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# First calculations of the total output of Latvia and Lithuania in the 1920s: a comparison

Zenonas Norkus

Sociology Department, Faculty of Philosophy, Vilnius University, Vilnius, Lithuania

## ABSTRACT

The contemporary system of national accounts (SNA) framework is used to compare the methodologies and to adjust the findings to allow for cross-country comparisons of the very first calculations of the total economic output of Lithuania in 1924 by Albinas Rimka (1886–1944) and of Latvia in 1925 by Alfrēds Ceihners (1899–1987). Ceihners' notion of national income corresponds to the SNA concept of gross national income (GNI), while Rimka measured net national income (NNI). Rimka's estimate has a downward bias, because he applied a fixed capital depreciation rate that was too high and did not include the value of noncommercial public sector services.

**KEYWORDS** Economic history of Baltic states; Lithuania 1918–1940; Latvia 1918–1940; national income; history of national accounting; Alfrēds Ceihners; Albinas Rimka

## Introduction

This paper has two interconnected aims. The first is to compare the methodologies of two pioneering calculations of the total economic output of two newly independent states that emerged after World War I (WWI). Two outstanding economists produced these methodologies. Albinas Rimka (1886–1944) published the calculation of the national income of Lithuania for 1924 (Rimka 1926) in 1926 and Alfrēds Ceihners (1899–1987) published the calculation of the national income of Latvia for 1925 (Ceihners 1927) in 1927.<sup>1</sup> Because both contributions refer to nearly contemporaneous time periods and are grounded in all of the available statistical information at that time, such a comparison allows for the comparison of the economies of the two neighboring countries at nearly the same time, which is the second aim of this paper. Therefore, this paper is a contribution both to the economic history of the two Baltic countries and to the history of the economic history (historiography) of Latvia and Lithuania.

The paper is structured as follows. The first section presents brief biographical information about the two economists and addresses how the comparison of Ceihners' and Rimka's work on the macroeconomic measurement can advance both the knowledge of the history of the social sciences in the two Baltic 'sister countries' and the knowledge of the past of their economies. The following sections present, compare, and discuss the economists' estimates of the contribution of agriculture,

industry, and services to the national income of Lithuania in 1924 and Latvia in 1925. To add lucidity to the comparison of these findings, the most important aspects are presented in tables. Monetary data is presented in the Lithuanian currency, Litas (LTL), in the Latvian currency, Lats (LVL), and in U.S. dollars (\$), using the gold parity of these currencies in 1924–1925 for conversion.

At that time, one LTL was equal to 0.150462 g of gold, while one LVL was equivalent to 0.2903226 g, and \$1 to 1.504631 g of pure gold. These conversion rates reflect the decision in 1922 of Lithuanian lawmakers to set the value of 1 LTL to 10 U.S. cents, while their Latvian counterparts opted in the same year for a fixed exchange rate of 1 LVL to 1 Swiss gold franc, which was worth 0.2903226 g of pure gold (Karnups 2012, 26; Terleckas 1992, 82). Therefore, the exchange rates that I am using for the conversion are \$1 = 10 LTL, \$1 = 5.18 LVL, and 1 LTL = 0.518 LVL (or 1 LVL = 1.93 LTL). Until the 1930s, both currencies were under an effective gold standard, with their market exchange rates only slightly oscillating around their gold parities. Therefore, the gold parity provides a sound basis for the comparison of the output of both countries in monetary terms. Because the time periods under comparison are contiguous, and narrative sources do not report any remarkable macroeconomic instabilities for between 1924 and 1925 in the economic history either country, the use of current prices cannot be a source of noticeable distortions. The comparison at the currency exchange rate does not take into consideration the differences in the purchasing power of national currencies because of inequalities in price levels in Lithuania and Latvia. However, the only available research of these price differences is limited to the period between 1938 and 1940 (Vaskela 2007). The comparison of price levels in the 1920s is not possible without additional research grounded in primary sources and would exceed the space for a single paper.

## **Two (Internationally) forgotten pioneers of macroeconomic measurement in the Baltic states**

For many Lithuanian readers, Albinas Rimka probably needs no introduction. He was one of the founders and leaders of the second most popular political party in the early interwar Republic of Lithuania. This was the Peasant Populist (*valstiečiai liaudininkai*) Party, which was the Lithuanian sister party of the Latvian Farmers' Union (*Latvijas Zemnieku savienība*). After co-authoring the famous agrarian reform law, enacted in 1922, Rimka transitioned into academia, resuming his studies at the Frankfurt Academy of Trade and Social Sciences (*Frankfurter Akademie für Handels- und Sozialwissenschaften*; see Schefold 1989), which he had commenced before WWI. After his graduation, he began to teach at Kaunas University in 1923. In 1926, he served as the Minister of Finance in the left-of-center government, which was deposed by the authoritarian coup in the same year. In subsequent years, Rimka combined academic and practical activities. He taught at Kaunas University, served from 1927 to 1928 as the Director of the Central Statistical Bureau of Lithuania, and then led the analytical division of the Lithuanian Bank from 1928 to 1929. In 1930, he became a full professor at Kaunas, followed by Vilnius University in 1940, and in 1941, he was elected a member of the Lithuanian Academy of Science.

Rimka's untimely death just before the Soviet return to Lithuania in 1944 spared him the hard choice between emigration and service to the Soviet regime. Although, at the time, Rimka was rebuked as a 'bourgeois scholar,' his memory survived because

his main publications were in social and economic statistics, which was the least ideologized, in relative terms, branch of economic science. After all, his publication list includes authoritative textbooks in statistics (Rimka 1922, 1925, 1933, 1939), which were used in educating a whole generation of Lithuanian economists. In the restored independent Republic of Lithuania, Rimka is revered as one of the founding fathers, both of independent Lithuania and of economic science in that country. Celebrating his 110th birthday, the Faculty of Economics at Vilnius University and the Department of Statistics of Lithuania held a conference in 1996, where the leading economists and statisticians in contemporary Lithuania discussed various aspects of his life and work (Martišius 1996). Each year, the Lithuanian Academy of Science announces a competition for the Albinas Rimka prize, which is awarded to the most distinguished Lithuanian economists.

Alfrēds Ceihners graduated from the Division of Economics at Latvian University and defended his first dissertation on the economic significance of Latvian forestry in 1929 (Ceichners 1929). In 1931, he defended his second dissertation discussing the impact of Latvian state economic policies on the national wealth (Ceihners 1931). He was employed as a referent at the Department of Economics of the Ministry of Finances of Latvia and by the newspaper *Brīvā zeme* between 1935 and 1939. There is no information that he ever held a permanent or full-time academic position. In 1944, he emigrated to Germany, and later to the U.S.A. He died a few years before the restoration of an independent Latvia in 1990–1991. Short articles in Latvian encyclopedias (Ceichners, Alfrēds 1950–1951; Ceihners, Alfrēds 2002) are only source of information about Ceihners' life and work. This information is very scarce (even his exact death date is not known), although during the interwar time period, he was among the first five most distinguished economists in that country.

One of the reasons why Ceihners died in obscurity and remains there, despite his prolific output (more than 100 contributions to periodicals and several books), may be the perception of posterity that he was closely affiliated with the authoritarian regime of Karlis Ulmanis from 1934 to 1940, and then, was a Nazi collaborator from 1941 to 1944. In fact, his publishing record includes a thick book about the economic policies of the Ulmanis regime (Ceichners 1939) and an extensive study of Soviet crimes during their first occupation of Latvia in 1940 and 1941 (Ceichner 1943). This book remains classified as Nazi propaganda in many libraries in the world.<sup>2</sup> This may be a grave error or historical injustice as the book is a well-researched scholarly work. Library classifiers probably assumed that in Riga in 1943, there could be no legal publications other than Nazi propaganda.

The biographies of both scholars are still waiting unwritten. The aim here is much more modest: to fill a lacuna in the historiography of the emergence of the contemporary SNA. In 1958, Paul Studenski published the magisterial book *The Income of Nations. Theory, Measurement, and Analysis: Past and Present* with the explicit aim of covering all contributions to the calculation of national income in all of the countries of the world since the pioneering works of William Petty until his own time. Other authors updated Studenski's research, covering later developments or discussing the work of researchers who were omitted or only given brief consideration by Studenski (e.g. Kenessey 1994; Vanoli 2005). Studenski (1958, 149) mentioned Latvia in his list of countries for which systematic national income estimates were developed between the two world wars. However, in contrast to other countries on this list, there is no section about the work on the economic macromasurement in Latvia in the third part

of the book, where he surveyed the rise of national accounting on a country-by-country basis. A. Ceihners is mentioned, but misspelled (as Ceickners), and the date of the first national income calculation in Latvia (1931) is wrong (Studenski 1958, 156). There is not a single reference to the work on economic macromasurement in Estonia<sup>3</sup> and Lithuania.

One can only speculate why Studenski excluded the Baltic countries. The most credible explanation is that this omission occurs because the Baltic countries were nonexistent on the political world map at the time of the publication of his authoritative book. This guess can be indirectly corroborated by comparing different editions of another well-known synoptic work on national income – *The Conditions of Economic Progress* by Colin Clark, who was the pioneer of the international comparison of output on the purchasing power parity basis. While the first two editions (1940 and 1951) provided output data (the yearly average for the 1925–1934 period) for all three Baltic countries, in the third edition (Clark 1957), they disappeared. The references to Ceihners' work were dropped too. Meanwhile this work along with the later collection of the international national income data published by Dresdner Bank (1930), was the source of Clark's data about Latvia in the first and second editions of Clark's book.<sup>4</sup> Obviously, in preparing the last edition of his magisterial work, Clark took into account the changes in the political map of the world after WWII, which may have seemed irreversible by the late 1950s. Studenski's neglect of interwar Baltic contributions can be explained by the same consideration.

However, the introduction of Ceihners' and Rimka's contributions to macroeconomic measurement in the broader international research community is not just a matter of the restoration of historical justice in the wake of the restitution of the independent Baltic states. This author argues that their estimates are critically important historical sources for research of the economic history of Latvia and Lithuania. According to many qualitative judgements (see e.g. Kriškčiūnas 1938; Elango 1958; Vaskela 1998, 241), by 1924–1925, the Baltic economies had recovered from the destruction brought by WWI, from the strain imposed by their integration into the world market as separate macroeconomic units, and the loss of the access to Russian market. Without knowing the size of their economies at that time, there is no possibility of knowing, in quantitative terms, how large their economic progress was during the time of interwar independence. As the only extant estimates for the earliest year of this period, the estimates of Ceihners and Rimka are indispensable benchmarks for the estimates of their economic growth over the entire interwar period.

In fact, contemporary Lithuanian scholars take the summary results of Rimka at face value in their work on the economic progress of Lithuania during the interwar time period. His estimate that Lithuania's national income was 1266.9 million LTL (or 582 LTL per capita) in 1924 became quasi-canonical after it was endorsed in the synoptic history of the industrial development of Lithuania in the nineteenth to first half of the twentieth century, co-authored by the group of economists and historians led by the then Director of the Institute of Economics of the Lithuanian Academy of Sciences, Kazimieras Meškauskas (Meškauskas et al. 1976). Besides Rimka's estimate, these researchers used the calculations of the Central Statistical Bureau of Lithuania for the German administration for the *Reichskommissariat Ostland* (Reichskommissar für das Ostland 1942, 120). According to these results, the national income of Lithuania in 1938 was 1165.9 million LTL (482 LTL per capita), and in 1939, it was 1259.1 LTL (515 LL per capita) at current prices.

Recalculating in constant 1924 prices, Meškauskas derived 2460.0 million LTL (1017 LTL per capita) for 1938 and 2499.7 million LTL (1023 per capita) for 1939. These figures imply that, from 1924 to 1939, the total national income of Lithuania nearly doubled, growing by 97%, while the national income per capita grew by 75.8%. Another implication of the recalculation is that the average annual growth rate of the total national income in Lithuania was 4.6%, while the national income per capita grew at a 3.8% rate. These conclusions remain undisputed by contemporary Lithuanian authors who have discussed the economic growth of interwar Lithuania (see Meškauskienė 1981; Vaskela 1998; Norkus 2014; Vaskela 2014). These estimates of the Lithuania's economic progress critically depend on the reliability of Rimka's measurement of the size of the Lithuanian economy in 1924. They should be revised, if this measurement underestimate or overestimates its real size.

In 1936, the statistical office of Latvia published (Valsts statistiskā pārvalde 1936, 276–77) the first semiofficial estimate of national income. In his landmark work on interwar Latvian economic history, Arnolds Aizsilnieks (1968, 834) provided a national income data series for the 1934–1938 period at current and at constant 1934 prices. Jānis Kalniņš and Gunta Piņķe (2012) recently published a nearly complete list of the national income estimates for interwar Latvia. If, at some time in the future, Latvian historians use these rich statistical sources to assess the overall economic progress during the time period of interwar independence, they will not be able to bypass Ceihners' calculations, which provide the first available data point in the time series. However, the estimates of Ceihners and Rimka cannot be used for a comparison of the size and structure of the economies of Latvia and Lithuania in 1925 and 1926 without scrutinization of their derivation, because no internationally accepted standards for the calculation of total output existed at that time.

Therefore, their estimates are not strictly comparable without an examination of the conceptual assumptions and procedures used in their calculations and the subsequent adjustment of these estimates for relevant differences in assumptions and procedures. Only after the Keynesian revolution in economics, the standardization of national accounting, and the charging of national statistical offices with the task of publishing estimates of the total output on a regular basis, could the measurement of the total output become an integral part of the state macromanagement of national economies. Such national accounting-based macromanagement became established practice only after WWII, with the U.N.'s promulgation of the codex of the internationally standardized rules of national accounting for the first time in 1953. The definitions of the basic concepts in the current version of these rules (United Nations 2009) are used as the framework for the interpretation and rational reconstruction of the contributions of both economists.

In interpreting Rimka's contribution, another challenge must be addressed. Before 1922, when the newly established Republic of Lithuania established its first high school – Kaunas University – there were no studies in economics in the Lithuanian language. There were not even any translations of textbooks in economics and statistics. The first professional Lithuanian economists, who conducted their studies in economics abroad or worked in that profession using Russian and Polish, created Lithuanian scholarly and economic terminology in the early 1920s. Therefore, during the first decade of Lithuanian independence, there was no lack of misleading translations of the technical economic terms into Lithuanian. Such confusion also occurred with the concept of 'national income,' which, before the invention of the gross

domestic product (GDP) statistic, stood for total output. The first Lithuanian authors (Kvieska (1926) and Rimka himself) misleadingly translated the expression 'national income' (with *Nationaleinkommen* as its German and *narodnyj dokhod* its Russian equivalent) as '*tautos pelnas*.' Its literal back-translation into English is 'national profit.' This study argues that the SNA concept of 'net national income (NNI)' is the closest equivalent to Rimka's 'national profit.'<sup>5</sup>

## A comparison of Latvian and Lithuanian output of agriculture

Before passing to the details, it may be useful to recall that Latvia in 1925 and Lithuania in 1924 differed from contemporary Latvia and Lithuania in terms of their territorial and demographic identity. With a population of 2.9 million people and 65,200 km<sup>2</sup> territory as of 2015, contemporary Lithuania is the largest Baltic state, followed by Latvia (1,986,000 in population and 64,589 km<sup>2</sup> in territory). In 1925, Latvia was the largest Baltic state in terms of territory (65,800 km<sup>2</sup>), but not in population. According to 1925 census data, its population (1,844,805) did not differ much from its contemporary size. There was only one population census (in 1923) in interwar Lithuania, which found 2,028,971 inhabitants in its 53,242 km<sup>2</sup> territory. These numbers do not include the territory of the Klaipėda region, which has been under Lithuanian control since January 1923. The annexation of this region was internationally recognized in 1924. Therefore, in 1924, the area of Lithuania increased to 55,670 km<sup>2</sup> and its population to 2,176,800 people. This is the figure used by Rimka in his calculations of the values of the indicators and indexes on a per capita basis, sometimes rounding it up to 2.2 million

The population of Latvia in 1925 was only 73.8% of its pre-WWI population of approximately 2.5 million. Before WWI, some of its territories were reputed to be the 'Belgium of the East,' hosting many large plants and factories (Hiden and Salmon 1991, 76–77; Kahk and Tarvel 1997, 98–102; Norkus 2016). These industry works emerged here after the Russian Finance Minister (1892–1903) Sergei Witte increased the protective tariffs in the late nineteenth century to defend Russian industries from foreign competition and to attract foreign direct investment (FDI). Riga and Liepāja (Libau) attracted most FDI. Western companies established here their subsidiaries, processing imported raw materials (cotton, rubber) and semimanufactures into finished products to sell in the huge Russian market (Karnups 2013). According to Karl Siilivask (1990, 233), the industrial output of Latvia constituted 52% of the total output of the national economy in 1913. This figure refers to the entire territory of the future independent Latvia, including its Eastern part, Latgale, which was socioeconomically more similar to many parts of the future independent Lithuania than to Kurzeme, Vidzeme, or Ziemgale. Although Latvia preserved its developmental edge over Lithuania after WWI, it became an agrarian country, more similar economically to its southern neighbor than it was before the war.

Therefore, both authors start with an assessment of the contribution of agriculture, which was the leading sector in the economies of both countries in terms of employment and the contribution to the total output by 1924 and 1925. Both scholars applied the added value created method here, which, in their time, was called the 'objective' method. Ceihners could draw upon the data of the first general census of agriculture, conducted in Latvia in 1923, while in Lithuania, general census of agriculture was conducted for the first time only in 1930. However, because Rimka was one

of the main scientific consultants of the Lithuanian national statistical office *Centralinis statistikos biuras* (and later its director for some time), he had the privilege of access to the unpublished data of this office. He could also use restricted access data collected by the tax inspectors of the Ministry of Finance. Much of this information was not published or was lost, so his work is the only source of the primary data used as the basis for his calculation. Nevertheless, with no agricultural census data, he could only provide a much less detailed and differentiated picture of Lithuanian agricultural output and that of the primary sector in general (cp. Table 1).

Happily for comparability, in assessing the contribution of crop production, both authors used the annual average yields for the same 1923–1925 period. Rimka took into account only the production of rye, wheat, barley, oats, peas, potatoes, flax seeds, and flax fiber. Ceihners also calculated the value of grass mixture, hay, clover, and straw. However, this difference has no influence on the final results, because with the exception of relatively small quantities of oats sold on the market (8.8 million LVL, 3% of total production), the yield of the fodder crops was internally consumed in agriculture itself (as input for animal production).<sup>6</sup> For the estimation of the monetary value of the output, Rimka used the average retail prices of the 1923–1925 period, while Ceihners applied the prices of October 1925. October is the month when the price of the agricultural products is at the lowest for the year. Ceihners' rationale for this choice was to avoid double counting, because retail prices include the trader's mark-up, which is trade's contribution to the total output. Ceihners aimed to assess the value of agriculture's output at producer's prices (factor cost), but he had no reliable data about producer prices. Therefore, he argued that the lowest seasonal retail price could stand for the average year's producer's price.

**Table 1.** Average annual crop production in Latvia and Lithuania in 1923–1925.

	Gross output (in thousand tons) Latvia	Gross output (in thousand tons) Lithuania	The value of gross output in Latvia in millions of LVL and \$ (in brackets)	The value of gross output Lithuania in millions of LTL and \$ (in brackets)
Rye	289.0	577.8	60.7 (\$11.7)	247.8 (24.8)
Wheat	53.8	104.9	15.0 (\$2.9)	62.9 (\$6.3)
Barley	172.7	207.0	34.5 (\$6.7)	71.6 (\$7.1)
Oats	298.1	301.1	56.6 (\$10.9)	113.2 (\$11.3)
Potatoes	735.0	1623.2	58.8 (\$11.3)	205.5 (\$20.5)
Flax seed	25.3	33.5	11.4 (\$2.2)	22.8 (\$2.3)
Flax fiber	27.6	33.9	41.4 (\$8.0)	83.4 (\$8.3)
Peas	35.0	80.3	8.7 (\$1.7)	34.4 (\$3.4)
Grass mixture	75.2	nd	11.3 (\$2.2)	nd
Hay	1673.5	nd	100.4 (\$19.4)	nd
Clover	920.9	nd	73.7 (\$14.2)	nd
Halm of spring crops	932.6	nd	37.3 (\$7.2)	nd
Halm of winter crops	810.9	nd	24.3 (\$4.7)	nd
Total	6049.6	2961.7	534.1 (\$103.1)	841.6 (\$84.1)

Sources: Ceichners (1927), p. 10: 389 and Rimka (1926), 3 (43), p. 72 and 4 (44), p. 106. Ceihners provides the value of the net output as the gross output net of seed value. Rimka provides the value of the net output as the gross output net of the value of seed and the value of crops consumed in animal production. For comparability reasons, I provide the value of the gross output. The figures in brackets refer to the value in USD at the golden parity. In 1923–1925, the summary annual mean output value of rye, wheat, barley, oats, potatoes, flax seed and fiber, peas' gross yield in Latvia was \$55. million, in comparison with \$84.1 million in Lithuania.



Rimka did not draw this distinction when working with retail prices. He could perhaps be exculpated for this omission by the observation that up to 80% of Lithuanians satisfied their need for basic food products by household production, receiving these products at producer's prices. This omission did not mean that the Lithuanian economist was not wary of double counting. He subtracted from the total output in kind the estimated quantities of crops internally consumed in the agricultural production. These quantities include seed and crops used for animal husbandry. Almost all of the yearly output of oats (with exception for 2% of the output, worth 2.3 million LTL) was handled in the same way. After subtracting the estimated quantities of seed and internally consumed crops (17.3% rye, 57% wheat, 29% barley, 18.5% potatoes, 25% flax seeds) from the gross output, he calculated 574.6 million LTL (\$57.5 million) for the 'gross profit' of the crop production (Rimka 1926, 106).

Ceihners started in a similar way, subtracting the seed and the estimated quantities of rye, wheat, barley, and potatoes used internally in animal production from the gross crop. He estimated the value of the livestock (horses) consumed in crop production in a nearly identical way to Rimka's method, equating it to the value of the yearly net yield of oats (45.4 million LVL) and subtracting this quantity from the value of crop production. Next, he performed two additional steps. Drawing upon the data of the Latvian general agricultural census of 1923, the Latvian economist determined that all of the machinery and tools used in Latvian agriculture were worth 70 million LVL. Assuming 10% annual depreciation, he determined that annual wear and tear allowance of 7 million LVL should be subtracted from the value of the crop output. Then, the Latvian economist struggled over some three pages of text that were densely packed with fine grain zootechnical statistics to ascertain the yearly value of the manure produced in animal husbandry: 57 million LVL. To this figure, he added the value of fossil and artificial fertilizers (7.4 million LVL).

After the subtraction of the value of all of the inputs used in plant production, the initial huge total gross value of the net yield of Latvian crops (534.1 million LVL) shrinks to a net value of 96.4 million LVL, which is rounded to 100 million LVL (\$19.3 million). This is nearly three times less than the crop value in Lithuania (\$57.5 million). Meanwhile, if compared in kind, the Lithuanian mean output from 1923 to 1925 was only, at most, two times larger (for potatoes, wheat, rye, peas) than that of Latvia during the same period. The difference arose because Rimka did not subtract from the crop value that of all inputs (except that of horse power). The neglect of the value of the fossil and artificial fertilizers did not have a significant impact on the final results, because their use in Lithuanian agriculture was still very limited at that time. Of greater consequence was Rimka's disregard of the value of manure. However, it matters only for the estimates of the relative shares of the crop and animal production in the output of agriculture, not for the estimate of its total value, which is the sole concern of this contribution. Subtracting the value of manure from that of the crop yield, Ceihners added it to that of animal production, inflating its contribution to the cost of crop production, while Rimka gave a pass to crop production.

Using 1923 Latvian agricultural census data, Ceihners provided a rich and very different picture of Latvian animal production, with 334 million LVL (\$64.5 million) as the summary estimate of its output. This figure included 161 million (\$31.1 million) for milk, 104 million (\$20 million) for meat, 8 million (\$1.54 million) for bristle and hides, and 57 million (\$11 million) LVL for manure. The estimate for milk may be exaggerated, because Ceihners, at one point, failed to avoid double counting. Estimating the

total milk output to be 1150 million kg (produced by 641,000 dairy cows with a 1800 kg average milk output per cow), he derived the value of this output by multiplying the total output by 14 santims (0.14 LVL) as the producer's price for 1 kg milk. However, he did not take into consideration the intermediate consumption of milk in animal production itself (for feeding heifers and pigs). The value of this milk is part of the meat value, and it should be subtracted from the milk value estimate.

Next, different from the calculation of the value of the crop output, Ceihners did not estimate and subtract the value of fixed capital consumed in the production (i.e. its depreciation) from the value of the animal production output. This omission recurred in his estimation of the annual value of poultry (33 million LVL), beekeeping (2.2 million), gardening (18.3 million), forestry (31 million), and fishing (4 million). The omission made Ceihners' procedure somewhat incoherent, if measured by contemporary SNA rules. Because he took into account the depreciation of fixed capital in the calculation of the contribution of crop production, his estimate (100 million LVL) can be interpreted as that of NNI. However, in the calculation of the contributions of other branches of agriculture and other sectors, he never estimated and deduced the allowance for depreciation. In these cases, the component estimates can be interpreted as those of the contributions to gross national income (GNI). The simplest way to eliminate this incoherence is to add to the value of crop production the 7 million estimate of the consumption of fixed capital and to interpret his final summary estimate as indicating the size of Latvia's GNI in 1925. Adding to Ceihners' own estimate of the total value of Latvian agriculture (488 million LVL; \$94.2 million) the consumption of fixed capital (7 million LVL) in the crop production, we receive 495 million LVL (\$95.5 million) as the value of the contribution of Latvian agriculture to GNI. Adding to this sum the 31 million LVL from forestry and the 4 million LVL output of fishery, we get 530 million LVL (\$102.3 million) for the primary sector in Latvia.

The only data provided by the Lithuanian statistical office on animal production from 1923 to 1925 were the estimates of the number of horses, cattle, pigs, and sheep in the country. Instead of working with these meager data, Rimka applied an ingenious, if not bold, shortcut to master this obstacle. He used, as the point of departure, the minimal norms of yearly consumption (called 'existential minimum') set by the Lithuanian statistical office. For one person aged 12 years or older, they were as follows: 72 kg of meat, 12 kg of butter, 72 eggs, and 6 kg of fish (herring).<sup>7</sup> The 'existential minimum' of a child up to 1.5 years of age was set at 25% of this amount and that from 1.5–7 years was 50%. The survival minimum for a person aged 7–12 years old was estimated as 75% of an adult person's non-vegetable food consumption minimum.

According to the Lithuanian general population census in 1923, 3.43% of the Lithuanian population was younger than 1.5 years, 10.16% was 1.5–7 years of age, 9.56% was 7–12 years of age, and the rest (76.85%) were at least 12-years old. Rimka assumed that this age distribution remained the same the next year and (rounding up) the total number of consumers in Lithuania was 2.2 million people. Thus, the first age bracket included 75,460, the second 223,520, the third 210,320, and the fourth 1,690,700 persons. From the 'existential minimum' norms for the respective age groups and their totals, he derived the estimated quantities of the meat, butter, eggs, and herring consumed. Next, he summed up these quantities, getting the total quantities consumed, and then calculated the averages per capita for the total population, as well as the value of these total quantities at 1924 retail prices.

According to this bold method, the average Lithuanian consumed 64.77 kg meat in 1924. This is more than the meat consumption of an average German or Englishman in the 'golden times' at the eve of WWI (Rimka 1926, 107). Therefore, Rimka made a downward correction, setting the yearly average meat consumption level at 50 kg per capita, which implied the consumption of a total of 110,000 tons of meat. As the most popular kind of meat in Lithuania is pork, Rimka calculated the total meat consumption at the 1924 price of pork, calculating 220 million LTL (\$22 million) in total value for meat consumption. In the same way, he calculated that, in that year, the average Lithuanian consumed 23,749 kg butter, which was worth 142.5 million LTL (\$14.3) at the price of 6 LTL per kg. The Lithuanian economist conceded that, in fact, butter consumption was lower, but defended this figure as the proxy for the total milk consumption. Finally, he estimated egg consumption, which is approximately 142.5 million eggs, priced at 0.12 LTL per egg, with a total value of 17.1 million LTL (\$1.7 million).

At this time, Lithuania did not import crops and animal products, with the exception of small quantities of elite seeds and breeding animals. Therefore, Rimka estimated the total value of Lithuanian animal production in 1924 by adding the value of the animal products consumption and the value of Lithuanian exports of animal products, which was 93.7 million LTL or \$9.4 million (this figure is actually the mean value for the 1923–1925 period). By this calculation, the total value of Lithuanian animal production was 483.3 million LTL or \$48.3 million (389.6 million LTL value of internal consumption + 93.7 million LTL of export). Adding to this figure the value of crops (574.6 million LTL), Rimka derived his estimate of the value of the total output of Lithuanian agriculture (1057.9 million LTL or \$105.8, which is slightly more than the output of agriculture in Latvia (\$95.5 million). This figure is of the *mixtum compositum* type, where one part (the value of crop production) is calculated by the production method, while another (the value of animal production) is calculated by the expenditure method. Such a procedure is not admissible under the contemporary SNA standards, where the expenditure method can only be used to cross-check the summary estimate derived by the value added or income distributed method and *vice versa*.

However, given the scarcity of primary statistical data about Lithuanian animal production in 1923–1925, it is difficult to find a better method to estimate its output. Because practically all of the consumed animal products in Lithuania were internally produced, Rimka's bold shortcut may provide a satisfactory estimate. Only its application to fish, which was important consumption article, could lead us astray. Rimka's estimate of the 389.6 million LTL value of the internal consumption of animal products includes the 10 million LTL (\$1 million) value of some 15,000 tons of fish (herring), which were all imported. However, because of its small relative size, it could not introduce any noticeable upward bias in the summary estimate of the output of Lithuanian agriculture. This bias is overcompensated by Rimka's omission of the output of many smaller branches, which can be identified by comparing its calculation with Ceihners' much more differentiating analysis: beekeeping, gardening, and horticulture. According to Ceihners' calculation, only beekeeping and gardening produced an output worth 21.3 million LVL in Latvia, which is equivalent to 41 million LTL (\$4.1 million). The output of these branches could not be less in Lithuania. However, in Rimka's estimate of the contribution of animal production, we should not miss the value of manure, which is assessed by Ceihners with much expertise in the technology

of animal husbandry and agronomy, because the Lithuanian scholar considered it as a part of the crops value.

The most conspicuous difference between the procedures of the two scholars is their handling of fixed capital depreciation. Ceihners took it into account at only one point. For Rimka, it was a permanent concern. Therefore, I will claim that his concept of 'gross national profit' matches that of NNI, while Ceihners' concept of national income is equivalent to that of GNI in the SNA. However, Rimka's depreciation allowances were unjustifiably large, leading to marked downward biases in the estimates of the net output, not only of agriculture, but also of some other branches of the Lithuanian economy.

For agriculture, Rimka estimated that the yearly fixed capital consumption was 275.4 million LTL (\$27.5 million), or 26% of the value of its output as calculated above. After subtracting the cost of the consumed fixed capital, he got 782.5 million LTL (\$78.3 million) as the final net output value. By SNA standards, there is no rationale for such exorbitant depreciation rates. From 2005 through 2013, the fixed capital consumption fluctuated in Lithuania between 12.3% (2005) and 14.4% (2010) of the annual GNI. According to World Development Indicators data (World Bank 2016), during this period, the annual fixed capital consumption as a percentage of annual GNI in the lower middle-income countries was between 8% and 9%, between 10% and 13% in low- and middle-income countries, between 10% and 14% in middle-income countries, between 11% and 15% in upper middle-income countries, and between 14% and 16% in high-income countries.

For the simplified and rough calculation of the NNI, the so-called 11/12 rule was applied for a long time, assuming that NNI is equal 11/12 of the GNI, i.e. that summary amortization allowance is 1/12 of the gross national product. However, this rule is unreliable and unsafe in our times, when equipment rapidly depreciates morally (Čiegis 2012, 74).

This warning applies to technologically advanced economies with a high capital to labor ratio. However, Lithuanian agriculture in the 1920s was technologically primitive, with a low capital to labor ratio, and it used no significant quantities of fixed capital. Therefore, even the 10% depreciation rate, suggested by Ceihners in his calculation of the contribution of agriculture to the national income, may be too high for the conditions in Lithuania in the 1920s.

Rimka may have felt that he went astray with his huge depreciation allowances, because he pondered over two depreciation deduction rates – a larger (26%) rate and a smaller (18.8%) one. When applying the 18.8% depreciation deduction rate, the consumption of fixed capital in Lithuanian agriculture in 1924 was 199.2 million LTL (\$19.9 million), while the total net output of agriculture was 858.7 million LTL (\$85.9 million). However, even this smaller depreciation allowance appears to be too large for the conditions of Lithuanian agriculture in the 1920s. Applying a 10% depreciation deduction rate, we should estimate a fixed capital consumption equal to 105.8 million LTL, raising the net value of the output of Lithuanian agriculture to 952.0 million LTL (\$95.2 million).

Depreciation deductions that were too high also marred Rimka's estimates of the output of Lithuania's forestry. From the 17.1 million LTL profit reported by Lithuania's state-owned forests administration, which, after the 1922 land reform, managed over 90% of Lithuania's total forest area, he suggested deducting 7.9 million (46.2%) or 10.9 million LTL (63.7%) as the fixed capital cost. After these

deductions, the meager 9.2 million (\$0.9 million) or 6.2 (\$0.6 million) LTL of the estimated forestry output was added to the contribution of agriculture. Thus, Rimka arrived at his final estimate of the output value of the primary sector of Lithuania in the range from 788.7 to 868.9 million LTL (\$78.9–86.9 million). Under the proposed 10% depreciation allowance of this study, we get a 967.5 million LTL (\$96.8 million) value for the primary sector's net contribution to the NNI. The total primary sector's contribution to the GNI was 1074.2 million LTL (\$107.4 million), with this figure including the 17.1 million LTL gross contribution of forestry. This is only a little above the output of the primary sector in Latvia (\$102.3 million), even if we take into consideration that Rimka's calculation was less inclusive, omitting some smaller branches of agriculture production.

### **A comparison of Lithuanian and Latvian output of industry**

Measuring the contribution of Lithuanian industry to the country's national income, Rimka had to cope with equally difficult problems because the shortage of relevant primary data. Lithuanian industrialists and traders had to pay a profit tax and report their 'gross profit,' defined as the sales revenue minus the cost of the material input used in the production, to the tax office. This 'gross profit' included wages. There were no regulations for the deduction of the consumption of fixed capital. However, these tax data were unprocessed and unpublished. Rimka was able to gain access to the tax office files, which contained the original revenue declarations and their controls by the tax inspectors. He processed these raw data himself. However, the data only measured the industry and trade in the provisory capital of Lithuania, Kaunas, and its district.<sup>8</sup> In 1924, that area hosted 1024 industry enterprises, which employed 15,000 workers. In relative terms, they accounted for 19.4% of the total number (5400) of Lithuanian enterprises and 17.7% of the total number of Lithuanian industry workers (85,000). These figures do not include the industries of the autonomous Klaipėda district, which employed 12,000 workers.

For 1924, Kaunas' industry enterprises reported a 19.3 million LTL 'gross profit.' After controls, the tax inspectorate charged them 25.0 million LTL. Rimka took, as the real 'gross profit,' the size of the means of both sums (22.2 million LTL). As an indicator of the relative share of the industry of Kaunas in the total industrial output of Lithuania (without the Klaipėda district), he took the mean of its shares in the total number of enterprises and in the total number of industry workers  $(19.4\% + 22.2\%) / 2 = 18.6\%$ . From these data, he derived the total 'gross profit' (119.4 million LTL) for Lithuania. Estimating the contribution of the Klaipėda district, he multiplied per worker 'gross profit' (1407 LTL) in Lithuania, without the Klaipėda district, by the number of Klaipėda district industry workers. The final estimate of the total 'gross profit' was 136.2 million LTL (\$13.6 million). It included the wages for employees, taxes, the interest for capital, and the entrepreneur's pure profit. Rimka did not attempt to gauge the shares of employees, capitalists, and entrepreneurs. In contrast to his analysis of the contribution of the primary sector, he made no effort to estimate the consumption of fixed capital or the deduction for depreciation. Therefore, 136.2 million LTL is industry's contribution to the GNI. The deduction of 10% from the 'gross profit' (12 million LTL; \$1.2 million) may serve as a quick fix. Then, the net value added contributed by Lithuanian industry to the NNI was 107.4 million LTL (\$10.7 million).

The more advanced condition of the statistics and the welfare state in Latvia allowed Ceihners to apply the distributed income approach more consistently in the estimation of the contribution of Latvian industry, avoiding such a heavy dependence on the extrapolations and bold assumptions that marked Rimka's work. By 1925, in Latvia, there was obligatory medical insurance for wageworkers and employees, with part of the insurance cost paid by the state. The state's contribution was set at 2% of the insured person's salary. Thus, from the sum total of the state's contribution to the medical insurance of wageworkers (2,420,000 LVL), Ceihners could derive the total of the wages received by Latvian workers (121 million LVL). After cross-checking this figure with other sources, Ceihners cut it to 118 million LVL (\$22.8 million), which exceeds the total value added (\$13.6 million) of Lithuanian industry in the previous year by nearly two times.

In estimating the employers' share, Ceihners relied on the data of the Latvian tax office regarding the profit taxpayers in industry and trade. These taxpayers were divided into two groups. The first group included the large mass of enterprises (48,000), which were under an obligation only to report their profits and to provide other data if it was requested by the tax inspectors. The second group included only 598 enterprises, which were under an obligation to regularly publish their balances and to disclose other data about their business activities. Most of these enterprises were private joint-stock companies that paid dividends to their owners. In 1925, the enterprises of the first kind paid a 3% (average value) tax from their profits, providing the Latvian state budget with 2,629,200 LVL in revenue, which implies 87.6 million LVL (\$16.9 million) in total profits. The profit tax contribution of the second group to the state revenues was 593,000 LVL, and the average tax rate was 5%, with an implied 12 million LVL (\$2.3 million) in total profits. Thus, the total profit of Latvian businesses was circa 100 million LVL (\$19.3 million). This figure includes the profits of both trade and industry. After analyzing the Latvian business statistics in more detail, Ceihners concluded that this sum should be divided equally between trade and industry.

Ceihners' final estimate of the contribution of industry to the national income of Latvia was 172 million LVL (\$33.2 million), including 118 million in the wages of workers and employees, 50 million in business profits, and 4 million in taxes paid to state, municipalities, and medical insurance. Thus, the output of Lithuania's industry (\$13.6 million) was only 40.1% of its Latvian counterpart. Ceihners provided no information about whether (and how much) Latvian tax legislation provided for deductions from gross profits or revenue for the depreciation of fixed capital. It seems that there were no such provisions at the time. Thus, 172 million LVL (\$33.2 million) was the contribution of industry to the country's GNI, while its net contribution was some 10% less (154.8 million LVL or \$29.9 million).

### **A comparison of the output of the service sector in Latvia and Lithuania**

Both scholars concluded with a discussion of the contribution of trade, transport, post, and other services. Again, Ceihners provided a much more detailed picture, applying the distributed income method. Trade provided the largest contribution to the total output in both countries. In Latvia, its contribution (68 million LVL; \$13.1 million) included 50 million LVL in profits, 11 million LVL in wages, and 7

million LVL in taxes paid to the central government, municipalities, and medical insurance funds. Ceihners estimated the contribution of railways and sea shipping, adding up the wages of sailors (4 million LVL), railway workers and employees (14.3 million LVL) and profit (1.8 million LVL). Ceihner's final summary estimate of the contribution of trade and transport was 88 million LVL (\$17.0 million). He did not discuss the fixed capital consumption, which suggests that this figure should be interpreted as a part of the GNI.

Anticipating the contemporary SNA approach, Ceihners considered all branches of government as productive and estimated their contribution simply by adding up the salaries of their employees. As the military received part of their salaries in kind, Ceihners added the cost of its food, clothing, footwear, heating and lighting to the monetary salaries. Together, this amounted to 27.78 million LVL, while the salaries of civil officials added up to 30.45 million LVL. This figure did not include the salaries for teachers at state schools paid from the central budget (5.73 million), the wages of post and telegraph workers and employees (4.19 million), the salaries of the employees of state-owned financial institutions, and those of the employees of the national opera and national theater (2.74 million LVL). All salary expenses of the state (central government) budget amounted to 74.32 million (\$14.3 million) LVL.

To this figure, Ceihners added the salaries of officials, teachers, workers, and other municipal employees (20 million LVL), the wages of some 29,000 home servants and attendants (26 million LVL), and the earnings of free professions (8 million LVL). The total monetary value of the services provided by public employees paid from the central budget, municipal employees, servants and attendants in the private sector, and those of the free professions amounted to 128 million LVL (\$24.7), while the total contribution of the service sector was 216 million LVL (\$41.7 million): less than that of the primary sector (\$102.3 million), but larger than the output of industry (\$33.2 million).

Rimka's estimate of the contribution of the service sector was much more grudging. First, he only took into consideration trade, railway, post, telegraph, and telephone services. Estimating the contribution of trade, he used the same data and methods as in the estimation of industry. Processing the tax declarations of the traders in Kaunas and the Kaunas district, the Lithuanian economist found that they earned 54.57 million LTL of 'gross profit.' From this figure and the estimate of the share of Kaunas' trade (21.26%) in the total trade of Lithuania, he derived the size of the total contribution of trade to the national income (257.3 million LTL; \$25.7 million). Again, this figure did not include the Klaipėda district. Given the prominent position of Klaipėda as the only port city in Lithuania, Rimka assumed that Klaipėda's trade contributed as much as Kaunas to the national income of Lithuania in terms of value (54.57 million), deriving the final estimate of the contribution of trade (312.0 million LTL; \$31.2 million). These estimates may be slightly inflated by double counting, because Rimka calculated the value of the agricultural output at retail prices, thereby including the trader's mark-up. The suspicion that retail trader's mark-up is counted twice becomes stronger after observing that the contribution of trade in Lithuania exceeded its Latvian counterpart (\$13.1 million) by more than two times. This difference can only partly be accounted for by the larger population of Lithuania. However, at this time, I can only leave the search for the remedy to further research.

The joint contribution of trade and industry to the Lithuanian national income amounts to  $312 + 136.2 = 448.2$  million LTL (\$44.8 million). Rimka did not estimate an allowance for depreciation for either the first or the second constituent of this sum. Therefore, this figure indicated the contribution of these branches to GNI. However, as in the measurement of the contribution of the primary sector, Rimka provided two estimates of the summary contribution of trade and industry (Rimka 1926, 146). He described the last figure as the output of trade and industry under actual 'abnormal' international world economy conditions, which did not allow the Lithuanian economy work at full capacity. Under 'normal conditions,' the joint contribution of trade and industry would amount to 561.8 million LTL. Unfortunately, he provided no detail about how he arrived at this figure, because his distinction intriguingly resembled the famous Keynesian contrast between the actual and potential full employment output of an economy.

According to Lithuanian Ministry of Communication data, in 1924, Lithuanian railways<sup>9</sup> earned 32.5 million LTL in revenue, from which 15.0 million was spent to cover the 'material expenses' of their operating cost, with the remaining 17.5 million LTL described as 'profit.' Again, Rimka was very concerned about the consumption cost of fixed capital. He estimated the yearly depreciation allowance for railways at 27.1 million LTL. Such yearly spending was necessary to replace Lithuanian railway equipment (621.4 million LTL estimated value) during the 40 years at a 2% annual amortization rate. Based on his calculation, Rimka came to the radical conclusion that the contribution of railways to the Lithuanian national income was negative, with a 9.6 million LTL net loss. Rimka was more lenient to the government-owned post, telegraph, and telephone services, which were also run by the Communication Ministry. This ministry reported 10 million LTL in profits in 1924. Arguing that, in comparison with the railways, these services operated with small fixed capital, Rimka estimated their net output as 7–8 million LTL. Together with the profits of some other state-owned enterprises, this sum was only sufficient to compensate for the alleged loss imposed on the Lithuanian economy by the operation of the railways. Thus, according to Rimka's final estimate, the summary contribution of all of the state-owned enterprises providing commercial services to the net national output was zero. Summarily estimating the contribution of the private and public branches of the service sector providing commercial services, he arrived at the conclusion that only trade made a positive contribution.

Rimka's summary estimates of the 'gross national profit,' which according to the interpretation of this author, refer to the NNI, was 1266.9 million LTL (\$126.7 million), including 787.7 million LTL (62.3%) contributed by agriculture and forestry, 136.2 million LTL (10.8%) by industry, 312 million LTL (24.6%) by trade, and 30.0 million LTL (2.4%) added by remittances of the Lithuanian diaspora from abroad. Very differently, remittances to Latvia were too small to offset the transfers from Latvia. Under 'normal' conditions or full use of the production capacities of the Lithuanian economy, its total output could amount to 1480.7 million LTL (\$148.1 million), including 868.9 million LTL from the primary sector, 561.8 million LTL from industry and trade, and 50 million LTL from 'other sources.' In the last case, Rimka most probably did not mean an increase in the remittances from abroad, but more revenue from the state-owned railway network and the post office, enabling them to provide a positive (even if only a modest one) net contribution to the national income.



The most puzzling part of Rimka's calculation is that the contribution of the public sector to the national income of Lithuania was estimated as zero, with the sole exception for the state-owned forestry, with its 17.1 million LTL gross and 6.2–9.2 million LTL net contribution. He omitted all noncommercial services provided by the public service. It is not the purpose of this study to speculate whether this omission may be related to his peasant populist political views, which may have made him predisposed to perceive the government and the state in general as essentially unproductive or even useless. Instead, the following is a possible quick fix for this omission. In 1924, the expenditure of the Lithuanian central government was 232.3 million LTL (*Lietuvos statistikos metraštis 1924–1926*, 1927, 317). There was 9.5 million LTL in expenditure by the autonomous Klaipėda region administration, and 23.0 million LTL by the municipalities in the remaining parts of Lithuania (*Lietuvos statistikos metraštis 1929–1930*, 417) should be added to this sum. Sources do not provide information about the share of salaries and wages in this total 264.8 million LTL (\$26.5 million in Lithuanian public sector expenditures. If we assume the same share of the staff expenditures as in Latvia (circa 50%),<sup>10</sup> then Rimka's estimates of the national income of Lithuania should be increased by 132.4 million LTL (\$13.2 million).

## Final estimates and considerations

Table 2 provides the overall summary of the estimates of both scholars, together with the suggested corrections and adjustments made in this paper. By the standards of the contemporary SNA, both estimates are too low, because both scholars did not include many important sources of economic value (e.g. housing and construction). Ceihners pointed out some of these omissions (e.g. animal production for own use by the population of smaller towns) himself, describing his estimate as 'minimal' (Ceichners 1927, 11, 430). The encompassing measurement of the GDP and GNI of both countries, in full correspondence with the actual SNA rules (United Nations 2009), should be grounded in archival research, looking for the missing primary statistical data (with an uncertain prospect of success). This can only be a task for further research.

This study has reanalyzed the primary data used by Ceihners and Rimka, comparing their procedures and using the contemporary definitions of the basic concepts in the SNA. This reanalysis allows for important conclusions and adjustments, which can be useful in further research on the economic history of the Baltic states. The most important conclusion is that the two summary estimates are not immediately comparable, because Ceihners' 'national income' refers to GNI in the contemporary sense, while Rimka's 'national profit' refers to NNI. There are two ways to come to comparable measures. First, we can adjust both estimates in line with the SNA definition of the GNI. Ceihners' notion of the national income is very close to this definition, because he (with only one exception) did not subtract the consumption of fixed capital from the final estimates. Therefore, my estimate of Latvia's GNI (in the second column from the right) differs from Ceihners' estimate of national income (in the third column from the right) only by 7 million LVL. To recall, this is his estimate of the annual fixed capital consumption in the crop production. I receive my estimate (in the fourth column from the left) of the Lithuanian GNI from Rimka's GNI (*bendrosios tautos pajamos*; in the second column from the left), adding the value of the noncommercial

services of the public sector to his estimate. I estimate them in the same way that Ceihners did for Latvia.

Actually, Rimka's main concern was not to find the 'gross national income' (*bendrosios tautos pajamos*), but the 'gross national profit' (*bendrasis tautos pelnas*), calculated by deducting the allowance for depreciation from the GNI. Because of this operational definition, the NNI can stand for Rimka's 'gross national profit.' However, he goes astray by deducting the depreciation allowances, which are too large for Lithuania in the 1920s, with its meager assets of fixed capital. He provided two estimates of 'national profit' (NNI), applying a lower and a higher depreciation allowance. Under the lower allowance (see the third column from the left in the second table), the NNI of Lithuania was 1480.7 million in total or 680 per capita LTL. Under the larger allowance, the GNI of Lithuania, estimated by Rimka himself as 1570.7 million LTL, shrank to a 1266.9 million total or 582 per capita LTL NNI.

This paper suggests using a 10% depreciation allowance, which is typical for low-income countries. Under this allowance, and including the value of noncommercial public sector services in the GNI of Lithuania, its NNI was 1558 million total or 716 million LTL per capita. Applying the same fixed capital depreciation allowance to the GNI of Latvia, a tentative estimate of its NNI in 1925 is calculated as 826.5 million total or 453 per capita LVL (see the first column from the right in [Table 2](#)). According to these estimates, the GNI and NNI of Lithuania per capita were approximately 80% of the same statistics estimated for Latvia, compared on a gold parity basis. This estimate of the Lithuanian GNI and NNI per capita in terms of Latvian GNI and NNI per capita (=100%) is significantly larger than estimates implied by Rimka's findings. Comparing his lower and higher estimates of the Lithuanian 'national profit' per capita with the national income of Latvia per capita as calculated by Ceihners on the gold parity basis, we get that Lithuanian 'national profit' per capita made out from 60% (under lower estimate) to 70% (under higher estimate) of Latvian national income per capita. However, last a comparison is methodologically unsustainable because Rimka's 'national profit' and Ceihners' national income are calculated in different ways. The detection of a downward bias in Rimka's estimate of the output of Lithuania has important implications, that is, that the received assessments of the economic progress of interwar Lithuania in 1924–1938 may have been exaggerated.

A more accurate estimate of the disparity of both countries is a challenge for further research. I would only to point out that the economic disparity between Lithuania and Latvia indeed was much larger in 1913. Ceihners himself (and he was fully exempt from any suspicion of ideological biases on this issue) estimated that the Latvian national income per capita, as of 1925, was two times smaller than on the eve of WWI (Ceichners 1927, 11, 430). It was less of a challenge for agricultural Lithuania to recover from the destruction of WWI and the independence wars, and to come back to its rather low pre-war output per capita level than it was for Latvia. It was utterly desolated after a positional war front standing on its territory for nearly 3 years, and most of its industry 'evacuated' to Russia in 1915 and did not return. Even if its industrial output exceeded that of Lithuania by more than two times, after WWI, it was an agrarian country according to the sectoral structure of its output, as Lithuania was before (and remained after) that war.



Table 2. Gross and net national income in Lithuania 1924 and Latvia 1925.

	Lithuania in 1924				Latvia in 1925			
	GNI (Rimka)	'National profit' higher estimate (Rimka)	'National profit' lower estimate (Rimka)	GNI (author)	NI (author)	National income (Ceichners)	GNI (author)	NNI (author)
Crop production	574.6 (57.5)	858.7 (85.9)	782.5 (78.3)	574.6 (57.5)	952.0 (95.2)	100 (19.3)	107 (20.6)	100 (19.3)
Animal production	483.3 (48.3)	nd	nd	483.3 (48.3)	nd	334.0 (64.5)	334.0 (64.5)	300.6 (58.0)
Other agricultural production	nd	nd	nd	nd	nd	54 (10.4)	54 (10.4)	48.6 (9.4)
Agriculture total	1057.9 (105.8)	858.7 (85.9)	782.5 (78.3)	1057.9 (105.8)	952.0 (95.2)	488 (94.2)	495 (95.5)	449.2 (86.7)
Fishery	nd	nd	nd	nd	nd	4 (0.8)	4 (0.8)	3.6 (0.7)
Forestry	17.1 (1.7)	9.2 (0.9)	6.2 (0.6)	17.1 (1.7)	15.4 (1.5)	31 (6)	31 (6)	27.9 (5.4)
Primary sector total	1075.0	868.9	788.7	1075.0	967.4	523	530	480.7
Industry	136.2 (13.6)	170.7 (17.1)	136.2 (13.6)	136.2 (13.6)	122.6 (12.3)	172 (33.2)	172 (33.2)	154.8 (29.9)
Trade	312.0 (31.2)	391.1 (39.1)	312 (31.2)	312 (31.2)	280.8 (28.1)	68 (13.1)	68 (13.1)	61.2 (11.8)
Transport	17.5 (1.8)	20 (2)	-10 (-1)	17.5 (1.8)	15.8 (1.6)	20 (3.9)	20 (3.9)	18 (3.5)
Post	10 (1)	10 (1)	10 (1)	10 (1)	9 (0.9)	nd	nd	nd
Noncommercial public sector services	0	0	0	132.4 (13.2)	132.4 (13.2)	94 (18.1)	94 (18.1)	94 (18.1)
Home service	nd	nd	nd	nd	nd	26 (5.0)	26 (5.0)	26 (5.0)
Free professions	nd	nd	nd	nd	nd	8 (1.5)	8 (1.5)	8 (1.5)
Transfers from abroad	30.0 (3)	30 (3)	30 (3)	30 (3)	30 (3)	nd	nd	nd
Total	1570.7 (157.1)	1480.7 (148.1)	1266.9 (126.7)	1713.1 (171.3)	1558 (155.8)	911 (175.8)	918 (177.2)	826.5 (159.5)
Per capita	722 (72.2)	680 (68.0)	582 (58.2)	787 (78.7)	716 (71.6)	500 (96.5)	504 (97)	453 (88)

Sources: Ceichners (1927); Rimka (1926); own calculations. The output of both countries is measured in their national currencies. The figures in brackets provide the equivalent in US\$ using gold parity.

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## Disclosure statement

No potential conflict of interest was reported by the author.

## Notes

1. There is no misspelling in the former sentence because his publications bear the family name of their author in at least four different spellings: Ceichners, Ceichner, Zeichner (1931), and Ceihners. In the reference list, I am providing the author's name with the spelling in the original publication. In the text, I am using Ceihners, which is the version found in the most recent publication under his authorship and in the contemporary Latvian sources.
2. This information is provided by the world's largest library catalog, WorldCat, which itemizes the collections of more than 70,000 libraries in 170 countries that participate in the Online Computer Library Center (OCLC) global cooperative.
3. The first calculation of the total output of Estonia was published in 1932 (Janusson 1932; see also Janusson 1937; Horm 1940). Contemporary Estonian authors (see Valge 2003; Klesment 2008) have already discussed and recycled these calculations.
4. Dresdner Bank (1930) provided national income data in current prices in Reichsmark (RM) at the foreign exchange rate. The reference list of this publication includes Ceihners' work. For Lithuania, Dresdner Bank (1930) provided the estimates only for 1913 and 1928, and described its source as its 'own calculation.' In producing these estimates, Dresdner Bank analysts could have consulted Rimka's work or even have contacted him directly, because his responsibility area as the head of the analytical division of the Lithuanian Bank included the provision of information in response to inquiries from abroad. In Rimka's personal archive, preserved in the Library of the Lithuanian Academy of Sciences, there is at least one request of this kind (Rimka 1929). Even more importantly, the Dresdner Bank (1930) estimate for 1928 did not differ much from that of Rimka for 1924.
5. To recall (United Nations 2009), gross domestic product (GDP) is the final value of goods and services produced in a country over a certain period. Gross national income (GNI), formerly called gross national product (GNP), is the income received by the residents of a country. GNI is GDP plus labor and property income received from abroad, minus analogous income and taxes transferred abroad. Net national income is GNI minus the consumption of fixed capital.
6. The oats were consumed by horses, which were maintained in large numbers in both countries, serving as the main traction force in agriculture.
7. Most of the Lithuanian population were devout Catholics, with their religious calendar including two protracted periods of fasting (before Christmas and Easter), when fish was allowed as an alternative to meat.
8. According to the Lithuanian constitutions of the interwar time period, its official capital was Vilnius, which was then under Poland's rule.
9. Except for a few narrow gauge lines in the Klaipėda district, all railways were state-owned in Lithuania.
10. In 1924 and 1925, the Latvian central government spent 151.4 million LVL (\$29.2 million) and the municipalities 40 million LVL or \$7.7 million (Siew 1931, 22, 25).

## Notes on contributor

*Zenonas Norkus* is professor at the Faculty of Philosophy, Vilnius University. His book publications include 'Max Weber und Rational Choice' (2001), 'On Baltic Slovenia and Adriatic Lithuania. A

Qualitative Comparative Analysis of Patterns in Post-Communist Transformation' (2012), and 'Two Twenty-Year Periods of Independence' (2014).

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