



A long-run perspective on Latvian regional gross domestic product inequality, 1925–2016

Ola Honningdal Grytten, Zenonas Norkus, Jurgita Markevičiūtė & Jānis Šiliņš

To cite this article: Ola Honningdal Grytten, Zenonas Norkus, Jurgita Markevičiūtė & Jānis Šiliņš (2024) A long-run perspective on Latvian regional gross domestic product inequality, 1925–2016, *Baltic Journal of Economics*, 24:1, 88-115, DOI: [10.1080/1406099X.2024.2325232](https://doi.org/10.1080/1406099X.2024.2325232)

To link to this article: <https://doi.org/10.1080/1406099X.2024.2325232>



© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 15 Mar 2024.



Submit your article to this journal [↗](#)



Article views: 92






View related articles [↗](#)



View Crossmark data [↗](#)

A long-run perspective on Latvian regional gross domestic product inequality, 1925–2016

Ola Honningdal Grytten ^a, Zenonas Norkus ^b, Jurgita Markevičiūtė ^b and Jānis Šiliņš^c

^aDepartment of Economics, Norwegian School of Economics NHH, Bergen, Norway; ^bInstitute of Sociology and Social Work, Faculty of Philosophy, Vilnius University, Vilnius, Lithuania; ^cVidzeme University of Applied Sciences, Valmiera, Latvia

ABSTRACT

This paper for the first time calculates the historical regional GDP (rGDP) for an Eastern European country by using the methodology of Frank Geary and Tom Stark [2002. Examining Ireland's post-famine economic growth performance. *The Economic Journal*, 112 (482):919–935]. The estimates cover the period 1925–1935 and are made for the historical Latvian regions Kurzeme, Vidzeme, Zemgale, Latgale, and Riga as well as within the contemporary NUTS3 units. The results are compared with the GDP disparity of the NUTS3 regions of the restored independent Latvia (2001–2016). The main findings are that the sigma divergence remained stable. Direct comparisons of regional growth rates indicate that economically more advanced regions were more sensitive to business cycles than less advanced regions. Hence, sigma divergence seems to prevail in times of high growth and convergence in times of low growth.

ARTICLE HISTORY

Received 16 August 2023
Accepted 20 February 2024

KEYWORDS

Regional gross domestic product; cross-regional economic inequality; interwar Latvia; restored independent Latvia; sigma convergence; beta convergence

JEL CODES

R11; E01; N94

1. Introduction

As of 2020, regional GGP (rGDP) per capita in the Latvian capital region Riga (25 895 €) was more than three times higher than the poorest region Latgale (8 111 €), which stood at 51 percent of national mean (15 937 €) (Central Statistical Bureau of Latvia, 2023a), making Latvia rank fifth highest on the list of regional economic disparities in 29 OECD countries (OECD, 2022). This paper aims to contribute to an increasing body of research on long run (hundred or more years) trends in the changes in cross-regional inequality in European countries and their historical roots (Badia-Miró et al., 2012a, 2012b; Buyst, 2010; Caruana-Galizia, 2013, 2015; Crafts, 2005; Enflo, 2014; Enflo et al., 2010; Enflo & Missiaia, 2018; Enflo & Rosés, 2015; Felice, 2011, 2012; Geary & Stark, 2016; Henning et al., 2011; Martínez-Galarraga et al., 2015; Rosés & Wolf, 2019; Tirado et al., 2016; Tirado-Fabregat

CONTACT Zenonas Norkus  zenonas.norkus@fsf.vu.lt  Institute of Sociology and Social Work, Faculty of Philosophy, Vilnius University, Universiteto 9/1, Vilnius LT-01513, Lithuania

© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

& Badia-Miró, 2014). However, currently, research is limited to older European Union (EU) member countries, with a partial exception for Poland (Bukowski et al., 2017, 2019) and former Yugoslavia (Kukić, 2020), which is a different case from Latvia because of Yugoslavia's federal territorial organization during socialist period.

In this paper, we draw on this research, measuring Latvia's regional GDP disparities, 1925–1935 and comparing them with those for 2000–2019. Thus, our study covers two periods in the history of Latvia, the first (1918–1940) and the second independence (since 1990). Measurements of the rGDP disparities for the interwar years are made possible by the recent progress in estimating its national GDP in the contemporary SNA framework (Klimantas et al., 2023; Norkus, Markevičiūtė, et al., 2024). The present paper answers the following research questions: how large were cross-regional disparities in economic productivity in interwar Latvia? How did they change during the first and the second period of Latvia's independence, i.e. did the regions converge or diverge? What are the similarities and differences in size and trends of changes in inequality during the first and the second periods of independence?

By this time, Latvian total output estimates according to the contemporary System of National Accounts (SNA) framework for the foreign occupation period (1940–1990) are absent. The most recent release of the Maddison project database (MPD, 2020) provides GDP estimates for Latvia for 1973 and 1980–1990. However, the absence of the breakdown of this data by sectors along with the lack of local-level sectoral wage data is an insuperable obstacle to apply our methodology to this period. From the Soviet time literature, it is known, that until the 1960s, industrial investments were concentrated in Riga. This could only increase the pattern of cross-regional economic inequality. During the last decades the authorities tried developing Liepaja, Ventspils, Daugavpils, Rezekne, Jekabpils, Valmiera, and Gulbene as industrial centres (Gulian, 1982, pp. 192–199; Šneidere, 1989, pp. 208–201, 233–249). Although the quantitative knowledge about the success or failure of these policies is of obvious interest, the measurement of Soviet-time cross-regional disparities should be postponed until further progress in the estimation of detailed GDP figures for the occupation period.

We will start with contextual information, explaining why Latvia is the best starting point for extending research in the long-run perspective among the Baltic countries. This section also provides contextual information on the regional divisions of the country. In the third section, we describe our methodology and data. The fourth section presents our findings on Latvian rGDP in 1925, 1930, and 1935. We also apply standard measures of sigma convergence and divergence (coefficient of variation, Gini index, mean logarithmic deviation, and the Theil index). This is also done for the period 2001–2016, as this allows for cross-time comparisons of levels and trends of regional inequality during the two periods. We also present findings on beta convergence. The concluding section provides a summary of the key findings, i.e. the huge differences in GDP per region for both periods and limited signs of beta convergence. Here we also discuss the relevance of the Latvian case in a theoretical context of the discussion on how to explain cross-regional economic disparities and their change. We compare the Latvian pattern with a few European countries that can be deemed as most similar cases. Regional employment by sectors and wage data are available as on-line supplemental material.

2. Contextual information and research questions

Due to their small size, the Baltic countries may be considered irrelevant for cross-regional economic disparities. However, Latvia is an exception to this assumption, due to extreme polarization between Riga and the rest of the country. In Estonia, the dominance of Tallinn is balanced to some degree by the growth of Tartu, while Lithuania has even two non-metropolitan economically successful cities (Kaunas and Klaipėda). Thus, Estonia ranks ninth and Lithuania fourteenth in the OECD (2022) ranking according to cross-regional economic disparities.

At the same time, Latvia is the only Baltic State which has a regional division inscribed into its constitution. The list of Latvian regions is provided in Article 3 of the Constitution (*Satversme*) of Latvia, accepted in 1922 and reinstated in 1991: 'The territory of the State of Latvia, within the borders established by international agreements, consists of Vidzeme, Latgale, Kurzeme and Zemgale'. This provides a potential legal basis for regionalist politics and claims for equal consideration. However, the list does not include the capital city of Riga, which usually is singled as a separate unit on par with the four 'constitutional regions'. It is placed at the juncture of three relatively advanced regions, i.e. Vidzeme, Kurzeme, and Zemgale, and it has status as their common gravitation centre (Figure 1).

Another distinctive feature of Latvia is the special position of the eastern part, Latgale. It has a significantly lower level of productivity and is known for a conspicuous regional

Administratīvais iedalījums 1939. g.



Figure 1. Historical ethnographic regions of Latvia (Provinces of the independent Republic of Latvia 1918–1940). Source: Šķiņķis, Pēteris. Administratīvi teritoriālais iedalījums Latvijā. <https://enciklopedija.lv/skirklis/22981-administrat%C4%ABvi-teritori%C4%81lais-iedal%C4%ABjums-Latvij%C4%81> <https://enciklopedija.lv/api/image/original?name=b22842116c16-6392855a-4633-42d8-86fb-c7c56a853485.jpg>.

identity, i.e. 'Latvians of Latgale', commonly called Latgalians. They are distinguished by the dominant Catholic and Orthodox churches, contrary to the dominant Lutheran faith in the rest of the country, Latgale also holds cultural and linguistic peculiarities. The ability of mainland Latvians to understand Latgalian without learning makes it akin to dialect. However, differently from other dialects in the Baltic languages, there is an old and still alive tradition of literature written in Latgalian. For Latgalian regionalists, this provides a reason to describe Latgalian as a separate Baltic language (Bukšs, 1976/2012; Plakans, 2011). This makes the situation of Latvia unique in comparison with the other Baltic countries.

The regional disparities acquired salience in geopolitical tensions after the outbreak of the hybrid Russian-Ukrainian war in 2014. Among new EU and NATO members, Latvia is sometimes perceived as the 'weakest link' due to its high share of the Russian-speaking population (Pridham, 2018). Besides Riga, Latgale holds a huge Russian concentration. As of 2022, the share of ethnic Latvians in the population of Latvia was 63 percent. However, in Latgale the share was 46 percent, and in the largest city of Latgale Daugavpils only 21 percent. Among the non-Latvian population of Latgale, 36 percent were Russians, 6 percent Poles, and 5 percent Belarussians (Central Statistical Bureau of Latvia., 2023b). The resentment against the 'Riga elite', fuelled by Latgale's socio-economic problems, like unemployment, poverty, and social exclusion finds its expression in the protest vote in support of Latvia's Russophile Harmony Center party and populist parties.

We join the scholars (Auers et al., 2019; Kebza et al., 2019; Keišs & Kazinovskis, 2014; Krastiņš & Vanags, 2005; Račko & Voronovs, 2014; Vanags et al., 2012) in considering Latgale's economic underdevelopment as the main cause of its social and political problems. We contribute to this discussion by bringing a deeper historical perspective and entering nearly uncharted waters. There is significant research on economic and social inequalities within and across regions of the restored independent state of Latvia. Since 2000, Latvia's national statistical office has published annual estimates of regional GDP, based on Eurostat templates. However, nearly all cross-regional studies on interwar Latvia are qualitative or focus on cultural history (Bukšs, 1957, 1976/2012; Malahovskis, 2014; Zeile, 2006).

The only but important exception is the work of the Latvian pioneer of national accounting Alfreds Ceichners (1929a, 1929b), who presented estimates of the Latvian national income for 1925, 1929–1930, and 1932 (Grytten et al., 2022; Norkus & Markevičūtē, 2021). The estimation of Latvia's national income for 1929–1930 was the topic of his habilitation thesis (Ceichners, 1931), including the attempt to estimate the share of Latgale of the total national income. Ceichners' main results for 1925 at current prices are presented in Table 1.

Unpublished Ceichners estimate refers to 1929–1930 and provides only national income figures (also at current prices) for Latgale along with totals for Latvia (Table 2).

According to the first estimate, national income per capita in Latgale was 62 percent of Latvia's mean value. According to the second, it was 50 percent of the Latvian mean. Grytten et al. (2022) (see also Norkus, 2018) provide the discussion of Ceichners work on the national income of interwar Latvia. The main finding is that his accounting methodology was unstable, being marked by ad hoc changes in the calculation rules. Thus, for 1929–1930 alone he provides three different national income estimates. For the same reason, his estimates for different years are not comparable and cannot be used for output growth assessment. Therefore, it is not possible to know whether the difference

Table 1. Latvian regional and national income in 1925.

Employment branch	Vidzeme	Kurzeme	Zemgale	Latgale	Latvia (total)
Agriculture	163.8	84.5	110.2	113.0	471.0
Manufacturing	106.9	27.7	18.7	16.7	170.7
Trade	63.0	13.9	8.7	16.7	100.0
Communications and transport	21.4	5.3	3.4	3.5	34.0
Public administration	13.0	3.0	2.2	3.6	22.0
Intellectual work occupations	35.4	6.8	4.6	7.0	54.0
Servants, including domestic servants	14.0	3.5	2.0	2.3	22.0
Other and unknown occupations	27.9	10.9	7.8	7.2	54.0
Total	445.0	155.0	158.0	168.0	926.0
For 1 employed person, Ls	1 005.0	904.0	890.0	505.0	825.0
For 1 inhabitant, Ls	600.0	541.0	571.0	311.0	502.0

Source: Ceichners (1929b).

Table 2. Latgalian regional and Latvian national income (millions Ls) in 1929–1930.^a

Employment branch	Latgale	Latvia
Agriculture	103	493
Forestry	2	18
Sea fishing	–	3.5
Manufacturing	17	270
Trade and credit	16	177
Transport and communication	5	47
Real estate in the towns	2	40
Other income (salaries of officials etc.)	10	103
Total	155	1151
The income of Latgalian workers earned in other regions of Latvia	10	–
Total	165	1151
Per capita, Lats	300	600

Source: LSHA (n.d.) 1308, 11, 18920.

^aThe text found in the archive (LSHA 1308, 11, 18920) does not have a date. However, its content suggests that it could be written in 1933–1934.

in his estimates of Latgale's standing in comparison with the national mean for 1925 and 1929–1930 reflects his opinion that in 1925–1930 the lag between Latgale and mainland Latvia increased.

In addition, we find Ceichners' pioneering estimates of the regional shares conceptually flawed. From the contemporary systems of national accounts (SNA) perspective, gross domestic product (GDP) is the value of finished domestic goods and services produced within a specific territory (United Nations, 2009). On the other hand, national income is the value of the final production of goods and services owned by a country's citizens, whether those goods are produced in that country, and it excludes income repatriated by foreigners. Hence, national income is calculable only on the national level, as there is no possibility to trace the income flows across regional limits. Nevertheless, Ceichners' figures are of interest for control purposes.

3. Methodology and data

To make cross-time comparisons of the new figures with the restored independence period possible, we calculate rGDP twice. First for the Latvian regions (*apgabals*) according to the interwar administrative regional division (Kurland, Latgale, Vidzeme, Zemgale,

Riga city). However, the limits of these units only approximately correspond to those for NUTS 3, which in 2009–2021 were also ‘planning regions’ (*Latvijas plānošanas reģioni*), (Figures 1 and 2).

While the territory of the interwar Kurzeme region perfectly coincides with that of the contemporary NUTS3 region (LV003), this does apply to the other regions. In interwar Latvia, there was no Pierīga region, which includes the territories of interwar Riga and Tukums counties. Accordingly, the contemporary Vidzeme (LV008) region was diminished by Riga County, while Zemgale (now LV009) ‘lost’ Tukums county. Another ‘loss’ is Ilukste county, which now belongs to Latgale (LV005). However, the territory of the Latgale region itself was diminished by the transfer of one-third (1300 km²) of the territory of interwar Jaunlatgale (renamed in 1938 to Abrene) county to the Russian Federation in 1945 (Nacionālā Enciklopēdija, 2018, p. 37) (see Table 3 below).

To ensure maximal comparability, we calculate rGDP also for territories enclosed within the contemporary limits. For this aim, we reorganize the data according to the spatial harmonization scheme presented in Table 1. Because our aim is a cross-time comparison and space is limited, we present rGDP figures for territories within contemporary NUTS3 only. However, comparing our findings with Ceichners’ estimates, we use rGDP for regions according to interwar time definitions.

Regional GDP estimates, which are presently published for the regions of the Baltics by the national statistical offices, are derived by constructing subnational accounts according to the SNA 2008. We compile them from Eurostat (2023). However, due to lack of sufficient primary data, this is not possible for the distant past. Thus, for the estimation of the regional output of interwar Latvia, we use an indirect estimation method, which is broadly applied on European regions (Rosés & Wolf, 2019).



Figure 2. NUTS 3 statistical regions of contemporary Latvia by the Central Statistical Bureau of Latvia, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=18527500>.

Table 3. Spatial synchronization scheme for Latvian interwar and contemporary (2009–2019) regions.

Interwar Latvian regions (Composition by interwar counties)	Contemporary (NUTS 3) statistical regions (Composition by interwar counties)
Riga City	Riga city (LV06)
Na	Pierīga (LV007): Riga and Tukums counties
Vidzeme: Riga, Valmiera, Cesis, Valka, Madonna counties	Vidzeme (LV008): Valmiera, Cesis, Valka, Madonna (Riga to Pierīga)
Kurzeme: Liepāja, Aizpute, Kuldīga, Ventspils, Talsi counties	Kurzeme (LV003): Liepāja, Aizpute, Kuldīga, Ventspils, Talsi counties (no changes)
Zemgale: Tukums, Jelgava, Bauska, Jekabpils, Ilukste counties	Zemgale (LV009): Jelgava, Bauska, Jekabpils (Tukums to Pierīga, Ilukste to Latgale)
Latgale: Daugavpils. Rezekne, Ludza, Jaunlatgale (Abrene) counties	Latgale (LV005): Daugavpils. Rezekne, Ludza, Jaunlatgale (Ilukste from Zemgale, part of Jaunlatgale (Abrene) county to Russian Federation)

Frank Geary and Tom Stark (2002) invented the method. The basic principle is that a country's GDP is equal to the sum of all regional GDP's. Thus, total GDP (Y_i) is the sum of n regional GDPs (Y_j):

$$Y_i = \sum_j^n Y_j \quad (1)$$

Also, regional GDP (Y_j) can be decomposed into contributions from all sectors in the economy:

$$Y_j = \sum_k^K y_{jk} L_{jk} \quad (2)$$

y_{jk} being output, or average value, per worker in each region j , in sector k , and L_{jk} the number of workers in each region j and sector k . As we have no direct data for y_{jk} , we find proxies by assuming that regional differences in labour productivity in each sector are reflected in regional industry wage level relative to the national sector wage level w_{jk}/w_k .

Hence, regional GDP can be estimated as:

$$Y_j = \sum_k^K \left[y_k \beta_k \left(\frac{w_{jk}}{w_k} \right) \right] L_{jk} \quad (3)$$

Here, y_k is value added per worker in sector k at the national level, w_{jk} is wage paid in region j in sector k , w_k is country average wage in each sector k , and β_k is a scalar that preserves relative region differences but scales absolute values to make regional total for each sector added up to national total:

$$\beta_k = \frac{Y_k}{\sum_k^K \left[y_k \left(\frac{w_{jk}}{w_k} \right) \right] L_{jk}} \quad (4)$$

where Y_k is the total value added in a sector k .

The data necessary for using this procedure are national-level estimates of GDP, value added per worker, nominal wages, and employment by sector. We follow the same procedure as Rosés and Wolf (2019), i.e. the Geary-Stark method for census years only, since they provide the most reliable data on employment by sector. Four inter-war censuses

were taken: 1920, 1925, 1930, and 1935. However, the 1920 census data were only partly published, and they do not include employment statistics.

The 1930 census data were also incompletely published, probably because of austerity policies imposed by the Latvian government during the Great Depression. However, we were able to locate relevant data in the archives. Importantly, original data exist with breakdowns by regions and counties, making it possible to regroup the data according to borders for contemporary NUTS III regions, i.e. Kurland, Latgale, Pierīga, Rīga, Vidzeme, Zemgale, according to spatial harmonization scheme in [Table 1](#). Our regional employment data is available in Appendix 1.

The Latvian statistical office published the annual ‘Statistics of Labor’ (*Darba statistika*), containing data on manufacturing by major cities, regions, and professions. We draw from this source, using means of daily wages of skilled and unskilled workers for regions. For agriculture, we found necessary data in the accounts of expenditures and revenues, collected from a sample of farms, covering all four regions. The real challenge is data on wages in the service sector, as ‘Statistics of Labor’ provides them for a limited number of occupations and locations only. Following the established practice in the application of the Geary-Stark method, we use the weighted means of wages in agriculture and manufacturing, using the number of persons employed in agriculture and manufacturing in the different regions as weights.

Almost all authors applying the Geary-Stark method, use nominal wages (Rosés & Wolf, 2019). However, cross-regional differences in nominal wages reflect not only differences in labour productivity, but also those of living cost. This could be important for Latvia, where retail prices for most food products were higher in Rīga. Therefore, we deflated nominal wages by using regional rye prices and following the examples by Wolf (2019) and Lust (2007). Then we do our calculations twice: using nominal and real wages data (this data is in Appendices 2 and 3). Because of space limits, we present only the findings on rGDP based on real wages in the main text, placing estimates based on nominal wages into Appendix 4.

Calculating rGDP for the Pierīga region (LV07), which was non-existent in the interwar time, we use employment data for the Rīga and Tukums counties, and agricultural wage data for interwar Vidzeme, which included the Rīga County. Manufacturing wages for the Pierīga region are computed as the weighted average of Vidzeme and Zemgale wages. We use the number of employed persons in Rīga and Tukums counties as weights. The last data necessary for the estimation of the rGDP are national-level GDP at base prices by sectors. These data were recently provided by Norkus, Markevičiūtē, et al. (2024) and Klimantas et al. (2023) (See [Table 4](#) below).

After estimating total rGDP values for the interwar regions and territories within contemporary NUTS3 limits, we calculate rGDP per capita values and use standard measures of inequality, i.e. coefficient of variation (CV), the Gini index, mean logarithmic deviation (MLD), and the Theil index. Following the mainstream approach, going back to Williamson (1965), we weigh the values by the shares of the population of the regions to the total population.

All these statistical tools are measures of sigma convergence (σ), defined by variation of values around a sample or population mean. In statistics, σ is a designation of standard deviation, referring to the amount of variability in each set of data: if the data are clustered. All measures of inequality presented here are derivatives of σ . The lower σ is the

Table 4. Real GDP at 1935 base prices in Latvia 1920–1939.

Year	GDP at basic prices, mil.Ls, total	GVA of agriculture, forestry, and fishing, mil. Ls	GVA of manufacturing and construction, mil. Ls	GVA of services, mil.Ls
1920	485.5	169.9	51.5	264
1921	561.2	212.8	74.6	273.9
1922	578.5	207.7	89.5	281.3
1923	674.7	240.3	117	317.4
1924	698.1	238.2	125.5	334.3
1925	755.3	262.00	136.9	356.4
1926	764.2	257	139.7	367.4
1927	789.7	261.8	149.5	378.5
1928	795.3	245.0	158.8	391.5
1929	872.9	273.7	178.9	420.4
1930	946.6	294.9	207.4	444.2
1931	868.3	288.3	175.0	405.0
1932	862.8	322.4	156.2	384.2
1933	947.3	339.5	197.7	410.0
1934	1037.6	375.1	228.8	433.7
1935	1061.8	383.4	240.1	438.3
1936	1073.6	364.4	255.8	453.6
1937	1167.7	390.7	291.8	485.3
1938	1203.1	399.9	308.2	495.0
1939	1209.7	409.7	314.5	485.6

Note: The GDP values used for rGDP estimation are in bold.

Source: Klimantas et al. (2023); Norkus, Markevičiūtė, et al. (2024).

higher convergence. Full equality is reached when the standard deviation is zero, while high values of σ reflect a very low degree of equality.

There is another concept of growth convergence, i.e. β -convergence: it occurs when initially poorer economies grow faster than initially richer ones. In statistics, β is the designation of the coefficient of the independent variable in a regression equation. Its sign indicates the direction of change. A positive coefficient indicates divergence, and a negative coefficient indicates convergence. In an analysis of cross-regional economic disparities, the independent variable is the level of GDPpc at the start of a period of interest, and the dependent variable is the annual growth rate during this period.

4. Findings: cross-time comparison of disparities in regional productivity

Table 5 provides a summary of our findings at constant 1935 prices. We report Eurostat (2023) data on Latvian rGDP, 2001–2016, recalculated at constant 2010 prices in Table 6. As the output figures for these periods are in different monetary units, comparison of rGDP volumes are impossible. However, as they are at constant prices, a comparison of growth rates is sensible.

Importantly, the two periods of rGDP punctuate substantively different eras of economic development. For interwar Latvia, 1930 was the last year when its economy displayed growth before it contracted in 1931–1932, related to the Great Depression, which hit Latvia during the autumn of 1930. In 1935, the economy was firmly on the track of recovery, which according to recent findings started in 1933 (Klimantas et al., 2023).

For the restored independent Latvia, 2006 was the last year of the two-digit growth rates. The following year, it slowed down, and in 2008–2010 the economy contracted severely, affected by the Global Financial Crisis (GFC) 2007–2008. 2011 is the first year when it displayed growth again, continuing the next five years. The available data do

Table 5. Regional GDP of interwar Latvia, 1925–1935, within contemporary NUTS3 and interwar region borders at constant 1935 prices (estimates based on cross-regional differences in real wages). Own calculation.

		1925		1930		1925–1930, annual growth GDPpc %	1935		1930–1935, annual growth GDPpc %	1925–1935, annual growth GDPpc%
		Total, mil. Ls	Per capita, Ls	Total, mil. Ls	Per capita Ls		Total, mil. Ls	Per capita. Ls		
Contemporary Latvian NUTS regions										
LV06	Riga	284.16	841.46	414.68	1097.27	5.45	433.99	1127.05	0.54	2.97
LV07	Pieriga	53.44	378.44	61.25	406.04	1.42	75.08	482.63	3.52	2.46
LV08	Vidzeme	113.80	373.56	116.72	392.47	0.99	141.49	477.48	4.00	2.48
LV03	Kurzeme	122.25	426.46	139.80	485.25	2.62	148.03	505.82	0.83	1.72
LV09	Zemgale	75.35	411.23	84.20	443.55	1.52	102.61	520.64	3.26	2.39
LV05	Latgale	161.71	273.44	199.14	334.16	4.09	238.40	382.17	2.72	3.40
LV000	Latvia	810.70	439.45	1015.79	534.62	4.00	1139.60	584.26	1.79	2.89
Interwar Latvian regions										
Na	Riga	283.74	840.22	414.52	1096.85	5.48	433.66	1126.20	0.53	2.97
Na	Vidzeme	151.31	373.77	160.21	395.76	1.15	194.39	478.50	3.87	2.50
Na	Kurzeme	121.76	424.76	139.66	484.78	2.68	147.59	504.30	0.79	1.73
Na	Zemgale	106.35	385.40	119.09	413.39	1.41	146.94	490.84	3.49	2.45
Na	Latgale	147.54	273.38	182.31	336.91	4.27	217.02	382.64	2.58	3.42
Na	Latvia	810.70	439.45	1015.79	534.62	4.00	1139.60	584.26	1.79	2.89

Table 6. Regional GDP of contemporary Latvia, 2001–2016, at constant 2010 prices.

	2001		2006		2001–2006. annual growth GDPpc %	2011		2006–2011. annual growth GDPpc %	2016		2011–2016 annual growth GDPpc %	2001–2011 annual growth GDPpc %	2001–2016. annual growth GDPpc%	2006–2016. annual growth GDPpc%	
	Total, mil. Eur	Per capita, Eur	Total, mil. Eur	Per capita Eur		Total, mil. Eur	Per capita. Eur		Total, mil. Eur	Per capita. Eur					
Contemporary Latvian NUTS regions															
LV06	Rīga	5089	6800	9763	13900	15.37	9934	15200	1.80	13767	21500	7.18	8.38	7.98	4.46
LV07	Pierīga	1098	3100	2160	5900	13.74	2897	7800	5.74	3847	10500	6.13	9.67	8.47	5.93
LV08	Vidzeme	622	2500	1107	4700	13.46	1291	6100	5.35	1644	8500	6.86	9.33	8.50	6.10
LV03	Kurzeme	1118	3500	1779	6000	11.38	2236	8300	6.71	2376	9600	2.95	9.02	6.96	4.81
LV09	Zemgale	703	2400	1311	4800	14.87	1624	6400	5.92	1919	8100	4.82	10.31	8.45	5.37
LV05	Latgale	735	2000	1227	3600	12.47	1654	5500	8.85	1784	6500	3.40	10.65	8.17	6.09
LV000	Latvia	9374	4000	17363	7800	14.29	19666	9500	4.02	25371	12900	6.31	9.04	8.12	5.16

Source: Eurostat (2023).

not allow us to estimate rGDP for the last years of the interwar independence, 1935–1939. Thus, one cannot compare them with the next period of strong growth of the restored independent Latvia, 2011–2016. However, national growth rates for this period can be compared with those for 1935–1939, provided in Klimantas et al. (2023).

Hence, we find that the growth rates in restored independent Latvia were significantly higher in comparison to the interwar time. The cross-time difference in growth rates can be explained by period effects, as the interwar years are known as an era of weak growth (Feinstein et al., 1997). The main cause was the breakdown of international trade during and after the Great Depression, including a temporary reversal of globalization. Differently, the GFC did not have such an effect. However, there were important similarities in the economic policies of the Latvian governments during both periods. During the GFC, the Latvian government embraced extremely strict austerity policies, to uphold the peg of the national currency to the Euro. Also, an aim of the economic policy of the Latvian government 1930–1936 was to avoid devaluation of the Lat. This policy delayed the recovery. The austerity policies during the GFC helped Latvia to preserve the image of a safe haven for foreign investments.

Indeed, the huge inflow of foreign investments on the eve of the Latvian entry to the EU in 2004 and during its first membership years probably was a main driver for its two-digits growth. Foreign investments were an important driver of the interwar growth until 1930, when more than 50 percent of its manufacturing was foreign-owned (Ceichners, 1933, p. 58). However, during the next decade outflows surpassed inflows, making Latvia rely on domestic capital accumulation.

Another important similarity between the periods is that Riga was by far the most attractive location for these investments, due to its permanent productivity edge over other Latvian regions. Return migration from Soviet Union continued until 1925, with most returnees, formerly workers in the Riga industry. Creating excess supply of highly qualified workforce, return migration depressed by 1925 real wages in Riga below the national mean, making it even a more attractive place for foreign investments. Table 7 compares the economic productivity of the Latvian regions, expressing their rGDPpc in percentages of the national GDPpc value. This is the simplest way to let transpire trends in change of disparities (convergence or divergence) during both periods as well as continuities and differences. To provide possibility to assess the sensitivity our findings to use of nominal or real wages as basis for rGDP assessment, 1925–1935, we provide ratios of rGDP to national GDP mean.

Table 7. Regional GDPpc of Latvian regions, 1925–1935 and 2001–2016, in percent of country mean GDPpc.

	rGDP calculated basing on cross-regional differences in nominal wages			rGDP calculated basing on cross-regional differences in real wages			Eurostat data on GDP and rGDP			
	1925	1930	1935	1925	1930	1935	2001	2006	2011	2016
Kurzeme	89	88	84	97	91	87	88	77	87	74
Latgale	61	57	61	62	63	65	50	46	58	50
Riga	203	210	208	191	205	193	170	178	160	167
Pieriga	86	80	80	86	76	83	78	76	82	81
Vidzeme	88	80	81	85	73	82	63	60	64	66
Zemgale	86	81	81	94	83	89	60	62	67	63

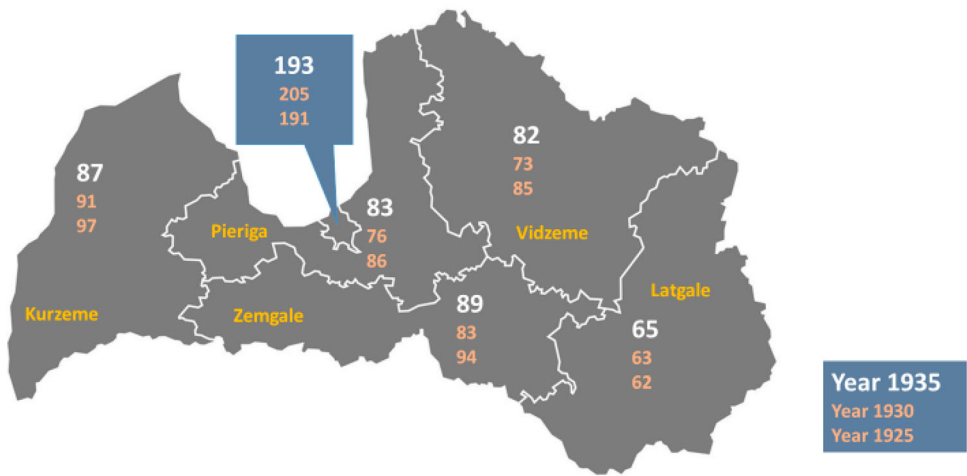


Figure 3. Cross-regional differences of regional GDP (estimates based in cross-regional differences in real wages) in interwar Latvia (territories within contemporary NUTS3 borders). Source: Own.

Figures 3 and 4 visualize Table 7 for the interwar and the restored independence periods correspondingly.

During both the interwar and restored independence periods, Riga was considerably ahead of the remaining regions. Our results completely new evidence that during the interwar period, the productivity gap separating the Latvian metropolis from all other regions was even larger than in the early 2000s. GDPpc in Riga surpassed the mean more than twice in 1930, while during the second and third independence decades, its edge over country mean was 60–78 percent. Using nominal wages data, interwar Riga always surpassed the national mean more than twice.

Another common feature for both periods is the wide lag of Latgale. If the positive outlier position of Riga with respect to the mean decreased a bit after 60–70 years

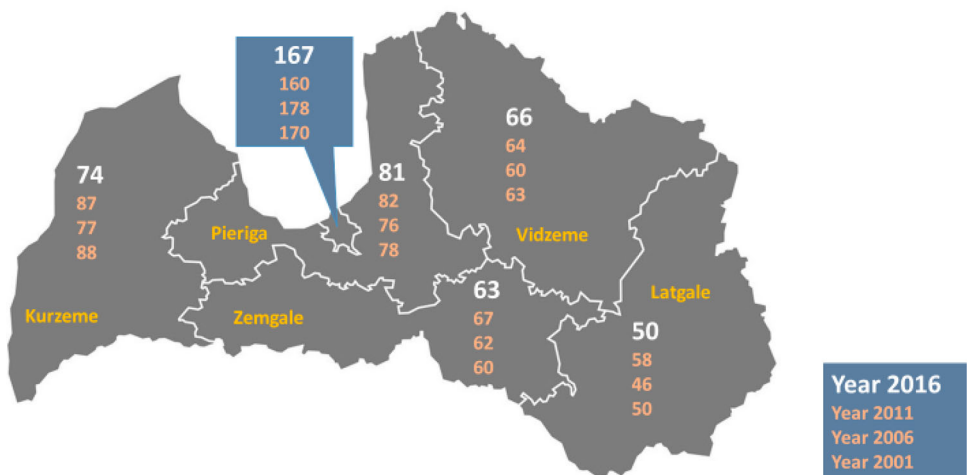


Figure 4. Cross-regional differences of regional GDP in restored independent Latvia. Source: Own calculations using Eurostat data.

separating the periods of comparison, the Latgale as a negative outlier became even more conspicuous. In 1925–1935, the rGDPpc of Latgale was 62–65 percent of the national mean, against 46–58 percent 2001–2016. Comparing rGDP values for the interwar period derived using nominal wages, Latgale’s standing appears slightly worse. In both cases, the use of nominal wage data may distort the real situation, since the costs of living were higher in Riga, while in Latgale the purchasing power of the Lats was higher. When assessing the ranking of regions for the interwar period we should rely on the rGDP values derived from real wages data.

According to data visualized in the [Figure 3](#), Riga was by far the wealthiest in the interwar period, followed by Kurzeme and Zemgale, which were pretty even. Thereafter Pieriga and Vidzeme were at similar levels and Latgale at a clear bottom. For the period 2001–2016, Riga was still significantly above the others followed by Kurzeme and Pieriga. After these two Vidzeme and Zemgale performed at similar levels, when Latgale still lagged considerably behind, significantly less than a third of Riga.

Importantly, Pieriga did not become the richest non-metropolitan region of the post-communist era before more than a decade into the twenty-first century. Pieriga surpassed Kurzeme in 2016. This may be explained by the sprawling of contemporary Riga across its administrative limits into the surrounding Pieriga region. It involved the suburbanization of Riga and the relocation of economic activities from the city to its surroundings, facilitated by the automobilization of its population taking place during the same time. Riga was growing in interwar times. However, by 1935 its number (385 000) still was below its size in 1914 (520 000) (Norkus et al., 2021). At that time available infrastructure could accommodate both influx of population and new economic activities within the city limits, contrary to the situation during the first decades of the twenty-first century.

Despite Pieriga was replacing Kurzeme as Latvia’s second richest region, the overall scale of cross-regional inequalities in the restored independent state remains at nearly the same levels as during the interwar time. This is in line with the sigma divergence measures presented in [Table 8](#) and [Figures 5](#) and [6](#). According to these measures, cross-regional productivity disparities during both periods of independence remained at similar levels. Hence, during both periods, no clear sigma convergence or divergence trend is discernible.

The measures of sigma convergence describe the distribution of wealth creation across regions. The reliability depends on data quality. Measuring beta convergence involves model estimation. Thus, the reliability also depends on the size of the sample. Because of the limited sample, one hardly expects reliable results from a quantitative beta convergence analysis of our data. Nevertheless, running linear regressions for all possible subperiods in 1925–1935 and 2001–2016 provides some information.

Table 8. Sigma convergence measures for Latvia, 1925–2016.

	rGDP calculated basing on cross-regional differences in nominal wages			rGDP calculated basing on cross-regional differences in real wages			Eurostat data on GDP and rGDP			
	1925	1930	1935	1925	1930	1935	2001	2006	2011	2016
CV	0.5024	0.5591	0.5429	0.4524	0.5332	0.4691	0.4943	0.5350	0.4241	0.4706
MLD	0.0977	0.1209	0.1112	0.0827	0.1079	0.0852	0.1160	0.1344	0.0846	0.1049
Gini	0.2330	0.2620	0.2472	0.2197	0.2473	0.2173	0.2592	0.2749	0.2221	0.2449
Theil	0.1079	0.1331	0.1244	0.0897	0.1205	0.0947	0.1161	0.1347	0.0856	0.1054

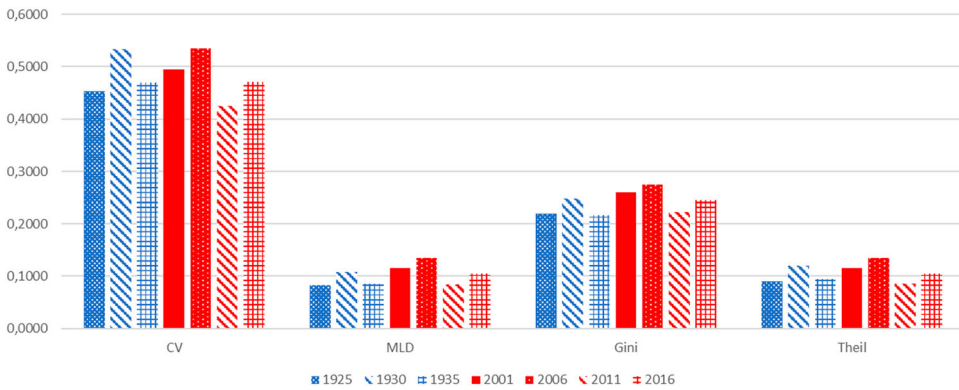


Figure 5. Sigma convergence measures for Latvia, 1925–2016. Regional GDP values, 1925–1935, were estimated using regional real wages data.

Due to the small population, we use $p \leq 0.1$ as a critical statistical significance value. Four models, for 1930–1935, 2001–2011, 2006–2011, and 2006–2016 were statistically significant (Table 9).

During both independence periods, the cross-regional GDPpc disparity displays the same pattern. The years of booms are marked by cross-regional divergence, shown in increasing values of all four measures, indicating an increase in inequality. For the periods 1925–1930 and 2001–2006 rapid growth took place with easy access to capital. It seems that metropolitan regions profit more from those than the peripheral regions, leading to an increase in cross-regional disparities.

During the recessions during the 1930s and 2007–2011, the cross-regional disparities decreased when the metropolitan region suffered relatively more. For 2006–2011 Riga’s growth rate was the lowest among the regions (1.8 percent) and significantly below the over all-Latvian rate (4.0 percent) (Table 6). The pattern observed for the interwar period is very similar (Table 5). This is the main reason for the decrease in the sigma values during 1930–1935, and 2006–2011. This interpretation is vindicated by the only statistically significant regression of beta convergence (1930–1935) for the interwar

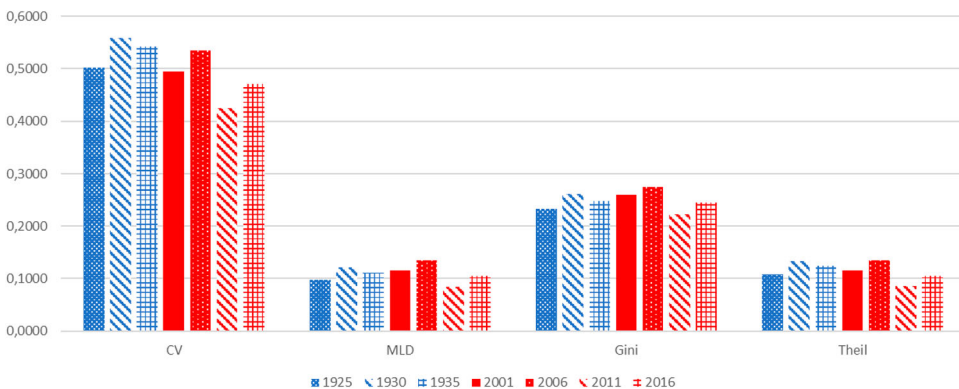


Figure 6. Sigma convergence measures for Latvia, 1925–2016. Regional GDP values, 1925–1935, were estimated using nominal wages data.

Table 9. Estimations of beta convergence for Latvia's NUTS3 regions, using (1925–1935) rGDP data based on real wages data.

	1925–1930 model	1925–1935 model	1930–1935 model	2001–2006 model	2001–2011 model	2001–2016 model	2006–2011 model	2006–2016 model	2011–2016 model
β_0	-12.8459	3.1774	18.5121(*)	2.1972	23.4156(***)	11.8597(*)	44.9168(***)	16.0228(**)	-14.5335
β_1	5.5648	-0.2177	-5.8255(*)	3.2514	-3.9687(**)	-1.0803	-10.4033(**)	-2.8041(*)	5.0822

Note: (*) – significant with a level less than 0.1; (**) – significant with a level less than 0.05; (***) – significant with a level less than 0.01.

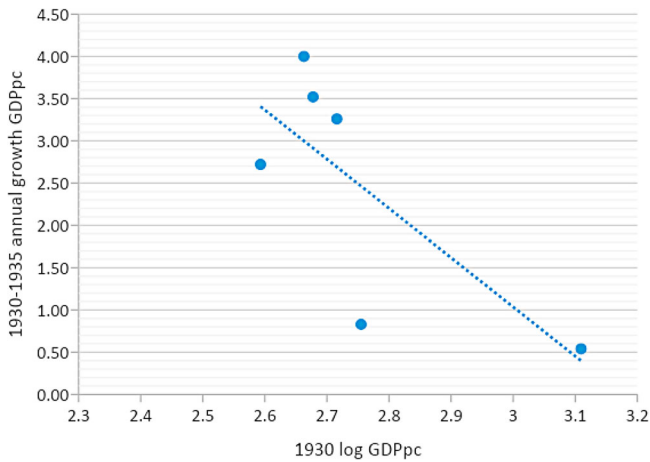


Figure 7. Beta-convergence of Latvian regions, 1930–1935. Source: See [Table 5](#).

period when the model predicts convergence during the crisis ([Figure 7](#)). The same picture is provided by the regression for 2006–2011, encompassing the GFC ([Figure 8](#)).

The poorest region, Latgale, was not the worst performer in terms of GDP growth during the interwar period. For 1925–1935, its growth rate was above the Latvian aggregate and its rGDPpc ratio to the national increased from 62 to 65 percent ([Figure 3](#)). For 2001–2011 it increased from 50 to 58 percent ([Figure 4](#)). During the next five years, 2011–2016, Latgale’s growth (3.40 percent) was relatively weak, surpassing only that of Kurzeme (2.95 percent). Latgale’s rGDPpc was back to 50 percent of the national in 2016, significantly lower than the bottom in the interwar period of 62 percent.

For 1925, our findings for Latgale coincides with [Ceichners \(1929b\)](#) results ([Table 1](#)). His calculations imply that the national income per capita in Latgale was 62 percent of Latvian national income. His figures for Kurzeme (108 percent) and Zemgale (114 percent) are higher than our findings (97 and 88 percent correspondingly).¹ He also claimed Latgale

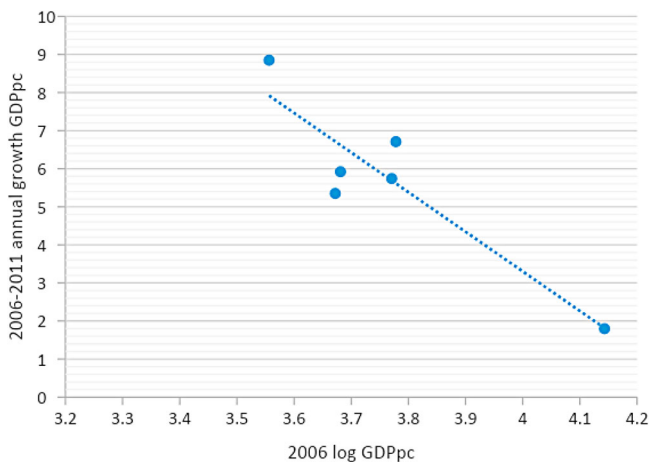


Figure 8. Beta-convergence of Latvian regions, 2006–2011. Source: See [Table 6](#).

made up 50 percent of the overall-Latvian value in 1929–1930, against our 63 percent (Tables 2 and 5). Ceichners considered Riga as part of Vidzeme. His findings imply that the national income per capita of Vidzeme was 120 percent of the Latvian average. Reshuffling our findings for Vidzeme enlarged by Riga, we get 134 percent.

5. Concluding discussion

Less productive regions must grow faster than more productive regions to obtain catching-up convergence. However, such beta convergence is only a necessary condition of sigma convergence. Thus, there can be sigma divergence despite beta convergence. Beta convergence without sigma convergence may take place when growth rates change rank between regions. During beta divergence, productivity growth is faster in the more productive regions or when productivity in the more productive regions decreases slower than in the less productive regions. Convergence may also be the case during recessions affecting more productive regions more severely than less productive regions.

It looks like the last scenario materialized in Latvia both in 1930–1935 and in 2006–2011. In 1925–1930, Riga's growth record was the best and in 1925–1930 the worst with 5.45 and 0.54 percent respectively. For the restored independence period, we find the same picture. During the 'golden' period 2001–2006, it was the best performer with 15.37 percent annual growth. During the crisis 2006–2011 the capital was the worst performer with 1.80 percent annual growth. During both the interwar and restored independence eras, there were dramatic changes in the growth rates of the non-metropolitan regions.

During the interwar years, they include the acceleration of Vidzeme (LV008)² from an annual growth of 0.99 in 1925–1930 to 4.00 percent in 1930–1935. How can this acceleration of growth of the peripheric (agrarian) regions despite the crisis be accounted? Riga's industry suffered most from the crisis. However, Ceichners (1933) found that real output of agriculture increased during the crisis (this finding is corroborated in Klimantas et al., 2023). The reason was not just a coincidence of good harvests (1930, 1933–1934) and crisis in the general economy, but peculiarities of the economy of family farms, which were the dominant economic units in interwar Latvia. They reacted to falling prices by expanding production to pay taxes and debts during deflation. The ways to reduce production cost included reducing personal consumption.

Under the restored independence, agriculture was not the leading sector anymore, technological conditions of production changed even for extant family farms. Therefore, none of the regions could accelerate during the crisis-ridden period 2006–2011 in comparison with the early 2000s. However, in these years Latgale displayed a top growth performance (8.85 percent), which was more than two times higher than the Latvian aggregate (4.02 percent). However, during the subsequent boom, 2011–2016, its growth slowed down to 3.40 percent, making it remain at the same low relative level in 2016 as in 2001 despite regional cohesion policy.

From 2006–2011 to 2011–2016, the growth rates improved most in Riga, from 1.80 to 7.18 percent. Kurzeme showed a slowdown from 6.71 to 2.95 percent and Zemgale from 5.92 to 4.82 percent. Pieriga surpassed Kurzeme in the position as the second-richest region, explained by the 'sprawling' or suburbanization of Riga proper. This is the only

important difference when it comes to spatial distribution during the independence restoration years compared to the interwar years.

To increase the international comparability of our analysis, we recalculated our estimates of regional GDP into 1990 Geary Khamis international dollars (GK 1990\$), based on the figures of total GDP of Latvia in 1935 by Norkus, Markevičiūtė, et al. (2024) and in 1925–1935 by Klimantas et al. (2023) (Table 10).

Comparing these data with comparable figures from the work on GDP for the interwar Baltic economies (Klimantas, 2023 on Lithuania; Valge, 2003 on Estonia) and the MPD, we find that the new estimates for all Latvian regions except for Latgale were higher than GDPpc of Lithuania during 1925–1935 (1627 GK1990\$ in 1925). At the same time, the new estimates for all regions, except for Riga, were below that of Estonia (2280 GK1990 \$ in 1925). At the same time, the estimates for Riga were higher than the GDPpc for Sweden and Norway, but lower than that for Denmark, which was the richest Nordic country (Grytten, 2022). However, in 1935 the value for Riga was quite close to the Danish level (5480 GK1990\$). In this sense, even if the ‘Denmarkization’ policies were still far from achieving success in the entire Latvia, it was successful in the case of Riga.

According to the formerly dominant Williamson (1965) model, the long-run dynamic of cross-regional productivity disparities under conditions of modern economic growth has an inverted U shape. The onset of such growth is marked by an increase in regional disparities. Thereafter, as described in the neo-classical growth model (Barro & Sala-i-Martin, 1991, 2003; Solow, 1970) there was both cross-country and cross-regional convergence. The remarkable stability of the basic pattern of cross-regional productivity inequality over the last hundred years, makes the Latvian case contradict this model.

In this respect, Latvia differs a lot from Finland, which during the interwar period, was perceived by some Western observers and travellers as the fourth Baltic state. In 1930, the rGDPpc of Finland’s metropolitan Uusimaa county was 212 percent of the national mean GDPpc value (=100%) while Finland’s value of the CV was 0.47 percent (Enflo, 2019). This is close to the Latvian values (Riga’s rGDPpc 205 percent and CV value 0.5332) in the same year. However, by 2010 Uusimaa’s rGDP was just 138 percent of Finland’s GDPpc and the CV value was 0.25 against Riga’s value 160 percent and Latvian CV value of 0.42 percent in 2011.

Other European countries that may deem as similar cases are Austria (after 1918) and Denmark. Austria is of interest, because both Riga and Vienna had to cope with the contraction of their hinterland. The hypertrophy of Riga in interwar Latvia was the legacy of its

Table 10. National and regional GDP for Latvia 1925–1935.

	1925		1930		1935	
	Total GDP, mil. GK1990\$	GDPpc, GK1990\$	Total GDP, mil. GK1990\$	GDPpc, GK1990\$	Total GDP, mil. GK1990\$	GDPpc, GK1990\$
Riga	1345.59	3984.58	1967.86	5207.12	2060.39	5350.78
Vidzeme	717.57	1772.50	760.58	1878.79	923.66	2273.64
Kurzeme	577.41	2014.33	663.01	2301.39	701.26	2396.15
Zemgale	504.33	1827.69	565.36	1962.48	698.20	2332.24
Latgale	699.67	1296.45	865.50	1599.45	1031.19	1818.15
Latvia	3844.57	2084.00	4822.31	2538.00	5414.69	2776.05

Note: Regional GDP values estimated using real wages data.

Source: Norkus, Markevičiūtė, et al. (2024); Klimantas et al. (2023).

role in larger economic space of the Russian empire. Similarly, Vienna was a ‘too large’ capital for the Republic of Austria (since 1918), because earlier it was the capital of the huge Habsburg empire. In 1934, the value of the CV for Austria was approximately 0.32, while the rGDPpc of Vienna was 142 percent of the national mean (Schulze, 2019). By 2014, the values of these indicators were 0.22 and 123 percent. Interestingly, Western Austria (Salzburg area), which was a poorer part hundred years ago, not only did catch up, but even surpassed Eastern Austria, where Vienna is located. Thus, both Finland and Austria dovetail with Williamson’s model.

The comparison with Denmark is of special interest because Janisse et al. (2019) provides estimates for Denmark’s NUTS3 regions, both countries are of similar size, and interwar Latvia tried to repeat Denmark’s success story by policies of ‘Denmarkization’. The rGDPpc of Copenhagen in 1930 stood at 156 percent of the national mean, while the CV was approximately 0.3. By 2010, these values were 170 percent and 0.33 correspondingly. Thus, disparities between the metropolitan region and the rest of the country were on similar levels in Denmark and Latvia. The disparity between Denmark’s poorest region West Jutland, with 56 percent of the national mean in 2010, resembled the position of Latgale, with 58 percent in 2011.

There are two important differences between patterns of cross-regional inequalities of two countries. Firstly, Latgale remained in the laggard position. In Denmark there were large changes in the fortunes of particular regions during the last century. In 1930, the poorest region was Bornholm. In 1950, this position was taken by South Jutland, but by 2010 the latter region had become the second richest, since after 1970 it became the hub of Danish exploitation of the North Sea oil. Secondly, there were huge changes in the overall level of cross-regional inequalities. By 1960, the CV value dropped to the historical low of 0.15 percent but started to increase again after 1990, when the era of the IT-driven service economy began. Therefore, the overall trajectory of long-run change of cross-regional inequalities in Denmark has a U shape, contradicting Williamson’s model.

According to the new economic geography approach (Fujita et al., 1999; Krugman, 1991, 1999), economies of scale, externality of demand, pooling of specialized inputs, positive feedbacks, and path-dependent dynamics are obstacles to convergence. Of special importance are agglomeration effects that occur where and when firms can harvest gains from locating in a close neighbourhood. Areas that offer better access to the markets, like Riga, attract industries with increasing returns to scale. Thus, it looks like the application of the new economic geography approach is more promising for the Latvian case. However, we don’t have reliable estimations yet to know what happened in the period 1936–2000.

A main limitation of our research is that we can estimate interwar Latvia’s rGDP for a period encompassing ten years only. A task of further research is to extend the estimates both backward and forward, including the time before WWI and the time of foreign occupations (1940–1990). For the bulk of this time, Latvia was part of the Soviet centrally planned economy, where wages and most prices were administratively set. Hence, the estimation of rGDP in such economies faces additional methodological problems. Preferentially, these problems should be solved for all three Baltic countries at once, making a long-run comparison of cross-regional disparities possible for all of them during the last century. This would be an aim of further research, starting with this contribution.

Notes

1. To ensure comparability, we use our findings about Zemgale in its interwar limits.
2. Not including Riga.

Acknowledgements

The authors acknowledge the financial support from the Baltic Research Programme project 'Quantitative Data About Societal and Economic Transformations in the Regions of the Three Baltic States During the Last Hundred Years for the Analysis of Historical Transformations and the Overcoming of Future Challenges' (BALTIC100), project No. EEA-RESEARCH-174, under the EEA Grant of Iceland, Liechtenstein and Norway Contract No. EEZ/BPP/VIAA/2021/3. We also thank Ilmars Mežs for the research assistance.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Baltic Research Programme project 'Quantitative Data About Societal and Economic Transformations in the Regions of the Three Baltic States During the Last Hundred Years for the Analysis of Historical Transformations and the Overcoming of Future Challenges' [grant number EEZ/BPP/VIAA/2021/3].

Notes on contributors

Ola Honingdal Grytten is a professor in economic history at the Department of Economics, NHH Norwegian School of Economics in Bergen. His major fields of research are macroeconomic history, financial history, historical entrepreneurship, and labour market history. Currently, he is senior researcher at the international project BALTIC100: 'Quantitative Data About Societal and Economic Transformations in the Regions of the Three Baltic States During the Last Hundred Years for the Analysis of Historical Transformations and the Overcoming of Future Challenges'.

Zenonas Norkus is a professor of comparative historical sociology at the Institute of Sociology and Social Work, Faculty of Philosophy, Vilnius University. His most recent book publications are 'The Great Restoration: Post-Communist Transformations from the Viewpoint of Comparative Historical Sociology of Restorations' (Brill 2023) and 'Post-Communist Transformations in Baltic Countries, A Restorations Approach in Comparative Historical Sociology' (Springer 2023), and his most recent completed research project is on the comparative historical sociology of modern restorations.

Jurgita Markevičiūtė is a senior researcher at the Institute of Sociology and Social Work, Faculty of Philosophy, Vilnius University, and an associated professor at the Institute of Applied Mathematics, Faculty of Mathematics and Informatics, Vilnius University. Her research areas are probability theory and applications in statistics and econometrics; data science; applications of statistics and data science in sociology, social policy, history, medicine, and economics.

Jānis Šiliņš is a researcher at the Vidzeme University of Applied Sciences; and a researcher at the Latvian National Archives. His main research field is Latvian political and economical history of the early 20th century. His most recent book publication (co-authored with Gatis Krūmiņš, Ieva Bērziņa, Māris Andžāns, Anna Broka, Jānis Buholcs, Agnese Dāvidsone, et al) is 'How Not to Get Lost in the Future? The Role of Belonging and Participation in Strengthening a Democratic Society in Latvia' (2021, in Latvian).

ORCID

Ola Honningdal Grytten  <http://orcid.org/0000-0003-1416-0980>

Zenonas Norkus  <http://orcid.org/0000-0001-6364-0716>

Jurgita Markevičiūtė  <http://orcid.org/0000-0002-9653-7798>

References

- Auers, D., Spuriņš, U., Gubins, S., & Karnitis, E. (2019). *Reģionu konkurētspēja: Latvijas konkurētspējas ziņojums 2019*. Domnīca Certus.
- Badia-Miró, M., Guilera, J., & Lains, P. (2012a). Regional incomes in Portugal: Industrialisation, integration and inequality, 1890–1980. *Revista de Historia Económica / Journal of Iberian and Latin American Economic History*, 30(2), 225–244. doi:10.1017/S0212610912000080
- Badia-Miró, M., Guilera, J., & Lains, P. (2012b). *Reconstruction of the Regional GDP of Portugal, 1890–1980*. Documents de Treball. Facultat Economia i Empresa. Universitat de.
- Barro, R. J., & Sala-i-Martin, X. I. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 22(1), 107–182. doi:10.2307/2534639
- Barro, R. J., & Sala-i-Martin, X. I. (2003). *Economic growth*. The MIT Press.
- Bukowski, M., Koryś, P., Leszczyńska, C., & Tymiński, M. (2017). Rozwój regionalny ziem polskich pod zaborami. Porównanie poziomu produktu brutto per capita na dzisiejszych terenach Polski na przełomie XIX i XX w. (wyniki pierwszych estymacji). *Roczniki Dziejów Społecznych i Gospodarczych*, 77, 163–198.
- Bukowski, M., Koryś, P., Leszczyńska, C., Tymiński, M., & Wolf, N. (2019). Urbanization and GDP per capita: New data and results for the Polish lands, 1790–1910. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 52(4), 213–227. doi:10.1080/01615440.2019.1580171
- Bukšs, M. (1957). *Latgaļu literatūras vēsture*. Latgaļu izdevniecība.
- Bukšs, M. (1976/2012). *Latgaļu atmūda: idejas un ceļņas*. Latgales kultūras centra izdevniecība. (Original work published 1976)
- Buyst, E. (2010). Reversal of fortune in a small open economy: Regional GDP in Belgium, 1896–2000. *Rivista di Storia Economica*, 26(1), 75–92.
- Caruana-Galizia, P. (2013). Estimating French regional income: Departmental per capita gross value added, 1872–1911. In C. Hanes & S. Wolcott (Eds.), *Research in economic history 29* (pp. 71–95). Emerald Group Publishing Limited.
- Caruana-Galizia, P. (2015). *Economic development and market potential: European regional income differentials, 1870–1913* [PhD thesis]. The London School of Economics and Political Science (LSE). http://etheses.lse.ac.uk/3062/1/Caruana-Galizia_Economic_Development_and_Market_Potential.pdf
- Ceichners, A. (1929a). Rīgas pilsēta kā Latvijas saimnieciskais un kultūrālais centrs. *Ekonomists* Nr. 9 (01.05.1929), 380–388.
- Ceichners, A. (1929b). Atsevišķo apgabalu loma mūsu tautas saimniecībā. *Ekonomists* No. 18 (15.09.1929), 721–727.
- Ceichners, A. (1931). *Latvijas tautas bagātība un valsts saimnieciskās politikas iespāids uz tās attīstību*. Rīga. (Unpublished typescript copy available at the Latvian National Library in Riga).
- Ceichners, A. (1933). *Galvenās pārmaiņas Latvijas tautas saimniecībā un valsts saimnieciskā politikā 1930.-1932. krīzes gados (typescript)*. Library of the University of Latvia in Riga.
- Central Statistical Bureau of Latvia. (2023a). IKR010. Gross domestic product by region and city (at current prices). Official Statistics Portal. Retrieved December 9, 2023, from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__VEK__IK__IKR/IKR010/
- Central Statistical Bureau of Latvia. (2023b). RIG040. Population in regions, cities, municipalities, towns, rural territories (based on the boundaries in force at the beginning of 2023), neighbourhoods and densely populated areas by ethnicity (experimental statistics) 2000–2022. Retrieved August 16, 2023, from https://data.stat.gov.lv/pxweb/en/OSP_PUB/START__POP__IR__IRE/RIG040/table/tableViewLayout1/

- Crafts, N. (2005). Regional GDP in Britain: Some estimates. *Scottish Journal of Political Economy*, 52(1), 54–64. doi:10.1111/j.0036-9292.2005.00334.x
- Enflo, K. (2014). Finland's regional GDPs 1880–2010: Estimates, sources, and interpretations (Lund Papers in Economic History. General Issues; No. 135). Department of Economic History, Lund University. https://lucris.lub.lu.se/ws/files/18258181/2014_135.pdf
- Enflo, K. (2019). Balancing east and west. Evidence from Finland's regional GDPs, 1880–2010. In J. R. Rosés & N. Wolf (Eds.), *The economic development of Europe's regions. A quantitative history since 1900* (pp. 103–128). Routledge.
- Enflo, K., Henning, M., & Schön, L. (2010). Swedish regional GDP 1855–2000: Estimations and general trends in the Swedish regional system. *Research in Economic History*, 30, 47–89. doi:10.1108/S0363-326820140000030000
- Enflo, K., & Missiaia, A. (2018). Regional GDP estimates for Sweden, 1571–1850. *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 51(2), 115–137. doi:10.1080/01615440.2018.1429971
- Enflo, K., & Rosés, J. R. (2015). Coping with regional inequality in Sweden: Structural change, migrations, and policy, 1860–2000. *The Economic History Review*, 68(1), 191–217. doi:10.1111/1468-0289.12049
- Eurostat. (2023). Gross domestic product (GDP) at current market prices by NUTS 3 regions. Retrieved December 9, 2023, from https://ec.europa.eu/eurostat/databrowser/view/nama_10r_3gdp/default/table?lang=en
- Feinstein, C. F., Temin, P., & Toniolo, G. (1997). *The European economy between the wars*. Oxford UP.
- Felice, E. (2011). Regional value added in Italy, 1891–2001, and the foundation of a long-term picture1. *The Economic History Review*, 64(3), 929–950. doi:10.1111/j.1468-0289.2010.00568.x
- Felice, E. (2012). Regional convergence in Italy, 1891–2001: Testing human and social capital. *Cliometrica*, 6(3), 267–306. doi:10.1007/s11698-011-0076-1
- Fujita, M., Krugman, P., & Venables, A. (1999). *The spatial economy: Cities, regions, and international trade*. The MIT Press.
- Geary, F., & Stark, T. (2002). Examining Ireland's post-famine economic growth performance. *The Economic Journal*, 112(482), 919–935. doi:10.1111/1468-0297.00064
- Geary, F., & Stark, T. (2016). What happened to regional inequality in Britain in the twentieth century? *The Economic History Review*, 69(1), 215–228. doi:10.1111/ehr.12114
- Grytten, O. H. (2022). Revising growth history: New estimates of GDP for Norway, 1816–2019. *The Economic History Review*, 75(1), 181–202. doi:10.1111/ehr.13085
- Grytten, O. H., Norkus, Z., Markevičiūtė, J., & Šiliņš, J. (2022). Can the economic growth of interwar Latvia be estimated by contemporary national accounts? *Baltic Journal of Economics*, 22(2), 90–109. <https://doi.org/10.1080/1406099X.2022.2097370>
- Gulian, P. V. (1982). *Latvija v sisteme narodnogo hoziajstva SSSR* (2nd ed.). Zinatne.
- Henning, M., Enflo, K., & Andersson, F. N. G. (2011). Trends and cycles in regional economic growth: How spatial differences shaped the Swedish growth experience from 1860–2009. *Explorations in Economic History*, 48(4), 538–555. doi:10.1016/j.eeh.2011.07.001
- Janisse, K. A., Jensen, P. S., Radu, C. V., & Sharp, P. R. (2019). Regional GDP in Denmark, 1850–2010. In J. R. Rosés & N. Wolf (Eds.), *The economic development of Europe's regions. A quantitative history since 1900* (pp. 85–102). Routledge.
- Kebza, M., Nováček, A., & Popjaková, D. (2019). Socio-economic disparities in the Baltic States: Analytical comparison and categorisation of the regions. *Geographia Polonica*, 92(3), 289–307. <https://doi.org/10.7163/GPol.0150>
- Keišs, S., & Kazinovskis, A. (2014). *Reģionālā attīstība Latvijā: administratīvi teritoriālās reformas norises gaita, problēmas, risinājumi*. Vītola izdevniecība.
- Klimantas, A. (2023). Lithuanian economy, 1919–1940: Stagnant but resilient. The first inter-war GDP time-series estimates and their implications. *Scandinavian Economic History Review*, doi:10.1080/03585522.2023.2259909
- Klimantas, A., Norkus, Z., Markevičiūtė, J., Grytten, O., & Šiliņš, J. (2023). Reinventing Perished Belgium of the East: New estimates of GDP for Inter-war Latvia (1920–1939). *Cliometrica*, doi:10.1007/s11698-023-00275-y.

- Krastiņš, O., & Vanags, E. (Eds.). (2005). *Dažādā Latvija: pagasti, novadi, pilsētas, rajoni, reģioni: vērtējumi, perspektīvas, vīzijas*. Latvijas Statistikas institūts.
- Krugman, P. (1991). *Geography and trade*. Leuven UP.
- Krugman, P. (1999). *Development, geography, and economic theory*. The MIT Press.
- Kukić, L. (2020). Origins of regional divergence: Economic growth in socialist Yugoslavia. *The Economic History Review*, 73(4), 1097–1127. doi:10.1111/ehr.12967
- LSHA (Latvian State Historical Archive; *Latvijas Valsts vēstures arhīvs*). (n.d.). 1308, inv. 11, file 18920 (Ceichners, A. "Latgales saimnieciskā dzīve").
- Lust, K. (2007). Agricultural labourers and their wages in Estland in 1885–1913. *Ajalooline Ajakiri*, 3/4 (121/122), 393–410.
- Maddison Project Database (MPD), version 2020.
- Malahovskis, V. (2014). *Mērieku laiki Latgalē (20. gadsimta 20. gadi)*. Latgales druka.
- Martínez-Galarraga, J., Rosés, J. R., & Tirado, D. A. (2015). The long-term patterns of regional income inequality in Spain, 1860–2000. *Regional Studies*, 49(4), 502–517. doi:10.1080/00343404.2013.783692
- Nacionālā enciklopēdija: Latvija*. (2018). Latvijas Nacionālā bibliotēka.
- Norkus, Z. (2018). First calculations of the total output of Latvia and Lithuania in the 1920s: A comparison. *Journal of Baltic Studies*, 49(2), 241–261. doi:10.1080/01629778.2016.1266503
- Norkus, Z., Ambrulevičiūtē, A., Markevičiūtē, J., Morkevičius, V., & Žvaliauskas, G. (2021). Population of Cities and Towns in Latvia (within Interwar Borders), 1897–1939. Lithuanian Data Archive for HSS (LiDA), V3. <https://hdl.handle.net/21.12137/Y7GYKI>
- Norkus, Z., & Markevičiūtē, J. (2021). New estimation of the gross domestic product in Baltic countries in 1913–1938. *Cliometrica*, 15(3), 565–674. doi:10.1007/s11698-020-00216-z
- Norkus, Z., Markevičiūtē, J., Grytten, O. H., Šiliņš, J., & Klimantas, A. (2024). Benchmarking Latvia's economy: A new estimate of gross domestic product in the 1930s. *Cliometrica*, 18, 251–325. doi:10.1007/s11698-022-00260-x
- Organisation for Economic Co-operation and Development. (2022). *Regions and cities at a glance 2020 – country note Latvia*. <https://www.oecd.org/cfe/Latvia-Regions-and-Cities-2020.pdf>
- Plakans, A. (2011). Regional identity in Latvia: The case of Latgale. In M. Housden & D. J. Smith (Eds.), *Forgotten pages in Baltic history: Diversity and inclusion* (pp. 49–70). Rodopi B. V.
- Pridham, G. (2018). Latvia's eastern region: International tensions and political system loyalty. *Journal of Baltic Studies*, 49(1), 3–20. doi:10.1080/01629778.2017.1413408
- Račko, E., & Voronovs, V. (2014). *Latvijas reģionu konkurētspējas novērtējums*. Daugavpils Universitātes Akadēmiskais apgāds "Saule".
- Rīgas pilsētas statistikas birojs. (1927). *Rīgas pilsētas statistiskā gada grāmata 1925–1926*. Rīgas pilsētas statistiskā valde.
- Rosés, J. R., & Wolf, N. (Eds.). (2019). *The economic development of Europe's regions. A quantitative history since 1900*. Routledge.
- Schulze, M. S. (2019). From empire to Republic: Regional inequality in Austria, 1870–2014. In J. R. Rosés & N. Wolf (Eds.), *The economic development of Europe's regions. A quantitative history since 1900* (pp. 42–68). Routledge.
- Šneidere, I. R. (1989). *Socialističeskaja industrializacija v Latvii. Khod, itogi, problemy*. Zinatne.
- Solow, R. M. (1970). *Growth theory: An exposition*. Oxford UP.
- Tirado, D. A., Díez-Minguela, A., & Martínez-Galarraga, J. (2016). Regional inequality and economic development in Spain, 1860–2010. *Journal of Historical Geography*, 54, 87–98. doi:10.1016/j.jhg.2016.09.005
- Tirado-Fabregat, D. A., & Badia-Miró, M. (2014). New evidence on regional inequality in Iberia (1900–2000). *Historical Methods: A Journal of Quantitative and Interdisciplinary History*, 47(4), 180–189. doi:10.1080/01615440.2014.955232
- United Nations. (2009). *The system of national accounts 2008*. Retrieved February 17, 2023. <http://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf>
- Valge, J. (2003). Uue majanduse lätteil. Eesti sisemajanduse kogutoodang aastatel 1923–1938. *Akadeemia* 10–12: 2202–28; 11:2443–87; 12:2712–35.

- Vanags, J., Geipele, I., Grizāns, J., Auziņš, A., Geipele, S., & Stāmure, I. (2012). *Pilsētu un reģionu attīstības mijiedarbības sociāli ekonomiskie aspekti*. Rīgas Tehniskā universitāte.
- Williamson, J. G. (1965). Regional inequality and the process of national development: A description of the patterns. *Economic Development and Cultural Change*, 13(4-2), 1–84. doi:[10.1086/450136](https://doi.org/10.1086/450136)
- Wolf, N. (2019). Regional economic growth in Germany, 1895–2010. In J. R. Rosés & N. Wolf (Eds.), *The economic development of Europe's regions. A quantitative history since 1900* (pp. 149–176). Routledge.
- Zeile, P. (2006). *Latgales kultūras vēsture: no akmens laikmeta līdz mūsdienām*. Latgales Kultūras centra izdevniecība.

Appendices

Appendix 1. Employment in Latvian regions (contemporary and interwar borders) by sectors

NUTS-Codes	Region	1925				1930				1935			
		Agriculture	Industry	Services	Total	Agriculture	Industry	Services	Total	Agriculture	Industry	Services	Total
Contemporary Latvian regions													
LV06	Rīga	5358	63457	102403	171218	6081	85392	117750	209223	6760	90699	106858	204317
LV07	Pierīga	78700	9036	6294	94030	79094	11548	10057	100699	77713	10934	9614	98261
LV08	Vidzeme	172419	17246	13966	203631	171161	18531	17877	207569	160146	17460	17196	194802
LV03	Kurzeme	123169	22090	26541	171800	124123	26536	30640	181299	120194	25711	27916	173821
LV09	Zemgale	94642	10814	12298	117754	96988	13249	16066	126303	94446	14854	15609	124909
LV05	Latgale	322817	14301	27841	364959	342545	15620	32485	390650	345730	17872	32805	396407
LV000	Latvia	797105	136944	189343	1123392	819992	170876	224875	1215743	804989	177530	209998	1192517
Interwar Latvian regions													
Na	Rīga	5358	63457	102403	171218	6081	85392	117750	209223	6760	90699	106858	204317
Na	Vidzeme	228823	24208	18367	271398	227054	27451	25130	279635	215010	25676	24170	264856
Na	Kurzeme	123169	22090	26541	171800	124123	26536	30640	181299	120194	25711	27916	173821
Na	Zemgale	147136	14441	15569	177146	149727	17996	20688	188411	148002	19872	20060	187934
Na	Latgale	292619	12748	26463	331830	313007	13501	30667	357175	315023	15572	30994	361589
Na	Latvia	797105	136944	189343	1123392	819992	170876	224875	1215743	804989	177530	209998	1192517

Source: Valsts statistiskā pārvalde (1925). Otrā tautas skaitīšana Latvijā: 1925. g. 10. Februāri. Rīga: Valtera un Rapas akc. sab. spiestuve (1925); Latvian State Historical Archive, f. 1308, inv. 6 apraksts, files 2364-2383 (1935). Valsts statistiskā pārvalde (1939). Ceturtā tautas skaitīšana Latvijā 1935. gadā. Rīga: Valsts statistiskā pārvalde.

Appendix 2. Nominal daily wages and rye prices (in Lats at current prices) in interwar Latvian regions

Region	1925				1930				1935			
	Agriculture	Manufacturing	Services	Rye prices (100 kg)	Agriculture	Manufacturing	Services	Rye prices (100 kg)	Agriculture	Manufacturing	Services	Rye prices (100 kg)
Rīga	3.33	3.75	3.72	34.00	3.27	4.78	4.67	18.08	2.07	3.95	3.82	16.37
Vidzeme	3.33	3.73	3.37	31.85	3.27	3.85	3.33	18.90	2.07	2.98	2.17	13.90
Kurzeme	2.81	3.53	2.92	28.65	3.13	3.83	3.25	16.94	2.04	2.88	2.19	14.01
Zemgale	3.06	3.53	3.10	28.70	2.97	4.28	3.11	16.98	1.98	2.80	2.08	12.91
Latgale	2.55	3.25	2.58	30.02	2.61	3.65	2.65	15.75	1.70	2.63	1.74	12.99
Latvia	3.06	3.55	3.13	29.78	3.13	3.90	3.26	17.20	2.00	2.80	2.14	13.57

Sources: Agriculture: Fridbergs A. Skuja J. (Eds) (1939) *Lauksaimniecības rentabilitāte 1935/36., 1936/37. un 1927/37. saimniecības gada*. Rīga: Valsts statistiskā pārvalde. Manufacturing: Baltais J., Salnais V. (eds) (1931) *Darba Statistika 1930* (1925 and 1930); Baltais J., Salnais V. (eds) (1936) *Darba Statistika 1935* (1935). Services: own calculations. Rye prices: Rīgas pilsētas statistikas birojs, 1927 (1925); Baltais J., Salnais V. (eds) 1931 *Darba Statistika 1930* (1930); Baltais J., Salnais V. (eds) (1936) *Darba Statistika 1935* (1935).

Appendix 3. Real daily wages (in Lats at current prices) in Latvian regions (according to contemporary and interwar borders) by sectors

NUTS-Codes	Region	1925				1930				1935			
		Agriculture	Manufacturing	Services	Mean	Agriculture	Manufacturing	Services	Mean	Agriculture	Manufacturing	Services	Mean
		Contemporary Latvian regions											
LV06	Riga	3.33	3.75	3.72	3.60	3.27	4.78	4.67	4.24	2.07	3.95	3.82	3.28
LV07	Pieriga	3.57	4.02	3.62	3.74	3.14	3.88	3.23	3.42	2.46	3.52	2.59	2.85
LV08	Vidzeme	3.55	3.98	3.59	3.71	3.13	3.68	3.18	3.33	2.44	3.50	2.54	2.83
LV03	Kurzeme	3.33	4.18	3.46	3.66	3.34	4.08	3.47	3.63	2.38	3.36	2.56	2.77
LV09	Zemgale	3.63	4.18	3.68	3.83	3.16	4.55	3.33	3.68	2.51	3.55	2.65	2.90
LV05	Latgale	2.89	3.68	2.92	3.16	3.00	4.19	3.05	3.41	2.14	3.31	2.20	2.55
LV000	Latvia	3.49	4.05	3.58	3.71	3.29	4.10	3.43	3.61	2.41	3.38	2.59	2.79
	Interwar Latvian regions												
Na	Riga	3.33	3.75	3.72	3.60	3.27	4.78	4.67	4.24	2.07	3.95	3.82	3.28
Na	Vidzeme	3.55	3.98	3.60	3.71	3.13	3.68	3.19	3.33	2.44	3.50	2.55	2.83
Na	Kurzeme	3.33	4.18	3.46	3.66	3.34	4.08	3.47	3.63	2.38	3.36	2.56	2.77
Na	Zemgale	3.63	4.18	3.67	3.83	3.16	4.55	3.31	3.68	2.51	3.55	2.63	2.90
Na	Latgale	2.89	3.68	2.92	3.16	3.00	4.19	3.05	3.41	2.14	3.31	2.20	2.55
Na	Latvia	3.49	4.05	3.58	3.71	3.29	4.10	3.43	3.61	2.41	3.38	2.59	2.79

Source: the same as for Appendix 2.

Appendix 4. Regional GDP of interwar Latvia, 1925–1935, within contemporary NUTS3 and interwar region borders at constant 1935 prices (estimates based on cross-regional differences in nominal wages)

	1925		1930		1925–1930, annual growth GDPpc %	1935		1930–1935, annual growth GDPpc %	1925–1935, annual growth GDPpc%
	Total, mil. Ls	Per capita, Ls	Total, mil. Ls	Per capita Ls		Total, mil. Ls	Per capita. Ls		
Contemporary Latvian NUTS regions									
LV06 Riga	301.39	892.49	423.84	1121.52	4.67	467.70	1214.61	1.61	3.13
LV07 Pierīga	53.51	378.94	64.76	429.32	2.53	72.32	464.87	1.60	2.06
LV08 Vidzeme	117.23	384.81	127.47	428.61	2.18	139.94	472.24	1.96	2.07
LV03 Kurzeme	111.77	389.92	135.78	471.30	3.86	144.26	492.91	0.90	2.37
LV09 Zemgale	69.54	379.55	82.24	433.21	2.68	93.10	472.41	1.75	2.21
LV05 Latgale	157.26	265.92	181.70	304.90	2.77	222.28	356.33	3.17	2.97
LV000 Latvia	810.70	439.45	1015.79	534.62	4.00	1139.60	584.26	1.79	2.89
Interwar Latvian regions									
Na Riga	301.10	891.62	423.42	1120.39	4.67	467.38	1213.77	1.61	3.13
Na Vidzeme	156.03	385.43	174.53	431.13	2.27	191.92	472.41	1.85	2.06
Na Kurzeme	111.43	388.72	135.46	470.20	3.88	143.83	491.47	0.89	2.37
Na Zemgale	98.55	357.14	116.31	403.75	2.48	134.12	448.00	2.10	2.29
Na Latgale	143.59	266.07	166.07	306.89	2.90	202.36	356.79	3.06	2.98
Na Latvia	810.70	439.45	1015.79	534.62	4.00	1139.60	584.26	1.79	2.89

Sources: Own calculation.