	277.2	160.9	75.3	3.69
22. Cherkasy	274.1	158.4	78.6	3.72
23. Kirovohrad	259.5	188.8	109.3	2.14
24. Chernihiv	252.9	158.9	81.2	3.15
25. Khmel'nyts'kyi	250.5	113.0	51.0	5.45
26. Sumy	249.2	159.2	88.4	3.03
27. Kremenchuk	216.6	148.1	112.0	2.57
28. Ivano-Frankivs'k	204.0	105.0	70.0	4.53
29. Kramators'k	203.8	149.8	175.4	2.07

Table 18 Continued

Center	1985 Population (000)	1970 Population (000)	1970 Devel- opment Index	Annual Rate of Growth 1970-85
30. Rovno	197.0	115.5	75.0	3.62
31. Melitopol'	181.1	136.9	128.8	1.88
32. Kadiivka	180.0	137.1	150.3	1.83
33. Ternopil'	178.0	84.7	57.3	5.08
34. Kerch	175.5	127.6	145.2	2.15
35. Bila Tserkva	173.7	108.5	92.3	3.19
36. Nikopol'	169.6	125.0	150.8	2.06
37. Slovians'k	166.8	124.2	175.4	1.99
38. Komunars'k	161.6	122.8	162.0	1.85
39. Lysychans'k	155.2	117.8	170.0	1.86
40. Luts'k	153.1	93.9	75.7	3.31
41. Uzhhorod	142.2	64.6	50.8	5.40
42. Konstantynivka	139.3	105.4	182.7	1.88
43. Krasnyi Luch	133.5	102.6	178.1	1.77
44. Berdians'k	131.7	100.1	134.5	1.85
B. Random ranks:				
45. Berdychiv	121.6	71.5	74.0	3.60
46. Kamianets'	118.3	57.1	55.8	4.98
47. Drohobych	118.1	56.0	59.3	5.10
48. Uman'	114.6	63.4	69.4	4.03
49. Ismail	122.2	70.3	71.2	3.17
50. Mukacheve	108.6	57.4	72.1	4.34
51. Konotop	107.9	68.4	88.3	3.09
52. Zhmerynka	101.7	36.2	32.3	7.13
53. Shostka	100.8	64.4	87.6	3.03
54. Oleksandriia	100.7	69.4	88.7	2.51
55. Pryluky	94.2	57.5	74.1	3.35
56. Nizhyn	91.6	56.3	74.1	3.30
57. Smila	91.6	55.5	85.8	3.40
58. Stryi	90.7	48.0	73.2	4.33
59. Korosten'	89.5	55.8	84.9	3.20

Table 18 Continued

Center	1985 Population (000)	1970 Population (000)	1970	
			Devel- opment Index	Annual Rate of Growth 1970/1985
60. Kolomyia	81.3	41.1	67.5	4.65
61. Kalush	80.7	40.7	66.9	4.67
62. Shepetivka	78.0	38.7	58.1	4.78
63. Iziium	76.9	51.6	74.4	2.70
64. Fastiv	75.0	42.3	67.0	3.89
65. Pervomais'k	74.2	59.4	94.1	1.49
66. Novovolyns'k	68.6	41.2	69.9	3.46
67. Lubni	66.8	40.4	67.4	3.41
68. Koziatyn	66.5	26.7	39.3	6.27
69. Mohyliv	65.8	26.1	38.6	6.35
70. Dubno	54.2	25.4	42.3	5.18
All centers	24,054.4	15,043.4	95.4	3.18

Source: Same as in previous tables.

cludes two basic components: one is the historically inherited effect of urbanization, which is characterized by various features of local strengths and weaknesses; the other is an attempt to differentiate the required increments and to correct the position of individual centers. Successful in many instances, the latter approach is, however, too weak to offset the present hierarchial structure. It deals with the transfer of 9,656,000 persons, which is much less than the 25,689,000 established urban residents. The task becomes even harder when considering the excessive agglomerations and deficits in regional distribution.

The first 44 centers follow a successive order of rank, while the remaining 26 centers are presented at random. This means that other cities not considered here may also appear in this group. This applies particularly to centers of under 100,000 persons in the highly urbanized areas of southeastern Ukraine. With self-generated growth and minimal rural transfers, many of them will move into the higher ranks; at least six (Sieverodonets'k,

Pavlohrad, Torez, Ienakiieve, Artemiv's'k, and Evpatoriia) will qualify for the category of large cities (over 100,000 persons). These omissions, however, do not alter the estimates of the enumerated communities, which are still valid.

Evaluating the new strength of principal centers, we observe now the appearance of one center exceeding a population of three million, one in excess of two million, and three centers above one million. This yields a total of 9,423,000 persons, which amounts to 23.0 percent of the total urban population. The share of the two centers at present in this category reaches only 11.1 percent. There will be six centers with a population between 500,000 and 1,000,000 (the same numerical representation). A very significant increase will apply to centers between 200,000 and 500,000 persons (18 vs. 11). Below this level, 100,000–200,000 persons, the incomplete estimate is a figure of 31 centers which compares satisfactorily with the present 22 centers. Thus, the 41 large centers will increase to 60 and their share in total population will climb from 29 percent to 43 percent. There will also be a pronounced shift in urban population by upgrading the weight of large centers from 52.5 percent to 57.3 percent.

The model of urban development applied in this study possesses the ingredients of self-corrective adjustments which slow down the growth of well developed centers and accelerate the expansion of retarded centers. The effectiveness of this approach can be deduced from the number of communities occupying the opposite squares in the "Development-Growth" matrix. Patterned after a similar classification used before (Table 13), the new distribution (Table 19) approximates ideal conditions. It yields 59 out of 70 centers which are located in the desirable "northeast" and "southwest" groupings. Only three centers occupy the "northwest" placement, while eight communities have been relegated to the "southeast" corner of the matrix.

It is interesting to note that the average rates of growth in the new tabulation closely resemble the old ones. With the exception of the "northwest" distribution, which shows the same characteristics, all other classifications have growth rates $\frac{1}{4}$ – $\frac{1}{2}$ percent higher than the previous figures. This is not a significant difference when we consider that the present median value of growth is also $\frac{1}{4}$ percent higher. More important than the growth factor is the changing spread of development indexes between the opposite groups. Thus the dominant "northeast" and "southwest" categories of centers which had 53.0 points variation in the 1959–70 period increase now to 72.7

Table 19
 Relationship Between the Development Level of Principal Centers in the Ukraine (1970)
 and the Project Annual Rate of Growth (1970-85)

Summary Results

Development Index	Annual Rate of Growth	
	High (3.18 percent and over)	Low (under 3.17 percent)
High (100.0 and over)	No. of centers: 3 Median population: 1,486,000 Average population: 1,489,000 Development index: 106.1 Rate of growth: 3.50 percent	No. of centers: 27 Median population: 290,000 Average population: 400,000 Development index: 143.5 Rate of growth: 2.30 percent
Low (under 100.0)	No. of centers: 32 Median population: 111,000 Average population: 242,000 Development index: 70.8 Rate of growth: 4.47 percent	No. of centers: 8 Median population: 105,000 Average population: 134,000 Development index: 83.9 Rate of growth: 2.88 percent

Sources: Same as in previous tables.

points, while the "northwest" and "southeast" differences diminish from 76.0 points to 22.2 points. This is identical with a greater effectiveness of the self-corrective measures. Not only were we able to increase and diminish the numerical representation of centers in opposite groupings, but we have achieved this with a more pronounced qualitative selection.

A comparison of both tables also discloses considerable changes in the size of urban centers in various categories. Taking median value as an appropriate basis of evaluation, we can observe the five-fold increase of population in the "northeast," little change in the "southwest," and a doubling in the "southeast." The latter results are particularly significant since they indicate that there is virtually no difference between the two groups of undeveloped centers. Their sizes are fully comparable now, which means that many small centers which were listed under the "southeast" schedule have now moved in a "southwest" direction. A few of those retained are additionally characterized by a somewhat higher development index (83.9 vs. 70.8). Compared with this relationship, the centers in the "northwest" corner barely qualify for the label of developed centers. Their index of 106.1 is considerably lower than the 143.5 of the remaining developed centers.

Table 20 has three listings in this category. They are the second and third largest centers of the Ukraine (Kharkiv and Odessa), which qualify for a higher-than-average rate of growth, because of their top ranks, and the city of L'viv (sixth largest center) which has gained considerably from the excessive surplus of rural population (see Table 15). With these three exceptions, all well-established centers have qualified for a low rate of growth. They are predominantly centers located in the southeastern and southern Ukraine. Two additional centers in this group are Chernivtsi (large rural surplus offset by high increase in urban centers) and Kirovohrad (below-average surplus).

The "southeast" group is comprised of two principal capitals, Chernihiv and Sumy, and two secondary cities in the same regions, Konotop and Shostka. All these centers are characterized by relatively high rates of growth (they represent the border case of classification) and relatively strong development indexes (exceeding the group average in three out of four cases). Their "misfortune" of finding placement in the "southeast" category is due to the average dimension

of the rural surplus in both provinces and the high requirements for additional urban centers in the province of Sumy (also affecting Konotop and Shostka). The allocation of the remaining four centers (Izium, Oleksandriia, Izmail, and Pervomais'k) to this category can be attributed to the low surplus of rural population in their provinces; in the case of Izmail, it is also influenced by the number of required centers.

The comparison of centers in the "southwest" square with the past record of their performance allows one to group them into distinct patterns of behavior. Some centers which experienced an adequate rate of growth continue at approximately the same pace. Here belong Vinnytsia, Poltava, and Korosten'. Other centers, however, have a tendency to slow down their past developments; this category includes Cherkasy, Rovno, Bila Tserkva, Luts'k, Kalush, and Novovolyn'sk. The third group, which also contains the capital city Kiev and such centers as Ternopil', Berdychiv, Uman', Pryluky, Fastiv, and Lubni, shows a moderate increase in the rate of growth, exceeding one-third that of the old growth. Higher rates of expansion, approaching a doubling of past figures, apply to such communities as Uzhhorod, Kamianets', Drohobych, Nizhyn, Smila, Stryi, Kolomyia, and Dubno. The remaining five centers, Mukacheve, Zhmerynka, Shepetivka, Koziatyn, and Mohyliv, experience the most favorable improvements by surpassing the limits mentioned and often tripling their past performance.

It is obvious that these results have been heavily influenced by our assumption regarding the regional allocation of rural surpluses and urban centers. They particularly favor the areas with a large number and high percent of farm population (see effect on urban growth in the provinces of Vinnytsia and Khmel'nyts'kyi). What is most important, however, is not the magnitude of improvement in the past rates of growth but the required level of expansion at present. Inspection of individual cases reveals six centers with rates between 5.0 and 5.5 percent, two around 6.0 percent, and one about 7.0 percent. All the remaining centers (there are 23 of them out of 32) have lower rates of growth. This result seems to be quite compatible with the old structure in 1970 where 7 out of 23 centers exceeded the 5.0 percent annual growth. In other words, the projected goals of our model appear to be quite realistic if measured by past standards of individual and group performance.

CONCLUSION

The present study has confirmed our original hypotheses and expectations.

Although the Ukraine experienced a progressive increase in the rate of urbanization in the last 50 years (19.3 percent in 1913 vs. 54.5 percent in 1970), the level of her development falls short of the standards which have been achieved in other republics and regions. Thus, the Russian Republic, which trailed the Ukraine in 1913 (17.4 percent), caught up to her in 1933 (33.5 percent) and took the lead thereafter (62.3 percent in 1970). This is equivalent to a net gain of 9.7 points over the entire period. If urbanization in the Ukraine matched the rate of Russia, it would have required an additional transfer of 3,650,000 persons from rural to urban areas in 1970. This gap, which represents a 14 percent deficit for urban population and a 17 percent surplus for rural population, is likely to continue in the future. Our forecast places it at 4,280,000 persons in 1980.

It is interesting to note that the spread in global rates of urbanization is not applicable to the total numerical representation of urban centers. By eliminating the differences in dimension of the two countries, we obtain exactly the same share of rural population per center (17,300 persons). This means that the Ukraine is relatively well supplied with locational outlets but lacks significantly in their strength. In aggregate, the Russian cities and towns are 37.6 percent bigger than their Ukrainian counterparts. This inequality is particularly pronounced in the numerical distribution and strength of certain size centers.

The greatest weakness of urban structure in the Ukraine applies to the centers of over 1,000,000 persons. Here belong two cities, Kiev and Kharkiv, which record a combined deficit of 88 percent under equalized conditions of urbanization with the Russian Republic. This qualification is particularly valid for the capital city of Kiev. The next ranking gap in development can be identified for the group of centers between 200,000 and 500,000 persons (70 percent), followed by the category of "small" middle-size centers, 20,000–50,000 persons (42 percent). The average rate of deficit (13 percent) is also visible in "upper" middle-size centers of 50,000–100,000 persons. Compared with these effects, there is a surplus of population in size 500,000–1,000,000 persons (13 percent) and under 20,000 persons (19 per-

cent). The recent rates of growth, in the 1959–70 period, appear to have added to the above inequalities (except for improvement in the rank of Kiev).

The unsatisfactory level of urban development in the Ukraine is accompanied by an uneven pattern of regional location of centers. The urban communities are heavily concentrated in the southeastern regions of Donetsk, Voroshylivhrad, Dnipropetrovsk, Crimea, and Zaporizhzhia. This agglomeration contrasts strikingly with the minimal urban functions performed by centers in the western Ukraine, west of the Kiev-Odessa axis. This polarization magnifies the overall effects of weak urbanization. It applies to all center ranks but is least pronounced for the smallest sizes (under 5,000 persons).

The growth pattern in recent years (1959–70 period) reveals certain tendencies to compensate for these irregularities, although it is far from perfect. There is evidence of a slowing down for mining centers in the Donetsk-Basin but not for neighboring metallurgical centers. A significant emphasis has been placed on the development of provincial capitals in rural regions while entirely neglecting the secondary centers in these areas. Considerable growth is noticeable for harbor cities in the Ukraine. This has apparently been motivated by political and economic considerations of the entire Soviet Union.

An attempt has been made here to illustrate the optimal effects of urban development in the Ukraine, which was assumed would reach a 75 percent level over a period of fifteen years. Based on the 1970 data, these changes would have required a transfer of approximately 9,650,000 persons, which represents a 45 percent decline in rural and a 38 percent increase in urban population. It was also assumed that both of these sectors would experience a natural growth of 1 percent per annum (a cumulative urban increase of 15,340,000 persons). We have allocated the appropriate share of this figure (9,010,000 persons) to 70 principal centers by applying the differentiated rates of growth. The results show the probable strength of major urban centers in the Ukraine, which is comparable with present West European conditions. It also reconciles the inherited weaknesses of urban structures (size and region) with the corrective mechanism of desired adjustment.

Weak urbanization must obviously be linked to weak industrialization. Official sources supply enough evidence regarding the composi-

tion of leading and missing types of manufacturing in the Ukraine. In summary, they disclose the predominance of industrial concentration on Russian territory. Whatever motivation (political or economic) may lie behind this, the Ukraine does not get its proper share of balanced industrial development. This picture closely resembles conditions in agriculture, where the specialization of the Ukrainian Republic is dictated by outside interests.¹⁵ The Ukraine, one must conclude, is economically dependent upon, and exploited by, Russia.

¹⁵ See I. Stebelsky, "Ukrainian Agriculture" and discussion by P. Woroby in P. J. Potichnyi (ed.), *Ukraine in the Seventies* (Oakville, Ontario: Mosaic Press, 1975).

VNDIVO and Ukrainian Water Quality Management

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INTRODUCTION

Water supply and water quality are of crucial importance to any human society. Nonetheless until recent years they have received little public attention either in the U.S. or the USSR. As a result of prodigious industrial and urban growth in both countries since World War II, however, water supply and water quality problems in both societies have gravitated closer to center stage. This paper focuses upon the water quality problems of one of the most urbanized and heavily industrialized republics of the Soviet Union, the Ukraine.

It is claimed that before the Revolution only 55 of the 88 Ukrainian cities had central water supply systems and only 15 cities had sewers. In both cases only the central parts of cities were served. Of the total urban dwelling units only 5 percent were supplied with water and 2 percent were connected to central sewers. Of the 15 cities having sewer systems, only Kiev, Odessa, and Kharkiv partially purified their sewage—probably by mechanical screening and sedimentation. Not surprisingly, outbreaks of gastrointestinal diseases were common events. By the end of 1972, of the 387 Ukrainian cities and 861 urban-type settlements, 365 cities and 670 settlements had central water supply networks and 251 cities and 210 settlements had central sewer networks. By the end of the Ninth Five-Year Plan in 1975, all the cities and 714 of the urban-type settlements were scheduled to have central water distribution systems. The average supply of water per urban resident was to reach 224 liters per day by the end of 1975, compared with a pre-Revolutionary figure of 20 liters per capita per day.¹

The total length of the Ukrainian sewer network has been increased 24-fold since the Revolution. In the early seventies, these networks

*The support of the Ford Foundation, the Institute of Comparative Studies at the University of Washington, Seattle, Washington, the U.S. Environmental Protection Agency, and the employees of VNDIVO at Kharkiv is gratefully acknowledged.

¹ V. D. Ploshchenko, "Razvitie vodoprovodno-kanalizatsionnogo khoziaistva i teplosnabzheniia Ukrainskoi SSR," *Vodosnabzhenie i sanitarnaia tekhnika*, 1972, no. 12, p. 7.

were receiving 8.65 million m³ of sewage daily, of which 5.60 million m³ were passing through purification stations. During the Ninth Five-Year Plan the sewer capacity of the Ukraine was to be increased by 3.0 million m³ per day. Also, new biological purification stations were built, or old ones expanded, in Kiev, Kryvyi Rih, Kharkiv, Donetsk, L'viv, Odessa, Cherkasy, Zhytomyr, Makiivka, and other Ukrainian cities.² Nonetheless, the Ukraine contains some of the most severely polluted waters of the entire USSR, especially in the southeastern oblasts. This unfortunate situation arises partially from technological factors and partially from institutional neglect and a managerial incentive structure which favored and continues to favor production at the expense of environmental preservation.³ Physically, the Ukrainian water quality problems are exacerbated by the geographical disparity between water supply for assimilative uses and the distribution of effluent generating activities.⁴

This study has two primary objectives. The first is to assess the actual spatial distribution and severity of water quality problems within the Ukrainian portion of one of the Soviet Union's most important drainage basins—the combined Black Sea—Sea of Azov system. This task serves to complement another study⁵ in which the obligatory use of regional rather than point-source raw data tends to obscure many serious Ukrainian water quality problems which exist on a smaller or local scale. At the same time, the following case studies provide empirical evidence which supports the spatial patterns of regional water pollution potential that emerge from the regional pollution estimating procedure employed in the other study.

The second major objective is to discuss and evaluate the on-going efforts of VNDIVO (All-Union Scientific Research Institute for the Protection of Waters) located in Kharkiv to design, construct, and operate a computer-automated pollution control system for a stretch of the Sivers'kyi Donets' River. VNDIVO scientists readily admit that this river is one of the most polluted rivers of the entire USSR, as well as of the Ukraine. Because it is a pilot project, it could foreshadow future Soviet efforts and approaches to water quality management problems.

² Ibid., p. 8.

³ Craig ZumBrunnen, "Institutional Reasons for Soviet Water Pollution Problems," *Proceedings of the Association of American Geographers*, vol. VI, April 1974, pp. 105-08.

⁴ Craig ZumBrunnen, "Water Pollution," in I. S. Koropec'kyj (ed.), *The Ukraine within the USSR: An Economic Balance Sheet*, (New York: Praeger Publishers, forthcoming).

⁵ Ibid.

EMPIRICAL STUDIES OF UKRAINIAN WATER POLLUTION⁶

The high population density, heavy industrial development, and relatively low freshwater endowment of the Black and Azov sea basins have precipitated some major water-pollution problems. Map 1 delimits the Soviet portions of these basins and includes the various specific locations cited in the text. Although the Ukraine's waters are the recipients of "upstream" contamination, the following case studies do not consider pollution originating within the watershed territories beyond the republic's boundaries. On the other hand, all locations noted on the map but existing in other union republics represent foci of pollution as cited in a previous investigation.⁷

POLLUTION ALONG THE DNISTER AND SOUTHERN BUH RIVER SYSTEMS. The Dnister River begins in the Carpathian Mountains southwest of L'viv and empties into the Black Sea southwest of Odessa. It accounts for 80 percent of the freshwater surface flow of the Moldavian SSR and supplies Odessa with municipal water. The Moldavian Republic has a well-developed food industry which depends on fresh water from the Dnister system for processing. Thus, the need for the river's purity is obvious. Nonetheless, the food industry is itself one of the major polluters of the Dnister.⁸

The pollution of the Dnister, however, begins far upstream in L'viv Oblast of the Ukraine. The head of the Boryslav Drilling Operations Administration was recently fined 25 rubles for emptying 2000 m³ of polluted waters into the Shchepil'sk River, resulting in a fish-kill.⁹ The tributary to the east, the Stryi River, is oil-stained. A large quantity of unpurified industrial waste is discarded into the Dnister and its tributaries in L'viv and Ivano-Frankivs'k Oblasts of the Ukraine. Furthermore, high manure content runoff from collective and state farm livestock yards and buildings is a significant pollution problem.¹⁰ The city of L'viv, however, is building a new 75,000 m³/day capacity municipal sewage treatment plant.¹¹

⁶ This section is based upon parts of a revised and updated study, Craig Zum Brunnen, "Water Pollution Problems within the Black and Azov Sea Basins," in Frederick Singleton (ed.), *Environmental Misuse in the USSR* (New York: Praeger Publishers, 1976).

⁷ *Ibid.*, see entire paper.

⁸ P. Bogatenkov, "Man and Nature: How to Help the Dniester," *Current Digest of the Soviet Press* (subsequently CDSP), 1970, no. 35, p. 18.

⁹ "Conservation Is a Matter of National Importance," *CDSP*, 1973, no. 51, p. 25.

¹⁰ Bogatenkov, *op. cit.*, p. 18.

¹¹ T. S. Kaposhina, "Razvitie vodoprovodno-kanalizatsionnogo khoziaistva v 1966-1970 gg.," *Vodosnabzhenie i sanitarnaia tekhnika*, 1971, no. 8, p. 4.

Table 1
Selected Hydrologic Data for the Black and Azov Sea Basins

Location (or letter) from Map 1	River	Annual Discharge = km^3/yr m^3/sec				
		Average 50 Percent	75 Percent	90 Percent	95 Percent	Guaranteed Discharge 95 Percent
Zalishchyky	Dnister	6.90	5.20	4.12	3.58	
River mouth	Dnister	219	165	131	114	
River mouth	S. Buh	8.66	6.78	5.54	4.89	
		275	215	176	155	
		3.42	2.42	1.81	1.54	
		108	76.8	57.4	48.9	
Chernihiv	Desna	10.9	8.58	6.98	6.16	
		346	272	222	196	
River mouth	Seim	3.35	2.50	1.98	1.70	
		106	79.4	62.7	53.8	
River mouth near Kiev	Desna	11.4	8.90	7.28	6.42	
		361	282	231	204	

Kiev	Dnieper	43.2	35.9	30.2	27.0
Kremenchuk	Dnieper	1370	1140	959	858
River mouth	Vorskla	45.7	37.8	31.4	27.8
Kryvyi Rih	Inhulets'	1450	1200	998	884
River mouth	Inhulets'	1.15	0.762	0.533	0.440
River mouth	Inhulets'	36.4	24.2	16.9	14.0
River mouth	Dnieper	0.312	0.144	0.078	0.049
Zmiiv	Sivers'kyi Donets'	9.90	4.57	2.48	1.56
Lysychans'k	Sivers'kyi Donets'	0.388	0.170	0.081	0.053
River mouth	Sivers'kyi Donets'	12.3	5.40	2.57	1.68
River mouth	Sivers'kyi Donets'	53.5	44.1	36.9	32.8
River mouth	Sivers'kyi Donets'	1700	1400	1170	1040
River mouth	Sivers'kyi Donets'	1.41	1.02	0.78	0.66
River mouth	Sivers'kyi Donets'	44.8	32.4	24.8	21.0
River mouth	Sivers'kyi Donets'	3.47	2.48	1.88	1.59
River mouth	Sivers'kyi Donets'	110	78.7	59.7	50.5
River mouth	Sivers'kyi Donets'	5.62	3.57	2.45	1.92
River mouth	Sivers'kyi Donets'	178	113	77.8	61.0

Source: M. S. Protas'ev (ed.), *Vodnye resursy i vodnyi balans territorii Sovetskogo Soiuza* (Leningrad, 1967), pp. 155-61.

Undoubtedly the most severely contaminated part of the Dnister watershed is within the Moldavian SSR, especially two of the Dnister tributaries—the Reut and Byk.¹² As recently as 1970, only 30 of Moldavia's 170 food industries had satisfactory purification facilities. Thus, it is no wonder that fish are disappearing from the Dnister River Basin.¹³ It is indeed ironic that food processing, the economic activity which requires the purest water, is probably the major source of pollutants within the Dnister River Basin.

The Southern Buh parallels the Dnister to the northeast. It probably is polluted heavily in Vinnytsia Oblast by sugar-refining and other food-processing wastes. During this study, however, only one serious episode of pollution has been uncovered within the Southern Buh drainage system. This is the late September 1972 massive fish-kill in the Black Tashlyk River, a left-bank tributary in Kirovohrad Oblast. An investigation has revealed that 10,000 white carp, 60,000 perch, and 5,000,000 carp were destroyed by the inky effluent of the Novoukrainka Sugar Refinery.¹⁴ On January 6, 1973, *Izvestia* announced that the Kirovohrad Oblast prosecutor's office had initiated criminal proceedings in connection with this lethal incident.¹⁵ At the present time the most severely polluted part of the Southern Buh system is its estuary where the BOD (biochemical oxygen demand) levels in the summer reach 10-12 mg O₂/l. (2 mg O₂/l of BOD is the Soviet MPC (maximal permissible concentration) for potable water and 6 mg O₂/l for fisheries and recreational uses.) In fact, the oxygen deficit is often sufficient to yield the anaerobic decomposition product, hydrogen sulfide (H₂S) in concentrations of 1-3 mg/l.¹⁶

On the positive side, in the very southwestern tip of the republic, the port of Reni on the Danube annually recovers and utilizes about 3,900 metric tons of petroleum products worth 27,700 rubles by cleaning the oily bilge water of ships.¹⁷

¹² Charlotte Saikowski, "Soviets Sound Pollution Alarm," *The Christian Science Monitor*, May 4, 1970; Bogatenkov, op. cit., p. 18.

¹³ "Dnestr: Soviet Press in Pollution Fight," *San Francisco Chronicle*, September 4, 1970.

¹⁴ Panteleimon Koriagin, "Astonishing Stories: Black River," *CDSP*, 1973, no. 51, pp. 25-26.

¹⁵ "How Astonishing Stories End," *CDSP*, 1973, no. 51, p. 26.

¹⁶ L. A. Zhuravleva and I. G. Enaki, "Vliianie zaregulirovaniia rechnogo stoka na gidrokhimicheskii rezhim ustevykh oblastei rek severo-zapadnoi chasti Chernogo moria," *Vsesoiuznoe nauchno-tekhicheskoe soveshchanie: razrabotka i organizatsiia kompleksa vodokhrannykh meropriiatii* (Kharkiv, 1973), p. 172.

¹⁷ Iu. P. Belichenko and Iu. G. Egorov, "Ob opyte raboty organov vodnogo nadzora," *Problemy okhrany vod*, vypusk 5 (Kharkiv, 1974), p. 16.

POLLUTION PROBLEMS WITHIN THE DNEIPEP RIVER BASIN. As Map 1 suggests, several pollution trouble spots exist within the Upper Dnieper River Basin. In fact, pollution of the Dnieper begins at Safanova in Smolensk Oblast of the RSFSR, if not farther upstream.¹⁸ The Dnieper system within Belorussia has a multitude of pollution trouble spots, especially from organic wastes and inorganic salts.¹⁹ Some of Belorussia's most polluted waterways include the Svisloch, Sluch, Usha, Lideia, and Mukhovets Rivers.²⁰

Within the Ukraine, the Teteriv River near Zhytomyr (see Map 1) was studied intensively in 1971-73 to investigate the influence of flushes from the Zhytomyr water impoundment basin upon the river's water quality. The major source of BOD contamination comes from the Zhytomyr municipal sewage treatment plant. Although the river was reported to have some significant polluted sections, the flushes appeared to greatly facilitate self-purification processes.²¹

The Desna River joins the Dnieper just north of Kiev and serves as a water supply for Briansk, Chernihiv, and Kiev. It has been reported that intensive water use combined with the discharge of unpurified sewage has led to a marked deterioration of water quality within the Desna River Basin.²² However, during the 1971-75 Plan, significant improvements have been reported within the Desna Basin, especially in the upper reaches of the basin in Briansk Oblast of the RSFSR.²³ The only specific pollution incident uncovered, in fact, was a 1969 fish-kill in the tributary river Seim at Karl Libknekht in Kursk Oblast. Interestingly enough, the assistant chief engineer of the Kobinin Sugar Refinery there, G. V. Shchadnykh, was sentenced to a year of corrective labor and a 20 percent forfeiture of his wages for his criminal dereliction of duty in allowing the pollution of the Seim to occur.²⁴

¹⁸ Iu. Kuznetsov, "In Sharp Focus: Along the Street," *CDSP*, 1972, no. 28, p. 24.

¹⁹ For example, see Craig ZumBrunnen, "Water Pollution Problems within the Black and Azov Sea Basins," *Discussion Paper No. 46*, Department of Geography, The Ohio State University, 1975, pp. 9-14.

²⁰ A. Vorontsov and I. Novikov, "Reka zhdet pomoshchi; za stroki pisma," *Pravda*, September 21, 1971; V. S. Bishniakova, "Reki v opasnosti: o zagriaznenii vodoemov Belorusskoi SSR," *Priroda*, 1966, no. 4, pp. 93-97.

²¹ N. G. Prima et al., "Kharakteristika transformatsii kachestva rechnoi vody pri popuskakh iz vodokhranilishch (na primere uchastka r. Teterev)," *Problemy okhrany vod*, vypusk 5 (Kharkiv, 1974), pp. 77-90.

²² N. V. Fedenko, "Malye reki dolzhny zhit'," *Priroda*, 1968, no. 9, pp. 109-10; M. K. Krakhmalev, "Speech by Deputy M. K. Krakhmalev, Pochep E.D., Briansk Province," *CDSP*, 1970, no. 52, pp. 10-11.

²³ V. Travinsky, "The Committee on the Desna," *CDSP*, 1974, no. 13, pp. 12, 13, 15.

²⁴ A. Manokhin, "From the Courtroom: Held Responsible for Killing Fish," *CDSP*, 1970, no. 9, p. 17.

Iu. P. Belichenko, an engineer for the USSR Ministry of Reclamation and Water Management, has reported in at least three articles that sanitary conditions within the Desna have recently improved, or at least that pollution has been halted on the small Snezhnet' and Botva tributaries of the Desna.²⁵

Four large reservoirs exist along the Dnieper in the Ukraine. Eutrophication or blue-green algae "blooms" seem to be a problem in all of them, especially the Kiev Reservoir. Along stretches of the Dnieper bordering on the Kiev Reservoir the concentration of ammonium ion (NH_4^+) has increased by 32 percent, nitrite ion (NO_2^-) by 300 percent, and nitrate ion (NO_3^-) by 200 percent, compared with data before the dam construction. The average annual concentration of NH_4^+ in the Kremenchuk Reservoir in 1961 was 0.40 mg N/l; by 1969 it had increased to 0.95 mg N/l. In Kakhovka Reservoir the 1956 value for NH_4^+ was 0.62 mg N/l and by 1969 the reading has increased to 0.89 mg N/l. The Soviet MPC for NH_4^+ in drinking water is 0.10 mg N/l. In the lower reaches of the Dnieper, the concentration of NH_4^+ increased 300 percent, dissolved phosphorus by 35 percent, organic nitrogen by 56 percent, and organic phosphorus by 30 percent, between 1954 and 1972. Between 1963 and 1968 the annual quantity of nitrogen entering the Dnieper and its reservoirs from fertilizer runoff grew from 21,700 metric tons to 105,600 metric tons, while the quantity of phosphorus remained at the level of 17,000 metric tons. In addition to agricultural runoff, the Dnieper receives about 14,000 metric tons of nitrogen annually from discharged effluents.²⁶

These quantities of nitrogen and phosphorus are equivalent to concentrations of 3.65 mg/l and 0.52 mg/l, respectively, using the entire annual discharge of the Dnieper at its mouth (32.8 km³/yr) for dilution. The Soviet MPCs for nitrogen and phosphorus in drinking water are 10 mg/l and 3.5 mg/l, respectively.²⁷ Although neither contaminant exceeds its norm in the aggregate, it is highly likely that they both do so along numerous local stretches of the Dnieper Basin.

²⁵ Iu. P. Belichenko, "Vsesoiuznoe soveshchanie po ispol'zovaniu i okhrane vodnykh resursov," *Gidrotekhnika i melioratsiia*, 1968, no. 9, p. 112; Iu. P. Belichenko, "Otnositia k vodnym bogatstvam strany po-Leninski," *Priroda*, 1969, no. 12, p. 76; N. Penchenko and Iu. P. Belichenko, "Discussing the Draft Principles of Water Legislation: Water and the Law," *CDSP*, 1970, no. 46, p. 18.

²⁶ A. I. Denisova, "Evtrofikatsiia Dnepra v rezul'tate zaregulirovaniia i vypuska stochnykh vod," *Vsesoiuznoe nauchno-tekhicheskoe*, pp. 207-08.

²⁷ "Voda pitevaia," Gost 2874-73, *Gosudarstvennyi standart Soiuza SSR* (Moscow, 1974), pp. 3, 5.

Further, the dramatic rate of increase in the influx of these biogenic materials is rather disconcerting. On the other hand, considerable research is being conducted in an effort to remedy this situation.²⁸

Two pollution episodes along the Vorskla River which discharges into the Dniprodzerzhyn'sk Reservoir have been reported. The first in Poltava in 1966 resulted in a massive fishkill. However, those individuals accused of responsibility for the incident were either fined or given corrective labor sentences.²⁹ Another massive fishkill caused by unpurified sewage occurred at Poltava recently. This time the two individuals held responsible were assessed fines of 200 and 300 rubles, respectively.³⁰

In the mid-sixties the city and enterprises of Dnipropetrovs'k were discharging an average of 1.5 million m³/day of polluted water into the Dnieper. The main pollutants were crude oil, slag, and grease.³¹ Hence, BOD levels were probably high. However, the Dnieper's flow averages perhaps 130 million m³/day at Dnipropetrovs'k (see Table 1 for Kremenchuk). The small Samara River which empties into the Dnieper just downstream from Dnipropetrovs'k receives 196,400 m³ of coal mine waste water daily.³²

Downstream at Zaporizhzhia a massive new, innovative approach to both gaseous and liquid waste recycling is being planned. Announced in 1968, the new, largely underground facility is to neutralize toxic wastes, reclaim valuable by-products, use the heat generated for a 100-hectare greenhouse, and make inert building blocks from the non-degradable wastes.³³ The scheme is not without its critics who doubt the efficacy of the planned 170-million ruble facility. At any rate the installation is a long way off and at present pollution control investments (25 million rubles in 1968-69 in Zaporizhzhia alone) are

²⁸ O. Antonov et al., "Nature and Us: How Much We Lose," *Current Abstracts of the Soviet Press*, vol. 1, 1968, no. 3, p. 13; S. Morozov, "Volge byt' chistoi: zdorove vody," *Izvestia*, August 1, 1968; A. Topachevsky, "Man and Nature: Turning a Problem to Good Account," *CDSP*, 1967, no. 1, p. 28.

²⁹ D. Sanzharevsky, "From the Courtroom: Poisoners of the River," *CDSP*, 1967, no. 3, pp. 22-23.

³⁰ V. Kotlyar, "From the Courtroom: So That the Water Remains Clear," *CDSP*, 1973, no. 6, p. 21.

³¹ D. Armand, *Nam i vnukam* (Moscow, 1966), p. 70.

³² B. A. Miloslavskii, S. L. Lozovskii, and Iu. L. Shampaev, "Ob okhrane vodoemov i vodotokov ot zagriazneniia shakhtnymi vodami," *Vsesoiuznne nauchno-tekhnicheskoe*, p. 177.

³³ "Kombinat—okhrany prirody," *Pravda*, February 19, 1968; S. Tsikora, "News of Science and Technology: The Output Is Purity," *CDSP*, no. 14, pp. 33-34.

not so beneficial as they could be because of a departmental as opposed to an integrated approach to pollution abatement.³⁴

Probably two of the worst polluted small waterways of the entire Soviet Union are the Inhulets' and Saksahan' Rivers, which are the receptors of the copious industrial and communal wastes of the Kryvyi Rih iron-mining and steel center. The waste effluents contain large quantities of salts, iron, and acids. Water recycling has been introduced at some metallurgical enterprises, and water purification plants exist at many mines and ore enrichment combines. But overall, a great deal more pollution control work is needed.³⁵ In fact, irrigation water from the Inhulets' is reported to have led to the destruction of vegetables on hundreds and thousands of hectares of irrigated land.³⁶

Another Dnieper pollution spot is the textile city of Kherson, which regularly pollutes the Dnieper and the small Kosheviia River with textile and other industrial wastes, plus domestic-fecal sewage.³⁷ In the mid-sixties, the Kherson Spinning and Weaving Plant and the second unit of the city's cotton combine were both put into operation despite protests from the sanitary-epidemiology station.³⁸

In spite of the Dnieper pollution problems cited above, some recent improvements have occurred, especially in the Ukrainian section of the river. Pollution levels have dropped at a number of locations along the Dnieper, most notably below Kiev and Cherkasy.³⁹ Then, too, a 600,000 m³/day capacity municipal sewage purification plant is being finished at Kiev and a 175,000 m³/day one at Zaporizhzhia.⁴⁰ However, between the two periods 1951-57 and 1967-72 the lower Dnieper and the Dnieper estuary have both experienced significant increases in mineral salts and BOD contamination levels.⁴¹

³⁴ A. Palm, "Clouds over the City," *CDSP*, 1971, no. 10, p. 25; N. Vasov and V. Reut, "At the Researcher's Side: Dream of the Sky-Blue City," *CDSP*, 1971, no. 46, pp. 7-8.

³⁵ T. A. Klevtsov, "Beregite landshafty: bor'ba s zagriaznieniem vod i atmosfery v Krivorozhskom zheleznorudnom basseine," *Priroda*, 1965, no. 6, pp. 70-73.

³⁶ Armand, op. cit., p. 71.

³⁷ A. I. Simonov et al., "Chemical Pollution of the Coastal Waters of the Seas of the U.S.S.R.," *Soviet Hydrology: Selected Papers*, 1968, no. 2, p. 178; Zhuravleva and Enaki, op. cit., pp. 172-73.

³⁸ Iu. Danilov, "Let Us Protect the Water, Air and Soil from Pollution," *CDSP*, 1965, no. 24, p. 13.

³⁹ Belichenko, "Vsesoiuznoe soveshchanie," p. 112; Belichenko, "Otnositia k vodynym," p. 76; Panchenko and Belichenko, op. cit., p. 18; A. Isayev, "Man and Nature: The Rivers Are Being Made Clean," *CDSP*, 1969, no. 30, p. 23.

⁴⁰ Kaposhina, op. cit., p. 3.

⁴¹ Zhuravleva and Enaki, op. cit., pp. 170-74.

COASTAL POLLUTION OF THE BLACK SEA. In 1970 the Black Sea coastal waters were being polluted at 200 locations where waste waters were being poured into the sea without any purification whatsoever.⁴² The sea water in the vicinity of Odessa, Mykolaiv, Kherson, Sevastopol', Feodosiia, Tuapse, Novorossiisk, and Batumi were, and likely are still, constantly being polluted by both industrial effluents and sewage. Domestic fecal sewage pollutes the coastal waters of Evpatoriia, Yalta, Masandra, Alushta, Anapa, Gelendzhik, Sochi, Gagra, Sukhumi, and Ochamchira. The Dnister and Southern Buh estuaries, Odessa Gulf, Sevastopol', and the Bay of Novorossiisk are said to be the most seriously polluted areas. Part of the severity at these locations is due to poor and/or slow water exchange and, hence, the accumulation of pollutants in the stagnant waters.⁴³

The content of petroleum products is high in harbor areas and closed bays. In Sevastopol' and Feodosiia the oil content reaches 1000 to 4000 mg/kg of dry bottom sediment while in Tuapse and Novorossiisk the value reaches 400 to 700 mg/kg. The MPC for phenols is 0.001 mg/l, but it reaches 0.665 mg/l, 0.140 mg/l, and 0.040 mg/l in Sevastopol' Bay, Tuapse, and Novorossiisk, respectively. At Yalta the oily pollution zone has been claimed to extend 10 to 15 kilometers seaward from the coast.⁴⁴

The concentration of biogenic substances is very high (10 to 100 times greater) compared to open sea water. The nitrite content of the coastal waters reaches 40 to 50 $\mu\text{g N/l}$, while in clean water the reading is close to zero.⁴⁵ The high organic waste load from sewage creates BOD levels of up to 26 mg O_2/l compared to a value of 2 mg O_2/l in clean water. Sometimes anaerobic hydrogen-sulfide contaminated zones cover large areas. Such high BOD levels are probably in existence near Evpatoriia along the south Crimean shore from Yalta to Alushta, and at several health resorts along the eastern Black Sea shore.⁴⁶

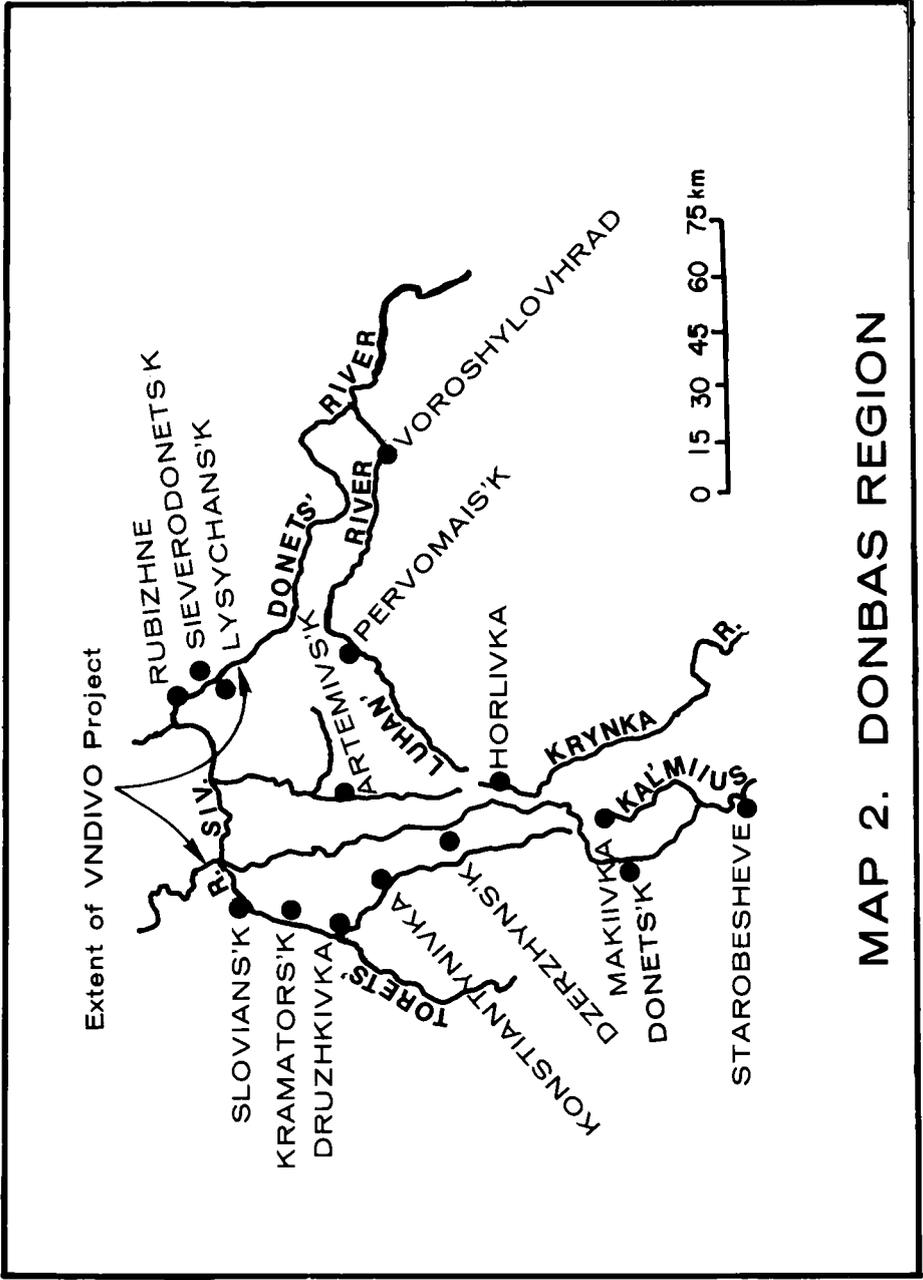
⁴² G. Kiryanov, "Man and Nature: Thoughts about Water," *CDSP*, 1970, no. 35, p. 17.

⁴³ I. O. Aliakrinskaia, "More i neft'," *Priroda*, 1966, no. 6, p. 111; F. Davitaya and G. Lebanidze, "Man and Nature: Disturbed Equilibrium," *CDSP*, 1969, no. 26, p. 33; Kiryanov, op. cit., p. 17; N. P. Lesnikova and N. F. Fedenko, "Vsemernaia i polnaia zashchita prirody Kryma," *Priroda*, 1968, no. 12, pp. 99-100; Simonov et al., op. cit., p. 178.

⁴⁴ Simonov et al., op. cit., p. 178.

⁴⁵ Ibid.

⁴⁶ Armand, op. cit., p. 68.



MAP 2. DONBAS REGION

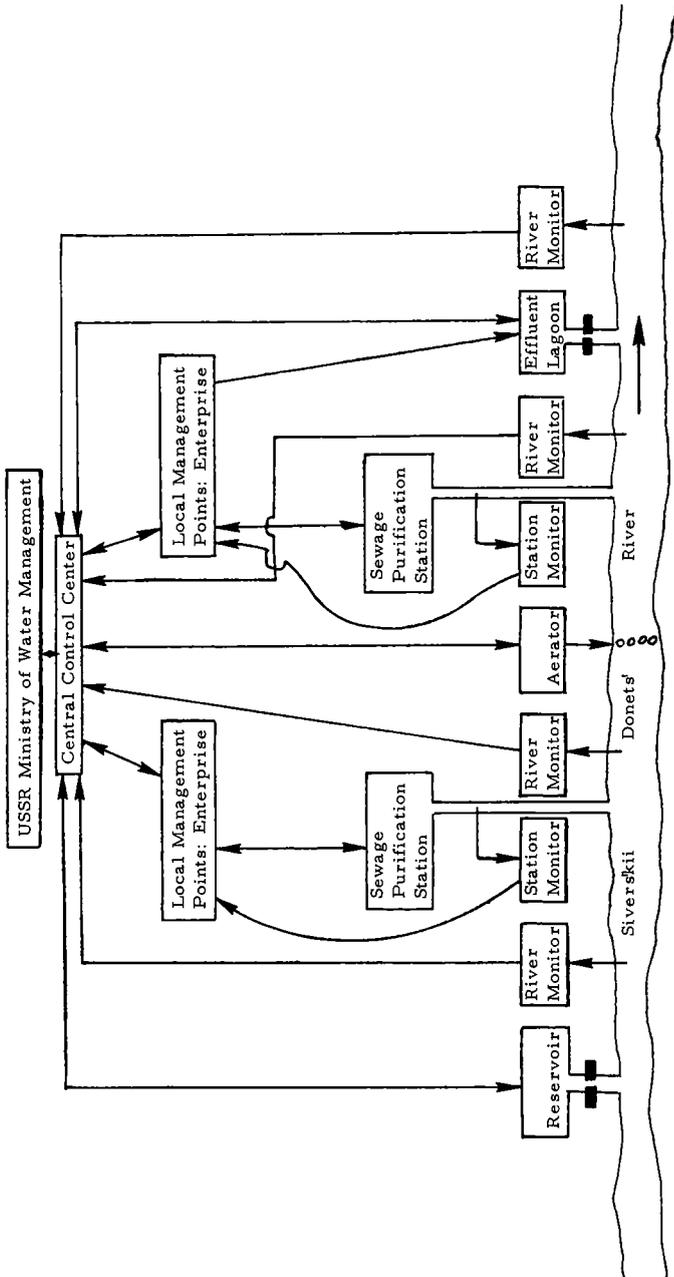


FIGURE 1. SCHEMATIC STRUCTURE OF THE SIVERSKII DONETS' POLLUTION CONTROL SYSTEM

This account is not intended to suggest that no positive steps are being taken to control pollution along the Black Sea coasts. The city of Odessa is building a new 270,000 m³/day sewage treatment plant.⁴⁷ The port of Odessa also has introduced so-called purification ships and floating oil sweepers. In a recent year, a floating station collected 400 tons of sperm whale oil and 1300 tons of oil from the bay's surface.⁴⁸

THE SIVERS'KYI DONETS' RIVER AND THE DONBAS. Although there are some indications of recent improvements, the Azov Sea Basin probably contains the most polluted region of the entire Soviet Union, the Donbas (see Map 2).⁴⁹ In the early 1960s the Sivers'kyi Donets' was receiving an average of 1 million m³/day of unprocessed sewage water, which is equivalent to almost one-fifteenth of the river's average daily discharge.⁵⁰ The first upstream sources of pollution at that time were two sugar mills and the Shebekino Synthetic Fatty Acid Plant. About 100 kilometers downstream Kharkiv has its water tap. Not surprisingly, Kharkiv's water smelled occasionally of rancid fat.⁵¹ The same sewage purification station was used for both household and industrial sewage (a very common practice in the United States as well) and was overloaded by a factor of two to three.⁵² Thus Kharkiv's liquid wastes turned the Udy, a tributary of the Sivers'kyi Donets', into an open sewer which added to the pollution load of the Sivers'kyi Donets' before the natural "self-purification" processes had cleansed its waters.⁵³

⁴⁷ Kaposkina, *op. cit.*, p. 3.

⁴⁸ "Follow-Up on a Document: Maritime Sanitation Workers," *CDSP*, 1971, no. 33, p. 24; N. M. Marachev, "Vodoemam—chistotu," *Gorodskoe khoziaistvo Moskvy*, 1969, no. 10, pp. 47–48; A. Tkachev, "Pisma v 'Pravde': i more nado chistit," *Pravda*, September 27, 1968.

⁴⁹ M. Mazanova, "Territorial'nye proportsii razvitiia ekonomiki," *Planovoe khoziaistvo*, 1969, no. 2, p. 16.

⁵⁰ I. Demin and D. Bilenkin, "A River Calls for Help," *CDSP*, 1960, no. 17, p. 19; A. I. L'vovich, "Problemy okhrany rek i vodoemov ot zagriazneniia stochnymi vodami," *Izvestiia Akademii Nauk SSSR, seriia geograficheskaia*, 1963, no. 3, p. 35; I. S. Senin, "In the Council of the Union: On the State Plan for Development of U.S.S.R. National Economy in 1960–1965," *CDSP*, 1964, no. 52, p. 10; M. P. Tolstoy and V. P. Bondarev, "Tsennoe syr'e dlia mineral'nykh udobrenii," *Priroda*, 1964, no. 8, p. 93.

⁵¹ Demin and Bilenkin, *op. cit.*, p. 19.

⁵² P. A. Spysnov, "Water Supply and Sewerage Development in the U.S.S.R. Cities," *U.S.S.R. Literature on Water Supply and Pollution Control*, vol. 4, (Washington, D.C.: U.S. Public Health Service, 1962), p. 32; N. N. Litvinov, "Problems in the Protection and Sanitization of the External Environment Connected with the Expansion of the U.S.S.R. Chemical Industry," *ibid.*, vol. 3, p. 247.

⁵³ Demin and Bilenkin, *op. cit.*, p. 19.

However, by 1966 the purification effectiveness at the Kharkiv biological purification station had improved substantially.⁵⁴ The station's capacity is now about 400,000 m³/day with a 250,000 m³/day expansion under construction. In the United States such a station would be sufficient to treat the wastes of 1.3 to 2.0 million people. Kharkiv's present population is approximately 1.3 million. A visual inspection of the station and its final product in May 1975 seemed to validate the director's claim that the BOD of the incoming effluent (320 mg O₂/l) is reduced to 9 mg O₂/l before discharge into the Udy River. In fact, according to VNDIVO scientists, both the directors of the Shebekino factories and the enterprises themselves were severely fined for their violations of sanitary norms and have subsequently halted their pollution. This fact combined with the improvements mentioned at the Kharkiv municipal sewage treatment facility, led VNDIVO scientists to claim that the severe pollution along the upper reaches of the Sivers'kyi Donets' between Shebekino and Zmiiv no longer exists.

While the claims of VNDIVO workers may be true, the improvements must have materialized since 1969. Prior to then, time-series data of ten water-quality parameters for eleven points, beginning above Belgorod in the RSFSR and extending downstream to below the confluence of the Kazennyi Torets' with the Sivers'kyi Donets', reveal almost a total increase in all contamination parameters at all points. The same VNDIVO study includes 1969 data on fourteen water quality indexes for sixteen points along the upper Sivers'kyi Donets' again from above Belgorod to below the mouth of the Kazennyi Torets'. In the section from above Belgorod to a point above the mouth of the Udy, the water samples exceeded the Hydrometeorological Services' 10 mg O₂/l MPC for BOD (using the permanganate method) by 1.6 to 2 times, and in the stretch from below the Udy to below the Kazennyi Torets' by 1.8 to 3 times. Values for the other indexes were high as well.⁵⁵

The Slov'ians'k soda plant discharges calcium chloride salts (CaCl₂). Also the "tar-black waters" of the Kazennyi Torets' were and undoubtedly still are polluting the Sivers'kyi Donets'.⁵⁶ In the late 1960s an

⁵⁴ M. I. Dombrovskii et al., "Nekotorye dannye ekspluatatsii sooruzhenii Kharkovskoi biologicheskoi ochistki," *Vodosnabzhenie i sanitarnaia tekhnika*, 1968, no. 6, pp. 34-46.

⁵⁵ A. N. Smirnova, N. V. But, and L. V. Dobrovol'skaia, "Gidrokhimicheskie pokazateli kachestva vody verkhnego uchastka Serverskogo Dontsa," *Problemy okhrany i ispol'zovaniia vod*, vypusk 3 (Kharkiv, 1973), pp. 69-79.

⁵⁶ Demin and Bilenkin, op. cit., p. 19.

average of 3.3 m³/sec was being withdrawn from the Kazennyi Torets' for water supply, while 3.7 m³/sec of sewage was being returned.⁵⁷ The Rubizhne and Lysychans'k Chemical Combines and the Donets' Soda Combine darkened the Sivers'kyi Donets' water even more, and added ammonia.⁵⁸ Waste purification remained unsatisfactory at the Rubizhne Chemical and Soda Plant at least through the middle of 1975. During our technical excursion⁵⁹ to the Sivers'kyi Donets' in May 1975, we saw a large, open, steamy, black industrial sewer leading from the plant directly to the river. On the other hand, a large-capacity industrial effluent lagoon was nearing completion at the plant. Also, VNDIVO has built a prototype (60 m³/day capacity) purification facility for testing and designing a waste treatment installation for the Rubizhne factory.⁶⁰ At any rate, water samples below the Lysychans'k plant collected in April and October 1973, revealed BOD levels ranging from 0.8 to 2.1 times the MPC, with extremely high concentrations of inorganic salts.⁶¹

On the more positive side, the Sieverodonets'k Chemical Combine, one of the largest in Europe, now has a modern, multi-stage, 7.5 million ruble biological purification shop which spreads over more than 115 hectares with a total capacity of 90,000 m³/day.⁶² According to claims made by the treatment plant's chief engineer, A. A. Kar-mazina, during our spring 1975 visit, the facility achieves a 98 percent effectiveness in BOD removal. Although very high compared to American standards, the claim is probably accurate as the effluent is recycled through the system a second time and then is retained in 245,000 m³ capacity fish ponds for three days before discharge. During our visit the plant was undergoing expansion to a capacity of 113,000 m³/day.

⁵⁷ L'vovich, op. cit., p. 35.

⁵⁸ Demin and Bilenkin, op. cit., p. 19.

⁵⁹ A U.S. Environmental Protection Agency exchange visit consisting of a three-member U.S. delegation—William P. Somers of the U.S. E.P.A. Office of Water Planning, Daniel L. Loucks, Cornell University, and Craig ZumBrunnen, University of Washington—which took place during a three-week period of May and June 1975.

⁶⁰ L. I. Iakovleva, V. N. Ladyzhenskii, and L. S. Solodova, "Opytno-proizvodstvennye ispytaniia metoda oshistki stochnykh vod khim-kombinata po proizvodstvu anilinovykh krasitilei i produktov organicheskogo sinteza," *Problemy okhrany i ispol'zovaniia vod*, vypusk 2 (Kharkiv, 1973) pp. 76–86.

⁶¹ P. M. Bespalov, G. I. Kaplin, and A. N. Shertiuk, "Rol' vzaimosviasi poverkhnostnykh i podzemnykh vod v formirovanii resursov i kachestva podzemnykh vod v doline srednego techeniia Severskogo Dontsa," *Vsesoiuznoe nauchno-tekhnikheskoe*, pp. 136–39.

⁶² E. Zhanov, "We and Nature: Living Water," *CDSP*, 1970, no. 26, p. 39.

The quality of the treated effluent is monitored in three ways: (1) by fish in the 16 hectare ponds and in laboratory tanks; (2) by fur animals and birds which are fed crops irrigated by the treated effluent; and (3) by the human consumption of fruit grown on the treatment facility's premises, using the sludge as fertilizer. Karmazina claimed that the treated waste water is of better quality in terms of suspended solids, BOD, and biological organisms than is the water abstracted from the Sivers'kyi Donets' upstream from the plant. Hopefully she is correct, since twenty kilometers downstream from Sieverodonets'k the river serves as a potable water supply. The cost of treatment is 4.2 kopecks/m³. One question remains unresolved. Officials of the Sieverodonets'k Chemical Combine stated that *all* the waste water is being recycled without any discharge into the Sivers'kyi Donets' at a savings of 360,000 rubles per year. However, another source states that the treated waste water is emptied into the Sivers'kyi Donets' River from the fish ponds.⁶³

An old report (1960) says that a coal gasification plant below Lysychans'k increased the river's phenol content several times above the MPC. The river then improved for a distance before again being polluted by ore-concentrating waste water near Luhans'k (now Voroshylovhrad).⁶⁴ Also, the treatment installations at Luhans'k were overloaded by a factor of two to three.⁶⁵

In Luhans'k Oblast (now Voroshylovhrad Oblast) the coal industry was paying hundreds of thousands of rubles in fines annually, but pollution continued. In fact, the fines were used by local Soviets to finance clubhouses, pave streets, and lay water mains. One director of a Makiivka factory was even reprimanded by the Ukraine's Ministry of Ferrous Metallurgy for insisting upon the allocation of funds for a sewage treatment shop!⁶⁶

Other severely polluted rivers in the 1950s and early 1960s included the Kryvyi Torets', the Krynka, and Kal'miius Rivers. The concentration of phenols and ammonia in them ranged from 38 to 190 mg/l, and suspended solids from 1000 to 13,000 mg/l.⁶⁷ The Kal'miius was receiving about 2.5 m³/sec of sewage, whereas its an-

⁶³ Belichenko and Egorov, op. cit., p. 14.

⁶⁴ Demin and Bilenkin, op. cit., p. 19.

⁶⁵ Spyshnov, op. cit., p. 32.

⁶⁶ Demin and Bilenkin, op. cit., p. 20.

⁶⁷ T. Kartamyshva and A. Zhdaniuk, "O sanitarnom sostoianii vodoemov v Donetskoj oblasti," *Gigiena i sanitariia*, 1970, no. 2, p. 86.

nual mean rate of discharge was only 3.0 m³/sec.⁶⁸ The only bright spot was the Luhanka River which was rejuvenated by the efforts of the economic council and public organizations of Luhans'k Oblast.⁶⁹

Presently phenols are only rarely detected in these Donbas rivers; ammonia exists within the range of 10-22 mg/l, and suspended solids are down to 200 mg/l. Furthermore, the Kryvyi Torets' has improved in the section from Dzerzhyns'k to its confluence with the Kazennyi Torets'. In turn, the Kazennyi Torets' has become cleaner in the section from Druzhkivka to Kramators'k. Sanitary conditions on the Kal'mius from Starobesheve Reservoir to Zhdanov have improved. Sections of the Krynka have also improved.⁷⁰

Several other positive signs should be mentioned. First, the new Pervomais'k Chemical Combine in Kharkiv Oblast is being built with a sewage and water recirculation system which will reduce the volume of contaminated water from 130,000 to 11,000 m³/day.⁷¹ The Canadian-based pro-Soviet monthly, *Northern Neighbors*, contains a photo of the elaborate biological purification plant at the chemical plant along the Luhan' River at Pervomais'k.⁷² The Horlivka nitrogen fertilizer factory, which was a massive polluter 30 years ago, is reported to have all but eliminated its discharge of wastes. In the process, a profit is earned up to the 50 percent reduction level. The reduction from the 50 to 90 percent is on a break-even basis and the profits from the first half are used to remove the last 10 percent.⁷³ This claim of complete elimination of waste products at a zero net cost is probably an exaggeration on both counts. Nevertheless, the plant's pollution-control efforts are admirable. Then, too, the city of Donetsk has recently completed a new 100,000 m³/day sewage plant and is finishing construction of another one of identical size.⁷⁴ Again, in the United States a 100,000 m³/day sewage plant would be sufficient for a city of 200,000 to 300,000 inhabitants. Since Donetsk has a population of about 900,000, at least four or five such plants would be necessary to handle the city's sewage (provided the per-capita sewage production is similar to that of the U.S.A.). Between 1961 and 1969, more than 400 installations to collect and purify domestic fecal sew-

⁶⁸ L'vovich, op. cit., p. 35.

⁶⁹ Demin and Bilenkin, op. cit., p. 22.

⁷⁰ Kartamysheva and Zhdaniuk, op. cit., p. 87.

⁷¹ S. Tsikora, "Let the Achievements of Science Serve Production: A Clear Sky and Clean Water," *CDSP*, 1970, no. 33, p. 14.

⁷² *Northern Neighbors*, April 1971, p. 10.

⁷³ Igor Petryanov, "Quo Vadis," *Soviet Life*, November 1970, p. 53.

⁷⁴ Kaposchina, op. cit., p. 3.

age were built and put into operation.⁷⁵ Furthermore, between 1966 and 1970, Donbas industrial enterprises built 154 purification stations and recyclable water-supply systems, costing an estimated 111 million rubles.⁷⁶

In spite of these improvements, severely polluted sections of Donbas rivers still exist in the Konstantynivka, Kramators'k, Slovians'k, and Artemivs'k regions and along several small rivers. Furthermore, the sanitary state of the daily volume of discharged domestic sewage, plus the effluents from the chemical, coal, metallurgical, machine building, and other enterprises of Donets'k Oblast amounted to 7.6 million m³ (essentially equal to one-half the average daily discharge of Sivers'kyi Donets' at its mouth), of which 1.3 million were not receiving any prior treatment. These figures do not include thermal effluents.⁷⁷ However, they do include mine water discharges into Ukrainian rivers (see Table 2). This waste volume, coupled with the

Table 2
Quantity of Mine Water and Mineral Salts
Discharged in Donbas Rivers

River	Mine Waters		Salts	
	10 ³ m ³ /day	10 ⁶ m ³ /year	tons/day	10 ³ tons/year
Samara	196.4	71.6	596.4	217.6
Kal'miius	204.8	74.7	697.7	254.6
Miius	484.6	176.8	1002.1	365.8
Silvers'kyi Donets'	737.1	269.0	2036.4	743.2
Total for Donbas area	1852.0	691.2	—	—

Source: B. A. Miloslavskii, S. L. Lozovskii, Iu. L. Shamraev, and A. N. Serbin, "Ob okhrane vodoemov i vodotokov ot zagriazneniia shakhtnymi vodami," *Vsesoiuznoe nauchno-tekhicheskoe soveshchanie: razrabotka i organizatsiia kompleksa vodookhrannykh meropriiatii* (Kharkiv, 1973), p. 177.

⁷⁵ Kartamysheva and Zhdaniuk, op. cit., pp. 86-87.

⁷⁶ D. M. Gridasov, "Speech by Deputy D. M. Gridasov, Krasnoarmeiskoe E. D., Donetsk Province," *CDSF*, 1971, no. 52, p. 6.

⁷⁷ Kartamysheva and Zhdaniuk, op. cit., pp. 86-87.

low water availability of the Donbas region, still makes this region's surface water resources the most heavily polluted of the entire Soviet Union.

In 1962 of 2.27 km³ of sewage discharged into Ukrainian waterways, only 0.57 km³, or one-fourth, had received treatment. By 1968 the total volume of discharged sewage had reached 4.53 km³, of which a reported 80 percent was receiving mechanical treatment, but only a relatively small percentage was being biologically treated. Furthermore, only 50 to 70 percent of the capital investment funds allocated for the building of purification facilities was actually being spent.⁷⁸ Then, too, in 1968 only 18 percent of the Ukraine's industrial water was being recirculated.⁷⁹ This percentage, which is itself low, probably refers primarily to cooling water.

SEWAGE IRRIGATION. A final footnote concerns sewage irrigation in the Ukraine. In 1969 the cities listed in Table 3 made use of sewage irrigation. In 1968 one-fourth of the sewage potentially usable for irrigation, or 90 million m³, was utilized to irrigate 56,000 hectares. In the future it will be possible to irrigate 200,000 hectares in the Ukraine.⁸⁰ In the Donbas, about 87 percent of the sewage from 39 industrial enterprises (the main polluters of the Sivers'kyi Donets' River) could be used in agriculture after some preliminary treatment.⁸¹ Thus, upwards of 100,000 hectares could be irrigated in the Donbas area alone.⁸²

COASTAL POLLUTION OF THE SEA OF AZOV. In May of 1966 the USSR Council of Ministers adopted a resolution designed to protect the water resources of the Azov Basin.⁸³ The serious coastal pollution of this shallow sea probably prompted their action. According to several Soviet sources the sea is severely polluted in certain coastal zones, especially around Zhdanov, Taganrog, the Don River estuary, and Berdiansk.⁸⁴

⁷⁸ B. Bogdanov, "Conservation and Economics," *CDSP*, 1970, no. 19, p. 8.

⁷⁹ A. M. Grin and N. I. Koronkevich, "Principles of Construction of Long-Term Water-Management Balances," *Soviet Geography: Review and Translations*, 1969, no. 3, p. 127.

⁸⁰ D. V. Leporskii and I. A. Nazarov, "Oroshenie stochnymi vodami na Ukraine," *Gidrotekhnika i melioratsiia*, 1968, no. 4, pp. 98-100.

⁸¹ V. A. Birun, "Vodoemy dolzhny byt' chistyymi," *Gidrotekhnika i melioratsiia*, 1968, no. 11, p. 124.

⁸² Leporskii and Nazarov, op. cit., p. 99.

⁸³ "Official Department: Protection of the Azov Basin," *CDSP*, 1966, no. 21, p. 43.

⁸⁴ A. I. Zhukov, "Ochistka stochnykh vod i zashchita vodoemov ot zagriazneniia," *Vodosnabzhenie i sanitarnaia tekhnika*, 1970, no. 4, p. 11; Anatoli Simonov, "Cleaning Up the Seas," *Soviet Life*, January 1970, p. 59; Simonov et al., op. cit., p. 178-79.

Table 3
Sewage Irrigation in the Ukraine

Location	Year Started	Hectares
Kiev	1894	23,300
Odessa	1887	1,300
Kharkiv	1930	4,000
L'viv	1938	—
Donets'k	1947	—
Voroshyl'ovhrad	—	6,600
Total for the Ukraine		56,000

Sources: D. V. Leporskii and I. A. Nazarov, "Oroshenie stochnymi vodami na Ukraine," *Gidrotekhnika i melioratsiia*, 1969, no. 4, pp. 98-99.

M. A. Tolstoi and V. A. Bondarev, "Tsennoe syr'e dlia mineral'nykh udobrenii: Shiroko ispol'zovat' promyshlennye otkhody," *Priroda*, 1964, no. 8, p. 93.

M. I. Bedusenko and V. E. Shandybin, "Dinamika solevogo rezhima pochvogrunтов v usloviakh orosheniia ochishchennymi gorodskimi stokami," *Problemy okhrany vod*, vypusk 2 (Kharkiv, 1973), p. 105.

Iu. P. Belichenko and Iu. G. Egorov, "Ob opyte raboty organov vodnogo nadzora," *Problemy okhrany vod*, vypusk 5 (Kharkiv, 1974), p. 19.

The phenol content of the sea's northern shores is several times higher than the phenol MPC of 0.001 mg/l. Traces of iron, mercury, and manganese are also present.⁸⁵ In the Zhdanov area, phenols range from 0.006 to 0.150 mg/l; in Taganrog Bay from 0.031 to 0.126 mg/l; and in Berdians'k the level is 0.052 mg/l. The iron content in the Zhdanov zone exceeds the MPC by a factor of six. The manganese content at Zhdanov and Taganrog is twice that of natural sea water. Then, too, oil pollution is serious. Referring to a Soviet point scale where 2 is the MPC, the neighboring waters of Zhdanov (5 points), Berdians'k (3-4 points), and Taganrog (3-4 points), all are seriously contaminated by oil. The sea bottom sediments also have high oil concentrations, especially near Taganrog and Zhdanov.⁸⁶ While BOD levels are only moderately high, the content of phosphorus, phosphates, nitrites, and ammonium ion (NH_4^+) is quite high in the vicinity of major coastal cities.

⁸⁵ Simonov, op. cit., p. 59.

⁸⁶ Simonov et al., op. cit., pp. 178-79.

On the basis of comparisons between data for 1950 and 1960 the pollution levels of the Sea of Azov have increased. Only about 30 percent of the sewage which enters the sea has received any treatment. The total volume of sewage is reported to exceed the total annual discharge of the Don River by 15 percent.⁸⁷ This tremendous volume equals about one half the total estimated effluent for the USSR for 1970.⁸⁸ This figure is too high, but the order of magnitude is probably correct, since the Azov receives all the wastes of the Donbas region.

This quantity of sewage has had a very harmful impact upon fishing in the Sea of Azov. The annual fish catch declined three-fold from 1936 to 1955 and for some fish eight- to nine-fold.⁸⁹ The annual catch has decreased from a peak of 150,000 tons to only 5,700 tons in 1975.⁹⁰ The effluent of the Azov Steel Mill along the north shore is reported to be particularly destructive for young fry.⁹¹ However, the Zhdanov Steel Plant is reported to have recently installed a newly developed type of sewage filters which not only have increased the plant's treatment capacity three-fold, but also make it unnecessary to construct expensive settling basins.⁹² The pollution of the coastal regions of the Azov Sea is quite serious and compounded by the sea's shallowness, the slow rate of water exchange with the Black Sea, and the precipitous reduction in the inflow of fresh water into the sea due primarily to increased municipal, industrial, and irrigation water withdrawals along the Don and Kuban' river basins. For example, the inflow declined from about 40 km³ in 1970 to only 22.0 km³ in 1975, resulting in a marked increase in the sea's salinity from a normal range of 9 to 10 ppm to 13.3 ppm.⁹³ It has been proposed that a dam be built across the Kerch Straits to help alleviate the salinity problem, but unless such pollution control efforts as those under way at VND-IVO are spectacularly successful, the proposed dam may just help create a massive cesspool.

⁸⁷ *Ibid.*, p. 179.

⁸⁸ I. A. Gerardi, *Osobennosti prirodnykh i meliorativnykh uslovii zony nedostatochnogo uvlazhneniia i problemy pereraspredeleniia stoka rechnykh basseinov po territorii SSSR* (Moscow, 1969), p. 63.

⁸⁹ L'vovich, *op. cit.*, p. 37.

⁹⁰ M. A. Sholokhov, "Speech by Comrade M. A. Sholokhov, Writer, Rostov Party Organization," *CDSP*, 1966, no. 16, p. 27; M. Podgornikov, "Medicine for the Sea," *CDSP*, 1976, no. 12, p. 7.

⁹¹ G. Nikolsky, "Dormant Giants," *CDSP*, 1970, no. 29, p. 26.

⁹² "Cleaning River," *Soviet Life*, October 1975, p. 45.

⁹³ Podgorodnikov, *op. cit.*, p. 28.

VNDIVO AND THE SIVERS'KYI DONETS' PILOT PROJECT⁹⁴

The attempt here has been to gauge the deleterious impact of Ukrainian urbanization and industrialization upon the water quality of the republic. Although some examples of pollution abatement and prevention are noted, the focus is upon examples of pollution production rather than prevention. In contrast, this brief section concentrates upon a VNDIVO pilot project to create a river basin pollution control system. It is safe to assume that the chief motivation behind this innovative undertaking is indeed the seriously deteriorated water quality of the rivers and groundwater of at least the southeastern Ukraine.⁹⁵

VNDIVO has been assigned three major responsibilities. First, the institute is responsible for the creation of the water resources portion of the all-union nature protection plan which is to be compiled by 1980.⁹⁶ Second, VNDIVO researchers are involved in a number of laboratory and field investigations related to water-quality protection. Third, and most important for our purposes, VNDIVO has been given the task of designing, and overseeing the construction, testing, and operation of an automated pollution-control system for a short stretch (about 75 km) of the Sivers'kyi Donets' River, from Raihorodok, above the confluence of the Kazennyi Torets', to below Lysychans'k (see Map 2).⁹⁷

Both the all-union nature protection plan and the Sivers'kyi Donets' project will consist of an amalgamation of distinct legal, organizational,

⁹⁴ Except where explicitly noted, the information in this section is based upon interviews, lectures, and discussions with members of the VNDIVO staff and technical visits arranged by VNDIVO during May and June 1975.

⁹⁵ For examples of groundwater pollution in the Donbas, see Bepalov, Kaplin, and Sherstiuk, *op. cit.*, pp. 129-39.

⁹⁶ A. Kuzin, "Programmy i podkhod k planirovaniu vodookhrannykh meropriiati," unpublished manuscript, VNDIVO.

⁹⁷ The following references should be consulted for more detailed information about the theoretical and technical aspects of this river basin pollution control project: A. Kuzin, "Rekomendatsii po stepeni ochistki gorodskikh i blizkikh k nim po sostavu proizvodstvennykh stochnykh vod," unpublished manuscript, VNDIVO; A. K. Kuzin and L. P. Os'machko, "Optimizatsiia razmerov sanitarnykh popuskov," *Vodnye resursy*, 1975, no. 2, pp. 90-102; A. K. Kuzin and S. A. Stanishevskii, "Zadachi i printsipy optimizatsii vodookhrannykh meropriiati," *Vodnye resursy*, 1974, no. 5, pp. 111-24; A. K. Kuzin, L. P. Os'machko, and S. A. Stanishevskii, "O vybore optimal'nykh tekhnicheskikh reshenii po ochistke stochnykh vod," *Problemy okhrany i ispol'zovaniia vod*, vypusk 2 (Kharkiv, 1973), pp. 170-79; A. K. Kuzin, S. A. Stanishevskii, and L. P. Os'machko, "Opredelenie optimal'noi stepeni ochistki gorodskikh stochnykh vod pri rassmotrenii v komplekse neskol'kikh kanalizatsionnykh stantsii," *Problemy okhrany i ispol'zovaniia vod*, vypusk 2 (Kharkiv, 1973), pp. 179-87.

economic, and technical measures. The legal component establishes the minimum objectives of the system. In other words, the legal MPCs of a number of potential water contaminants provide the initial constraints for the control system. The organizational component deals with such matters as the design, construction, operation, and monitoring of the system's operation.

The economic component of the system is of considerable interest. First, the VNDIVO pilot project makes extensive use of a number of physical-hydrologic models such as one- two- and three-dimensional admixture diffusion models and "self-purification" models (Streeter-Phelps) linked to econometric-mathematical models. The latter incorporate such items as capital expenditure, including depreciation and operating cost, for possible variants of pollution-abatement installations. Thus the objective of the total system of linked models is to minimize the total annual costs of the entire system subject to the initial constraint that the minimum legal water-quality standards be guaranteed at all points where water is being withdrawn. Operationally, these points are defined by monitoring points located 1 km. upstream from the water abstraction points.

To make the computer simulated control system computationally feasible, only the MPC for BOD has been used thus far. A group of VNDIVO researchers are currently trying to define operationally a single surrogate index of water quality, an exceedingly difficult if not impossible task. The design group makes use of a half-dozen or so numerical methods of solution. The most powerful software techniques used, however, are dynamic programming algorithms. All the models are predicated upon the use of the minimum average monthly flow, which occurs once in twenty years for the river at selected critical points.

Two aspects of the design stage of the system are worth emphasizing. First, the modeling of the scheme makes explicit use of the self-purification potential of the river. Such an approach is "economically rational," but would be an ecological anathema to sizable proportion of American environmentalists. Second, because of the centralized ownership and control of the Soviet economy, VNDIVO scientists and economists are able to implement a system optimization approach or a basin-wide approach. Such an arrangement is essentially precluded in the American context because, although theoretically it would increase overall social welfare, it would concomitantly alter the relative price and cost structure among privately-owned, competing enterprises. Hence, governmental attempts to impose a basin form of sys-

tem optimization in the United States would likely encounter strong opposition.

The technical component of the project or the “nuts-and-bolts” of the scheme includes four types of physical installations which constitute four alternative pollution abatement measures. First, water reservoirs—which are multiple-use facilities—will be used for regulation of the river’s discharge or for low-flow augmentation to maintain a certain minimum assimilative capacity. The use of flushing to ensure minimal sanitary norms is significantly cheaper than the use of treatment alone, to stay within the legal sanitary norms. The second measure, which is of more restricted application, is the installation of mechanical and pneumatic aerators in the stream to facilitate the natural self-purification processes. Floating aerators are currently in operation on sections of the Dnieper and Don rivers. At any rate, the aerators will be set up at the known locations of oxygen sinks along the Sivers’kyi Donets’. Effluent lagoons constitute a third measure of controlling the river’s quality. Three large groups of industrial lagoons already exist along the stretch of the Sivers’kyi Donets’ in question, and another at Rubizhne is nearing completion. Although the lagoons are built by the industries which store their wastes in them, VNDIVO will regulate their discharge as part of the integrated control system. The final measure involves the regulation of the composition and quantity of the effluent discharged. Essentially, this part of the system pertains to mechanical, chemical, and biological treatment processes and stations. Changes in technological processes will be at least partially instrumental in altering both the composition and quantity of discharged wastes. Deep-well injection of the most harmful admixtures (a highly questionable practice also commonly used in the U.S.) and sewage irrigation are also to be utilized as part of the overall scheme.

Already VNDIVO researchers have solved the control model for the optimal degree of treatment, flushes, and size of lagoons. Using the system optimization approach involving the four major measures enumerated above, VNDIVO economists report an estimated cost savings of 8 percent versus the use of sewage treatment alone to achieve the desired water quality goals. Of this total savings, up to 50 percent is attributed to the regulation of lagoonal discharges, and 20 to 25 percent each to low-flow augmentation and sewage purification measures. The savings effect of aerators has not been determined.

Figure 1 on page 129 schematically represents the structure of the Sivers’kyi Donets’ pollution control system. The automatic monitoring devices

(8 in total) are supposed to keep records on up to twelve parameters: (1) pH; (2) redox; (3) dissolved oxygen (DO); (4) electroconductivity; (5) suspended solids (SS); (6) temperature; (7) river discharge; (8) Cl^- ; (9) NH_4^+ ; (10) Cu; (11) Fe; and (12) phenols. Information between the various subsystems will be by telecommunication lines, and data will be automatically introduced into the computer at the Central Control Center. The determined regulatory response of the data processing will be transmitted back to any and all regulatory installations (e.g. lagoon discharge gates) for automated adjustment of the regulatory "valves." Redundant manually operated controls at the reservoirs, lagoons, aerators, and treatment plants will also be constructed.

Part of the system is to be in operation by 1977, and the entire system by 1980. This paper has only hinted at the complexity and ambitiousness of this pilot project. It will be exceedingly interesting to "monitor" the development of the project over the next five years.

CONCLUSIONS

The first part of this study tried to survey the major water pollution problems of the Ukraine in particular, and of the Black and Azov Sea Basins in general. On the basis of Soviet empirical evidence, it appears that the most severely polluted waterways exist within the eastern half of Belorussia, central Moldavia, and the three southeastern oblasts of the Ukraine—Donets'k, Voroshylovhrad, and Dnipropetrovs'k. Additionally, several cities along the Dnieper River and the two sea coasts represent serious foci of pollution.

These generalizations are not meant to obscure the multitude of other contamination centers discussed or left out of this study, but rather to highlight those areas which have the highest concentrations of pollution-generating activities combined with the largest volumes of effluent. Thus, this geographical empirical investigation offers no real surprises. Rather, it does serve to document the spatial pattern of water pollution that emerged from the pollution-potential estimating procedure previously cited.⁹⁸

Between 1971 and 1974, capital investment in water protection facilities in the Ukraine amounted to 805 million rubles and the total

⁹⁸ Craig ZumBrunnen, "Walter Pollution."

capacity of newly commissioned purification installations exceeded 3.5 million m³ per day (or 1.28 km³/yr).⁹⁹ Despite these positive achievements and the examples of water pollution abatement cited in this study, it is not at all clear whether or not these efforts are even sufficient to keep up with the pace of urban and industrial growth in the Ukraine.

The VNDIVO pilot project is ambitious, encouraging, and surely symbolizes a new emerging Soviet resource consciousness. Unfortunately, as in the United States experience, this new consciousness has been dictated more by the harmful repercussions of a long history of neglect about Soviet water-resource practices than engendered by ecological foresight. At the same time, the VNDIVO project symbolizes the Soviet proclivity to seek technological, as opposed to institutional, accommodations or solutions to problems. The introduction of a charge for water use and/or disposal, coupled with meaningful environmental externality fulfillment targets in the "Plan," could possibly become effective institutional tools for improving and protecting water quality within the Ukraine as well as within the USSR. Needless to say, such an approach is doubtful in the near future, since it implies both a greater decentralization and a shift in relative priorities—from production from the environment to protection of the environment—than the Soviet leadership is probably willing to entertain.

⁹⁹ B. Vol'tovskii, "Delo gosudarstvennoi vazhnosti," *Pravda Ukrainy*, October 9, 1975.

Legal Aspects of Individually Owned Houses in the Ukrainian SSR*

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There is no foundation for the generally held belief that the nationalization of urban dwellings which was carried out in the first years of the revolution resulted in the concentration of public housing funds in the hands of the central authorities of the USSR, thereby precluding independent decisions of the Ukrainian SSR in this matter. In the first place, there was no USSR during that period, and the public housing economy was administered by the UkSSR under its own laws. In the second place, the municipal economy fell under the authority of each one of the union republics, even after the USSR was formed. Nowadays, each union republic has its own Ministry of Municipal Economy, and there is no Ministry of Municipal Economy of the USSR. If one takes into account the fact that all regulations concerning individually owned houses come from the Ministry of Municipal Economy of the corresponding republic, one can come to the conclusion that the only uniform public housing policy (which includes also individually owned houses) for the entire Soviet Union is the one formulated by the Communist Party of the Soviet Union (CPSU). The execution, however, of this uniform policy falls to no small extent under the authority of each republic.

Many legal questions concerning individually owned houses are regulated by the Civil Code (C.C.) of each union republic. The compilation of these law books was based on the so-called "Foundations of Civil Code" of the USSR and of the union of republics (1961). Consequently, a uniform policy was guaranteed for the entire USSR. Each one of these C.C.s, however, treats the legal questions in different ways. In addition, if one takes into account the fact that disputes concerning individually owned houses fall under the jurisdiction of the courts of each union republic, and that the verdicts of these courts are seldom made uniform through the decisions and general instructions given by the Supreme Court of the USSR, the problems that we

* The Editor wishes to thank Alfred R. Wedel, University of Delaware, for translating this article from the German.

are about to deal with regarding the construction of individual houses of a given republic will prove to be quite interesting. In passing, let it be noted that the maximum dwelling space for state apartment houses permitted by the different C.C.s varies, sometimes differing a great deal, from republic to republic; for instance, 9 square meters in the RSFSR, 13.65 square meters in the UkSSR, and 12 square meters in the Georgian SSR and in the Azerbaidzhan SSR. The differences are quite considerable.

HISTORICAL EVOLUTION

The nationalization of "capitalistic house ownership" in the cities was carried out in the RSFSR by the decree of August 20, 1918. At that time, the Ukraine was an independent state under Hetman Skoropads'kyi. It was only after his fall that the Ukrainian communists took over; they prepared the way for the abolition of private property rights to real estate in the cities—and thereby the nationalization of house ownership in the cities—with the decree of the Ukrainian Central Executive Committee of July 29, 1919. This decree coincided in general terms with that of the same name issued by the RSFSR on August 20, 1918. The difference was that according to the decree of the RSFSR all houses in towns over 10,000 inhabitants were to be nationalized if their worth—or their profit—surpassed the limits stipulated by the local authorities, whereas in the Ukraine these measures applied only to towns with more than 15,000 inhabitants.¹ On July 14, 1919, the Council of the People's Commissars of the UkSSR nullified the decree entitled "On Seizure, Requisitions, and Distribution of Dwelling and Non-Dwelling Quarters," which had been very carefully prepared, but which could not have been enforced because of the war-related incidents occurring on Ukrainian territory. Only in the following year were the conditions for the execution of the nationalization of private property met.² Correspondingly, full use of

¹ V. L. Kobalevskii and I. M. Gotfrid, *Zhilyshchmoe zakonodatel'stvo Ukrainy* (Kharkiv, 1924); *Istoriia derzhavy i prava Ukrain'skoi RSR*, vol. 1 (Kiev, 1967), p. 295.

² In the RSFSR a distinction was made between "nationalization" and "municipalization." In the Ukraine, however, only the term "nationalization" was used. E. F. Ev-tichiev, *Osnovy sovetskogo administrativnogo prava* (Kharkiv, 1925), pp. 275 ff. The term "municipalization" was not used in the entire Soviet Union until the Central Executive Committee of the USSR adopted the resolution "Concerning the Property Rights Laws of Local Councils." The term "municipalization" meant that houses expropriated by the state would come under the jurisdiction of local council.

the experience gained was made in the law "On Living Space in the UkSSR," of November 1, 1921,³ which was in force during the 1920s.

In rural areas, only the houses of the great landowners and those of similar "capitalistic" elements were nationalized. Houses belonging to peasants remained their private property.

In the early 1920s the government of the USSR—as part of its "New Economic Policy"—began to return to private hands some of the nationalized houses. Generally, these were houses in need of repair and, therefore, no longer profitably rentable. The reestablishment of private property was carried out according to distinct criteria. These criteria varied not only from republic to republic, but also from region to region. State and trade-union houses were not returned to private ownership. Furthermore, according to the contemporary laws of the UkSSR, houses were not returned to their former owners if these persons had been ex-policemen and ex-constables, spies, trouble makers, ex-collaborators of hostile and counterrevolutionary news services, and persons recognized as enemies of the working class. Moreover, people who had acquired their houses after January 1, 1919, were also excluded. Only one house per family could be assigned as a private possession, and ownership of more than one house per family was explicitly forbidden.⁴

In the cities the principle that all houses were considered nationalized property unless they had been returned to private property status prevailed. The reverse applied in the country: all houses were privately owned with the exception of those that had been nationalized by some special administrative act. Both of these principles were formulated in the decree of the USSR government entitled "Concerning the Policy Governing Living Quarters" of January 4, 1928, and in the ordinance of the UkSSR government "On Houses Belonging to the State in Cities and Urban-Type Settlements, and on the Procedures for Occupancy of Living-Quarters in Those Houses" of January 11, 1928.⁵

During the years 1929–34 a compulsory collective farm system (kolkhozes) was established for agriculture. Under this ruling many peasant houses were socialized. The peasants of the collective farms were permitted to keep ground with their houses and farm buildings. These houses were no longer the private property of the peasants,

³ *Zbir uzakonnen' URSR*, no. 22/1921, Article 641.

⁴ Evtichiev, *op. cit.*, p. 274.

⁵ *Istoriia derzhavy*, vol. 1, p. 526.

however; they were considered *kolkhoz* property, i.e., belonging to the whole community as communal property (*sumisna vlasnists'*).

The building of individually owned houses was not supported by the state at that time because it did not conform to the prevailing ideology. The state, however, which had been driven up a blind alley by communist housing policy, was unable to get out of the predicament without the help of private initiative. A solution to this problem was sought in the so-called "right to build" law. The establishment of the "right to build" law was common to all C.C.s of all union republics; this right was adopted almost without any change from the C.C. of the RSFSR (articles 71–84). The "right to build" was a time-limited right to possession of private property; it expired after the period specified in each contract, and the house then became the property of the state. The state agency in charge of the transaction had to compensate the owner for the value of the house after a new estimate of its reduced value—due to depreciation—was established.⁶ Building contracts specified the following time limits: Up to 65 years for stone and concrete buildings, up to 60 years for mixed structure houses, and up to 50 years for wooden structures. Thus, Soviet citizens were allowed to build their own "private" homes, but only according to the stipulations of the "right to build" law. The legal rights of the persons entitled to this privilege were equal to the legal rights of a private owner; the "right to build"—just like the right to private property—could not only be transferred, but was also hereditary, and enjoyed immunity against interference by anyone. The press did not conceal the fact that the "right to build did serve the purpose of extracting from the population new resources for the construction of dwellings."

The construction of individually owned houses in the state-owned farms (*sovkhozes*) had its own peculiarities which were settled by the decree of June 7, 1934, of the USSR government.⁷ The *sovkhoz* contracted with a worker to commit the state to make available to him the necessary real estate on which he could build a house and cultivate the garden plot. The *sovkhoz* also provided the worker with credit for the acquisition of building materials and the necessary means for their transportation. After completion of the house, an official statement was drawn up and signed by the director of the *sovkhoz* and the *sovkhoz* worker, in which the legal rights of the latter were considerably limited. The worker was not allowed to transfer his "right to build"

⁶ *Grazhdanskoe pravo*, vol. 1 (Moscow, 1938), p. 245.

⁷ *Ibid.*, p. 234.

to a third party, nor lodge in his house people who were not workers of the sovkhoz. If the house owner left the sovkhoz community, he had to evacuate the house, or face eviction through administrative channels. The sovkhoz then took possession of the house and was bound to compensate the owner only for his actual building expenses, less depreciation of the house, and the unpaid credit balance.

From an economic point of view the "right-to-build" law was sheer nonsense for the state. The house owner had control of the house over a period of 50–60 years. At the end of this period, when the house was already delapidated, it became state property. Consequently, the legislation began to reflect gradual toleration in individual cases of the construction of dwellings which were personal (unconditional) property, especially because Article 10 of the Constitution of the USSR and Article 10 of the Constitution of the UkSSR granted protection to the right of "personally" owned houses. Finally, on August 25, 1948, the ordinance titled "On the Right of Citizens to Buy and Build Private Houses" was issued by the USSR government; it declared that "each male or female citizen of the USSR had the right to buy or build for him/herself, as personal property, a one- or two-story house containing up to five rooms, whether in a town or in the country."⁸ In the following year the "right-to-build" law was abolished, and the articles of the C.C. dealing with "right-to-build" were annulled.

DELINEATION OF COMPETENCY BETWEEN THE USSR AND UkSSR

Through the ordinance of August 15, 1948, the government of the USSR had taken the initiative in regard to the regulation of the construction of single houses. The maximum size of private houses was limited to two floors (ground floor and upper floor) and five rooms. Since the determining factor for the individual owner of a house is not the number, but rather the size of rooms, and since this fact encouraged the "richer" citizens to construct larger houses, the ordinance of June 18, 1958, by the USSR government stipulated the maximum permissible size of a private house to be 60 square meters.⁹ The living area was not to include kitchen, bath, lavatory, garret, etc. A provision was made not to penalize the owners of previously built

⁸ In the USSR the ground floor counts as the first floor.

⁹ *VVS SSSR*, no. 16/1958, Article 284.

houses of larger size (under the ordinance they would have had to relinquish the surplus living space). The ordinance explicitly provided that the maximum permissible size of a private house was to be only 60 square meters, but this was not to be made retroactive.

The ordinance of August 25, 1948, of the USSR government provided for the manner of distribution of real estate, its size, the obligations of the house owner and those of the agents, who were responsible for the adherence of house owners to the legally stipulated regulations. The local executive council (or union committee) was empowered to supervise the construction work carried out on the sites provided by the government. If a house owner had his house built in violation of the building code or some other technical norms, the executive council had to decide whether to stop construction and to tear down the completed part at the owner's expense.

The individual regulations of the ordinances of 1948 and of 1958 were superseded by the so-called "Sources of the Civil Legislation of the USSR and of Union Republics of 1961," and by other such fundamental legislative acts. As a result, the C.C. of the different union republics, including the C.C. of the UkSSR of 1964, and the Real Estate Code of UkSSR of 1970, were adopted.

Soon enough the construction of private houses in the cities proved to be impractical from an urban and economic point of view. The government of the USSR intervened and no longer allowed the granting of real estate and credit for construction of single houses in the large cities of union republics.¹⁰ The union republics carried out further restrictions under their own administration. On July 10, 1962, the resolution of the Central Committee of the Communist Party of the Ukraine (CC CPU) and of its Council of Ministers was adopted. This resolution, "Concerning Single and Cooperative House Construction," forbade the allotment of real estate for construction of individual houses in the following cities: Kharkiv, Dnipropetrovsk, L'viv, Donetsk, Zaporizhzhia, Sevastopol' as well as in the cities and settlements of the Crimea oblast lying between the health resort centers of Kerch and Evpatoriia.¹¹

However, the plans of the Ukrainian government went much further. It was generally held that there was no reason to encourage

¹⁰ Decree of the CC of the CPSU and of the Council of Ministers of the USSR of June 1, 1962, "Concerning Individual and Co-operative House Construction." *Sobranie postanovlenii pravitel'stva SSSR*, no. 12/1962, Article 93.

¹¹ *Zbirnyk postanov i rozporiadzhen' uriadu Ukrain's'koi RSR (ZP)*, no. 7/1962, Article 93.

the building of small private houses, since this could lead to the waste of land under certain circumstances. Accordingly, on July 28, 1964, the CC CPU passed a rather curious resolution. Beginning September 1, 1964, all allotments of grounds for the construction of individual one-story houses were to be forbidden in all cities of the different regions, including the fifteen cities enumerated in the document, and, beginning January 1, 1965, in all the other cities and settlements of the sovkhozes.¹² An exception was made only in those cases where high-rise apartments could not be erected for "geological reasons." At the same time, the construction of one-story single houses was forbidden in all these cities, settlements, and sovkhozes. In their place, the construction of high-rise buildings was encouraged. The executive committees of the oblast councils were to present by September 1, 1964,¹³ the appropriate plans to the Ukrainian Gosplan, in order to be considered by this agency in their economic planning policy for the year 1965. The Committee for the Construction Industry (Gosstroy), the Ministry for Production and Procurement of Agricultural Products, and the Ministry of Agriculture of the UkSSR were instructed to work out appropriate suggestions, in cooperation with the oblast executive committees, with reference to a progressive change toward the construction of high-rise apartments in the country, and to present their suggestions to the Council of Ministers.

A few months later, these measures proved to be of no avail whatsoever in solving the housing shortage. On February 23, 1965, a new resolution of the CC CPU and the Council of Ministers of the Ukraine was passed.¹⁴ By its terms, restrictions for single-house construction were made practically null and void. However, these restrictions remained in force in Kiev, Kharkiv, Dnipropetrovs'k, L'viv, Donetsk, Zaporizhzhia, Sevastopol', and in the health resorts on the Black Sea. The implementation of these resolutions was left in the hands of executive committees of local councils.

The legislation of the USSR settled, therefore, only general questions dealing with the construction of single houses; the practical realization of them was, however, left to the discretion of the agencies of the Ukraine.

¹² *ZP*, no. 8/1964, Article 95.

¹³ This time limit was later extended to January 1, 1967.

¹⁴ *ZP*, no. 2/1965, Article 10.

GOVERNMENTAL PROMOTION OF SINGLE-HOUSE CONSTRUCTION

The program of the CPSU of 1961 provides that "in the course of the first decade the housing shortage will be eliminated. Families who still live in overcrowded and inadequate quarters will receive new homes. In the second decade, the occupancy of living quarters by citizens will progressively become a service free of charge." No reference is made to the privately owned houses. Nevertheless, the resolution of June 1, 1962, instructs the governments of union republics to take the necessary steps to support the construction of privately owned houses.

The instructions for implementation of this resolution, applicable to the entire union, were spelled out in the resolution of the CC CPU and the Council of Ministers of the Ukraine of July 7, 1962, addressed to oblast executive committees. These required that the committees' annual plans make provision for the following: the supply of building materials for the construction of single houses, the necessary means of transportation, the "prompt" allotments of parcels of land, etc. The principle was established that the land should be allotted for construction only according to the prepared plans; in other words, single houses should be constructed according to the general plan of the urban development. In addition, the executive committees of the local councils were asked to work out their own projects for the construction of single houses; and the Committee for Architecture of the UkSSR was to furnish specific standard projects. These developments suggest that the decision was—and still is—to include the citizens' private initiative to aid in solving the housing shortage.

In the 1950s the government especially promoted the construction of small summer houses (*dacha*) by providing land, building material, and credit for construction expenses. Thus, entire complexes of these dwellings (*dachne selyshche*) were erected on the outskirts of the large cities. Industrial and state agencies were allowed to sell to the citizens small summer houses. Since a summer house is considerably cheaper than a regular house and can be built in a short time, a privately run trade with these dwellings began. For this reason, the government prohibited the allotment of real estate for such purposes in the entire Soviet Union. In 1961, the Council of Ministers of the UkSSR ordered a strict control of real estate allotted for summer houses. Several agencies of the republic were empowered to control the utilization of

these landed properties. It was discovered that under the pretense of selling a summer house, state-owned land was being sold, or houses were built only to be leased. Moreover, hired laborers were employed to cultivate the parcels of land.¹⁵ The local executive committees were supposed to intervene upon discovery of such machinations; they were to void the utilization of the land in question, and to call the culprit to penal account.¹⁶

The construction of individual houses was herewith placed under rather tight restrictions. New houses can be built nowadays only in the country and in cities of up to 100,000 inhabitants; the construction of summer houses is no longer permitted. Nevertheless, the funds for the construction of individually owned houses represent a large portion of the total fund for construction in the USSR. In 1966 these funds amounted to one-third of the total construction budget.¹⁷

PROCEDURE FOR ALLOTMENT OF LAND FOR CONSTRUCTION

Land in the Soviet Union is unlike that of all other East-Bloc countries—state property. It is not possible to purchase a piece of land from a private owner. If someone wants to build a private house, he must petition the local executive committee to be assigned a piece of land. Not every citizen has the right to be assigned a parcel for construction. When the Department of Municipal Economy of the local executive committee studies the petition, it takes into account not only the relationship of the petition to city construction policies, but also inquires into the “need for living quarters” of the petitioner, his family situation, and his attitude toward work.

If the petition is rejected, the petitioner has the right to appeal to the appropriate next higher state agency. The latter makes the final decision in this matter. If the petition is granted, the petitioner is allotted a parcel for construction “for his use and without any time limitation.” The right to make use of the land is his personal right; it cannot be transferred to another person, nor sold, nor given away

¹⁵ ZP, no. 2/1961, Article 11.

¹⁶ Since there was a shortage of convalescent homes and of establishments of a similar nature, some of the jurists considered these measures completely unfounded. “There is no reason to regard a small summer house as alien to communistic ideology.” See V. F. Maslov, *Osnovnye problemy lichnoi sobstvennosti v period stroitel'stva kommunizma v SSSR* (Kharkiv, 1968), pp. 197 ff.

¹⁷ TsSU, *Strana Sovetov za 50 let* (Moscow, 1967), p. 248.

without the consent of the local executive committee. Once the land has been allotted, the petitioner is bound to build a house within the time limit determined by the "contract."

The granting of the petition does not in itself consummate the assignment of land for construction. A contract must be drawn up first between the person who was allotted the real estate and the Department of Municipal Economy of the local executive committee. This contract is modeled after a sample contract designed in 1949 by the government of the UkSSR. According to this sample contract, the prospective house owner commits himself to start construction within a year and to finish it within three years. If for justifiable reasons the building cannot be finished at the appointed time, the time limit can be extended for another construction period. If the building is not finished within the extended time limit, the Department of Municipal Economy then has the right to exact interest payments for each day of delay. The state agency does not have the right, however, to take away the allotted land for construction; it can—under certain circumstances—propose to the courts the confiscation of the real estate and the compensation for eventual losses. The confiscation of real estate can, therefore, be carried out only by legal decision.

The following items are listed in the contract: personal data of the house owner, the size of the allotted parcel, street, number, etc. The contract also notes what kind of house is to be built; wood or brick construction, number of floors and rooms, etc. Finally, the contract commits the house owner to a specified project. Since the size of the allotted piece of land considerably exceeds the area on which the house is to be erected, the contract requires detailed specifications concerning the space not used for construction. It must be indicated, for instance, whether trees will be planted or a garden developed. All conditions noted in the contract must be fulfilled by the house owner.

After the completion of construction, a special commission examines the completed structure and determines whether it can be declared suitable for habitation. Only then can the house owner move into the house and claim it as his property. He has no claim as owner before the inspection; he simply owns parts of the total construction, i.e. the building materials.

Matters concerning the size of the real estate were determined in general terms by the government of the USSR. Simultaneously with the issuance of the ordinance of August 26, 1948, "On the Right of Citizens to Buy and Build Private Housing," a resolution of the Coun-

cil of Ministers of the USSR was announced. In this resolution the executive committees of local councils were instructed to allot to the citizens parcels of land for construction and for use, without any time limitation. This resolution still applies today. The size of the parcels depends on the size of the houses to be built. In cities, the sizes vary between 300 to 600 square meters; outside the cities, between 700 to 1,200 square meters. The local executive committees can grant construction sites within these size limits.

For the use of the land the prospective house owner must pay, according to the law, the so-called ground-rent (between 0.4 and 1.8 kopeks per square meter). In the Soviet Union the ground-rent is called a tax, but it is really not a tax. Normally, when speaking of taxes, it is understood that a person or association of persons performs a duty by paying a certain amount to different state agencies, without the state's being obliged to reciprocate with any special commitment. The ground-rent is paid for the use of the land. There is, therefore, payment and benefit. It would be more correct to call the ground-rent a charge for the use of the land and not a tax. It is the equivalent of the relationship between the proprietor and the tenant (leaseholder) in capitalistic countries. The socialist state appears, in our case, as the private owner and allots parcels of land for utilization in return for remuneration.

FINANCING CONSTRUCTION

In the Soviet Union financing and crediting are strictly centralized. The credit laws for single-house construction do not vary among different union republics, but are fashioned after the unionwide resolution called "Prescriptions for the Granting of Credit by the Investment Bank of the USSR for the Construction of Individually Owned Houses, for the Repair of Houses, and for the Connection of Private Houses of Workers to the Municipal Water Supply and to the Sewer System."¹⁸ The practical aspects of financing are carried out in the UkSSR by the branches of the Investment Bank of the UkSSR, with the consent of the interested industries and organizations of the republic.

Soviet publications give no indication as to price or construction costs of single houses. The guiding principle is that credit covers only half the cost of construction. Exceptions are made for physicians and

¹⁸ *Sbornik zhilishchnogo zakonodatel'stva* (Moscow, 1963), p. 527.

teachers of city schools, who receive credit up to 70 percent of the construction costs (i.e. 30 percent down payment); for teachers of country schools, the bank takes over the entire financing of the construction costs, with the full amount to be repaid in installments (i.e. mortgage without down payment).¹⁹

Workers and employees in the cities receive credit of up to 700 rubles with a seven-year repayment schedule. Teachers and physicians in the cities receive credit of up to 1,000 rubles to be repaid within seven years; in the country they may borrow up to 1,200 rubles for a period of ten years. The loans carry a 2 percent interest rate. Since credit covers only half the cost of construction, one can calculate the total cost of a single house to be between 1,400 and 2,000 rubles. No payment is required for the land on which the construction takes place. The instructions given when applying for credit for the construction of single houses require that the other part of the construction costs be provided by the prospective worker through "his own labor and the labor of members of his own family." By construction costs is meant the cost of building materials. In any case, the price of building material needed for a small single house is low (if it is available!).

Credit for general repairs of privately owned houses, and for hook-up with the municipal water supply and the sewer system is considerably lower (up to 300 rubles with a five-year repayment schedule).

As a general rule, bank credit is not given directly to the owner; it is granted in cooperation with industries and organizations where the owner is employed (that is, credit is granted upon the intervention of the applicant's employer). In order to apply for credit at his place of employment, the applicant must provide his employer with evidence confirming the assignment of a piece of real estate, as well as the approval of a construction project. The employer (manager) is responsible for determining whether the applicant really needs the dwelling place, what means he has at his disposal to meet the building expenses, and what the final cost of the house will be.²⁰ The petition also sets forth the payment terms. The employer forwards the application to the bank, which makes the final decision about the granting of the credit.

¹⁹ This privilege aimed at stopping country teachers from migrating to the cities.

²⁰ I. P. Prokopchenko, *Upravlenie i pol'zovanie zhilishchnym fondom v SSSR* (Moscow, 1970), p. 130.

Immediate payment of the full credit amount is not made. On the contrary, partial payment is made periodically and is directly dependent upon the work completed. Moreover, the money is not paid to the prospective owner, but to his employer. In this way, the employer takes control of the construction progress and makes certain that credit is used only for the purpose of construction. Finally, the employer takes responsibility for the builder's repayment of the loan.

The repayment of the loan is due in equal quarterly installments. Each quarter, however, is divided into three monthly payments, so that credit payments fall due every month. If the debtor delays payment over a period of six months, the bank has the right to pursue legal execution upon the house in question, and in certain cases, upon the debtor's other property.

The house owner does not assume ownership until the house has been built. The bank takes over, however, the lien (the right over the mortgage) until the house has been paid off in full. The debtor is not allowed to dispose of his house until the loan has been repaid. If a sale takes place, the bank has a right to bring a lawsuit against the owner, and can render the sale or the donation deed null and void. In a case where the landlord has discontinued construction before the house has been completed, the right to the house—with the rest of the credit to be paid off—can be transferred to a third party, if the latter assumes the responsibility for repaying the balance of the loan. The previous owner must, however, be compensated for his expenditures by his successor.

CO-FINANCING THE CONSTRUCTION

The strict stipulations cited in the sample contract (of 1949) designed by the government of the UkSSR, according to which the prospective house owner must commence the construction of his private house within a year and complete it within three years, quite often place the owner-to-be in extreme financial difficulties. Consequently, the builders feel constrained to seek financial help from their relatives or from a third party in order to continue with the construction of the house without interruption. Later on, these people often make the claim that they have the right to consider the house joint property because of their financial support to the builder. The local departments of the executive committee, however, did not recognize these claims, since these state agencies considered the al-

lotments of real estate to be a grant of land to just one person. Thus, the utilization of these parcels is seen as having individual character. If another person, for instance, is permitted to be co-owner of a house, then this person receives a portion of the land which was originally not granted to him for his use.

There were cases in which the owner allowed a third party to build, under contract, a wing as his own residence. This person claimed later to be the owner of the wing of the house.

In all these cases, besides the "legal" owner to whom the land had been granted officially, there appears an "illegal" owner who was not recognized as the owner by the local administration. Disputes and, as a consequence, litigation resulted. In one of these disputes the case was brought to the Court of Trustees for Civic Affairs of the Supreme Court of the UkSSR, which, in its decision of October 23, 1961, recognized the house as joint property of all those people who had built it, although the land had been allotted to only one of these persons. This decision induced the Supreme Court of the USSR to overrule the verdict of the Ukrainian court,²¹ and to issue on July 31, 1962, to all courts in the USSR the directive "On Judicial Practice Regarding Private Ownership of Houses."²² According to this directive, all persons who gave financial help to the house owner are entitled to reclaim only the money. Those who have participated in the construction of the house are entitled to compensation for their work, but they are not entitled to co-ownership of the house. With these measures, the government of the USSR was trying to put an end to the actual, but illegal, exchange of real estate. The Supreme Court of the USSR, however, allowed an exception to this rule: private ownership, or co-ownership, can be substantiated in those cases where all parties involved sign a contract (joint contract) in which it is established that they will jointly participate in the construction of the house with money and labor, and choose to consider the house as joint property, provided that the executive committee of the local council agrees to change the contract in reference to the utilization of the allotted land.

REGISTRATION OF THE CONSTRUCTED HOUSE

State law requires that all privately owned houses be registered. In the Ukraine, the registration procedures are determined by its

²¹ *Zhilyshchnoe i zhilyshchno-stroitel'noe zakonodatel'stvo* (Kiev, 1967), p. 104.

²² *Biulleten' Verkhovnogo Suda SSSR*, no. 5/1962, p. 23.

Gosplan and by the decree of its Ministry of Justice "On the Registration Procedures for Houses in the Cities and Urban Settlements of the Ukraine" of June 29, 1959.²³ The Bureau for Technical Inventory (stock taking) of the urban executive committee is in charge of these procedures in the cities. The registration takes place when the documents presented by the person vouch for his ownership of the house. The reason for this procedure is that only the name of the person who owns the house is registered. If it is joint property, the portions of the co-owned house are also registered under the other names. The C.C. of the UkSSR provides that one can also be the proprietor of a part of a house, for instance a room (Articles 101, 102, 103, among others). In cases like this, the ownership of parts of the house is to be registered.

PERMISSIBLE NUMBER OF PRIVATELY OWNED HOUSES

Article 101, paragraph 1, of the C.C. of the UkSSR specifies that each citizen may have only one privately owned house. Formerly, a different directive was in effect, allowing a person to possess two houses, but only if the second house had been acquired as an inheritance or as a gift. Nowadays, if a citizen or spouses, living together with their underage children, come into possession of more than one house through legal channels (e.g. through inheritance or bequest), he has (or, they have), in such case, the right to keep possession of—and according to choice—only one of these houses. The other house or houses must be sold, given away, or disposed of one way or the other, by the owner within a year (C.C. of the UkSSR, Article 103, paragraph 1). The one-year time limit stipulated for the voluntary sale of the house begins on the official date cited in the transaction by which the citizen becomes the owner of a second house (Article 103, paragraph 2). After the expiration of the one-year time period, the executive committee of the local council must demand from the owner a written declaration indicating which house he prefers to keep, as well as which house he prefers to sell by order of the executive committee. The proceeds of the sale go to the former owner after the costs of the transaction have been deducted (Article 103, paragraph 2). It can happen, however, that the sale does not take place for lack of a buyer. In this case—and according to Article 103, paragraph

²³ *Zhilyshchnoe*, pp. 118 ff.

4—the house becomes uncompensated state property by resolution of the executive committee of the local council.

The same rule applies if a citizen or spouses, living together with their underage children, come into possession of the following items through legal channels:

1. portion (or portions) of a second house;
2. portions of various other houses;
3. portion (or portions) of a house that exceeds the maximum living area permitted by the C.C. Article 102 (i.e., 60 square meters);
4. more than one apartment in a multiple family dwelling complex of a joint association of house owners (C.C., Article 103, paragraph 5).

In the Ukraine, as in all parts of the Soviet Union, there exist the so-called "Apartment Cooperatives,"²⁴ whose members do not acquire co-ownership of the building but only the right to live in an apartment building belonging to this association. Consequently it can happen that a given person may acquire the right to live in such an apartment and at the same time be the owner of a private house. In such a case, Article 104 of the C.C. specifies the following: "If a citizen or spouses, living together with their underage children, possess a house, or part of a house, or come into possession of such property through legal channels, and at the same time own an apartment in a building of an "Apartment Cooperative," the owner of the house, or the owner of part of the house, has the right to choose to keep either the house (or the part of the house that he owns) or the apartment in the building of the association. Should he opt for the latter, the owner of the house must dispose of his house within a year; the one-year time limit commences with the date on which the owner legally became proprietor of the house, or with the date on which he officially moved into one of the apartments of the association. If a citizen does not meet these requirements, Article 103 of the C.C. applies," that is, the state forces a sale.

Different is the case of a person and his family who reside in an apartment of a state owned-building, and at the same time own a house. In this instance, the state does not force the owner to sell his house, but allows him to break his lease and move from the state

²⁴ The sample charter of the cooperative for joint house construction was approved by the Ministry of Municipal Economy of the UkSSR on December 19, 1964, Article 163.

building subject to the following conditions: (a) the private house is suitable for habitation; (b) the house is located in the same general area; (c) the living space of the single house corresponds to the needs of the person (C.C. Article 316, paragraph 2). If these criteria are not met, a person and his family may live as tenants in a state apartment and at the same time possess—as is often the case—a privately owned house in the city or in the country.

SIZE LIMITATIONS OF THE PRIVATELY OWNED HOUSE

Article 102 of the C.C. of the UkSSR determines that the size of a house, or part of a house, or of parts of the house, owned by a citizen cannot surpass 60 square meters of living area. Spouses living together with their underage children have the right to possess only one private house, or part of a house, which can be the property of a single member of the group, or of all the members as joint property (C.C. of the UkSSR, Article 101, paragraph 2). This fact does not exclude the possibility, however, that one of the family members mentioned above may own another portion of the same house as private property (Article 101, paragraph 3).

This regulation reflects Soviet living conditions. A family, for instance, may own a house, or parts of a single house. The father lives with the mother in one room which is privately owned by the father, two children live in another room which belongs to the mother. However, all the family members together may not possess more than a total of 60 square meters of living area. One can, therefore, own several parts of a single house as long as the total living area does not exceed 60 square meters.

Article 101, paragraph 2, speaks of "spouses living together," but the possibility exists that spouses may not live together, even though they are not divorced. In such a case, each of the spouses can keep in his/her private possession a house or part of a house. However, if they set up a joint household, one of the houses (apartments) must be disposed of.

The local executive committee can allow a citizen who has a large family, or the right to more living area, to acquire and to keep as his property a house or part of a house of larger size. In this instance, the living area for such a family may not surpass the size stipulated as the norm for house tenants who—by action of the local council—are entitled to have additional living space (Article 102, paragraph 2).

The right of certain persons to additional living space is governed by acts issued in the 1930s. To this group of people belong:

1. sick persons who, according to the published list, are suffering from certain diseases;
2. leading officials of government, party organs, and other state agencies, according to a specific listing of appointments;
3. military personnel above the rank of colonel;
4. scholars who hold the rank of Professor, Assistant Professor, or Senior Research Fellow at an institution of higher learning
5. writers, composers, painters (among others) who are members of the Writer's Union or of other socialist professional organizations;
6. discoverers, inventors, and originators of proposals for methods of rationalization which are considered of value to the state;
7. Heroes of the Soviet Union and Heroes of Socialist Labor
8. distinguished scientists, artists, technicians, actors, singers, teachers, physicians, among others;
9. physicians and dentists who work privately in accordance with regulations issued by the executive committee of the local council;
10. honored pensioned individuals and retirees with pensions from a scientific institution, etc.²⁵

The additional living area generally amounts to 20 square meters. The following areas are not used to calculate the additional living area: cellar, storeroom, corridor, bathroom, lavatory, garret, etc. For a family with two children, for example, where the husband holds a responsible position as an official and his wife is a "deserving" physician, an additional living area of 40 square meters (20 + 20 square meters) can be granted. The family can build, in this case, a house with a total living area of 100 square meters. If one takes into consideration that kitchen, corridor, etc., are not counted as part of the permitted maximum living area, the size of the single house is quite adequate, especially in terms of living conditions in the Soviet Union. When the children become of age and live independently, the owner of such a privately owned house is not required to relinquish the surplus living area; it can be utilized by its owner as additional living

²⁵ Prokopchenko, *op. cit.*, pp. 244 ff.

space for himself alone, or it can be leased.²⁶ Naturally, only the privileged class of the population can profit from these regulations.

COOPERATIVE OF INDIVIDUAL HOUSE OWNERS

Article 101, among others, of the C.C. of the Ukraine speaks of "Multiple-Family Houses of the Home Construction Cooperative of Individual House Owners." (*Bahatokvartyrnyi budynok zhytlovo-budivel'noho kolektyvu individual'nykh zabudovnykiv.*) This is one approach to individual house construction which was developed during the 1950s. The endorsement of this approach to the construction of individual houses in the Ukraine was issued by its Council of Ministers on April 30, 1958.²⁷ Two approaches to the construction of houses are envisioned:

1. multiple-family house on the same piece of land;
2. several small single homes on the same piece of land.

It is understood that these houses can be built only in towns where the construction of single houses is not forbidden.

These are the procedures for establishment of such a cooperative: The Cooperative of Individual House Owners can be organized by several co-workers of an enterprise or of an organization, who—according to the principles of "mutual help" and of "joint efforts"—will build multiple-family houses or several single houses. In the case of multiple-family houses, each member of the collective can acquire an apartment as his property, while ownership of the whole building is shared proportionately by all members of the collective. Storeroom, cellar, staircase, etc. are considered joint property and are maintained at joint expense. In the case of single-family houses, each member acquires ownership of his own house.

When small business enterprises or private individuals are involved, such cooperatives can be organized—by way of exception—by the different Departments of Municipal Economy of the executive committees of the local councils. The number of people forming a collective varies with each case, depending on the business or the organization. The number is determined also by the parcels of land available and by the feasibility of acquiring the necessary building materials

²⁶ Maslov, op. cit., pp. 228 ff.

²⁷ *ZP*, no. 4/1958, Article 83.

from local supplies. The formation of a cooperative of house owners is governed by a contract.

The executive committee of the local council provides the building site for the business enterprise or the organization that wants to engage in construction. Each business enterprise recommends, then, which parcels will be allotted to which members of the collective. A contract is drawn up between the members of the cooperative and between the cooperative and the Department of Municipal Economy. This document lists all conditions governing the use of the land.

The size of the apartments or private housing cannot surpass 60 square meters of living area. Large families or large groups of people may request a larger living area. In the case of multiple-family houses, each member receives only one apartment.

BUYING A HOUSE OR AN APARTMENT

The ordinance of the USSR issued on August 26, 1948, made possible the acquisition of available small houses as private property from business enterprises, organization, construction agencies, and local councils. The guidelines for purchasing a house were given in the ordinance "Concerning the Regulations Governing the Sale of One- and Two-Story Homes with 1 to 5 Rooms," issued on January 10, 1949, by the Ministry of Finances of the USSR. In view of the fact that these guidelines for the acquisition of a house were not sufficiently explicit, each of the union republics, including the government of the Ukraine, i.e. the Ministry of Municipal Economy of the UkSSR, released additional and more detailed instructions.²⁸

The purchase of the house from business enterprises and from organizations by a private person has its own peculiarities when compared to a purchase from the local council. In the first place, business enterprises build small houses for their workers and sell these to them for cash, or mortgage them for up to a period of ten years. In either case, a 10 percent down payment is required. If the buyer fails to make two consecutive payments (on his mortgage), the business enterprise can annul the contract, evict the buyer, and sell the house to another worker. The cash value of the house is determined by an appraisal commission, and later endorsed by the appropriate ministry

²⁸ V. R. Skripko, I. B. Martkovich, P. G. Solov'ev *Zhilishchnoe zakonodatel'stvo v UkSSR i RSFSR* (Moscow, 1965), pp. 33 ff.

to which the business enterprise is subordinated. If the buyer purchases the house with cash, he becomes its owner immediately; if payment occurs on the installment plan, the buyer becomes the owner of the property only when the mortgage has been satisfied in full.

The conditions stipulated by the local councils for the purchase of one of their houses are more strict; one-fifth downpayment is required immediately; the balance must be paid within a time period of from two to three years, and in monthly payments that carry a 2 percent rate. In this case too, the buyer does not become owner of the property until the house has been paid for in full.

EXPROPRIATION OF PRIVATELY OWNED HOUSES

If the government needs for certain official purposes (e.g. the construction of streetcar lines, railroad beds, factories, large apartment buildings, etc.), it can expropriate the owners' real estate without paying indemnity. The state is, indeed, empowered to take over all houses built on land that it requires. The losses suffered by the owners are made up in other ways, however.

This problem is not even worth mentioning, since such expropriations are known to occur also in capitalistic countries. Of greater interest is the expropriation of privately owned houses which occurs when the owner can be accused of illegal conduct. According to Soviet interpretation, private property can exist only so long as it serves to fulfill the material and cultural needs of the owner, but not if it is used to generate "unearned income" (*netrudovi dokhody*), i.e., income not earned by working. This concept is clearly expressed in Article 100 of the C.C. of the Ukraine. In regard to private houses, Article 106 of the C.C. stipulates: "If a citizen owns a single house, a summer house, or any other property, or simply part of a house, and he uses this private property to generate unearned income, the government will proceed to confiscate the house, or part of the house, the summer house, or any other property, without indemnity. The confiscation follows the established legal channels as soon as the executive committee of the local council has brought the charges against the citizen. The house (summer house), or part of the house (or part of the summer house) confiscated by the courts will be given to the local council as part of its public funds."

Unfortunately, there is no clear legal definition of what is meant by "unearned income." According to the prevailing socialist theory and

constitution, the right to private property must have been acquired through earnings from labor, i.e. the "personal labor" performed by the citizen. Everyone is required to work; in return, wages are paid, and one is allowed to acquire or to build a house with one's savings. In the event that someone has an income for which he himself does not have to work, one would have to conclude that this constitutes "unearned income." In reality, the situation is not that simple.

Let us show that this theory is by far too dogmatic and unrealistic. Income derived from the sale of agricultural products by a kolkhoz member on the free market, for instance, as well as profits gained from the sale of objects by artisans, the sale of fruits and vegetables by owners of orchards and gardens, the proceeds from the sale of personal possessions, the income from gifts and from inheritance, etc., cannot be considered "earned income;" therefore it ought to be subject to all the consequences thereof. The fact is, however, that this does not occur; on the contrary, it is argued that such profits do not count as "unearned income." Moreover, jurists continue to debate the exact meaning of "unearned income," but have not yet found an acceptable answer to the problem.

Generally speaking, when a legislator refers to "unearned income" he means the clear profit obtained by leasing out a privately owned house. Article 286 of the C.C. of the UkSSR stipulates that the rent paid for living in a privately owned house cannot surpass the rent paid for a government owned house by more than 20 percent. If a landlord regularly collects a higher rent from his tenants, he is violating Article 286, and thus runs the risk that the local executive committee may summon him to court to demand the expropriation of his house. The court determines if the owner was leasing his house regularly to derive "unearned income," and can, subsequently, order the expropriation of the house without indemnity. This does not necessarily happen, however, as illustrated by the following case:

The executive committee of a town in the Ukraine filed suit to expropriate the house of an owner who lived in one part of his house while leasing the other part—an area of 57.2 square meters—to a state-owned trade company. The owner demanded 30 rubles rent per month instead of the 25.45 rubles stipulated by law. The lawsuit went through several courts of justice. Finally, the Supreme Court of the UkSSR decided by its decree of May 29, 1965, that the expropriation of the house was not justified in this case, and that it would be suffi-

cient if this "unauthorized enrichment" (i.e., the extra money earned by the landlord) would be collected for the benefit of the state.²⁹

The legal expropriation of a private house without indemnity is justified also if the house was acquired or constructed with "unearned income" or if the house had been built with materials belonging to socialist organizations. The Soviet press launched a campaign against this type of house owners during the years 1960–62, and published figures to support the allegation that these "illegal capitalists" of the Soviet Union earned huge profits. In the Ukraine, this campaign served as a propaganda means to allow the Presidium of the Supreme Soviet to issue its decree of August 29, 1962, "Concerning the Expropriation without Indemnity of Single Houses, Summer Houses, and Other Buildings Constructed or Acquired by Way of Income not Requiring Personal Work."³⁰ This ordinance still applies.

The executive committee of the local council, assisted by the finance agencies, and the different social organizations, have the power to examine such illegal acts committed by citizens. The executive committee proposes the motion of expropriation to the local people's court. The confiscation of the house is decided in open hearing with the assistance of a public prosecutor and the representatives of social organizations. The person in question is invited to be present and he is allowed to express his own views regarding all the questions asked of him.

The ordinance of August 29, 1962, described above, does not determine the status of the executive committee's legal action. Is it a civil action? If it is a civil action, then the verdict reached by the court ought to be based on one of the articles of C.C. This question has not been clarified to this day, simply because there is no appropriate article in the C.C. of the UkSSR. It is argued, however, that Article 4 of the C.C. of the Ukraine could be applied in such a case.³¹ This article contains the following "general clause:"

Civil rights and civil obligations originate not only in legislative actions, but also in actions of citizens and organizations which—according to general principles and their interpretation—could provide a basis for such rights and obligations, although they may not have been provided for by a specific law. Civil rights originate, therefore, as a result of damage and unjustified accumulation of wealth.

²⁹ *Radians'ke pravo*, 1965, no. 7, pp. 99 ff.

³⁰ *Visti Verkhovnoi Rady Ukrain's'koi RSR*, no. 35/1962, Article 446.

³¹ Maslov, *op. cit.*, p. 222.

Accordingly, a person who acquires wealth without working, that is, by means of an arbitrary, illegal act at the expense of society or of another citizen, must pay out the unauthorized profits to the state. A Soviet jurist is of the opinion, therefore, that in these cases of legal "expropriation," a valid civil suit takes place.³²

The ordinance of the Presidium of the Supreme Soviet of the Ukraine of August 29, 1962, does not provide for a statute of limitation. It would be much easier if the builder were obliged to give an account of his capital for construction as soon as he is granted a permit to build. The government does not demand such evidence, however. Only years later, after the completion of the house, can a motion for expropriation of it be proposed by the executive committee to the local people's court. The prosecutor (the executive committee) simply establishes that the defendant (the house owner) could not have been able to finance the construction costs of his home with the wages he earned. Consequently, the burden of proof lies with the defendant. He must provide evidence that he financed the construction of his house by legal means, a fact which is, naturally, very difficult to prove.

Another reason for the expropriation of a privately owned house is given in Article 135 of the C.C. of the Ukraine:

If a citizen fails to properly maintain a house belonging to him by allowing it to deteriorate, the executive committee of the local council may specify a time limit for the repair of the house. After the raion executive committee or the local council have filed a lawsuit because the citizen—without sound reasons—has failed to carry out the necessary repairs, the courts can expropriate the house without indemnity, and turn it over to the local council as part of its public funds.

Finally, a private house can also be confiscated on the grounds that it was built "without authorization." The Ukrainian Council of Ministers passed the following resolution on December 30, 1950: "On Measures to Fight Unauthorized Construction in the Cities and in Urban-Type Settlements of the UkSSR."³³ Later, on June 20, 1959, the following resolution was added "On Measures to Fight Unauthorized Construction in the Rural Areas of the UkSSR."³⁴ In these resolutions, the Council of Ministers confirmed that "in many cities and settlements citizens are building on parcels of land which have

³² Ibid.

³³ *ZP*, nos. 23–24/1950, Article 72.

³⁴ *ZP*, no. 6/1959, Article 75.

not been allotted to them," or that the citizens were undertaking construction work "on parcels of land which exceeded the area granted to them." The ordinance of the Ukraine of September 10, 1962,³⁵ which was supplemented by Article 199 of the Penal Code of the UkSSR of 1961, provides for a penalty of six months to one-year imprisonment and the confiscation of the house for such transgressions.

The confiscation of a house can also occur as a result of a civil suit, if a citizen has constructed a house (summer house) without the customary permission or without the necessary approval of his plans. Significant departure from approved plans, or violation of fundamental rules for construction, are also cause for expropriation. Article 105 of the C.C. of the UkSSR determines that in a case like this, the proprietor of the house is not entitled to dispose of the house (summer house), or part of the house (summer house). Nor can he give it away, or lease it. Such a house (summer house) or part of a house (summer house) will be torn down after appropriate action by the raion executive committee or the city council. The razing of the house will be carried out either by the builder or at his expense. The house can also be confiscated without indemnity by a decree of the court, and assigned to public funds under the jurisdiction of the local council.

These are the essential legal aspects of private house ownership in the UkSSR. Unfortunately, space does not permit the discussion of other interesting questions dealing with the conditions for leasing private houses, or the rights of family members in regard to a house built by the head of the family.

³⁵*Visti Verkhovnoi*, no. 37/1962, Article 461.

Note on Geography of Recent Investments in the Ukraine

THEODORE SHABAD

(The New York Times)

The Ukraine, situated as it is in the southwest quadrant of the Soviet Union, and on the seacoast, is expected to benefit over the long run from two nascent trends in the Soviet strategy of economic development. One is the growing Soviet interest in seacoast development as part of the increasing involvement of the country in international trade, or what they like to call the "international division of labor." The other trend, complementing the seaward orientation of Soviet planners, has been a net migration into the southwest of the Soviet Union, including Ukrainian coastal areas.

The interest in maritime connections, which is only just beginning to be articulated in Soviet analyses,¹ is of particular relevance to the Ukraine because of its fronting on the Black Sea, one of the principal maritime approaches to the Soviet Union, with the best year-round shipping conditions. With only 13 percent of the total Soviet coastline, the Black Sea basin accounted in 1970 for 43 percent of the Soviet Union's ocean-going freight tonnage and 49 percent of the fixed assets of the Soviet ocean-going fleet.² It also represented 40 percent of the population of Soviet coastal towns with 50,000 inhabitants or more, most of them situated in the Ukraine.³ The particular involvement of the Black Sea basin in world maritime trade is also suggested by the fact that it accounts for 43 percent of all tonnage of foreign goods carried in Soviet vessels.⁴

It is not surprising, therefore, that many of the so-called compensation deals—in which Western companies finance Soviet projects with payback in product—are situated in the Ukraine. One of the largest

¹ V. V. Pokshishevskii, "Theoretical Aspects of Attracting Population to Seacoasts and the Measurement of that Attraction," *Izvestiia Vsesoiuznogo Geograficheskogo Obshchestva*, 1975, no. 1, pp. 29–35, *Soviet Geography; Review and Translations*, March 1976; O. N. Krivoruchko, "Maritime Economic Systems of the USSR," *Geografiia v shkole*, 1975, no. 3, pp. 10–14, *Soviet Geography*, March 1976.

² *Ibid.*

³ *Ibid.*

⁴ Iu. V. Klement'ev, *Morskie parokhodstva SSSR* (Moscow, 1973), pp. 39, 45.

such projects during the current five-year plan (1976–80) is the construction of a new chemical seaboard terminal in the Hryhoriivka Liman, east of Odessa. The port, now being dredged and built for planned inauguration of the first stage in 1978, is an outgrowth of a chemical deal concluded by the Soviet Union with Occidental Petroleum Corporation. The deal provides for Soviet imports of superphosphoric acid from the United States and Soviet exports of ammonia. An ammonia pipeline from ammonia plants now under construction at Togliatti on the Volga River and at the Strol plant in Horlivka (Donets' Basin) will deliver 2.5 million metric tons of ammonia a year to the Hryhoriivka terminal. An ammonia-urea plant is planned next to the terminal.

Another major industrial project reflecting the Soviet Union's growing overseas connections and the role assigned to the Ukraine is the construction of the seaboard alumina plant at Zhovtneve, southern suburb of the shipbuilding center of Mykolaiv. The one million-ton alumina plant, scheduled to be inaugurated about 1978–79, will process about two million tons of bauxite, from a Soviet assisted mining project in Guinea, for use at an aluminum reduction plant at Saianogorsk, nearly 3,000 miles away on the Ienisei River in Southern Siberia. The Mykolaiv alumina operation is part of the Soviet Union's increasing reliance on imported bauxite in the absence of large high-grade domestic bauxite resources and an apparent disenchantment with the use of inferior, nonbauxitic minerals for alumina production.

Other industrial projects going forward with both Western and Comecon assistance during the current five-year plan are a polyethylene unit at the Azot plant in Sieverodonets'k, iron pelletizer plants at the concentrator of the Kremenchuk iron district and the Northern concentrator in the Kryvyi Rih basin, a machinery plant at Novovolyns'k, in the western Ukraine, and the construction of the Orenburg gas pipeline, which traverses the Ukraine from the Orenburg gas field to the Soviet Union's western border.

This increasing interconnection between Ukrainian economic development and that of foreign countries is being complemented by an apparent policy decision to channel larger investments into areas with a surplus population and underemployment. The Soviet planners appear to have realized that there is little to be gained by inducing workers to move temporarily to eastern regions, with harsh environmental conditions, only to have them return to the more comfortable living conditions of the western parts of the Soviet Union upon expi-

ration of contract. There is evidence of a growing sense that the national interest would be served by creating employment opportunities in areas now suffering from underemployment.⁵ According to Mints, "purposeful planned migration, designed to provide adequate labor for major productive facilities of the East, was cancelled out by uncontrolled migration streams attracted by southern, warmer regions, which were perceived by migrants as offering particularly favorable living conditions," and he adds: "Socio-political considerations require that new employment opportunities be created in union republics with a high rate of population growth."⁶ Among such areas is the western Ukraine, which has generated a net outmigration because of rural overpopulation. In the two-year period 1968-69 preceding the 1970 census, the region experienced a net outmigration of 123,000 one of the largest such streams from one of the Soviet Union's major economic regions (the Urals recorded a net outmigration of 110,000 and West Siberia 93,000 during the same period).

There is already evidence of increased industrial activity in the western part of the Ukraine to provide additional employment. A growing building program is evident from the significant increase in cement capacity through the construction of the large Kamenets'-Podil's'kyi cement plant, with a capacity of 3.6 million tons. The plant reached its designed capacity in December 1975. The intensified economic activity in the western area is also suggested by the construction of two of the Ukraine's three nuclear power stations in the west—the Chornobyl' station, where the first one-million kw reactor is due at the end of 1976, and the Rovno station. The third station, initially planned in the Ivano-Frankivs'k area, has been relocated in the Mykolaiv area because of enhanced activity in connection with the proposed alumina complex. Another power source will be the 700,000-kilowatt Dnister hydroelectric station under construction at the point where the oblast boundaries of Chernivtsi, Khmel'nyts'kyi, and Vinnytsia meet. The Dnister project, to be completed in the early 1980's, will be the second largest Ukrainian hydroelectric dam, after the Dnieper dam at Zaporizhzhia. An example of the wide variety of manufacturing facilities going up in the western Ukraine is the Luts'k

⁵ A. A. Mints, "A Predictive Hypothesis of Economic Development in the European Part of the USSR," in the book *Resursy, sreda, rasselenie*, (Moscow, 1974), pp. 20-54, *Soviet Geography*, January 1976.

⁶ *Ibid.*

ballbearings plant, which will be three times larger than the Kharkiv bearings plant and will supply parts to the Kama truck-manufacturing complex. Much of the economic development in the western Ukraine is motivated by a desire for greater integration with the adjoining Comecon countries. An example is the Kalush chemical complex, which, among other activities, imports ethylene from the Hungarian petro-chemical center of Leninvaros and reexports vinyl chloride, for which the ethylene provides a raw material.

In summary, it would appear evident that a combination of factors, including the Soviet Union's greater overseas orientation, the attractiveness of the southwest for settlement, and a desire for closer integration with Comecon will further enhance the economic role of the Ukraine, already one of the most crucial spatial components in the Soviet economic structure.

The Economic Profession in the Ukraine

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The purpose of this note is to present the current situation of the economic profession in the Ukraine. Such factors are described as the number of economists, their education, degree requirements, ethnic composition, and salaries, as well as the structure of research institutions in which they work and the publication of economic books and journals. No attempt is made to give an evaluation of the professional quality of the research. That topic requires a separate and more extensive treatment than this. It is necessary to mention that some information in this note was obtained informally from private sources. Despite double-checking of such information, it is still possible that some factual mistakes may have occurred.

Economists in the USSR are a part of an occupational group called scientific workers. According to the official definition, this includes:

academicians, full and corresponding members of all academies; all persons who have the scholarly degree of doctor of science, candidate of science or scholarly title of professor, associate professor, senior scientific worker, junior scientific worker, assistant, regardless of place and nature of work; persons who conduct scientific-research work in scientific establishments and scientific-pedagogical work in establishments of higher education, regardless of whether they have or have not a scholarly degree or scholarly title, as well as specialists who have neither scholarly degree nor scholarly title but who conduct scientific work in industrial enterprises and project organizations.¹

This group should not be confused with an occupational category called "economists" and a related category called "planners and statis-

¹ TsSU, *Narodnoe khoziaistvo SSSR v 1973 g.* (Moscow, 1974), p. 819, (subsequently *Narkhoz*).

ticians"; members of these two groups are usually engaged in some practical work.²

In 1974 there were 11,380 such scientific workers in economics in the Ukraine, of whom 170 had a doctoral and 3,663 a candidate degree. They represented 7.0, 4.2, and 8.1 percent, respectively, in these categories in the total for all sciences. Comparing the Ukraine with the USSR in terms of the number of these three groups of economists per one million of the population between 1964 and 1974, the following picture is obtained:³

	1964		1974	
	Ukraine	USSR	Ukraine	USSR
All economists	92.9	121.0	233.2	316.2
Doctors	.9	1.9	3.5	5.5
Candidates	22.7	30.6	75.1	86.5

It is apparent that the increase in the number of economists in the Ukraine's population was considerable during this period of time. However, the Ukraine was below the average for the USSR in this category and no relative improvement over these years can be observed.

The high school graduate in the Ukraine interested in pursuing the career of an economist begins his studies at an institution of higher education which has a specialized department of economics (*fakul'tet*). The following universities and institutes have such departments: Donets'k State University, T. H. Shevchenko Kiev State University, I. Ia. Franko L'viv State University, A. N. Gorky Kharkiv State University, D. S. Korotchenko Kiev Institute of National Economy, Odessa Institute of National Economy, Donets'k Institute of Soviet Commerce, L'viv Commerce-Economic Institute, Kharkiv Engineering-Economic Institute, Kharkiv Institute of Public Catering, Polytechnic Institutes in Kiev, L'viv, Kharkiv, and Odessa. These institutions often specialize in one or more narrower fields within economics. For example, the Kiev State University specializes in political economy,

² According to TsSU, *Narodne hospodarstvo Ukrain'skoi RSR v 1973 rotsi* (Kiev, 1974), p. 387, (subsequently *Narhosp*) there were 133.3 thousand economists in a broader sense with higher education, and 285.1 thousand planners and statisticians with high-school specialized education in 1973.

³ *Narkhoz 64*, p. 700; *Narkhoz 74*, pp. 7, 144; *Narhosp 64*, p. 597; *Narhosp 74*, pp. 7, 84. The data for 1964 are the earliest which are comparable with those in 1974.

Kiev Institute of National Economy in planning, Odessa Institute of National Economy in finance, etc. Specialized studies in agricultural economics are offered at Ukrainian Agricultural Academy in Kiev, and Agricultural Institutes in L'viv, Odessa, Poltava, and Kharkiv.⁴

Studies in economics at these institutions last approximately five years. The curriculum is very extensive.⁵ It includes the study of political economy, various economic sectors and industrial branches, planning principles, international economics, and also a quite good training in quantitative methods and the application of computers. In addition, during these years a student is exposed to practical experience by working at the enterprise level in industry and agriculture and in various planning organizations. Finally, in order to graduate, a student must prepare a diploma paper (usually within 13 weeks) and to defend it before an examination committee. After the student has successfully met all these requirements, a title of economist is conferred on him.

For students wishing to continue their economic education, graduate studies are offered by educational and research institutions which have earned scholarly reputations and on whose staff there are a certain number of scholars with a doctor of economic sciences degree. The most important of such institutions are: Institute of Economics of the Academy of Sciences of the Ukrainian SSR and its branches, Kiev State University, Kiev Institute of National Economy, and Ukrainian Agricultural Academy. To be considered for admission to such studies (*aspirantura*), the students majoring in theoretical economics at the universities must be recommended by their departments. Graduates from all other educational institutions must first work for two years; only then can they be recommended by their employers for these studies. The applicant must write a paper in Ukrainian or Russian, and pass an examination in the theory of scientific communism, political economy, his specialty within economics, and a foreign language.

⁴ *Dovidnyk dla vstupu do vyshchykh uchebnykh ustanov Ukrainy* (Kiev, 1968). A new Institute of Economic Management has been opened recently in Kiev (*Pravda Ukrainy*, September 7, 1975), which no doubt will also have an economic department.

⁵ For a detailed description of economic curriculum in the USSR, although quite outdated, see Ronald L. Meek, "The Teaching of Economics in the USSR and Poland," *Soviet Studies*, April 1959, and also Vladimir G. Treml and Dimitri M. Gallik, "Teaching the History of Economic Thought in the USSR," *History of Political Economy*, Spring 1973.

The *aspirantura* is a prerequisite for obtaining the degree of candidate of economic sciences. It lasts approximately three years. During this time, the student attends various lectures, but primarily works on his thesis under the supervision of a sponsor of his choice. The possible areas of study are: political economy; history of national economy; economics and the organization of management, and planning of the national economy and of its branches; scientific organization and economics of labor; effectiveness of capital investment and of new technology; statistics; and mathematical methods in economic research. To be allowed to defend his thesis, the student must pass an examination in his specialty, dialectic materialism, and a foreign language. The thesis is usually about 150 pages long. Its preliminary version is read and criticized by all the members of the student's department. After making required improvements, the student prepares an abstract of about 15–20 pages and sends it to specialists throughout the USSR. The defense takes place before a specially designated council and can be attended by anyone. After the successful defense of the topic, the candidate degree is granted by the relevant institution, and it must subsequently be approved by the Higher Certifying Committee (*Vysshaia attestatsionnaia komissia*) in Moscow (VAK).

To qualify for the degree of doctor of economic sciences, the candidate must have worked for some time in educational, research, or state institutions and must have had administrative experience. With respect to his research, the candidate is expected to have an established reputation among his peers within his specialty, and he must also have developed some new aspects of that specialty. The candidate has to apply to a degree-granting institution, which then appoints 2–3 referees for this purpose. Their task is to review the doctoral dissertation, for which an already published book by the candidate can often be substituted. An abstract of approximately 40 pages is circulated by the candidate among specialists prior to his defense, which takes place before an appointed council. The decision is made by a secret vote. If the outcome is favorable, the degree must be approved by the Presidium of VAK.

The councils before which the candidates for the degrees of candidate and doctor of science can defend their dissertations must number 11 to 25 people, appointed by VAK. They should include at least three scholars with the doctoral degree and three scholars with the candidate degree in the specialty of the candidate for a candidate

degree. The rest could be scholars from the same discipline or from related disciplines, and one representative from the Communist Party and the professional union, each. In the case of doctoral defense, at least five specialists with the doctoral degree are required. This regulation,⁶ promulgated in 1976, has important implications for all provinces outside Moscow, but especially for non-Russian republics. Because there is an insufficient number of doctors in various specialties in the Ukraine, only in a very limited number of specialties can the Ukrainian candidates for doctor's degrees defend their dissertations in their republic. For example, the Institute of Economics in Kiev can grant such degrees in only three economic specialties. As a result, candidates for doctoral degree in several specialties have to apply for permission to defend their dissertations to a specialized council in Moscow—where presumably councils for all specialties can be organized—and they also arrange defense there. This, no doubt, will have a retarding effect on the growth of doctoral degree holders and thus on scientific advance in non-Russian republics. Presumably the quality of degree candidates should gain by this measure.

The new regulation affects also the language in which candidate and doctoral dissertations can be written. Until 1976, they could have been written, at least in theory, in Ukrainian. Now, according to the unclearly formulated regulation, typical for Soviet conditions, the defense can take place in the native language of the candidate, upon his request and with the agreement of council members. But, all documentation with respect to defense, including dissertation, has to be submitted to VAK in Russian.⁷ One can interpret it that the candidate can write his dissertation in the native language and then for the VAK purpose translate it into Russian. The question arises—why not write the dissertation in Russian in the first place?

These degrees usually are required for appointment to teaching positions. The ranking of teaching titles at universities and institutes, in descending order, is as follows: professor, *dotsent*, senior scientific worker, assistant, and junior scientific worker. It is necessary to mention that these titles can be conferred also on non-teachers. The first three titles must be approved by VAK upon the proposal of the scholar's institution. In order to be promoted or appointed to the rank of

⁶ See "Polozhenie o poriadke prisuzhdeniia uchenykh stepenei i prisvoeniia uchenykh zvanii," *Biulleten' Ministerstva vysshego i srednego spetsial'nogo obrazovaniiia SSSR*, 1976, no. 4.

⁷ *Ibid.*, p. 23.

professor, the doctor's degree is usually required, while in the case of *dotsent* and senior scientific worker a candidate degree is required. There are no life tenures for teaching and research positions in the USSR. Each incumbent must apply for reappointment after four or five years of service, and must compete with the outsiders applying for this position.

A doctor of sciences who has contributed something new to economics, is a recognized authority in his field, has some research following, and has administrative experience can be proposed by the institution at which he is working for election as a corresponding member of the Academy of Sciences of the Ukrainian SSR. The Presidium of the Academy accepts such proposals, with the required documentation. Before the election, the Institute of Economics of the Academy, after consultation with the Institute of Economics of the Academy of Sciences of the USSR, makes its recommendation. The opinion of the Moscow Institute seems to be the decisive factor in the whole procedure. All full and corresponding members of the Academy participate in the election. A simple majority of those voting is sufficient for a successful outcome.

Elevation to full membership in the Academy requires similar achievements to those of corresponding members, but to a higher degree. Only full academicians participate in the election. A majority of votes is sufficient for this promotion also; no approval by the Moscow Higher Certifying Committee in this as well as in the case of corresponding members is required. Election to the Academy of Sciences of the USSR is considered to be the pinnacle of the scientific career in the USSR. At the present time only one Ukrainian economist is such an academician, M. P. Fedorenko, director of the Central Economic-Mathematical Institute in Moscow and one of the most widely known economists in the USSR. However, he was never connected with Ukrainian scientific life. Also, I. I. Lukinov, the current director of the institute of Economics, is an academician of the Lenin All-Union Academy of Agricultural Sciences.

At the time of this writing, the following economists are members of the Academy of Sciences of the Ukrainian SSR (in parentheses are noted their affiliation and main field of research): O. M. Alymov (Council for the Study of Productive Forces, economics of industry); P. I. Bahrii (Institute of Economics, growth theory); S. M. Iampol's'kyi (Institute of Economics, economics of technological innovation); I. I. Lukinov (Institute of Economics, agricultural economics); and M. M.

Palamarchuk (Sector of Geography, regional economics). The following are corresponding members: A. A. Chukhno (Kiev State University, political economy); M. H. Chumachenko (Institute of Economics of Industry, economics of industry and accounting); P. O. Khromov (Moscow, economic history); O. S. Koroid (Kiev Institute of National Economy, political economy); M. T. Mileshkin (Branch of Institute of Economics in Odessa, planning and management); O. O. Nesterenko (Kiev, economic history); P. I. Verba (Branch of Institute of Economics in Kharkiv; economics of industry). Most of the prominent education and research institutions in the Ukraine have on their staffs either a full academician or a corresponding member. This suggests that wide institutional dispersion of its membership is a policy of the Academy.

There are no data on the ethnic composition of economists in the Ukraine. The ethnic character of their names may serve as an approximate substitute. Obviously, the determination of a person's nationality on the basis of his name can, in an individual case, be misleading. However, it can be assumed that such a method in the case of a large number, could correctly identify the ethnic trends. Thus, among twelve academicians and corresponding members, there are eight with Ukrainian and four with Russian sounding names. This happens to be the actual nationality distribution among these scholars. Among 339 economists who received either the candidate or doctoral degree between 1968 and 1973, 68 percent have Ukrainian-sounding and 32 percent Russian-sounding names.⁸ The latter include a handful of non-Slavic names. No trend with respect to the distribution between Ukrainians and Russians can clearly be observed during these six years. Among all those receiving degrees, the percentage with Russian-sounding names was 38 in 1968, declined to 25 in 1972, and then increased to 35 in 1973. In any case, if this indicator in fact reflects the actual ethnic composition of the economists in the Ukraine, then one can conclude that the share of Russians is relatively high in view of the fact that they account for only approximately one-fifth of the Ukraine's total population.

The following sample represents the monthly salaries in rubles of various categories of scientists, including economists, in the early 1970s.⁹

⁸ Various issues of *Ekonomika Radians'koi Ukrainy* (subsequently *ERU*).

⁹ Mervyn Mathews, "Top Incomes in the USSR: Towards a Definition of the Soviet Elite," *Survey*, Summer 1975, p. 8.

Director of VUZ, Research Institute	500-700
Pro-rector	400
Professor, Chief Researcher	325-525
Assistant Professor, Dotsent, Leading Researcher	300-350
Senior Researcher	200-250
Researcher	135-150
Junior Researcher	105-125
Membership in the Academy of Sciences	350-500

The differences within a rank are accounted for by the degree of the particular economist (no degree, candidate, doctor), the category of institution (there are three; the Institute of Economics in Kiev, for example, belongs to the highest, Group 1), and time on the job. Many economists hold a second job. In such a case, they cannot receive more than 50 percent of the basic salary of the second job. In addition, economists receive royalties for their articles and books, payment per graduate student and supervised dissertation, fees for consultations, etc. In general, one can conclude that economists are quite well paid if one considers that the average monthly salary of Soviet workers and employees was 141 rubles in 1974.¹⁰

In addition to teaching, Ukrainian economists are engaged in research. In 1969 such research was conducted in 147 scientific-research institutions and 85 higher education establishments.¹¹ The research institutions usually specialize in the economics of individual sectors of the national economy. In that year 14 such institutions stressed research in theoretical and interbranch problems, 68—industry, 44—agriculture, 5—construction, 2—commerce, 2—municipal economy, 3—water resources, and 9—other sectors and branches.¹² With respect to administrative subordination, research institutions can be subdivided into the following three broad groups: (1) within the framework of the Academy of Sciences; (2) economic departments of Gosplan, various ministries, and other state organizations; and (3) branches of Moscow-based union institutions.

Presently the highest body with respect to economic research within the Academy is the Department of Economics, organized in 1975.¹³ Its purpose is to coordinate all research work in this field in the

¹⁰ *Narkhoz* 74, p. 561.

¹¹ V. Filipov, M. Kharchenko, and R. Ivanukh, "Deiaki pytannia orhanizatsii i planuvannia ekonomichnykh doslidzhen' v respublitsi," *ERU*, 1969, no. 10, p. 12.

¹² *Ibid.*, pp. 13-14.

¹³ *ERU*, 1975, no. 4, pp. 1-4.

Ukraine. Until this time, this function was performed by the now defunct Coordinating Council of Problems of Economic Science, organized in 1971.¹⁴ In addition, there are four institutions within the Academy's framework which are actually engaged in economic research.

1. The most important among them is the Institute of Economics, organized in 1919 and under its present name and in its present structure since 1936.¹⁵ Its recent employment, including that of the Institute's branches, amounted to over 900, among whom over 300 were scientific workers.¹⁶ The Institute's function is to conduct research on various theoretical and practical problems, to publish books, perform contractual research for the state, organize conferences, educate economists, grant advanced degrees, and other similar tasks. In order to eliminate duplications and stimulate better performance, the Academy's Presidium charged individual institutions with responsibilities in specific fields of economic research. In view of its position, the Institute has been made responsible for research in practically all the fields of economics.¹⁷

The Institute is divided into departments, largely according to the research area. Its present structure is as follows (next to the department's name is listed the name of its director if known):¹⁸

Director: I. I. Lukinov

Deputy-director: V. I. Holikov

Departments:

Problems of political economy of socialism,

Agrarian problems of socialism, L. O. Shepot'ko

Effectiveness of capital investment, M. S. Herasymchuk

History of national economy, T. I. Derev'iankin

Economic statistics, P. A. Nahirniak

World economy, V. Ia. Bobrov

Problems of management, V. I. Holikov

Economic accounting and finance, S. H. Haluza

¹⁴ *Visnyk Akademii Nauk Ukrains'koi RSR*, 1971, no. 10, pp. 106-07, (subsequently VAN).

¹⁵ For the history of the Institute, see P. M. Pershyn et al., "Ekonomichni nauky," in *Akademiia Nauk Ukrains'koi RSR, Istoriiia Akademii Nauk URSR*, vol. 1 (Kiev, 1967); V. Kyforak, *Instytut ekonomiky—tsentr rozvytku ekonomichnoi nauky na Ukraini* (Kiev, 1969); V. Kyforak, "Instytut ekonomiky AN URSR—tsentr rozvytku ekonomichnoi nauky na Ukraini," *ERU*, 1976, no. 7.

¹⁶ Kyforak (1976), op. cit., p. 33.

¹⁷ *VAN*, 1971, no. 12, pp. 3-5.

¹⁸ Departments' names are from Kyforak (1976), op. cit., pp. 34-35.

Demography, V. S. Steshenko
 Economics of labor,
 Methodology of technical and economic measurements,
 History of economic thought, V. S. Zhuchenko
 Planning and stimulation of scientific-technical progress, M.
 S. Iampol'skyi
 Problems of socialist reproduction, P. I. Bahrii
 Economic problems of nonproductive sphere and popula-
 tion consumption, V. Ie. Kozak
 Economic problems of introduction and assimilation of new
 technology, V. H. Chyrkov
 Optimization of interbranch relations, O. S. Onyshchenko
 Laboratory of professional orientation and professional allo-
 cation, I. M. Nazimov

A scientific council on "Economic Laws of Socialist Development and Its Transformation into Communism" operates within the Institute. This Council coordinates the work of 80 chairs of political economy and 60 sections of political economy at the chairs of Marxism-Leninism in the Ukrainian universities and institutes.¹⁹

The Institute of Economics is now located in the main building of the Academy of Sciences, at Kirov 4, Kiev. A new multistory building, which will contain the computer facilities also, is now being constructed for the exclusive use of the Institute. It is interesting to note that the director of the Institute and his deputy are non-Ukrainians, despite the fact that there are thousands of Ukrainian economists. The working language of the Institute is presently Russian; this was also true under the former directors who were mostly Ukrainians.

The Institute of Economics has three branches: L'viv: director M. I. Dolishnii; Kharkiv: director P. I. Verba; Odessa: director M. T. Mileskin. According to the assignment previously mentioned, the L'viv branch is responsible for research in economic and social problems of management, mathematical modeling, and projection of management structures. The Kharkiv branch is assigned to research on the economic and social problems of technological progress,²⁰ improvement in the organization of production and labor, mathematical methods in planning and management (on the level of industrial en-

¹⁹ *ERU*, 1973, no. 6, p. 94.

²⁰ This function has most likely been transferred to the special council, organized in 1974. See, below.

terprises). Finally, the primary responsibility of the Odessa branch is research on the problems of sea transportation (this should be extended in the future to research on all kinds of transportation) and the application of economic-mathematical models.

2. Second in importance to the Institute of Economics is the Council for the Study of Productive Forces, organized in 1934. Its present director is O. M. Alymov. The following research fields have been assigned to this institution:²¹ development and distribution of productive forces by oblasts; development and methodology for long-run and intermediate forecasting of the growth of productive forces; directions of development of individual regions; economic evaluation and utilization of mineral and labor resources; forecasting industrial and agricultural growth; regional development; interbranch problems; interrepublic economic relations; and generalization of works in the areas of spatial organization of the national economy. The Council has a branch in L'viv which is responsible for research in interbranch relations in the Western Ukraine.²²

3. The Institute of Economics of Industry was organized in 1968 as a separate institution within the Academy of Sciences on the basis of the branch of the Institute of Economics in Donetsk. It is headed at the present time by H. M. Chumachenko. Its research specialization is concerned with:²³ economics of industry and of its individual branches; effectiveness of industrial production; principles of economic accounting; economic-mathematical methods in the management of industrial enterprises; optimization of industrial planning and management; effectiveness of fixed capital utilization; and social-economic and economic-judicial problems of organization and management of industry. The Donetsk Institute has two branches. The branch in Voroshylovhrad specializes in research in the improvement in industrial production through the determination of existing reserves, improvement of labor organization, and methodology of determination of normatives. The responsibility of the Dnipropetrovsk branch is research in economic problems of the metallurgical industry.

4. Finally, the most recent institution within the framework of the Academy, organized in 1974, is the branch of the Scientific Council of the Academy of Sciences of the USSR on the Social-Economic Prob-

²¹ *ERU*, 1971, no. 12, pp. 94-95.

²² *VAN*, 1973, no. 2, p. 81.

²³ *VAN*, 1971, no. 12, p. 5.

lems of Scientific-Technological Revolution.²⁴ Its purpose is reflected in the title. The Council is at present headed by a historian, Academician A. T. Chekaniuk. It is divided into the following departments, which have high-powered leadership (named in parentheses): economic problems (S. M. Iampol's'kyi); social problems (L. V. Sokhan'); ideological problems (O. S. Onyshchenko); organization and management of science (H. M. Dobrov); forecasting and long-term planning (V. I. Holikov); and organization and management (H. M. Chumachenko).

The O. H. Shlikhter Ukrainian Scientific-Research Institute of Economics and Organization of Agriculture is responsible for research in agriculture. It is subordinated to the Ministry of Agriculture and its responsibilities include the coordination of research in agricultural economics conducted in all institutions of the Ukraine. It was headed for many years by the present director of the Institute of Economics, I. I. Lukinov.

Within the Gosplan of the Ukraine three separate institutions are engaged in economic research. Their names and directors (in parentheses) are: Scientific-Research Economic Institute (O. S. Iemel'ianov); Ukrainian Scientific-Research Institute of Scientific-Technical Information and Technological-Economic Research (S. Ia. Ohorodnyk); and Main Scientific Research and Information-Calculation Center. The first employs around 300 people and seems to have been quite active in recent times. More interesting works published in the last three or four years originated in this institute. The second institution is a recent one and its responsibility is to study technological and managerial progress at home and abroad, to digest the information gathered, and disseminate it among officials and enterprise managers.²⁵ The purpose of the third institution is reflected in its title. It has at its disposal some computer capabilities, while the Institute of Economics, for example, has none at the present time.

Also various state institutions, especially ministries, have either separate research institutes specializing in the economics of a given sector or industrial branch, or economic departments within their overall research institutes. The following deserve mentioning: Donets'k Scientific-Research Institute of Coal, Institute of Ferrous Metallurgy of the UkSSR Ministry of Ferrous Metallurgy, Scientific-Research Institute of Construction of the UkSSR Gosstroy, The most

²⁴ *VAN*, 1974, no. 5, p. 105; *ERU*, 1974, no. 8, pp. 95-96.

²⁵ *ERU*, 1974, no. 2, pp. 94-96.

important among them is no doubt the Sector of Economic Cybernetics and Systems Techniques at the Institute of Cybernetics of the Academy of Sciences of the Ukrainian SSR, headed by Academician V. S. Mykhalevych. According to a Western observer, this institution is engaged in the most advanced theoretical research in economics in the entire USSR, but does not pay much attention to the application aspect.²⁶ Two other economic research institutions deserve mention: the Sector of Geography of the Academy of Sciences and the research institute of the Ministry of Commerce.

Finally, there are branches of Moscow institutions located in the Ukraine, mainly in Kiev. Among the most important are these: Scientific-Research Institute of Labor, All-Union Scientific-Research Institute of Planning of Normatives, Ukrainian Scientific-Research Institute of Prices (M. Kalyta, director), Scientific-Research Institute of the USSR TsSU, Southern branch of Lenin All-Union Academy of Agricultural Sciences (M. V. Kuz'menko, director), and Scientific-Research Institute of Economic Conditions. Their specializations are reflected in their names.

According to listings in *Ekonomika Radians'koi Ukrainy*, there were 583 economics books published between 1970 and 1975 in the Ukraine.²⁷ In this number are not included statistical yearbooks, speeches of the leaders, and the texts of economic plans. The percent distribution of these books by subject, according to the calculation of this writer, was as follows: political economy—12; political economy of capitalism and criticism of capitalist economy theory—4; history of national economy and individual economic establishments—10; labor unions, socialist competition, and scientific organization of labor—11; economics of industry and of individual industrial branches—18; economics of agriculture—18; planning, management, technological progress, and investment—14; and other (other economic branches than industry and agriculture, international economic relations, other socialist countries, finance, consumption)—13. In more recent times a tendency is observed among published books as well as dissertations to write less on political economy and to use more quantitative methods. More substantial books are usually published as symposia, apparently according to certain research plans.

²⁶ Vsevolod Holubnychy, "The Present State of Cybernetics and Republic-Level Economic Planning," in Peter J. Potichnyj (ed.), *Ukraine in the Seventies* (Oakville, Ontario: Mosaic Press, 1975), pp. 72-73.

²⁷ Its various issues.

Out of this total, 39 percent of books were published in the Russian language, while the rest were in Ukrainian. The Russian language prevails in the field of the economics of industry and the history of the national economy (64 and 44 percent respectively), while in the case of agricultural economics and the political economy of capitalism, for example, it accounts for one-fourth of all books. This distribution, no doubt, reflects the use of both languages in the management of industry and agriculture. The books prepared within the Scientific-Research Economic Institute of the Ukrainian Gosplan, which are somewhat more interesting and methodologically more sophisticated than the rest of literature, are published chiefly in Russian. Although in past years the percentage of Russian-language books in the total varied around 35, the figure rose to 51 percent in 1975.²⁸ This obviously indicates the recent intensification of the Russification drive in this area, also. The language of published works is determined by publishing officials and reflects the current policy of the leadership. But, no doubt, some authors volunteer to write in Russian not only to make their works more accessible to readers throughout the USSR, but also to ingratiate themselves with those in power. Some books written by Ukrainian economists are published, obviously in Russian, by Moscow-based publishing houses. This is considered a greater professional success than to have a book published in Kiev.

Another possible way to achieve publication of economic works is to have them appear in professional journals. At the present time only one periodical journal appears regularly in the Ukraine, *Ekonomika Radians'koi Ukrainy*. This journal is published monthly in Ukrainian (9000 copies) and in Russian (11000 copies). Its joint publishers are the Ukrainian Gosplan and the Institute of Economics. In addition, a number of periodical journals are published, but not always regularly. Thus the Institute of Economics publishes: *Istoriia narodnoho hospodarstva ta ekonomichnoi dumky Ukrain'skoi RSR*, *Demohrafichni doslidzhennia*; Scientific-Research Economic Institute of the Gosplan: *Organizatsiia i planirovanie otraslei narodnogo khoziaistva*; Scientific-Research Institute of Economics and Organization of Agriculture: *Ekonomika i orhanizatsiia sil's'koho hospodatsva*; Kiev State University: *Pytannia politychnoi ekonomii*, *Ekonomichna heohrafia*; L'viv State University: *Pytannia politekonomii*, *Visnyk-Seriia ekonomichna*; Kharkiv State University: *Visnyk-Politekonomiia*. Also the journal *Kibernetika* publishes economic articles, predominantly of a highly abstract nature.

²⁸ According to calculation by Professor E. Bej, in terms of pages and not titles, the Russian language accounted for 60 percent of the total in 1975.

Finally, the question remains to be answered of how the economic profession in the Ukraine has been treated by Moscow. To be able to answer, an evaluation of the quality of the Ukraine's economists, primarily with respect to their publications, is necessary. Since such an evaluation in detail is outside the scope of this note, the opinion of this writer must be substituted for it. On the basis of reading of professional literature, including periodicals, both in the Ukraine and in the rest of the USSR, the author believes that the Ukraine is well behind Moscow, Leningrad, and Baltic republics with respect to the technical level of analysis, methodology, and presentation.²⁹

With respect to the topics about which they write, one looks in vain for information on the analysis of subjects of obvious importance to the Ukraine. There are very few interesting works on specific problems of decision-making of the Kiev authorities and their relationship to Moscow,³⁰ particular needs of the Ukrainian economy, its comparative performance, its relationship to other Soviet republics and foreign countries, and similar problems. In all fairness it is necessary to state that most likely these topics are not avoided by the Ukraine's economists because of professional inability to deal with them, but rather these topics are off limits on political grounds. As a result, Ukrainian professional literature is full of belaboring of scholastic points of Marxist theory, empirical presentation on a very low aggregation level, and sheer propaganda pieces. It is indeed difficult to demonstrate one's professional competence in such writings. In general, it seems that the Ukrainian economists are behind their Russian counterparts³¹ in this respect, while both are well behind the West.

What are the reasons for this situation? To fully answer this question would require a separate study. It is sufficient to point out a few of the most important factors responsible for this situation, applicable

²⁹ See also, James W. Gillula, "Input-Output Analysis of the External Relations of the Ukraine," in I. S. Koropecyjk (ed.), *The Ukraine within the USSR: An Economic Balance Sheet* (New York: Praeger Publishers, 1977).

³⁰ This author was recently engaged in research on planning and management in the Ukraine. He was unable to find one single source dealing fully and analytically with this subject over the entire period of the Soviet regime.

³¹ The following small episode illustrates this situation. Since 1960, three Ukrainian economists held fairly responsible position successively in the Secretariat of the United Nations in New York. In view of the keen competition among member nations for employment quotas, this position was regarded as the "Ukrainian position." However, when the tenure of the last incumbent was completed in 1976, it was impossible to find in the Ukraine one professionally competent economist with a rudimentary knowledge of the English language as well to fill this position.

generally to the entire USSR and specifically to the Ukraine. Economic research in the USSR lagged for a long time significantly behind the West, mainly because of ideological orthodoxy. Only since the mid-1950s have attempts been made to catch up with the West, particularly in the areas of economics which could be utilized for the improvement of efficiency of the Soviet economy, while maintaining its basic institutions intact. To this end, greater emphasis has been placed on the study of quantitative methods and statistics. Also, the possibility for professional contacts between Soviet and Western economists have been considerably broadened in the last two decades. However, these new directions in research, as well as the opportunity for scholarly intercourse with the West, have been limited to a few cities only, especially to Moscow and Novosibirsk. Kiev and the Ukraine in general have largely been left outside these developments.

There are also some specific factors responsible for this situation in the Ukraine. For example, while Moscow libraries receive literally all economic books and journals published in the West, the budget of the Ukrainian Academy of Sciences for this purpose is ridiculously low. Of all Western economic journals, the Institute of Economics in Kiev receives only the *American Economic Review*. Furthermore, Kiev economists only very rarely have opportunity to travel abroad for professional purposes; for a Western economist to obtain permission to establish professional contact with Kiev would indeed be an exception. The situation must be stifling indeed if the Ukrainian scholars dare openly to protest against such conditions.³² It is doubtful that these protests have had any effect on existing policies. It seems that Moscow, by means of miserly allocation of foreign exchange to Ukrainian libraries, and of severe restrictions on the relations between Ukrainian and Western scholars, is determined to keep the Ukraine a backward province also in the area of the development of economic science.

³² For example, Academician V. P. Shelest proposed the creation of a scholarly establishment in the Ukraine similar to the Princeton Institute for Advanced Study (*Literaturna Ukraina*, May 5, 1970) that was supported by the Ukrainian Minister of Higher and Secondary Special Education, Iu. M. Dadenkov, who, in addition hinted that such an institution can become a center of scholarly intercourse between the Ukraine and the world (*ibid.*, October 13, 1970); Academician Iu. M. Mytropol's'kyi demanded the scholarly exchange between the Ukraine and the West outside existing USSR-Western countries agreements (*ibid.*, June 9, 1970); and Academician O. H. Ivakhnenko complained about the shortage of foreign scientific literature and the fact that if a lucky academic from the Ukraine travels abroad, it is usually not because of his scholarly merits (but his Party connections—ISK) (*ibid.*, July 28, 1970; this and above references were taken from various issues of *Digest of the Soviet Ukrainian Press*).

Symposium: M. I. Tuhon-Baranovs'kyi's Final Article

The following is the final article written by the eminent Ukrainian economist, M. I. Tuhon-Baranovs'kyi, 1865–1919. Because of his pioneering analysis of the mutual relationship between economics and other scholarly disciplines, this work is a unique intellectual achievement. The purpose of the articles by Aron Katsenelinboigen and Eugene Lashchuk is to review some of the subsequent developments in the areas discussed by Tuhon-Baranovs'kyi.

The pamphlet from which the present translation was made includes this introductory note:

The present work is the last one coming from the pen of Mykhailo Ivanovych Tuhon-Baranovs'kyi. It was written in Kiev at the end of 1918 and the beginning of 1919 and was especially designated by him for vol. 1 of the *Works* of the Social-Economic Department of the Ukrainian Academy of Sciences. The manuscript was in my safekeeping and I, in the first place, attended to making from it an accurate copy—a precaution, as later proved, far from unnecessary. In 1919 during my absence, one of the close co-workers of M(ykhailo) I(vanovych) from whom I originally received it took the manuscript and, subsequently, he himself left Kiev and disappeared without a trace. For a long time, I had every reason to assume that the original had irrevocably perished; however, it turned out that the manuscript (incomprehensibly for me) found itself in the files of one of the former researchers of the Academy—a jurist who has left Kiev in 1920.

In 1924, the Social-Economic Department published in vol. 1 of its *Works* a Ukrainian translation of the work of M. I. and presently, in accordance with its decision of November 30, 1922, approved by the Conference of the Academy, publishes the Russian original as a separate pamphlet.

Kiev, March 30, 1925

Secretary of the Social-Economic
Department of the Ukrainian Academy
of Sciences
Academician M. Ptukha

The Influence of Ideas of Political Economy on the Natural Sciences and Philosophy*

M. I. TUHAN-BARANOVSKYI

Classification of sciences plays an important role in scientific philosophy. Most authors who have attempted to arrange various sciences into a specific system have designed classification tables of a linear nature. In these systems, sciences are arranged like a staircase, corresponding to the degree of complexity of a given science. Of such a nature, for example, is August Comte's classification of sciences which was especially popular among students of pure sciences and which has been repeatedly imitated.

On the basis of the nature of science itself, a linear arrangement of sciences, corresponding to their larger or smaller generalizations, seems to be the most natural classification. Thus it becomes clear that mathematics, because of its inner nature, is a much more general science than are the natural sciences. Physics and chemistry are much more general sciences than is geology, and so on. Hence, by arranging sciences according to the degree of generalization of their results, a system of knowledge can be obtained in which each member is based on the preceding one in that the conclusions of a science occupying a subsequent spot are based on the data of the science occupying the preceding place, and are not possible without them. This sequence of the logical nature of knowledge should be reflected in the development of the relevant sciences: more concrete sciences should develop later than the more abstract sciences, and their development should be based on the findings of the sciences that precede them.

Such a linear classification of sciences, however, encounters significant difficulties. First of all, the placement of some sciences in a linear order is doubtful. Let us look, for example, at psychology. Comte considered psychology to be related to biology. Thus psychol-

*Translation from a pamphlet in Russian published by the Social-Economic Department of the Ukrainian Academy of Sciences, Kiev, 1925. Notes have been edited to the present standards. Those marked with an asterisk were added by the Editor. The translation was made by Mrs. Lubov Drashevskaya to whom the Editor expresses his gratitude.

ogy appeared to be a science with a highly specialized field of research of a very concrete nature. On the other hand, however, psychology also can be considered a science about the cognitive subject. In this sense, psychology appears to be the most general science because any cognition implies the presence of the cognitive subject; hence, learning the character of this subject should be recognized as a condition of any other learning. True, it is logical that the theory of knowledge, gnosiology, can be and should be strictly distinguished from psychology. However, one cannot deny that there is a certain relationship between psychology and gnosiology. In any case, gnosiology and psychology appear to be sciences which are closely interrelated historically. Since the theory of knowledge and logic are prototypes of the most general knowledge, it seems unnatural to separate psychology completely from these sciences, to place it among sciences with much more concrete contents, and to assign psychology a remote position in the classification system.

There is another more important difficulty involved in the linear arrangement of sciences. It is quite wrong to hold that concrete sciences do not influence abstract sciences. Actually, the interrelationships among sciences are of a more complex nature; not only are the concrete sciences influenced by the abstract sciences but *vice versa*—the abstract sciences are subjected to the powerful reciprocal influence of the more concrete sciences. These reciprocal influences prove that, in fact, all the sciences form not a straight line but a circle, every point of which is simultaneously both the beginning and the end. True, one cannot deny that the more concrete sciences logically presuppose the sciences of a more general nature; however, one is also right to argue that more abstract sciences, in their development, are based on more concrete sciences. Thus the system of the sciences presents not a staircase, but a living organism in which each separate part, each organ, serves other parts and organs, at the same time that it uses them. So the parts are simultaneously both means and goal.

Let us consider mathematics, the most perfect and the most abstract science. Historically both principal branches of ancient mathematics, arithmetics and geometry, developed entirely from the needs of everyday economy: arithmetic developed from the needs of trade, the counting of money, and geometry, as is evident from its name, developed from the need of measuring tracts of land to be sold. Other factors contributed to the initial genesis of mathematical science, and later, in fact up to the present time, the continual development of

mathematics was directly influenced by tasks set by both the more concrete sciences and by everyday life.

In this connection for example, Professor D. Grave, a contemporary mathematician, writes:

In my opinion, the significance of applications for the progress of mathematics is so important that I do not dare to say what is of a greater importance: mathematics for applications, or applications for mathematics. We shall not err by stating that mathematics developed under the continuous impact of applications. The latter were both theoretical, in natural philosophy, and practical, in technology and generally in everyday life. Undoubtedly, if there were no Kepler, all of Newton's achievements would probably have appeared much later, and probably we would not yet have differential and integral calculus. These calculations could have developed under the influence of other applications, and mathematics in general could have taken a different course.¹

Thus up to the present time the science which, according to Comte's classification, constitutes the foundation of the whole system of scientific knowledge, has shown itself to be dependent in its development on the tasks posed before it both by everyday life and by the more concrete sciences. The same should be said about all other sciences: each of them develops under the complicated influence of all other sciences not only by the more abstract but also by those more concrete than the given science, as well as under the influence of everyday life.

The idea that theory does not originate from practice but practice from theory should be rejected. Actually, practice and theory are an organic entity, whose every constituent part is essential for the development of the whole. Practice supplies theory with goals and tasks for research and in this way powerfully influences the direction and nature of theoretical research.

We will dwell here on one of the most interesting examples of these reciprocal influences of the concrete sciences on the abstract sciences: specifically, on the influence of ideas of political economy on the natural sciences and philosophy.

Political economy is one of the youngest social sciences; it achieved definite outline only in the 18th century, in the works of Quaisnay and Adam Smith. However, in spite of such a late appearance, politi-

¹ D. Grave, *Entsiklopediia matematiki* (Moscow, 1912), pp. 587-88.

cal economy, among all the social sciences, is the one most closely approximating that type of scientific knowledge whose pattern is represented by natural sciences, devoted to the study of general regularities of nature—for example, physics, chemistry, and biology.

Political economy, in its research, is undoubtedly based upon the data of natural science. Let us take, for example, the theory of land rent. This theory proceeds from the so called law of diminishing returns to agricultural labor. This law states that beyond a certain point each subsequent expenditure of labor would render a decreasing amount of agricultural product. This law has the characteristic of a generalization in the natural sciences. Actually, economists did not borrow this generalization from natural scientists but came to it independently; to the contrary, the naturalists borrowed it from economists. For example, the prominent chemist Liebig,² who attached a great importance to this law, identified as the source from which he learned about it, the well-known course in political economy by J. S. Mill. In any case, by itself the law of diminishing returns to agricultural labor (or, as it is erroneously named, the law of diminishing returns to soil), according to its gnosiological nature, undoubtedly belongs to the field of applied natural sciences, and can be verified only with the data of the natural sciences.

The economic principle concerning the advantages of large-scale production over small-scale production is also completely based on the well-known data of the applied natural sciences: technology, agriculture, and others. Only on the basis of these data did economists come to the conclusion that in those fields where human labor is applied to inorganic nature are the advantages of large-scale production much greater than in the areas in which labor comes in direct contact with the biological processes of nature. Economists' teachers in all the problems related to the general tendency of economic evolution are the technologists and agriculturists because any change in technology, as was aptly demonstrated by Marx, must influence in the most significant way the nature of the economic structure of society.

In general, the dependence of political economy on more general and abstract fields of knowledge, such as the natural sciences, is so clear and well-known that it does not need further elaboration. Much less attention has been paid thus far to the influence of political economy on the development of the natural sciences. But there is no

² Justus von Liebig, 1803–73, German chemist.*

doubt that this reverse influence exists, as does the direct influence of the natural sciences on political economy.

Any natural scientist would agree that Darwin's theory of the origin of species by natural selection played an exceptionally great role in the history of the natural sciences. In the second half of the 19th century there was no other theory in the field of the natural sciences whose general scientific value could be compared to Darwinism. It is possible that Darwinism is now in decline, replaced by new biological doctrines. However, Darwinism was an extremely important factor in the development of biology in the second half of the 19th century and marked a new era in the history of sciences.

The basic idea of Darwin's theory is the proposition that due to the limited supply of food, with the practically unlimited ability of living organisms to reproduce, organisms struggle bitterly for existence. This results in the extinction of the weaker organisms and only the best-adapted organisms survive and leave offsprings. From this idea Darwin easily concluded that distinctive characteristics of each organism are nothing other than those inborn traits of its ancestors that were useful in their struggle for existence and were passed on to future generations.

No doubt Darwin's exceptional intellectual talent and his mighty powers of observation were needed in order to draw from these simple basic ideas all the tremendous conclusions which explain the origin of species in all their varieties. However, the theory of the origin of species was based on two very simple considerations already mentioned; the second consideration is a natural conclusion from the first.

In view of this, special importance must be attached to the indubitable fact that Darwin borrowed his basic idea from no one else but the economist Malthus. Darwin himself testifies to this. He writes in his autobiography that after his return from the voyage on the *H.M.S. Beagle*, he began systematically to search for the reasons that would explain the variety of organisms observed during his voyage. However, he could not find any explanation. By his own words, he followed Bacon's method, collecting and grouping facts without any assumed theory. He understood very soon that artificial selection was a decisive factor in the formation of breeds of domestic animals. Darwin wrote:

But how selection could be applied to organisms living in a state of nature remained for me a mystery for some time. In October 1838, that is, fifteen months after I had begun my systematic enquiry, I happened to read for amusement

Malthus on *Population*, and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favorable variations would tend to be preserved, and unfavorable ones to be destroyed. The result of this would be the formation of new species. Here, then, I had at last got a theory by which to work.³

However, even if Darwin's own testimony did not exist, the similarity between Darwinism and Malthusianism is so great that there is no doubt about the mutual interdependence between the two doctrines. Malthus powerfully and precisely outlined the fundamental idea of the struggle for existence.

Writing only about human society, Malthus stated that the reproductive instinct is a force of nature keeping human society continually at the threshold of poverty and famine. Human society reproduces until it comes to an insurmountable wall—the shortage of the food supply. Malthus in the first edition of his famous book expressed especially sharply his idea about the bitter struggle for existence among men. In later editions he softened this idea by inserting an acknowledgment that the moral self-restraint of man may limit the instinct of reproduction and set limits to the struggle for existence. However, Malthus felt that this restriction, even in the case of man, would not be very effective and his concept basically remained the same: the instinct of reproduction under conditions of the limited food supply would cause poverty in human society. Naturally, concerning other organisms, the restrictions in the struggle for existence, expressed by Malthus, should be dropped. Thus Darwin had to get an idea from Malthus' book that in the organic world the most bitter struggle for existence occurs, that it is unavoidable, and that it is caused by the nature of things themselves. Hence, Darwin, according to his own testimony, could make all his further derivations and create an epoch in the history of the natural sciences.

The conclusion concerning the immediate dependence of Darwin's theory on the much earlier idea of Malthus is still more convincing, because of the fact that Wallace,⁴ who shared with Darwin the glory of

³ *The Autobiography of Charles Darwin, 1809–1882*; the author cites French translation of this work, *La vie et la correspondance de Charles Darwin* (Paris, 1888), pp. 119–20.

⁴ A. R. Wallace, 1823–1913, British zoologist.*

proposing the theory of the origin of species by natural selection, also, according to his own admission, got his idea from the same book of Malthus. It is known that Wallace formulated his theory, which coincides with Darwin's theory in all significant features, quite independently from Darwin. Thus the fact that both scientists indicate Malthus' book as a source of their fundamental ideas is the best evidence of this book's significance in the genesis of Darwinism. Malthus' book was obviously not an accidental impetus setting Darwin's and Wallace's thoughts in a certain direction, but it was a real starting point of the new doctrine.

Thus, the history of Darwinism presents persuasive evidence of the significant influence rendered by the economists' ideas in the 19th century on the development of natural science. The example of Darwinism, however is far from unique.

Let us take the broader doctrine of evolution which in the most elaborate form is found in Herbert Spencer's philosophy. Spencer was one of the those philosophers of the second half of the 19th century who had a particularly strong influence on natural scientists, especially in England and America. His doctrine of world evolution may be considered the most important achievement of Anglo-Saxon scientific philosophy of the last half-century. The essence of this doctrine boils down to two very simple ideas: first, evolution is directed towards increasing differentiation—greater and greater complexity and diversity of all existing things; second, evolution is directed towards the growing integration of parts of the whole, as well as towards their greater and greater interconnection. These ideas of Spencer represent nothing else but a generalization on the whole nature of observations by biologists on the course of the development of the organic world. It should be noted that Spencer was greatly influenced by Baer's⁵ theory of evolution.

However, the teaching of biologists about the progressive character of the complexity of the organism's functions and organs, and the growing interdependence among organs, undoubtedly reflects the prevailing ideas of political economy. Even at the time of Adam Smith, the doctrine of the division of social labor as the basic factor in social progress was firmly entrenched in economics. The doctrine of the division of labor was stated by Smith in the first lines of *The Wealth of Nations*; he greatly exaggerated the significance of this factor as a stimulus to public wealth. Following Smith, this doctrine was also

⁵ K. E. von Baer, 1792–1876, German zoologist.*

accepted by all of his school; only the socialists considered it necessary to introduce into the thesis of a progressive nature of the growing division of labor some essential restrictions.

There is no doubt that, under the influence of the economists' doctrine of the progressive nature of the division of labor, biologists recognized that a greater or smaller complexity of the organism's structure is a criterion of the level of its development. Spencer borrowed from biologists his doctrine of world evolution, and in this way a purely economic doctrine became the foundation for the explanation of the most general facts embracing the totality of the world of phenomena.

Another example of the universal application of the principle established by economic science is presented by the interesting fate of the specific proposition of economic science, the so-called "economic principle." This term, considered by many economists to be a fundamental characteristic of the very notion of economics, is applied by economists to a tendency according to which man in his economic activity should aim at gaining the highest results with the lowest expenditure of effort. This "economic principle" played an important role in the economic literature of the second half of the last century, especially in Germany.

The applicability of this principle to the rational structure of an economy is self-evident. It serves as a criterion of the rationality of economy, and therefore many economists (for example, Roscher, Ad. Wagner, A. Isaev,⁶ and others) define the economy as an activity corresponding to this principle.

However, such a definition of economic activity should be considered problematic for the following reasons. In their desire to establish a distinguishing feature of economy, economists discovered a principle of much broader significance. Any rational activity, in fact, should be based on this principle. We are thinking according to the "economic principle" which aims at solving a problem of interest to us with the least expenditure of our mental efforts, and the value of the product of our mental work is assessed by the same principle. An abstract notion containing in a general formula an unlimited amount of separate concrete impressions reduces our mental efforts and therefore is a necessary tool for our thinking. In this idea lies the sense of all application of mathematical methods. For example, it would be possible to dispense with multiplication by replacing it with

⁶ A. Isaev, 1851–1924, Russian economist.*

the addition of multiplicants, but this would increase tremendously the expenditure of our mental efforts. By the same token, algebra generalizes individual numbers by letters and in this way tremendously economizes our efforts; in this lies its advantages over arithmetic.

The esthetic value of works of art also depends on their capacity, with the least expenditure of outward means, to achieve the greatest amount of esthetic effect. What is the difference between the picture painted by an artist and a photograph? The difference is that a photo shows everything that leaves an impression on the light-sensitive plate, while the artist selects for his picture only essential things, rejecting superfluous and unnecessary details. Everything that does not reinforce the impression which an artist wishes to achieve with his painting is superfluous and unnecessary. It is precisely here that the superiority of the painting over the photograph lies. In this is the secret of a much stronger impression of the painting because any unnecessary detail distracts attention from what is basic and essential.

The distinguished Austrian philosopher and scientist Ernst Mach expanded the "economic principle" over a much wider field; the principle of economy of effort occupies a prominent place in his philosophical system. "The economy of thought," he writes, "is most developed in that science which has achieved the highest formal development and also is often used by natural sciences, i.e. in mathematics . . . Physics is an economically ordered experience."⁷ Referring to the source from which he borrowed his idea of the economy of efforts, Mach mentions E. Herman.⁸ Hence, in this case also we see that economic science formulates the principles which later are applied much more widely in sciences of a more general nature than is political economy.

We think, however, that the deepest and widest influence of ideas and principles of political economy is still to come. Here we have in mind a scientific doctrine completely elaborated by political economy and which at present attains more and more universal significance. That is the theory of value.

It has been observed lately that the problem of value attracts more and more attention from philosophy in its broadest sense. Philosophers have begun to elaborate the theory of value as

⁷ Ernst Mach, *Popularwissenschaftliche Vorlesungen*, 3rd ed.; the quotation from the Russian edition, *Nauchno-popularnyye ocherki* (Moscow, 1909), pp. 158-59.

⁸ *Ibid.*, p. 209.

thoroughly as economists do. A voluminous treatise dealing with the theory of value in a purely philosophical sense has been written by the contemporary English philosopher Wilbur Urban, and it is very typical in this respect. In the beginning of his work, Urban states: "It is doubtful that there ever was a time in the history of thought, when the problem of value attracted so much attention as it does now."⁹

In fact, the modern trend of philosophical thought is characterized by a tendency to extend further and further the limits of the notion of value, which becomes a fundamental philosophical notion. This is related to the voluntaristic trend in modern psychology. Contemporary psychologists consider that will is the fundamental and determining element in man's psychic life, and the category of value is one of the forms of the category of will. How can we distinguish between valuable and non-valuable? Only by the reaction of our will. The will always aims at something, rejects something, and avoids something. We consider that the goals at which the will aims are positive values; the things avoided by the will as negative values. There are no values without will, and there is no will without values. This is the reason why modern philosophy with its voluntaristic tendency attaches primary importance to the category of value over all other psychic categories. For example, Wundt, a distinguished German scientist and philosopher, says: "The element of valuation forms the most important characteristic distinguishing spiritual from purely physical elements. The spiritual world is the world of values with various qualitative traits of very different degrees. Everything in the spiritual world has its positive or negative, larger, or smaller value."¹⁰ Windelband states, "Philosophy is a critical science about generally obligatory values."¹¹ The American psychologist and philosopher Muensterberg states: "The factor that is missing from our thinking is the system of pure values complete in itself; only then will philosophy again become a real vital force."¹²

It follows that the category of value first understood and elaborated by economic science, acquires primary significance in general philosophy. But this is not all. I dare to think that the notion of value should be of great importance also in the development of the natural sciences. I shall try to demonstrate how this notion can be applied to

⁹ Wilbur Urban, *Valuation, its Nature and Laws* (New York, 1909), p. 1.

¹⁰ Wilhelm Wundt, *Logic*, vol. 2 (Stuttgart, 1907), p. 16.

¹¹ Wilhelm Windelband, *Praeludien* (Tübingen, 1884), p. 30.

¹² Hugo Muensterberg, *Philosophie der Werte* (Leipzig, 1908), p. vi.

the solution of one of the most important and difficult problems of physiological psychology.

It is well-known that the so-called "Weber-Fechner Law"¹³ plays a prominent part in modern physiological psychology. This law was first established experimentally by Weber, then Fechner elaborated it mathematically and called it "the fundamental law of psychophysics." In fact, this law occupies a central position in physiological psychology, expressing the mathematical relationship between irritations of the organism caused by its surrounding physical-chemical environment and the internal reaction of the organism.

According to Fechner, the law states that sensations increase as logarithms of stimuli; in other words, the increase in stimuli in geometric progression causes an increase in responses in arithmetic progression. The same law can be expressed still (more simply): absolute differences between responses are equal when the relations between stimuli are equal; or, in order to obtain an equal absolute increase in response, stimuli should be equally increased.

Extensive experiments conducted by many researchers for the testing of this law have shown that it is valid only within certain limits; namely, the logarithmic dependence is not observed in the case where the response is close to its threshold (*Reizschwelle*, the lowest point) or to its limit (*Reizhöhe*, the highest point). Close to their threshold and to their limit, responses increase slower than in the arithmetic progression, while stimuli increase in geometric progression. However, within the range of intermediate values, many responses change according to Weber-Fechner Law.

It was experimentally established that each specific response has its constant coefficient of increase. According to the data presented by Wundt in his *Physiologische Psychologie*,¹⁴ this coefficient for light perception equals 1/100, for responses related to muscles (weight-lifting) equals 1/40, for responses caused by pressure equals 1/20, for sound perception equals 1/10. In other words, the increase in light intensity is felt in cases where this intensity is increased by 1/100; a hardly noticeable increase in pressure is felt when a lifted weight is increased by 1/20, and so on.

¹³ E. H. Weber, 1795–1879, German anatomist and physiologist; G. T. Fechner, 1801–87, German physiologist and psychologist.*

¹⁴ Wilhelm Wundt, *Grundzüge der physiologischen Psychologie*, 3rd ed., vol. 1 (Leipzig, 1874).

Such is the sense of Weber's Law, whose significance cannot be exaggerated in all the areas of psychic phenomena. However, while modern science established this law, its interpretation and its expression in the form of simpler regularities still cause differences of opinion among researchers. Wundt divides all attempts at the interpretation of this law into three basic types.

First comes the interpretation by Fechner himself. Actually, Fechner did not give any interpretation of the law he had established; he saw in this law the fundamental regularity of psychic life which cannot be resolved into simpler elements. Modern science, not sharing Fechner's mystic world-outlook, cannot follow the steps of the father of psychophysics and cannot be satisfied with acceptance of the logarithmic law as the fundamental regularity of spiritual life.

Of much higher scientific value is a purely physiological interpretation of the law given by the physiologist George Mueller.¹⁵ According to Mueller, the stimulus is not transmitted by a nerve corresponding to the logarithmic law. He thinks that the increase in the stimulus intensity in the geometric progression leads to the increase in irritation transmitted by the nerve in the geometric progression; however, this irritation encounters certain resistance and delay in the central nervous system and thanks to it in our conscience geometrically increasing stimuli turn into arithmetically increasing responses.

Wundt rejects this interpretation, too, as not confirmed by experimental data.

As a result of evaluation of various attempts at interpretation of logarithmic law, Wundt comes to the following conclusion: the response itself, without any delay, increases in our nervous system proportionally to the stimulus. Wundt says that this is evident from Fick's¹⁶ experiments on muscle contraction caused by nerve irritation. Nevertheless, in our consciousness responses proportional to the stimuli intensity turn into responses increasing proportionally to a much slower, arithmetic progression. This is explained by the peculiarities of our psychic life, and these peculiarities should be used for the interpretation of Weber's Law. Hence, Wundt comes to the psychological interpretation of this law. Its essence is this:

Psychological explanation derives this law not from physiological peculiarities of a nervous substance and not

¹⁵ Georg Müller, 1850–1934, German physiologist and psychologist.*

¹⁶ A. Fick, 1829–1901, German physiologist.*

from a peculiar interaction of physical and psychic elements, but from psychological phenomena which act at a time of comparing measured responses. This interpretation derives the law not from responses themselves but from processes of apperception. Without these processes the quantitative evaluation (*Schätzung*) of responses can never be accomplished. The psychological law of Weber evidently resolves to a more general observation implying that in our consciousness we have not an *absolute* but a *relative* gauge for measuring the intensity of states of this consciousness. Consequently, we always measure one state of our consciousness by its other state, since we are compelled to compare the first state with the second. Therefore we have a right to consider Weber's Law a special case of a more general law of relativity governing our internal spiritual experiences. An important argument for such an interpretation is the existence of this more general law which we observe also in other fields of the psyche, namely in the qualitative comparison of sensations, as well as in relations of feelings to ideas. According to such an interpretation, Weber's Law is not a law related to sensations but rather the law of apperception. Only in this way can one explain that the action of this law passes the limits of sensations. At the same time, it is also clear that such an interpretation does not contradict an assumption that a sensation increases in its limits according to the same law of an approximate proportionality, the same as the excitement of the central perceptive nervous system; important is the fact that this law is not related immediately to sensations but to the process of apperception stimulated by sensations. Therefore the psychological interpretation has an advantage because it does not exclude the physiological interpretation, while the two preceding interpretations can illuminate only one aspect of the problem. In this connection, it should be noted that our knowledge of the nervous processes of the central nervous system is still insufficient and thus cannot give us an empirical foundation for such an explanation.¹⁷

Today, Wundt is probably the most competent representative of a still young science—physiological psychology. Therefore, special attention should be paid to his interpretation of the “fundamental psychophysical law.” What is this interpretation?

In Wundt's opinion, this law lies completely in the area of evaluations of sensations by our consciousness. While 200 candles are burning, we do not see the light of one additional candle, not because

¹⁷ Wundt, *Grundzüge*, vol. 1, pp. 374–78.

the 201st candle does not stimulate our organs of sense and our central nervous system, but only because our attention is saturated by the light coming from 200 candles. Our consciousness evaluates unconsciously for us the intensity of all the stimuli perceived by our nervous system and assigns them a corresponding value, taking into account not an absolute but a relative intensity of each stimulus. With 50 candles before us, we notice that the light intensity increases if one more candle is added. However, if there are 500 candles in front of us, we will not notice a difference in the light intensity at all if one more candle is added.

According to Wundt's interpretation, the fundamental psychophysical law is a result of unconscious processes of the evaluation of external stimuli by our consciousness. We can agree with this interpretation but obviously it has not been fully defined. Wundt did not demonstrate why our consciousness evaluates a stimulus in this and not in any other way; why our consciousness takes into account a relative but not an absolute value of a stimuli. This is the basic question not answered by Wundt.

We think that Wundt failed because he is not an economist and is not familiar enough with the theory of value formulated by modern economic science. Wundt certainly possesses a general knowledge of political economy and in his *Logik* even devoted a number of interesting pages to the methodology of economic science. Nevertheless there is an impression from Wundt's publications that he is more familiar with the old economic literature and scarcely knows the modern theory of value, i.e. the doctrine of the so-called marginal utility. Meanwhile, there is an obvious similarity between the fundamental psychophysical law and the process of evaluation as interpreted by the theory of marginal utility. A man with 100 rubles in his possession would put a much smaller value on one ruble than would the man with only 10 rubles. By the same token, while 100 candles are burning, the light of one candle would act on our consciousness much less than in the case of only 10 candles. Is this not a complete analogy between the conscious evaluation (in the first case) and the unconscious evaluation (the second case)?

Long ago economists noticed a similarity between Weber's Law and our conscious evaluation, based on the method of marginal utility. Having indicated this similarity, economists explain it by the fact that economic evaluation is nothing other than a particular application of Weber's Law.

We fully agree that the similarity does exist but we give it a quite different interpretation: economic evaluation is not an example of Weber's Law but, on the contrary, Weber's Law is just a specific case of economic evaluation. We shall try to prove this paradoxical thesis.

As a matter of fact, the proof would not be too difficult to produce. It is only necessary to develop and continue the interpretation of the main psychophysical law given by Wundt.

Wundt indicates that in the process of apperception, only relative, not absolute, differences are taken into account. The question then arises why our apperception is of such a nature.

We think that this can be quite satisfactorily explained on the basis of the theory of natural selection. Our apperception, as well as our consciousness in general, which expresses a unique nature of our nervous system, was shaped as a result of the struggle for existence and the survival of the fittest. One can assume that the nervous system originally perceived external stimuli proportionally to their intensity. The question arises whether such a nature of apperception contributes to the survival of the species or not? Obviously, it does not. As a matter of fact, in our environment our organism is exposed to an infinitely large number of external stimuli. If our nervous system were to react to every stimulus, it would be continuously excited and so we would spend the strength of our organism in vain. The organism is interested in perceiving those stimuli to which the reaction could be of practical use. However, the perception of stimuli which in no way change conditions of the struggle for survival of the species is not only useless but harmful from the point of view of the preservation of the species since every nervous reaction requires a certain expenditure of the organism's energy. In this case such energy is spent without any practical result.

The species is interested that our consciousness notices only practically important stimuli, that is, those exciting such external reaction of the organism as may have an impact on the preservation of the species. We therefore perceive only a limited amount of stimuli, and in addition, we do this on the basis of their relative, but not their absolute, intensity. As an example, of what use would it be for us to be able to distinguish a faint source of light in the presence of strong sources? Let us imagine that in the daytime we can see the moon and stars. Will this ability be of any practical use to us in our struggle for existence? In no way. By contrast, the ability to see moonlight at night is necessary for the organism's well-being: organisms unable to see at all at night would die out because of attacks of various beasts of prey.

It is possible to assume (and this is done by Wundt) that initially the nervous system transmits sensations to the central consciousness in proportion to the intensity of stimuli. Thus the stimulus provoked by the starlight is perceived by the retina of our eye and is transmitted to the central nervous system in exactly the same way both during the day and at night. However, in the daytime, our consciousness does not perceive this stimulus, because in the course of the struggle for existence we developed an ability to perceive stimuli corresponding to their relative but not to their absolute intensity.

One can imagine that organisms initially perceived the light of stars in the daytime. By means of the survival of the best-adapted organisms, these organisms gave place to others who lost the ability to see stars during daytime whereas they developed the ability to perceive faint sources of light at night. Thus our perceiving apparatus gradually developed an ability to perceive according to Weber's logarithmic law, for the reason that such a nature of perceiving corresponds best to the interest of species preservation.

Let us imagine, indeed, that we do not possess this ability, that we perceive stimuli not accordingly to their relative, but to their absolute intensity. How will this affect our existence? In such a situation, the number of our sensations will increase enormously, and we will simultaneously hear all kinds of noises and sounds; the total amount of sounds will be so great and diverse that it becomes extremely difficult to differentiate them. In addition to hearing the voice of the person talking to us, we hear wheels rumbling from the street, voices from the adjacent room, wind howling in the chimney, and mice rustling. Faint rustling usually heard at night, will invade our room at daytime, even when we are closely engaged in conversation. It is easy to imagine that such an organization of the system will distract our attention and constitute a useless expenditure of the strength of our nervous system.

Similarly, let us imagine that we have to carry a heavy package for a long distance. It is important to know the weight of the package because the expenditure of our strength changes depending on whether the package weighs five or six pounds. However, if the case involves the unloading of bags, that is, moving considerable weight for a short distance, then the difference of one pound between loads weighing several pounds is not significant. We apply the same effort whether we carry on our shoulders thirty pounds or thirty pounds plus one pound. This means that it is important for our well-being to know how to find little differences in weight in cases where the abso-

lute weight is not large, while it is practically useless to be able to find the same absolute differences in cases where weights are large.

As has been indicated, the same reasoning applies in relation to the ability to see faint sources of light in the presence or absence of strong sources. In all these cases it is clear that the organism gains because of the fact that it perceives stimuli according to their relative, but not their absolute intensity—in other words, according to Weber's Law.

To achieve our goals most effectively, our consciousness had to develop the ability not to notice weak stimuli in the presence of strong stimuli. Since the role of consciousness is very important in the struggle of the organism for existence, it is clear that due to his intellect man gained a dominant position among all organisms. It is no wonder that our apperceiving ability developed just those properties required by the interests of the preservation of the species.

Equally, the economic evaluation which takes into account the marginal utility of each unit of all commodities judges a certain thing according to its relative, but not its absolute value for our well-being. Why is it that in the case where we already have three pounds of bread we put a smaller value on one additional pound of bread than in the case where we have only two pounds of bread? It is because the third pound of bread is of smaller significance to our well-being than is the second pound. In this process of evaluation we see a perfect analogy to our ability to perceive very weak stimuli in cases where our attention is not absorbed by more intensive stimuli. The difference between two nervous processes lies in the fact that in the first case of economic evaluation we deal with arbitrary processes of which we are completely conscious, while the process of perception does not depend on our will; however hard we strain our eyes, we do not see stars in the daytime. The difference is explained by the fact that natural selection programmed in our nervous system the ability to perceive external stimuli according to laws of economic evaluation—in other words, corresponding to Weber's Law. This law, is nothing other than internalized economic evaluation.

So the economic theory of value supplies the foundation for the interpretation of the central law of psychic phenomena. In general, in all cases where it is necessary to explain an expedient adjustment of an organism (and such an adjustment is typical for each organ), the explanation should be based on the economic theory of value, because economic evaluation is nothing other than an accounting of expediency. Any teleology, whether related to the external structure of the organism or to inner psychic experiences, is based on the phenomena of evaluation.

Natural scientists do not know much about the theory of marginal utility, the pride of modern economic science. However, they learn gradually about this theory, and then natural sciences can draw from this principle many conclusions for a better understanding of the organic world. The theory of the struggle for existence, developed by economists, has already led to a revolution in science concerning the origin of organisms. It is possible that in the future the economic theory of value will have no less a significant impact on natural sciences.

What is the reason for this powerful influence of political economy on other more general sciences? The explanation lies in the specific nature of economic science.

The fact is that among all sciences, political economy is the one that studies phenomena related to man's most urgent and vital interests. This is not intended to imply that economic interests constitute the only practical problems of man. Practical problems of humanity are complicated and many-sided, and among them, economic problems are the simplest and most elementary.

Life is certainly not confined to economic activity. However, economic interests prevail over all other vital interests, because they are most urgent, and are closest to the material basis of life. Economic activity is nothing else than the adjustment of the external material environment to man's needs; every need of man requires such an adjustment. Therefore the satisfaction of all life's needs is related to some extent to economic activity.

Because of the urgency of economic welfare (*primum vivere, deinde philosophare*) man is especially interested in a thorough accounting of everything related to conditions underlying the satisfaction of these needs. At the same time, because the economy is directly related to physical environment, such an accounting is possible in a more precise form than is true in other fields of psychic life. Thus, economic science elaborates methods of more precise accounting for those psychic processes which it deals with than does any other non-natural science.

Strictly speaking, it is only in the economic field that evaluation processes arrive at numerical results. Everything in man's life has its definite value, but almost nowhere outside the field of economic value are these values expressed in numbers. How does one measure the value of beauty, mind, health, or talent? There is no doubt that they all possess values, but these values cannot be measured.

In contrast, economic value, the price, is expressed in strictly determined numbers commensurable one with the other. Only because of the quantitative commensurability of the value do economic com-

putations acquire that precise and definite nature necessary for economic success.

Only because of precise accounting, can the notion of value be formulated. In addition, it must be kept in mind that the notion of economic value acquires a definite quantitative aspect only at a certain stage of economic development, namely, at the stage of monetary economy. As long as the commodity economy was underdeveloped, and the majority of economic needs were satisfied without exchange, economic value had a quite imperfect quantitative expression. But in a developed money economy, every object of the economy, every element of debit and credit has a strictly definite price expressed in money and all the prices can be measured exactly and compared one to the other.

In the form of money value, economic value became an object of precise scientific study and analysis. The modern economic theory of value was developed on such a monetary foundation and embraces a much broader field than the economy. Economic theory of value, discovered by economic science, is, at the same time, the theory of value as a general phenomenon of spiritual life. Modern scientific-philosophical thought recognizes the preeminence of the practical mind over the theoretical mind and the preeminence of the will over the mind. From the modern viewpoint, the intellect is an organ created by the will, it is a servant of the will, a tool of the organism used in its struggle for existence and developed in the course of this struggle.

The influence of the ideas of political economy on the development of science in general is explained by the fact that the political economy deals with a field of the most urgent practical importance. Economic interest is urgent but at the same time it is the simplest interest which, because of its elementary nature, permits quantitative measurements. Hence, economic science arrives at generalizations embracing generally the whole field of teleological activity of the will. Darwinism greatly extended the area of the application of the teleological study of natural phenomena. It is no wonder that a push to this radical change in science was given by political economy. It is possible to believe that the economic theory of value will become a source of new theoretical constructions in the sciences which deal with phenomena appearing as the result of the struggle of organisms for existence.

Economics and the Problem of Values

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TUHAN-BARANOV'S'KYI'S FUNDAMENTAL INSIGHT

A brilliant essay by M. I. Tuhán-Baranov's'kyi, "Vplyv idei politychnoi ekonomii na pryrodoznavstvo i filosofiiu" was published in Kiev in 1924.¹ This work is original in that it is among the first to explore what the economic theory offers to other sciences. The approach contrasts sharply with the prevailing view that it is only economic theory which has been borrowing from other sciences.

In this essay, Tuhán-Baranov's'kyi identifies several ways in which economics influences other sciences. Specifically, he states: "The theory of the struggle for existence, developed by economists, has already led to a revolution in science concerning the origin of organisms. It is possible that in the future the economic theory of value will have no less significant impact on natural sciences." Furthermore, he suggests that it is particularly the economic theory of value (i.e., the theory of prices in modern Western formulations) which holds promise for the sciences. In his view, "Economic science elaborates methods of more precise accounting for those psychic processes with which it deals than does any other non-natural science." Moreover, he argues that economic theory of value, that was initiated and developed by economic science, is the theory of value as a general phenomenon of spiritual life. Tuhán-Baranov's'kyi recognized that conceptualization of value in economics offers fundamental insights that are relevant to other fields of inquiry. In his view, the reason for the universality of economics is that the economic motive or interest is urgent and, at the same time, the simplest interest which, because of its elementary nature, permits quantitative measurements. It seems that Tuhán-Baranov's'kyi's fundamental insights into scientific methodology can be well upheld today.²

¹ For its English translation, see this volume.

² Among the scholars who stress the usefulness of economics for other sciences is Kenneth Boulding. In addition to his numerous articles, see his *Economics as a Science* (New York: McGraw-Hill, 1970).

The purpose of my article is to follow up on Tuhan-Baranovs'kyi's seminal idea and explore how economic theories have been, or could be, used in other sciences.

EXTENSIONS OF VON NEUMANN'S MODEL TO OTHER SCIENCES

Economic theories seem applicable not only to psychology and sociology but also to sciences which are not generally regarded as related to economics.³ I have argued elsewhere that value (more narrowly, market value or price) as it is conceived in economics—to the extent that it plays the role of “pushing” and “pulling”—is a universal phenomenon, manifesting itself as force in physics, emotion in biology, evaluations in psychology, morality in ethics, and so on.⁴ The variety of these forms of the same universal phenomenon is due both to difference in pertinent environmental conditions and to the perception or measurement by the observer.

Economic theories seem especially pertinent in sciences relying on axiology, i.e., the theory of values. This contention can be supported by references to recent economic mathematical models of static and dynamic equilibrium, theory of games, theory of optimization, the algorithm method for solving economic problems, mathematical and dynamic programming, and chess-economic analogies.

To support the thesis, let me consider in some detail the implications of J. Von Neumann's model of dynamic equilibrium.⁵ By dynamic equilibrium we mean the condition in which the chosen variables attain certain maximum rate of growth as the system moves over time. Von Neumann's model is attractive because it is based on the widely applicable assumption that a system aspires to enlarge its size, more precisely, to maximize its growth. Maximization entails either

³ In certain areas like “consumer behavior,” economics and psychology overlap and, hence, the theories and methods of the two fields closely interact. However, the influence of advancements in one field on another is a different matter. Thus J. Piaget explores several recent applications in psychology of econometric methods and such economic theories as the theory of value or the game theory. See J. Piaget, “Psikhologiya: mezhdistsiplinarni svyazi i sistema nauk,” *Voprosy filosofii*, 1966, no. 12.

⁴ A. Katsenelinboigen, “Sistemnyi analiz i problema tsennosti,” in annual collection *Sistemnye issledovaniia* (Moscow, 1972); “General Systems Theory and Axiology,” and “Constructing the Potential of a System,” in *General Systems*, 1974.

⁵ The exposition of the Von Neumann model follows Kelvin Lancaster, *Mathematical Economics* (New York: Macmillan, 1968).

prolonging the existence of definite elements in the system or increasing the speed of multiplication. Here, we shall limit our discussion to multiplication because it is the simpler of the two.

The model in question starts with the condition that a given amount of resources is being transformed by a set of definite technological means (here, the means are linear operators) into a given number of products. The resultant products become resources for the next transformation step and, in that sense, the model is a closed one. These conditions may be formalized as follows:

$$A X (t) \leq B X (t-1), \quad (1)$$

where

A — matrix of input
 B — matrix of output
 X — vector of intensiveness
 of the used technological
 means
 t — time

To solve this system of inequalities, one has to find a maximum rate of growth λ , so that

$$X (t) = X (t-1) \lambda. \quad (2)$$

Von Neumann's investigation of the dual parameters of the above primal model is most interesting. Here prices play the role of the dual variables. Let P stand for the price vector. Because in the state of equilibrium the price must not be less than the expenditures on production, the dual system of equations becomes

$$P (t) B \geq P (t - 1) A. \quad (3)$$

The price vector is normalized so that the sum of prices is equal to 1. The price of a commodity signifies its marginal contribution to the total amount of values in the system.

The solution of this system of inequalities described by these three equations yields the minimum rate of decrease in prices,

$$P (t) \lambda = P (t - 1). \quad (4)$$

In the dynamic equilibrium, the rate of growth of output is equal to the rate of decrease in prices. Thus the system conserves the aggregate (or mass) of values. Simultaneously the system conserves the aggregate of matter because it is assumed that external resources are unlimited. The unlimited resources reduce their price to zero. Hence in the development of an economic system (in a situation of dynamic equilibrium), we satisfy the law of conservation of matter and values.

It is known that the dual system of inequalities is an effective means of finding a solution for the primal system of inequalities. The economic interpretation of the solution of both systems of inequalities is clear. Because the prices reflect the global information of the system, we can use prices for a specific or local choice of an appropriate technological method. In the local decision, we measure, in terms of corresponding prices, the profitability of the technological method as the difference between input and output.

In other words, prices offer the possibility of understanding the suitability of specific (or local) actions because they give directions to the specific units to achieve the state of equilibrium. In this case, the local actions do not necessarily require complete information about the system in the form of prices. The prices serve the purpose well because they are relatively stable, changing more slowly than the basic initial parameters.

Within the framework of this general model, economics offers an insight into the formation of the information field and its field of gravity. Thus, in the sphere of socioeconomic activity, the aspirations of the people represent the primary forces, and the underlying system of values appears to be the active force transforming the elements. We note that the formation of global value parameters is based on, and is bound by, the individual aspirations. The economist will readily recognize that we have in mind here the formation of prices as it is directed by the information field. The economic model allows us to generalize, however, that the values (prices) are not just an attribute of things but are independent parameters that form the field of gravity as part of the general information field. In this sense, physical elements (like commodities) acquire the role of values.

One would expect that concepts of the primal and the dual in the Von Neumann model could have other applications as they appear relevant in the study of value in formal deductive constructions (theories) pertaining to physics, biology, and social systems. This view assumes that there is a potential for various types of dynamic evolution in the world where elements can be organized into formations

which, in their turn, aid in the organization of existing elements and formations into new formations, and so on.

Thus, in biology, the genes might be regarded as such organizing formations. A similar conceptualization is promising also in the realm of physics where scientists view the reproduction of particles into formations within the gravity field of the system; the gravity force is but a part of the overall information field that can also include elements and formations related to the initial field. Accordingly, one can view the initial and dual models in economics as the initial field of elements and information, where the sphere of gravity directs the initial activity.

The relevance of the Von Neumann economic model has been demonstrated in physics in the case of the theory of nuclear reactors. H. Soodak has used economic concepts to analyze the process of multiplying particles which occurs in nuclear reactors.⁶ He departs from the usual conception of the particle and its posterity according to the principle of conservation of value. Instead, he defines the present value (importance) of the particle as equal to its future value as determined by its prior investment; here, the investment is being registered by the spark detector instrument which measures the quantity of particles. Over time, the gain in the value of the particle diminishes according to the rate of multiplication of particles. Here we see the laws of changing values of particles to be analogous to the laws in the Von Neumann economic model. In the physical model of reactors, the statistical weights reflect the diversity of the energies of particles and are normalized so that their sum equals one. Interestingly enough, the relative values of the particles are equivalent to the values of the products in the Von Neumann model.

In this essay, we are merely suggesting several lines of inquiry. Further research could well compare the influence of weights of the particles and their coordinates on the development of a physical system, with the corresponding role of prices and quantities of products in the process of dynamic equilibration in the economic system. Quite likely, the relevant mathematical economic model would yield to a physicist significant insights into the dynamic process in the realm of nuclear physics.

⁶ M. Soodak, "Reactor Statics: Theory and General Results," in U.S. Atomic Energy Commission, *The Reactor Handbook*, vol. 1, (Washington, D. C.: U.S. Printing Office, 1955). These ideas are developed further in Jeffery Lewins, *The Importance; The Adjoint Function* (New York: Pergamon Press, 1965).

AN ECONOMIST'S VIEW OF BIOLOGICAL PROCESSES

The theory of economic value has interesting implications in the realm of biology. It seems that values which had been accumulated during the development of inorganic nature find a reflection in living organisms. Thus, in cellular physics, the discovered electrical and magnetic fields can be interpreted in terms of the field of gravity within the general information field; in that system, the physical forces play the role of values.⁷

Furthermore, it seems plausible that the values accumulated during evolution are reflected in the emotional mechanism of animals. The presence of these values allows the animal, under given specific circumstances, to make independent local decisions in the directions of equilibrium of the system as a whole.⁸ The dynamic adjustment process is possible in the case of relatively minor changes in the environment in a manner analogous to the adjustments to minor changes in the equilibrium of prices discussed previously.

Turning next to the realm of human emotions, one can postulate that a man, creating an artificial material world as well as socioeconomic institutions, tries to build for himself a manageable system of values. Imbedded in the man's subconsciousness, the human emotional mechanism reflects the values accumulated in the process of evolution. However, the conflicts between the subconscious system of values and the system instituted by the social process result in repressed emotions. In diverse human activities, some conflicts are internal to the person, while others are external and involve interaction between people. The conflict between the subconscious and the conscious systems of value is being researched by the psychologists, psychiatrists, and sociologists.

With regard to the attitude of one person to another, of special interest is the question of how man-made tools relate to emotions. Consider the extreme act of homicide. The ethologists have established that animals do not kill their own kind because their inherited emotional mechanism prevents such self-extinction.⁹ Since a simi-

⁷ See my "The Potential of a System," in *Systems Thinking and the Quality of Life*, Proceedings of the Annual North American Meeting of the Society for General Systems Research, 1975.

⁸ The role of emotions as forces which organize the thought, training behavior, and personality structure is explored in W. Gray, "Emotional Cognitive Structure Theory in the Self-Organization of Insight and Hearing," 1975 (manuscript).

⁹ Konrad Lorenz, *On Aggression* (New York: Harcourt, Brace and World, 1966).

lar self-preserving mechanism guides the *homo sapiens*, homicide seldom occurs without the aid of some tool. Standing face to face with an enemy, man's physical strength seems paralyzed, and he seldom has the nerve to kill with his bare hands. However, man-invented tools help to overcome emotional barriers. The tool replaces physical strength, and the killer can avoid exposure to the victim's suffering. It may be postulated, leaving statistical confirmation to psychometricians, that the incidence of homicides is proportional to the distance between a potential killer and his victim in a situation of conflicts. Today, there is a real though ghastly prospect that millions of humans might be annihilated with long-range missiles released by someone pressing a red button.

Clearly, the relation between man-invented tools and conflicts in human emotional mechanisms has far-reaching implications with respect to the evolution of values.

One can postulate in the context of teleological terminology that, in the process of evolution where there is striving for a maximum expansion rate, new subsystems might spring into existence to expedite their rate of growth. This view requires that the previously examined Von Neumann model should be modified to allow the addition of endogenous technological process, i.e., the production of new technological methods. The immediate goal of such species appears to be the maximization of the difference between the number of the *new* species and the cost of such mutation. The objectives of the species need not contradict the motive of self-preservation and the consequent struggle for survival of individuals. Moreover, the creation of a new species does not necessarily mean the abolishment of the old one. Interestingly enough, during the process as conceived here, ecological equilibrium is being preserved in the system.

Human evolution seems distinctive in that it relies not so much on the change of the intrinsic human nature as of attributes that are not being automatically transmitted through heredity. People have invented the means of transforming their natural surrounding, and the accumulated knowledge must be passed from generation to generation to preserve the species. Unfortunately, humanity today faces the problem of controlling knowledge which, potentially, could not only advance but also devastate mankind. Immediate threats include the possibility of irreversible pollution, the outbreak of a disastrous world war, the pursuit of uncontrollable biological or nuclear experiments, and so on. To be sure, mankind has always aspired to understand and prevent disasters inherent in the drive for change and progress.

CONCLUDING REMARKS

Economics does not merely borrow analytical tools from other sciences, as is widely held by historians of economic thought. A reciprocal relationship exists; in that economic theories exert an influence on other sciences or at least have the potential to do so. This is especially true with regard to such broadly conceived phenomena as value, equilibrium, and maximization of growth.

Economic phenomena intersect in certain dimensions with physical, biological, social, and moral phenomena. It is therefore hardly surprising that an analytical breakthrough like the Von Neumann model in economics offers fruitful applications in other sciences. Tuhan-Baranovs'kyi's insight about the applicability of economic theories of values in other fields has considerable appeal in view of the great accomplishments of economics as a science since his time. But more research is needed in that direction.

Some Reflections on the Relationship between Philosophy and Economics

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Tuhan-Baranovs'kyi's article has been available for over fifty years, but few if any economists and philosophers know about its bold and original ideas because it has been unavailable in English.¹ Essentially, he argues that the economic needs of society have been usually responsible for developments in mathematics, science, and philosophy. He claims that there is an essential unity between theory and practice and that few theories have arisen in isolation from the economic needs of mankind. In this paper we will discuss another aspect of this thesis, namely that economic concepts and theories have influenced philosophy and the natural and social sciences. We will discuss the logic of reasoning by analogy from economics to science and vice versa, and then develop a counter-thesis to Tuhan-Baranovs'kyi's claim that economics has influenced the philosophical conception of values. Next we will evaluate Tuhan-Baranovs'kyi's evolutionary justification of the famous Weber-Fechner law. Finally, we will explore the fruitful suggestion that the "economic principle" is the principle of all rational behavior.

THE ROLE OF ANALOGIES IN THE INFLUENCE OF ONE SCIENCE ON ANOTHER

Tuhan-Baranovs'kyi argues the thesis that economic ideas have influenced central ideas in the natural sciences. While scientists then and now would tend to reject this view, Tuhan-Baranovs'kyi presents a most convincing argument for this novel claim. He states that ". . . the system of the sciences presents not a staircase model but a living organism in which each separate part, each organ, serves other parts and organs at the same time that it uses them. So the parts are simul-

¹ The author thanks the following for helpful suggestions with earlier drafts of this paper: Ranan Banerji, Arleen Dallery, Donald Keller, Albert Kipa, Wolodar Lysko, and Mark Pfeiffer. All references to Tuhan-Baranovs'kyi's article are to its English version in this issue of *The Annals*.

taneously both means and goal.”² This organismic model brings out clearly the interdependence between mathematics, the natural sciences, the social sciences, and philosophy. Tuhan-Baranovs’kyi does not discuss precisely the kinds of channels of mutual influences which he has in mind, but one can infer some of them from the kinds of examples offered. He employs analogical arguments to bring out fruitful similarities, as, for example, between conscious employment of the law of marginal utilities in economics and Fechner’s law, which describes the unconscious process of evaluation of external stimuli in sense perception.³

Tuhan-Baranovs’kyi’s example of “complete analogy” concerns the case of a man who would consciously put a much smaller value on the addition of one more ruble if he had 100 rubles in his possession than if he had 10 rubles. Similarly, if 100 candles are burning, the light of one additional candle is felt much less on our consciousness than in the case of 10 burning candles.⁴

Such analogical reasoning from one science to another has been called by scientists and philosophers a formal analogy. A similarity of structure of the laws employed is crucial to formal analogies. Duhem, the famous 19th-century physicist, philosopher, and historian of science, describes such analogies in the following manner:

. . . it may happen that the equations in which one of the theories is formulated are algebraically identical to the equations expressing the other. Then, although these two theories are essentially heterogeneous by the nature of the laws which they coordinate, algebra establishes an exact correspondence between them. Every proposition of one of the theories has its homologue in the other; every problem solved in the first poses and resolves a similar problem in the second. Each of these two theories can serve to illustrate the other according to the words used by the English [physicist]:

² *Ibid.*, p. 191. Actually, the impact on the social sciences is much more significant and frequent.

³ The analogy and similarity between Fechner’s psychophysical law and marginal utility was already seen by F. Y. Edgeworth in 1881 in his *Mathematical Psychics: an Essay on the Application of Mathematics to the Moral Sciences* (London: C. Kegan and Paul & Co., 1881). Actually F. A. Lange, *Die Arbeiterfrage in ihrer Bedeutung für Gegenwart und Zukunft* (Duisberg, 1865) saw the analogy even earlier. For further exposition of Edgeworth’s work on the similarity see R. S. Howey, *The Rise of the Marginal Utility School 1870–1889* (Lawrence: University of Kansas Press, 1960), pp. 101–02. Tuhan-Baranovs’kyi’s contribution lies in proposing an explanation of both laws in terms of their survival value in Darwinian evolution.

⁴ Tuhan Baranovs’kyi, *op. cit.*, p. 203.

By "physical analogy," Maxwell said, "I mean that partial resemblance between the laws of a science and the laws of another science which makes one of the two sciences serve to illustrate the other."⁵

Further, Duhem states:

. . . this sort of algebraic correspondence between two theories . . . not only does . . . bring a notable intellectual economy . . . but it also constitutes a method of discovery.

We want, however, to cite another contemporary example of formal analogy between physics, demography, and economics to further illustrate the type of influence identified by Tuhan-Baranov'skyi. Kenneth Arrow develops a plausible argument for applying the formal properties of the law of gravitation to the interaction between cities. Arrow states:

Another empirical regularity found is that the interaction between two cities is inversely proportional to the distance between them. This applies particularly to the flow of traffic or information between them. The study of this relation has been begun earlier by John Q. Stewart of Princeton University, an astronomer. Stewart has stressed the *formal analogies* of this relation *to the law of gravitation*. Let P_i be the population of a place i , and D_i be the distance of place i from a given place A ; then the demographic potential at A is defined to be $\sum (P_i/D_i)$ the sum being taken over all populated places i . Under the above law, the demographic potential should represent the total amount of transactions per unit population at A and therefore should correlate with other economic magnitudes. Some evidence has been found to support this assertion but it can hardly be described as proved.⁶

The other major type of analogical reasoning between the sciences has been called material analogy. This kind of analogical reasoning employs two models: the parent model, where the properties are observable as, for example, collisions of billiard balls in motion, and another model where some properties are unobservable. Niels Bohr

⁵ Pierre Duhem, *The Aim and Structure of Physical Theory*, translated by P. P. Wiener (New York: Atheneum, 1962), pp. 96–97. Tuhan-Baranov'skyi also stresses a point made by Duhem that such methods bring about intellectual economy, a preference derived from economics.

⁶ Kenneth Arrow, "Mathematical Models in the Social Sciences," in D. Lerner and H. D. Lasswell (eds.), *Policy Sciences* (Stanford: Stanford University Press, 1965), p. 150.

used the model of the solar system and constructed a model of the atom where the nucleus was like the sun and the electrons were like the planets in certain respects. These known respects were called by M. Hesse,⁷ following the economist, J. M. Keynes,⁸ positive analogies. The ways in which the two models differ—for example, one is large and the other infinitesimally small—are called negative analogies or disanalogies. The most interesting class of analogies from the point of view of future scientific research is the neutral analogies; these are properties which are not yet known to be applicable. These neutral analogies between the two models supply the scientist with a useful insight that would normally be explored in scientific research. This exploration proceeds by the formulation of hypotheses on the basis of neutral analogies and their subsequent testing. Such reasoning is most useful when scientists go from an observable area to one where the crucial structure is unseen, as in the nucleus of the atom. The spin of a planet on its axis constituted, for example, a neutral analogy between the two models. If spin has been entertained as a possible property of electrons, the Zeeman effect could have been explained fifteen years earlier than it was.⁹

The logic of analogical reasoning is still at the embryonic stage of development. Much work remains to be done, but it holds the best promise of attaining some day, as Duhem said, something approaching a logic of scientific discovery.

MEASUREMENT, VALUES, AND DECISION THEORY

Tuhan-Baranovs'kyi believes economics has influenced philosophy in the realm of value theory since, presumably, economists have developed a scientific approach to axiology with the quantification of values. Compared to economic values, such values as beauty, intelli-

⁷ Mary Hesse, *Models and Analogies in Science* (Notre Dame: University of Notre Dame Press, 1966), pp. 9–10.

⁸ J. M. Keynes, *A Treatise on Probability* (London: Macmillan, 1921).

⁹ For a further discussion of the Bohr model see Ernan McMullin, "What Do Physical Models Tell Us," in M. B. Von Rootselaar and V. F. Staal (eds.), *Logic, Methodology and Philosophy of Science* (Amsterdam: North Holland Pub. Co., 1968), pp. 392–95. For a useful summary of research on analogies in science and a more complete bibliography see W. H. Leatherdale, *The Role of Analogy, Model and Metaphor in Science* (New York: American Elsevier, 1974).

gence, and talent do have different degrees of value, but these cannot be expressed in numbers and thus cannot be measured.¹⁰

The issues surrounding the measurement of values are extremely complex, involving almost two centuries of intensive research, not only in economics but also in psychology, philosophy, and decision theory. We will restrict the discussion to the following topics: (a) how the ethical theory of utilitarianism influenced economics in the 19th century; (b) developments in the logic of measurement since Tuhan-Baranovs'kyi wrote his article; and (c) the measurement of values in economics since 1918.

BENTHAM'S HEDONIC CALCULUS AND THE PRINCIPLE OF UTILITY. The thesis of Tuhan-Baranovs'kyi¹¹ that economics has influenced the philosophical conception of value was not as well supported prior to 1918 as was the counter thesis, that philosophy influenced economics. Economic historians¹² are in agreement that before the 20th century the philosophical ideas of the utilitarians on values, measurement of pleasures, and utility had a significant impact on the development of the theory of marginal utility, particularly in England. There is ample evidence to show that Jevons, and later Edgeworth, were thoroughly versed in philosophy, especially the philosophy of Jeremy Bentham, J. S. Mill, and H. Sedgwick. Without doubt the greatest impact of Jevons' use of utility came from Bentham's writings. The stamp of Bentham's formulations can be found even on Jevons' very first version of the principle of marginal utility in 1863. There Jevons states that "a true theory of economy can only be attained by going back to the springs of human action—the feelings of pleasure and pain."¹³ The economic historian, R. S. Howey, in com-

¹⁰ Tuhan-Baranovs'kyi, *op. cit.*, p. 207. His fame in the West rests primarily on his work with business cycles. For a discussion of Tuhan-Baranovs'kyi's synthesis of marginal utility with the labor theory of value, see V. P. Timoshenko, "M. I. Tuhan-Baranovs'kyi and Western European Economic Thought," *The Annals of the Ukrainian Academy of Arts and Sciences in the U.S.*, 1954, no. 3.

¹¹ He says: "It follows that the category of value first understood and elaborated by the economic sciences acquires the primary significance in general philosophy." *Op. cit.*, p. 199.

¹² Howey, *op. cit.*, pp. 10–11; see also Emil Kauder, *A History of Marginal Utility Theory* (Princeton: Princeton University Press, 1965), p. 37. He particularly stresses the influence of Bentham on Jevons.

¹³ W. S. Jevons, "Notice of a General Mathematical Theory of Political Economy," *Report of the Thirty-Second Meeting of the British Association for the Advancement of Science; held at Cambridge in October 1862. Notices and Abstracts of Miscellaneous Communications to the Sections* (London: John Murray, 1863), p. 158.

menting on this passage states: "What could ring more clearly of Bentham than a reference to 'the springs of human action'?"¹⁴ In the first editions of his classical book of 1871, *The Theory of Political Economy*, Jevons states "we must undoubtedly accept what Bentham has laid down upon the subject."¹⁵ In the preface to the second edition of *The Theory* of 1879, Jevons says that Bentham's ideas "are adopted as the starting points of the theory given in this work."¹⁶ This is not to say that Bentham had a full-blown economic theory of marginal utility¹⁷ but, nevertheless, the application of mathematics to morality, politics, and economics and other key ideas are traceable to the corpus of Bentham's works. We shall now sketch some of these ideas to illuminate the mutual influence between philosophy and economics.

Jeremy Bentham rejected the contract theory of the legitimacy of the state and developed new principles for reforming the major in-

¹⁴ Howey, op. cit., p. 10.

¹⁵ Ibid., for reference to Bentham, see note 35, p. 227.

¹⁶ Ibid., p. 227.

¹⁷ I have found in Bentham's writings at least three formulations of the principle of marginal utility. In manuscripts published only in 1952, Bentham says that if one guinea gives a man one degree of pleasure, one million guineas does not provide one million degrees of pleasure but some smaller fraction of that sum. Bentham concludes that "the ratio of pleasure to pleasure is in this way less than a ratio of money to money." There is no limit beyond which the quantity of money can go. But there are limits, and those comparatively narrow, beyond which pleasure can not go. See David Baumgardt, *Bentham and the Ethics of Today: With Bentham's Manuscripts Hitherto Unpublished* (Princeton: Princeton University Press, 1952), p. 559.

A more explicit formulation by Bentham of the principle of marginal utility can be found in his resolution of the diamond-and-water paradox. In criticizing Adam Smith's treatment of utility Bentham states: "Water is the example he has chosen of that sort of article which has great value with a view to use but not with a view to exchange. In order to realize how erroneous the latter assertion is, he would only have to consult in London the New River Board, and to remember that at Paris he had seen it sold retail by those who carry it into the houses.

He gives diamonds as an example of that sort of article which has great value with a view to exchange and none with a view to use. This example is as ill chosen as the other. . . . The value of diamonds is . . . a value in use. . . .

The reason why water is found not to have any value with a view to exchange is that it is equally devoid of value with a view to use. If the whole quantity required is available, the surplus has no kind of value. It would be the same in the case of wine, grain, and everything else. Water, furnished as it is by nature without any human exertion, is more likely to be found in that abundance which renders it superior to that of wine." See W. Stark (ed.), *Jeremy Bentham's Economic Writings*, vol III (London: Allen Unwin, 1954), pp. 87-88, quoted by T. W. Hutchinson, "Bentham as an Economist," *The Economic Journal*, June 1956, p. 291. For an even more explicit formulation of the law of diminishing return see the following passage: ". . . the quantity of happiness produced by a particle of wealth (each particle being of the same magnitude) will be less and less at every particle; the second will produce less than the first, the third less than the second and so on." See John Bowring (ed.), *The Works of Jeremy Bentham* (Edinburgh, 1843), p. 229.

stitutions of society of his time. One formulation of his principle of utility, namely, "the principle of the greatest happiness of the greatest number" was to be used by the legislator to evaluate existing political and legal institutions. Bentham's program of action was to construct a scale for the measurement of subjective states of pleasure and pain during the act of consumption, and then use this information as a guide for decision making by the individual and by the social legislator. This program was crucial to Bentham's utilitarianism for the following reasons: (1) he believed that the springs of human action are feelings of pleasure and pain and, furthermore, he defined good in terms of pleasure; and (2) happiness was defined as the accumulation of an overabundance of pleasure feelings as opposed to feelings of pain in one's lifetime. What Bentham needed was some dependable way of making those decisions which maximize pleasurable experiences and minimize painful ones. A rational reconstruction of Bentham's intended decision method might be formulated in the following practical syllogism:¹⁸

1. All actions which lead to your greatest happiness in the long run are better than those which do not.

2. This action—because it has yielded the highest measure of pleasure—has the tendency to lead to your greatest happiness more than the others.

3. Therefore it is best that this action be chosen over the others.

The major premise is a version of Bentham's principle of utility. The second premise is arrived at by the application of the hedonic calculus. The conclusion which follows deductively from the two premises directs the person to do this act rather than the others.

Bentham provides the following dimensions of value in his hedonic calculus:¹⁹ intensity, duration,²⁰ certainty or uncertainty,²¹ propin-

¹⁸ For a more thorough critical discussion of Bentham's hedonic calculus, see Eugene Lashchuk "The Hedonic Calculus as a Decision Method: Some Contemporary Reevaluations and Interpretations" (Unpublished M. A. thesis, City College of CUNY, 1964).

¹⁹ *The Utilitarians: Jeremy Bentham, Introduction to the Principles of Morals and Legislation* (Garden City: Dolphin Books, 1961), see particularly Chapter IV.

²⁰ For a contemporary discussion of duration or the role of the time factor in economics see Nicholas Georgescu-Roegen, "Utility" in David L. Stills (ed.), *Encyclopedia of the Social Sciences* (New York: The Macmillan Co., 1968). Georgescu-Roegen states: "... there is little doubt that by far the greatest amount of work still to be done in utility theory concerns the time factor." (p. 250).

²¹ Bentham proposes to compute the degree of certainty by taking the ratio of chances for its happening over the chances for its not happening. This departs radically from our concept of probability which is normally computed by taking chances of its happening, divided by the total number of chances.

guity or remoteness, fecundity, purity, and extent. Only the first two are in the strict sense parameters of pleasure (value). Bentham had a very optimistic attitude in 1780 when he first proposed the calculus in his *Introduction to the Principles of Morals and Legislation*.²² He simply gave the following directions:

Sum up all the values of all the pleasures on the one side and those of all the pains on the other. The balance, if it be on the side of pleasure, will give the good tendency of the act upon the whole, with respect to the interests of the individual person; if on the side of pain, the bad tendency of it upon the whole.²³

At that stage of Bentham's thought no indication is given as to the unit of measurement to be used; no numbers were assigned; no search for minimum or maximum of the dimensions were given. It is no wonder that the immediate reaction to Bentham's calculus was one of severe criticism and ridicule. But Bentham, being a practical man, continually struggled with this problem and came up with a series of interesting suggestions which he stated in his unpublished manuscripts of 1782.²⁴ We will comment briefly only on intensity,²⁵ which is the most important parameter.

Intensity, according to Bentham, has its natural zero point at the state of indifference or insensibility. Insensibility is to be defined as that degree of intensity possessed by that pleasure which is the faintest of any that can be distinguished. At the higher intensities, Bentham simply states that they are to be represented by higher numbers. This suggestion of using as a unit of pleasure the "faintest that can be distinguished" reminds us of Fechner's unit for the measurement of sensations, "the just noticeable difference" developed about half a century later. The most difficult problem connected with using "just noticeable difference" as a unit for the measurement of pleasures is whether such a unit can be meaningfully explained for the pleasure domain.²⁶ The concept of pleasure is not a clear one. Different writers mean quite different things when they use the word "pleasure."²⁷

²² Originally published in 1780.

²³ *Ibid.*, p. 39.

²⁴ Baumgardt, *op. cit.*, Appendix 4.

²⁵ For intensity, see *ibid.*, p. 565.

²⁶ See Robert Heath (ed.), *The Role of Pleasure in Behavior* (New York: Harper and Row, 1964).

²⁷ John Laird, *The Idea of Value* (Cambridge: Cambridge University Press, 1929), pp. 348, 359.

Passages are found in Bentham's and Jevons' writings where pleasure and preference are used interchangeably. This is a helpful suggestion, for if preference could be substituted for pleasure, then there might be a way of modifying the hedonic calculus so that it could be used more easily as a decision method. This direction has been taken by contemporary discussions of decision theory and measurement of values by economists, philosophers, and psychologists.²⁸

Around 1782 Bentham took the indirect approach and suggested using money as a measure of intensity. To determine the relative value of two objects, 'a' and 'b', Bentham suggests that one ask a person how much money he would be willing to spend for 'a' as compared with 'b'. The ratio between the two sums of money is an indication of the relative values of the two objects of pleasure.²⁹ What complicates the simplicity of this approach, however, is that the quantity of money that a person might be willing to relinquish depends, among other things, not only on the strength of the person's preference for object 'a' over 'b' but also on the probabilities of getting 'a' rather than 'b'. Even though we have to modify Bentham's psychology by admitting that there are many more springs of human action than desire for pleasure, and redefine his notion of good to include much more than just the seeking of pleasure and avoiding of pain, his attempts, however, at constructing models of personal and social decision making were ahead of his time.³⁰

It can be stated that, contrary to Tuhan-Baranov'skyi's claim, the influence of the utilitarian philosophers on economic conceptions of value was greater than the influence of economists on philosophy

²⁸ Kauder describes this radical change from utility to preference after 1943 in the following terms: "Before 1943 the object of measuring was utility, which was defined as a bundle of pleasure feelings" and after von Neuman and Mcrgenstern". . . utility is nothing but an indicator of preferences." See Kauder, *op. cit.*, pp. 200-01. For a more contemporary treatment of decision theory using utilities in combination with subjective probabilities, see Richard Jeffre, *The Logic of Decision* (New York: McGraw Hill, 1965).

²⁹ Concerning money Bentham states (Baumgardt, *op. cit.*, p. 558): "Money, therefore is the only current possession, the only current instrument of pleasure. When a legislator then has occasion to apply pleasure, the only easy (method) he has of doing it ordinarily speaking is by giving money. Now then money being the current instrument of pleasure, it is plain by uncontroverted experience that the quantity of actual pleasure follows in every instance in some proportion or other to the quantity of money. As to the law of that proportion nothing can be more indeterminate."

³⁰ For plausible arguments against psychological hedonism which asserts that pleasure and pain are the ultimate principles of human action; and against ethical hedonism, which asserts that pleasure alone is good and pain is evil, see Bhikhu Parekh, "Bentham's Justification of the Principle of Utility," in Bhikhu Parekh (ed.), *Jeremy Bentham Ten Critical Essays*, (London: Frank Cass, 1974).

prior to 1918. It is only with the appearance of J. von Neuman and O. Morgenstern's *Theory of Games and Economic Behavior*, that economics has left a significant imprint on philosophical discussions of the measurement of values and decision theory.

Measurement. Since Tuhan-Baranovs'kyi's 1918 article "On the Influence" the whole concept of measurement has undergone a series of major revisions. What follows is a brief summary of the major positions on the logic of measurement and some of the difficulties associated with them.

One of the finest, most important and influential discussions of measurement was contained in N. R. Campbell's *Physics: The Elements*, published in 1921. Carl Hempel, following Campbell, made the distinction between fundamental and derived measurement.³¹ Fundamental measurement is obtained by constructing a quasi-serial order and then giving it a metrical interpretation. The measurement of mass, length, electrical resistance have the same logical structure, and all are examples of fundamental measurement. Derived measurement is the determination of a metrical scale by means of criteria which presuppose or are dependent upon some sort of prior measurement. Examples of derived measurement are the measurement of temperature by means of a thermocouple, of altitude by barometer, and of specific gravity by hydrometer.

The distinction between fundamental and derived measurement has recently been criticized by Muriel W. Gerlach who writes:

. . . just as defined notions are theoretically eliminable in favor of the primitive notions by which they are defined, so too the prior measurement supposedly assumed in "derived" measurement is eliminable in favor of the non-quantitative concepts from which it was originally constructed.³²

³¹ For a most comprehensive early work on the nature and logic of measurement, see N. R. Campbell, *Physics: The Elements* (Cambridge: Macmillan, 1921), reprinted as *Foundations of Science* (New York: Dover, 1957), particularly Part II. See also Carl Gustav Hempel, "Fundamentals of Concept Formation in Empirical Sciences," in *International Encyclopedia of Unified Science: Foundations of the Unity of Science*, vol. II (Chicago: The University of Chicago Press, 1952).

³² Muriel W. W. Gerlach, *Interval Measurement of Subjective Magnitudes with Subliminal Differences*, Technical Report No. 7 (Stanford: Stanford University, 1957), p. 4. For further criticism of fundamental and derived measurement, see also S. S. Stevens "On the Theory of Scales and Measurement," reprinted in A. Danto and Sidney Morgenbesser (eds.), *Philosophy of Science* (New York: Meridian Books, 1961), p. 147. Stevens has pointed out that both fundamental measurement and derived measurement usually result in ratio scales which are invariant under multiplication by a constant.

Morris R. Cohen and Ernest Nagel, in their book on logic in 1934, divided measurement into "intensive" and "extensive."³³ Intensive measurement is an arrangement of different degrees of a quality in a series, such as the measurement of degrees of hardness, temperature, density, and intelligence. The chief characteristic of intensive measurement is non-additiveness. It makes no sense to say, for example, that an I.Q. of 50 plus an I.Q. of 60 will yield an I.Q. of 110. Extensive measurement, on the other hand, is measurement of additive properties, that is, by combining two quantities of the same property, we obtain an entity with a meaningful increase of that property. Time, length, areas, angles and electrical current, all represent examples of extensive measurement.

This approach to measurement has since been criticized as not going to the heart of the nature and kinds of measurement. A fresh and useful perspective on measurement has been provided by S. S. Stevens. He states:

Measurement is a relative matter. It varies in kind and degree, in type and precision. In its broadest sense measurement is the assignment of numerals to objects or events according to rules, and the fact that numerals can be assigned under different rules leads to different kinds of scales and different kinds of measurement.³⁴

For Stevens the crucial characteristic of measurement is the specification of the rule according to which numbers are assigned to things.³⁵ A meaningful application of numbers for the purpose of measurement is obtained when the structure of a set of objects or events under some specific operation and relationship is isomorphic to the structure of a set of numbers under specific operation and relationship.

³³ Morris R. Cohen and Ernest Nagel, *An Introduction to Logic and Scientific Method* (New York: Harcourt, Brace and Co., 1934), pp. 296–98.

³⁴ S. S. Stevens, "Mathematics, Measurement and Psychophysics," in S. S. Stevens (ed.), *Handbook of Experimental Psychology* (New York: John Wiley and Sons, Inc., 1951), p. 1.

³⁵ For some corrections of Stevens' otherwise useful account that measurement is simply to make "an assignment of numerals to things according to a rule—any rule" (S. S. Stevens "Measurement, Psychophysics and Utility" in C. W. Churchman and P. Ratoosh (eds.), *Measurement: Definitions and Theories* (New York: Wiley, 1959), see Brian Ellis, "Measurement" in Paul Edwards (ed.), *The Encyclopedia of Philosophy*, vol. V (New York: Macmillan, 1967), p. 243. The rule "Think of a number and write it down," even though a rule for making numerical assignments, does not yet constitute measurement. *Ibid.*, p. 243.

To determine the different kinds of scales, says Stevens, we need only answer the question: "Under what transformations is the relationship between numbers used in measuring invariant?" In psychometrics, Stevens found it useful to distinguish the following scales: (1) nominal scale, (2) ratio scale, (3) interval scale, and (4) ordinal scale.

1. The nominal scale is formed according to the rule "Do not assign the same numeral to different classes, or different numerals to the same class." In this scale, numerals are used only as identifying marks, as in the case of the numbering of football players for purposes of identification.

2. A "ratio" scale is set up by assigning a numerical value to some standard object such as the International Prototype Kilogram; from that time on, the mass of every other object is uniquely determined. The only arbitrary thing is the number assigned to the standard object. The ratio that exists between any two objects is invariant. Absolute zero is implied in this type of scale. Other examples of this type of measurement are length, density, and electrical resistance.

3. An "interval" scale is a scale where the interval between assigned numerical values is significant, but the unit and the zero point are arbitrary.³⁶ If we take temperature and time as illustrations of this definition, we will see that the numerical intervals set up by these scales are invariant.

4. "Ordinal" scales simply determine greater or smaller magnitudes. Assigning of numerical values is arbitrary except for the order, which has to be preserved. Ordinal scales are, therefore, said to be order-preserving. The following are examples of ordinal scales: Moh's hardness scale for minerals, the Beaufort wind scale, and aptitude tests.

Tuhan-Baranovs'kyi's claim that non-economic values could not be measured did indeed reflect a prevailing view of economists and philosophers. From the statements in his article one can infer that he believed utility was cardinally measurable and interpersonally comparable. This claim has since been challenged and, in actuality, it

³⁶ Stevens, "On the Theory," p. 146, makes the following important observation concerning interval measurements in psychology (we think that the comment can be extended to economics): "Most psychological measurement aspires to create interval scales, and it sometimes succeeds. The problem usually is to devise operations for equalizing the units of the scales. . . . Only occasionally is there concern for the location of a "true" zero point because the human attributes measured by psychologists usually exist in a positive degree that is large compared with the range of its variation."

has been shown that ordinal measurement of utility is sufficient for the economists to construct a meaningful demand curve.

It is easy to see how earlier classifications of measurement, including the classification between cardinal and ordinal measurement in economics, acted as a straightjacket for the whole field of measurement of values and decision theory. It is for this reason that Stevens' classification removed the shackles and brought about a whole series of novel scales for the measurement of subjective states.

Above all, one must remember that measurement does not guarantee that the scientific discipline has reached the level of explanation and control that is desirable in a good scientific theory. We can measure temperature and humidity, but this does not mean that we have models or theories in meteorology and climatology on the basis of which we can make accurate predictions. Granted that it is easier to measure economic values than moral or esthetic or other values, this in itself is no panacea in science. For too long measurement has been synonymous with the highest achievement of a science. It seems to us that what is even more important than measurement is the selection of the fruitful parameters. But this selection depends on possessing an adequate theory or hypothesis which points the way for further research. Measuring unproductive parameters can be a waste of energy.³⁷

DEVELOPMENTS IN ECONOMICS SINCE THE 1918 PAPER. Tuhan-Baranovs'kyi assumes that marginal utility is an economic law which is universally applicable. In actuality, not only are there important exceptions to the so-called law, but wholly different systems of economics have been developed, for example—on the basis of needs, which bypass the whole area of the measurement of marginal utility.

J. R. Hicks, among others, rediscovered the ideas of V. Pareto, which denied the existence of any ratio measure of utility and substituted the order of preference which was expressed as indifference curves or surfaces in mathematical and diagrammatic exposition.³⁸ These

³⁷ For a useful discussion of the problem of error in all measurement and of the implications of this result to the objectivity of our knowledge, see V. M. Svyrydenko, "Protседura, vymiriuvannia ta problemy tochnosti znannia," *Filosof'ska dumka*, 1973, no. 1.

³⁸ For a useful discussion of how marginal substitution was considered a replacement or refinement of the law of diminishing utility put forth by Edgeworth as early as 1881, see Kauder, op. cit., pp. 143-44.

formed the basis for the proposed measurement of values in terms of prices. In their classic mentioned above, Von Neumann and Morgenstern showed that the prices of risky claims could be used to obtain a numerical measure of utility.³⁹

The similarities between the hedonic calculus and the measurement of utilities in economics are obvious: both presuppose a preference ranking, and both combine this ordered set with the set of probabilities attached to the outcomes. Von Neumann and Morgenstern have shown that a utility function could be constructed when numerical values are assigned both to the preferences and the probabilities. Such an assignment of numbers to outcomes is invariant up to a linear transformation that is unique except for origin and the unit of measure of preference.

Still another approach to the measurement of values which bypasses some of the difficult problems of utility theory utilizes wants or needs as the basis of value. This approach was recently developed by, among others, N. Georgescu-Roegen.⁴⁰ Three broad classes of needs or wants can be distinguished. The first class, which is common to all humans, contains those wants that pertain to the immediate requirements of maintaining life—water, food, rest, and shelter. The next class of wants is culture-relative and consists of the accepted conveniences peculiar to the particular culture. Finally, after the two lower classes of wants are satisfied, the need for luxuries surfaces. These are also culture dependent, but there are great deviations from individual to individual. An important aspect of this approach to values is the principle of the irreducibility of wants. Georgescu-Roegen argues

³⁹ Von Neuman's precursor was Daniel Bernoulli. In an article that might as well have been written in the 20th century, Bernoulli states: "To do this the determination of the values of an item must not be based on its price, but rather on the utility it yields. The price of the item is dependent only on the thing itself and is equal for everyone; the utility, however, is dependent on the particular circumstances of the person making the estimate. Thus there is no doubt that a gain of one thousand ducats is more significant to a pauper than to a rich man though both gain the same amount." See Daniel Bernoulli, "Exposition of a New Theory on the Measurement of Risk," translated by L. Sommer, *Econometrica*, January, 1954, p. 24, originally published in Latin in 1738 in St. Petersburg. Since Tuhau-Baranov'skyi taught at St. Petersburg University, it is reasonable to assume that he was acquainted with Bernoulli's paper. It would be interesting to know, however, whether in fact he read the paper. Since there are situations where the element of risk approaches zero, one can proceed to devise measurement of preference and get a decision procedure without probabilities. See Donald Davidson et al., "Outline of a Formal Theory of Value," *Philosophy of Science*, April, 1955, p. 158; also Amnon Goldworth, *The Utilitarianism of Jeremy Bentham as a Social Decision Method*, (Unpublished Ph.D. dissertation, Stanford University, 1959).

⁴⁰ Georgescu-Roegen, op. cit., pp. 262-65.

further that the principle of irreducibility, and not the postulate of indifference, should be part of a realistic theory of choice. This is not the place to adequately compare and evaluate the two contemporary theories of choice in economics. Let me conclude by pointing out that this seemingly new approach goes as far back as Book II of Plato's *Republic*.

There are indications in Tuhan-Baranovs'kyi's articles that he would have sympathetically embraced this new trend in economics. He said that "... economic activity is nothing else than the adjustment of the external material environment to man's needs . . . Therefore the satisfaction of all life's needs is related to some extent to economic activity."

A DARWINIAN EXPLANATION OF THE WEBER-FECHNER LAW

One of the most interesting sections of Tuhan-Baranovs'kyi's paper is a detailed exposition of the Weber-Fechner law and an attempted explanation of this law that establishes a functional relationship between sensations and stimuli. Weber conducted experiments which showed that a geometrical increase in a physical stimulus causes an arithmetical increase in the sensory response. The just-noticeable difference between one sensation and another, above the absolute threshold, was used as a unity of measure called the "jnd" scale. Fechner, then, derived a mathematical relationship from Weber's psychophysical relationship. Thus the intensity of a sensation (I) varies with the logarithm of the strength of the stimulus (s) or $I = c \log s$, where c is a constant which is different for different sensations (brightness, loudness).⁴¹

⁴¹ In Fechner's own words the measurement formula states: "The magnitude of the sensation I is not proportional to the absolute value of the stimulus s but rather to the logarithm of the magnitude of the stimulus, when this last is expressed in terms of its threshold value (b), i.e. that magnitude considered as unit at which the sensation begins and appears. In short, it is proportional to the logarithm of the fundamental stimulus value." See Gustav Theodor Fechner, "The Fundamental Formula and the Measurement Formula," reprinted in George A. Miller (ed.), *Mathematics and Psychology* (New York: John Wiley & Sons, 1964), p. 96. It is interesting to note that there is a continuity going back to 1738 between versions of the law of marginal utility and Fechner's law in psychometrics. Fechner studied mathematics, particularly Bernoulli's paper, which contains a version of the famous law of marginal utility. For an account of this connection, see E. G. Boring, *A History of Experimental Psychology*, 2nd ed. (New York: Appleton Century Crofts, 1957), pp. 284-85. For correction and revision of this law from the logarithmic version to a power law, see S. S. Stevens "The Quantification of Sensation," in Miller, *ibid*.

Tuhan-Baranovs'kyi was interested in finding an interpretation of this psychophysical law. He cites the German philosopher and psychologist Wund who thought that the Weber-Fechner law expresses evaluations of sensations by our subconsciousness. Wund observed that our consciousness evaluates the intensity of all stimuli, not according to their absolute intensities but according to their relative intensities. For this reason, we notice an increase in intensity of illumination if one candle is added to fifty candles, but not in the case of the addition of one candle to five hundred candles.

Tuhan-Baranovs'kyi claims that an adequate explanation of this phenomena can be found only by the application of the concepts of Darwinian evolution and the economic law of marginal utility.⁴² He first establishes an analogy between marginal utility and Fechner's law, then he explains marginal utility by reference to its survival value, and thus explains Fechner's law because of its survival value. As we have pointed out earlier, it is an excellent example of a beautiful formal analogy.

Why is it, asks Tuhan-Baranovs'kyi, that if we had three pounds of bread, we would assign a smaller value to one additional pound of bread than in the case where we had two pounds of bread. The explanation, he says, lies in the fact that the fourth pound of bread is of smaller significance for our well-being than the third pound. In the case of marginal utility we are conscious of this reasoning, but in the case of Fechner's law we are unconscious of such a reasoning process. Tuhan-Baranovs'kyi suggests that Fechner's law happens to be true about our species because it has survival value. An organism that perceived the absolute intensity of stimulus rather than its relative intensity would have a much smaller chance to survive than otherwise. The above explanation by Tuhan-Baranovs'kyi is plausible in the case of the five hundred and one candles, but we have doubts about the validity of his thesis in some other cases. We doubt that it is the perception of the relative intensities that is responsible for our survival. Let us sketch a few of the reasons for this guarded scepticism:

1. First of all, a point of clarification. If Fechner's law holds for all birds and mammals, as it seems to do, then it held for extinct ones as well. Therefore such perception can only be at best a necessary condition for survival rather than a sufficient condition.

2. Furthermore, which stimulus is essential for our survival is not determined by the strength of the stimulus, be it relative or absolute.

⁴² Tuhan-Baranovs'kyi, *op. cit.*, p. 206.

A stimulus with survival value functions as a sign of an impending danger. We would argue that it is because of our intellect and our imagination that we are able to develop theories and generalizations which enable us to anticipate the future and thus ascertain and evaluate what is detrimental to our survival and what is not. It is easy to imagine a case where a stimulus, below the threshold of our perceptual apparatus, is actually lethal to the human species, as in the case of certain bacteria and viruses which are too small to be perceived by the naked eye, and yet are deadly. As far as can be ascertained, humans cannot sense the presence of X-rays in the environment and yet they are detrimental to our well-being. Actually, certain birds can detect by means of their olfactory organs the presence of certain levels of X-rays in the environment, but this does not guarantee their survival. It should also be pointed out that many murders are concealed, using the information that certain sounds, for example, might not be heard because of the presence of a louder sound. A shot is not heard because of the rumblings of an elevated subway in the background. It is thus not the weakness or strength of stimuli which is important for survival but the capacity to identify certain stimuli as signs of impending danger. This capacity to interpret stimuli as signs depends on our intellect, imagination, language, memory, and books which aid the memory by storing empirical and theoretical information. Language and the written word enable man to hand down accumulated knowledge to the next generation.

If we were to interpret Fechner's law as supplying us with information which is coded in a certain kind of stimulus signal, then any more of that signal could be considered superfluous information. There are enough passages in the paper to suggest, however, that Tuhan-Baranovs'kyi wants to say more than that. For example, he states that if we were to perceive stimuli according to their absolute value, then the number of our sensations would grow enormously and we would hear simultaneously all kinds of voices and sounds.⁴³ Besides hearing the voice of the person talking to us, we would hear wheels rumbling in the street, voices from the adjacent room, wind howling in the chimney, and mice rustling. Somehow Tuhan-Baranovs'kyi believes that perceiving relative rather than absolute values of the stimuli would resolve the confusion. Actually, the effect known as the cocktail party effect is explained not only by the fact that we perceive relative rather than absolute values of the stimuli, but also by the fact that the

⁴³ *Ibid.*, p. 205.

person is tuned in selectively only to one person's voice and conversation, somehow suppressing hundreds of other potentially audible conversations. Interest of the person acts as the filtering screen. Similar phenomena occur if a person is working on an intellectual problem and is so involved that he or she is "lost to the world." That is, the person does not hear that a picture fell off the wall or that a baby is crying. One does not see how either the phenomena can be explained by the Weber-Fechner law. Furthermore, perception according to relative values of a stimulus would include information from a wide range of sources. If so, then the apparent advantage can easily become a disadvantage, depending on context.

To stress the importance for survival of particular sensory responses to stimuli seems to us to presuppose a Lockean model of sensation and knowledge. In the narrow empiricist Lockean position, the mind functions as a *tabula rasa* which is passive in sensations. The stimuli impinge on the senses, forming simple ideas without the intervention of an active mind that selects some stimuli rather than others for careful scrutiny, observation, and interpretation.

Tuhan-Baranovs'kyi's model is an improvement on the defunct Lockean model, for he recognizes, at least, the intervention of the nervous system and consciousness which evolved over the millenia to perceive only the relative, rather than the absolute, values of the stimuli. But this screening seems to us to be insufficient for survival. Let us say again that it is not a question of the relative weakness or strength of the stimuli but a question of their relevance for survival, whatever the value of their strength.

RATIONALITY AND THE ECONOMIC PRINCIPLE

One of the central questions in philosophy of science of the 1970s is the rationality of scientific change. Are scientists rational when they choose one theory from a set of competing theories? What factors influence the assessment of the relative merits of competing theories? Are the criteria of comparison of theories dependent on the dominant theory? The proposed answers to the above questions are varied. Some, like M. Polanyi, argue that scientific judgments are rational but that the basis of such judgments cannot be made explicit.⁴⁴ They are part of the tacit knowledge of the scientist. Others like S. Toulmin

⁴⁴ M. Polanyi, *The Tacit Dimension* (Garden City, New York: Doubleday & Co., 1966), see particularly Chapter I.

argue that criteria for assessment of theories are dependent on the historical context.⁴⁵ There are no criteria which are context free.

Despite this diversity, there is a kind of consensus that simplicity, predictive accuracy, and prediction of novel phenomena are the kinds of criteria which regularly are cited when scientists are asked to defend their choice of one theory over another.⁴⁶ The problem for philosophers of science has been to justify these criteria. To this purpose, Tuhan-Baranov'skyi presents a very refreshing, optimistic, and unabashed argument with his "economic principle":

In their desire to establish a distinguishing feature of economy, economists discovered a principle of a much broader significance. Any rational activity, in fact, should be based on this principle. We are thinking according to the "economic principle" which aims at solving a problem of interest to us with the least expenditure of our mental efforts, and the value of the product of our mental work is assessed by the same principle. An abstract notion containing in a general formula an unlimited amount of separate concrete impressions reduces our mental efforts and therefore is a necessary tool for our thinking. In this idea lies the sense of all application of the mathematical methods.⁴⁷

Ultimately, the preference for abstract formulas, hypotheses, and theories, which minimize our mental efforts and thus conserve our

⁴⁵ Stephen Toulmin, *Human Understanding* (Princeton: Princeton University Press, 1974).

⁴⁶ These criteria can be traced at least to William Whewell, *Philosophy of the Inductive Sciences* (London, 1840). For a controversial recent discussion of rationality and scientific change, see Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962) particularly, pp. 152–60. For a detailed discussion of the very extensive literature on the topic of rationality, objectivity, and scientific change and the three criteria, see Eugene Lashchuk, *Scientific Revolutions: A Philosophical Critique on the Theories of Science of Thomas Kuhn and Paul Feyerabend* (Unpublished Ph.D. dissertation, University of Pennsylvania, 1969). For an interesting treatment of the problem of evaluation and comparison of scientific theories from the Soviet Ukraine see S. V. Ostapenko's "Otsinka i ekstrapoliatsiia teoretychnykh system," *Filosof'ska dumka*, 1973, no. 5. For a discussion of the above article see Eugene Lashchuk review of *Filosof'ska dumka* for 1973 in *Recenzija*, 1975, no. 2. For discussion of the relevance of Kuhn's description of revolutions in science to economics, see A. W. Coats, "Is There a Structure of Scientific Revolutions in Economics" *Kyklos*, 1969, no. 2; Donald Gordon, "The Role of the History of Economic Thought in the Understanding of Modern Economic Theory," *American Economic Review*, May 1965, p. 55; Ron Stanfield, "Kuhnian Scientific Revolutions and the Keynesian Revolution," *Journal of Economic Issues*, March 1974.

⁴⁷ Tuhan-Baranov'skyi, *op. cit.*, p. 197.

energy, are justified by Tuhan-Baranovs'kyi by appeal to the evolutionary theory of the survival of the fittest. Based on this reasoning, simpler theories are valued more than complex theories because they constitute a more economical way of grouping the diverse data. What is more economical has greater survival value.

If one takes Boyle's law or other empirical generalizations and compares them with raw data, then Tuhan-Baranovs'kyi's case is plausible. But if one compares one theory or generalization with another, it is not clear what sense of simplicity to use. It could be simpler in the sense of making fewer presuppositions as in the case of an axiomatization: a system that has one axiom is simpler than a system that has five. But it is doubtful that a more elegant axiomatic system has more survival value. It is not clear in what sense it saves energy either, for, normally, a logical system which employs fewer rules requires much more energy and ingenuity in finding a proof than does a system which employs more rules. Thus simplicity in the sense of mathematical elegance is no indication of economy of effort in the utilization of the systems for practical goals. Likewise, the Copernican heliocentric system was in some sense simpler than the Ptolemaic geocentric system, but there is no easy way to translate this simplicity into the principle of economy.⁴⁸

It is easier to justify the criteria of predictive accuracy and the prediction of novel phenomena⁴⁹ on the basis of Tuhan-Baranovs'kyi's principle of economy. There is no doubt that theories which enable us to make more accurate predictions have survival value. In terms of survival of the species it is equally obvious that we should prefer theories which anticipate heretofore unknown phenomena or novel phenomena to theories which make predictions only about known phenomena.

⁴⁸ For an illuminating account of the complexities of comparing Ptolemaic geocentric theory with the Copernican heliocentric theory, see Thomas Kuhn, *The Copernican Revolution* (Cambridge: Harvard University Press, 1957).

⁴⁹ For an explication of one important sense of novelty, see E. G. Zahar, "Why did Einstein's Programme Supersede Lorentz's," *British Journal for the Philosophy of Science*, 1973, nos. 2 and 3. "A fact will be considered novel with respect to a given hypothesis if it did not belong to the problem situation which governed the construction of the hypothesis . . .," p. 103.

Bibliographies

Soviet Bibliography on the Ukraine's Postwar Economy

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The first decade after World War II was marked by an extreme paucity of information on the Ukraine's economy as well as on that for the USSR.¹ The situation changed in the mid-1950s as the amount of literature published increased both quantitatively and qualitatively. In addition to the monographs dealing with the variety of theoretical and applied problems, the appearance of annual handbooks, followed by specialized handbooks for specific sectors of the economy, did much to increase the understanding of the USSR economy. At the same time, monographs and statistical handbooks on the economies of individual republics and their administrative subdivisions began making their appearance.

At the present time, Ukrainian annual statistical handbooks are available in the USA for all the years from 1956 to 1974, with the exception of 1962. It is not certain whether the compendium for that year was never published or simply did not arrive in the West. The Ukrainian handbooks follow closely the union format but generally provide less detail. Some omissions are minor but others, e.g., gross

¹ I should like to thank a number of people who have aided me in compiling this bibliography. Murray Feshbach of the Department of Commerce permitted the use of his material; his bibliographies, published in Joint Economic Committee reports of the U.S. Congress, served as models in organizing this bibliography. Edward Kasinec and Joseph Danko of Harvard University and Yale University, respectively, were kind enough to provide me with monographs located in their school libraries. Basil Nadraga was very helpful in aiding my search at the Library of Congress.

value of output and fixed assets, are quite crucial in appraising the economy of the republic. The two omissions are particularly puzzling since growth rates are given for them, indicating the existence of absolute numbers. Aside from the more abridged annual statistical compendiums, the number of specialized statistical handbooks on the Ukraine are much less numerous than those for the Soviet Union. For example, handbooks on employment, finance, and transportation and communications have been published for the Soviet Union but not for the Ukraine. However, much of the data in union compendiums are disaggregated by republic and lower administrative units. An interested student can consult various issues of *Soviet Studies* for the listings of such handbooks.

The monographs listed here do not necessarily deal exclusively with the Ukrainian economy, but all sources are believed to include some information on the Ukraine. The bibliography is based on material located at Harvard University, the Foreign Demographic Analysis Division of the U.S. Department of Commerce, the Library of Congress; and Yale University.² The list is not exhaustive, particularly with respect to material located at the Library of Congress. Because of cataloging procedures at the Library and a practice of listing Ukrainian literature under "the Ukraine" or "Russia/USSR," it is very difficult to collect all relevant material available there. It is believed that most of the monographs listed here can be found in the Library of Congress. Various issues of *Ekonomika Radians'koi Ukrainy*, or its Russian version *Ekonomika Sovetskoi Ukrainy*, a monthly issued in Kiev, list new literature on economics published in the Ukraine.

In compiling the bibliography, a number of conventions were adopted. Since much of the Soviet literature is issued by institutions, these monographs may be cataloged either under editors or compilers, or under issuing institutions. The bibliography largely follows the convention used by libraries housing these monographs. But in other libraries the same books may be listed under the alternate author. The Library of Congress transliteration system, with minor modifications, was used for Ukrainian and Russian alphabets. Places of publi-

² 1 Located at Harvard University

2 Located at Foreign Demographic Analysis Division

3 Located at the Library of Congress

4 Located at Yale University

cation in the monographs are given in Russian or Ukrainian versions, depending on the language of the publication. But in the bibliography, current Ukrainian names of cities are used, regardless of the language of publication, with the exception of Kiev and Odessa, which are accepted forms of spelling in the West. Finally, since many Ukrainian authors have published their works in Russian and Ukrainian, two versions of the same name may appear in the listing. In such instances a notation was made that the author is also listed under another name in the bibliography.

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A Bibliography of Western-Language Writings on the Ukrainian Economy, 1919–75 (A Preliminary Attempt)

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This bibliography records more than 700 citations to Western-language writings of research or information value, dealing with Ukrainian economic affairs, and published in different countries of Eastern and Western Europe as well as in North America from 1919 to 1975. Included are the following categories of works: (a) articles in journals; (b) chapters or portions of books, including contributions published in such collective works as proceedings of conferences and symposia; (c) separately published books and pamphlets; and (d) 56 doctoral dissertations: 37 German, 8 American, 6 Austrian, 3 Swiss, 2 French.

The bibliography has been prepared on the basis of, first, the holdings of Columbia University, Yale University, and the New York Public Libraries, and second, printed catalogs of the Library of Congress; *The Library Catalogs of the Hoover Institution on War, Revolution, and Peace, Stanford University*; *A London Bibliography of Social Sciences*; *Bulletin analytique de documentation politique, économique et sociale contemporaine*; *Bibliographie der deutschen Zeitschriftenliteratur mit Einschluss von Sammelwerken*; *Bibliographie der fremdsprachigen Zeitschriftenliteratur*; *Internationale Bibliographie der Zeitschriftenliteratur aus allen Gebieten des Wissens*; *Bibliographie der Sozialwissenschaften (Bibliographie der Staats- und Wirtschaftswissenschaften)*; *Bibliographie der Wirtschaftswissenschaften*; catalogs of the Bibliothek des Instituts für Weltwirtschaft an der Universität Kiel. The latter three tools are especially abundant and useful sources of bibliographical information as far as the economic and social science fields are concerned. In addition to these, other important American and non-American general and special subject indexes and guides to periodical literature as well as other bibliographical tools, too numerous to be listed here, have been consulted.

Of all the entries, only 55 percent of titles are described *de visu*. The description of the rest of the items is based on bibliographical information found in the sources mentioned above. Because of the inability of the compiler to make the selection of titles to be included on the basis of personal examination, and, thus, being unable to prepare a *de visu* description of each title included, this bibliography is to be considered preliminary in character. Although not exhaustive and not definitive, it is hoped that the compilation may prove helpful as a guide to Western-language literature on the Ukrainian economy.

As the table of contents shows, the material is arranged in 24 subject groups. Within each group, entries are arranged alphabetically, with the exception of Chapter 22, where three official serial publications are listed first. Many titles can be placed in two or more subject groups. This is especially true of many entries classified in Industry, Mineral resources, Economic conditions of individual regions, Money, and Commerce. For economy's sake, no entry is placed in more than one subject division. This means that the user interested in material on mineral resources, for example, will have to search at least two subject groups: *Mineral resources* and *Economic conditions of individual regions*.

The transliteration, when provided by the compiler, is that of the Library of Congress; transliteration found in source has been transcribed "as is," which means that more than one system of transliteration will be found in this bibliography. As far as variant spellings and forms of names are concerned (and there are many of them), again the form of the name found in the source has been transcribed without change. Any additions to the names, provided by the compiler, are enclosed in square brackets. For the author index, however, one form of the author's name, usually the most frequently used form, has been selected with references to variant forms.

With the exception of widely known or easily verifiable periodicals, place of publication has been added (in parenthesis) to the titles of serials, for easier identification and verification.

The writer would be happy to share or to extend the burden of responsibility for the inadequacies and shortcomings of this work by adding here the sort of note of thanks frequently found in books and articles: "This paper has benefited from critical reading and comments of Professor X. Any errors of fact or interpretation, are, of course, the writer's alone." However, since this writer not only compiled this conspectus himself, but also typed and retyped it himself, no helpful soul shares the responsibility for his errors.

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Reviews

The Location Quotient Method in the Regional Analysis of the USSR

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Since all economic activities are related to time and space, all production, distribution, and consumption decisions inevitably involve location decisions. Who makes these decisions, how they are made, their content and consequences depend on the type of socioeconomic system within which the decisions are made. In a market economy, they are made by individuals guided by predominantly economic motives. The impact of these location decisions on the area, region, or the nation is usually neither intended nor foreseen by the decision maker.

In a centrally planned economy, location decisions are made by the central planning authorities—national, regional, or local—and their impact and consequences are anticipated by the planners, though the actual results may greatly deviate from original intentions due to lack of foresight and inability to grasp the complexity of the factors determining the outcome.

Even in a market economy, it is extremely difficult to isolate economic from non-economic factors and to build a location decision theory in purely economic terms. Several attempts to develop such a “pure theory” were made in the past within the narrow confines of neo-classical theory.¹ However, location decisions lie at the heart of economic growth and of development theory, which is essentially multidisciplinary. This is even more evident in the case of centrally planned command economies. In such economic systems, ideological, political, military, and economic factors inevitably enter the planning processes as an inextricably intertwined complex in which purely

¹ Alfred Weber, *Über den Standort der Industrien* (Tübingen, 1909) and “Industrielle Standortlehre” in *Grundriss der Sozialökonomik* (Tübingen, 1914). See also a concise summary of Weber’s theory in Andreas Predoehl, “The Theory of Location in Its Relation to General Economics,” *Journal of Political Economy*, June 1928.

economic considerations are frequently subordinated to the non-economic.²

In a command economy of the Soviet type, location decisions are made by the central planning agencies, which have the difficult task of reconciling the ideological, political, military and economic preferences of the rulers in the Kremlin. No wonder the location criteria of spatial allocation developed by Academician V. S. Nemchinov³ and elaborated by Academicians V. V. Novozhilov and L. V. Kantorovich, based on purely economic considerations of "minimum total input of labor time per unit of final product," were not accepted as universal criteria of location theory by Soviet authorities.⁴ Such a single criterion of maximization could not satisfy the needs of central planners dealing with a monopolistic Soviet economic system which, all Marxist claims to economic determinism notwithstanding, is guided primarily by ideological, political, and military-strategic considerations.

Under such circumstances, it is almost impossible, on an *a priori* basis, to specify the theoretical principles used by Soviet planners in making their location decisions. This still leaves open the alternative approach of looking at the decisions in retrospect and to interpret them in an *ex post* manner.

The main objective of this review article is to critically evaluate three attempts to interpret the Soviet location policies in works by Hans-Jürgen Wagener,⁵ I. S. Koropec'kyj,⁶ and V. P. Voloboi and V. A. Popovkin.⁷ Each of these contributions throws some light on Soviet location decisions made in the past, by presenting available statistical evidence and by analyzing it by means of such analytical tools as location quotients, incremental capital-output ratios, coefficients of specialization, specialization curves, etc.

² For a detailed treatment of interrelations of these factors in a command economy, consult Oleg Zinam, "The Economics of Command Economies," in Jan S. Prybyla (ed.), *Comparative Economic Systems* (New York: Appleton-Century-Crofts, 1969).

³ V. S. Nemchinov, *Izbrannyye proizvedeniia*, vol. 4 (Moscow, 1967), p. 54.

⁴ V. Holubnychy, "Recent Soviet Theories of Value," *Studies on the Soviet Union*, 1961, no. 1.

⁵ Hans-Jürgen Wagener, "Rules of Location and the Concept of Rationality: The Case of the USSR," in V. N. Bandera and Z. L. Melnyk (eds.), *The Soviet Economy in Regional Perspectives* (New York: Praeger Publishers, 1973).

⁶ I. S. Koropec'kyj, *Location Problems in Soviet Industry before World War II: The Case of the Ukraine* (Chapel Hill: The University of North Carolina Press, 1965).

⁷ P. V. Voloboi and V. A. Popovkin, *Problemy terytorial'noi spetsializatsii i kompleksnoho rozvytku narodnoho hospodarstva Ukrainy'koi RSR* (Kiev, 1972).

The first two works deal with the problems of interregional allocation of resources in the USSR, while the third also investigates the interregional allocation of resources within the Ukrainian republic. The time periods covered by these studies are not coextensive. Wagener's article develops two comparisons covering periods from January 1, 1962 to January 1, 1970 and from 1960 to 1966; Koropec'kyj covers a period of the first two five-year plans running from 1928 to 1937; while Voloboi and Popovkin use several periods between 1960 and 1970.

All three works contain some analytical framework, but their major stress is on measuring actual performance in terms of statistical data. Studies of this type are especially valuable in a field that has been dominated until recently by studies of either purely theoretical or descriptive character.

After establishing that Soviet location decisions were rational in the Weberian sense, i.e. functional in relation to a subjectively intended aim,⁸ Wagener states that the major goals of Soviet planners were growth and equality. The only Western location theorist accepted by some Soviet economists was Alfred Weber who "examines the question of optimal location only from the standpoint of the individual firm whose objective function, besides profit maximization or growth, does not contain any social variables."⁹ Soviet economists who followed the minimum production cost concept of regional allocation were favoring further development of already industrialized areas around Leningrad and Moscow and in the Donbas. Their opponents rejected this principle, since it does not consider different levels of economic development and other inequalities among the regions.

Weber's location theory deals with the location of a firm and not with the resource allocation theory in heterogeneous regions. Theories of interregional and international trade deal with these types of problems.

Though Soviet planners rejected the purely economic minimum-cost principle of location developed in the West, and adapted to the Marxist labor theory of value by the founders "of Soviet mathematical economics, Nemchinov, Novozhilov, and Kantorovich, they developed a body of principles which can be called laws of allocating socialist production, which, taken together, form a 'dialectical un-

⁸ Max Weber, *The Theory of Social and Economic Organization* (New York: Oxford University Press, 1947), p. 14.

⁹ Wagener, *op. cit.*, p. 65.

ity.”¹⁰ The most important locational rules accepted by Soviet policy makers are: minimizing social costs in the exploitation of natural resources; minimum cost of production in allocating manufacturing industries; the principle of specialization and complex development in regional allocation of industries, “the law of planned proportional development of the economy” on the national level; disappearance of differences between urban and rural areas; guaranteed industrialization and cultural development for all regions; maintenance of the nation’s defenses; and international division of labor inside the socialist bloc. These seemingly conflicting requirements represent a kind of dialectical unity between the basic requirements of rapid growth through specialization, and the equalization of economic advance required by ideological, political, and strategic considerations.

Soviet plans and programs frequently focus on the problem of specialization and complex development, and Soviet economic literature deals with it more than with any other aspect of location policy. Western interpreters disagree in their views on the relative importance of specialization and complexity for economic development. For example, I. S. Koropec'kyj thinks that industrialization of all parts of the country is necessary for economic growth and development,¹¹ while P. J. D. Wiles considers the principles of specialization and complex development completely meaningless.¹²

Specialization denotes, in the Soviet interpretation, preferential treatment of industrial branches reflecting differences in natural and social conditions of production, whereas complexity reflects “inter-regional convergence of economic structures.”¹³ According to Wagner, the concept of location quotients is an appropriate analytical tool that provides a quantitative appraisal of the spatial structure of the economy. The location quotient is defined as:¹⁴

$$LQ = (B_r/I_r) / (B_u/I_u) = (B_r/B_u) \cdot (I_u/I_r),$$

where B = branch value of a certain variable and I the total industry value of the same variable. The suffixes r and u denote region and

¹⁰ A. E. Probst, *Razmeshchenie sotsialisticheskoi promyshlennosti* (Moscow, 1962), p. 9.

¹¹ I. S. Koropec'kyj, “The Development of Soviet Location Theory before World War II,” *Soviet Studies*, July 1967, p. 24.

¹² P. J. D. Wiles, *The Political Economy of Communism* (Cambridge, Mass.: Harvard University Press, 1964), pp. 150–51.

¹³ Sh. P. Rozenfel'd, *Metodologiya vyvaznivanii urovnei razvitiia ekonomicheskikh raionov SSSR* (Moscow, 1969), p. 58.

¹⁴ H. W. Richardson, *Elements of Regional Economics* (London: Harmondsworth, 1969), p. 29.

union. The closer the LQ to unity, the more complexity is attained. The further the LQ is from unity, the more specialization. The difficulty lies in drawing a demarcation between complexity and specialization.

The empirical part of Wagener's study contains two comparisons of location quotients of several industrial branches in fifteen Soviet republics. The first comparison covers conditions between January 1, 1962 and January 1, 1970, in eleven major categories of industrial production. The location quotients in this study are based on the distribution of fixed capital. Another comparison deals with ten major industrial categories, using LQs based on the distribution of employment and covering the period from 1960 to 1966. Wagener states that the movement of location quotients toward unity represents a complex development, while movements away from it can be interpreted as specialization. The comparison of location quotients can be done either on the basis of individual regions or industrial branches. Looking at the regions, one finds that the RSFSR deviates very little from the union branch averages and all of its location quotients are close to unity. This is explained by the fact that the Russian republic's industrial production represents about two thirds of union production and it tends to determine the union average. Consequently, only for smaller republics do location quotients contain meaningful information.

A comparison of the branches reveals that industries dependent on natural resources are distributed unevenly among regions. Some branches were concentrated only within a few republics; others have almost the same weight in all regions, while some are distributed very unevenly among them. Such comparisons can be made on the basis either of capital or employment statistics. Though the correspondence of these two methods is good, there are some significant differences in food industries and construction materials. Some republics show higher location quotients based on employment than on capital. This is due to higher labor intensity in less developed regions.

One general conclusion flowing from these comparisons is that general industrialization of a country leads toward more complex development, whereby the less developed regions have been catching up with more industrially developed regions. It is of special interest that in energy and construction materials sectors, the location quotients are more balanced than in other sectors. The complex development in both sectors reflects the planned character of the Soviet

regional development process, since these sectors are prerequisites of industrialization.

The comparisons do not support the general contention that the structures of regional economies show "a tendency toward capital-intensive branches in the more developed regions and toward labor-intensive branches in the less developed regions."¹⁵ Only the light and food industries as well as machine building seem to run against this contention. The food industry, which is capital-intensive, is represented more strongly in developed regions, whereas labor-intensive light industry is found predominantly in less developed regions of the USSR. Wagener's study does not include the agricultural sector. If agriculture were included, there would probably be more tendency of labor-intensive production to gravitate toward the less developed regions.

Wagener concludes that empirical evidence is not in conflict with the general proposition that Soviet planners struggled to achieve a balance between the two, frequently conflicting, objectives: maximization of the economy's over-all growth, and equalizing levels of economic development in all regions. Empirical data support a general hypothesis that "the process of industrialization and regional development—as far as large regions are concerned—is expected to result in similar proportions in particular economic structures: complex development."¹⁶

In contrast to Wagener who compared development of fifteen major regions, I. S. Koropecykj's book deals explicitly with the problem of development of the Ukraine within the economy of the USSR. In his view, to explain differential development of Ukrainian industry, it is necessary to study Soviet theory and practice of industrial locations. The case of the Ukraine is useful because it throws some light on how Soviet planners handled industrialization and regional development in general, thus contributing to our understanding of regional problems in other developing countries. This volume covers an area neglected in Soviet literature. Writing in 1965, Koropecykj stated that "none of the studies published in the USSR on the development of Ukrainian industry treats explicitly and critically the basic problem of this study: the efficiency of geographic allocation of investment in regard to Ukrainian industry."¹⁷

¹⁵ Wagener, *op. cit.*, p. 78.

¹⁶ *Ibid.*, p. 80.

¹⁷ Koropecykj, *Location Problems*, p. 8.

While Wagener selected the figures for a period in the 1960s, Koropecykyj uses a ten-year span covering the first two five-year plans, i.e., 1928–1937. The allocation decisions in that period reflected the basic philosophy of the Kremlin's leaders and have strongly influenced the economic growth and development of the USSR as a whole and of all individual regions. These decisions have laid the groundwork for the present geographic distribution of Soviet industry. Moreover, though the technique of planning has become more complex and sophisticated, the basic objectives of Soviet regional development remained more or less unchanged.

In contrast to Wagener, who uses capital and labor employment bases for his computations of location quotients, Koropecykyj concentrates on one single basis: the fixed capital, which includes building and structures, means of transportation, equipment, and machinery.

Koropecykyj, like Wagener, is aware of the conflicting requirements for over-all economic growth and the goal of greater economic equality among the regions with different resource endowments. He uses empirical data on distribution of fixed capital in the Ukraine and in the Soviet Union as a whole for benchmark dates of October 1, 1928 and January 1, 1938. From these data he derives location quotients for the Ukraine. The location quotient is obtained "by dividing the share of the national total for a given manufacturing industry in the area by its share of all manufacturing."¹⁸ Increase in the degree of localization indicates a higher degree of specialization of the region in this particular branch of industrial production. The comparison of location quotients for sixteen major branches of Ukrainian industry between 1928 and 1938 shows a general decline in quotients, indicating that the degree of specialization in most branches declined.¹⁹

To establish the degree of this decline in the specialization of Ukrainian industry relative to USSR industry, Koropecykyj uses the coefficients of specialization and specialization curves. The coefficient of specialization is computed by subtracting from the shares (in percent) of the distribution of branches for the whole USSR the corresponding shares of each individual industrial branch in the Ukraine. The absolute values of differences obtained are added and then divided by one hundred. The higher the value of specialization coefficient, which can vary between one and zero, the greater the degree of specialization. Computed by this method, the coefficients for the

¹⁸ *Ibid.*, p. 20.

¹⁹ *Ibid.*, Table 2.2, pp. 22, 23.

Ukraine had a value of 0.43 for October 1, 1928 and of 0.25 for January 1, 1938. Thus, Koropecykyj concludes, specialization of the Ukrainian industry definitely declined during this crucial period of reconstruction of Soviet economy. The author dramatizes these structural changes by the drawing of specialization curves, which are obtained by plotting the cumulative percentage distribution of the USSR's fixed capital by industrial branches on the horizontal axis, and of the Ukrainian branches on the vertical axis.²⁰

If comparative cost analysis would have been feasible in practice, the comparison costs of the most important branches in the Ukraine with those of the USSR and other regions would explain this decline in specialization. Yet the nature of Soviet pricing would render comparative cost studies worthless. This leaves the alternative of testing whether the output-maximization approach was used by the Soviet planners to compare incremental capital-output ratios between the industries of the Ukraine and the industries of the Soviet Union. The incremental capital-output ratio (ICOR), defined as "the ratio between the increase in capital and increase in output during a certain period, under the assumption that the length of production process remains unchanged and the technological progress is neutral,"²¹ is considered by Soviet economists an important method of estimating productivity of capital. Koropecykyj first computes Ukrainian capital-output ratios as a percentage of USSR ratios for fifteen basic industrial branches, and weighs them by percentage of increase in fixed capital in Ukrainian industry by branches to arrive at an approximate ratio of Ukrainian to the union's capital-output ratio.

The evidence shows that, on the average, the increases in output per increase in fixed capital in the Ukraine were about one fifth higher. This was due to several advantages the Ukraine had over the rest of the union, such as the level of economic development, the introduction of advanced technology, the level of capital utilization, the supply and skill of labor, the availability and quality of natural resources, the degree of modernization of production, and some others.

Then, Koropecykyj compares Ukrainian ICORs as percentages of the USSR ICORs with ratios of increase in Ukrainian fixed capital to USSR increases in fifteen major industrial branches.²² The coefficient

²⁰ Ibid., Table 2.2, p. 24.

²¹ R. F. Harrod, *Towards a Dynamic Economics* (London: Macmillan and Co., 1948), pp. 82, 83.

²² Koropecykyj, *Location Problems*, Table 6.1, p. 83.

of correlation between these two sets of variables does not reveal any correlation ($R^2 = 0.083$). This means that economic considerations were not a deciding factor in the distribution of capital investment between the Ukraine and the USSR. Soviet location policy subordinates economic to political considerations, especially to the overriding objective of preservation and expansion of power of the Communist party of the Soviet Union. Koropeckyj concludes that deemphasis of industrial growth of the Ukraine as well as other western regions in favor of the regions in the east, beyond the Urals, was due to Soviet long-range defense considerations. This resulted in a loss to the USSR in terms of goods which could have been produced if location decisions were based on economic consideration of productive efficiency. A transfer of about 1 percent of the total industrial capital investment from other regions of the Soviet Union to the Ukraine would have resulted in an increase of the USSR's output in the magnitude of 0.4 to 0.6 percent.

As a result of this allocation policy, the USSR failed to maximize its overall growth and to attain a higher level of military preparedness in the immediate pre-World War II period. Moreover, capital allocation among Ukrainian industrial branches created an imbalance among them and the Ukraine remained a supplier to other regions of the Soviet Union. Such policies had a negative effect on transportation, and decreased efficiency of industry in general.

The volume by Voloboi and Popovkin deals with three problems: the allocation of resources and economic development of the Ukraine; the balance between specialized and complex (i.e., integrated) planning in the Ukrainian SSR; and efficiency of territorial specialization of the republic *vis-à-vis* the rest of the union.

Since the methodology of the book is discussed by I. Gordijew elsewhere in the present volume, our attention turns to the use of location quotients as indicators of structural changes toward or away from specialization. The authors define their "index of localization" (location quotient) as the ratio of the relative weight of the region in the country in terms of a given type of economic goods produced to the relative weight of the region in the country in terms of a given basic indicator, such as population, industrial production, national income, etc.

The volume provides extensive data on regional development of the Ukraine as a part of the USSR and on contributions of major parts of the Ukrainian SSR to overall production of the republic and the Soviet Union. Relative economic weight of the Ukraine within the

Soviet Union is illustrated by a comprehensive comparison of the volume of the most important industrial branches in the Ukraine and in the USSR for 1960, 1965, and 1970. For each of these years, a ratio of Ukrainian to the total Soviet production of each economic good is computed. Some ratios declined, some increased, but on the whole the ratios remained pretty stable.²³

The degree of specialization of the Ukraine relative to the rest of the union in 1960 and 1967 is expressed in terms of three types of location quotients. A table summarizing these indexes covers a large number of industrial branches.²⁴ Though the period covered is almost coextensive with the period presented by Wagener, the direct comparison of location quotients is not possible due to different bases used in their computation. It is difficult, however, to discern any general trend in these indexes. It would be interesting to compute coefficients of specialization for the Ukraine in terms of the union based on data presented in Table 27 on the ratio of the Ukrainian to the union production of industrial goods, as Koropeckyj did for the 1928–1937 period.

Two additional computations of location quotients in the Voloboi-Popovkin volume are worth mentioning. One compares the location quotients of Ukrainian industrial production with those of the USSR as a whole in 1965 and 1970, based both on the size of population and the volume of production. All of the quotients based on size of population declined, except that of the chemical industry, which remained stable, and that of light industry, which increased from 0.60 to 0.71. In terms of the volume of production, half of the quotients declined while the other increased.²⁵

Another computation provides a comparison of specialization indexes for major branches of Ukrainian agriculture for 1960 and 1967. All indexes based on population are larger than unity except for that of production of sheep; three indexes out of eleven are less than unity when the index is based on agricultural production. However, the general trend between 1960 and 1967 is difficult to discern since some of the indexes are going up, while the others are declining. Perhaps the application of Koropeckyj's coefficient of specialization would clarify this issue.²⁶

²³ Voloboi and Popovkin, *op. cit.*, Table 27, pp. 128, 129.

²⁴ *Ibid.*, Table 26, pp. 119–22.

²⁵ *Ibid.*, Table 29, p. 135.

²⁶ *Ibid.*, Table 33, p. 151.

The tentative predictions as to the future development of regional specialization of the Ukraine for 1975 and 1980 are especially interesting. The authors believe that during this period the location quotients of ferrous metals, woodwork, and paper industries will slightly decline, whereas that of light industry will increase. But these changes will be very gradual and most of the quotients will remain stable over the period. A comparison to indexes for 1970 reveals that the leaders of specialization as measured by location quotients were ferrous metals, machine building, food industry, fuel, and electrical energy. Thus, over a longer period of time, one can detect a slow trend toward less specialization of the Ukraine in industrial production. This seems to be in line with Koropecyky's predictions, based on his 1928–1937 study of specialization trends in Ukrainian industry.

According to Voloboi and Popovkin, the application of contemporary methods of regional analysis indicates that the Ukrainian SSR is successfully developing its economy within the Soviet Union. Following the principle of socialist division of labor, the Ukraine is maintaining its role as the largest producer of coal, gas electric energy, iron ores, metallurgical, mining and chemical equipment, locomotives, railway cars, tractors and other agricultural machinery, corn, sugar, vegetables, and animal fat and meat. The production of consumer goods in the republic is apparently increasing rapidly. All in all, the observed specialization of the Ukraine is claimed to be efficient in that it is based on the geographic pattern of resources.

The authors indicate, however, that the growth of finished goods in the republic should be speeded up. The manufacturing industry should be expanded, especially in western parts of the republic so as to better utilize their human, mineral, and agricultural resources. Such policies would also be efficient from the standpoint of maximization of the national product of the union as a whole.

The three works reviewed here are not coextensive and cover different years. They show, however, that substantive analysis of regional economics of the USSR is under way not only in the Soviet Union but also in the West. To be sure, the study of Soviet regional theories and policies is complicated by the political, ideological, and strategic factors that frequently overshadow the purely economic considerations. Fortunately, the studies discussed here avoid undue entanglement in ideological and political issues. Instead, they try to interpret the extensive empirical evidence with meaningful statistical methods. It is encouraging that enough statistical data is available to pursue regional studies of the USSR in the West.

Regional Economics from the Standpoint of a Member Republic

IHOR GORDIJEV

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Although the management of the Soviet economy relies in large measure on the productive efforts and administrative structure of each of the constituent Soviet republics, serious attempts to analyze the rationality of resource allocation from the regional perspective are quite recent. The present critical review of one study, *Problems of Regional Specialization and Integrated Development of the Ukrainian SSR*, aims to elucidate the scope of research in this realm.¹ While generous references aim to familiarize the Western readers with the content of the book, an attempt is also made to evaluate its method and conclusions.

SCOPE OF THE STUDY

Voloboi and Popovkin, the joint authors of the book, indicate that they are among the first Soviet researchers to deal with the Ukrainian economy from the standpoint of regional specialization. To quote, ". . . there is as yet no separate monograph devoted to the issues of specialization and integrated² development of the Ukrainian SSR economy" (p. 4, Preface).³ While studies on specialization and development trends in the Belorussian and Georgian economies have been published (p. 4), the authors note that various aspects of regional

¹ P. V. Voloboi and V. A. Popovkin, *Problemy terytorial'noi spetsializatsii i kompleksnoho rozvytku narodnoho hospodarstva Ukrain's'koi RSR* (Kiev, 1972). In the present article page numbers in the parentheses refer to the book under review.

² The term "kompleksnyi" will be henceforth translated as "integrated."

³ The most notable recent work on regional specialization within the USSR published outside the USSR is V. N. Bandera and Z. L. Melnyk (eds.), *The Soviet Economy in Regional Perspective* (New York: Praeger, 1973); consider also an incisive review of this collective volume by D. Duff Milenkovich in *The Journal of European Economic History*, Winter 1975. Other related monographs include I. S. Koropec'kyj (ed.), *The Ukraine within the USSR: An Economic Balance Sheet* (New York: Praeger, 1977); Paul Dibb, *Siberia and the Pacific: A Study of Economic Development and Trade Prospects* (New York: Praeger, 1972); and V. Holubnychy, "Some Economic Aspects of Relations Among the Soviet Republics," in E. Goldhagen (ed.), *Ethnic Minorities in the Soviet Union* (New York: Praeger, 1968).

structure of major economic areas have not yet been seriously considered (p. 32). This is so despite the existence of official bodies charged with the study of regional economic development, such as the Council for the Study of the Productive Forces of the USSR, attached to Gosplan USSR (p. 153), and the Council for the Study of the Productive Forces of the Ukrainian SSR, attached to the Ukrainian Academy of Sciences (pp. 5, 176).

The monograph under review consists of five chapters. The first chapter deals with methodological and definitional issues in researching regional specialization and integrated economic development. The second chapter discusses the natural and economic conditions underlying the evolution of the Ukrainian economy. Chapter 3 is concerned with present-day specialization patterns within the Ukrainian economy. The principal ways of raising the economic effectiveness of regional specialization and of integration appropriate for the Ukrainian economy are dealt with in Chapter 4. Finally, in Chapter 5, the authors present some of their research findings based on multiple correlation and several indexes.

The ideological, political, and scientific constraints under which research and writing in economics in general and in regional studies in particular have to be conducted in the USSR are well known. Western students must be reminded, however, that a Soviet scholar exposes himself to further censure if he decides to study the economy of a constituent republic, particularly if that republic does not happen to be the Russian SFSR. Then one would face the danger of being accused of manifesting a malignant form of "localism," namely, "bourgeois nationalism." It is understandable therefore that Voloboi and Popovkin show considerable circumspection in analyzing the position of the Ukraine *vis-a-vis* the union.

UNION VERSUS REPUBLIC CRITERIA

Voloboi and Popovkin take pains to stress that the Ukrainian SSR is a component and inseparable part of the USSR (pp. 50, 209). No similar insistence on "indivisibility" and "oneness" is thought necessary when Voloboi and Popovkin deal with the three component regions of the Ukraine, i.e., there are no declarations that these regions are "inseparable" parts of the Ukraine. At the same time, to conform with the alleged Leninist nationalities policy, the authors describe the Ukraine as a "sovereign socialist republic" (p. 177) and as one of

Europe's largest states (p. 150). However, the authors' rhetorical question whether the central authorities really need to determine the specialization of regions of *all* types (p. 19) reflects the limits of that sovereignty in reality.

Our concern with the treatment of Ukraine *vis-a-vis* other administrative and political entities within the USSR is not merely academic. The issue is central to the whole area dealt with by the work under review. This is because the evaluation of existing specialization and any policy recommendations for change depend fundamentally on whether the economist approaches the issues from the standpoint of the Ukraine's interests or those of some other smaller or larger geographic and political entity.

The ambivalent attitude of the authors toward the choice of the entity from whose point of view the current and proposed arrangements are to be assessed may be seen from their attitude towards "local" *versus* "global" interests. Voloboi and Popovkin seem compelled to favor the "global optimum" over "local suboptimization." When speaking of the need for improving regional specialization, Voloboi and Popovkin indicate that "general state interests" must be considered in addition to any peculiarities of the economic life of a republic (p. 185). It is notable that the term "interests" is nowhere explicitly applied by the authors to any of the constituent republics. Voloboi and Popovkin stress that "It is well known that a local optimum is not always conducive to the effectiveness of the national economy as a whole" (p. 46). The authors reject certain criteria for assessing output "effectiveness" on the ground that these reflect inadequately the effectiveness of a regional complex from the standpoint of the national economy as a whole (p. 46), and claim that certain industry branches are in need of further development because they "fail to meet national economic needs" (p. 135).

Nonetheless, in certain contexts Voloboi and Popovkin stress the importance of "local" needs. For example, evaluating indicators of the effectiveness of integrated development of a region, they express the view that maximization of the difference between exports from and imports into a region is the more effective the more fully a region's needs are met by drawing on its own output (p. 48), a view that approves the promotion of self-sufficiency of a republic. But Voloboi and Popovkin are not ready to concede openly that a conflict may arise between the economic interests of the Ukraine as a geographic and national entity and those of the rest of the USSR in planning and

implementing development policies. Hence, the issue of reconciling local and global interests is being skirted, and the need for compromise remains neglected.

AN INTERPRETATION OF ECONOMIC STRUCTURE OF THE REPUBLIC

The book provides the essential background regarding the regional structure of this second largest Soviet republic. The Ukraine covers 603.7 square kilometers and had a population of 47 million in 1970 (p. 50). The Ukraine consists of 25 oblasts, subdivided further into 476 administrative regions (p. 51). Soviet regional planning and management procedures divide the Ukraine into three major economic regions (p. 52):

1. The Donetsk'-Dnieper region (220.9 thousand square km. or 36.7 percent of the republic's territory, containing 8 oblasts).
2. The South Western region (269.5 square km. or 44.9 percent of the republic's territory, containing 13 oblasts).
3. The Southern region (113.3 square km. or 18.4 percent of the republic's territory, containing 4 oblasts).

Before considering in greater detail some of the recommendations proposed by Voloboi and Popovkin in the light of their findings and from the standpoint of political and ideological constraints mentioned earlier, it seems appropriate to identify certain critical features of the Ukraine's economy as revealed by the monograph. To be sure, Voloboi and Popovkin usually preface their own critical remarks with such approbatory declarations as ". . . the present structure of regional specialization is on the whole rational . . ." (p. 134) or "The economic links between the Ukraine and other parts of the USSR . . . are on the whole rational . . ." (p. 174). Nonetheless, the monograph identifies three sets of problems experienced by the Ukrainian economy, and we shall discuss each of them in turn.

DISPROPORTIONS AND SHORTAGES. A list of substantial disproportions and shortages compiled from the book includes the following:

- a. Disproportions in the development levels of economic regions (e.g., the comparative underdevelopment of the South Western economic region) (pp. 186, 215, 226) with consequent disparities in living standards and disturbances of the synchronous formation of new territorial production complexes (p. 20). The au-

thors attribute these occurrences to the violation of elementary economic laws, but such violations are said to be the result of subjective causes rather than generated by the Soviet economic system as such (p. 20). This is a debatable assertion, to say the least.

- b. Disharmony between the levels of development of Departments I and II (pp. 163, 196, 200) and between the "productive" and "nonproductive" spheres of economic activity. Woloboi and Popovkin imply that enough is enough and would welcome some diminution in the disparities of growth rates between the two departments and the two spheres (pp. 162, 196, 200, 223). It will be recalled that these disparities in growth rates are the consequence of policies pursued by the CPSU for many decades and declared by it to be an inviolable law of Communist construction.
- c. Imbalance between branches producing finished output as against those producing raw materials, fuel, and semifabricates (p. 196). The authors consider the low proportion which processing occupies in total output to be the chief defect in the present pattern of specialization in the Ukrainian economy (p. 186). This in turn leads to such undesirable consequences as inadequate supplies of the products of light industry (p. 163) and agriculture (e.g., in the Donets'-Dnieper economic region, p. 201).
- d. Excessive level of materials and capital use in contrast with underutilization of labor resources (p. 196). Volcboi and Popovkin regard the recent growth in the capital intensity of output as an undesirable development (pp. 134, 161, 203, 211, 215) since their own statistical calculations indicate this has led to a decline in fixed asset yields of between 7 and 10 percent as compared with 1958 (pp. 95, 163).
- e. Excessive growth of industry (p. 158) and neglect of, and disproportions within, agriculture. The treatment of agriculture is recognized by the authors to have been so unfair that they are moved to remind the planners to treat agriculture as an equal partner of industry (p. 219). Livestock raising is said to suffer from an inadequate fodder base (pp. 154, 162, 200, 216-17). The authors also advocate greater attention on the part of the authorities to fish and wild animal breeding, the latter to encourage hunting (p. 72).

- f. Shortages of water resources in some highly industrialized regions of the republic (pp. 67, 191, 196, 201) as well as excessive river water pollution (p. 68), and shortages of timber as a result of excessive logging (p. 70) accompanied by inadequate reforestation measures (p. 71).
- g. Shortages of fuel and energy resources (pp. 123–24, 188, 189, 191, 200, 201) leading to a retardation in the rate of industrial development and a consequent paucity of employment opportunities affecting certain regions of the Ukraine more seriously than others (p. 186).
- h. Inadequate and overstrained freight and passenger transport facilities (p. 200), an excessive amount of cross-hauling of freights to and from the Ukraine (p. 113), and the consequent empty and half-empty runs on the railroad network (p. 174).

EXCESSIVE CONCENTRATION IN EXTRACTIVE AND CAPITAL INTENSIVE RESOURCE USE. The predominance of extractive, raw material, and semifabricated products in the Ukrainian economy may be viewed as a sign of structural disproportions between and within industry branches and sectors of the economy. When discussing the degree of specialization attained by various industry branches in the Ukrainian economy, Voloboi and Popovkin repeatedly stress that the highest specialization level (as defined by indexes developed by the authors) is found among the predominantly extractive, raw material, and some material intensive branches (pp. 127, 158, 187, 211, 213). This is confirmed by data relating in particular to the Donets'-Dnieper economic region (pp. 139–41). Commenting on the data in Table 30 (pp. 139–41), Voloboi and Popovkin conclude that the highest degree of specialization is discernible among the extractive, raw material, and material-intensive industry branches (p. 141).⁴

In 1969 the share of raw materials and other resource-related production as components of overall industrial production outlays in the Ukraine was 63.2 percent, ranging from 53.2 percent in heavy metallurgy to 81 percent in oil processing (p. 55). Table 1 indicates that the annual rate of extraction of many ores and minerals as a percentage contribution to total Soviet supplies in 1968 far exceeds the Ukraine's share in the estimated USSR reserves of the relevant ores and miner-

⁴ The economics of the Ukrainian mineral resources is discussed in A. S. Romaniuk and I. Slowikowski, "The Non-Renewable Resources of Ukraine," in P. J. Potichnyj (ed.), *Ukraine in the Seventies* (Oakville, Ontario: Mosaic Press, 1975).

Table 1

The Ukraine's Share of Resources and Output in
Extractive Industries

	Percentage Share in Aggregate USSR Reserves	Percentage Share in Annual Rate of Extraction (for 1968)
Coal	15.9	33.2
Brown coal	1.2	2.0
Oil	—	3.0
Natural gas	20.0	30.0
Iron ores	31.7	54.9
Manganese ores	84.1	71.4
Sulphur	—	89.0
Rock salt	10.0	34.9
Potassium salt	7.7	10.8
Saline solution	100.0	100.0
Graphite	34.3	61.4
Caoline	26.3	38.5
Dolomite	33.2	47.7
Heat-resistant clays	29.2	40.3
Ozokerite	46.0	19.6
Gypsum	39.3	21.7
Furnace clays	71.3	—
Chalk	34.3	31.3

Source: Voloboi and Popovkin, *op. cit.*, p. 56. The authors derived the data from the union and the Ukrainian regional geological surveys.

als. Nevertheless, Voloboi and Popovkin expect that extractive, raw-material, and semifabricated products will continue to predominate among the Ukraine's contributions to the Soviet export effort (p. 184).

Expressed in relative terms, the value of fixed assets employed in the Ukraine's heavy metallurgy exceeds the USSR average for this branch by 2½ times (p. 94). Voloboi and Popovkin welcome the gradual shift in the Ukraine from such capital-intensive branches as heavy metallurgy and the fuel industry towards more labor-intensive branches, such as machine building, metalworking, and the chemical

and light industries (pp. 95, 136), although such shifts have been rather minor (Table 48, pp. 210, 211, 214–15). Voloboi and Popovkin describe the Ukraine as the foundry, the smith-works, “the coal and metal base” (p. 212) of Soviet industrialization and of its post-World War II reconstruction (p.213).⁵ But while they used such strong-worded expressions as “predatory exploitation” when referring to the cultivation of land in the Ukraine in pre-Revolutionary times (p. 112), their language is restrained when they comment on the predominantly extractive bias of present-day resource used in the Ukraine (p. 187).

UNDEREMPLOYMENT OF LABOR AND OF OTHER RESOURCES. Despite the excessive emphasis on extractive activities and capital-intensive branches, inadequate use is being made of some resources which the Ukraine has in abundance. These include natural conditions favorable to human habitat, an advantageous geographical location, and a well-developed transport network (pp. 187, 213). But chief among the underutilized resources is the labor force. According to Voloboi and Popovkin, unskilled and semi-skilled labor as well as scientific personnel within the republic are not used to full capacity (pp. 134, 186) despite the rather low population increase in recent years (an average annual rate of 1.1 percent between 1959 and 1970, p. 79). Judging from remarks made by the authors, unemployment or underemployment among women is higher than that among men, particularly so in small- and medium-sized urban settlements (pp. 88, 142, 201). These flaws are aggravated by excessive labor migration from certain rural districts of the Ukraine to urban centers, depriving agriculture of its able-bodied work force and leading to undesirable reductions in agricultural output (p. 158). Some labor shortages are experienced in the industrial areas of the Southern economic region of the Ukraine (p. 165).

These revelations are significant because the question of unemployment is highly sensitive in Soviet economic dogma and policy, and reliable evidence on unemployment has not been published in the USSR since the early 1930s. While few Soviet economists take the level of labor utilization into account (p. 43), Voloboi and Popovkin, in their own aggregate index of regional economic development, assign

⁵ For an extensive study of industrial development before World War II, see I. S. Koropecyij, *Location Problems in Soviet Industry before World War II: The Case of the Ukraine* (Chapel Hill: The University of North Carolina Press, 1965); also his article “Structural Changes in Ukrainian Industry before World War II,” in *The Annals of the Ukrainian Academy of Arts and Sciences in the U.S.*, vol. XI, no. 1–2 (31–32), 1964–1968.

a weight to the employment indicator second only to that of the gross output indicator (p. 222). E. B. Alaev and M. M. Ippa are among those noted to recommend the inclusion of an employment indicator in their regional development and specialization formulae (pp. 24, 41).

The authors are therefore forced to resort to a long-standing but by now discredited Soviet practice of concealing absolute figures behind percentage indexes, purporting to indicate the intensity of labor utilization in various sub-regions of the Ukraine, relative to the Ukraine-wide index of 100 (pp. 87, 221). This is despite the availability of some employment statistics in absolute terms, cited by the authors themselves (Table 37, p. 159). They are careful not to relate the Ukraine-wide index to its USSR-wide equivalent, lest "outsiders" deduce their own estimates and jump to unwelcome conclusions regarding unemployment levels in the Ukraine as compared with the rest of the USSR. The authors make no attempt to spell out explicitly the content and meaning of the 100 percent of intensity of labor utilization, other than to indicate by implication that it is less than "full employment" since certain districts within the Ukraine are shown to enjoy employment levels in excess of 100 percent. Apart from these regrettable but understandable lapses, we note here a revealing application of the index method to the problem of unemployment. Voloboi and Popovkin go to considerable lengths throughout the monograph to alert policy-makers to inadequate and unevenly distributed employment opportunities throughout the republic and to the urgent need to create a greater number and variety of jobs for the expanding labor force of the Ukraine (p. 163).

UKRAINE'S PATTERN OF SPECIALIZATION AND CONTRIBUTION TO THE UNION

Much has already been said about the Ukraine's pattern of specialization in our preceding discussion of the excessive concentration on extractive, raw material, and capital-intensive industry branches. According to Voloboi and Popovkin, industry generates three-quarters of the aggregate value of industrial and agricultural output of the republic (p. 157). (*Note:* There appears to be a typographical error in the text where the word "and" is omitted in the phrase ". . . the volume of aggregate output of industrial (and) agricultural production . . ."). The authors find that the Ukraine at present enjoys an absolute advantage in terms of lower prime cost in the case of at least

80 out of 100 of the most important types of industrial output as compared with the average for the USSR (p. 214). Their attempt to distinguish specializing from non-specializing industry branches within the Ukraine uses a combination of three criteria—industrial output, national income, and labor force characteristics—and compares the results for the Ukraine with those for the USSR as a whole. It is shown that the Ukraine specializes in 30 out of 63 branches (p. 137). With regard to the overall standing of the republic within the union, there is agreement that:

- a. Almost two-thirds of the most significant types of industrial output produced in the Ukraine have a prime cost which is lower than the corresponding USSR-wide prime cost.
- b. The republic is specializing within the pattern of all-union division of labor in precisely those types of output in which it enjoys favorable natural and economic conditions (p. 133).
- c. The Ukraine specializes in almost all branches of agriculture and animal husbandry with the exception of wool growing (p. 152).⁶

The description of the Ukraine as the “coal and metal base” of Soviet industrialization and post-war reconstruction (pp. 212–13) has already been cited. The authors also concede that the Ukraine contributed significantly towards the economic development of Imperial Russia during the Tsarist regime (p. 110),⁷ the industrialization drive in other Soviet republics (p. 113, 114),⁸ and the defense potential of the USSR as a whole over a long period of time (p. 212).

Using Marxist terminology, the authors note that the Ukraine’s contribution to Soviet economic development is facilitated by the redistribution of national income and “surplus product” between regions (p. 47). Information on such redistribution is however not readily obtainable, but Voloboi and Popovkin are not entirely correct in claiming that national income estimates are not computed for the republics and economic regions (p. 49).⁹

⁶ For a discussion of specialization in Ukrainian agriculture, see I. Stebelsky, “Ukrainian Agriculture: The Problems of Specialization and Intensification in Perspective,” in *Pouchnyj*, op. cit.

⁷ This has long been stressed by Western scholars. See, for example, Z. L. Melnyk, “Ukraine in Soviet Economic Development.” *The Ukrainian Quarterly*, Spring 1973.

⁸ Estimates of the Ukraine’s contributions to the Soviet industrialization drive during the First Five Year Plan can be found in Z. L. Melnyk, *Soviet Capital Formation: Ukraine, 1928/29–1932* (Munich: Ukrainian Free University Press, 1965); see also his article “Regional Contribution to Capital Formation in the USSR: A Case of the Ukrainian Republic,” in *Bandera and Melnyk*, op. cit.

⁹ On this, see I. S. Koropecykyj, “Methodological Problems of Calculating National Income for Soviet Republics,” *Journal of Regional Science*, 1972, no. 3.

The Ukraine has also played a significant role in the economic development of COMECON member nations (p. 215). Further, she has contributed raw materials for the industrial needs of some of the capitalist countries and has supported the developmental effort of Third World nations. Thus, Voloboi and Popovkin inform us that the Ukrainian SSR exports raw materials, fuel, semifabricates, and machinery and equipment to COMECON member countries (p. 178). The republic exports extractive and other raw materials to the U.K., France, Finland, and the U.S. (p. 178). Underdeveloped countries in Africa, Asia, and Latin America also benefit from trade links with the Ukrainian SSR (pp. 178-79).

Many policy recommendations proposed by the authors follow from their assessment of disproportions and shortages within the Ukrainian economy and need not be spelt out again. A glaring case of contravention of the Ukraine's economic interests is their recommendation that costly Donets' coal should continue to be mined simply because it is required by the majority of the economic regions of the European part of the USSR and by COMECON member nations (pp. 133-34). They apply the same argument to the mining of manganese and natural gas (p. 134). The Ukraine could presumably use its labor and capital resources to greater advantage by transferring some of them from the production of costly or uneconomic materials to those in whose production it has a comparative advantage over other regions of the USSR. Voloboi and Popovkin advise against forcing the pace of development of industries involved in the production of articles of organic synthesis, in view of their high energy and water inputs that are in short supply, as noted, and the underdeveloped state of the oil processing industry in the Ukraine (p. 134). Some of their recommendations appear in disguised form as predictions (too detailed to be discussed here) regarding changes in the pattern of specialization, development, and resource use in the immediate future as well as in the 1980s, and beyond (pp. 179-80, 205). An extensive discussion of explicit and implied recommendations is also offered in Chapter 4, particularly in its Section 2 entitled "Ways of Raising the Effectiveness of the Integrated Development of the National Economy of the Ukrainian SSR" (pp. 195-202).

SOME CONCLUDING REMARKS

It has already been observed that the work under review constitutes a serious attempt by two Soviet writers to come to grips with conceptual and methodological problems in the subject area of regional

specialization. Their effort is especially valuable because it concentrates on the specialization of a well-defined major component of the union, a subject of increasing interest in the USSR, but poorly comprehended abroad. The book pays no attention whatever to the institutional and organizational procedures developed over the decades by the Soviet state for managing regional planning and specialization. In other words, we are told nothing about who decides which region of the USSR shall specialize in this or that line of production. We are told little explicitly about the actual criteria—whether political or economic—used by planners, high and low, to decide what the pattern specialization shall be. It may be surmised that the neglect of this fascinating subject of the decision-making process is by no means accidental. To put the matter bluntly, the authors avoid dwelling on the degree of centralization involved in this, as in most other Soviet decision-making processes.¹⁰ There is a remarkable lack of comment on the effects of the 1965 economic reform in stimulating production in the Ukraine and elsewhere. Although that reform intimately involved the republics, Voloboi and Popovkin seem to regard it as a “non-event.”

As is usual for Soviet books, citation of sources and references for statistical tables contained in the book are often either inadequate or missing altogether. The monograph contains neither a subject nor an author index, so that the present reviewer had to compile one in order to fully comprehend and evaluate the volume.

One final comment ought to be made regarding the method. Voloboi and Popovkin seem blissfully unaware that, in dealing with regional specialization, they are discussing an aspect of international trade theory. Hence they fail to bring into their analysis useful conceptual tools (such as the distinction between absolute and comparative advantage) developed over the last 100 years or so by Western economists. It may well be that the notion of the Ukraine as a trading partner *vis-à-vis* other republics (including the RSFSR) on terms of reciprocal advantage is unacceptable to central authorities domiciled in the capital city of both the RSFSR and the USSR.¹¹ Be it as it may, the Ukraine trades (i.e., exchanges goods and, hence, specializes) with the rest of the union as well as with outside countries. Therefore

¹⁰ See S. A. Billon, “Centralization of Authority in Regional Management,” in Bandera and Melnyk, *op. cit.*

¹¹ In this connection, see the estimated balance-of-payments account by V. N. Bandera, “Interdependence between Interregional and International Payments: The Balance of Payments of Ukraine,” in Bandera and Melnyk, *op. cit.*

regional and international economic analysis are intertwined. In other words, spatial economics pertaining to the Ukraine must encompass intrarepublic, interrepublic, as well as international economic transactions, all of which involve intrinsically the economic fabric of the republic.

Roman Rozdolski, *Die Grosse Steuer-und Agrarreform Josefs II* (Warsaw: Panstwowe Wydawnictwo Naukowe, 1961) pp. 9–195.

Specialists in the economy of the Ukraine will find this excursion into economic history an especially valuable one. The late Professor Rozdolski was widely respected as a specialist in Marxism. Although he is best known for his work in Marxist theory, he, like many Marxists, had a long-standing interest in economic history. His extensive archival research on the tax and agrarian reforms of Joseph II of Austria in the 1780s is a fascinating product of this historical interest. After the Habsburg Monarchy incorporated Polish and Turkish territories in the period 1772–95, they became home for several million Ukrainians (about four million in 1913). Since Rozdolski himself spent most of the early life in his native Western Ukraine,¹ much of his analysis of the Josephinian reform period is concerned with this region of the former Monarchy.

In the 18th century the Habsburgs were faced with the problem of managing an unwieldy collection of multilingual territories in which feudal nobles often exercised extraordinary countervailing power against the crown in both economic and political matters. Consistent with the mercantilist policies of that era, Maria Theresa (1740–80) sought to centralize power and rationalize the administration of the Habsburg realms. Rozdolski's examination of Joseph's reforms (1780–90) should be viewed in this context. Continuing the work of his mother, Joseph launched a two-pronged attack on the economic front. First, he proposed a substantial reduction in the legal inferiority of the peasants by granting them the right to marry, to enter a profession, and to exchange holdings without the lord's permission. Second, he proposed a single tax based on the gross yields of all landholdings as the chief source of revenue for financing the growing expenditures of the crown. In the process, remaining dues and servitudes owed the lords by the peasants were converted into payments in cash or kind. The reform was less an attempt to relieve the burden of the peasants than it was to alter the distribution of income in favor of the crown, as against the nobles. Regardless of his motives, however, Joseph does stand out as a particularly "enlightened" ruler among Europe's absolutist monarchs. Had his reforms not been torpedoed after his death, economic growth might have been accelerated in the Habsburg lands, since the agrarian sector would have been placed on a more capitalistic basis.

¹ For his biography and bibliography, see *Entsyklopediia Ukrainoznavstva*, vol. 7 (Paris–New York, 1973), pp. 2553–54.

For Rozdolski, the chief villain in the demise of the Josephinian reforms was the landowning class, in particular the Polish nobles of Galicia and the powerful Magyar nobles in Hungary. They recognized clearly that Joseph's program was a direct threat to their economic power and the legal foundations upon which it rested. The noblemen's opposition was steady all through the 1780s but reached a fever pitch after the outbreak of the French Revolution in 1789 and the death of Joseph a year later. Lacking the strong advocacy of the Emperor and amidst the growing fear that violence would accompany the unleashing of democratic forces, the reform succumbed to the mounting anti-reform reaction.

Rozdolski is critical of those Polish and Hungarian historians who have viewed the assault on Joseph II as a "national" campaign of all non-German social classes against the "Germanizing" policies of the Habsburg crown. His view that the attack was ultimately rooted in the class interests of the landowning class seems largely supported by the evidence. However, the significance of this period for the future course of East European nationalism should not be ignored. What may have started as "aristocratic nationalisms" in the 18th century became increasingly powerful enough to weld together widely divergent class interests into broadly based nationalist movements. The ultimate disintegration of the multi-national Habsburg state in the aftermath of World War I is ample testimony to the tremendous power of these nationalist forces.

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Chronicle

During the period from August 5, 1971, to December 18, 1976, the following lectures were delivered at the plenary sessions of the Academy:

- January 29, 1972 Conference together with the Commission for the Study of the History of Ukrainian-Jewish Relations
- Omeljan Pritsak: "The Cultural Interaction between the Jews and the Local Population at the Time of Kievan Rus'"
- April 23, 1972 • Bohdan Y. Cymbalista: "Goals and Methods of the Education of Ukrainian Youth in America Aimed at the Preserving of its Ukrainian Ethnic Identity"
- May 6, 1972 Grand Conference in honor of Taras Shevchenko
- George Y. Shevelov: "From Kulish to Siniavskii (a Fragment from the History of the Study of Shevchenko's Idiom)"
 - Oleksander Ohloblyn: "The Problem of Shevchenko's Relations with Ukrainians"
 - Joseph Hirniak: Recitation of Panteleimon Kulish's Eulogy of Shevchenko"
- May 13, 1972 • Roman Osinchuk, M.D.: "Nutrition and its Effect on Arteriosclerosis"
- December 16, 1972 • George Y. Shevelov: "Two Episodes of Contact between the Ukrainians and Foreigners"
- April 7, 1973 Grand Conference in honor of Taras Shevchenko
- John Fizer: Opening Address
 - Petro Odarchenko: "Review of the Recent Publications in the Field of Shevchenko Studies"
 - Petro Holubenko: "From Shevchenko up to Modern Times (Symbols of Ukrainian Romanticism)"
 - Iwan Zamsha: "Reminiscences on the Celebration of the Hundredth Anniversary of Shevchenko's Birth in Harbin, 1914"
- April 14, 1973 Conference commemorating the first anniversary of the death of Wolodymyr Mijakowskyj, the founder and curator of the Academy Museum-Archives and Library
- Oleksander Ohloblyn: Opening Address

- Vasyl Omelchenko: "Wolodymyr Mijakowskyj's Life and Work"
- Marko Antonovych: "The History of the 19th Century in Wolodymyr Mijakowskyj's Works"

May 19, 1973

Conference commemorating the 40th anniversary of the famine in the Ukraine in the years 1932–1933

- Timothy Sosnovy: "The Famine in the Ukraine in the Years 1932–1933"
- Vsevolod Holubnychy: "Immediate Economic Reasons and Results of the Famine in the Ukraine in the Years 1932–1933"
- Walter Dushnyck: "The Famine in the Ukraine of 1932–1933 as Reflected in the American Press"
- Joseph Hirniak: Recitation of excerpts from Ukrainian literature depicting the famine in the Ukraine of 1932–1933

October 27, 1973

Grand Conference together with the Ukrainian Historical Association in the U.S.A., the Harvard Ukrainian Research Institute, and the Historical-Philosophical Section of the Shevchenko Scientific Society, in observance of the hundredth anniversary of the Shevchenko Scientific Society

- Volodymyr Kubijovyc: "The Resuming of the Activities of the Shevchenko Scientific Society Abroad"
- Lubomyr R. Wynar: "Hrushevs'kyi's Period in the History of the Shevchenko Scientific Society"
- Omeljan Pritsak: "The Shevchenko Scientific Society in the Period Between the two World Wars"
- Yaroslav Padoch: "Scholarly Work in the Field of Law Conducted at the Shevchenko Scientific Society during a Hundred Years"
- Bohdan Krawciw: "Studies of Literature in Publications of Shevchenko Scientific Society"
- Vasyl Lencyk: "Scholarly Publications of the Shevchenko Scientific Society in 1913–1939"
- Kost Pankiowskyj: "Reminiscences on the Shevchenko Scientific Society"

December 8, 1973

- Constantine V. Warvariv: "Universal Declaration of Human Rights from 25 Years' Perspective"

- April 7, 1974 Grand Conference in honor of Taras Shevchenko
- George Y. Shevelov: Opening Address
 - Petro Odarchenko: "Taras Shevchenko and his Predecessors, Skovoroda, and Kotliarevs'kyi"
 - Bohdan Rubchak: "Profile and Masks in Shevchenko's Lyrics"
- November 10, 1974 Grand Conference in honor of the 95th birthday of Borys Martos, head of the Economics and Law Section of the Academy, prominent Ukrainian statesman, leader in the fields of Ukrainian civic affairs, cooperative movement and academic life
- Vsevolod Holubnychy: "Political and Scholarly Activities of Professor Borys Martos"
 - M. Bida: "Martos' Contribution to the Development of Ukrainian Economics Science"
 - Iwan Zamsha: "Borys Martos as Theoretician and Organizer of the Ukrainian Cooperative Movement"
- December 14, 1974 Grand Conference commemorating Kost Pankiivskyj, Ukrainian political and civic leader
- Stephen Ripetsky: "Dr. Kost Pankiivskyj—Man and Citizen"
 - Lev Holinaty: "Dr. Kost Pankiivskyj's Youth"
 - Lubov Drashevskaja: "My Meetings and Collaboration with Dr. Pankiivskyj"
 - Tayisa Bohdanska, piano recital
- March 30, 1975 The Conference together with the Department of Slavic Languages, Columbia University, and the Department of Slavic Languages and Literatures, New York University, in observance of the second anniversary of the death of Boris O. Unbegaun, Professor of Comparative Slavonic Philology at Oxford, Columbia, and New York Universities, member of the Ukrainian Academy of Arts and Sciences in the U.S.
- Robert L. Belknap: "A Slavist in New York"
 - Andrey Kodjak: "Boris O. Unbegaun as a Colleague and Friend"
 - Valerie O. Filipp: "Boris O. Unbegaun: His Life and Works"

- Rado L. Lencek: "Boris Unbegaun's Paradox"
- George Y. Shevelov: "Features of a Scholarly Profile"

September 13, 1975

Conference together with the Mathematical-Physical Section of the Shevchenko Scientific Society; from the series of the conferences marking the 25th anniversary of the Academy

- Vasyl Omelchenko: Opening Address
The First Session—"Atom": Chairman, Volodymyr Petryshyn
- Ihor Kunash: "Lithium—from Ceramics to Nuclear Energy"
- Roman Voronka: "Stochastic Models in Mathematical Genetics"
- Theodore Kostiuk: "Infrared Rays and Cosmos"
The Second Session—"Cell": Chairman, Sviatoslav Trokhymenko
- Christine Spolska: "Cell and Heredity"
- Andriy Zvarun: "Radioactive Marking of Bacteria"
- Oleh Tretiak: "The Basis of Electromagnetic Usage in Medicine"
The Third Session—"Man": Chairman, Oleksa Bilaniuk
- Renata Holod: "Architecture and Geometry"
- Tit Hevryk: "Architecture of Kiev in the 1930s"
- Eugene Lashchuk: "Structure of Scientific Cognition"

December 20, 1975

- Oleksander Ohloblyn: Opening Address
- Volodymyr Kubijovyc: "Migration Processes in the Ukrainian SSR Indicated by the Census of 1970"

February 14, 1976

Conference on the State of Social Sciences in the Soviet Ukraine and Belorussia sponsored by the Academy and the Program on Soviet Nationality Problems, Columbia University; took place in the School of International Affairs, Columbia University

- E. Allworth and George Y. Shevelov: "Opening Remarks"
- History: Chairwoman, A. Procyk

Speakers: I. Myhul and J. Zaprudnik

Anthropology: Chairman, K. Sawczuk

Speaker: G. Edynak

Geography-Demography: Chairman, R. Lewis

Speakers: V. Kipel, S. Prociuk, and V. Kachmarsky

Political Science: Chairman, Y. Bilinsky

Speakers: O. Fedyshyn and J. Danko

Sociology: Chairman, V. Nahirny

Speakers: W. Fisher and Markc Kuchment

Economics: Chairman, I. S. Koropecykj

Speakers: V. Holubnychy and V. Znayenko

- E. Kasinec: "Library and Information Service in the Soviet Union, 1964-1975"

- O. Fedyshyn: "Summing It Up"

April 10, 1976

- Omeljan Pritsak: "Prolegomena to the Ukrainian Intellectual History of the 19th Century"

April 17 and 18, 1976

Conference commemorating the 100th anniversary of the birth of academician Serhii Iefremov

- George Y. Shevelov: Opening Address

- Jurij Bojko: "The Methodological Foundation of Iefremov's Research on the History of Literature"

- Maria Ovcharenko: "Serhii Iefremov and the Post-Revolutionary Ukrainian Literature"

- Petro Odarchenko: "Iefremov as a Student of Shevchenko"

- George G. Grabowicz: "Iefremov as a Historian of Ukrainian Literature"

- Petro Holubenko: "Iefremov as a Journalist"

- Valerian Revutsky: "The Correspondence of Serhii Iefremov with Ivan and Sofiia Tobilevych"

- Marko Antonovych: "Iefremov and the Youth Circle in Kiev Surrounding Oleksander Konys'kyi"

- Hryhory Kostiuk: "Iefremov and Vynnychenko"

- John Fizer: Closing Remarks

May 16, 1976

Conference marking the hundredth anniversary of the Ems Ukase forbidding the printing and teaching in Ukrainian

- Vasyl Omelchenko: Opening Address
 - Jurij Lawrynenko: "Political Movement of Vil'na Spilka as the Answer to the Ems Ukase Forbidding the Ukrainian Culture"
 - Marko Antonovych: "Measures Undertaken by the Ukrainians to Resist the Results of the Ems Ukase"
- Roman Solchanyk "Mykhailo Drahomanov and the Ems Ukase"

November 28, 1976

- George Y. Shevelov: "A Fragment from the History of the Sounds (ʀ and ʁ) in the Ukrainian Language"

Literary and Philological Section

August 5, 1971

- Jacob P. Hursky: "The 100th Anniversary of the Birth of Vasyl' Stefanyk"

February 24, 1974

- Oksana Asher: "Topics in the Poetry of Mykhailo Draï-Khmara"

November 17, 1974

- Eugene Fedorenko: "Mykhailo Kotsiubyns'kyi as Impressionist"

February 1, 1975

- Hryhory Kostiuk: Opening Address
- Oksana Asher: "A Profile of Mykhailo Draï-Khmara"

February 23, 1975

- Hryhory Kostiuk: Opening Address
- Vasyl Hryshko: "The Problem of Nikolai Gogol's Bilingualism"

April 19, 1975

- Marko Antonovych: "Wolodymyr Mijakowskyj as a Student of Shevchenko"

December 7, 1975

- Vitalij Keis: "Symbolism and the Ukrainian Modern Poetry of the Early 20th Century"

February 22, 1976

- Hryhory Kostiuk: Opening Address
- George G. Grabowicz: "The Ukraine's Myth in Gogol's Writings"

Historical Section

November 6, 1971

The Ninth Annual Conference of Historians and Social Scientists Devoted to the Problems of Galicia in the Period between two World Wars

- Vasyl Omelchenko: Opening Address

- Roman Ilnytzkyj: "The Impact of Ukrainization on the Policy of the Western Ukraine in the 1920s"
 - Roman Solchanyk: "The Ukrainian Problem in Poland and the Policy of the Communist Party of the Western Ukraine"
 - Taras Hunczak: "Galicia as seen by the British Consul General Savery"

- February 12, 1972
 - John V. Sweet: "Four Ukrainian Congresses in the Far East and Two Congresses in Siberia, 1917–1921"

- February 26, 1972
 - Taras Hunczak: "Political Aspects of Berest' Union"

- March 11, 1972
 - Julian Revay: "The Carpatho-Ukraine in 1939"

- May 27, 1972
 - Omeljan Pritsak: "The Problem of Authenticity of the Ancient Hebrew Document on Oleh the Seer"

- September 10, 1972
 - Michael Woskobijnyk: "The Nationality Problem in Russia in the Years 1905–1907"

- February 10, 1973

The Conference devoted to the Ukrainian historical Materials in Polish, Austrian, and French Archives

 - Vasyl Omelchenko: Opening Address

Reports: Orest Subtelny and Lyubomyr Hajda

- February 18, 1973
 - Michael Woskobijnyk: "The Development of Nationalism among non-Russian Peoples Prior to the Revolution of 1905"

- March 4, 1973
 - Michael Woskobijnyk: "Demands Related to the Ukrainian Nationality Problem in the First and Second Russian State Dumas"

- May 18, 1974
 - George Perchorowycz: "A Mystery of the Svitiaz' Lake in Volhynia"

- May 25, 1974

The Conference of Historians and Social Scientists together with the Commission for the Study of Ukrainian-Jewish Relations

Taras Hunczak: Opening Address

 - Henry Huttenbach: "Ideological Origins of Anti-Semitism in Russia"
 - Omeljan Pritsak: "The Role of the Bosphorus Kingdom and Late Hellenism as the Basis for the Medieval Cultures of the Territories North of the Black Sea"

- April 15, 1975 The Annual Conference of Historians and Social Scientists together with the Commission for the Study of Ukrainian-Jewish Relations
- Lila Everest: "Ukrainian-Jewish Relations in Galicia in the Years 1905-1907"
 - Taras Hunczak: "Sir Lewis Namier and Struggle for Eastern Galicia in the years 1918-1920"
 - Michael Woskobijnyk: "First Attempts of Ukrainian-Jewish Cooperation in the Years 1905-1907"
- April 27, 1975 • Rev. Semen Hajuk: "The Polots'k Act of Reunification of Uniates with the Orthodox Church in 1839 and its Main Executors"
- October 25, 1975 The conference from the series marking the 25th anniversary of the Academy
- Ivan Novosivsky: "A Contribution to the History of Chernivtsi University on the Occasion of its Hundredth Anniversary"
- March 7, 1976 • John V. Sweet: "Four Drafts of the Constitution for Russian Empire and the Ukraine (Decembrists Pestel' and Muraviev, Minister Melikov, and Mykhailo Drahomanov)"
- December 5, 1976 • Rev. Semen Haiuk: "St. Teodozii Uhlyts'kyi, Archbishop of Chernihiv, and His Time"
- Ancient History Section*
- December 18, 1971 • Alexander Dómbrovsky: "Beginnings of the Greek Historiography"
- April 5, 1975 Conference commemorating the 20th Anniversary of the Commission Work
- Alexander Dombrovsky: "On the Problem of Dividing into Periods and the Terminology of the Early History of the Ukraine"
 - Tatiana Iwaniwsky: "Problems of the Art Development during the Post-Scythian Period on the Territory of the Ukraine and Adjacent Countries"
- December 11, 1976 • Alexander Dombrovsky: "Genesis and Development of the Ancient Historiography"

Economics and Law Section

- December 28, 1973
- V. N. Bandera: Opening Address
 - V. Holubnychy: "Research Directions of the Economists in the Ukraine"
 - I. S. Koropeckyj: "Research of Ukrainian Economists in the West"

Archeological and Anthropological Institute

- June 3, 1972
- George Perchorowycz: "Critical Review of Professor M. Gimbutas' Book on the Origin of Slavs"
- November 4, 1972
- Neonila Kordysh-Holovko: "An Ancient Settlement of the Trypillian Culture near the Volodymyrivka Village (Pidvysots'kyi Rayon Kirov Oblast)"
- December 1, 1973
- George Perchorowycz: "What is 'Chrti' and 'Rizy'?"
- March 23, 1974
- Yuri Shumovsky: "Archeological Treasure of West Africa as Witnessed by the Speaker during his Research"
- November 9, 1975
- The conference from the series marking the 25th anniversary of the Academy
- Neonila Kordysh-Holovko: "Excavation of the Trypillian Culture in the Dnister River Basin"
 - Tatiana Iwaniwsky: "Scythian Art"
 - Alexander Dombrowsky: "Tavryda in the Ancient World"

Commission for the Study of the Post-Revolutionary Ukraine and the Soviet Union

- April 20, 1974
- Omeljan Pritsak: "Ukrainian Problem at the Conference in Yassy, November 1918"
- November 2, 1974
- Taras Hunczak: "An Attempt in Kiev in 1923 at Organizing an Ukrainian-British Enterprise"
- November 16, 1974
- Mykhaylo Yeremiiv: "Four Universals of the Central Rada on the Background of the Events of the Ukrainian Revolution (Comments of a Contemporary and Universals' Co-author)"

- November 30, 1974 • Iwan M. Novosivsky: "The International Diplomatic Struggle for Bessarabia in the Years 1918–1920"

Biological–Medical Section

- September 25, 1971 • Alexander Archimovych: "The History of the Founding of the Protozoological Laboratory Attached to the Academy and Research Conducted there"
• Serhij Krasheninnikov: "Electronic Microscope and its Importance in Biological Research"
- September 30, 1972 • Th. Welykokhatko: "Polygenesis (On the Problem of the Evolution of Life on the Earth)"
• Alexander Archimovych: "The Regional Study of the Flora in the U.S.A."
• Serhij Krasheninnikov: "Observations of the Ultrastructure of *Balantidium Coli*"
- January 26, 1974 • Roman Osinchuk, M.D.: delivered a lecture
- March 2, 1975 • Oleh Wolyansky, M.D.: "New Horizons in Cytogenetics"
- November 15, 1975 • Jaroslav Turkalo, M.D.: "Medicine and Surgery in Modern China (Impressions from Visiting Hospitals in Peking, Shanghai, and Canton)"; the lecture was illustrated with slides
- November 22, 1975 • George W. Lucyszyn: two lectures—"Clinical Laboratories in Modern Guatamala"
"Guatamala at the Time of the Mayas and Today"
- February 28–29, 1976 The Conference together with the Chemical-Biological-Medical Section of the American Shevchenko Scientific Society
The First Session—Chemistry and Geology: Chairman, Oleh Kononenko
• Mykhaylo Dymitsky: "Syntheses and Structure of Alkalic Salts of Iron-nitroso Sulfides"
• Ivan Oleksyshyn: "Mineral Reserves of the Ukraine and their Distribution over the Ukrainian Territory"
• Orest Popovych: "A Comparison of Ions Activity and Electrical Potentials in Various Solvents"

The Second Session—Biology and Agriculture: Chairwoman, Lubow Margolena-Hansen

- Kira Archimovych: "The World Famous Ukrainian Botanists and Michurin's Part in Their Perishing"
- Alexander Archimovych: "A Geographical Distribution of the World Production of Crops"
- H. Haharin: "Wheat Revolution in the Ukraine"
- Ivan Hromyk: "Fifty Years of the Selection and Research of Crops and Legumes at the Ulady's'ko-Liulinets'ka Agricultural Selection Station"
- Ivan Hromyk: "The Last Scientific Expedition of Academician Nikolai Vavilov in 1940 to the Western Ukraine and Northern Bukovina"
- Roman Kobrynsky: "Forest and Hunt in the Old Ukrainian Law"
- Wolodymyr Lazorko: "On the Problem of the Occurrence in the Ukraine of the Butterfly *Parnassius Apollo L.*"
- Roman Maksymovych: "Gibberellic Acid as a Regulator of the Development of the Terminal Bud and Leaves in Plants"
- Lubow Margolena Hansen: "The Alpine Flora of Northern Italy"
- Mykola Ostapiak: "The Soviet Inquisition in Biology and Agricultural Sciences in the USSR and specifically in the Ukraine"

The Third Session—Medicine: Chairmen, Bohdan Hordynsky, M.D. and Roman Osinchuk, M.D.

Oleh Wolyansky, M.D.: "Genetic Investigation of Congenital Defects in Metabolism"

- Bohdan Hordynsky, M.D.: "Terpenes in the Medical Treatment of Diabetes"
- George W. Lucyszyn: "A Clinical Chemical Laboratory in Central America"
- Roman Osinchuk, M.D.: "A Treatment with Corticosteroids Yesterday and Today"
- Mykhaylo Stefaniv: "Biochemical Reactions Accompanying the Bacteriostatic and Bactericide Actions of Antibiotics"
- Mychaylo Stefaniv: "A Defect in the Genetic Mechanism of Cholesterol Metabolism as a Reason of Inherited Hypercholesteromy"

- December 18, 1976 Physicians' Panel: "Headache from the Point of View of Specialists"
- Dr. Roman Osinchuk: Opening Address
 - Dr. Yuri Truchly, Orthopedic Surgeon, Moderator
- Participants:
- Dr. Oleh Wolyansky, Psychiatry and Neurology
 - Dr. Yuri Kushnir, Dentistry
 - Dr. Markian Migotsky, E.N.T.
 - Dr. Rostyslav Sochynsky, General Practice
 - Dr. Taras Shegedin, Ophthalmology
 - Dr. Danylo Shemlka, Neurological Surgery

Technical and Physico-Chemical-Mathematical Section

- December 11, 1971 • A. Libatsky: "Some Problems of Modern Oceanography"
- May 11, 1974 • O. Bilaniuk: "On the Road of Mastering the Hydrogen Energy and the Present State of Competition between the West and East"
- February 8, 1975 • Ivan E. Zukovskyy: "Ukrainian Church Architecture in the Countries Outside the Ukraine"
- November 21, 1976 • Ivan Zayac: "Number and Architecture (a Philosophical Essay)"

Musicological Section

- February 6, 1972 Conference and Concert commemorating the great Ukrainian composer Mykola Leontovych on the occasion of the 50 anniversary of his tragic death
- Vasyl Zavitnevych: "Musical Compositions by Mykola Leontovych"
- Concert of Leontovych' choral music performed by the choir of St. Volodymyr Cathedral in New York City, Vasyl Zavitnevych, conductor; Soloists: Hanna Scherey, Olena Zamiata, Nina Galion, Yuri Fedorov
- March 31, 1974 Conference and Concert commemorating Nestor Horodovenko, a prominent choral conductor
- Vasyl Zavitnevych: "The Life of Nestor Horodovenko and his Work as Choral Director"

- Iwan Zamsha: "The First Steps of the Capella 'Dumka' organized in 1918 by Dniprosoiuz and Directed by Nestor Horodovenko"

Concert of Ukrainian folk songs arranged by Horodovenko; Soloists: Hanna Scherey, Olena Zamiata, Nina Galion, Yuri Fedorov

Commission for the Study of the History of Ukrainian-Jewish Relations

- October 2, 1971 • Ihor Huryn: "Jews in the Ukrainian Literature"
- February 4, 1973 • Lubow Margolena-Hansen: Opening Address
- Omeljan Pritsak: "Judaism and Hellenism in Eastern Europe in Times preceding the Establishment of the Kievan State"

Commission for the Study of Ukrainian-Polish Relations

- May 10, 1975 Conference with the participation of members of the Shevchenko Scientific Society
- The First Session: Chairman, Taras Hunczak
- Frank E. Sysyn: "Adam Kysil' and Polish-Ukrainian Relations in the 17th Century Commonwealth"
- M. K. Dziewanowski: "Pilsudski and Ukraine, 1918-1921"
- The Second Session: Chairman, Volodymyr Stoyko
- Roman Solchanyk: "The Guerilla Movement in the Western Ukraine and the Ukrainian Leftists in the Years 1918-1923"
- Ivan Kedryn-Rudnytsky: "Pilsudski and Poland's Nationality Policy"
- March 20, 1976 • Constantine Zelenko: "Ukrainian-Polish Relations: Synthesis of the Past History and Prospects for the Future"

Commission for the Study of the History of Ukrainian Immigration to the United States

- February 17, 1974 • John V. Sweet: "The Present State of the Ukraine Immigration in the U.S.A. on the Basis of Censuses of 1959-1970"
- November 7, 1976 Conference with the Participation of the Ukrainian Historical Association in the U.S.A.; from the series

of conferences marking the 25th Anniversary of the Academy and the centennial of the Ukrainian settlement in the U.S.A.

- Vasyl Omelchenko: Opening Address
- Rev. Meletius Woynar: "Foundations of the Ukrainian Catholic Church in America"
- John V. Sweet: "Alaskan Legends about the Ukrainian Zaporozhian Cossacks"

*Commission for the Preservation of the Literary Heritage of
Volodymyr Vynnychenko*

- December 9, 1972 • Hryhory Kostiuk: "The 70th Anniversary of the Appearance of Vynnychenko's Prose (on the Problem of Vynnychenko's Place and Significance in the Ukrainian Literary Development in the First Half of the 20th Century)"
- May 12, 1974 • Hryhory Kostiuk: "On 'Zakutok' and Vynnychenko's Grave in Mougín"
• Oksana Radysh: "Problems Involved in Putting in Order the Vynnychenko's Correspondence"
- May 19, 1974 • Laryssa Onyshkevych: "Vynnychenko's Drama 'Disharmony' and the Ideas of Existentialism"
- November 23, 1974 • Mykhaylo Yeremiiv: "Reminiscences on Volodymyr Vynnychenko"
- May 22, 1976 • Gregory Luzhnycky: "Vynnychenko's Dramas on Stage"

Fine Arts Group

- November 11, 1972 The Conference and Exhibit on the Occasion of the 100th Anniversary of Vasyl' Krychev'skyi's Birth
• J. Hnizdovsky: Opening Address
• Vadim Pavlovsky: "Vasyl' Krychev'skyi's Life and Creative Work"
The presentation of color slides of Krychev'skyi's paintings
- February 23, 1974 • Petro Cholodny: "Sviatoslav Hordynsky's Book: "The Ukrainian Icon of the 12th-18th Centuries""

Popular Talks and Travelogs

- March 4, 1972 • Jaroslav Turkalo: "Mount Sinai and St. Catherine Monastery"
- December 10, 1972 Film by Dimitri Horbay: "A Journey to the Ukraine and Kuban in September 1972"
- November 18, 1973 • Jaroslav Turkalo: two talks illustrated with slides
 "A Journey to the Town of Galati (Romania) in Search of Hetman Mazepa's Grave"
 "The Present State of Mychailo Drahomanov's Grave in Sofia (Impressions from Visiting the Capital of Bulgaria and Sites Associated with Drahomanov's Last Days)"
- March 17, 1974 Film by Dimitri and Maria Horbay: "A Journey to the Ukraine in 1973"

Recitals

- October 16, 1971 An evening commemorating Lesia Ukrainka arranged together with the Association of Ukrainian Writers "Slovo"
- Lubov Kolenska: "Lesia Ukrainka's Inner World of Art and Ideas"
 Recitation of Lesia Ukrainka's poems

Concerts Arranged by the Doroshenko Relief Committee

- May 21, 1972 • Natalia Ossadcha-Janata: "Opening Remarks"
 Concert of Ukrainian Songs performed by Antonina Lysenko's and Zoya Markovych' Musical Schools
- December 17, 1972 Concert: Marta Kokolska, Hanna Scherey, and Valentin Levinsky
- April 27, 1974 The Concert of two Generations of Ukrainian Musicians arranged by Alla Kipa
- Natalia Ossadcha-Janata: "Opening Remarks"
 Performing artists: Hanna Scherey, Marta Kokolska, Ya. Salenko, L. Chorna, R. Chorna, Ya. Stan, O. Fedynyak, and M. Ivasivka

The Association of Podolians

October 30, 1972 George Perchorowycz presented a paper

Group of the Academy in Denver, Colorado

- November 11, 1972 • Bohdan S. Wynar: "The Development of Ukrainian Economic Thought in the Middle Ages"
- March 24, 1973 • Bohdan S. Wynar: "Ukrainian Historical Association in the U.S.A., 1963-73"
 • Leo Bykovsky: "Wolodymyr Mijakowskyj, 1888-1972"
- June 16, 1973 • Vasyl Gvozdetsky: "The Climate of the Pluvial Stages of Lake Bonneville (On the Basis of Water Balance in the Lake Basins)"
- August 18, 1973 • John V. Sweet: "The Study of Ukrainian Movements in Asia"
- June 22, 1974 Conference in Salt Lake City, Utah
 • Filimon Ukradya: "The Results of Many Years Research on Kidney Functioning in Men and Animals"
 • Orest Symko: "Physics of Low Temperatures"
 • Ivan Hromyk: "Reminiscences on the Expedition together with Academician Nikolai Vavilov to the Western Ukraine in 1940"
 • Bohdan Chopyk: "The Present Situation in the Ukraine as Indicated by the Soviet Press during the Last Five Years"
 • Vasyl Gvozdetsky: "A Fragment from my Diary (The Khreshchatyk Village-Kiev) 1923-1928"
 • Leo Bykovsky: "Twenty Years of the Activity of the Academy Group in Denver, 1954-1974"
- October 19, 1974 Conference together with the Ukrainian Historical Association in the U.S.A.
 • Bohdan S. Wynar: "The Russification of the Ukraine as seen from the Recent Soviet Publications"
 • Leo Bykovsky: "Twenty Years of the Activity of the Academy Group in Denver, 1954-1974"

October 18, 1975

Conference with the Shevchenko Scientific Society in the U.S.A.

- B. Zyla: "Shevchenko's Mystery 'Velykyi Liokh'"
- Roman Kukhar: "Remarks on the Climate of Modern Literature of the Ukrainian 'Emigre.'"

Group of the Academy in Washington D.C.

February 23, 1973

Conference in Memory of Olexa Powstenko

- Y. Starosolsky: "Powstenko's Life and Creative Work"
- Works by Powstenko were exhibited

Compiled by Iwan Zamsha

Obituaries

ILLIA VYTANOVYCH

(1899–1973)

Professor Illia Vytanovych, a well-known economist and historian, a member of the Ukrainian Academy of Arts and Sciences in the U.S. and the Shevchenko Scientific Society (Naukove Tovarystvo im. Shevchenka), and a founding member of the Ukrainian Historical Society (Ukrains'ke Istorychne Tovarystvo) died on December 27, 1973.¹

Illia Vytanovych was born on August 9, 1899 in a peasant family of modest means in the town of Burshtyn in the Western Ukraine. He began his high-school education in Rohatyn and completed it at the Academic Gymnasium in L'viv, from which he was graduated only after World War I, in 1921. During the Ukrainian struggle for independence, Vytanovych first served with the Ukrainian Riflemen (Ukrains'ki Sichovi Stril'tsi) for a short period and then with the Ukrainian Galician Army (Ukrains'ka Halyts'ka Armiia) and the army of the Ukrainian National Republic (Ukrains'ka Narodna Republika) as a lieutenant. He commenced his higher education at the Ukrainian underground university in L'viv where he studied Ukrainian history with such outstanding scholars as Ivan Krypiakevych and Zenon Korduba. At that time he became acquainted with the Ukrainian economists Valentyn Sadovs'kyi and Oleksander Mytsiuk, both of whom were residing at that time in L'viv. From 1923 Vytanovych continued his studies at the Polish State University in L'viv, at first in history, but later in socioeconomic history and the social sciences. He was graduated in 1927, and in 1928 passed the state examination qualifying him to teach in secondary schools. In 1929, after passing his examination with the well-known Polish historian Franciszek Bujak, author of numerous works on the socioeconomic history of Galicia, Vytanovych received his doctorate in socioeconomic history. In 1928, the young professor married Daria, daughter of Professor Osyp and writer Katria Hrynevych.

Because of his abilities, the doors to a scholarly career were open to Vytanovych but only in Polish institutions and outside his native land. The young scholar, like majority of his peers, declined to take advantage of these opportunities. Instead, he decided to work within the Ukrainian community and devoted only his spare time to the scholarly work. In 1927, Vytanovych began teaching in a commercial high school, and in the years 1937–39 he was a principal of a three-year commercial liceum, organized and funded by the Ukrainian cooperatives, a school which was intended to be the equivalent of a business college.

Upon emigrating during the war, Vytanovych continued his teaching profession at Ukrainian institutions of higher education in Munich. He lectured there on the history of the national economy and on the socioeconomic history alongside such well-known Ukrainian scholars as Mykola Vasyli'v, Iurii Studyn'skyi, and Roman Dymyn'skyi. Unfortunately his pedagogical work in

¹ The Editor wishes to thank Sophia M. Koropec'kyj, University of Pennsylvania, for translating this eulogy from the Ukrainian.

Germany did not last long, for, in 1949, the professor emigrated to the United States with his family—wife, two daughters, and a son—and settled in Chicago. After the initial period of adjustment difficulties, Vytanovych found, thanks to his knowledge of foreign languages, a position with a publishing concern. In 1959 he transferred to work in the law library at the Northwestern University, where he remained until 1967. Upon his retirement in this year, Vytanovych moved to Berkeley Heights, New Jersey, in order to live in greater proximity to the better libraries in the East.

This short and rather dry biographical sketch reflects certain facts which are only evident; namely, the unfortunate circumstances of life in the Western Ukraine which were not conducive to any scholarly work, even for the most gifted and best-educated young scholars of Ukrainian nationality. This applies as well to such eminent scholars as Krypiakievych and Korduba in Galicia and to Sadovs'kyi and Mytsiuk in Czechoslovakia. In addition to difficult beginnings, Vytanovych had to cope with the difficulties of emigration and resettlement, which further hampered his scholarly work. Despite these tribulations, he never abandoned his research: from his days as a student until the last weeks of his life, this scholar was continually engaged in his beloved work and actively participated in Ukrainian intellectual life.

Vytanovych's first study appeared in 1922; this was a short article entitled "The Ukrainian Army in the Times of Sahaidachnyi," published in *Hromad-s'kyi visnyk*. Subsequently, the young scholar wrote extensively on historical subjects. Among his most important studies are a work on the Galician King Danylo (published by *Istorychna biblioteka* in 1923), seminar papers on Hetman Petro Konashevych-Sahaidachnyi, Hetman Ivan Mazepa, and the Polish King Stanislaw Liszczyński (these were published in various newspapers), a work on Prince Volodymyr Monomakh, and others. One of the most important studies of this period was his work on Mykhailo Hrushevs'kyi, historian, sociologist, and political leader in *Kooperatyvna respublika*, 1935. Vytanovych later incorporated this work into a more extensive study on this most important Ukrainian historian, entitled, "Uvahy do metodolohii ta istoriosofii Mykhaila Hrushevs'koho," *Ukrains'kyi istoryk*, 1966, no. 9–10.

During his studies at the university in L'viv, the young Vytanovych attended lectures given by Franciszek Bujak and, probably under his influence, began concentrating on the study of socioeconomic history, sociology, and other social sciences. Vytanovych began publishing articles in these fields in the serial publications of the institute of socioeconomic history at the university, as well as reviews of Ukrainian, French, and Russian economic literature, which appeared continuously, almost until 1939, in the serial publications of this institute. His two larger works in Polish (all others were published in the Ukrainian language) appeared at about this time. On the basis of his dissertation, Vytanovych published, "Polityka agrarna Se jmu galicyjskiego w cyfrach budżetów krajowych," in journal *Studja*, 1930 (a publication of the mentioned institute) and, a year later, in *Roczniki*, 1931 of the same institute appeared a study on the eminent Ukrainian economist entitled "Michal Tuhan-Baranowski: ekonomista, historyk kapitalizmu i teoretyk ruchu kooperatywnego." Many of Vytanovych's seminar studies, including his work on Fr. Stefczyk (organizer of cooperatives), a monograph about a proletarian family,

commercial and military routes through the Carpathian Mountains during the Middle Ages, and others, were published in various periodicals.

Vytanovych contributed to such Ukrainian periodicals as *Kooperatyvna respublika*, *Hospodars'ko-kooperatyvnyi chasopys*, *Agronomichnyi visnyk* as well as to the newspapers *Dzvony* and *Meta*, among others. In 1933 Vytanovych, at a relatively young age, was elected to full membership of the Shevchenko Scientific Society, where he was chairman of the committee on modern Ukrainian history. He was also the founder and long-time secretary of the committee on economics, statistics, and sociology of this society, and thanks to him, the fifth volume of collected works of this committee, *Studii z pohla suspil'nykh nauk i statystyky* (L'viv, 1938) was published and dedicated to the pioneer of these studies in the Ukraine, Oleksander Rusov. This volume included Vytanovych's study "O. Rusov u vzaemynakh Halychyny z Naddniproshchynoiu." Vytanovych's intellectual interests and his active participation in the Ukrainian cooperative movement deepened his ties with a number of notable cooperative and business leaders in the Western Ukraine such as Iuliian Pavlykovs'kyi, Ostap Luts'kyi, Ievhen Khraplyvyyi, Karlo Kobers'kyi, Volodymyr Nestorovych, Denys Korenets', Andrii Palii, Andrii Mudryk, and such prominent economists as Valentyn Sadovs'kyi, Oleksander Mytsiuk, Roman Dymins'kyi, Vasyl' Domanyts'kyi, who then resided outside the Western Ukraine. Vytanovych cooperated actively with the Ukrainian Economic Academy (Ukrains'ka Hospospodars'ka Akademia, renamed later Ukrain-s'kyi Torhovel'no-Hospodarchyi Instytut) in Podebrady, Czechoslovakia, an institution for which he prepared a textbook, *Zakhidno-ukrains'ke selo, ioho studii i suchasnyi stan* (Podebrady, 1933). Of the most important works of this period, the following deserve mention: *Volodymyr Navrots'kyi—pershyi ukrains'kyi statystyk-ekonomist u Halychyni na tli svoiei doby, 1782–1847* (L'viv, 1934) and shorter works on Ievhen Olesnyts'kyi (1937), Andrii Zhuk (1938). In 1939, Vytanovych wrote a monograph on Kost' Pan'kivs'kyi, Sr., which was subsequently published (in 1954) in New York.

With the aim of improving the understanding of economics in the Western Ukraine, Vytanovych prepared a number of popular works. One of the most important was a popular review of the significant stages in the economic development of the Ukraine, *Narys suspil'no-ekonomichnoi istorii* (L'viv, 1934). Similar works have been written at that time by Iulian Pavlykovs'kyi, Ievhen Khraplyvyyi, and Karlo Kobers'kyi. Also at that time was appearing, under the editorship of Matvii Stakhiv, the series, of about twelve short brochures per annum, on various popular topics. They were financed by Selfenlightment (Samoosvita) and the Ukrainian Workers Association in the United States. Vytanovych contributed to this publication along such scholars as Ol'gerd Bochkovs'kyi, Arkadii Zhyvotko, Karlo Kobers'kyi, Stepan Siropolko, Panas Fedenko, and Volodymyr Levyns'kyi. His three monographs dealt with the history of Ukrainian peasantry and were entitled: "How Did Ukrainian Peasantry Live in the Past?" "The Peasants' Life from the Time of Khmel'nyts'kyi to 1842," and "The Ukrainian Peasantry on the Road to Liberation." It is important to emphasize that these monographs contain a great deal of statistical material, particularly for 19th-century Galicia. They appeared in 1936 as the 76th, 77th, and 79th issues of this series. A pamphlet, *Tradytsii Kyrylo-*

Metodiiv's'koho Bratstva u narodynakh ukrains'koho kooperatyvnoho rukhu (L'viv, 1939) reflects the author's interests in historical topics. From this time exists a manuscript, as yet unpublished, entitled "Agrarian Policy of the Ukrainian Government, 1918–1920," which was scheduled for publication by the Shevchenko Scientific Society, but the outbreak of the war prevented it. It is obviously impossible within the scope of this sketch to enumerate the many other popular works written by Vytanovych with the aim of raising the level of enlightenment among the Ukrainian people.

His pedagogical activity extended not only to teaching and writing, but to work in such societies as Our School (*Ridna shkola*), Enlightenment (*Prosvita*), and Teachers' society (*Uchytel's'ka hromada*, of which he was a member of the executive board between 1937 and 1939), as well as to work with cooperative organizations, in particular with Supervisory Union of the Ukrainian Cooperatives (*Reviziyni soiuz ukrains'kykh kooperatyv*).

After emigrating first to Germany and then to the United States, Vytanovych continued his research activities, devoting to it his entire spare time. While still in Germany, he took part in the preparation of the Ukrainian Encyclopaedia, a project on which he continued to work until his death. As one of the editors, Vytanovych contributed articles and shorter entries on economics and economists, the cooperative movement, the political history of the Ukraine, and other subjects. Vytanovych's monumental work, *Istoriia Ukrains'koi kooperatsii* (New York, 1964), completed away from basic archival sources, could not have been written by anyone else. He worked on this study for many years, dilligently collecting the necessary material, and maintaining contacts with participants of the movement who were still alive. This work is not only a thoroughly researched study and the most important of its kind, but it also utilizes the unique method of analyzing the cooperative movement in terms of contemporary sociological trends. The broad historical background of this monograph will remain, for years to come, an encyclopaedic source for researchers of the economic history of the modern Ukraine.

Notwithstanding the long years spent by this outstanding scholar on this project, he still managed to work on other subjects. He retained his interest in sociological questions ("Napriamni suchasnykh sotsiologichnykh studii v SSSR i v Ukraini," *Naukovi Zapysky UTHI*, vol. 18) and in the economic development of the Ukraine. A short monograph, *Suspil'no-ekonomichni tendentsii u derzhavnomu budivnytstvi Ivana Mazepy*, was published by the Shevchenko Scientific Society, Chicago Branch, in 1959, and another study, "Ahrarna polityka ukrains'kykh uriadiv, 1917–1920 r.," was originally included in *Ukrains'kyi istoryk* and later published as a separate pamphlet in 1968. Vytanovych also published many articles in various newspapers and journals during his years in the United States. In the 1960s he began collecting material for a new study on the history of Ukrainian economic thought, but his death prevented the completion of the project.

The scholarly achievement of Vytanovych is impressive—about 300 published works. The variety of their topics is evidence of his wide intellectual interests. To the last days of his life, Vytanovych continued his work on the problems of modern Ukrainian history, particularly that of the Western

Ukraine, the field of his university studies. This interest is reflected in the many contributions by the late professor to the Ukrainian Encyclopaedia and to various journals and newspapers. His economic studies are based on thorough research of sociological processes, and, together with Sadovs'kyi and Mytsiuk, he can be considered one of the most important representatives of the sociological school of Ukrainian economics. The development of Ukrainian economic thought, with particular emphasis on the cooperative movement, was continually at the center of Vytanovych's interests. With his death, the Ukrainian nation suffered a great loss. He will be difficult to replace. We have lost a man of great abilities and achievements, an eminent son of Galicia, and an exceptional human being.

BOHDAN WYNAR

KOST PANKIWSKY (1897–1974)

Dr. Kost Pankiwsy, a prominent Ukrainian political figure and civic leader, and author of books dealing with the political and public life in the Western Ukraine in 1939–44 and with the Ukrainian emigration in Western Europe in 1944–49, died on February 20, 1974, in the New York City area. He was a devoted supporter of the Ukrainian Academy of Arts and Sciences in the U.S. from its first steps in 1949 until his death.

Pankiwsy was born on December 6, 1897, in L'viv. His parents, Kost and Osypa Pankiwsy, were active civic leaders in the Western Ukraine at the turn of the century. They were both co-founders of the Shevchenko Scientific Society (Naukove Toraystvo im. Shevchenka). Kost Pankiwsy, Sr. was a pioneer and leader of the cooperative movement in the Western Ukraine, a philanthropist, publisher, educator, and founder of many Ukrainian institutions and organizations. He maintained close ties with many Ukrainian scholars, writers, and civic leaders living in the Ukraine under Russian rule. The family environment helped to shape the life, work, *Weltanschauung*, and character of Pankiwsy, Jr. In his paper delivered at the Academy conference devoted to the 100th anniversary of the Shevchenko Society, on October 27, 1973, less than three months prior to his death, Pankiwsy reminisced about how, when a little boy, he helped his father as a messenger, delivering manuscripts and proofs to the Society's printer. He told about prominent men and women he had met in his parents' home.

After his graduation in 1915 from the gymnasium in L'viv, Pankiwsy enlisted in the Austrian Army and was sent to the Italian front. He was wounded twice. Early in 1918, as a soldier of the Austrian occupation forces in the Ukraine, he was in the Kherson region and tried to contact local Ukrainian leaders.

In the fall of 1918 he started to study law at the University of L'viv. In 1920 he went to Prague, where he continued his studies at Charles University. In 1923 he received the degree of doctor of jurisprudence there. He also took

courses of philosophy and history; in 1924 he completed a course on diplomatic and consular service.

The young lawyer returned to L'viv in 1924 and served a clerkship with several outstanding Ukrainian attorneys in the Western Ukraine. In 1934 he went into private practice in L'viv. Some of his most important cases involved his defense at political trials of members of the Ukrainian underground. Pankiwsky was active in lawyers' professional organizations and in Ukrainian civic and philanthropic groups. For him, law was not merely his profession; it was a mission of his life. He was a fighter for human rights, for the rights of his native country.

At the time of the Soviet rule in the West Ukraine, 1939-41, Pankiwsky worked as a planner with the Pharmaceutical Administration in L'viv.

On July 31, 1941, a month after the German troops occupied L'viv, Pankiwsky was elected secretary general of the L'viv National Council (Natsional'na Rada), which was formed in the first days of the German occupation but was very soon dissolved. He took this position on the advice and persistence of Metropolitan Andrei Sheptyts'kyi and Kost' Levyts'kyi, a senior Ukrainian political leader. It was understood that Pankiwsky would represent the Ukrainians before the German civil administration under very responsible and dangerous conditions. The next day, the West Ukraine was incorporated into the General Government. In September 1941, Pankiwsky became the chairman of the Ukrainian Regional Committee (Ukrains'kyi Kraievyyi Komitet) in L'viv and in March 1942 he was named vice-president of the Ukrainian Central Committee (Ukrains'kyi Tsentral'nyi Komitet) in Cracow and head of the L'viv branch of this committee, the only organization permitted by the Germans. Its tasks were enormous. In July 1944, when the Red Army had seized most of the Western Ukraine, Pankiwsky left his native land. While in Germany, he continued his work with the Committee, organizing assistance to the refugees from all parts of the Ukraine. He cooperated with prominent public leaders from the Eastern Ukraine in reviving the government-in-exile of Ukrainian People's Republic (Ukrains'ka Narodna Respublika). In March 1945, he became a member of this government.

After the end of the war, Pankiwsky lived in West Germany and participated actively in the political life of Ukrainian émigrés. In 1948 he became vice-president of the Executive Organ of the Ukrainian National Council (Ukrains'ka Natsional'na Rada), which united most of the Ukrainian political groups abroad.

In 1949 Pankiwsky came to the United States and settled in Larchmont, near New York City. From 1969 and until his death he lived in the City. While earning his living, he was vigorously engaged in Ukrainian political and cultural life. He also headed the representation of the Ukrainian National Council in this country, as well as that of the Union of the Ukrainian National Democrats.

Pankiwsky was one of the earliest supporters of the publication of *The Annals* by the Academy. He also raised funds for another Academy's publication, *Symon Petliura, Statti, Lysty, Dokumenty*, (New York, 1956). In 1959, at the memorial meeting honoring the first president of the Academy, Michael Vetukhiv, he delivered a paper, "Public and Political Activities of Michael Vetukhiv."

In 1955, Pankiwsky started to work on his memoirs which he published, with his personal funds, as three books: *Vid derzhavy do Komitetu* (New York, 1957, the second edition in 1970), *Roky nimets'koi okupatsii, 1941–1944* (New York, 1965), and *Vid Komitetu do Derzhavnoho Tsentru* (New York, 1968). Numerous documents are included in each book. The books were reviewed, quoted, and mentioned in numerous publications in Western countries and in the USSR. They will remain a source for the study of Ukrainian political and public life during the years 1939–49. They will also reveal what a “co-laborator” with great intellect and pure heart can achieve for his countrymen.

LUBOV DRASHEVSKA

GEORGE PERCHOROWYCZ

(1894–1976)

George Perchorowycz, student of the ancient history of the Ukraine, a member of the Ukrainian Academy of Arts and Sciences in the U.S., died on June 16, 1976, in New York City.

Perchorowycz was born on October 1, 1894, in Syniov Village, near Rovno, Volhynia, in the family of a priest. He graduated from the Volhynian Theological Seminary in Zhytomyr and also from the Department of History and Philology of Warsaw University. After graduation Perchorowycz taught Latin and Ukrainian literature in Volhynia's gymnasiums.

During World War II Perchorowycz emigrated to the West. At first he lived in Germany and in 1951 came to the United States and settled in New York City. Perchorowycz was interested in the ancient history of the Ukraine, especially in the history of ancient tribes and peoples and their names. At the Academy conferences he delivered 14 papers related to these problems. He was the author of papers on historical and religious topics and of several articles in Ukrainian periodicals.

N. N.

VSEVOLOD HOLUBNYCHY

(1928–1977)

Professor Vsevolod Holubnychy, a noted Ukrainian economist, political scientist, historian, and political activist died suddenly in New York on April 10, 1977.

Holubnychy was born on June 5, 1928, in Bohodukhiv, in the eastern most part of the Kharkiv Oblast, to the family of Serhii and Lidia born Kopeikina. The father was an agronomist who worked in the state planning office in Kharkiv; he also taught in the secondary schools. Between 1937 and 1941 he was arrested for “political offenses,” despite the fact that during the Revolution he served with the elite Budenny cavalry. The mother, ethnically Rus-

sian, was a kindergarten teacher. At the age of three, Vsevolod broke his hip and, as a result, had to stay in a cast for three years. Then he underwent additional treatment in a Crimean sanatorium and, for this reason, he was separated from his parents for one year. Because of poor medical care, one of his legs remained a little shorter than the other. Initially, he had to wear specially designed braces and for the rest of his life an orthopedic shoe. The separation from his dear ones at such a tender age and his inability to play with other children made Holubnychy rather introspective, withdrawn, and inclined to meditation in solitude. This was perhaps the reason for his early intellectual maturity.

While still in his native city, young Vsevolod had finished five grades by the outbreak of the USSR-German war in 1941. In the same year Bohodukhiv was occupied by German troops. By 1943 the entire family, which also included a younger brother Oleksander, had to flee west before the returning Red Army. The family traveled in a horse-drawn wagon throughout the East-Central Ukraine, the Western Ukraine, Hungary, and Austria, before finally settling in Ingolstadt, Bavaria. During a short stop in Hungary, young Vsevolod had helped to earn a living for the family. He resumed his secondary education in Ingolstadt, but very soon moved to Regensburg where he completed secondary school. After graduation he enrolled at the Ukrainian Free University (Ukrains'kyi Vil'nyi Universytet) in Munich, in the department of law and economics. In the meantime, between 1947 and 1949, he studied at the Augsburg Institute of Modern Languages. In 1951 he emigrated to the United States and settled in New York City, where he lived until his death.

In New York, Holubnychy continued his studies of economics at Columbia University, where he obtained a B.S. degree in 1953 and an M.A. degree in 1954. The title of his master thesis was "Property and Life Insurance in the USSR." During his studies Holubnychy was a Fellow of the Ford Foundation. He received his Ph.D. in Economics in 1971, writing a dissertation "V. V. Novozhilov's Theory of Value." His areas of specialization were: economic theory, comparative economic systems—with emphasis on Soviet-type economies, and Marxist philosophy. While still a student, he taught at the Russian Institute of Columbia University between 1954 and 1956 and also during the summer of 1957 at Middlebury College, Vermont. From 1962 he taught at Hunter College, City University of New York, where at the time of his death he was an associate professor of economics. In 1952 he married his school sweetheart from his native city, Lidia born Shehemaha, a Ph.D. candidate in Chinese and Japanese history and philology at Columbia University. Her tragic death preceded his by two years. The loss of his beloved wife created for Holubnychy an unbearable sorrow from which he could not recover. This, probably, impaired his ability to work during the last two years of his life and was likely one of the causes of his untimely death.

Between 1954 and 1959, the young scholar was associated with the Institute for the Study of the USSR in Munich (MI) and between 1963 and 1965 with the Institute of Asian Studies in Hamburg. From the early 1950s he cooperated closely with the Ukrainian Academy of Arts and Sciences in the U.S. in New York. He became a full member of this Academy, member of its manag-

ing board, and was also a member of the editorial board of this issue of *The Annals*. Within the Academy he was associated intimately with the work of the Law and Economics Section and the Commission for the Study of the Post-Revolutionary Ukraine and the Soviet Union. For this forum he organized several conferences and himself presented a large number of papers and speeches. From 1960 he worked with the Shevchenko Scientific Society (Naukove Tovarystvo im. Shevchenka), European branch, and participated in the publication of the *Ukrainian Encyclopaedia* in the Ukrainian and English languages. He was the chief editor of the section on economics, but he also wrote on history, politics, biographies, and other subjects. He contributed about 1,000 pages of essays and shorter entries to this publication. At the time of his death, Holubnychy had reached an agreement with the Canadian Institute of Ukrainian Studies, University of Alberta, which would have allowed him to work during the next two years full time on preparation of the new four-volume edition of the *Encyclopaedia* in English. He was expected to be the editor of sections on economics and post-revolutionary history of the Ukraine.

Professor Holubnychy became involved in research at a very early age and during his relatively short life he published around 100 works. There are still some manuscripts left which need only finishing touches to be published. To this group belongs, for example, his doctoral dissertation. His research activity can be divided into two periods: the decade of the 1950s, when he was associated with the Munich Institute, and the period from the early 1960s on, when he was teaching at Hunter College. His works from the former period, mostly prepared under contract, for the Munich Institute were published in the Institute's various publications and in various languages. With respect to topic, they can be divided into following five groups: Marxian theory of value and its relevance to the theory of value and the price structure in the USSR; statistical studies; economic conditions in the USSR; relations between the USSR and China; and economic and political conditions in the Ukraine.

To understand Soviet economics, Holubnychy went back to the source of it all and studied very thoroughly the writing of Marx, reading everything available in European languages. As a result, he became thoroughly acquainted not only with the Marxian economics, but also with Marxist philosophy and everything else referred to as Marxism. The resulting book-length study on the Marxist theory of value remained unpublished because Holubnychy believed that it needed additional work. Thematically related to it is a major article "Recent Soviet Theories of Value," *Studies on the Soviet Union*, 1961, no. 1. Here he analyzed the Soviet discussion on price structure which took place in the USSR following Stalin's death. In this article Holubnychy anticipated many ideas expressed by Western scholars on this subject later in the 1960s. His empirical studies on Soviet price structure include: "Ruble Exchange Rates," *Bulletin-MI*, August 1958; "Statystychna analiza porivnial'nykh tsin na dovhotryvali spozhyvchi tovary na Ukraini ta v SShA," *Ukrains'kyi zbirnyk*, vol. 17, 1960; and "The Soviet Price System, Based on a New Method," *Studies on the Soviet Union*, 1962, no. 2. Holubnychy returned again to the theory of value in the early 1970s. In his dissertation, previously mentioned, he discussed the attempts of Novozhilov to formulate a theoretic-

cal basis—claiming to be related to that of Marx—for construction of efficient prices in the USSR. In a paper “Marxography and Marxology, Or What Has Been Known About Marx!” presented at the University of North Carolina in 1974, he analyzed the availability and publication of Marx’ writings. That Holubnychy was unable to prepare these two significant pieces of research on Marx and Novozhilov for publication is truly an irreplaceable loss.

To the statistical studies belong these works: “The New Soviet Index of Gross Industrial Output,” *Bulletin—MI*, December 1955; a major article “Government Statistical Observation in the USSR: 1917–1957,” *The American Slavic and East European Review*, February 1960; and “O neopublikovannykh dannykh perepisei neseleniia SSSR,” *Vestnik MI*, 1960, no. 2. The following two statistical studies refer specifically to the Ukraine: *The Industrial Output of the Ukraine 1913–1956* (Munich, 1957) and “Das Volkseinkommen der Ukraine in den Jahren 1940 und 1954,” *Sowjetstudien*, March 1957. The titles alone of his statistical studies indicate the wide range of Holubnychy’s interests. The monograph on Ukrainian industrial production, which was compiled on the basis of dispersed information in various sources and of shrewd estimates, deserves special attention. This collection provided insight on the economic importance of the Ukraine in the USSR during the times of the Soviet statistical blackout. Holubnychy’s estimate of the national income of the Ukraine was the first attempt in the West to establish a methodology for estimation of this important statistical indicator for an individual Soviet republic and to undertake such estimation on the basis of very limited information.

Holubnychy analyzed the current situation of the Soviet economy during this period in the following four major articles: “O tempakh ekonomicheskogo razvitiia SSSR,” *Vestnik MI*, 1957, no. 3/4 (translated into German in *Ost Probleme*, Bonn); “Le ralentissement des rythmes d’accroissement de l’économie soviétique,” *Problèmes soviétique*, 1959, no. 2; “L’économie soviétique vue par des économistes Américains,” *ibid.*, 1962, no. 4; and “Problemy ‘osnovnoi ekonomicheskoi zadachi’ SSSR,” *Uchenye zapiski MI*, 1963, no. 1. In these works, written during the exceptionally prosperous years of the Soviet economy, the young scholar argued that the slowdown of the growth rate is inevitable, unless the Soviet leadership radically changes its economic policy, a rather unlikely event. Needless to say, this prediction had already been proved true by the end of the 1950s.

In the two articles from these years, “Soviet Economic Aid to China,” *Bulletin—MI*, January 1956 (translated into French in *East à Ouest*, Paris) and “Zum Verständniss der Vorgänge in China,” *Gewerkschaftliche Monatshefte*, Köln, March 1960, Holubnychy, during the period of close USSR-China alliance, came to the conclusion that the Great Leap Forward was intended, first of all, to make China economically independent of the USSR, and, at the moment when this goal might be achieved, China would also become politically independent of the USSR. There is no need to elaborate on the accuracy of the second part of this prediction. Holubnychy resumed his studies on China again in the early 1960s, but this time on topics of philosophical nature. The following three papers belong to this category: “Der dialektische Materialismus Mao Tse-Tungs im Vergleich mit den Klassikern des

Marxismus-Leninismus, untersucht als Faktor zur Beurteilung der chinesisch-sowjetischen Beziehungen," *Der Ostblock und die Entwicklungsländer*, Bonn, 1962, no. 8-9; "Der dialektische Materialismus Mao Tse-Tungs," *Merkur*, Munich, July 1963; and "Mao Tse-Tung's Materialistic Dialectics," *The China Quarterly*, July-September 1964 (translated into Chinese in *Ming Pao*, Hong Kong, and into French in *L'Herne*, Paris). The translation of this article into French as late as as 1972, is good evidence of the permanent value of Holubnychy's understanding of ideological developments in China.

Economics and politics in the Ukraine occupied an important place in Holubnychy's research. During this period, in addition to the two works on Ukrainian statistics previously mentioned, he made accessible to wider readership "The Views of M. Volobuyev and V. Dobrohaiyev and Party Criticism," *Ukrainian Review*, 1956, no. 3; discussed "The Present State of Ukrainian Ferrous Metal Industry," *ibid.*, 1957, no. 4; and elaborated "On the Rationale of the Soviet Collectivization of Agriculture in 1929," *The Annals of the Ukrainian Academy of Arts and Sciences in the U.S.*, vol. IX, 1961. He also wrote at that time an article on economic policy in another Soviet republic, "The Location of Industries in the Belorussian SSR," *Belorussian Review*, 1957, no. 4. In it he showed inefficient behavior of Soviet planners with respect to the geographical distribution of industry, because of too centralized decision making, particularly in view of the union's huge size. These findings may as well be applied to the Ukraine. This article deserves attention also for the reason that it represents the first attempt of this scholar to analyze explicitly Soviet regional policy, the topic to which he devoted much attention during his later years.

Holubnychy also wrote on the political problems of the Ukraine. From this period two works especially deserve attention: a monograph, *Ukraina v Ob'iednanykh Natsiakh* and very important article, "Outline History of the Communist Party of the Ukraine," *Ukrainian Review*, 1958, no. 6. In addition, he contributed several articles on related subjects in *Suchasnist'* (Munich) and other journals and newspapers.

The achievements of Holubnychy during this period are unquestionable. His works, based on a sound economic theory and knowledge of history and ideology, analyzed the Soviet economic system thoughtfully. They are full of insights into the working of the Soviet economy, anticipate many future developments, and foresee the direction of Western research on this subject. However, one is forced with sadness to say that Holubnychy has not met at that time with the recognition of his peers he so justly deserved. The reason for this is, no doubt, the misplaced caution with which Western scholars listened, and unfortunately sometimes continue to do so, to views of those who, at first hand, experienced "the blessings" of the Soviet economic system and of those who published under the auspices of the Munich Institute.

The period of the 1960s and the early 1970s was for Holubnychy a period of scholarly maturity. He published perhaps not so frequently as before, but his works were longer and more profound than were the works from the preceding period. During this time he published in co-authorship with A. R. Oxenfeldt a successful textbook, *Economic Systems in Action: The United States, the Soviet Union, and France* (New York: Holt, Rinehart and Winston, 1965), which was translated into Swedish and Spanish.

The scholar continued to work on the Ukrainian economy, and his Introduction to Z. Lew Melnyk, *Soviet Capital Formation: Ukraine, 1928/29-1932* (Munich: Ukrainian Free University Press, 1965) is a small masterpiece. In this writer's opinion, there is no other source where the economic relationship between the Ukraine and Russia in the historical context, and the research on this problem are formulated so clearly and concisely. The historical development of the Ukrainian economy and its current situation are no doubt at the present time in the West most fully and best presented in *Ukraine: A Concise Encyclopaedia*, vol. 2 (Toronto: Toronto University Press, 1971). The bulk of the material was written by Holubnychy himself and the rest, written by other authors, was edited by him. His recent article "The Present State of Cybernetics and the Republic Level of Planning," in P. J. Potichnyj (ed.), *Ukraine in the Seventies* (Oakville, Ontario: Mosaic Press, 1975) is based on conditions in the Ukraine and deals with the problem of the centralization of decision making in the period of revolutionary changes in the information system. Related to the problems of the Ukraine are two works on international economic relations among the countries of East-Central Europe: "Trade Between Central Europe and the Soviet Union," *Studies for a New Central Europe*, 1973/74, no. 3-4, and "Economic Integration in Eastern Europe: A Deterministic Approach," in *Naukovi zapysky* (Munich: UTHI, 1976). In these two works Holubnychy introduced a novel approach to the analysis of international economic relations. In order to avoid arbitrary pricing and often the lack of any price information, he based his analysis on the commodity movement in physical units and their technological relationship. In these two works and also on a basis of an earlier, small pamphlet, *Try leksiï pro ekonomiku Ukrainy* (Munich, 1969), among other conclusions, he argued that the organic ties of the Ukraine are rather with East-Central Europe than with Russia proper.

Regional problems occupied most of Holubnychy's attention during this period of time. The following three titles assure him the well-deserved respect and gratitude of all scholars in this field: "Some Economic Aspects of Relations Among the Soviet Republics," in Erich Goldhagen (ed.), *Ethnic Minorities in the Soviet Union* (New York: Praeger, 1968); "Spatial Efficiency in the Soviet Economy," in V. N. Bandera and Z. L. Melnyk (eds.), *Soviet Economy in the Regional Perspective* (New York: Praeger, 1973); and "Teleology of the Macrorregions in the Soviet Union's Long-Range Plans," in A. F. Burghardt (ed.), *Development Regions in the Soviet Union, Eastern Europe, and Canada* (New York: Praeger, 1975). In these works Holubnychy analyzed the growth of output and welfare in Soviet republics and the relative worsening position of the non-Russian republics; development of a theoretical basis for such an economic policy, in view of the political and ideological climate; and, not surprisingly, the linkage of this policy with military considerations of the Soviet leadership.

In addition to these and many other articles, not mentioned here, Holubnychy contributed several book reviews to such journals as *American Economic Review*, *Journal of Economic Literature*, *Journal of Economic Issues*, and *American Historical Review*.

It is impossible, within the scope of this essay, to summarize the favorable acceptance of Holubnychy's works in various professional publications. It is sufficient to mention the names of the reviewers: V. N. Bandera, Y. Bilinsky,

Robert Campbell, Harry Hamm, Harry Hanak, Raymond Hutchings, Hans Kohn, Warren Nutter, John Reshetar, Andy Rowe, Tang Tsou, V. Stanley Vardys, and others. Also the Soviet economists reacted often on his works, but obviously in their own way. Among them one finds such names as S. A. Khavina, V. Zasans'kyi, V. S. Zhuchenko, and none other than the secretary for ideology of the Communist Party of the Ukraine, V. Ie. Malanchuk. Neither it is possible to analyze here all Holubnychy's important contributions to economics and particularly to the understanding of Soviet economics. This remains a fruitful field for the future researcher of Soviet studies in the West and of Ukrainian economic thought. However, from reading attentively his works, primarily from the latter period, the following contribution stands out:

Western specialists on Soviet economy have been analyzing it as a homogeneous entity. While such an approach was sufficient for global international comparisons, it failed to give a picture of component parts of this entity. Holubnychy's basic contribution was that he was one of the first who started to destroy the myth of a Soviet economic monolith. He showed that the development of Soviet regions, because of their natural, historical, and ethnic diversity, deserves to be analyzed explicitly, and only the understanding of this diversity allows one to understand the behavior of the entire Soviet economy. Furthermore, he showed on the basis of investment distribution that the purpose of Soviet economic policy is not the maximization of output or consumers welfare, but political and military preferences of the Russian leaders of the USSR. It seems that this view started to gain ground among Western scholars, as can be judged from an increasing number of studies on this topic in recent times. It can be hoped that it will also penetrate the thinking of political leaders and public opinion in the West.

However, his education and, later on, scholarly activity did not exhaust all interests of Holubnychy. Already in his teen-age years he was engaged in political activity within the Ukrainian Revolutionary Democratic Party (Ukrains'ka Revoliutsiina Demokratychna Partiiia), whose members were mostly the refugees from the East-Central Ukraine. There he was the leader of the youth and the editor of their newspaper *Young Struggle* (Iunats'ka borot'ba). When this group split in 1947, Holubnychy went with the group referred to as "Forward" (Vpered), after the name of this group's newspaper. He was the editor of this newspaper to which he contributed large number of articles signed either by his own name or by various pseudonyms, most often Holub or Felix. This group was the most left in the political spectrum of the Ukrainian emigration. Its program, which reflected accurately Holubnychy's views, was approximately as follows: Economic and social changes which took place in the Soviet Ukraine are historically justified, although the barbarian methods which were used to achieve these changes are condemned. According to these views, what remains to be done for the Ukrainian nation is to achieve political independence from Moscow, to replace the state ownership of the means of production by the social ownership, and to introduce democracy in all aspects of human activity. It should be socialism, known later under the name of "socialism with a human face."

In New York, Holubnychy became acquainted with the works of underground writers, Poltava and Hornovyi. He concurred with their emphasis on

equality of national and social components in the liberation struggle of the Ukrainian nation as well as on the dominant role of political processes in the present-day Ukraine, including within the Communist Party, in this struggle. Because the group, referred to as the Ukrainian Supreme Liberation Council (Ukrains'ka Holovna Vyzvol'na Rada), advocated these views among the émigrés, Holubnychy became close to it, although he never became its member. His interest in the political life in the Ukraine and the conviction of the need for thorough democratization of all activities of Ukrainians in the West was a factor in his becoming active in the 1960s in the "Club of Round Table" (Kliub Okruhloho Stola) in New York, of which he was the chairman for many years. The aim of this club was precisely to serve as a forum for the exchange of opinions between visitors from the Ukraine and the Ukrainian émigrés as well as the encouragement to free discussion about all problems of social life.

It is necessary to emphasize that Holubnychy's political activity did not impair in any way the objectivity of his scholarly work. Of course, his selection of subjects—as is true with other scholars—could have been motivated by political considerations.

The scholarly achievements were made possible thanks to Holubnychy's highly analytical mind—a mind that could distinguish the important from the transient, and could place phenomena in the context of historical development and theoretical relationship—and to his phenomenal memory. In addition, he was intellectually disciplined, had enormous capacity to work, and placed high requirements on his work. Although he gave the impression of being aloof and harsh, those close to him knew him to be sensitive and kind to others. His willingness to help others, particularly students and beginning scholars, with his time and his extensive library was unlimited. Indeed, his knowledge and dedication to work influenced some students to embark on the difficult and unrewarding road of a scholar. Holubnychy was an uncompromising and proud man who wanted to rely only on himself and who would not accept anything from anybody without repayment in some form. Obviously, these characteristics made his adjustment with the surrounding world and his cooperation with others not always easy.

Holubnychy's most important characteristic was love for the Ukraine and its people. Indeed, he considered his life as a service to the cause of the political liberation of the Ukrainian nation from Russian occupation. However, unlike many patriots everywhere, he considered political liberation unthinkable apart from social advancement of the people, primarily of the poor and disadvantaged. These two goals were, for him, inseparable. His work constituted a mission to achieve them. He died relatively young, but he had already achieved much more than many who live longer lives. As a result of his work, Ukrainian scholarship is richer today and the Ukrainian nation is a little closer to achieving its goals. In our deep mourning we are thankful to him for this.

I. S. KOROPECKYJ

DMYTRO I. CHYZHEVS'KYI

(1894–1977)

Dmytro I. Chyzhevs'kyi (Dmitry Čiževsky, Dmitrij Tschizevskij), a world renown Slavist, philosopher, mediaevalist, the leading authority on baroque literature, died on April 18, 1977, at Heidelberg, West Germany. In an age of narrow and intense specialization, Professor Chyzhevs'kyi was a rare and exceptional phenomenon. Instead of emulating the scholarly world around him, i.e. instead of becoming but another expert on a minute problem in one scholarly field, he chose to transcend a number of them and become a renaissance man in a non-renaissance age. The odds against such an intellectual goal were great. The academic fields that Chyzhevs'kyi chose to explore, in this century, have grown both in depth and *in extenso*. For one person to master them, nay, to make a contribution to them, would have seemed an utterly impossible task. And yet, Chyzhevs'kyi not only dared to undertake it but also to succeed in it. In 1954, on the occasion of Chyzhevs'kyi's 60th birthday, under the editorship of Professor Max Vasmer, a group of leading scholars and his former students recognized his academic success with a *Festschrift* (*Festschrift für Dmytro Čiževskij zum 60 Geburtstag*) (Berlin, 1954) and ten years later, adhering to an established tradition in the West, on his 70th birthday, scholars all over the world honored him with another *Festschrift* (*Orbis Scriptus: Dmitrij Tschizevskij zum 70 Geburtstag*) (Munich, 1966).

What was the secret of his unusual success? This question can hardly be answered fully and objectively, but perhaps one is suggested by select data of his dynamic and turbulent life.

Chyzhevs'kyi was born on March 23, 1894, in a provincial town, Oleksandria, in the Ukraine. There he attended elementary and secondary school, which he completed in 1911. Upon graduation he matriculated at the St. Petersburg University where he studied mathematics. In 1914 he transferred to Kiev University to pursue studies in philosophy and Slavic philology, which he completed in 1918. Here he worked under the aegis of two outstanding professors of philosophy, V. Zenkovskii and M. Losskii. During the Bolshevik revolution he was detained, and upon release he left his native country for Germany never to return to it. He resumed his studies of philosophy at the Universities of Heidelberg and Freiburg where he studied with the "father" of phenomenology, Edmund Husserl. In Freiburg he wrote his doctoral dissertation, *Hegel in Russland*, and was awarded a doctor of philosophy. In 1924 he joined the faculty of the Ukrainian Pedagogical Institute in Prague in which he remained active up to 1927. Two years later he completed his habilitation dissertation, *Hegel and the French Revolution*, and was promoted to *dotsent* (assistant professor) at the Ukrainian Free University in Prague. In 1932 Chyzhevs'kyi left again for Germany, this time for the University of Halle to develop and teach Slavic philology. In 1935–38, along with his work at Halle, he also taught at the University of Jena. At the end of World War II, in 1945, the University of Marburg invited Chyzhevs'kyi to occupy the chair of Slavic philology. In 1952, on the invitation of Harvard University, he came to the United States, where, as a visiting professor, he lectured, held seminars, and directed doctoral dissertations in comparative Slavic literatures.

In 1957 he left Harvard and returned to the university of his student years, Heidelberg, at which he became director of the Slavic Institute, professor of Slavic philology, and an editor of the prestigious journal *Zeitschrift für slavische Philologie*. In 1970 Chyzhevsk'kyi terminated his formal association with this famous University.

The domain of Chyzhevsk'kyi's academic interest was as broad as it was amazing. It ranged from astronomy and mathematics to literature. His bibliography, between 1912-54, prepared by Dr. D. Gerhardt and published in the 1954 *Festschrift*, contains 33 pages of research articles, commentaries, book-reviews, anthologies, monographs, and synthetic studies, published in the Ukrainian, Russian, Slovak, Czech, Polish, German, French, and English languages. His bibliography since 1954 up to his retirement brings the list of his publications to ca. 800 entries.

Chyzhevsk'kyi polyhistoricism has two foci, history of philosophy and history of Slavic literatures. In the field of philosophy, mention should be made of his book-length studies, *Logika* (Prague, 1924), *Filozofia na Ukraini* (Prague, 1926), *Hrets'ka filozofia do Platona* (Prague, 1927), *Hegel bei dem Slaven* (Reichenberg I.B., 1934), *Filozofia H. S. Skovorody* (Warszaw, 1934), *Gegel' v Rossii* (Paris, 1939). His contributions to the latter field include: *Ukrains'kyi literaturnyi barok* (Halle, 1944), *Geschichte der altrussischen Literatur im 11, 12, und 13 Jht.* (Frankfurt/Main, 1948), *Comparative History of Slavic Literatures* (Nashville, 1971), *A History of Ukrainian Literature* (Littleton, 1975).

Chyzhevsk'kyi was particularly attracted to personalities whose intellectual and spiritual quest was directed toward realities beyond the possible and verifiable. He was passionately interested in Bohme's mysticism, in Hus' rebellion against the established church, in Skovoroda's pantheism, in Comenius' search for an ideal perfection of human mind, in Dostoevsky's and Nietzsche's challenges to this life's conventions, in Shevchenko's, Schiller's, Goethe's variants of romanticism. This interest could be, perhaps, explained in terms of his own opposition to everything that tended to contain and stifle his creative spirit.

Ukrainian scholarship and particularly literary criticism, history, linguistics, philosophy, and intellectual history should feel the loss of Professor Chyzhevsk'kyi. For over 50 years of his life he systematically researched, wrote, and lectured on a broad variety of Ukrainian topics. In his introduction to the 1954 *Festschrift*, Professor Vassmer observed: "From his Ukrainian native land D. Čiževskij brought out a strong interest for national problems. His love for his own people, however, has not restrained his studies of Russian culture and the masters of the 19th century Russian culture." Indeed all his studies of Ukrainian topics are imbued with love and dedication. It mattered greatly to him to establish the right view, the right perspective on Ukrainian language, thought, creative arts, in brief, on the locus of Ukrainian culture in the context of European history. This is probably why he focused so much of his attention on the sources of this culture. Once these sources are comprehended and explained objectively, the historical uniqueness of this culture does not have to be defended any longer.

Chyzhevsk'kyi developed his own methodology of research. Unlike many of his contemporaries who conceived of literary art as part of closed ethnic or

psychological configurations, he conceived it in the context of specific aesthetic sensibilities, or movements, such as baroque, neo-classicism, romanticism, realism, and modernism that transcend geography and ethnicity. This approach permitted him to suspend most of the extra-literary factors and focus on the "literariness" of literature. Such an approach, as S. A. Zenkovsky aptly observed, "required from the writer a profound knowledge of the evolution of European thought, an understanding of the trends of European, especially Slavic, literature, and, finally, a thorough command of the Slavic language." Chyzhevs'kyi had all those qualifications.

In addition to his impressive and prolific research and publishing achievement, he was ceaselessly active in numerous scholarly organizations. As early as 1930 he became a member of the Hegel Association in Berlin and German Association for Slavic Research; he actively participated in the activities of the Prague Linguistic Circle, widely known for its structuralist position in a number of humanistic disciplines. He was also a member of the prestigious Kantgesellschaft. From among the Ukrainian scholarly associations, in 1924-37 he belonged to the Ukrainian Historical and Philological Society in Prague and collaborated with the Ukrainian Scientific Institutes in Warsaw and Berlin. He held full membership in the Shevchenko Scientific Society and the Ukrainian Academy of Arts and Sciences in the U.S. During the 1930s and after World War II he participated in a number of International and World Congresses. The papers he read at these congresses attest to the broad range of his scholarly interest. For example, in 1929, at Lund, Sweden, he presented a paper on "The Plants and Religious Symbolism" and in 1930 at Prague, a paper on the "Relationship of Phonology and Psychology".

He lectured widely at most of the principal universities of Western Europe.

Chyzhevs'kyi, in the process of his extensive research on baroque, discovered a series of Comenius' manuscripts, specifically his *Pansophia* and the *Pansophistic Dictionary*. His painstaking scholarship on Comenius is considered to be the most comprehensive contribution to Comeniana.

Ukrainian scholarly community and Slavists all over the world have lost in Professor Dmytro Chyzhevs'kyi an erudite of the highest caliber.

JOHN FIZER

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