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Abstract

This article leverages uniquely abundant town-level data to examine spatial inequality in prices and wages during the First Globalisation. I build a new dataset on prices of traded and household goods, and wages of skilled and unskilled workers for a panel of 42 towns in Serbia, in the period from 1863 to 1910. I apply the welfare ratio approach to calculate real wages of day labourers and masons. I find strong convergence in grain prices and costs of living, but divergence in wages, both nominal and real. I estimate panel-data models to explore drivers of inter-urban differences in prices and wages. The main results suggest that falling transport costs decreased price gaps, whereas rising population differences increased wage gaps. The findings are consistent with theoretical predictions of new economic geography and urban economics.

JEL Codes: N33, N73, N93

Keywords: market integration, grain prices, real wages, Serbia, pre-1913

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I Introduction

The first age of globalisation in the late 19th century was characterised by falling transport costs and the rapid integration of global commodity and factor markets.¹ In their seminal work, O'Rourke and Williamson demonstrated that a significant share of late 19th-century international wage convergence can be explained by commodity-price convergence.² Their findings lend support to Heckscher-Ohlin's factor-price-convergence theorem.³ Subsequent research on factor-price convergence within countries produced mixed results. Sweden, a small open economy, stands out as a rare empirical example that recorded price and wage convergence.⁴ In the US, in England and Wales, and in large peripheral economies, such as Austria-Hungary, Italy, or India, prices converged between provinces or regions, but wages did not.⁵ These findings are more in line with New Economic Geography predictions that falling transport costs may increase wage inequality.⁶ Still, few papers simultaneously examined convergence in both commodity and labour markets. One of the key challenges is that, ideally, data should be available for both prices and wages for identical commodities and types of workers across the same localities over a sufficiently long period of time during which convergence may occur.

This article leverages uniquely abundant town-level data to examine spatial inequality in prices and wages during the First Globalisation. I build a new dataset on prices of traded and household goods, and wages of skilled and unskilled workers for a panel of 42 towns in Serbia, in the period from 1863 to 1910. I apply the welfare ratio approach to calculate real wages of day labourers and masons. I find strong convergence in grain

¹O'Rourke and Williamson, *Globalization and History*; Daudin, O'Rourke, and Morys, 'Globalization'.

²See O'Rourke and Williamson 'Late nineteenth-century' for the Anglo-American case, and O'Rourke, Taylor, and Williamson 'Factor price' for the Old and New World.

³See Ohlin, *Interregional and international trade*, and Samuelson, 'International trade', on theory of factor-price equalisation.

⁴Enflo, Lundh, and Prado, 'Role of migration'; Prado, Lundh, Collin, and Enflo, 'Labour'.

⁵Slaughter ('Does trade liberalization') examined factor-price convergence in antebellum US, and Collins ('Labor mobility, market integration, and wage convergence') in colonial India. Boyer and Hatton ('Migration and labour market integration') studied migration and labour market integration in late-nineteenth century England and Wales. See Schulze and Wolf ('Origins of border effects'; 'Economic nationalism and economic integration') and Cvrcek ('Wages, prices, and living standards') for Austria-Hungary. See Federico ('Market integration and market efficiency') and Federico, Nuvolari, and Vasta ('Origins of the Italian regional divide') for nineteenth century Italy.

⁶Krugman, 'Increasing returns'; Fujita, Krugman, and Venables, *Spatial economy*; Fujita and Thisse, *Economics of agglomeration*; and Lafourcade and Thisse, 'New economic geography'.

prices and subsistence costs of living, but divergence in skilled and unskilled wages, both nominal and real. The findings are in line with theoretical predictions of New Economic Geography models, but offer little support for Hecksher-Ohlin predictions on factor-price equalisation. I then estimate panel-data models to explore factors driving inter-urban differences in prices and wages. I find that falling transport costs were the main factor behind price convergence, while rising population differences between towns increased wage gaps.

My findings have great relevance to different traditions of scholarship in economic history. First, I contribute to the literature that explores factor-price equalisation in a historical setting.⁷ While most articles have so far studied factor-price convergence between large regions or within relatively large economies, I examine convergence within a comparatively small country.⁸ The long-term divergence of nominal and real wages within Serbia stands in contrast to the convergence found in Sweden, and is more in line with the lack of convergence in larger and more populous countries such as the US, Austria-Hungary, Italy, and India. This suggests that the case of Sweden cannot be generalised to hold in small open economies, and that wage convergence can equally elude both large and small countries.

Second, I contribute to the extensive literature on market integration. The integration of national commodity markets, including price convergence, is well documented.⁹ We know much less, however, about wage convergence.¹⁰ My research demonstrates that price and wage integration need not point in the same direction. I find that, in spite of a significant decline in the dispersion of grain prices and subsistence costs, inter-urban differences in both nominal and real wages were increasing. Moreover, I provide an econometric exploration of both price and wage gap determinants. The results are in

⁷See, for example, O'Rourke and Williamson 'Late nineteenth-century', O'Rourke, Taylor, and Williamson 'Factor price', Collins, 'Labor mobility, market integration, and wage convergence', and Slaughter, 'Does trade liberalization'.

⁸With approximately 2.5 million inhabitants and an area of 48,000 km² in 1900, Serbia was roughly 13 times less populous and 6 times smaller than the Kingdom of Italy.

⁹Federico, 'Market integration', surveys the recent literature. See Federico, Schulze, and Volckart, 'European goods market integration', for latest long-run estimates, and Federico, 'How much do we know', for an earlier literature review.

¹⁰Federico, 'Market integration', p. 635.

line with empirical studies stressing the importance of transport costs for grain market integration as well as with a large literature in urban economics that explains higher wages in more populated areas with agglomeration effects.¹¹

Third, I contribute to the vast historical literature on real wages. Allen's pioneering welfare ratio approach has often been applied to estimate real wages of urban labourers in the past.¹² Milanović and Mijatović have recently estimated national welfare ratios for Serbia.¹³ I develop new series of welfare ratios for many towns within Serbia. My new, town-level estimates reveal large spatial variation for both skilled and unskilled workers. Belgrade, the capital and most populous city in Serbia, regularly performed better than the national average. This implies that available (unweighted) national welfare ratios underestimate living standards in Serbia. My new series offer Belgrade as a natural benchmark for comparison with other cities around the world.

Lastly, I contribute to the fast-growing literature in the quantitative economic history of Central and South-East Europe. Recent studies of the period before the First World War have estimated economic growth, living standards and market integration in Austria-Hungary, national welfare ratios in Serbia, reconstructed Serbian GDP, re-examined industrialisation in Bulgaria, and explored business cycles in the region.¹⁴ In this article, I present the first spatial analysis of price and wage inequality in South-East Europe and place the results in an international comparative perspective.

¹¹For the latter, see Rosenthal and Strange, 'Agglomeration economies', Puga, 'Magnitude and causes of agglomeration economies', Combes and Gobillon, 'Empirics of agglomeration economies', and Duranton and Puga, 'Economics of urban density'.

¹²See Allen, 'Great divergence', for real wages in many European cities from the Middle Ages to the First World War, and Özmucur and Pamuk, 'Real wages', for real wages in Istanbul and other cities in the Ottoman Empire in the same period. For real wages in the period from the eighteenth until the early twentieth century, see Allen et al., 'Wages, prices, and living standards', for cities in the Chinese Yangtze Delta, and Bassino and Ma, 'Japanese unskilled wages', for Kyoto and Tokyo. Other, more recent, real wages studies include Federico, Nuvolari, and Vasta, 'Origins of the Italian regional divide', for 69 Italian provinces before the First World War; Cvrcek, 'Wages, prices, and living standards', for 21 Austro-Hungarian provinces; Cha, 'Unskilled wage gaps', for 11 cities in Imperial Japan; and Allen and Khaustova, 'Russian Real Wages', for several Russian cities from 1853 to 1937.

¹³Milanović and Mijatović, 'Real urban wage'.

¹⁴Good and Ma, 'Economic growth of Central and Eastern Europe'; Schulze, 'Patterns of growth' and 'Regional income dispersion'; Schulze and Wolf, 'Origins of border effects', and 'Economic nationalism and economic integration'; Cvrcek, 'Wages, prices, and living standards'; Milanović and Mijatović, 'Real urban wage'; Mijatović and Zavadžil, 'Serbia on the path to modern economic growth'; Ivanov and Kopsidis, 'Industrialisation in a small grain economy'; Morys, 'Emergence of a European region', and 'Has Eastern Europe'. For a recent handbook on the economic history of the region see Morys, *Economic history of Central, East and South-East Europe*.

The next section gives a brief introduction on Serbia's history, geography, and economy in the period under study. Section III describes the data and sources, explains the calculation of costs of living and welfare ratios, and presents how they evolved over time. In section IV, I estimate trends in dispersion of prices and wages and statistically test for convergence. In section V, I explore econometrically what might explain these spatial patterns in prices and wages. I then test the robustness of the econometric results and evaluate the role of migration in section VI. Section VII concludes.

II Historical background

State formation. Serbia fell under the Ottoman Empire in the fifteenth century and only gradually regained its independence during the nineteenth century. The Serbian revolution (1804-1835) involved two armed uprisings (1804-1813, 1815-1817) followed by a peaceful consolidation of political power that resulted in an autonomous and enlarged Serbian principality under Ottoman suzerainty. Serbia's de facto independence ensued in 1867, following the withdrawal of Ottoman garrisons from the principality. In 1878, the Congress of Berlin formally recognised Serbian independence and confirmed the territorial gains toward the south-east that Serbia had previously made against the Ottoman Empire (1876–1878). The Serbian Kingdom was proclaimed in 1882. In November of 1885, Serbia fought and lost a war against Bulgaria. After the Balkan Wars (1912-1913), by the Treaty of Bucharest (1913), Serbia further expanded its territory southwards.

Geography. Figure 1 illustrates Serbia's borders and geography. The Sava and Danube formed Serbia's border with Austria-Hungary to the north and with Romania to the north-east. The Balkan mountain range separated Serbia from its eastern neighbour Bulgaria and the Ottoman territory in the South. The Drina river made-up most of the western border with Bosnia (which had been jointly administered by Vienna and Budapest since 1878 and annexed in 1908 to the Austro-Hungarian Empire). The Dinaric Alps determined the border with Ottoman territory which extended diagonally from the south-west to the south. The average mean altitude of the outlined area is almost 490 m.

The overall relief of Serbian territory gradually flattens towards the north, so that most major rivers flow into the navigable Sava and Danube.¹⁵ Central Serbia, northern Serbian plains and the Morava Valley were the most fertile parts of Serbia.¹⁶

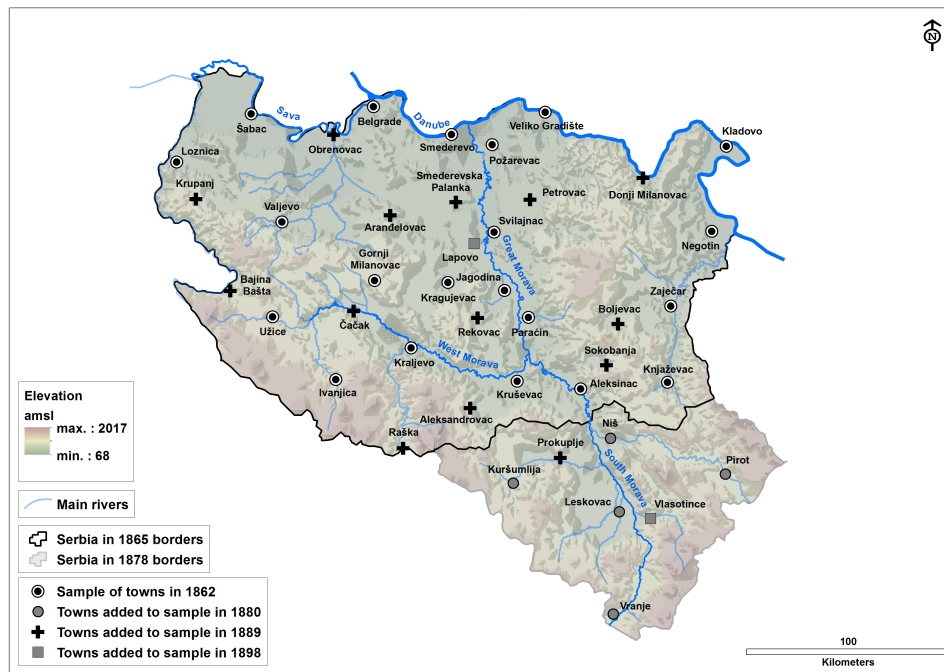


Figure 1: Serbia: geography, borders, and sample towns

Notes: Figure illustrates Serbia's physical geography, its borders in 1865 and 1878, and sample towns by date they enter the dataset.

Sources: own illustration.

Population. The Serbian population grew throughout the long-nineteenth century. From 1866 to 1910, according to population censuses, total population had more than doubled from 1,2 million to 2,9 million, growing at almost 2% per year. Natural increase, immigration from neighbouring regions (up to 1880), and territorial expansion (in 1878) contributed to population growth.¹⁷ This necessitated a transition from extensive livestock farming to extensive arable farming.¹⁸ The area used for field cultivation more than quintupled between 1847 and 1910. Land surveys consistently found that well over 90% of the total arable land was used for grain production, primarily corn and wheat.¹⁹

¹⁵The rivers inland were either not navigable or not regulated; see Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 508.

¹⁶Central Serbia or *Šumadija* is the area between the Great Morava, Western Morava, and smaller river valleys in west.

¹⁷Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 59.

¹⁸Ibid., p. 22.

¹⁹Ibid., p. 25.

Urban growth. Urban population grew, too. The law on administrative division distinguished between villages and urban settlements. Accordingly, census returns reveal that the urbanisation rate increased from 9.5% in 1866 to 14.1% in 1900. Urban settlements were further distinguished by law into towns (*varoš*) and townlets (*varošica*). This distinction was based on the extent of administrative privileges and was not determined by population size.²⁰ The number of urban settlements with town status increased from 17 in 1866 to 24 already by 1890 and subsequently remained unchanged. From 1866 to 1910, the number of townlets tripled, increasing from 21 to 62.²¹

Urban economy. The urban economy fundamentally differed from the countryside. In rural areas, a negligible 3% of the population lived from non-agricultural work in 1866, and their share increased only to 5.5% by 1900. By contrast, in 1866, 74% of the urban population earned a living outside of agriculture, and their share increased to 78.7% by the turn of the century.²² Importantly, the share of non-agricultural occupations in urban settlements varied across space. The labour force of the most populous towns (e.g. Belgrade, Niš, Kragujevac) was almost exclusively active in manufacturing and services. In smaller towns, however, the picture was more mixed. Most reported high shares of non-agricultural occupations, but some townlets remained largely dependent on agriculture even by 1900.²³

Masons. At the beginning of the 20th century there were about 100 registered urban trades in Serbia.²⁴ Masons represented an important skilled urban occupation.²⁵ By law, masonry was part of the guild system.²⁶ Masons were skilled workers, either master craftsmen or journeymen, who passed the appropriate guild exam. They were employed

²⁰Čalić, *Socijalna istorija Srbije 1815-1941*, p. 179.

²¹Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 93.

²²Ibid., p. 178.

²³See *Popis stanovništva u Kraljevini Srbiji 31. decembra 1900*, Volume I.

²⁴About 30% of all craftsmen at the time were engaged in the manufacture of clothing and footwear, 22% in the processing of iron and steel, 11% in woodworking, and 9% in construction. The remaining 28% was spread across other industries; see Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 286.

²⁵The term used in Serbian sources is 'zidar', which translates to bricklayer or mason. While bricklayers and masons may differ in terms of skills or type of material they work with (e.g. clay brick vs stone) the Serbian language does not differentiate between the two.

²⁶The guild and trade law of 1847 defined guild and non-guild trades. The law, with subsequent amendments in 1849 and 1853, was only replaced by a new trade code in 1911; see Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 227. See also Vučo, *Raspadanje esnafa*, vols. 1-2, on the guild system in Serbia.

on public works and built affluent private houses for urban dwellers using their own tools. Villagers could rarely afford to hire masons and instead built their own houses, which resulted in poor quality housing in the countryside.

Masons were unevenly distributed across Serbia. Building skills were first imported to southern Serbia, and from there gradually diffused to the eastern parts of the country.²⁷ Natives obtained building skills from Macedonian immigrants, who built and painted churches and other buildings. Some also acquired skills from Italian masons during the construction of the Ottoman railways south of Niš. Workers from a village in the south, Crna Trava, were reportedly first to have developed building trades. They subsequently achieved the reputation of being the most highly skilled in this work. Masons from this region were well known seasonal migrants. From spring until the fall, they would migrate, often in groups, in search of work both within Serbia and across the border into neighbouring Bulgaria.²⁸

Day labourers. Agrarian reforms of the 1830s, following Serbia's autonomy from the Ottomans, freed peasants, created an egalitarian land distribution, and guaranteed property rights.²⁹ Farmers owned their land, but most farms were very small. According to the agricultural census of 1897, around 55% of farms were smaller than five hectares. An often cited rural survey conducted in 1908-10 claimed that more than two-thirds of households had insufficient land to sustain even the smallest family.³⁰ The survey revealed that households with less than five hectares of land recorded budget deficits. For these households, between a third and a half of income had to come, not from land or cattle, but from additional, wage earnings. Many unskilled, agricultural workers hence offered their labour on urban markets.

A distinction should be made between urban and rural day labourers. Urban day labourers owned little or no land. They resided and worked in towns. Rural day labourers lived in villages and owned insufficient land to support their household. Day labouring in

²⁷See Palaret, 'Influence of commerce', pp. 548-69, on construction trades and seasonal migration.

²⁸Seasonal migrants in general were called 'pečalbari'. Construction workers were specifically referred to as 'dundjeri'.

²⁹Sundhaussen, *Historische Statistik Serbiens 1834-1914*, p. 194.

³⁰Avramović, *Naše seljačko gazdinstvo*, p. 17; Čalić, *Socijalna istorija Srbije 1815-1941*, p. 165.

the countryside was exclusively related to agriculture and had a strong seasonal character.³¹ By contrast, urban day labourers offered services throughout the year across different sectors; they could work in agriculture, but also in construction or other trades. Crucially, rural day labourers worked for food, whereas urban day labourers also received cash. In 1866, 7.7% of the urban labour force consisted of day labourers.³² In 1910, the share of urban day labourers increased to 8.4%.³³

III Data

Dataset. I compiled a new dataset on wages and prices spanning 42 towns across Serbia in the period 1862-1910.³⁴ Variables include wages of day labourers and masons, and prices of key traded and household goods.³⁵ I collected wholesale prices of the two most common grains in Serbia: maize and wheat.³⁶ For household goods, I include retail prices of eight foodstuffs (maize flour, bread, beans, pork, butter, cheese, eggs, and wine) as well as other items used for cleaning, clothing, lighting, and heating (soap, flax, tallow, and charcoal). Constructing the dataset required collecting more than 120,000 data points.³⁷

Sources. The data come from official publications of Serbian statistical authorities. On 18 April 1862, Prince Mihailo Obrenović ordered the Economic Department of the Ministry of Finance to regularly collect and publish statistical data. This legal act marks the beginning of official statistics in Serbia. On 27 June of the same year, the Ministry instructed town court officials to observe and record wages and prices on local markets

³¹On agricultural day labouring, see Palairt, ‘Influence of commerce’, pp. 539-47.

³²Calculated from occupational statistics reported in *Državopis Srbije*, vol. XIII.

³³Calculated from the population census; *Popis stanovništva u Kraljevini Srbiji 31. decembra 1900*.

³⁴I collected data from July 1862 but start the analysis from 1863, which is the first year with complete coverage. The sources report wages and prices as monthly averages in the period 1862-87, and both as monthly and annual averages in the period 1888-1910. When available, I collected annual averages. Otherwise, I calculated annual averages from reported monthly data.

³⁵The sources do not differentiate wages by gender. From the population census of 1900, we know that all masons and 80% of urban day labourers were male. At the same time, practically all masons and 95% of day labourers were above 20 years of age. Hence, the recorded wages primarily represent the remuneration of adult male workers. See *Popis stanovništva u Kraljevini Srbiji 31. decembra 1900*, Volume II, pp. 643, 652.

³⁶According to the agricultural census, in 1897, maize and wheat accounted for 81% of total agricultural yield; see Ministarstvo Finansija, *Statistički godišnjak Kraljevine Srbije za 1896-7*, pp. 198-9.

³⁷A total of 16 wage and price series, for each available town (increasing over time from 21 to 42 towns), reported monthly for 1862-87 (town-level annual averages not reported) and annually for 1888-1910, results in over 120,000 data points.

and report them to the Ministry. Once per week, local officials were to observe day wages of agricultural labourers and masons and actual sale prices of average quality goods sold on weekly markets.³⁸ State statisticians then calculated (unweighted) monthly and annual averages of prices and wages, and reported them in official publications.³⁹ Published data cover the period from July 1862 to the end of 1910. The wealth of town-level data provided by these sources has not been exploited until now.⁴⁰

Sample. Map 1 illustrates sample towns on a historical map of Serbia. The towns are differentiated by the year they enter the sample. At first data were reported for 21 towns. This initial sample already provides a wide geographical coverage. The sample increases in 1880 to 26, then again in 1889 to 40, and finally in 1898 to 42. The five towns added in 1880 span the territory added to Serbia following the Congress of Berlin in 1878. Towns added subsequently are scattered across the country. By the time they enter the sample, all sample towns were defined as urban settlements.⁴¹ Their population in 1900 accounts for 78% of the urban population.⁴² The sample is thus representative of urban Serbia.

Welfare ratios. Allen introduced the welfare ratio as an intuitive and internationally comparable measure of real wages.⁴³ The welfare ratio divides an estimated annual wage of an adult worker with the annual value of a consumption basket for a representative household.⁴⁴ Milanović and Mijatović recently applied this approach to estimate real wages for nineteenth century Serbia.⁴⁵ They modified Allen’s assumptions on annual working days and average household size to better fit the Serbian case. I too implement these adjustments, as explained below. I estimate new series of town welfare ratios:

$$WR_{it} = \frac{W_{it} * N}{\sum_{j=1}^k P_{ijt} * Q_j} * \frac{1}{H} * \frac{1}{D} \quad (1)$$

³⁸*Državopis Srbije*, vol. I, p. 21.

³⁹*Državopis Srbije*, vols. I–XVI; *Statistički godišnjak Kraljevine Srbije*, vols. I–XIII; and *Statistika cena poljoprivrednih proizvoda*, vols. I–III.

⁴⁰Milanović and Mijatović, ‘Real urban wage’, recently estimated Serbian real wages based on national averages reported in these sources.

⁴¹For ease of reference, I refer to all urban settlements as towns.

⁴²Calculated from the population census; *Popis stanovništva u Kraljevini Srbiji 31. decembra 1900*, Volume I. The sample does not cover the town of Čuprija (population of 4,406) and remaining townlets.

⁴³Allen, ‘Great divergence’.

⁴⁴For a broader approach on real household incomes, see the recent work by Horrell, Humphries, and Weisdorf, ‘Beyond the male breadwinner’.

⁴⁵Milanović and Mijatović, ‘Real urban wage’.

where WR is the welfare ratio, W is a worker's daily wage including food allowance, N is the number of days worked, P is price, Q is quantity, H is a 5% housing allowance, D is the number of household members expressed in consumption units, and i indexes towns, j consumption items, and t time.

Annual wages. On the income side, I calculate annual wages of day labourers and masons inclusive of payments in money and in kind. For annual wages, I add a daily allowance for food and wine to the recorded daily money wage and then multiply daily wages with 200 working days in a year.⁴⁶ I estimate the monetary value of the allowance by multiplying daily (subsistence) consumption quantities of maize flour, beans, pork, butter, and wine by their price in a given town and year.⁴⁷ On average, these in-kind payments amount to 12% of day labourer money wages, and 6% of mason money wages.⁴⁸

Several pieces of evidence back up the choice of 200 working days per year.⁴⁹ Results of a contemporary rural survey suggest that workers spent slightly more than 50% of days farming land or wage-earning; contrary to industrial work, the temperate continental climate rendered agricultural and construction work impossible in the late autumn and winter, and similar to pre-industrial Europe, workers were idle during numerous holidays throughout the year.⁵⁰

Consumption baskets. On the consumption side, I estimate the annual cost of subsistence and respectability baskets for a representative household. The composition of baskets and the annual consumption quantities for each basket item are as reported by Milanović and Mijatović.⁵¹ To calculate the cost of one adult consumption basket, I multiply fixed consumption quantities by prices of goods that vary across towns and over

⁴⁶For in-kind pay and working days, I follow Milanović and Mijatović, 'Real urban wage', pp. 433-5. See Humphries and Weisdorf, 'Unreal wages', on working days and real wages in England in the long run.

⁴⁷I divide annual consumption quantities by 365 days to arrive at daily quantities.

⁴⁸Daily and annual wages followed the same trends. Hence adding payments in kind has little impact on overall wage trends.

⁴⁹See also Milanović and Mijatović, 'Real urban wage', p. 435.

⁵⁰Interestingly, Federico, Nuvolari, and Vasta, 'Origins of the Italian regional divide', show that Italian provincial welfare ratios calculated with working days fixed at 250 and varying across provinces (from 192 to over 300 days) are highly correlated with a correlation coefficient of 0.925.

⁵¹The subsistence basket consists of nine goods: maize flour, beans, pork, butter, soap, linen, candles, tallow, and charcoal. The respectability basket consists of 12 goods: bread, beans, pork, butter, cheese, eggs, wine, soap, linen, candles, tallow, and charcoal. Compared to the subsistence basket, the respectability basket thus additionally includes bread (instead of maize flour), cheese, eggs, and wine. See Milanović and Mijatović, 'Real urban wage', p. 433, Table 1.

time, and sum the products across k consumption items.⁵²

To estimate the cost of a basket for an average household, I multiply the cost of one adult consumption basket with the number of household members measured in consumption units, taking into account housing costs. I take that the average household in Serbia had six members.⁵³ Assigning one consumption unit to the first household member and 0.667 consumption units to each additional household member, a household of six members equates to 4.33 consumption units. Adding 5% of the total basket cost for housing results in 4.55 consumption units.

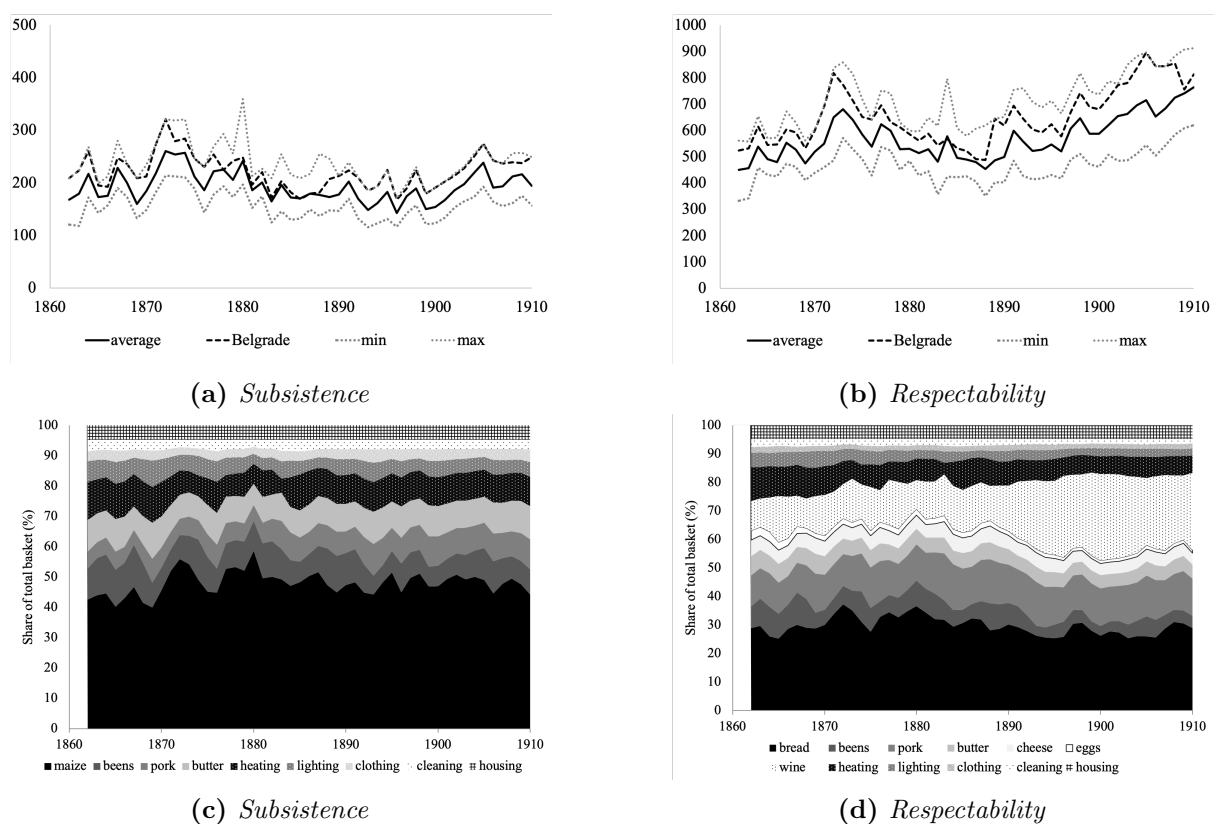


Figure 2: Cost and composition of subsistence and respectability baskets

Sources: Own calculations based on sources reported in section III.

Figure 2 illustrates the cost and composition of consumption baskets. The respectability basket was on average three times more expensive than the subsistence basket. For the most part, both baskets followed a similar trend, but respectable costs of living increased

⁵²By calculating welfare ratios for Serbia using fixed baskets, Milanović and Mijatović implicitly assume that the composition and quantity of consumption baskets remains constant across space and over time. In lack of information on town-specific consumption patterns, I am forced to make the same assumption.

⁵³I follow Milanović and Mijatović, ‘Real urban wage’, who base this assumption on Vuletić, ‘Koliko duša živi u jednoj kući?’.

more in the long run. Both baskets were dominated by food items, which in each case accounted for more than 75% of the total basket cost.

Welfare ratio trends. Figure 3 summarises welfare ratio trends. Real wages in Belgrade were consistently higher than the national average. Belgrade’s lead was more pronounced for unskilled workers than for skilled. Unskilled wages in Belgrade were closer to the country’s maximum, than its mean. The figure shows that urban living standards across Serbia were well above the subsistence level.⁵⁴

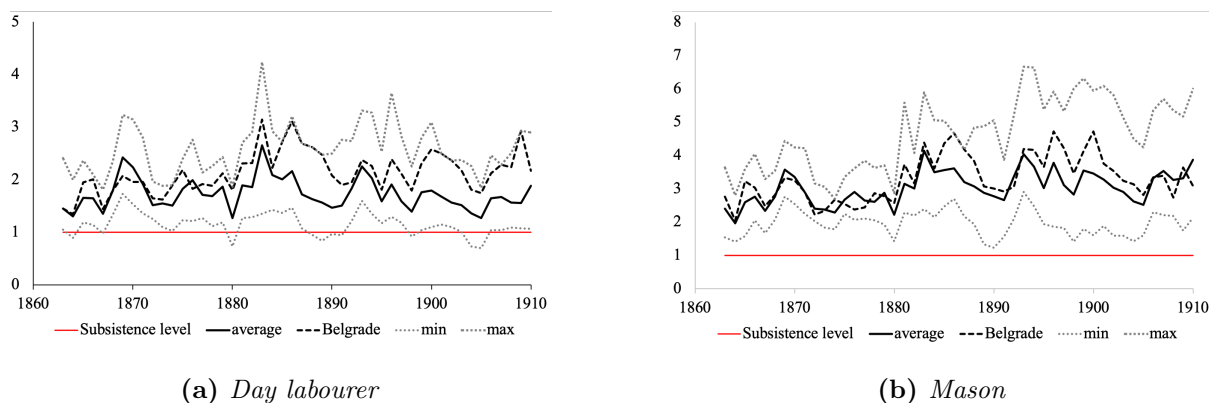


Figure 3: Trends in welfare ratios, 1863-1910

Notes and sources: figures show trends in welfare ratios of day labourers and masons (using subsistence baskets). Own calculations based on sources reported in section III.

International city-level comparison. The new welfare ratio series for Serbia’s capital, Belgrade, enables international comparisons at the city-level.⁵⁵ In the 1860s, unskilled workers in Belgrade could afford higher living standards than their counterparts in Milan. While the Milanese unskilled workers could not afford more than subsistence living, day labourers in Belgrade earned on average 50% above subsistence. At the same time, unskilled workers in Amsterdam and Leipzig were yet better off, making two to three times the subsistence wage, which was comparable to masons’ living standards in Serbia. Unskilled wages in these Dutch and German cities continued to grow, reaching four times subsistence by the end of the 1880s, and six times subsistence by 1913. Only the most well off masons in Serbia could afford this standard of living, and that only until the mid-1890s. In the 1880s, unskilled wages were still higher in Belgrade than in Milan

⁵⁴This is in line with Milanović and Mijatović, ‘Real urban wage’, p.16, who report that the welfare ratio of unskilled workers in Serbia was, on average, 1.65 times the subsistence level.

⁵⁵See Allen et al., ‘Wages, prices, and living standards’, p. 27, Figure 5, and Federico, Nuvolari, and Vasta, ‘Origins of the Italian regional divide’, p. 74, Figure 1A, for welfare ratios in other European cities.

(on average, 2.5 vs 2 times subsistence level). In the next two decades, Milanese unskilled wages continued to grow steadily and reached three times subsistence by 1910, whereas wages of unskilled workers in Belgrade fluctuated between 2 and 2.5 times subsistence.

In sum, living standards in Serbia were higher than previously thought. Workers in Belgrade earned higher real wages than workers in most other Serbian towns. Internationally, Belgrade offered competitive real wages to Southern, but not Northern Europe.

IV Convergence or divergence?

The new panel dataset allows estimating the evolution of spatial dispersion in prices and wages. The market integration literature has found ample evidence that prices of traded goods tend to equalise between locations when transport costs fall.⁵⁶ Grains, taken to be homogenous, tradable goods have been the workhorse for testing price convergence. According to factor-price equalisation theory, increasing commodity market integration may have an equalising effect on wages. Whether this prediction holds within a country has seldom been tested. I first explore trends in price and wage dispersion and then formally test for σ -convergence.

Convergence trends. I estimate trends in dispersion of prices or wages with the following fixed effects panel model:

$$\left| \ln\left(\frac{y_{it}}{y_{jt}}\right) \right| = \alpha_{ij} + \sum_{t=1863}^{1909} \beta_t D_t + \varepsilon_{ijt} \quad (2)$$

where y is a price or wage in towns i and j in year t . This approach controls for the increasing number of sample towns over time.

Figure 4 reports estimated convergence trends. Average price ratios of maize and wheat were falling over time, which suggests grain price convergence (Figure 4a). Initial differences in grain prices of approximately 25% for maize and 20% for wheat more than halved during the next half a century (falling respectively to 10 and 6%). By contrast, there is no evidence of long-run convergence in money wages (Figure 4b). If

⁵⁶See Federico, ‘How much do we know’ and ‘Market integration’.

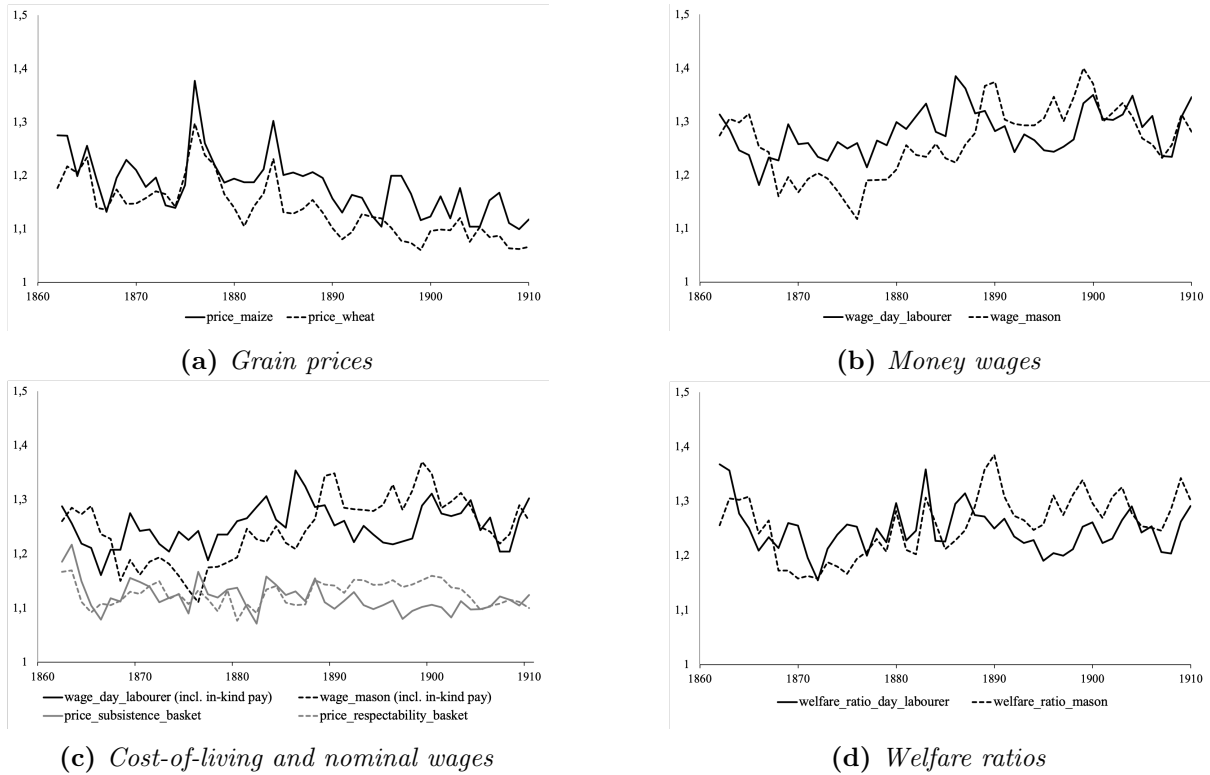


Figure 4: *Convergence trends: average town-pair ratios*

Notes and sources: Figure reports trends in average town-pair ratios for: a) prices of maize and wheat; b) money wages of day labourers and masons; c) nominal wages of labourers and masons (including payment in kind), and costs of subsistence and respectability baskets; d) welfare ratios (using subsistence baskets) of day labourers and masons. Trends are estimated with fixed effects panel regressions including time dummies. Own calculations based on sources reported in section III.

anything, for most of the period, money wages seem to have been diverging. Contrary to factor-price equalisation theory, the correlation between spatial variation in prices and wages is negative.⁵⁷ These trends clearly show that convergence of grain prices did not lead to an equalisation of money wages.

It may be, however, that spatial differences in real wages followed a different trajectory. First, grain prices do not capture the full breadth of living costs. A labourer's consumption basket consisted of more products than maize and wheat and included non-tradable goods, too. Spatial differences in costs of living may have evolved differently from those of traded goods. Hence, divergence in costs of living may perhaps explain a lack of convergence in money wages in spite of converging grain prices. Second, money wages are an incomplete

⁵⁷The correlation coefficients are: -0.36 and -0.54 between the average wheat price ratios and money wage ratios for day labourers and masons, respectively; and -0.21 and -0.39 between the average maize price ratios and money wage ratios for day labourers and masons, respectively. The correlation coefficients calculated with series of coefficients of variation yield qualitatively same results.

representation of historical labour income, which regularly included payments in kind. Thus a wage comprised of both money and in-kind pay may exhibit a different trend from the money wage series.

Trends shown in the bottom part of Figure 4 allow evaluating these hypotheses. Dispersion in costs of living was low and relatively stagnant over time (Figure 4c). On average, costs of living across Serbian towns differed by approximately 10 percentage points. By comparison, dispersion in nominal wages inclusive of money and in-kind pay was high and also increased in the long run for both unskilled and skilled labourers.⁵⁸ Given diverging nominal wages, and a lack of commensurate convergence in costs of living, we would expect divergence in real wages. Indeed, trends in the dispersion of welfare ratios confirm long-run real wage divergence (Figure 4d).

Sigma-convergence can also be studied with the coefficient of variation. In our case, as the panel is unbalanced, inference based on trends in the coefficient of variation might be biased. For comparison, I calculated coefficients of variation of price and wage series for both the full and balanced samples.⁵⁹ As a rule, trends in average town-pair ratios and coefficients of variation are highly correlated, and differences between the full and balanced sample are insignificant.⁶⁰

Convergence test. The statistical significance of σ -convergence can be estimated with the following log-linear regression equation:

$$\ln(CV_t) = \alpha + \beta \text{time} + \varepsilon_t \quad (3)$$

where CV is the coefficient of variation at time t , $time$ is a linear time trend, and ε is the error term. A negative and statistically significant coefficient for time indicates σ -convergence.⁶¹ Table 1 presents the results of testing for convergence in grain prices (columns 1-2), costs of living (columns 3-4), and nominal and real wages of day labourers

⁵⁸Thus the dispersion of nominal wages with or without in-kind pay followed similar trends. This is because in-kind payments formed only a small component of nominal wages and consisted of food items the prices of which were similar across space and converging over time.

⁵⁹I report the coefficient of variation series in the Supporting Information online section.

⁶⁰The correlation coefficients are above 0.9 for all series, except for day labourer's welfare ratio for which the correlation is 0.87.

⁶¹Federico, 'How much do we know', p. 479.

Table 1: *Sigma convergence, prices and wages 1863-1910*

Dependent variable:	ln(Coefficient of variation)								
	Price		Basket		Day labourer		Mason		
	Maize (1)	Wheat (2)	Subsistence (3)	Respectability (4)	Nominal wage (5)	Welfare ratio (6)	Nominal wage (7)	Welfare ratio (8)	Welfare ratio (9)
Full panel.									
1863-1910	-0.007*** (0.002)	-0.015*** (0.002)	-0.006*** (0.002)	0.001 (0.002)	0.008*** (0.001)	0.004** (0.002)	0.014*** (0.003)	0.012*** (0.002)	0.011*** (0.003)
R-squared	0.161	0.460	0.169	0.015	0.389	0.129	0.390	0.440	0.328
Balanced panel.									
1863-1910	-0.012*** (0.003)	-0.023*** (0.003)	-0.005** (0.002)	0.001 (0.002)	0.008*** (0.001)	0.004** (0.002)	0.012*** (0.003)	0.011*** (0.002)	0.010*** (0.003)
R-squared	0.261	0.574	0.118	0.002	0.415	0.113	0.285	0.404	0.280

Notes: robust standard errors given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%. Both panels have 48 observations. Full panel covers 42 towns, and the balanced panel 21 towns.

(columns 5-6) and masons (columns 7-9), in the full and balanced sample (upper and lower panels, respectively). Each series has 48 annual observations (1863-1910).

The results are clear: grain prices and subsistence costs were converging, while both nominal and real wages were diverging. Differences in respectable costs-of-living were stagnating. Convergence of both grain prices and subsistence costs of living is expected given the high share of tradable food items in the subsistence basket. Lack of convergence in the more affluent basket can be explained by its higher share of goods that were either non-tradables or traded significantly less than grains. Wheat prices were converging faster than maize prices (1.5% vs 0.7% annually), and price convergence was quicker in the balanced sample (1.2% for maize and 2.3% for wheat per year). Wages of masons were diverging more than wages of day labourers (1.1-1.4% vs 0.4-0.8% annually). Nominal wages diverged faster than real wages. This is in line with converging subsistence costs that somewhat offset divergence of real wages. Still, the significant divergence of real wages suggests that divergence in nominal wages was stronger than convergence in subsistence costs. Lastly, there is virtually no qualitative difference between wage convergence in the full and the balanced sample.

Comparative perspective. Did prices and wages in Serbia converge more, less, or similarly as compared to other countries in this time period? Strong price convergence within Serbia followed a general trend of increasing commodity market integration within European countries.⁶² Grain price convergence in Serbia resonates well with the Italian experience. In Italy, from 1862-65 to 1908-11, the coefficient of variation fell from approximately 0.11 to 0.05 for wheat, and from 0.135 to 0.061 for corn.⁶³ In Serbia, from 1863-65 to 1908-1910 the full sample coefficient of variation for wheat reduced from 0.16 to 0.064, and for maize from 0.181 to 0.102.⁶⁴ The Italian convergence record was impressive in comparative perspective and given their similarity, by extension, so was Serbian.⁶⁵

Wage differences increased more strongly within Serbia than elsewhere in Europe. In

⁶²For the latter, see *ibid.*

⁶³Federico, 'Market integration and market efficiency', statistical appendix.

⁶⁴Italy is an interesting comparator since the timeline of its unification somewhat overlapped with Serbia's de facto (1867) and de jure (1878) independence. As in the case of Italian unification, grain prices started to converge before Serbian independence. See *ibid.*, p. 299, for Italy.

⁶⁵*Ibid.*, p. 301.

Spain, the coefficient of variation on regional wages of unskilled urban workers increased slightly from 0.146 in 1860 to 0.159 in 1914.⁶⁶ In Italy, the coefficient of variation for provincial real wages declined from 0.212 in 1870-1878 to 0.194 in 1905-1913.⁶⁷ The coefficient of variation was similar in size and remained stable in Austria-Hungary in the period from 1870-1878 to 1905-1910.⁶⁸ In the same period, the coefficient of variation of real wages in Serbia increased from 0.166 to 0.202 for unskilled workers, and from 0.135 to 0.227 for skilled workers. In sum, whereas several studies of European countries report fairly stable or decreasing real wage dispersion, the Serbian case stands out for its divergence in both nominal and real wages.

V Why price convergence and wage divergence?

Price convergence literature. The standard explanation for price convergence are declining trade costs, which consist of transport costs and other transaction costs.⁶⁹ Economic historians agree that transport improvements are the main explanation for 19th century price convergence within countries.⁷⁰ Empirical studies found falling transport costs to be a significant predictor of price convergence.⁷¹ The precise measurement of transport costs is a demanding task. Measures range from time-invariant distances to time-varying transport costs, which optimise between multiple transport modes combining historical information and GIS software.⁷²

It is thus expected that falling transport costs would be the primary explanation for price convergence in 19th century Serbia, especially after the first railway had opened in

⁶⁶Rosés and Sánchez-Alonso, 'Regional wage convergence', table 2.

⁶⁷Federico, Nuvolari, and Vasta, 'Origins of the Italian regional divide', p. 79.

⁶⁸Cvrcek, 'Wages, prices, and living standards' (quoted after Federico, Nuvolari, and Vasta, 'Origins of the Italian regional divide').

⁶⁹According to Anderson and Van Wincoop, 'Trade costs', other than marginal production costs, all costs of delivering a good to a final consumer may be considered trade costs. These may include transport, tariff, information, administrative, currency exchange, contract enforcement, and distribution costs.

⁷⁰See Federico, 'Market integration', pp. 643-52, for an overview.

⁷¹See, for example, studies on 19th century Austria-Hungary (Schulze and Wolf, 'Origins of border effects', and 'Economic nationalism and economic integration'), British India (Andrabi and Kuehlwein, 'Railways and price convergence'), Germany (Keller and Shiue, 'Tariffs, trains, and trade'), and Italy (Federico, 'Market integration and market efficiency').

⁷²For the latter, see Donaldson and Hornbeck, 'Railroads and American economic growth', and Donaldson, 'Railroads of the Raj'.

1884.⁷³ Information networks may have also been important, especially telegraph lines, but town-level data on communication infrastructure are hard to find.⁷⁴ The literature has also pointed out the effect of political borders on price gaps.⁷⁵ There was no internal political border in Serbia, but its external border expanded after 1878 to include territories formerly ruled by the Ottoman Empire. The old border between Serbia and the Ottoman Empire may have continued to segment markets within Serbia even after its removal.⁷⁶

Other factors highlighted in the literature are not expected to have played an important role in price convergence within Serbia. Tariff barriers are important in the literature on international market integration, but there were no internal trade tariffs in Serbia.⁷⁷ Further, recent studies have documented that ethnic, linguistic, or religious differences correlate negatively with market integration in heterogeneous societies.⁷⁸ Serbia, however, was ethnically and religiously homogeneous.⁷⁹ In 1890, the Serbian language was the mother tongue of more than 90% of the sample population, and an even larger percentage was Christian-Orthodox.⁸⁰

Wage divergence literature. A large literature in economics has attributed inter-urban differences in productivity and wages to agglomeration effects.⁸¹ It is widely documented that larger and more densely populated cities have higher wages.⁸² The urban

⁷³Transport over land was historically much more expensive than water transport, thus railways greatly reduced transport costs; see Daudin, O'Rourke, and Morys, 'Globalization'.

⁷⁴See Chilosi and Federico, 'Early globalizations', and Steinwender, 'Real effects of information frictions', on the impact of the telegraph on transatlantic price gaps.

⁷⁵Engel and Rogers, 'How Wide Is the Border?', pioneered the approach discovering a significant effect of the contemporary border between US and Canada on the volatility of relative prices. For a historical example, see Andrabi and Kuehlwein, 'Railways and price convergence', who document a significant contemporaneous effect of borders between British India and the princely states on wheat price gaps.

⁷⁶Chilosi and Nikolić, 'Vanishing borders', find a significant but transitory effect of the border between Serbia and Austria-Hungary on grain price gaps. Hence, if Yugoslav integration is a valid guide, we would not expect the effect of the Serbian-Ottoman border on price gaps within Serbia to be persistent.

⁷⁷On the impact of trade tariffs see, for example, Federico, 'Market integration and market efficiency', and Keller and Shiue, 'Tariffs, trains, and trade'.

⁷⁸See Schulze and Wolf, 'Origins of border effects', and 'Economic nationalism and economic integration', for Austria-Hungary; Fenske and Kala, 'Linguistic distance and market integration', for India; and Chilosi and Nikolić, 'Vanishing borders', for Yugoslavia.

⁷⁹This is in contrast to high ethno-religious heterogeneity in Yugoslavia; *ibid.*

⁸⁰This is because Bulgarians and most Romanians living primarily in towns near the eastern border were also of Christian-Orthodox faith.

⁸¹See Rosenthal and Strange, 'Agglomeration economies', Puga, 'Magnitude and causes of agglomeration economies', Combes and Gobillon, 'Empirics of agglomeration economies', and Duranton and Puga, 'Economics of urban density', for summaries of empirical evidence on urban agglomeration effects.

⁸²For example, with recent evidence on modern economies, Roca and Puga, 'Learning by working in big cities', show that workers in Madrid earn 21% more than workers in Valencia, 46% more than workers

economics literature has distinguished several possible reasons that might explain higher wages in larger markets. Duranton and Puga classify the agglomeration mechanisms into three broad classes: sharing, matching, and learning.⁸³ The classification builds on the agglomeration benefits proposed by Marshall: knowledge spillovers, linkages between input suppliers and final producers, and labour-market interactions.⁸⁴ Recent empirical studies, which analyse modern, individual-level data, find that workers in big and small cities are not initially particularly different, but that working in cities of different sizes makes their earnings diverge. Roca and Puga demonstrate that workers in bigger cities receive an immediate agglomeration premium and over time accumulate more valuable experience.⁸⁵ Similarly, Baum-Snow and Pavan find that city-size wage premia are explained by a wage-level effect and returns to experience.⁸⁶

Migration may also have an important impact on spatial differences in wages. In the neoclassical framework, migration from poorer to richer areas increases the capital-labour ratio in sending areas and contributes to wage convergence.⁸⁷ In New Economic Geography models, by contrast, allowing for labour mobility contributes to wage divergence.⁸⁸ Concentration of labour in densely populated areas strengthens the aforementioned agglomeration forces that drive wage differences. Moreover, selective migration may alter the skill composition to the benefit of the already higher wage areas.⁸⁹ In short, migration may contribute to either wage convergence or wage divergence. Whether labour-supply or agglomeration effects prevail is ultimately an empirical question.

in median-sized cities, and 55% more than workers in rural areas; and Combes, Duranton, and Gobillon, ‘Spatial wage disparities’, report that workers in Paris earn 15% more than workers in other large cities, such as Lyon or Marseille, 35% more than in medium-sized cities, and 60% more than in rural areas.

⁸³Duranton and Puga, ‘Economics of urban density’, p.11: ‘First, a larger market allows for a more efficient sharing of local infrastructure, a variety of intermediate input suppliers, or a pool of workers. Second, a larger market also allows for better matching between employers and employees, or buyers and suppliers. Finally, a larger market can also facilitate learning, by facilitating the transmission and accumulation of skills or by promoting the development and adoption of new technologies and business practices.’. See also, Duranton and Puga, ‘Micro-Foundations of Urban Agglomeration Economies’.

⁸⁴Marshall, *Principles of Economics*.

⁸⁵Roca and Puga, ‘Learning by working in big cities’.

⁸⁶Baum-Snow and Pavan, ‘Understanding the city size wage gap’.

⁸⁷See, for example, Barro and Sala-i-Martin, ‘Convergence’, and ‘Convergence across states and regions’.

⁸⁸See Krugman, ‘Increasing returns’, Fujita, Krugman, and Venables, *Spatial economy*, Fujita and Thisse, *Economics of agglomeration*, and Lafourcade and Thisse, ‘New economic geography’.

⁸⁹See Kanbur and Rapoport, ‘Migration selectivity and the evolution of spatial inequality’, and Rapoport, ‘How does labor mobility affect income convergence?’.

Economic historians have examined the relationship between migration and wage convergence during the Age of Mass Migration and found mixed results. Boyer and Hatton concluded that, despite strong internal migration flows, substantial wage gaps remained at least until the First World War, both between rural and urban locations and within occupations across regions and cities, in late-nineteenth century England and Wales.⁹⁰ Rosés and Sánchez-Alonso report that, despite low rates of internal migration, substantial regional wage convergence occurred across Spain from 1850 to 1914.⁹¹ Hence, migration seems neither necessary nor sufficient for wage convergence. Enflo, Lundh, and Prado, on the other hand, found that migration contributed to wage convergence in Sweden before the First World War.⁹² The authors argue that labour-supply effects of migration outweighed any agglomeration effects of urbanisation. Therefore, the historical literature has not yet documented a case where agglomeration forces, propelled by migration, were the key driver of urban wage divergence.

Empirical approach. To quantitatively explore determinants of price convergence and wage divergence, I regress inter-urban price or wage gaps on measures of transport costs and urban agglomeration. I apply a town-pair panel approach, standard in the market integration literature, that allows me to test the impact of time-varying differences between town-pairs, while controlling for fixed town-pair characteristics. The panel consists of observations for town-pairs across eight census years for which population data are available: 1866, 1874, 1884, 1890, 1895, 1900, 1905, and 1910.⁹³ I estimate models of the following form:

$$\left| \ln\left(\frac{y_{it}}{y_{jt}}\right) \right| = \alpha_{ij} + \beta_1 \ln(\text{Transport costs factor}_{ijt}^g) + \beta_2 \left| \ln\left(\frac{Pop_{it}}{Pop_{jt}}\right) \right| + \varepsilon_{ijt} \quad (4)$$

where y denotes one of the outcomes in towns i and j in year t . The outcomes are price of maize, price of wheat, subsistence costs, nominal wage of day labourers, nominal

⁹⁰Boyer and Hatton, ‘Migration and labour market integration’.

⁹¹Rosés and Sánchez-Alonso, ‘Regional wage convergence’.

⁹²Enflo, Lundh, and Prado, ‘Role of migration’.

⁹³*Državopis Srbije*, vols. XIII, IX, and XVI, report population figures for 1866, 1874, and 1884, respectively. Figures for other years come from population censuses referenced under official publications.

wage of masons, real wage of day labourers, and real wage of masons.⁹⁴ The variable $\ln(\text{Transport costs factor}_{ijt}^g)$ takes the natural logarithm of transport costs divided by the relevant price or wage series g at origin. The coefficient β_1 estimates the elasticity of gaps in grain prices, cost of living, or wages with respect to transport costs. The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures time-varying, town-pair differences in log population, capturing the effects of urban agglomeration. Since I do not expect agglomeration to affect price gaps, the variable enters regressions with wage gaps as the outcome variable. The coefficient β_2 estimates the elasticity of wage differences with respect to population differences. The variable α_{ij} are town-pair fixed effects controlling for unobserved time-invariant factors. The error term, ε_{ijt} , allows for clustering by town-pairs. I check the robustness of the baseline results in restricted samples. In additional specifications, I include year dummies to control for unobserved time changes, such as weather shocks. I also interact distance with time to control for the development of communication infrastructure. Lastly, I explore whether differences in migration structure amplified agglomeration effects.

Transport network. I georeferenced a series of historical maps with GIS to reconstruct Serbia's pre-war transport network. The network initially consisted of rivers and roads, and from 1884 included railways, too. Already by 1862, all sample towns were connected by navigable rivers or roads. Shipping was possible between seven sample towns via the Danube and Sava rivers. Inland waterways were not navigable. At the Congress of Berlin (1878), Serbia pledged to build a railway from Belgrade towards the Ottoman and Bulgarian border to facilitate international traffic on its territory. The Belgrade-Niš railway opened in 1884. The trunk line initially connected seven sample towns. By 1888, railway tracks reached the southern border passing through Vranje and Pirot. Thereafter, the railways branched out to several towns mainly near the trunk line. The two branch lines extending west to Valjevo and Kraljevo opened later (1908 and 1910, respectively). By 1910, about a half of sample towns had railway access.

Transport costs. I combine the newly-digitised transport network with information on historical freight rates to calculate time-varying transport costs. I measure transport

⁹⁴I do not model spatial differences in respectable costs of living as they stagnated over time (Table 1).

costs with the freight factor: the ratio of nominal freight to the price or wage from the place of origin.⁹⁵ I take good-specific freight rates for transporting 100 kg of grain from the railway tariff book of 1884.⁹⁶ I account for fixed and variable costs per kilometre.⁹⁷ For the same year, I collect data from statistical yearbooks on the cost of transporting 100 kg of goods from various towns to Belgrade, by land or water. For each observed town, based on the transport network, I estimate the distance to Belgrade by road and by river. I divide the reported costs with estimated distances to arrive at freight rates per kilometre per transport mode.

Applying the relative costs of railway, water, and road transport, I predict city-pair freight transport costs. I employ the entire transport network database and relative transport costs to calculate the lowest-cost route between each town-pair in each year. The algorithm differentiates the length of each route by transport mode. I then multiply these least-cost route segments with appropriate transport costs for each transport mode. The result are time-varying town-pair freight transport costs in 1884 prices. Based on relative costs in 1884 of transporting 100 kg of grain and passengers by rail, I estimate passenger transport costs to be five times more expensive per kilometre.⁹⁸ To get at nominal freight and passenger transport costs, I reflate the real transport costs with the trend of subsistence costs.⁹⁹ In turn, this trend is computed with a fixed effects panel regression of subsistence costs over year dummies. The last step is to divide nominal transport costs by the relevant price or wage at origin (i.e. the lower value in a town-pair).

Descriptive evidence. Before estimating equation 4, I explore the evolution of transport costs over time. Figure 5 plots mean freight transport costs between sample towns. From 1866 to 1910, the mean freight transport cost between sample towns fell from approximately 12 to 8 dinar. Transport costs strongly decreased with the appearance of

⁹⁵Federico and Persson, ‘Market integration and convergence’, p. 98, highlight the freight factor as ‘the best measure of long-term change of transportation costs’. Deflating freight rates with the relevant price or wage at origin corresponds to the ‘iceberg’ costs in trade models.

⁹⁶*Tarifa za vozidbu putnika i robe.*

⁹⁷Fixed costs include taxes and loading/unloading, bill of lading, and stamp fees.

⁹⁸Repeating the described transport cost calculation procedure for passenger transport is not possible, since there is no information on the cost of passenger transport by land or water.

⁹⁹Using maize or wheat prices instead does not change the results. The correlation coefficient for the baseline and alternative nominal transport cost series is 0.98.

railways in 1884 and continued to fall with the extension of the railway and road network. The trend in transport costs correlates with that of grain ratios explored in section 4. This suggests that decreasing transport costs may have contributed to price convergence.



Figure 5: Mean transport costs between sample towns (nominal dinars)

Notes and sources: the figure illustrates mean nominal transport costs between sample towns in nominal dinars. Own calculation based on sources reported in section V.

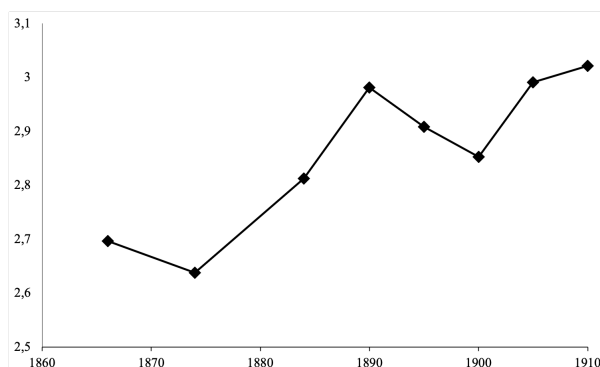


Figure 6: Trend in mean town-pair population ratio

Notes and sources: the figure reports trends in average town-pair population ratios. Trends are estimated with fixed effects panel regressions including time dummies. Own calculation based on sources reported in section V.

I also examined the trend in town-pair population ratios.¹⁰⁰ As Figure 6 illustrates, from the 1860s to 1910, Serbia witnessed an increasing concentration of the urban population. The average population ratio between sample towns of 2.7 in 1866 increased to above 3 by 1910. The overall trend of increasing dispersion is adjoined by shorter periods of convergence at the beginning of the sample period and before the turn of the century. The population ratio trend resembles that of wage ratios explored in section 4. This suggests that population differences may have played a significant role in driving wage divergence.

¹⁰⁰Trends are estimated with a fixed effects panel regression of population differences over year dummies.

Baseline results. Table 2 reports baseline results of regressing inter-urban price and wage gaps on measures of transport costs and urban agglomeration. The transport cost variable is positively and significantly related to inter-urban gaps in prices and wages. The higher the transport cost between town-pairs, the higher the gap in prices or wages. The sign of this relationship suggests that falling transport costs should have contributed to price and wage convergence. Thus, while falling transport costs go a long way in explaining price convergence, the reasons for wage divergence lie elsewhere.

Table 2: *Drivers of spatial disparities in prices and wages*

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $						
	Price		Subsistence	Nominal wage		Welfare ratio	
	Maize (1)	Wheat (2)	Basket (3)	Day labourer (4)	Mason (5)	Day labourer (6)	Mason (7)
$\ln(TCostfactor_{ijt}^g)$	0.158*** (0.007)	0.129*** (0.006)	0.054*** (0.006)	0.162*** (0.013)	0.227*** (0.012)	0.114*** (0.010)	0.139*** (0.010)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $				0.085*** (0.015)	0.054*** (0.018)	0.071*** (0.013)	0.089*** (0.017)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	4888	4888	4888	4888	4888	4888	4888
R-squared	0.165	0.134	0.026	0.063	0.140	0.045	0.061

Notes: The variable $\ln(Transport\ costs\ factor_{ijt}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

The magnitude of the transport cost effect on grain prices is somewhat larger than comparable estimates in the literature. Studying urban markets in Yugoslavia before and after the First World War, Chilosi and Nikolić recently estimated elasticities between the transport cost factor and price gaps for maize and wheat of 0.088 and 0.034, respectively.¹⁰¹ Following a similar estimation procedure, Schulze and Wolf estimated an elasticity of 0.05 between freight costs and grain prices in late 19th century Austria-Hungary.¹⁰² The late construction of Serbian railways explains the higher elasticity of grain prices with respect to transport costs in Serbia as compared to Austria-Hungary or Yugoslavia.¹⁰³

¹⁰¹Chilosi and Nikolić, ‘Vanishing borders’.

¹⁰²Schulze and Wolf, ‘Economic nationalism and economic integration’.

¹⁰³Former Austro-Hungarian provinces that joined Serbia in forming Yugoslavia, received railway access already in the 1840s. And other parts of Austria-Hungary built railways even before. Serbia, however, witnessed the first railway only in 1884.

Agglomeration forces widened wage gaps. The larger the population difference between towns, the larger the gap in nominal and real wages of both day labourers and masons. The effects are economically significant, too. For example, doubling the population difference increases the gap in welfare ratios by approximately 7% for day labourers and 9% for masons. These results are in line with a large literature in urban economics that has found wages to be higher in more populated areas.¹⁰⁴

In sum, baseline results show that falling transport costs help explain price convergence, whereas rising inter-urban population differences contributed to wage divergence. I next test the robustness of the baseline results. I conclude the empirical analysis by exploring migration as a potential mechanism behind wage divergence.

VI Robustness checks and migration effects

Pre-expansion sample. I first address a historical concern. The Congress of Berlin (1878) recognised the territorial expansion Serbia had won during the Serbian-Turkish Wars (1876-8). As Map 1 had illustrated, seven towns in the south join the sample after 1878. War and longer time spent under Ottoman rule may have slowed down the integration of these towns with the rest of Serbia. To check if excluding towns in South Serbia has any bearing on the baseline results, I define a ‘pre-expansion sample’ consisting of towns that formed part of Serbia already from the first half of the 19th century. I exclude town-pairs that include any town that became part of Serbia only after the Serbian-Ottoman wars. The pre-expansion sample includes 3,537 town-pairs, or 72% of the full sample.

The results, reported in Table 3, suggest that the baseline findings are not driven by developments in south-Serbian towns. All the coefficients are highly statistically significant and estimated with the expected sign. Compared to the baseline, there are small differences in the size of the estimated coefficients. The effects of transport costs are slightly smaller than in the full sample, which is expected given lower grain price variation

¹⁰⁴See, for example, Glaeser and Mare, ‘Cities and skills’, Combes, Duranton, and Gobillon, ‘Spatial wage disparities’, Baum-Snow and Pavan, ‘Understanding the city size wage gap’, and Roca and Puga, ‘Learning by working in big cities’.

Table 3: Excluding towns in South Serbia

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $						
	Price		Subsistence	Nominal wage		Welfare ratio	
	Maize	Wheat	Basket	Day labourer	Mason	Day labourer	Mason
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(TCostfactor_{ijt}^g)$	0.137*** (0.007)	0.112*** (0.006)	0.052*** (0.007)	0.140*** (0.014)	0.195*** (0.013)	0.101*** (0.011)	0.119*** (0.010)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $				0.082*** (0.017)	0.050*** (0.013)	0.083*** (0.011)	0.099*** (0.010)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	3537	3537	3537	3537	3537	3537	3537
R-squared	0.132	0.109	0.025	0.053	0.124	0.045	0.060

Notes: The variable $\ln(Transport\ costs\ factor_{ijt}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . The sample excludes all town-pairs that include at least one town in South Serbia. Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

in old Serbia. Agglomeration effects are slightly larger since mean population differences are larger in the restricted sample. In sum, the baseline results are robust to excluding towns in South Serbia from the sample and focusing on Serbia in its pre-1878 borders.

Trade and migration samples. One econometric concern with the full sample is that including non-trading town-pairs can cause attenuation bias in the estimated coefficients in the price-gap regressions. By the same token, including town-pairs where there is no economic motive for migration can also lead to biased results in the wage-gap regressions. For this reason, I re-estimate the baseline specifications in several restricted samples: i) town-pairs with grain price gaps higher than grain transport costs; ii) town-pairs with annual day labourer wage gaps higher than passenger transport costs; iii) town-pairs with annual mason wage gaps higher than passenger transport costs. In other words, the restricted samples include town-pairs in which a profit was to be made from grain trade or migration. The trading sample includes 3,869 town-pairs, or 80% of the full sample. The migration samples consist of 2,809 town-pairs for day labourers and 3,870 town-pairs for masons (respectively 57% and 80% of the full sample).

Table 4 presents the results of estimations with restricted samples. Models 1-3 restrict the sample to trading town-pairs; models 4-7 restrict the samples town-pairs where migration made economic sense. Restricted samples deliver results that are consistent

with the baseline interpretation. Compared to the baseline, there are some differences in the size of the estimated coefficients, but the signs and statistical significance remains unchanged. The estimated coefficients are larger in the restricted samples, suggesting some attenuation bias in the full-sample estimation. This is in line with Chilosi and Nikolić who also estimate larger transport cost effects on price gaps in restricted samples.¹⁰⁵

Table 4: Restricted samples

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $						
	Price		Subsistence	Nominal wage		Welfare ratio	
	Maize (1)	Wheat (2)	Basket (3)	Day labourer (4)	Mason (5)	Day labourer (6)	Mason (7)
$\ln(TCostfactor_{ij,t}^g)$	0.167*** (0.007)	0.146*** (0.006)	0.050*** (0.007)	0.190*** (0.015)	0.238*** (0.013)	0.158*** (0.013)	0.168*** (0.012)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $				0.085*** (0.020)	0.068*** (0.019)	0.074*** (0.018)	0.104*** (0.019)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	3869	3869	3869	2809	3870	2809	3870
R-squared	0.196	0.171	0.023	0.109	0.177	0.093	0.084

Notes: The variable $\ln(Transport\ costs\ factor_{ij,t}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . Models 1-3 restrict the sample to town-pairs with grain transport costs lower than grain price gaps. Models 4 and 6 restrict the sample to town-pairs with passenger transport costs lower than day labourer wage gaps. Models 5 and 7 restrict the sample to town-pairs with passenger transport costs lower than mason wage gaps. Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

Time fixed effects and communication infrastructure. The next set of regressions controls for unobserved time changes (such as weather or war-related shocks) with time-fixed effects, and additionally interacts time with distance to account for improvements in the communication infrastructure.¹⁰⁶ In the international trade literature, distance has been traditionally used as a proxy for transport costs. Scholars like Head and Mayer have recently argued for a broader interpretation of the effect of distance.¹⁰⁷ In their view, distance also captures unobservable impediments to trade stemming from information frictions. Having precise estimates of transport costs but lacking a measure of communication infrastructure (for example, telegraphs), I use the interaction between distance and time to control for the impact of information flows on price and wage gaps.

¹⁰⁵Chilosi and Nikolić, ‘Vanishing borders’.

¹⁰⁶Time-invariant distance drops out from these specifications since they include town-pair fixed effects.

¹⁰⁷Head and Mayer, ‘What separates us?’.

Table 5 report the results of this exercise. First, the baseline results are again confirmed. Introducing time fixed effects and its interaction with distance improves the overall fit of the regression, and increases the size of the estimated coefficients on the main regressors of interest, but it does not change the baseline interpretation.¹⁰⁸ Transport costs and urban agglomeration mattered. Second, in most specifications, the interaction between distance and year is statistically significant and estimated with a negative sign. This suggest a fall in the effect of distance over time, which is consistent with the expectation that information frictions declined over time, too.

Table 5: *Time fixed effects and communication infrastructure in restricted samples*

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $						
	Price		Subsistence	Nominal wage		Welfare ratio	
	Maize	Wheat	Basket	Day labourer	Mason	Day labourer	Mason
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(TCostfactor_{ijt}^g)$	0.243*** (0.015)	0.154*** (0.013)	0.152*** (0.014)	0.324*** (0.022)	0.420*** (0.018)	0.313*** (0.024)	0.410*** (0.019)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $				0.043** (0.018)	0.032* (0.017)	0.042** (0.019)	0.060*** (0.019)
$\ln(distance) * year$	-0.070** (0.028)	-0.041* (0.021)	0.020 (0.027)	-0.133** (0.057)	-0.238*** (0.051)	-0.212*** (0.056)	-0.219*** (0.058)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	3869	3869	3869	2809	3870	2809	3870
R-squared	0.324	0.281	0.116	0.221	0.287	0.204	0.246

Notes: The variable $\ln(Transport\ costs\ factor_{ijt}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . The interaction coefficients between $\ln(distance)$ and $year$ are multiplied by 100 to facilitate their comparison. Models 1-3 restrict the sample to town-pairs with grain transport costs lower than grain price gaps. Models 4 and 6 restrict the sample to town-pairs with passenger transport costs lower than day labourer wage gaps. Models 5 and 7 restrict the sample to town-pairs with passenger transport costs lower than mason wage gaps. Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

Migration. What role did migration play in observed wage divergence? As discussed, migration may have deepened town differences in population size or skill composition. These agglomeration effects may have offset any convergence effects of labour supply.

While inter-urban migration flows were not recorded, the population census of 1890 documented the stock of migrants in each sample town.¹⁰⁹ The census reports the number

¹⁰⁸Table S.1 in the Supporting Information online section shows that the results are virtually unchanged in specifications that introduce time fixed effects without their interaction with distance.

¹⁰⁹*Popis stanovništva u Kraljevini Srbiji 31. decembra 1890. godine*, Volume V, pp. 4-7.

of people born in a surveyed town, in another location in Serbia, or elsewhere. These data suggest that roughly two-thirds of the sample population were born in the same town they were surveyed in. There is, however, considerable variation between towns. Belgrade, for example, attracted many immigrants: only one-third of Belgrade’s inhabitants in 1890 were born in this city. On the other end, there were towns, especially in the South (Leskovac, Vlasotince, Vranje) in which more than 90% of the population was native born. This means that population growth in some sample towns depended almost exclusively on the rate of natural increase, while in others migration also significantly contributed to increasing town size.

I empirically test the impact of migration by interacting town-pair population differences with, $Migration_{ij}$, which measures how different were two towns in terms of their migration composition. Formally:

$$Migration_{ij} = 1 - \sum_{g=1}^n (m_i^g * m_j^g) \quad (5)$$

where m_i and m_j are shares of inhabitants in each of the three population groups g in towns i and j in 1890. The three groups respectively include inhabitants born in towns i or j ; born in another town in Serbia ($i \neq j$); born abroad. The variable measures the likelihood that two random individuals from two towns belong to a different group. The range is defined between 0 (no difference) and 1 (no similarity). There is a lot of variation in the town-pair migration composition, which ranges from 0.12 to 0.76.

Table 6 reports the results. Wage gaps were partially driven by the interaction of agglomeration and migration. The more town-pairs differed in their migration composition, the stronger the effect of agglomeration on wage divergence. Summing up the baseline and interaction coefficients implies elasticities of 0.4 and 0.28 for nominal and real wages of day labourers (Models 1 and 3), and 0.27 and 0.33 for nominal and real wages of masons (Models 2 and 4). When including time fixed effects (Models 5-8), the elasticities are reduced and the interaction effect for masons is no longer statistically significant at conventional levels. This means that skilled migration is somewhat related with unobserved

time changes, for example strong construction activity in particular years. Compared to Models 4-7 in Tables 4 and S.1, the sign, size, and significance of the coefficients on transport costs are practically unchanged. In sum, migration significantly contributed to urban agglomeration forces driving wage divergences. The effect appears more robust for day labourers than for masons.

Table 6: Migration effects

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $							
	Nominal wage		Welfare ratio		Nominal wage		Welfare ratio	
	Day labourer	Mason	Day labourer	Mason	Day labourer	Mason	Day labourer	Mason
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(TCost\ factor_{ijt}^g)$	0.179*** (0.016)	0.234*** (0.013)	0.152*** (0.014)	0.168*** (0.012)	0.304*** (0.022)	0.410*** (0.018)	0.304*** (0.025)	0.397*** (0.019)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $	-0.320*** (0.085)	-0.157 (0.096)	-0.184* (0.094)	-0.148 (0.099)	-0.214** (0.083)	-0.059 (0.086)	-0.128 (0.091)	-0.016 (0.090)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) * Migration_{ij}$	0.725*** (0.156)	0.426** (0.172)	0.463*** (0.168)	0.478*** (0.174)	0.466*** (0.155)	0.172 (0.156)	0.305* (0.167)	0.147 (0.163)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	no	no	no	no	yes	yes	yes	yes
Restricted sample	yes	yes	yes	yes	yes	yes	yes	yes
Observations	2692	3757	2692	3757	2692	3757	2692	3757
R-squared	0.107	0.172	0.086	0.087	0.220	0.272	0.198	0.236

Notes: The variable $\ln(Transport\ costs\ factor_{ijt}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . Odd-numbered models restrict the sample to town-pairs with passenger transport costs lower than day labourer wage gaps. Even-numbered models restrict the sample to town-pairs with passenger transport costs lower than mason wage gaps. The sample size is also reduced because of missing migration data for one sample town (Lapovo). Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

VII Conclusion

This article has shown that in times of falling transport costs prices may converge and wages diverge, even within a small country. To examine spatial inequality in prices and wages, I constructed a uniquely detailed dataset covering a panel of 42 towns across Serbia in the period from 1863-1910. The dataset includes prices of grains and household goods, and wages of day labourers and masons. Applying the welfare ratio approach, I calculated town-level real wages for skilled and unskilled workers. Workers in the capital, Belgrade, enjoyed above-average living standards. Trends in the data reveal significant convergence in grain prices and subsistence costs of living, but divergence of both nominal and real wages. These findings are consistent with New Economic Geography models, but do not support Heckscher-Ohlin predictions on factor-price-equalisation.

I estimated panel-data models to explore factors driving inter-urban differences in prices and wages. In line with a large literature on historical market integration, the main factor behind price convergence were falling transport costs. Rising inter-urban population differences increased wage gaps, and migration appears to have amplified these agglomeration effects. These findings sit well with the urban economics literature, which highlights agglomeration forces as the main source of urban wage differences.

In conclusion, the article makes three key contributions to economic history. It offers a detailed spatial dataset of prices and wages that, among other things, advances our understanding on the relative position of Southeast Europe towns in international comparisons of living standards during the First Globalisation. Further, the article provides an example where inter-urban differences in nominal and real wages of skilled and unskilled workers increased, in spite of falling spatial differences in prices and costs of living. Lastly, it documents, for the first time, a historical case in which agglomeration forces were the key driver of urban wage divergence. Identifying the exact agglomeration mechanism at work remains an important task for future work.

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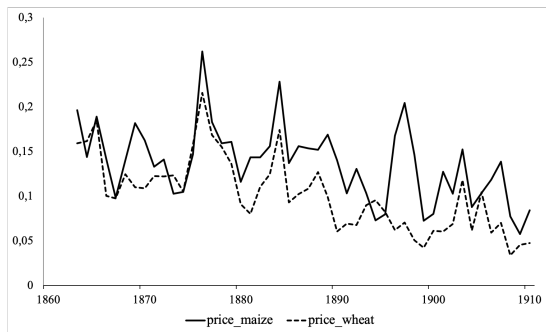
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Supporting information



Figure S.1: *Convergence trends: coefficient of variation*

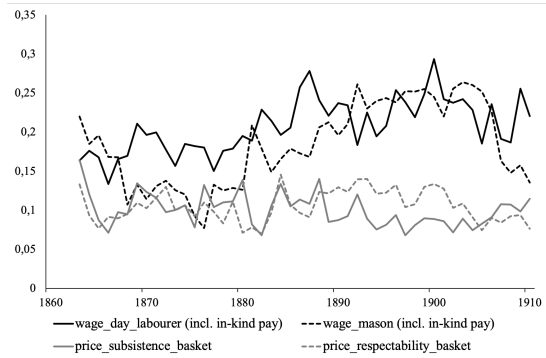
Notes and sources: figure reports the coefficient of variation for: a) prices of maize and wheat; b) money wages of day labourers and masons; c) nominal wages of labourers and masons (including payment in kind), and costs of subsistence and respectability baskets; d) welfare ratios (using subsistence baskets) of day labourers and masons. Own calculations based on sources reported in section III.



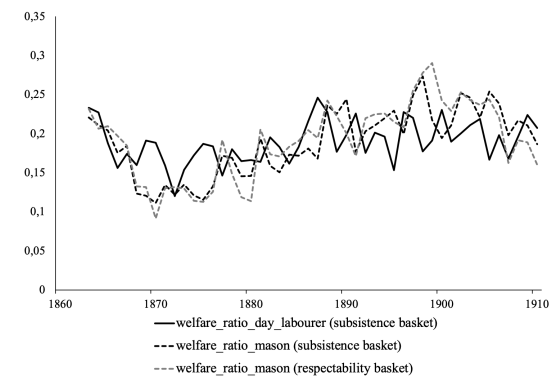
(a) Grain prices



(b) Money wages



(c) Cost-of-living and nominal wages



(d) Welfare ratios

Figure S.2: Convergence trends: coefficient of variation (balanced sample)

Notes and sources: figure reports the coefficient of variation in the balanced sample for: a) prices of maize and wheat; b) money wages of day labourers and masons; c) nominal wages of labourers and masons (including payment in kind), and costs of subsistence and respectability baskets; d) welfare ratios (using subsistence baskets) of day labourers and masons. Own calculations based on sources reported in section III.

Table S.1: *Restricted samples (with year fixed effects)*

Dependent variable:	$ \ln(\frac{y_{it}}{y_{jt}}) $						
	Price		Subsistence	Nominal wage		Welfare ratio	
	Maize	Wheat	Basket	Day labourer	Mason	Day labourer	Mason
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(TCostfactor_{ijt}^g)$	0.241*** (0.016)	0.152*** (0.013)	0.153*** (0.014)	0.323*** (0.023)	0.415*** (0.018)	0.310*** (0.025)	0.404*** (0.019)
$ \ln(\frac{Pop_{it}}{Pop_{jt}}) $				0.041** (0.018)	0.031* (0.017)	0.039** (0.019)	0.059*** (0.019)
Town-pair fixed effects	yes	yes	yes	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes	yes	yes	yes
Observations	3869	3869	3869	2809	3870	2809	3870
R-squared	0.323	0.280	0.116	0.218	0.280	0.197	0.242

Notes: The variable $\ln(Transport\ costs\ factor_{ijt}^g)$ takes the natural logarithm of transport costs between towns i and j at time t divided by the price or wage g at origin (i.e. the lower price or wage between towns i and j at time t). The variable $|\ln(\frac{Pop_{it}}{Pop_{jt}})|$ measures absolute differences in log population between towns i and j at time t . Models 1-3 restrict the sample to town-pairs with grain transport costs lower than grain price gaps. Models 4 and 6 restrict the sample to town-pairs with passenger transport costs lower than day labourer wage gaps. Models 5 and 7 restrict the sample to town-pairs with passenger transport costs lower than mason wage gaps. Standard errors, clustered by town-pairs, given in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

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