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## OBSERVING THE PRE-REVOLUTIONARY RUSSIAN ECONOMY

This article investigates both the theory and practice of economic observation in Russia as it developed in the second half of the 19th century up to 1917. It does so by focusing on both the institutions of observation — the Free Economic Society, *the zemstvo*, and natural resource surveys — as well as the contributions of various key individuals — A. I. Chuprov, A. A. Chuprov, A. V. Chayanov and S. N. Prokopovich. It concludes by examining the theoretical foundations and also the political ramifications of the different techniques and approaches to observation that were outlined in the Russian context. Refs 49. Tables 4.

*Keywords:* economic observation, measurement, survey techniques, methods, the 19th-century.

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### ЭКОНОМИКО-СТАТИСТИЧЕСКИЕ НАБЛЮДЕНИЯ В ДОРЕВОЛЮЦИОННОЙ РОССИИ

В статье анализируется развитие теории и практики экономико-статистических наблюдений (observation) в России во второй половине XIX — начале XX в. Автор выявляет как роль важнейших институтов, осуществлявших такого рода наблюдения, — Вольного экономического общества, земства, обследования естественных ресурсов, так и решающий вклад А. И. Чупрова, А. А. Чупрова, А. В. Чаянова и С. Н. Прокоповича в решение соответствующего круга проблем. Рассматриваются теоретические основы использования различных методов и подходов к наблюдению и их связь с политикой в российском контексте. Библиогр. 49 назв. Табл. 4.

*Ключевые слова:* экономическое наблюдение, измерение, опрос, методы, XIX век.

With a few notable exceptions, economists in the West in the nineteenth century focused their attempts at gathering and analysing observations on Western countries and institutions, and employed techniques that had been developed within different currents of Western economics. These currents varied considerably between themselves, as has been documented in the literature. However, an instructive comparison can be attempted with examples of data-gathering in non-Western states. In addition, the concept of ‘observation’ should not be conflated with ‘statistics’ [Maas and Morgan, 2012, p. 19]. As will be seen, observation can be a social process as well as a quantified result.

Russia is an interesting country to investigate vis-à-vis observation for various reasons: the interface between economists and governmental representatives was often conflicted, the institutions of observation were distinct from those in the West, and the purposes of observation could also be different. Russia’s unique position in the firmament of nation states was recognised in the West as early as 1737, when an article entitled ‘A Proposal for the Measurement of the Earth in Russia’ declared that:

...the Question concerning the Earth’s Figure is not yet at an end. Nay, ‘tis not impossible, that after finishing all the Observations which are actually making, new Difficulties may arise...’Tis with this View, and particularly to render such important Service to the Geography of *Russia*, that I think it necessary to undertake a Work of that Nature in *Russia*; towards executing which we have great Advantages, which the other Nations have not. One of the principal of these Advantages is the great Extent of *Russia* in every way [L’Isle, 1737, p. 40].

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The argument was that large distances between Russian cities aided the accuracy of geographical measurements. Another advantage was that Russia would benefit from existing knowledge and ‘may expect to succeed and execute it better than could have been done elsewhere, by applying timely Remedies against the Difficulties that occur’d in other Places’ [L’Isle, 1737, p. 42]. Russia’s size had economic consequences. Unique forms of trade, such as the large-scale commercial fair held annually over four weeks in Nizhni Novgorod, when transport was easiest, were conditioned by the vast scale of communication, manufacturing concentration in a small range of districts and the scarcity of commercial towns.

In selecting a non-Western state for investigation, the differences thought to exist should be considered. For some, Russia was ‘first and foremost a geographical concept, and an ambiguous one at that’ [Gerschenkron, 1970, p. 1]. It was ambiguous because it had one part of its geography and culture in the backyard of Europe, and another part (beyond the Ural Mountains) in Asia. In this sense it was different from other examples of ‘backward’ economies that have been considered, such as Italy, where the sheer range of geography and variety of customs was less [D’Onofrio, 2012].

To others, the differences between West and East were mainly institutional. The ideas in Henry Sumner Maine’s 1875 Cambridge lecture on ‘The Effects of Observation of India on Modern European Thought’ could be applied equally to Russia. For Maine, on observing the Indian system, Westerners found economic institutions that were ‘very like, yet appreciably unlike, what they had left at home’: there was ownership, but joint ownership; land rent, but no market standard; profit rates, but customary ones; and competition, but only between collective bodies [Maine, 1876, p. 222]. What Maine called ‘the comparative method’ of observation applied most cogently to institutions of property and contract, but his distinctive efforts were the exception in the West. Maine provided a precedent for what Mary Morgan has described as ‘seeing with new categories’, in the case of Western attempts to record the Nigerian economy in the 1950s [Morgan, 2010, p. 314].

A main goal of this article is consequently to sketch something about what economic observation meant in the Russian nineteenth-century context. To do this, national-level statistical organisations are first considered, and three examples of relatively autonomous data-gathering institutions are presented: natural resource surveys, the *zemstvo*, and the Free Economic Society. Here, discussion of observational issues by individuals as diverse as the industrial economist and chemist D. I. Mendeleev and the statistical analyst S. N. Prokopovich will be considered. Then a more theoretical analysis of whether there were unique Russian approaches to observational techniques, and how they might have connected to wider political/methodological debates, will follow, considering the work of the agricultural economist A. V. Chayanov, the historical economist A. I. Chuprov and his son, the statistical theorist A. A. Chuprov.

## 1. National Institutions

Sites for observation could most obviously mean central government statistical offices, which were fixed in the major urban centres (Moscow and St Petersburg). In 1811, the Russian Ministry of Police first organized a statistical department, which became the statistical committee of the Ministry of Internal Affairs in 1852, and then the Central Statistical Committee (TsSK) in 1857: the TsSK published its own periodical presenting agricultural data. The main areas that the TsSK documented were: population, harvest

data, sown area and livestock. In 1863, the Statistical Council was organised, composed from representatives of the statistical divisions of government departments. In different regions, *guberniya* (provincial) statistical committees also existed, but their work was often of limited value [Ezhov, 1960, p. 52].

Government departments like the Ministry of Trade and Industry, the Ministry of Agriculture and State Property, and the Ministry of Finance also produced statistical data in their own fields. ‘The Cash Accounts of the Ministry of Finance’ was initially issued in 1870, and the first official data source for the Russian state budget was published in 1866 [Livshits and Belen’ky, 1960, p. 190]. However, this type of statistical yearbook was based on data that had been gathered centrally, and related only to the remits of the Ministries concerned. The Ministry of Agriculture collected some data on sown area and harvests, but the quality of much of this data was questionable, and was not comprehensive in terms of geographical coverage or in documenting the diversity of Russian agriculture.

Various wide-ranging quantitative surveys, such as E. F. Zyablovsky’s *Statistical Description of the Russian Empire* of 1808, were published from the beginning of the nineteenth century onwards, but these were primarily descriptive. One of the first analytical works on statistics in Russia was D. P. Zhuravsky’s (1810–1856) *Concerning the Sources and Uses of Statistical Observations* of 1846, which considered the budgetary expenditure of different population classes. Zhuravsky distinguished between ‘material’ and ‘rational’ statistics — the former being concerned with simple chronological order and classification, the latter with the scientific re-working of data to obtain conclusions. He also elaborated a system of indicators for all areas of Russian society, and proposed a general programme for the investigation of the Russian productive forces.

Overall census counts of the Russian population had occurred since the time of Peter the Great (1672–1725). Censuses were nothing unusual within Europe, but what was exceptional was that in Russia ‘communal land *must* be redistributed during the census year’, i. e. periodic reallocation within the peasant commune was directly linked to observations of population growth [Haxthausen, 1972 (1847), p. 83]. One of the earliest examples of more focused governmental attempts at data collection was the decision by the Minister of the Interior, A. I. Bibikov, to compel Russian landowners to prepare inventories of their estates listing the obligations due to landowners by peasants, and to empower committees to gather related evidence. On reporting the results in 1846, the committees complained of inaccurate information due to a lack of skilled staff and even some landowner resistance.

There were other sources of data on aspects of the Russian economy after 1850: for example, the army horse census, usually taken every six years, which counted the number of horses fit for army service, and individual commissions created by the government to investigate certain branches of industry. The official *Proceedings of the Commission for the Study of the Handicrafts Industry in Russia* was published in a massive 17-volumes between 1879–1890. However, the lack of coordination of Russian observational efforts was indicated by the fact that the mineralogist V. I. Vernadsky was still calling for the creation of an official state network of scientific investigative institutes in 1916 [Vernadsky, 1922, p. 31].

## 2. Natural Resource Surveys

Sites for observation could also mean more movable feasts, such as the conducting of surveys of the national resources of Russia’s regions, and the mapping of geography,

hydrography, climate and ethnography. It was Peter the Great who, at the end of the seventeenth century, first despatched engineers to survey the provinces of the Russian Empire and 'sent persons skilled in metallurgy to the various districts in which mines were to be found' [Society..., 1833, p. 188]. This type of fact-gathering operation had a scientific component, relating to the existence of mineral deposits, and an economic component, regarding industries that could be located in specific resource-rich areas. These two aspects were sometimes blurred, as it was the Livonian Economic Society that requested in the second quarter of the nineteenth century that the astronomer F. G. W. Struve should cover Livonia with a trigonometric net of measurements [Witskowski, 1891, p. 307]. Accurate maps were a prerequisite of documenting raw materials deposits.

It was the Imperial Free Economic Society that joined the Imperial Geographical Society in 1867 for sending expeditions to various districts to study the commercial distribution of grains, and also sponsored expeditions for examining the distribution of Russia's *chernozem* (black soil) in 1878–1879 [Vucinich, 1970, p. 85]. The *Proceedings of the Expedition Equipped by the Free Economic Society for Investigating the Grain Trade* was published in 4-volumes in 1868–1876. The Geographical Society also conducted a range of extensive demographic surveys, and organised ethnographic expeditions documenting rural socio-economic organisation and customs. And it was the Russian Society of Mining Engineers that, at congresses in 1903 and 1911, studied the economics of geological prospecting activities and the legal bases of industrial exploration [Vucinich, 1970, p. 422]. A survey expedition to the Urals provided the world-renowned chemist D. I. Mendeleev (1834–1907) with evidence of iron ore deposits used in analysing mining and metals production.

However, due to Russia's size and the wider variety of its physical environments compared to West-European states, surveying and prospecting were often more difficult tasks in Russia than they were in more developed states. One methodological difference between how such surveys were conducted in Russia and (say) the UK, was that that in the former, observation was more often seen as a comparative activity, in that Russia's 'facts' were compared with those of more advanced states, as part of the process of articulating a development programme. For example, in works on industry and on tariff reform, Mendeleev frequently quoted observational data on Germany as points of comparison with Russia, and in 1877 he published a detailed analysis of *Petroleum Affairs in Pennsylvania and the Caucasus* [Barnett, 2004; 2005a]. In 1873–1874, Yu. E. Yanson published a series of *Comparative-Statistical Studies*, including contrast of Russian/European railways and mortality, and a general two-volume *Comparative Statistics of Russia and West-European States* in 1878–1880.

In 1889, in response to rumours that Baku oil supplies were being exhausted, Mendeleev compared Baku with Pennsylvania, indicating that Baku naphtha flows had increased between 1885–1888. He demonstrated that, because of the absence of storage reservoirs in Baku, the price of oil fluctuated much more in relation to changing demand compared with Pennsylvania. When demand for kerosene rose, prices in Baku increased, but this was not a sign of impending exhaustion, merely of differences in storage facilities [Mendeleeff, 1889, p. 755]. It was far less likely that US economists would write substantial works comparing their country's natural resources with those of Russia.

The vastness of Russia also obliged economists to divide the country into agricultural regions, each having its own distinct structure. The resultant agricultural geography related price variations and production intensity to distance from, and transport links to, local markets [Tchayanov, 1928, p. 546]. For example, A. I. Skvortsov (1848–1914) published *The*

*Influence of Railway Transport on Agriculture* in 1890. Other factors influencing regional typicality were the range of soils and the diversity of climatic zones, and the distance between farms and the factories they supplied with raw materials [Chayanov, 1991 (1929), p. 189–190].

In 1910, A.N. Chelinstev (1874–1962), a leading member of the Organisation-Production School of economists, published *Regions of European Russia as Stages of Agricultural Evolution*, arguing that different regions of Russia represented different phases of rural development, and that population density was linked to production intensity. Outside European Russia, in Siberia, indigenous semi-nomadic agriculture and clan-based tent villages persisted even to 1900, with West-Russian settlement producing intermixed economic institutions. Consequently, location theory in the style of Johann von Thunen was especially relevant to Russian observational practice, more so than in substantially smaller countries.

### 3. The *Zemstvo*

Another institution with special observational duties was the *zemstvo*. The *zemstvo* was an autonomous unit of regional government first created in Russia in 1864, which had limited tax-raising abilities and some governmental functions. *Zemstvo* powers were restricted to local tasks, for example education and roads, but they also had a special role in gathering and collating local statistics. Since the basis of *zemstvo* income was taxes levied on immovable property (land and commercial establishments), *zemstvo* statistical bureaus had a direct incentive to document local economic conditions [Matyukha, Postnikov, and Samoilov, 1960, p. 299].

The first detailed *zemstvo* statistical investigation was begun in 1870, and by the 1880s there were 21 separate *zemstvo* statistical bureaus in operation. In contrast to the government's own Central Statistical Committee, which often collected data by circulating questionnaires, local *zemstvo* bureaus employed their own staff in order to gather firsthand information [Johnson, 1982, p. 344]. One early method of observation used by *zemstvo* statisticians was the household inventory and the house-to-house census, which was a detailed investigation of peasant farms in specific areas, often for taxation purposes, that was then published in statistical abstracts [Lenin, 1960 (1899), p. 70, 603]. In such censuses, information on total annual output, date of establishment, number of workers, and methods of cultivation were collected. According to an 1893 estimate, the *zemstvo* censuses covered 123 *uezds* (districts) in 22 *guberniyas* (provinces), observing 2, 983, 733 separate peasant households and a combined population total of 17, 996, 733 people [Lenin, 1960 (1899), p. 345, 142].

Another higher estimate in 1894 estimated the coverage figure for the censuses made by *zemstvo* statistical bureaus at 80,000 villages across 25 Russian provinces [Craigie, 1897, p. 749]. By 1917, *zemstvo* statisticians had interviewed a total of around 4.5 million peasant families across 34 different provinces, and published around 3,500 separate items documenting their results [Johnson, 1982, p. 357]. As a consequence of observing 'millions of separate farms', one economist explained that: 'It is quite beyond doubt that no other country has such an extensive collection of local statistical monographs as Russia' [Tchayanov, 1928, p. 544]. House-to-house censuses and inventories were sometimes also made for handicraft industries in certain regions. After 1900, some new *zemstvo* survey

methods were developed, for example household budget studies and peasant consumption studies.

Given the size of the Russian Empire, the capacity of the central government for conducting local observations was limited, and hence the *zemstvo* was often the only institution able to collect data in more remote areas. But since conditions varied so extensively from region to region, it was found that it was not always possible to utilize a universal design for gathering data [Johnson, 1982, p. 347]. Indeed, the question of calculating the size of landholdings in various regions had been of great significance in debates over measuring the extent of rural development and setting peasant taxes. Whether average figures or more disaggregated measures should be used had provided a point of much discussion [Darrow, 2000, p. 70]. Lenin drew extensively upon *zemstvo* data to support his argument that peasant differentiation was creating a rural bourgeoisie in Russia, and hence that capitalism in agriculture was more developed after 1890 than Populist economists had acknowledged [Lenin, 1960 (1899), p. 144–145].

In the 1870s, Mendeleev attempted to encourage rural *zemstvo* in using weather forecasts as an aid to agriculture, by facilitating the use of aerostats (weather balloons) to collect meteorological data at high altitudes [Brooks, 2004, p. 45]. This type of data collection provided a direct link between natural and social science observations, as climate data would be of use both to derive laws relating to changes in atmospheric layers, and to assist Russian peasants in designing successful crop sowing patterns. These aerostat proposals were unsuccessful, but more important was Mendeleev's campaigning for metric measurement. Appointed as the Director of the Chief Bureau of Weights and Measures in 1893, in 1899 he introduced a law that attempted to standardize Russian units of measurement in relation to the metric system [Gordin, 2004, p. 164]. One of the reasons for introducing the metric system was to enable more accurate alcoholometry in order to improve the collection of excise duties. Another was to ensure that standardized weights and measures were used in commercial transactions across the Empire, as regional centres often used outdated and inaccurate measuring prototypes. In 1897, use of the metric system was also cited as enabling improvements in attaining accurate harvest data [Craigie, 1897, p. 743].

Across much of the work of *zemstvo* statisticians, it is possible to identify two different observational data-gathering goals that co-existed: a narrower attempt to assess the value of landholdings and property, and a wider attempt to investigate household inventories and local socio-economic conditions [Johnson, 1982, p. 345, 347]. The former had as its main aim to provide information to enable government and local tax collection, the latter to provide data that could be used to design policies in order to improve rural living conditions. The political tensions between conservatives and reformers was one overtone to these different goals, and *zemstvo* statisticians were sometimes accused of harbouring radical sympathies, but in other instances *zemstvo* statisticians had freely entered government service, and hence they were not all political reformers, let alone social revolutionaries.

#### 4. The Free Economic Society

The final institutional aspect of Russian observation that will be examined here is the work of the Imperial Free Economic Society for the Encouragement of Agriculture and Husbandry, which was created on the initiative of Catherine II in 1765 and was in existence until 1919. It was declared 'free' in that it was not under the formal tutelage of the Russia

government or the Academy of Sciences, although it did receive some central governmental funding. Throughout its existence it published 281 volumes under its banner and issued journals and questionnaires, as well as organising exhibitions and competitions.

It officially requested answers to economic questions in the form of open competitions, which attracted entries from Russian and foreign authors. Examples of the question asked included: 'For the vigorous spread of agriculture, what should be the estate of the ploughman?' and 'What is more useful for society, that the peasant have his own land or only movable property?' [Prescott, 1977, p. 509]. These prize competitions were a means of seeking new ideas and of gathering first-hand information. It also published individually authored pamphlets such as Grigory Yatsenkov's *To What Extent is Agriculture Found in Russia*, which investigated the degree and form of crop cultivation [Yatsenkov, 1840].

The general aim of the Free Economic Society was to accelerate the development of Russian agriculture and industry. This was to be achieved by various methods including the publication of periodicals and other collections, the dissemination of the latest agricultural knowledge, awarding medals and prizes, organizing public lectures, giving special commissions to members, conducting field investigations, setting competitions for solutions to certain tasks and publishing the best answers, arranging exhibitions of agricultural and industrial works, organizing agricultural shows and experimental farms, collecting statistical data, and authorising entrance to its museums and libraries [Ustav, 1859, p. 13–14]. The Society's journal not only published conventional articles, but also the replies that the journal received from the provinces on questions relating to soils, crops, agricultural equipment, and peasant economy more generally that had been posed in previous issues.

One noteworthy feature of the Free Economic Society was that its membership came from a wide circle of people, including aristocrats and landowners, statesmen and civil servants, writers and lawyers, those interested in political and social economy, and also natural scientists. It thus served as a point of connection for other institutions of civil society. For instance, it served as a clearing-house for otherwise isolated *zemstvo* statistical workers, where it was 'one of the very few institutions that made concerted efforts to gather valuable data related to this unique social experiment' and provide economists with usable empirical information [Vucinich, 1970, p. 86]. It also acted as a government consultant on various economic issues, and organised commissions such as that of 1885 investigating grain exports [Atkinson, 1980, p. 97]. Another example of the Society's work was in researching the best varieties of crops to grow on Russian soil.

The connection between economic and scientific observation was important to the methods of key individuals associated with the Society. In 1866, Mendeleev composed for the Free Economic Society a questionnaire on soil quality. As has been explained:

Similar to what he would propose for meteorological observations in the 1870s, local farmers would gather data (after being properly instructed by an expert — himself) and then he would coordinate all the results through the Free Economic Society [Gordin, 2004, p. 149].

In the same year, 1866, Mendeleev wrote a work entitled 'On the Organization of Agricultural Methods under the Free Economic Society'. A year previous to this, in 1865, he had purchased his own estate of land (around 1026 acres), on which he organised the scientific application of fertilizer to the cultivation of grain crops [Mendeleev, 1991, p. 6–7].

Perhaps one of the most significant examples of work using economic observations published under the Society's banner was that conducted by S. N. Prokopovich (1871–1955) on measuring national income. Before 1917, Prokopovich was a socialist sympathiser who witnessed the 1891–1892 Siberian famine first-hand; in 1922, he was deported from Soviet Russia, and then in exile he created the renowned Prague 'Economic Cabinet' for observing the Soviet economy. In a 1906 contribution issued in the 'Works of the Free Economic Society' publication series entitled *Experience of Calculating National Income in 1900*, Prokopovich provided the first indigenous estimate of aggregate national income for all of the Russia state (excluding Finland). He calculated that it was 8.9 milliard rubles in 1900 [Prokopovich, 1918, p.26]; what was interesting were the observations that were needed to reach this aggregate figure. This work on national income can be seen as the culmination of data-gathering efforts that had been taking place over decades.

Prokopovich declared that, in his calculation, national income was composed of the net production of six branches of material production, and for 50 *guberniyas* of European Russia, he estimated their levels as shown here in Table 1.

Table 1. RUSSIAN NATIONAL INCOME IN 1900

BRANCH OF PRODUCTION	LEVEL IN 1900 (in rubles)
Agriculture	2,985,057,000
Forestry and Fishing	626,167,000
Mining and Processing Industries	1,402,191,000
Transport Business	531,200,000
Construction Business	473,100,000
Trade	561,900,000
TOTAL	6,579,615,000

Source: [Prokopovich, 1918, p.6, 24].

Thus, total national income for 50 *guberniyas* of European Russia in 1900 was approximately 6.58 milliard rubles, which increased to 11.81 milliard in 1913. He recognised that figures for gross output for all branches of productive activity, and data on the consumption of material values used in production, would actually be necessary to calculate national income, but as these figures were not available, net production had been used as a substitute [Prokopovich, 1918, p.5–6]. Prokopovich later admitted that his calculation of national income in 1900 was not really an estimate of actual population income, but of the net production of the Russian national economy [Prokopovich, 1930, p.46].

In order to calculate the total figures for the branches of production that were used, Prokopovich employed observational data that had been gathered by the Central Statistical Committee (TsSK). However, the TsSK had judged some of its data, agricultural harvests, according to information gathered by *zemstvo* statisticians [Prokopovich, 1918, p.7]. In another instance, output of cattle, Prokopovich used data from peasant budget investigations published by the Free Economic Society [Prokopovich, 1918, p.10]. In still other instances, Prokopovich used data from the Russian Forestry Department, the Ministry of Finance, a Special Conference on Fuel, and various monographs and statistical yearbooks on specific areas of industry.



Thus, Prokopovich's national income calculation for 1900 was only possible because of the existence of a wide variety of data that had been gathered by a number of statistical institutions, and it can be conceived of as one of the most significant culminations of observational efforts in pre-revolutionary Russia. Prokopovich's efforts did not go unnoticed. Colin Clark declared that Prokopovich had adopted a 'somewhat limited and materialistic definition of national income' that excluded rents and many services [Clark, 1939, p. 5]. Prokopovich had readily recognised this deficiency, but data limitations had tied his hand; in fact he had been a pioneer.

## 5. Observational Techniques

Having considered various institutions, it is now time to focus on the techniques employed by Russian economists. One of the most important economists to have an impact on the development of observational techniques in the pre-revolutionary period was A. I. Chuprov (1842–1908), a leading Russian historical economist and President of the Statistical Section of the Moscow Juridical Society. In 1888, he defined the task of statistics as to compose the large mass of social facts describing phenomena in terms of systematic observations with the help of a special method, in order to elucidate the laws that underlay them [Chuprov, 1909a, p. 207]. He outlined that the successes achieved by Russian statistics in the previous quarter century had been huge, for example the formation of a Central Statistical Committee, which competed with government departments in providing data. Chuprov believed statistics was particularly important because an acquaintance with the facts of economic life was a necessary condition for the elaboration of norms for civil rights [Chuprov, 1909a, p. 210].

The 'special statistical method' that Chuprov referred to was the 'monographic method' or the 'monographic description' of separate entities such as villages, which he declared was a necessary means of renewing the foundations of *zemstvo* investigations [Chuprov, 1909b, p. 225]. The monographic method involved selecting a cluster of elements that were identified as typical of a given population in aspects that were deemed relevant, and then investigating them in substantial detail [Seneta, 1985, p. 120]. This was done either by using existing registrations, or by employing local agronomical and anthropological knowledge [Chayanov, 1991 (1929), p. 190; Morgan, 2010, p. 312]. The outcome could be detailed statistical data on production in a given area, or a study of the agricultural institutions found in a specific region. In another more focused example that was related to household inventories:

...while the data by household could be compiled in general tables, detailed descriptions should be obtained of one or more typical households in each particular district, including complete data on the budgets, and real and personal property of each household [Craigie, 1897, p. 751].

Many of the regional studies accomplished by *zemstvo* statisticians in the 1880s could be conceived as using the monographic method, at least in part.

Chuprov outlined the reasoning for the necessity of such typicality studies, and also the need for associated larger-scale investigations, as follows:

Explaining the fundamental difference between phenomena of the external [natural] world and human society consist of the fact that the former occurs under the influence of causes that are constant identical or uniform, whereas on the contrary, social phenomena

depend on a multitude of causes that are not only constant, but also variable and random, in consequence of this they also possess individual character. The observation of various facts here cannot serve as the basis for conclusions about other cases of the same kind; the action of one individual does not resemble the actions of another. In this latter case, it is necessary to combine observations of a large number of single cases together, in order from the sum of such individual studies to obtain one total investigation — it is necessary to accomplish what is called mass observation [Chuprov, 1909a, p.207].

Thus, Chuprov advocated focusing on the individual monographic selection of typicality, and also on wider documenting of the totality of which it formed a part, as two elements of a method designed to reveal unique economic specificities and also general trends in the wider economy.

Consideration of the monographic method was quite extensive, as it was discussed at a meeting of the International Statistical Institute held in St Petersburg in August 1897. In addition to general statistical analysis, the need for a special committee investigating what were called ‘methods of typological inquiry’ was asserted. Especially with regards to social questions, a large field allowing ‘partial investigations’ was identified, either case-study monographs or statistical explorations of specific fields, although the types chosen ‘should be as representative as possible’ and ‘controlled by’ general statistics in many regards [Craigie, 1897, p.766]. This latter point highlighted the selection criteria for ‘typicality’, which should be based on a wider understanding of general trends, or so-called ‘best representative typological methods’. However, others like S. A. Pervushin (1888–1966) argued that it was difficult to judge in isolation whether materials gathered by the monographic method were typical for peasant farms in general, and he suggested that the ‘expedition method’ of collecting budget materials on the basis of a single-period once-only investigation were often flawed: instead, receipt and outlay accounts over a series of years should be used [Chayanov, 1991 (1912), p.342–343].

It was A. I. Chuprov’s son, A. A. Chuprov (1874–1926), who was one of the most important theorists to challenge the relevance of the monographic method in Russia after 1900. According to J. M. Keynes, A. A. Chuprov was ‘one of the most important writers on the boundary line between statistical theory and the theory of Probability’ [Keynes, 1926, p.518]. In a 1910 work, the title of which is usually translated as *Sampling*, but could more literally but less accurately be rendered as *Selective Investigation*, Chuprov provided a critique of the monographic method and its hidden sources of observational bias [Chuprov, 1910]. Having in mind the sort of regional studies that had been commonly undertaken by *zemstvo* statisticians, Chuprov explained:

...when we return from a distant journey, mapping our representations of the visit to the locality, describing aspects of the streets, the character of buildings, and type of inhabitants, then you want to recount it free from figures, but in essence it rests on the purely statistical — only subconscious — calculation of various impressions and on inference, ‘typical’ for the total mass of your experience.

In such cases of ‘crypto’-statistical judgement we have matters on every stage of living customs. With this underlies, in the majority of cases, a concealment of so-called ‘popular wisdom’ finding expression in proverbs and omens. Here the same is attributed to the notorious ‘personal experience’ of the practitioner...[Chuprov, 1910, p.4].

Thus, according to Chuprov, when investigators produced their monographic studies of apparent typicality, they were unconsciously employing selection criteria for observations based on folk wisdom and their own selective experiences.

Clearly employing an analogy with the 'correct' observational techniques used by scientists, Chuprov continued his critique of typicality as follows:

The errors that creep into the conclusions with such unconscious use of statistical judgements have various sources. Not free from errors are, above all, those single [typical] observations that we summarize onto one general statistical map. Such types of error, that every naturalist sharply knows according to their daily practice, is not necessary for us to explain... But, in the large, measures serve attention in the second stage of the process — summing individual impressions into general conclusions. Here such ideas, passively providing natural currents of thinking experience, meet peculiar dangers... [Chuprov, 1910, p. 5].

Chuprov's solution to the problem of monographic bias was mechanically and randomly chosen samples (one out of every ten) and use of the idea of 'probable error' of estimates (Seneta, 1985, p. 120). He proposed that social science observations — 'the city of Petersburg as a complicated system of mutual relationships among an aggregate of its inhabitants' — should be analysed with the same sample count methods as used in the natural sciences, which were based ultimately on the application of the law of large numbers [Chuprov, 1981 (1913), p. 174].

Here was the essential methodological difference between the approaches of father and son. A. I. Chuprov, the historical economist, believed that social science observations were of a different type from those of the natural sciences, whereas A. A. Chuprov, the statistical theorist, believed they were the same. In the former case, the monographic method was deemed to be appropriate precisely because of this distinction, where essential differences between economic phenomena had to be observed and explained in individual and historically grounded terms: whereas, in the latter case, the monographic method was seen as biased and un-representatively selective, precisely because the law of large numbers was not being consistently applied.

It has been suggested that the monographic establishment of typicality involved only the use of the arithmetic average of a stratified sample, which would be a nonsensical measure if variability within the sample were large [Kotz and Seneta, 1990, p. 77–78]. E. E. Slutsky (1880–1948) made a similar point in *The Theory of Correlation* of 1912 regarding any statistical totality of items having a common relation when not all the items had indicated relations of the same magnitude:

There was a time when statisticians ignored these differences and only concentrated on the arithmetic mean of the indications. Nowadays, it is not anymore necessary to struggle against this dated...restriction. It is almost generally understood that the mean is reporting too little about the essence of the whole statistical group and that the aim of statistics comes to describing as completely and simply as possible the whole composition of totalities under consideration [Slutsky, 2009 (1912), p. 8].

However, this purely distributional characterisation of the method is missing an important part of the monographic approach. Typicality could mean not simply the numerical representation of a standard commonality, but the construction of complex distinctiveness.

A. I. Chuprov's concern with 'the sum of individual studies' implied that typicality was assembled organically and individually from the bottom up, rather than statistically and

mechanically from the top down. Beginning with detailed individual studies of specific farms/types/households/regions, the monographic description of more general structure was then built up through later comparison and contrast. This method was similar to the idea of revealing 'hidden internal structure' in the macro-economy through cartographic description [Morgan, 2010, p. 305]. This bottom-up approach was especially relevant to a large nation like Russia, where the diversity of agricultural economy was greater than in small West-European countries, and hence the standard deviation in relation to typicality measures would often be higher.

Another related issue that was debated in pre-revolutionary Russia was the use of averages with regards to time-series observations of individual quantities. For example, in estimating the volume of oil exports, in order to detect possible errors in the data, Mendeleev recommended crosschecking independently obtained figures against each other, and if no errors were apparent, then average (arithmetic mean) figures of the various data sets should be taken [Sheynin, 1996, p. 61]. In another instance he declared that, in presenting yearly data for Russian manufactories and mills over the period 1878–1890, under this averaging method 'production is estimated by the approximate mean values of the articles produced' [Mendeleeff, 1893, p. vii]. Mendeleev favoured the use of what he termed 'harmonious' observations, i.e. those in which the median value coincided with the arithmetic mean, or even better, those in which the mean of the middlemost third coincided with the mean of the means of its extreme thirds [Sheynin, 1996, p. 63].

Problems of observing agricultural yields and use of the notion of an 'average crop', were considered at the meeting of the International Statistical Institute in 1897. In some instances, only verbal statements of crop yield estimates were employed in Russia, the categories being: very good, good, good-average, average, under-average, bad, and very bad. The question was then raised whether the meaning of the term 'average' had any definite significance in the Russian context. Whereas in France, a 100% rating meant only the qualitative grading 'very good' and a 20% rating 'bad', in the USA, a 100% rating corresponded quantitatively to what was called a 'full average crop': the basis of comparison was taken as the average of the preceding ten years. Whilst this might be appropriate for the USA, where the yield varied comparatively little from year to year, in Russia, where production was so extensive and diverse and the climate so variable, the range of variation in the yield reached around 300%. In this latter instance, a 'full average crop' measure would have no real observational value, due in part to the sheer size of Russia and the diversity of its agriculture [Craigie, 1897, p. 744–745].

Perhaps the most well-known analyst of the techniques of household budget study employed by *zemstvo* statisticians was A. V. Chayanov (1888–1937), the renowned theorist of peasant farming who, in the 1920s, was the director of the Moscow Institute for Agricultural Economics. In 1912, he suggested that one of the most precise techniques of budget investigation could be the self-completed bookkeeping questionnaire, which peasants themselves were trained to conduct [Chayanov, 1991 (1912), p. 342]. Tables 2 and 3 present examples given by Chayanov from 1910, indicating the level of factual detail that such questionnaires were intended to capture.

Table 2 was designed to collect data on the hours worked by individual farm members disaggregated by category of labour, while Table 3 was designed for to collect data on the costs of various types of working equipment that farms employed. Alongside such Tables, for each household farmstead in a given village, numerous accompanying questions were

asked, such as how much of a particular crop was grown, the associated costs of cultivation, the harvests obtained, the prices realised, the average harvest level, the prices paid for leased land, percentage outlay on specific crops and so on.

Table 2. CALCULATION OF LABOUR EXPENDED ON A FARM

WORK DONE	WORK TIME	REQUIRED DAILY WORK:				PAYMENT:	
		HORSES	MEN	WOMEN	CHILDREN	UNITS	PRICE
Ploughing I							
Harrowing I (number of tracks)							
Ploughing II							
Harrowing II (number of tracks)							
Sowing							
Closing up							
Rolling							
Weeding							
Pulling out and linking							
Bringing together with poles							
Threshing							
Spreading							
Lifting							
Trampling down							
Pulling about							
Scutching							
Connecting							

Source: [Chayanov, 1991 (1929), p.72].

Table 3. AMORTIZATION OF TOOLS OF PRODUCTION

TOOL	SYSTEM	PLACE OF PURCHASE	NUMBER	COST	YEARLY MAINTENANCE	USUAL YEARS OF SERVICE
Plough						
Holing tool						
Mangle						
Rake						
Seed-divider						
Thresher						
Brake						
Winnower						
Scutcher						
Rower						
Seed Grader						

Source: [Chayanov, 1991 (1929), p.73].

To give an example of how Chayanov used such questionnaire data on budgetary expenditure, he presented the information shown here as Table 4, comparing various peasant farms in different regions, describing it as what he called character analysis.

Table 4. REGIONAL BUDGET DATA

REGION	ONE PERSON'S BUDGET (in rubles)	MONETARY PERCENTAGE	OUTLAY ON TEA AND SUGAR (in rubles)
Volokolamsky district	100.1	57.9%	8.0
Moscow province	79.1	52.0%	6.2
Vologodsky district	64.1	60.7%	5.4
Totemsky district	51.8	30.2%	2.5
Vel'sky district	56.7	31.2%	2.0

Source: [Chayanov, 1991 (1912), p.346].

Analysis of this data suggested that declining consumption of tea and sugar was linked to the size of the monetary element in family budgets. In Chayanov's original yet controversial analysis of Russian agriculture, peasant behaviour was based on a labour-consumption balance in which the monetary and non-monetary requirements of a family unit were evaluated against the drudgery of labour performed. Part of the origins of this analysis was the data that had been gathered through *zemstvo* budget investigations. Not everyone agreed with Chayanov's results. L. N. Litoshenko also used budget data to argue that peasant behaviour was mainly acquisitive and often market-driven.

Although Chayanov was not officially a *zemstvo* statistician, in 1912 he used survey materials gathered by *zemstvo* officers in Khar'kov to verify his hypothesis that the evolving needs of the family unit was the major factor in determining peasant behaviour: as previously, he compared monetary outlays in different regions with the varying character of purchasing trends [Chayanov, 1915, p. 125–130]. From the position of observational techniques, the crucial factor was that Chayanov was able to use data that was disaggregated by region and by size of peasant farm, and that observations on consumption patterns were now available. Some Russian economists also observed urban consumption budgets: in 1909, Prokopovich published an empirical study of *Budgets of St-Petersburg Workers*, while in 1910, D. Shaposhnikov conducted a regional account of factory worker budgets in Bogorodsk *uezd*. And although Slutsky's 1915 article 'On the Theory of the Budget of the Consumer' became famous as a contribution to microeconomic theory, it was also intended to stimulate the study of measurable budgetary data [Barnett, 2011, p. 42].

## 6. Political Ramifications

One way of determining the observational 'typicality' identified by historical economists was to group peasant farms by some category of socio-economic stratification, by size of allotment, number of draught horses owned, or the size of the monetary element in the household budget. Methods of grouping indicators into more complex systems were also proposed. Chayanov defined rural typicality in relation to family land-holdings within a region: each social stratum had its typical farm [Chayanov, 1991 (1929), p. 189]. Another example of 'typicality' was in organisational forms of economy: the *obshchina* (rural

commune), *artel* (industrial collective), *kustar* (small-scale handicrafts) and various types of cooperative association were all subject to statistical-monographic study.

Although the publications produced from *zemstvo* survey data were most often framed in terms of regional divisions, and hence the typicality that might emerge from the observational data was geographical, it is not true to suggest that *zemstvo* statisticians (or others gathering data) were always blind to socio-economic divisions. For example, in his pre-revolutionary analysis of 20 village communities within Ryzan *guberniya*, the geographer and statistician P.P.Semenov (1870–1942) plotted six types of peasant household: very wealthy, prosperous, well-to-do, middling, poor and very poor [Matyukha, Postnikov, and Samoilov, 1960, p. 298]. In 1915, he even published a book entitled *Types of Locality in European Russia and the Caucasus*.

In a study of peasant budgets of four *uezds*, the director of the Voronezh *zemstvo* statistical section F. A. Shcherbina (1849–1936), presented statistics on 67 budgets of what were called typical farms. Shcherbina also published budget studies under the auspices of the Free Economic Society. According to Lenin, however, Shcherbina's use of all-round averages produced misleading results, as it concealed the socio-economic differentiation that had developed [Lenin, 1960 (1899), p. 149]. Shcherbina divided land income by the total number of farms to obtain an overall average figure for the *uezds* in question. For Lenin, it was not peasant farming in totality that constituted a special 'type of development', but rather the rural proletariat and the peasant bourgeoisie, as these groups should be separately classified by size of allotment and number of animals owned [Lenin, 1960 (1899), p. 171]. Even so, as Lenin recognised elsewhere, other *zemstvo* statisticians did group peasant households according to area under crops, in the Taurida region finding that 20% of the households owned over 50% of the total area under cultivation [Lenin, 1960 (1899), p. 71].

Observations of industrial data did not escape consideration in political debates. Mendeleev provided analysis of the distribution of factory workers, noting in 1893 that there were 43 workmen per manufactory unit [Mendeleeff, 1893, p. lii]. Although such data might seem uncontroversial, in Russia they were subject to significant political debate. The conflict between Social Democrats like Lenin, Populists like V.P. Vorontsov and Legal Marxists like M. I. Tugan-Baranovsky over estimating the growth of factory/worker numbers has been documented, as the question of the extent of capitalist development in Russia during the 1890s was crucial to resolving questions of political strategy [Barnett, 2005b, p. 93–96].

In such debates, the unit of industrial observation was an essentially contested quantity, as definitions of 'factory', 'manufactory', 'handicraft unit' and so on were subject to elementary dispute. One part of this dispute related to the size of enterprises categorised as 'factories': should they include smaller artisan units? Another was whether a linear scheme of industrial transformation applied across the nineteenth century: did handicrafts precede, co-exist with, or follow on from the factory system? In both cases, dispute over what should be observed was fundamental. The issue of averages also reappeared: Tugan-Baranovsky warned that 'average numbers of workers' or 'value of output' did not provide a reliable measure of industrial concentration in cases of heterogeneous enterprises [Tugan-Baranovsky, 1934 (1907), p. 290–291].

Part of the problem was that three separate government institutions had responsibility for collecting data on Russian industry in the second half of the nineteenth century. The Ministry of Agriculture and State Property gathered information on mining and metallurgy,

the Ministry of Finance gathered information on industries in which production was assessed for excise duties, and the Ministry of Trade and Industry gathered information on industries in which production was not assessed for excise duties: different methodologies and programmes of collection proliferated, making a calculation of aggregate industrial growth more difficult to obtain. Factory inspectors also produced first-hand reports on working conditions by visiting individual factories, but their scope was severely limited by personnel shortages and travel limitations [Tugan-Baranovsky, 1934 (1907), p. 311].

Finally, the nature of the factories being documented had consequences for the observations that were (or were not) being made. After 1750, two basic types of Russian factory had existed: the manorial (*votchinnye*) factory, which was owned privately by the gentry and often used serf labour, sometimes without payment; and the possessional (*posessionnye*) factory, which either received state subsidies in the form of land or buildings, or were constructed with state aid, and used workers bound to it by law. If the owners of possessional factories did not fulfil their obligations regarding production, then the factory (along with its workers) could be sequestered by the state [Tugan-Baranovsky, 1934 (1907), p. 84]. Unsurprisingly, in the early nineteenth-century the Russian government collected extensive statistical data on this latter type of factory, whereas data on the former type was relatively neglected.

## 7. Conclusions

One issue that arises clearly from the above discussion was the consequences of scale for economic measurement, as was highlighted in the 1737 article on measuring the earth. In opposition to the notion that the extent of Russia assisted accurate scientific observations, Russia's vast scale often hindered the making of accurate economic observations, at least outside the major urban conurbations like Moscow/St Petersburg, and made a single methodology much harder to implement. Alfred Marshall's description of Russia as 'large, continuous and self-contained' was consequently correct only in its first and last characterisations [Marshall, 1919, p. 162]. Institutions such as the *zemstvo* evolved to fill the regional gap to some degree, but the information thus gathered was not always easily available to government departments, and was sometimes subject to fierce political debate.

The size of Russia also had consequences for the specific economics that developed, as was seen in the examples of location theory and typicality studies.

Another point that arises was whether specifically Russian institutions and techniques of observation could be detected. There were certainly unique Russian institutions, which conducted observations and were the subject of them, but perhaps less so were there unique techniques. *Zemstvo* surveys of peasant households were pioneering, as was Prokopovich's efforts at least in the Russian context. Certainly, the sheer volume of localized economic studies published in late nineteenth-century Russia was unprecedented, although as has been noted elsewhere, masses of raw facts can languish un-utilised, or be put to widely different purposes. But the debate over the 'monographic' methodology of the historical school versus the aggregate sampling favoured by statisticians was part of a wider continental trend, as the historical school came under attack for its 'unscientific' approach. In Russia the question of whether averaging lost more typicality information than it gained in overall representative-ness still remained open in 1917. As the scale of the averaging sample



increased, the representative nature of the average sometimes declined: who decided at what level an average was taken was therefore crucial.

Finally, the political components of the Russian debates over observation grew in intensity as the nineteenth century gave way to the twentieth. Today, it is understood how these debates were resolved after 1917: Lenin's sociological classification of peasant farms by size of allotment and number of animals owned was transformed in the late-1920s into the ideological attempt to measure the political 'sin' of class differentiation, which after 1929 became the chilling governmental attempt to 'annihilate the kulaks as a class.' Of course it is not inevitable that, if an attempt is made to observe class as a category, then this will be followed by a Marxian attempt to 'abolish' such categories and the individuals that constitute them.

Other Russian Marxists, such as Tugan-Baranovsky, moved in the opposite political direction to Lenin, and even cautiously welcomed some aspects of the development of capitalism in Russia after 1900, based in Tugan-Baranovsky's case on his extensive observations of the Russian factory in the past and the present. But the Russian/Soviet example provides an instructive tale of how the term 'observation' has various nuances of meaning: 'study' and 'inspection' can give way to 'surveillance' and 'judgement' in certain acute circumstances.

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