

# **Convergence and Catch-up at the Periphery? Living Standards in the Habsburg Empire, 1829 – 1910**

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**Abstract:** This paper analyses a brand new series of prices and wages for the territories once encompassed by the Habsburg Empire. Stretching back to 1829, the real wage series are the first continuous and consistent indicator of changing living standards in this part of Europe before and during the times of industrialization. The series confirm an overall West-East gradient both in terms of wages and prices. The living standards – as measured by the real wages – also declined (cross-sectionally) as one moved east and south. The differences were quite substantial with workers in the poorest province earning only 43% (in real terms) of what their Viennese counterparts earned in 1910. Differences in growth rates were even starker. Bohemia and Silesia were the fastest growing regions (at an average rate of 1% p.a.) while Croatia and Transylvania experienced a long-term decline in real wages of 0.2-0.4% p.a. Most of the growth in living standards occurred between 1850 and 1873 and again from 1896 to 1910.

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## 1. Introduction

The onset of industrialization and modern economic growth is perhaps the most important event in modern economic history. It has transformed, and is still transforming, the lives of millions through long-term increase in living standards. The British economy was the leader in this process and the origins and ingredients of its success have been studied extensively (Allen, 2009; Mokyr, 1977). All other economies were to greater or lesser extent imitators. Since the gap in wealth between Britain and the rest opened up, income disparity between countries has become a permanent feature of the world economy and the question of how to jump-start economic growth and catch-up with the leader(s) has become central to policy debate in the less developed countries.

The Habsburg Empire was one such latecomer and would-be emulator but its success in achieving long-term economic growth was uneven (Gerschenkron, 1977; Good and Ma, 1999; Schulze, 2000). The issue of modern economic growth is particularly relevant in this case because it is tied with the question of the Empire's actual existence: its demise at the end of the First World War immediately generated a debate as to whether its economy was a centripetal or a centrifugal force. Even in the industrializing parts of the empire, it is unclear how much real convergence onto the West European levels of living standard was achieved. The slow growth in laggard provinces probably increased the income disparity within the realm.

The newly constructed wage and price series, presented in this paper, shed some light on these questions. They are province-specific and span almost a century. They are well suited to address the issues of relative living standards and convergence across time – both within and without the empire. The series are geographically comprehensive, continuous in time and consistent in the chosen measure of living standard. They probably represent the most detailed series for this part of Europe in existence. The evidence suggests that economic growth began to

trickle down to the poorer strata of society in the second half of the 19<sup>th</sup> century and that the living standards doubled between 1830 and 1910.

These new series cover a lot of territory that had previously been a statistical *terra incognita*, thanks to the large geographical extent of the Habsburg Empire (see map in Figure 1). Its East-West span, from Bregenz on the Austrian-Swiss border to Suczawa in modern-day Romania, stretched 767 miles, which is equivalent to the aerial distance from the Atlantic coast to St Louis. Its North-South span of 579 miles is comparable to the distance from St Louis to New Orleans. Territorially, this was the second largest country in Europe after Russia and for most of the 19<sup>th</sup> century (until the formation of united Germany) also the second most populous.

Last but not least, because of the post-World War I developments, making the indices province-specific is perhaps more important for economic history in this part of the world than they would be elsewhere. The once-large Habsburg Empire disintegrated at the end of the Great War and was succeeded by a host of new countries, each with its separate national economy and government statistics. Since many of the new countries' borders overlapped with provincial borders of the Habsburg era, the 19<sup>th</sup> century data can be anchored onto more modern statistical information and provide valuable insight into the long-term development of the whole region.

## **2. Central European economic history in a wider context**

The present estimates can be viewed as part of a much larger project in economic history aimed at estimating and gauging the changing living standards of workers around the world (Allen, 2001; Allen et al., 2011; Lindert and Williamson, 1983; Feinstein, 1998; Se Yan, 2008; Scholliers, 1989). The roots of this project are intimately tied with the debate on industrialization and living standards, which has been raging ever since the 1840s. Many sources have been tapped and many kinds of evidence have been brought to bear on this question. But

while West-European countries have been studied relatively extensively, the Central and Eastern European record still has many gaps.

It is not for lack of trying. Sandgruber (1978) put together statistics on various aspects on production and employment in agriculture. Rudolph (1976) and Komlos (1983) published estimates of manufacturing and agricultural output. Schulze (2000) revisited the whole issue and estimated long-term growth of the Empire from 1873 to 1914. However, his output numbers are not calculated by region/province, beyond the basic split between the Cisleithanian and Transleithanian halves of the Dual monarchy.<sup>1</sup> Good and Ma (1998) and Schulze (2007) have tried to estimate provincial GDP per capita and other welfare statistics for the Habsburg Empire. They provide only five estimates in decadal intervals spanning 1870-1910. Comprehensive output series, however, rarely extend back beyond 1870 because the demands such calculations place on input statistics are rarely satisfied by the available sources from earlier years.

Another strand of research is exemplified by Komlos (1985, 1989, 2007) who presented anthropometric evidence on living standards. These papers use military records on the height of recruits. Komlos (2007) in particular sought to analyze regional disparities by looking at the birthplace of each conscript but his data do not go farther back than the birth cohorts of the 1850s and 1860s. In contrast, the data on living standards in this paper push that “frontier of oblivion” another two decades into the past, to 1829.

For the historical period in question, the real wage series are therefore a useful addition to the roster of welfare measures. They constitute perhaps the best available evidence on living

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<sup>1</sup> By the Compromise of 1867 (Ausgleich in German, Kiegyezés in Hungarian), the lands of the Crown of St Stephen (comprising Hungary, Croatia-Slavonia and Transylvania) obtained autonomy and came to be ruled from Budapest – with its own government, Parliament and administrative apparatus. Only currency, customs, army and foreign policy were joint with the Western provinces, ruled from Vienna. While most modern English-speaking historiography refers to the two halves of the Dual monarchy as “Austria” and “Hungary”, those labels are geographically imprecise and could lead to confusion later on in the paper (e.g. when I write of “Austrian provinces”, I refer only to those provinces that make up modern-day Austrian republic, not to all the provinces then ruled from Vienna). Therefore, I use the two labels (cumbersome though they are) used by contemporaries: Cisleithania for the Western part of the monarchy ruled from Vienna and Transleithania for the Eastern part ruled from Budapest.

standards. On the one hand, reconstructions of past GDP (and GDP per capita) are fraught with many problems of definition and estimation (especially in the service sector) and are certainly quite demanding in terms of component data (Guinanne, 2009). On the other hand, anthropometric measures, while straightforward in their construction, are also much trickier in interpretation. Steckel (1995) points out that there is no easy one-to-one mapping between heights and weights and “dollar-value” measures of wellbeing.

In the existing literature, several attempts have been made to assess the price and wage development in the Habsburg Empire. Jankovich (1923) was the first to try but his was an unweighted index of wholesale prices of various raw materials, spanning 1867 – 1909 and it was generally considered unsatisfactory (Good, 1974). Pribram (1938) compiled various prices (up to 1914) and some wages (up to 1800) for Vienna and the Austrian provinces. He did not combine the prices into a price index but his results were later used by Allen (2001) for his Viennese real wage series up to 1825. Mühlpeck, Sandgruber and Woitek (1979) focused on the 19<sup>th</sup> century, constructing a price index – for the cities of Vienna, Linz, Graz and Innsbruck – that runs from 1800 to 1914. Only the Viennese price index is a “full index” in that it includes housing, textiles and other consumption items. For the other cities, the price indices only include foodstuffs. Sandgruber (1982) then used the full Viennese price index to calculate real wages of local masons in the 19<sup>th</sup> century. Good’s (1974) price index for the period 1873 – 1914 also pertains only to Vienna and excludes rents. Matějček (1986) constructed his price index in order to calculate the real wages of Bohemian and Moravian miners but it only includes two goods, bread and meat. Wealth of 19<sup>th</sup> century price information is available from the Polish (then Galician) cities of Lwów (Lemberg, Lwow) and Krakow thanks to the work of Gorkiewicz (1950) and Hoszowski (1934). Again, they did not use the prices to form an index of costs of living and wages, even though these works include some nominal wage series and even scattered rent data.

Few works have looked at the cross-sectional pattern in provincial wages. Mesch's (1982) unpublished thesis reconstructs nominal wages in several provincial capitals for the period 1891 – 1914. Rauchberg (1895) also provided a cross-section of nominal wages for the Western part of the monarchy, relying on the results of the 1890 census. Neither of these works, however, adjusted the nominal wages for local prices to arrive at comparable series of real wages. Matějček (1986) and Purš (1986) strive to capture local variation in prices but they focus exclusively on the Czech lands (Bohemia, Moravia, Silesia).

All in all, the annual province-specific price and wage data presented in the paper circumvent many of the shortcomings of other measures while also extending farther back into history. They complement the previous findings and also present new questions.

### **3. Data sources**

Most of the technical details are relegated to the Appendices. The purpose of this section is to describe the data sources in general terms and to assess their reliability. The demands on the sources are, in fact, quite heavy: constructing a price index and wages series for 21 different locations across almost a century requires that a price quote or estimate be available for each of the 21 items in the consumption basket in each location in each year. Of course, in such context, some amount of interpolation will be inevitable but if the cross-sectional comparisons are to have any value, it is vital that the provincial price indices retain enough “local color”. Is that the case?

The backbone of the price series consists of two sources. The first of these is the regular annual statistical series published by the Viennese government from the 1829 onward and by the Budapest government from 1874 onward. These publications listed the average annual prices (by province in Cisleithania and by county in Transleithania) for grains, legumes, rice, potatoes, beef, wine, beer, hard wood and soft wood. Most of these were reported consistently

through time, although some changes in format did take place. For example, the prices of legumes, rice, beverages and wood were not available for the period from 1830 to 1840 while new items, such as flour, butter, sugar, petroleum and others appeared only after 1900. The geography of price reporting also changed through time: some provinces were bundled together before 1848<sup>2</sup> and prices from the Eastern provinces ceased to be reported in the Western statistics after the constitutional changes of 1867, which granted Hungary self-government. There are also a few cases when the publications change the definition of the reported prices. For example, in the Cisleithanian publications, from 1881 onward the prices are reported as pertaining to provincial capitals as opposed to the provinces generally. Similarly, the statistics published in Budapest switched from reporting the prices in each county to just reporting prices in the eleven most important cities (later extended to nineteen cities). Wherever these changes so required, the consistent, continuous price series for each province were reconstructed through interpolation and splicing, the details of which are relegated to Appendix 2.

The prices were reported as annual averages of prevailing market prices and they were collected by local authorities, *Markt-ämter* (Market offices), that were also entrusted with operating the trading locations in the various towns. It is not clear (and never clarified in these publications) how many individual observations entered into these averages and whether the individual price quotes were weighted by quantities traded at them. Where possible, I tried to cross-check the quoted prices against other sources, such as newspapers, statistical year books published by certain towns or individual provinces (Prague, Vienna, Budapest, province of Styria, province of Croatia-Slavonia etc.).<sup>3</sup> The purpose was to find out how much the reported average

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<sup>2</sup> Specifically, Salzburg had been part of Upper Austria, Carinthia had been bundled with Carniola, Silesia with Moravia and Bukowina with Galicia.

<sup>3</sup> For example, the weekly newspaper “Austria”, published between 1850 and 1870, carried local grain, wood and meat prices (as well as day wages) for various towns throughout the Habsburg Empire, and published them regularly either in quarterly or even monthly intervals. These prices came from the same market offices as the provincial averages in the annual publications but since the prices are town-level, I can calculate an independent provincial average. It turns out that

actually reflected the local provincial prices. The evidence suggests that the local prices within a province were close enough to each other so that whether the averages was simple or weighted would not make much difference. The reported “market average prices” (*Marktdurchschnittspreise*) therefore seem to be good indicators of price variation between provinces.

The second crucial source is the work of Mühlpeck, Sandgruber and Woitek (1979) (henceforth referred to as MSW). They constructed consumer price indices for four Austrian cities (Vienna, Graz, Linz and Innsbruck), spanning 1800-1914 and including 38 different goods. For some of the goods prices, they relied on the same official statistics that I use (or a related source) but they also present continuous prices series for many staples of household consumption such as sugar, salt, soap, petroleum and textiles which were not reported (or only very randomly) in the government publications. For some of these items (such as textiles), these are the only price series available. Regional variation in the price of these items is therefore not available (except for these four Austrian cities and except for official statistics after 1900) and so the provincial price indices are supplemented with the price series from whichever Austrian town was closest to each province.<sup>4</sup>

However, it is unlikely that this seriously compromises the local nature of the price indices since all of these five items together represent about 15% of the overall budget (see the following section). They were also highly tradable and, judging by the price variation in 1900 – 1910 when the official statistics did publish provincial prices of sugar, soap and petroleum, their prices did not differ much across provinces. I also rely on MSW in extrapolating the prices of

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within provinces, the differences in price between locations were not very large. Similarly, from 1894 to 1906, the main Cisleithanian statistical publication, *Österreichisches Statistisches Handbuch*, started publishing grain, potato and legume prices by town as opposed to province, which again allows for comparison between the provincial average and the price in the provincial capital.

<sup>4</sup> Specifically, Bohemian price index uses Linz prices for these five goods, Moravian and Silesian uses Viennese prices; Carinthia and Carniola use Styrian prices.



pulses, rice, beverages and wood in the years 1830 – 1840 when they were not reported in official statistical yearbooks.

Apart from these two main sources, I also relied on various local publications. They are listed in Appendix 1. Even so, for certain goods in certain periods, prices had to be interpolated. For example, from 1882 to 1893, the statistical publications report wheat, rye and oat prices only for provincial capitals and not for the province as a whole. One could reasonably expect that the capital would be somewhat more expensive than the countryside and so presuming the capital prices equal to the level in the province in general would overestimate the cost of living in the province. I have therefore looked at the relative prices in the capital and the province in general in 1877 – 1881 and in 1894 – 1898 when both provincial and capital series are available and I adjusted the 1882 – 1893 capital prices downward by whatever was the average capital city mark-up in 1877 – 81 and 1894 – 98. I used this adjustment consistently across all provinces and goods.

The resulting price series are, of course, afflicted with many shortcomings. There is very little information, for example, about the changing quality of goods consumed. This is particularly pressing in case of housing which has always been a very heterogeneous product and which underwent considerable transformation during the 19<sup>th</sup> century (in terms of indoor plumbing, construction materials, ventilation etc.). The same applies to clothing whose long-term trend was one of falling prices and – one may surmise – rising quantities consumed, even as quality improved also. There is very little that can be done about this, except assessing various scenarios that highlight how our conclusions depend on changing assumptions about these unobserved influences.

#### 4. Calculating the cost of living

The consumption basket employed in this paper consists of twenty one items: wheat bread, rye bread, oats, rice, butter, milk, potatoes, peas, beans, lentils, wine, beer, beef, sugar, salt, tobacco, heat (equated with the cheapest source of 1 BTU from among hardwood, softwood and coal), light (the cheaper of tallow and petroleum), soap, textiles and rent. This is a basket comparable to that of Feinstein (1998) for British workers, which includes 19 items. It is narrower than the 38 goods included by MSW but my subset of goods covers about 80% of the expenditures in the MSW basket.<sup>5</sup> Moreover, many of the additional items in the basket of MSW are close substitutes to some item or other in my basket (e.g. pork and beef).

As regards the weights of each good in the basket, Table 1 provides some information about the changing composition of worker households' consumption in Europe of 19<sup>th</sup> century. These are shares of overall expenditures for certain broadly defined consumption categories. Note that some of the reported budgets are based on a sample of one (e.g. Le Play's) and their information value, if taken in isolation, is practically zero. But placed in the context of a range of budget studies from the time period, it appears that the budget shares were relatively stable across time and space and even occupation. While the budgets are from around Europe, a good proportion of them comes from the former Habsburg Empire. They show that the Central-European budgets were not much different from spending patterns elsewhere. Food consistently took up over half of worker families' budgets while textiles and housing hovered around 10% (or more in large cities). Simple, unweighted average for the budget shares is shown in the penultimate row of the table. The weights that I chose for my calculations of cost of living are presented at the very bottom.

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<sup>5</sup> MSW also include three other kinds of meat, rolls and pastry, cheese, newspapers and various taxes and fees.

Shares alone are enough to construct a price index for each province but they would not allow us to compare the cost of a given consumption basket across provinces. So, on a more detailed level, I specify the actual absolute quantities of foodstuffs consumed. Such absolute quantities are much harder to come by and there is much more variation in them both geographically and inter-temporally. Table 2 gives a glimpse of the variation in food consumption. Clearly, some substitution was taking place across the 19<sup>th</sup> century. New consumption items were introduced while old ones fell out of favor. Local conditions affected, for example, the consumption of pork vs beef, wine vs beer and so on.

In specifying the absolute per capita consumption quantities in my calculations, I rely on Allen (2001, 2009) whose investigation is close in spirit to this one, even though it covers a different period and a much wider geographic area. His consumption basket is not a perfect fit for my purposes because it is clearly a pre-modern one, based on the consumption patterns of Strasbourg workers in the 1750s. It does not contain sugar or potatoes or rice, for example. However, underpinning Allen's (2009) consumption values are not only observed consumption patterns but also considerations of caloric and protein intake, which act as a suitable anchor for the values. As can be seen in Table 3, I have enhanced Allen's consumption basket by increasing the cereal consumption and by including the modern consumption items (sugar and rice). In setting these latter values, I took into consideration the consumption per capita reported in MSW for Viennese workers in 1910 – 1912. Among beverages, I increased the consumption of milk at the expense of beer and wine. This, too, is inspired by the consumption basket reported in MSW. Unfortunately, I do not have any prices for fruits and vegetables other than the pulses reported in Table 3. But while the basket is deficient in this respect, the fruits and vegetables do not usually constitute a large proportion of household budgets so the omission likely has a relatively minor effect.

As regards the actual calculation, Feinstein (1998: 634) states that a "fixed-weight (Laspeyres) index is taken to be the most suitable procedure for measuring long-run changes in workers' cost of living" and cites David and Solar (1977) in support of this view. His is an arithmetic index which, as Allen (2001: 424) points out, implicitly assumes Leontief preferences and allows consumers no room to adjust consumption in reaction to changing prices. Geometric index, i.e. a geometric average of price relatives weighted by the consumption shares, implicitly presupposes Cobb-Douglas preferences, which allows the quantity consumed to vary with price. Feinstein (1998) gets around the issue of changing consumption by producing a chained index where the bundle changes somewhat throughout the period he covers.

In my analysis, I use a fixed-weight Laspeyres index, which I calculate as a geometric average. This yields a price index for each province with the years 1898 – 1902 serving as the base for constructing price relatives. In order to be able to compare costs of living across provinces, I also calculate cross-sectional price relatives in each province compared to Vienna in 1898 – 1902 and I multiply each local provincial index by a geometric average of these cross-sectional price relatives. In this way, Viennese cost of living in 1898 – 1902 constitutes the base index value of 100 against which all years and all provinces are compared.

The "dollar value" of local cost of living is then obtained by multiplying the index value in each year by the cost of living in Vienna in the base period. In order to make the series better comparable to Allen's (2001) series of welfare ratios for various European cities, I multiplied the per-capita cost of living by three, thereby implicitly assuming a family of two parents and two children, with each child counting as half an adult. The welfare ratios introduced in the following section can then be interpreted as measuring whether such a family of four could be supported on the salary of the father alone.

## 5. Price level and its development

Before drawing any conclusions from the data, let us evaluate the new price index against previous work in the field. Figure 2 shows how the new price index compares to the index constructed by MSW and by Good (1974) for Vienna. Good's (1974) index only spans the period from 1874 to 1913 and omits housing and clothing (but includes coal, the only non-food item among the twenty goods in the consumption basket). There is clearly considerable overlap between the series in terms of changes in price level across years. In the post-1873 period, the three indices do not differ by more than a few percentage points. Prior to 1860, the difference is greater which can be accounted for by several explanations. One of them is the difference between geometric and arithmetic average, which generates the lower values for my index in the early part of the period. Second, MSW use weights from the end of the period, relying on the household budget study among Viennese workers in 1910 – 1912 which grants disproportionate weight to goods that have declined in price (and increased in consumption) considerably, such as textiles, making the past price levels relatively higher. My consumption basket reflects rather the consumption in the middle of the 19<sup>th</sup> century. Finally, there is the difference in the overall composition of the basket where MSW include 39 goods compared to 21 in my index.

Generally, the indices reveal that the price developments during the 19<sup>th</sup> century can be split into four broad sub-periods. Initially, there was a period of stagnation of prices up until mid-1840s, after which followed a period of inflation. It was punctured by two conspicuous price spikes, one in 1854 (perhaps in consequence of the Crimean War, given the visible uptick in food prices) and another one in the early 1860s (probably connected with the Civil War in the US). Prices peaked in 1873, which was also the peak of a business cycle and a beginning of a depression, commencing with the famous Viennese *Krach*. The subsequent period of deflation lasted for almost three decades. The indices differ somewhat in the timing of the nadir of price

deflation, with the MSW index placing it around 1896 while my index suggests that the price level definitively turned around only after 1903. The last decade before the First World War was a period of renewed inflation. These broad price trends reflect similar movements elsewhere in Europe. Landes (1969) points out that these price movements are often too readily identified with business cycles (or, more generally, with growth cycles), even though there is *a priori* no reason to expect overall production to be correlated with the price level. Still, the question of long, post-1873 stagnation and its contrast with the mid-century boom and the pre-First World War boom has commanded quite some attention among researchers in the Habsburg economic history (Good, 1978; Komlos, 1978; Komlos, 1983; März, 1985; Schulze, 2000). The next section will discuss whether the price trends find a comparable counterpart in the movements in real wages.

Figure 3 depicts the cost of living series for all 20 provinces or regions (and for Vienna). These are “dollar values” expressed in Austro-Hungarian currency, the Krone (K)<sup>6</sup>, and they represent the annual outlays necessary to feed, clothe and house a family of two adults and two children. As is clear from the figure, all provinces by and large shared the same trajectory even as actual price levels varied from one province to the next. In the early 1830s, the difference between the cheapest province and the most expensive province amounted to about 300 K; by 1914, this difference was still about 300 K. But the prices have more than doubled in the meantime. Clearly, some conditional convergence in price levels was taking place. The coefficient of variation for 1829 – 1832 equals 0.20, while by 1908 – 1910 it fell to 0.08. Not surprisingly, Vienna, Lower Austria (the province that includes Vienna) and the area of the bustling port of

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<sup>6</sup> The Habsburg Empire had two major currency reforms during the period in question. The first one came in 1857 when the silver content of the coin was reduced by 5% and the gulden was switched into a decadic system (with 100 kreuzers to a gulden, instead of 60, as previously). The second reform came in 1892, when the silver gulden was replaced by a golden Krone at a ratio of 1:2. All the prices and wages reported here were converted into Krone.

Trieste consistently ranked among the most expensive places to live in the Monarchy; Bukowina, Galicia and Transylvania, on the other hand, were always close to the cheap end of the list.

Figure 4 provides a different depiction of the cross-sectional variation in price levels. Along the horizontal axis, the provinces are arranged in a rough West-to-East direction (Vienna at the far left end of the axis being the exception) so that the graph offers a readily visible assessment of the frequently posited West-East, North-South gradient in economic conditions (Good, 1984). By and large, the four-year averages of costs of living do slope eastwards even though, with time, the gradient becomes ever less pronounced. In addition, there are some conspicuous outliers, such as Dalmatia on the Adriatic coast, which gradually became as expensive as Trieste, even while it was an immediate neighbor of the relatively cheap Croatia-Slavonia. This may be related to the fact that Dalmatia never had a railroad connection with the rest of the monarchy and so its price relations were more affected by the trade in the Adriatic than by the prices among its immediate neighbors.

It also seems that the Eastern half of the monarchy, Transleithania, was gradually losing its advantage of being a relatively cheap place to live. Admittedly, the price level in Hungary may have been affected by the metropolitan dearth of Budapest but even the other parts of the monarchy's Eastern half, like Slovakia and Transylvania, were catching up in terms of prices with the expensive West.

## **6. Wage trends**

Figure 5 offers a graph constructed along the same lines as Figure 4, but for nominal wages. Of all the prices needed to construct a reliable real wage series, the price of labor, the nominal wage, is surely the single most crucial statistic. Let us therefore go the extra mile to evaluate how reliable the nominal wage values actually are. As with prices, the nominal wage series present several surprises. An obvious one is Dalmatia, a province with unusually –

suspiciously – high nominal wages. Also surprising are the relatively low values reported for Bohemia, Moravia and Silesia, which were considered the most developed provinces, the true industrial powerhouses of the monarchy. Finally, there is the issue, visible in Figure 5, of the change in the relative position of Transleithania: the regions ruled from Budapest started out richer than the industrial powerhouses in 1829 – 32, but by 1908-10 ended up poorer. Before going any further, it first needs to be established that these peculiarities are not just quirky artifacts of unreliable reporting in the official statistical publications from which they are taken.

Table 4 provides a comparison of relative nominal wages in various provinces and regions as reported in three different sources. “OSH” stands for the main series, on which Figure 5 and all further analysis is based and which were extracted from the government annual yearbooks. “Austria” and “Tabak” refer to two other sources of nominal wages, brought in to corroborate or refute the official record. “Austria” was an economic and business newspaper, which published prices and the “day wage of a usual worker without food” (Taglohn eines gewöhnlichen Arbeiters ohne Beköstigung) in quarterly intervals from 1856 to 1869. The reporting was not entirely continuous (mid-1860s were missing) but – importantly – it was geographically comprehensive and detailed. The nominal wages were quoted at a town level, even if not all towns reported wages in every quarter and many provinces (such as Carniola) were represented by only one town, the capital. Still, Bohemia, Moravia and even Dalmatia were represented by two or more towns. The newspaper’s ultimate source were the same local market offices that also underlie the “OSH” statistics but their disaggregation allows for an independent calculation of provincial averages. “Tabak” is shorthand for Tabellen zur Statistik den K.K. Tabak-Monopol, a regularly published comprehensive statistic on the employment and wages in the



state-run tobacco factories in Cisleithania.<sup>7</sup> The tobacco monopoly employed between 26.000 – 38.000 employees, 90% of them women. The wages used in Table 4 refer to the wages of the roughly 3000 men of which about half worked for day wages, the other half for piece rates.

The purpose of Table 4 is to see whether the cross-sectional pattern from Figure 5 is reproduced in wage rates from other sources. The answer, for the aforementioned suspects, is mostly yes. Dalmatia still turns out to be almost as high-wage as Vienna and the Czech provinces – Bohemia, Moravia and Silesia – are reporting relatively lower nominal wages than the Austrian provinces. The relative ranking is preserved, even if individual ratios may differ. In fact, the data from “Austria” also support the official “OSH” series in the claim that Hungary, Transylvania and Croatia paid higher nominal wages, in the 1850s and 1860s, than the Czech provinces.<sup>8</sup> The wages paid out by the tobacco monopoly were more compressed across provinces, so the West-East gradient was not as steep but the Czech provinces again turn out to be close to the bottom of the table.<sup>9</sup> All in all, it is hard to blame any of the conspicuous features of nominal wages from “OSH” on misreporting. The general patterns (such as the high Dalmatian values) are persistent across the century, even through numerous revisions of statistical reporting and even in the

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<sup>7</sup> The series were published from 1860 but detailed wage information was only included from 1876 onward. There were 30 factories in operation by 1910: 2 in Vienna, 2 in Lower Austria, 1 in each of Upper Austria, Salzburg, Styria, Carinthia, Littoral and Carniola, 2 in Tyrol, 7 in Bohemia, 6 in Moravia and 5 in Galicia. Wage data from all of these are included in the calculations for Table 4. No tobacco factories were present in Silesia, Bukowina and Dalmatia. The Budapest government had its own tobacco administration, the data for which are not currently available.

<sup>8</sup> In case of “Austria” and “OSH”, even the actual provincial averages are very close to each other. The fact that “Austria” and “OSH” have the same ultimate source obviously accounts for a big portion of that similarity. Still, the local detail reported in “Austria” allows one to check whether the official, “OSH” values suffer from any compositional biases: if all Hungarian values consisted merely of the readings from Budapest while Bohemian wages were an average of many local observations, then the comparability would be problematic. But that is not the case: “Austria” reported Hungarian wages from up to 6 places at once, such as Arad, Debrecen, Pecs, Buda, Szolnok, Oradea; Bohemian wages similarly came from Cheb (Eger), Litomerice, Pisek, Pardubice, Prague, Liberec (Reichenberg) etc. Moravian readings came from Olomouc (Olmütz), Trebic, Brno, Novy Jicin (Neutitschein), Jihlava (Iglau) and others. In all these provinces, the local variation in the nature and number of places reported is very similar.

<sup>9</sup> The “Tabak” wages were industrial wages, so they were also considerably higher than the rates reported in “Austria” or “OSH”. They also displayed a faster growth in late 19<sup>th</sup> and early 20<sup>th</sup> century. In fact, in comparison with Sandgruber’s (1982: 125) Viennese data, which are specified by individual industrial sectors, it seems that the government paid its male tobacco workers even higher wages than the local machinery industry.

various sources brought to bear on the question here. Whatever oddities there are, are therefore probably real economic puzzles, rather than statistical puzzles.

Given all this, let us revisit Figure 5 and evaluate the record of nominal wages. Here the West-East gradient is even more pronounced than was the case with prices. Clearly, the nominal wage differences were the crucial determinants of relative living standards in the cross-section, with the varying price levels only attenuating the differences. The same holds true across time: the dividing line between leaders and laggards lies in the development of nominal wage rate. The successive values show that, by and large, nominal wages in the West were growing. In some periods, the growth was very close to zero, such as between 1872-75 and 1887-90, but overall, growth was the rule. This was not the case in Transleithania where, in the second half of the 19<sup>th</sup> century, nominal wages seemed to be treading water and it was only after 1902-05 and up to the First World War that there was a clear increase in the price of labor. The overall gap between the province with the highest and the lowest nominal wages did not change much across the century. The lowest nominal wages in 1829 – 1832 were paid in Galicia and they represented about 33% of the nominal wage in the highest paid Dalmatia. By 1908 – 1910, this ratio had only reached 38%, although at one point, in 1873, the ratio between the lowest and the highest grew to 51%.

The descriptions of trends in prices and in nominal wages are the necessary building blocks for a proper analysis of changes in real wages and living standards. Specifically, I measure both in terms of the welfare ratio. This is a ratio between the annual nominal earnings of an adult male, calculated as the day wage times 250 days of labor per year, and the costs of living of the four-piece family defined above. A value of 1 implies that the family of four could be supported on the man's salary alone.

Figure 6 shows that such par value was never reached in any of the provinces of the Habsburg Empire. Vienna and Dalmatia were close at various points during the 81 years covered

by data but even they fell short.<sup>10</sup> At the low end of the spectrum are Bohemia and Silesia in the early part of the period; later on, the dubious distinction of being the poorest provinces passed onto Galicia and Transylvania.

The relative position of individual provinces is actually quite surprising. First, there is the continuously high living standard in Dalmatia, which, as has been previously noted, is a result of very high nominal wages but relatively low price levels. The record in the early part of the time period shows that high living standards were characteristic for all the provinces on the Balkans, including Croatia-Slavonia and Banat (Serbian Voivodina). Even Transylvania was close to the top. In all these provinces, living was cheap (Figure 4) while nominal wages were moderately high (Figure 5). The record also indicates that, with the exception of Dalmatia, these provinces were not able to maintain their living standards and by the end of the period, all appear close to the bottom of the list, with Transylvania being by far the poorest.

The Czech provinces – Bohemia, Moravia and Silesia – are almost perfect opposites. These were provinces with low living standards in the 1830s and 1840s, with welfare ratios hovering between 0.2 and 0.3. These were clearly low-wage provinces (judging by Figure 5), together with Bukowina and Galicia. But unlike Bukowina and Galicia, they had high cost of living, comparable to the levels in neighboring Austrian provinces, such as Lower and Upper Austria.

The upshot, highlighted by Figure 7, is that there was a small-scale “reversal of fortunes” taking place within the Habsburg Empire during the 19<sup>th</sup> century. Those provinces, that have always been deemed the industrial powerhouse of the monarchy (Bohemia, Moravia, Silesia), had started from very modest beginnings but by 1910 pulled themselves up considerably. On the other hand, we have the unindustrialized, backward eastern and southern provinces, which

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<sup>10</sup> The values are obviously dependent on the underlying assumptions about workdays per year and the relative consumption of children and adults. These are just scalars, however, so they do not affect the relative position of individual series.

apparently enjoyed relatively good standards of living prior to industrialization but which lost ground – relatively, and even absolutely in some cases – during the course of the 19<sup>th</sup> century. In fact, all of Transleithania seems to have been mired in long-term stagnation throughout the period in question: the Eastern welfare ratios never decisively broke out of the narrow interval of 0.4 to 0.6.

How well does this picture, painted by real wage data, correspond to other measures of economic development for this region? The real wages can be compared with Schulze's (2007) provincial GDP per capita.<sup>11</sup> There is no strong *a priori* theoretical reason why GDP per capita should be correlated with the wages of day laborers, but if economic growth is driven by productivity-enhancing technological change and if it does in fact trickle down and improve the living standards of the population at large, then one of the channels it can be expected to work through is the marginal product (and hence the price) of labor. Table 5 shows that the cross-sectional correlation is relatively strong and positive in the year 1910, especially if the outlying Dalmatia is left out. For 1870, however, the welfare ratios – whether constructed with the full or a limited basket for the cost of living – are not correlated with Schulze's GDP per capita at all.

It is telling, however, that the correlation of Schulze's GDP per capita with my series of nominal earnings is markedly higher for both 1870 and 1910. One potential explanation that could account for the pattern of correlations lies in the cross-sectional differences in price levels. In constructing his real GDP figures, Schulze (2007) obviously discounted his nominal aggregates by the one CPI that was available to him, that of MSW. This index, as Figure 3 showed, captures well the changes in price level across time for any given province. But it does not convey any

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<sup>11</sup> The provinces as specified in Schulze's (2007) are identical to the ones used here for the Western, Cisleithanian part of the monarchy. In the East, his geographical division is finer than mine, splitting Hungary proper into three areas (Rechts-Donau Ufer, Donau-Theis-Beck and Links-Theiss-Ufer). For the purposes of further analysis, I compare my Hungarian data with Schulze's (2007) aggregate for these three regions, my Western Slovakia with his Links-Donau-Ufer, Eastern Slovakia with Recht-Theiss-Ufer and my Banat with his Theiss-Maros-Beck. Croatia-Slavonia and Transylvania are defined identically in both papers.

information about cross-sectional differences in price levels. My welfare ratios do account for these differences. Therefore, one could perhaps say, with some inevitable simplification, that the difference between Schulze's GDP p.c. values and my welfare ratios is akin to a difference between living standards being measured at exchange rates on one hand (where, of course, the exchange rate inside a single-currency area is one) and at purchasing power parity on the other (with the province-specific cost of living indices in Figure 3 reflecting the local prices of non-tradables, such as rent or perishable foodstuffs, as befits a PPP calculation).

Still, that does not address the issue of Dalmatia, which in all the figures stands out as having suspiciously high living standard. The correlations in Table 5 highlight the stark contrast between the living standards in this province measured by real wages versus measured by GDP per capita: Schulze (2007) concludes that Dalmatia was by far the poorest province by his metric. On the other hand, Komlos (2007) calculates the average height of Austro-Hungarian conscripts by province of origin and shows that Dalmatian conscripts were by far the tallest – almost 169 cm, in contrast to 164.5 cm of Viennese conscripts. The anthropometric record of biological living standards therefore corroborates the evidence from welfare ratios.

In truth, Dalmatia was odd in more ways than one. It was ruled from Vienna as an exclave among Budapest-ruled provinces, enjoying ready access to sea routes while being disconnected from mainland railroads (Jaszi, 1929). Contemporaries considered Dalmatia poor and underdeveloped (Rauchberg, 1895: 128). Fiedler (1903: 23, 25) writes of “poor fishermen’s cottages on the coast”, “meager industrial development and low purchasing power” of the local population. However, he also notes that Dalmatia, thanks to its peculiar territorial situation, enjoyed special trading privileges and lower tariffs (which co-existed with extensive smuggling anyway) and was overall much more integrated with the maritime Adriatic economy than with the Habsburg monarchy. It also enjoyed lower taxes on certain consumption goods such as wine

and spirits. While these facts highlight the peculiarity of Dalmatia, they better explain the province's prices rather than wages. Rauchberg (1895: 128) argued that the reported wages were misleading in areas of low development because most of the local population were personal servants (paid mostly in kind) and the data on market wages were generated in the tiny sliver of the labor market that was monetized and that pertained to specialized and/or seasonal workers. But there is little seasonality apparent in the Dalmatian wages as reported in the (quarterly) data in the "Austria" newspaper. And if the high reported wages only conceal true low earnings, then it is hard to explain why the Dalmatian men should be, on average, three inches taller than their Galician counterparts (Komlos, 2007) who also lived in a province with "meager industrial development", reported low wages and enjoyed no tariff exemptions. Dalmatia remains an enigma.

## **7. Patterns of growth**

Figure 8 reports the average per annum growth rates in real wages in each province over the period under study. They are simple time trends in logs of provincial real wages. The map highlights yet again the contrast between the West and the East. Western provinces, such as Bohemia and Moravia, started from relatively poor position but ended somewhere in the middle of the pack thanks to high rates of average growth rates. In the East, the growth record is very dismal and there were three provinces, where real wages declined in the long run. The growth picture is in line with the usual characterizations of the modernizing industrializing West and the lagging East.

The long-term averages hide considerable variation in growth rates across time. I have already mentioned, in Section 5, the usual periodization of European – not just Austro-Hungarian – economic development. The "usual suspects" for structural breaks are the abolition of the robot, or forced labor, in 1848, the great *Krach* of the stock exchange in the 1873 and the nadir of

a recession in 1896. These supposed turning points are viewed as game-changers primarily because they were harbingers of significant institutional reforms. This is most obvious in case of the 1848 abolition of the robot, one of the few lasting outcomes of the revolution of that year and a definitive break with whatever fossilized remnants of the second serfdom had outlived their usefulness. The change was associated with numerous administrative changes and followed by a decade of liberalizing reforms, deregulation and privatization. The year 1873 marked a turning point in these liberalizing efforts. The fallout of the depression of the 1870s led to the return of regulation, including limits on joint-stock enterprises, re-nationalization of railroads, return to active tariff policy and later to labor market regulations in the 1880s. The mid-1890s are perhaps the hardest to associate with significant institutional change even though the years were noted for heightened ethnic strife and dragged-out political stalemate which was then eased, among other things, by an extensive program of public works (Gerschenkron, 1977). 1896 was also a year of a major tax reform.

While I refrain from making any claims as to causation, I offer the most basic empirical test of structural breaks in growth rates in Table 6. Reported here are the growth rates of real wages, as obtained from simple regressions of log real wages on time trend and dummy variables for each of the periods (except the first). Bold print signifies a growth rate that was statistically different from the growth rate in the immediately preceding period. The results are instructive. Growth in real wages indeed picked up significantly in the second period compared to the first. In fact, the years prior to 1848 were almost universally years of stagnation or mild decline, with the conspicuous exception of Galicia, the early industrializers Styria and Tyrol and large parts of the Kingdom of Hungary.<sup>12</sup> It is quite remarkable that the uptick in growth rate after 1848 was almost entirely confined to the Western, Cisleithanian part of the monarchy even though most of

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<sup>12</sup> Interestingly enough, in Hungarian historiography, the period 1825 – 1848 is usually called the Reform Era and is associated with numerous efforts at modernizing the ancient kingdom.

this period still preceded the political compromise of 1867, which made the Habsburg Monarchy Dual. Komlos (1983) argues that, for all intents and purposes, the East-West split of the Empire was a *fait accompli* already in the late 18<sup>th</sup> century when Hungary was left out of the centralizing efforts of the Maria Theresa and Joseph II but on the other hand, the 1850s were a decade when the extent of political integration and centralization – and this time inclusive of Hungary – was at its zenith. The abolition of serfdom and the post-1848 reforms had long been hailed as important moves toward modernization in modern historiography. Komlos (1983: 11), on the other hand, analyzed levels of production in various sectors and concluded that these changes “cannot be viewed as a watershed in the development of either sector of the economy”. The rising real wages suggest that some productivity gains must have occurred, so if the overall production did not change, perhaps some other costs increased to offset the efficiency gains on the part of labor.

The breaks in growth path in 1873 and 1896 are much less pronounced. Growth did slow down in 1873 – 1895 compared to the previous period but not by much. Similarly, the swansong growth after 1896 was faster but not significantly so compared to the previous twenty-odd years. Schulze (2000) argues that the Cisleithania and Transleithania alternated in their growth pattern, with the East enjoying relatively faster growth after 1873 when the West was stagnating and the West then picking up after 1896. If the Eastern part of the monarchy did indeed grow faster post-1873, that growth apparently did not extend to the real wages of day laborers. Their wages only started growing significantly after 1896. That last period seems to be the only time when the Eastern provinces outpaced the Western ones.

## **8. Convergence**

Was there convergence or divergence in living standards in the Habsburg Empire? The problem of convergence in the sense of Barro (1991) has generated considerable academic literature. As a theoretical concept, it was subject to some important clarification. Friedman



(1992) and Quah (1993) stressed the distinction between  $\beta$ -convergence and  $\sigma$ -convergence, noting that the latter implies the former but not vice versa. Empirically, Sala-i-Martin (1997) probed the depths of conditional  $\beta$ -convergence, distinguishing between explanatory variables that did have staying power across specifications and those that did not. Practically, convergence in living standards is a question that touches upon the quality of life and the inequality of living standards in the countries across the world. In the more limited case of the Habsburg Empire, it also touches upon the realm's very existence. Jaszi (1929) argued that the economy had the potential to be a strong centripetal, integrating force while Taylor (1948) pointed out that the union of all these lands and kingdoms under one scepter was a result of no more than historical accident with very little common economic interest or logic to underpin it.

Let us start with  $\sigma$ -convergence. Figure 9 shows the coefficient of variation of the cost of living. This provides some information about the extent and direction of convergence in prices. Recall that a good portion of the consumption basket consisted of non-tradables, such as rent and easily decaying foodstuffs. Nonetheless, prices were clearly converging across the empire, regardless of whether the non-tradables are included in the basket or not. The business cycle produced considerable fluctuations around the underlying trend, however. This is most visible in the late 1840s and early 1850s, a time of economic depression, revolution and war. The fast rate of convergence, as evidenced by Figure 3, came from the sudden dearth in the provinces whereby the local costs of living caught up with Vienna.

In Figure 10, the exercise is repeated, this time for the welfare ratios and for provincial GDP per capita, calculated by Schulze (2007). Here the record is more mixed. Some  $\sigma$ -convergence across the empire was taking place in the first half of the relevant period. But already the 1850s saw a trend towards divergence and it was only the boom of 1867 – 73, which brought the provinces closer together. Even this development was short-lived, however, and

from the late 1870s onward the coefficient of variation rarely fell below 0.2. Note that this lack of convergence is primarily due to the economic non-integration in the Eastern half. The West did see some convergence after 1879 even though most of that was just a movement to get back to where the economy was at the peak of the boom in 1873. In Transleithania, however, the convergence ceased by 1849, the end of the Reform Era. The coefficients of variation of GDP per capita mostly corroborate the overall trends, with relatively little convergence taking place in Transleithania in the last four decades before the First World War.

The rate of convergence varied with time. To calculate how fast it was, I estimated a simple Barro (1991) equation, based on the well-known approximation of the transitional growth process in a neoclassical growth model:

$$g_i = x_i + \frac{1 - e^{-\beta T}}{T} \ln \frac{y_i^*}{y_{i,0}}$$

where  $g_i$  is the growth rate,  $x_i$  is the steady-state growth rate in per capita income (dependent, in the Solow model on local savings rate, population growth rate and capital depreciation rate), the logarithm captures the gap between a steady state output per worker and the initial level of output and  $T$  is the length of the observation interval. From a regression estimate of the fraction, one can back out  $\beta$ , the rate of convergence, which Barro and Sala-i-Martin (1991) argued usually lands close to 2% per year. When something converges at 2% per year, half the gap closes about every 35 years.

Table 7 is the regression report. Population growth controls for the steady state growth rate,  $x_i$ .<sup>13</sup> The coefficients of interest are in the first line: they all have the expected sign and are mostly statistically significant at 5%. They are used to calculate the implied  $\beta$ . Clearly, even when convergence was taking place, it was relatively slow and it was mostly confined (as observed in

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<sup>13</sup> Ideally, the steady state should be controlled for by the addition of the savings rate and the capital depreciation rate. The lack of relevant data on that forces the assumption that they were constant across provinces and are therefore subsumed under the constant.

Figures 9 and 10) to the Western half of the monarchy. As a reference point, Barro and Sala-i-Martin (1991: Table 1) show that over the period 1880 – 1988, the US states converged at a rate 1.75% per year. The Habsburg monarchy converged at a slower rate (1.02% per year) and even then most of that convergence was confined to the middle quarter of the century, 1848 – 1873. When considering the convergence rate without Dalmatia, the implied half-time of convergence is 25 years.

## **9. Conclusions**

The economic development of the Habsburg Empire has been a subject of intense debate ever since the empire's demise. Good (1984) was quite optimistic about the realm's economic record, speaking of its "economic rise", while Schulze (2000) is much more skeptical.

The present series of prices and real wages are an important addition to the existing data on the 19<sup>th</sup> century economic development in this corner of Europe. While the new information bolsters the prevailing view in some aspects (such as the West-East gradient of living standards just before the Great War), there are also some conspicuous surprises. Perhaps the most intriguing ones are the relatively low real wages of the early industrializers, like Bohemia and Moravia, and the rather high real wages observed – at least at the beginning of the period – in many Southern provinces, like Dalmatia and Croatia. It remains to be seen whether future research will corroborate or correct these findings. While the price and wage series go some way towards establishing the basic facts about the changing living standards, the more important and interesting questions in future research will be those of causation.

The evidence presented here shows that the Western provinces of Habsburg Empire were able, by and large, to launch on the path of sustained economic growth in the 19<sup>th</sup> century. But the growth does not seem to have been particularly spectacular or sustained. At the same time, it was uneven across provinces. While some saw their fortunes change significantly for the better

(Bohemia, Moravia, Silesia), others – in the East – lagged behind and maybe even declined (Transylvania, Banat, Croatia). It is hard to see the record of living standards (as measured by real wages) as one of convergence. And the location of the most obvious declines – the South-East of the monarchy – invites the interesting speculation about the possible connections between the ethnic strife in the Balkans and the lackluster economic performance in that same area in the decades preceding the First World War.

All this points rather towards the pessimistic assessment of the monarchy. The slow and uneven growth record not only must have meant that the empire was lagging behind its western rivals but that it also failed to unite the provinces through modernization. The convergence record, like the growth record, is mixed at best – and not much convergence seems to have taken place after mid-1870s. To be even more specific, the failure to grow and integrate falls especially strongly on post-1873 Transleithania. What that implies about the cherished and jealously guarded Hungarian self-government gained through the 1867 Compromise is an interesting problem for future research.

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## Appendix 1 – Description of sources and their abbreviations

In the following account, when referring to groups of provinces, I use “western” and “Cisleithanian” as synonyms for provinces which from 1867 onward were ruled from Vienna; similarly, “eastern” and “Transleithanian” are group adjectives for all regions and territories ruled from Budapest. The two labels derive from the river Leitha, which was seen as a (moreless symbolic) border between the two halves of the Dual monarchy after the Compromise of 1867.

As regards the geography of the provinces, the borders did change somewhat during the century or so under study and that affected statistical reporting. Specifically, Salzburg province was merged with Upper Austria and ruled from Linz until 1849. Consequently, official statistics quote only one average provincial price (for each good) for these two provinces. Given that Upper Austria was five times larger than Salzburg in terms of population, I take the price quote to reflect, by and large, the Upper-Austrian price levels. After 1849, Salzburg province had its own statistics and the prices turn out to be about 10 – 20% higher than in Upper Austria. I therefore estimate the pre-1849 Salzburg prices by marking up the pre-1849 Upper-Austrian prices by whatever was the price differential for each good in 1849 – 1854. Similar problem occurs with Moravia and Silesia which were also merged before 1849 (where Moravia was more than four times larger than Silesia), with Carinthia and Carniola (Carniola was 1.5 times larger) and with Galicia and Bukowina (Galicia being more than ten times more populous than Bukowina) – and in each case the solution is analogous to that with Salzburg and Upper Austria. Vorarlberg, a tiny province at the far-western end of the Monarchy, is always subsumed under Tyrol in the statistics, so no separate price or wage series is available for this province. Fortunately, even though the layout of statistical reporting changed through time, the borders of individual component provinces did not change and so the various provincial names consistently refer to the same territories throughout the period.

In the East, the situation was somewhat more complicated. To begin with, the three basic units were the Kingdom of Hungary, Transylvania (*Siebenbürgen, Erdély*) and Croatia-Slavonia. In 1849, the Habsburgs also created a new province, Serbian Voivodina and Temeser Banat (or Banat for short), in the south of Hungary (around the city of Timisoara in modern-day Romania). Soon after the Hungarians gained autonomy in 1867, they abolished the province again (as they did with Transylvania) but since their published statistics provide ample geographic detail for most of the period, it is still possible to reconstruct local prices in what used to be Banat and Transylvania. At the same time, the southern border of the monarchy was guarded by a long, centre-less, amorphous strip of land called the Military frontier (*Militärgrenze*), an anachronistic outgrowth of Austro-Turkish Wars of 17<sup>th</sup> and 18<sup>th</sup> centuries, which was ruled directly from Vienna and which was demilitarized and incorporated into Croatia and Banat in the 1870s and early the 1880s. This clearly constitutes a change in provincial borders. The disadvantage is that the definition of Croatia and Banat changed through time but on the plus side, the tight grip of Vienna on the Military frontier ensured that a full slate of statistics from this area was regularly published even in times when the Transleithanian price record grew thin due to revolution, war or civil disobedience on the part of the Hungarians (as it did in late 1840s and throughout the 1860s). I therefore use the Military frontier prices to interpolate Croatian and Banat prices in times when they are missing.

Moreover, modern-day Slovakia never constituted a separate province within the Kingdom of Hungary (even though the current Slovak-Hungarian borders do largely follow the sometime borders of smaller administrative units, the Comitats/Varmegye) and so no province-level prices appear in any of the statistics for the regions I call Eastern Slovakia and Western Slovakia. For those areas, the data consist of prices quoted for “Hungary” prior to 1874 and of prices in Nitra



(Neutra, Nyitra) and Banska Bystrica (Neusohl, Besztercebánya) (with a little help from prices from Bratislava-Pressburg-Pozsony) in the Western Slovakia and in Košice (Kaschau, Kassa) in Eastern Slovakia after 1874.

### **Official statistical publications:**

The following publications were either one-time publications for a special occasion (such as tax reform or currency reform) or they were published annually, as official government statistics. The cited years show the publication range. For better orientation in the following section, I have introduced abbreviations (in parentheses) for the most important publications. The backbone of official statistics in the Western (Cisleithanian) part of the monarchy consisted of the TSOM-SJOM-OSH series, which span the period 1841 – 1914. Darstellung (1829) was an unpublished precursor of these series. Until 1867, these annual publications presented statistics for the whole monarchy, east and west. After the Hungarians won their autonomy in 1867, they started their own series of official publications in 1874 (USJ). These series contained annual averages (sometimes even monthly averages) of the same products as the Western publications, except in 1877 when no prices were published (they had to be interpolated) and in 1893 when the prices were published in MSK (1895) – Mezőgazdasági Termelése. The agricultural wages for 1896 were obtained from von Matlekovits (1900).

Darstellung der Österreichischen Monarchie in Statistische Tabellen (abbreviated “Darstellung”), 1829

Tafeln zur Statistik der Österreichischen Monarchie (abbreviated TSOM), 1841 – 1865

Statistisches Jahrbuch der Österreichischen Monarchie (SJOM), 1862 – 1881

Österreichisches Statistisches Handbuch (OSH) 1882 – 1914

Tafeln zur Statistik der Steuerwesens im Österreichischen Kaiserstaate (abrev. “Steuerwesens”), 1858

Statistische Tabellen zur Denkschrift über die Directe Steuern in Österreich und ihre Reform (abbrev. “Denkschrift”), 1860

Statistische Tabellen zur Währungs-Frage der Österreichisch-ungarischen Monarchie (abbrev. Währungs-Frage), 1892

Tabellen zur Währung-Statistik, 1893

Statistická příruční knížka královského hlavního města Prahy/Statistisches Handbuch der kgl. Hauptstads Prag (Statistical Handbook of the Royal Capital of Prague – SH Prague), 1871 – 1903

Statistisches Jahrbuch der Stadt Wien (SJ Vienna), 1877 – 1906

Tabellen zur Statistik den K.K. Tabak-Monopol (Tabak-Monopol), 1861 – 1910

Statistički Ljetopis za godinu 1874/Statistisches Jahrbuch für das Jahr 1874 (abbrev. “Ljetopis”), Zagreb 1876

Stenographisches Protokoll der Enquête über die Reform der Gebäudesteuer (abbrev. Protokoll), Wien 1904

Statistische Mittheilungen über Steiermark (abbrev. “Steiermark”), Statistisches Landesamt der Herzogthums Steiermark, 1895 – 1908, Leuschner & Lubensky, Graz

Magyar Statistikai Évkönyv/Statistisches Jahrbuch für Ungarn/Ungarisches Statistisches Jahrbuch (USJ), 1874 – 1913

### **Statistical periodicals (journals and papers)**

These publications were more frequent periodicals. Some of them, such as the *Mittheilungen aus den Gebiet der Statistik* were basically expert, or scientific, press while for example “Austria” was a just a regular weekly (although its period of publication changed).

Austria, *Wochenschrift für Volkswirtschaft und Statistik*, 1855 – 1869

Hivátalos statisztikai közlemények (HSK), 1873

Magyar statisztikai közlemények – Mezőgazdasági Termelése (MSK), Budapest 1895

*Mittheilungen aus den Gebiet der Statistik* (MGS), 1850 – 1872

*Mittheilungen des K.K. Finanz-Ministeriums* (MFM), 1903 – 1906

Statisztikai közlemények (SK)

Statisztikai és nemzetgazdasági közlemények (SNK)

### Monographs and articles:

**Gorkiewicz, Marian.** *Ceny v Krakowie w latach 1796 – 1914*, Nakladem Poznanskiiego Towarzystwa Przyjaciół Nauk, 1950

**Hoszowski, Stanislaw.** *Ceny we Lwowie w latach 1701-1914*, Skład glówny: Kasa im. Rektora J. Mianowskiego, 1934

**Jankovich, Bela von.** “Index-number von 45 Waaren in der österreich-ungarischen Monarchie (1867 – 1909) (system Sauerbeck)”, *Bullettin de L’Institut International de Statistic* XIX, Le Haye 1923, pp. 136 – 156

**Kőrösi, Josef.** *Beiträgen zur Geschichte der Preise*, Pest 1873

**Matějček, Jiří.** “Reálné mzdy horníků uhelných dolů v českých zemích do roku 1914”, *Hospodářské dějiny* 14, 1986, pp. 217 – 319

**Matlekovits, Alexander von.** *Das Königreich Ungarn volkswirtschaftlich und statistisch dargestellt*, Leipzig 1900

**Mühlpeck V., Sandgruber R. and Woitek H.** “Index der Verbraucherpreise, 1800 – 1914” in *Geschichte und Ergebnisse der zentralen amtlichen Statistik in Osterreich 1829-1979*, Kommissionsverlag, Österreichische Staatsdruckerei, Vienna, 1979

**Schebek, Edmund.** *Beiträgen zur Geschichte der Preise*, Prague 1873

**Valenčič, Vlado.** *Zitna trgovina na Kranjskem in ljubljanske zitne cene od srede 17. stoletja do prve svetovne vojne*, Slovenska akademija znanosti in umetnosti, Ljubljana, 1977

### Archival sources:

SAS – Composition of consumption basket of north-Bohemian miners

III – 0497 – archival fund Severočeská akciová společnost v Mostě (Nordböhmisches Kohlen-werks Gessellschaft in Brux), inv. č. 455 (karton 112): Ceníky potravin a propočty výdajů za měsíc na jednu osobu, 1897 – 1900, 1911 – 1912; SOKA Litoměřice – pobočka Most (District Archive Litoměřice – branch Most, Czech Republic)

## Appendix 2 - Detailed price sources

### Wheat, rye, oats:

Darstellung for 1829; TSOM for 1841 – 1865, SJOM 1862 – 1881 (only Cisleithania from 1867 on); Ljetopis for 1871 – 1874 for Croatia and Military frontier; USJ for 1874 – 1914 for Transleithania; OSH 1882 – 1914 for Cisleithania; Gorkiewicz (1950) for Krakow; Hoszowski (1934) for Lwiw; Valenčič (1977) for Ljubljana; Kőrösi (1873) for Budapest up to 1872; Schebek (1873) for Prague up to 1872 (wheat only); Währungs-Frage (1892) for 1830 – 1840; MSK (1895) for Transleithania in 1893; HSK for Transleithania in 1870-71?

As mentioned the TSOM-SJOM-OSH series provide the main source of prices. Prices were usually quoted as annual averages in each province until 1877. From then on until 1882, prices were quoted separately for each provincial capital and for the rest of each province (“das übrige Land”). From 1882 onward, only capitals were listed. From 1894, OSH also quoted a list of cereal prices in various small local marketplaces in each province. I take a simple average of those as the provincial cereal price and use the capital price to bridge the gap from 1882 to 1894, adjusting for the capital-city mark-up. The Transleithanian government in Budapest published separate series in USJ for 45 marketplaces all over Transleithania from 1870s onward. In 1894, they limited their series to only a few cities (Budapest, Arad, Debreczen, Košice, Cluj, Oradea, Pécs, Bratislava, Szabadka, Szeged, Timisoara). For these 11 cities, I can construct a (moreless) continuous series of prices from 1870 to the First World War and they form the core of my regional prices for the Kingdom of Hungary. For Croatia, I have no information on prices from 1874 until 1898 when USJ added Zagreb to their roster of cities.

### Bread (wheat and rye)

MSW for Vienna, Graz, Innsbruck and Linz; Matějček (1986) for Prague (rye bread only); OSH for Cisleithanian provinces 1898 – 1909; USJ for Transleithanian provinces 1894 – 1912; Gorkiewicz (1950) for Krakow; Hoszowski (1934) for Lwiw; bread prices for all other provinces and time periods were estimated using Allen’s (2001) bread equation using available prices of bread, the local price of wheat (resp. rye) and local day wage. I used a fixed-effects model with AR(1). For completeness’ sake, I report the location fixed effects below together with all other regression coefficients.

Table A1 – Bread equation regression report		
	Wheat bread	Rye bread
Wheat / rye price (per 100 kg)	0.0079	0.0063
Day wage	0.0198	0.0277
<b>Period fixed effects</b>		
1834 - 1838	0.0310	0.0182
1839 - 1843	0.0307	0.0213
1844 - 1848	0.0491	0.0310
1849 - 1853	0.0538	0.0380
1854 - 1858	0.0781	0.0499
1859 - 1863	0.1349	0.0732
1864 - 1868	0.1433	0.0720
1869 - 1873	0.1617	0.0838
1874 - 1878	0.1356	0.1099
1879 - 1883	0.1705	0.1140
1884 - 1888	0.1629	0.1054
1889 - 1893	0.1610	0.1004
1894 - 1898	0.1430	0.1123
1899 - 1903	0.1514	0.1135
1904 - 1908	0.1381	0.1171
1909 - 1912	0.1518	0.1353
<b>Location fixed effects</b>		
Budapest	-0.0243	-0.0074
Brno	0.0000	0.0000
Cluj	-0.0534	-0.0334
Czernowitz	-0.0222	0.0215
Graz	-0.0777	-0.0105

Innsbruck	0.1145	0.0299
Klagenfurt	0.0569	-0.0017
Kosice	-0.0423	-0.0243
Krakow	0.0483	0.0356
Ljubljana	0.0238	0.0330
Lwiw	0.0446	-0.0061
Linz	-0.0983	0.0521
Nitra	-0.0557	-0.0362
Prague	0.1928	-0.0111
Salzburg	-0.0297	-0.0086
Timisoara	-0.0394	-0.0196
Trieste	0.0283	0.0531
Opava (Troppau)	0.0617	-0.0162
Vienna	-0.0088	-0.0155
Zagreb	-0.0071	0.0006
Zara	-0.0081	0.0004
Constant	0.0045	0.0175
N	455	569
Groups	21	21
R-sq	0.51	0.75

### Rice

MSW for Vienna in 1829 – 1910, for Upper Austria (Linz series), Styria (Graz series) and Tyrol (Innsbruck series) in 1829 – 1840, TSOM-SJOM-OSH thereafter; for all other western provinces, TSOM-SJOM-OSH are the main source for 1841 – 1909, OSH (1912: 349) in particular provides provincial time series on rice price spanning 1902 – 1912; for Transleithania, USJ provides rice prices from 1894 onward; for Hungary, Croatia and Transylvania, TSOM-SJOM provide prices intermittently for 1849 – 1869 and for Banat in 1849 – 1859; for all other provinces and time periods, prices were interpolated using existing series from a neighboring province or Vienna, using the price differential between the two locations from periods when both provincial series are available.

### Butter

MSW for Vienna, Lower Austria (Vienna series), Upper Austria (Linz series), Styria (Graz series) and Tyrol (Innsbruck series); OSH for Cisleithanian provinces for 1901 – 1909; USJ for Transleithanian provinces in 1898 – 1913; von Jankovich (1923) for Littoral in 1867 – 1909; SH Prague for Bohemia in 1874 – 1899; for Galicia, Gorkiewicz's (1950) Krakow prices from 1829 to 1855 and Hoszowski's (1934) Lwiw prices from 1856 to 1910; Kőrösi's (1873) Budapest prices for Hungary in 1829 – 1851; for other periods of time I interpolate using prices neighboring province (Viennese prices for Lower Austria, Moravia, Banat, Western Slovakia, Eastern Slovakia, Croatia-Slavonia, Transylvania and Hungary; Linz prices for Salzburg; Graz prices for Carinthia, Carniola and Littoral; Krakow prices from Gorkiewicz (1950) for Silesia; Galician prices for Bukowina; Littoral prices for Dalmatia)

### Milk

MSW for Vienna, Lower Austria (Vienna series), Upper Austria (Linz series), Styria (Graz series) and Tyrol (Innsbruck series); Prague prices for Bohemia from SH Prague in 1874 – 1903; Hoszowski's (1934) Lwiw prices for Galicia in 1832 – 1841 and 1867 – 1910; USJ for

Transleithanian provinces from 1894 onward; Kőrösi's (1873) Budapest prices for Hungary in 1829 – 1851; for all other time periods and provinces I interpolate using prices neighboring province (Vienna prices for Moravia, Banat, Western Slovakia, Eastern Slovakia, Croatia, Transylvania and Hungary; Linz prices for Salzburg and Bohemia; Graz prices for Carinthia, Carniola, Littoral and Dalmatia; for Silesia and Bukowina I combine Hoszowski's (1934) Lwiw prices and the Vienna prices from MSW)

### Potatoes

Darstellung for 1829; Währungs-Frage for 1830 – 1840; TSOM-SJOM-OSH for 1841 – 1914 (Cisleithanian provinces only from 1867); MSW for Vienna; Ljetopis for Croatia and Military frontier in 1871 – 1874; USJ for Transleithania from 1874 onward; for all other time periods and provinces I interpolate using prices neighboring province (Military frontier prices for Banat and Croatia; Hungarian prices for Eastern and Western Slovakia; Bukowina prices for Transylvania in 1860 – 1871; Lower Austrian prices for Hungary when Hungarian prices are missing in the period 1849 – 1870)

As with cereals, provincial potato prices were replaced, in the Cisleithanian publications, with prices from provincial capitals in 1882 and were not resumed until 1898. I use the prices from capitals to bridge the gap in 1882 – 1898 in reconstructing the provincial prices. Also, my series differ from those in MSW for Upper Austria and Styria because I consistently report the price of the (cheaper) old potatoes while MSW switch from old to new potatoes at various points in their series, which instantaneously doubles the price of this item (this has become apparent when I compared their potato prices with those quoted in Steiermark (1899: 146)).

### Peas, Beans and Lentils

TSOM-SJOM-OSH for 1841 – 1914 (Cisleithania only from 1867); MSW for Vienna, Lower Austria (Vienna series), Upper Austria and Salzburg (Linz series), Styria (Graz series) and Tyrol (Innsbruck series) from 1882 onward; Ljetopis for Croatia and Military frontier in 1871 – 1874; for the period from 1830 to 1840 I interpolate using prices neighboring province (Vienna series for Moravia, Vienna lentils and beans prices for Silesia, Galicia, Bukowina, Western Slovakia from 1882 to 1898; Linz series for Salzburg, Bohemia; Graz series for Carniola, Littoral and Dalmatia; Gorkiewicz's (1950) Krakow pea series for Silesia, Bukowina, Western Slovakia – up to 1848; Military frontier prices and Kőrösi's (1873) Budapest prices for Banat and Croatia-Slavonia in 1829 – 1848; Galician and Kőrösi's (1873) Budapest prices for Eastern Slovakia; Budapest and Bukowina prices for Transylvania); for Hungary in 1860 – 1871, I use Lower Austrian prices.

### Wine and beer

From 1841 onwards, TSOM-SJOM-OSH quote highest and lowest price in each year for both wine and beer, I use the midpoint; after 1900, OSH publishes the average; MSW prices for Vienna, Linz, Graz and Innsbruck which are compared with the provincial prices and used for local interpolation when local provincial prices are not available; Ljetopis for Croatia and Military frontier in 1871 – 1874; for 1830 – 1840, I interpolate using prices from neighboring provinces (Vienna series for Lower Austria, Moravia; Vienna wine price Silesia, Galicia and Bukowina; Linz series for Salzburg, Bohemia; Graz series for Carinthia, Carniola, Littoral and Dalmatia; Gorkiewicz's beer price for Silesia and Bukowina; Military frontier and Kőrösi's (1873) Budapest prices for Banat and Transylvania; Kőrösi's (1873) Budapest prices for Hungary and Croatia/Slavonia); for period 1860 – 1871, I use Lower Austrian prices for Western and Eastern Slovakia and Vienna prices for Hungary and Military frontier prices for Banat

## Beef

Darstellung for 1829; Währungs-Frage for 1830 – 1840; TSOM-SJOM-OSH for 1841 – 1914 (Cisleithanian provinces only from 1867); MSW for Vienna; USJ for Transleithania from 1874 onward; Kőrösi's (1873) Budapest prices for Hungary; Ljetopis for Croatia and Military frontier in 1871 – 1874; for all other time periods and provinces I interpolate using prices neighboring province (Military frontier prices for Banat and Croatia; Hungarian prices for Eastern and Western Slovakia; Bukowina prices for Transylvania in 1860 – 1871; Lower Austrian prices for Hungary when Hungarian prices are missing in the period 1849 – 1870)

## Sugar

TSOM-SJOM-OSH series include the provincial prices of sugar only for years 1900 – 1910, all other years had to be collected or interpolated from other sources; USJ published sugar prices from 1897 onward; for the whole period, I rely on MSW for Vienna, Lower Austria, Upper Austria (Linz series), Styria (Graz series) and Tyrol (Innsbruck series); for 1874 – 1909 I rely on SJ Prague for the price of sugar in Bohemia; I interpolate Salzburg, Bohemian prices using Linz series from MSW; Carinthian, Carniolan, Littoral and Dalmatian prices using Graz series from MSW; Moravian, Silesian, Galician, Bukowinan prices from Vienna series in MSW; for Transleithanian provinces, I interpolate the pre-1897 prices using Viennese prices in all of Transleithania

## Salt

No provincial salt prices were quoted in TSOM-SJOM-OSH series throughout the period; USJ published local salt prices from 1894 onward; I use Kőrösi's (1873) Budapest prices for Hungary for the period 1829 – 1851; for the whole period, I rely on MSW for Vienna, Lower Austria, Upper Austria (Linz series), Styria (Graz series) and Tyrol (Innsbruck series); for provinces where no local salt prices are available, I equate Salzburg, Bohemian prices with Linz series from MSW; Carinthian, Carniolan, Littoral and Dalmatian prices with Graz series from MSW; Moravian, Silesian, Galician and Bukowinan prices with Vienna series in MSW; for Transleithanian provinces, I interpolate the pre-1894 prices using Viennese prices in Banat, Transylvania and Croatia-Slavonia; I also use Kőrösi's (1873) Budapest prices on salt in 1829 – 1851 and MSW Viennese prices in 1852 – 1893 to interpolate prices in Eastern and Western Slovakia and in Hungary

## Tobacco

Darstellung for 1829; TSOM for 1841 – 1859 (no data for 1860); Tabak-Monopol for the period 1861 – 1879; USJ from 1875 onward (one series for Hungary, one for Croatia-Slavonia)

## Hardwood and Softwood

Darstellung for 1829; TSOM-SJOM-OSH for 1841 – 1910 (Cisleithania only after 1867); for period 1830 – 1840 I use MSW for Vienna, Upper Austria (Linz series), Styria (Graz series), Tyrol (Innsbruck series); for softwood in Bohemia, I use Schebek's (1873) Prague prices; for Galicia in 1830 – 1840, I use Gorkiewicz's (1950) Krakow prices; for Hungarian hardwood, I use Kőrösi's (1873) Budapest oak prices for 1831 – 1870; Ljetopis for Croatia and Military frontier in 1871 – 1874; I also use MSW Vienna series to interpolate Moravian prices in 1830 – 1840, Linz series to interpolate Salzburg and Bohemian prices in 1829 – 1848, Graz series to interpolate Styrian, Carniolan, Littoral and Dalmatian prices in 1830 – 1840, Carinthian prices in 1829 – 1848, Gorkiewicz's (1950) Krakow prices to interpolate Silesian and Bukowina prices in 1829 – 1848;

from TSOM-SJOM-OSH, Military frontier prices are used to interpolate Banat and Croatian-Slavonian prices in 1829 – 1849 and 1860 – 1871, MSW Vienna series to interpolate East- and West-Slovakian prices in 1829 – 1840 and 1860 – 1871, Bukowina prices to interpolate Transylvanian prices in 1829 – 1840 and 1860 – 1871.

Exact wood prices are difficult to obtain because of the inconsistent (both across time and space) measurements of the unit of consumption. Most sources quote the price per “1 nieder-österreichische Klafter”, i.e. one Lower-Austrian fathom which is a volume 6 feet in length (approx. 1.86 m) and 6 feet in width but with height varying by province. MSW argue that the most usual practice was for the wood to be 3 feet (36 inches) high. Local variations persisted, however, so it is important to ensure that, whatever the local height, the eventual price series are properly converted into comparable units. For example, SJOM (1874) notes that the Carinthian wood price is quoted for wood that was “zwölfzölliges”, i.e. 12 inches high when sold. The publication does not make clear whether the quoted price was for an already converted, more regular 36-inch fathom or not. MGS (1852: 18) suggests that the conversions had already taken place because it reproduces the table of prices from TSOM (1850) practically verbatim, except for the label on the wood prices, which it specifically describes as quotes for a 36-inch fathom for all provinces.

### Coal

I use TSOM-SJOM-OSH for provincial coal prices in 1900 – 1908; USJ has coal data from 1894 onwards; MSW is the source for coal prices for Vienna for the whole period, for Linz in 1860 – 1914 (with gaps), for Graz in 1846 – 1914 (with gaps); I also use Schebek's (1873) Prague prices for 1829 – 1870 and SJ Prague for period 1874 – 1900; Hoszowski's (1934) Lwiw coal prices in 1866 – 1910; von Jankovich's (1923) Budapest coal prices for Hungary in 1866 – 1890; for all other periods I interpolate coal prices using prices from neighboring provinces (Viennese series for Moravia; Linz series for Salzburg, Tyrol; Graz series for Carinthia, Carniola, Littoral and Dalmatia; Gorkiewicz's (1950) Krakow series for Silesia; Hoszowski's (1934) Lwiw series for Bukowina; Hungarian series for Eastern and Western Slovakia)

### Heat

The hardwood, softwood and coal prices, described above, are used as inputs in calculating the overall price of heat in millions of British thermal units (1 BTU = 1055 J). The rates of conversion are as follows:

$$1 \text{ m BTU} = 0.157 \text{ m}^3 \text{ hardwood} = 0.241 \text{ m}^3 \text{ softwood} = 41.23 \text{ kg coal}$$

In my calculations of the cost of living, I consider these three fuels to be perfect substitutes and so the price of heat is whichever is the lowest, cheapest way to buy 1 BTU.

### Light (tallow candles and petroleum)

For most provinces (specifically for Lower Austria, Salzburg, Styria, Carinthia, Carniola, Littoral, Tyrol, Moravia, Dalmatia, Banat, Eastern and Western Slovakia, Croatia-Slavonia and Transylvania) I use (without any further adjustments) MSW Vienna series or I combine the Viennese data with scattered local prices; other than that, for Bohemia in 1883 – 1908 I use Prague prices of petroleum in SJ Prague; for Galicia, I use Hoszowski's (1934) petroleum prices from Lwiw from 1869 onwards; Kőrösi's (1873) Budapest tallow prices for Hungary in 1829 – 1850 and Währungsfrage tallow series for Budapest in 1866 – 1876

## Soap

Only scattered information is available about the local price for soap in Cisleithania; MSW offer continuous series of soap prices for Vienna, covering the whole period, which I use (without any adjustments) in Lower Austria, Styria, Carinthia, Carniola, Littoral, Moravia and Dalmatia; for Upper Austria and Salzburg, I use MSW Linz series from 1876 onwards and Vienna series before that; for Tyrol, I combine MSW Vienna series with scattered price quotes for Innsbruck in MSW; for Bohemia, I use the Prague soap price from SJ Prague in 1874 – 1897 and MSW Vienna prices in all other years; for Silesia, Galicia and Bukowina, I use Gorkiewicz's (1950) Krakow soap prices for 1829 – 1868, MSW Vienna series until 1875 and MSW Linz series thereafter; I also use Kőrösi's (1873) Budapest soap prices for Hungary, Eastern Slovakia and Western Slovakia in 1829 – 1850, combined with MSW Vienna prices in 1851 – 1893 and then local prices reported in USJ from 1894 onward; for Banat and Transylvania, I use MSW Vienna prices for 1829 – 1893 and local price from USJ from 1894 onward; for Croatia, I use MSW Vienna prices until 1897 and local price from USJ from 1898 onwards

## Textiles

I use the same MSW series for the whole period and for every province. It is an equally weighted index of the price of loden, cotton and linen.

## Rent (Housing)

MSW for Vienna, Graz, Linz and Innsbruck; Protokoll (1904: 767) for Vienna – this source contains data on total rent revenue for the I. – X. and XX. District which MSW use to calculate their rent per capita; for Prague, I use SH Prague to obtain similar statistic – total rental revenue in a given year and divide it by population to obtain per capita rent; for all other provincial capitals, I get total rental return for 1856 and 1858 from Steuerwesens (1858) and Denkschrift (1860) respectively and from MFM in years 1803 – 1906; all other years are interpolated (see below)

Expenses on living quarters represent the most important single item in the budget while at the same time being the most elusive among the price series. Housing has historically been a very heterogeneous good, a problem that is compounded by the immense technological changes that housing construction underwent during the 19<sup>th</sup> century (e.g. internal plumbing). Needless to say, the constructed price indices will not be able to make justice to that. In addition, housing is perhaps the quintessential non-tradable good, which means that prices can differ considerably across markets.

MSW proxy for housing costs by calculating, for each of the four cities they consider, the rental revenue per capita. They rely on the fact that all provincial capitals (as well some other towns) were subject to a tax on rents. In any of the towns, more than 90% of houses were taxed and since not all of these were actually rented out, the law required government officials to construct estimated rent revenues based on the going market rate. Continuous series of this “officially ascertained rental return” that span the entire period are only available for Vienna. For Graz and Linz, they are only available continuously between 1872 and 1894. In addition, I have constructed analogical series for Prague from the city's annual statistics, spanning 1821 – 1903.<sup>14</sup> Apart from these four series, rental data on all other provincial capitals are only available

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<sup>14</sup> Both the rental return and the city population (as well as the per capita rent calculated from them) change abruptly (and lose comparability across time) when growing cities incorporate their suburbs. For that reason, the series mentioned above pay atten



(by fortunate historical coincidence) for 1856, 1859 and 1903 – 1906. Since two of these data points are relatively close to the beginning of the period and the rest close to the end of it, they provide some information about the relative rents in various towns and about the long-term trend. Throughout the 19<sup>th</sup> century, rents rose in line with the growing population but the rate of growth differed from place to place, with large cities experiencing the fastest growth. I use the scattered data points to estimate the long-term growth rate of rents in each individual city, interpolate the trend in rents and then I superimpose year-to-year fluctuations from the series for Vienna, Graz, Linz and Prague. This, of course, leaves much to be desired but at least it provides some indication of relative value of rents across time and space. I consider this a better course of action than either leaving the rents out altogether or using the same Viennese rent series in all places.<sup>15</sup> Given that housing costs represent about 10 – 20% of the household budget, overestimating rents by, say, a factor of three (as would be the case, for example, if the Linz series were replaced by the Viennese ones in the index for Upper Austria) would bias the index upward by as much as 40%.

### Nominal wages

Darstellung for 1829; Währungs-Frage for 1830 – 1840; TSOM-SJOM-OSH for 1841 – 1910 (after 1867, Cisleithanian provinces only); USJ for Transleithania from 1874 onward; Ljetopis for Croatia and Military frontier in 1871 – 1874; Sandgruber (1982: 125) and Mesch (1982) for Vienna, Salzburg, Graz, Trieste, Brno, Lwiw for 1891 – 1914 (these are industrial wages in large cities); Hoszowski's (1934) skilled and unskilled wages for Lwiw for 1829 – 1910; for Transleithania in 1893, I used MSK (1895) – Mezőgazdasági Termelése, and for 1896 I used Matlekovits (1900); for all other periods (particularly 1882 – 1910) and provinces, I interpolate nominal wages using data from neighboring provinces (see below for more detail): Salzburg wages for Upper Austria, Graz wages for Carinthia, Brno wages for Silesia, Lwiw wages for Bukowina, Trieste wages for Carniola and Dalmatia.

The official statistical publications do not specify, in their early editions, what sort of wages they are reporting (whether agricultural or industrial). The caption simply speaks of “lowest day wage” (Geringster Taglohn). The statistic is split into two columns: “with food” (mit Kost) and without food” (ohne Kost). In 1881, the caption changed into simple “Taglohn”, dropping the adjective “geringste”, without this change producing any significant break in the series. So it does not follow that the change in caption was accompanied with any change in definition of the statistic. It is quite likely, however, that the series represent wages in agriculture. From a purely practical matter, the agricultural sector was for most of the period and for most provinces by far the most important source of employment. As late as 1880, the only province (excepting Lower Austria which includes Vienna) with more than half of the population working outside agriculture was Bohemia, and even there the agricultural sector employed 47.4% (Sandgruger, 1978: 222). The form of reporting also suggests agricultural wages: MGS (1869: 57) notes that separating the mit Kost/ohne Kost categories of wage labor is the usual way of reporting wages in the agricultural sector. On that note, it is telling that the Viennese nominal wage in TSOM-SJOM-OSH are consistently available only for “ohne Kost”, as industrial workers in large cities were probably not used to receive part of their wage in the form of a lunch. The two instances where wage statistics are explicitly quoted with a sectoral label are the OSH (1892: 139) which reports agricultural wages in 1891 and OSH (1913: 148) which reports industrial wages in 1899

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<sup>15</sup> Allen (2009) constructs his historical price index by avoiding any estimation of rents altogether. Instead, he mentions that such costs amounted to no more than 5% of overall spending (p. 38) and accordingly augments the cost of his consumption basket by a factor of 1.05.

– 1912. Sandgruber (1982: 125) extended these series for Vienna (for various industrial sectors) to 1892. The situation was different in Hungary where USJ is explicit that the reported wages are agricultural wages.

Like all other prices in the TSOM-SJOM-OSH series, the wage rate, too, was first (in 1829 – 1877) reported for the whole province, from 1877 to 1881 separately for the province at large and for the provincial capital, and from 1882 onward for the capital alone. This change did produce a break in the series with the provincial capitals clearly paying higher wages than the countryside. The readings for these individual cities tend to be fairly constant, with the same one value being quoted sometimes for more than a decade. Rauchberg (1895: 127) notes that the 1882 law on worker insurance required local authorities to determine the local “customary day wage” (der übliche Taglohn) as a basis for calculating the various social transfers and that these were then used by the Statistical Commission in its reports. The constancy of reported wage rates could therefore be a product of bureaucratic inertia. This does not mean that the numbers are completely unreliable, given that the period was one of stagnating or declining prices and so employers could pay higher wages even as nominal wages stayed relatively constant.

In those few years, when the wage rates from provincial capitals and provincial countryside overlap, the wage rates in provincial capitals are (not too surprisingly) higher. In order to provide a consistent measure, I adjust the city wages down by whatever is the city premium in year 1877 – 1881 when the two series are co-reported. As a result, the levels of the wages are determined by the series up to 1877 and the 1891 values from OSH (1892: 139), while the year-to-year fluctuations are those of the (probably industrial) wages from provincial capitals.

The calculations for Transleithania were somewhat different because USJ did not split statistics by provinces but by districts (Comitats), which only occasionally correlate with the geographical areas defined in this paper.

**Table 1 - Budget shares of major consumption groups (in %)**

Occupation	Location	Year	Source	Foods and beverages	Housing	Clothing	Fuel	Light	Cleaning & pers. hygiene	Other expenses
workers	Strasbourg	1745-54	Allen (2009: Tab. 2.1)	78.8	5.0	4.6	4.4	6.9	0.1	0.2
36 Euro Budgets	Europe	1829-1854	Gruber (1887)	59.7	8.2	17.3	5.0		1.9	7.9
76 British budgets	Britain	1840-1854	Horrell (1996: Tab. 5)	65.0	10.5	6.0	4.5	4.5		9.5
Miner	Idria, Carniola	1846	Le Play (1879)	56.6	4.8	13.3	4.5	1.4	0.5	18.9
Caster	Slovakia	1846	Le Play (1879)	56.9	3.9	19.8	2.5	0.6	0.1	16.2
Peasant	Hungary	1846	Le Play (1879)	60.6	4.4	12.1	4.4	1.0	1.0	16.5
Factory workers	Zwickau, N. Bohemia	1847	MGS XVI (1869: 55)	66.7	3.3	10.0	15.8	4.2	NA	0.0
Cotton weaver, family of 5	Northern Bohemia	1847	Purš (1986: 86)	69.6	6.9	11.7	3.5	4.1	1.4	2.8
Carpenter	Vienna	1853	Le Play (1879)	63.5	14.4	5.7	3.5	2.7	5.3	4.9
235 Belgian budgets	Belgium	1853	Gruber (1887)	65.8	8.8	13.3	5.5		3.3	3.3
Various workers	Britain	1858/62	Feinstein (1998)	73.0	13.0	9.0	4.0	1.0	NA	0.0
Ind. workers (family of 4)	Vienna	1869	MSW, Tabelle A 9.5	54.9	20.1	12.5	5.0	7.5		
62 miners & metal workers	Prussian Silesia	1875	Gruber (1887)	60.6	7.0	15.6	4.6		NA	12.2
235 factory workers	Prussian Silesia	1876	Gruber (1887)	61.0	7.6	13.6	7.1		NA	10.7
33 budget studies	Germany	1829-1883	Gruber (1887)	59.4	9.9	13.3	5.5		3.4	8.5
16 factory workers	NO Bohemia	1882-1883	Singer (1885: 128)	64.0	9.4	10.5	8.2		4.6	3.3
Workers	Vienna	1910-12	MSW	59.4	14.8	9.2	4.4	0.2	2.8	9.2
Average				63.3	8.9	11.6	4.0	2.0	2.2	7.8
<b>Agricultural worker</b>	<b>Habsburg Empire</b>	<b>1829-1910</b>	<b>This paper</b>	<b>66.0</b>	<b>10.0</b>	<b>9.0</b>	<b>6.0</b>	<b>3.0</b>	<b>5.0</b>	<b>1.0</b>

<b>Table 2 - Quantities of food consumed</b>				
Source	Allen (2009)	MSW	SAS	MSW
Location	Strasbourg	Habsburg Empire	North Bohemian miners	Vienna
Time period	1750s	1860	1890 - 1897	1910 - 1912
Cereals total	234.0	158.6	228.0	115.5
Potatoes	0.0	66.4	180.0	35.1
Meats and Fats	26.0	25.6	44.4	34.9
<b>Staples total</b>	<b>260.0</b>	<b>250.6</b>	<b>452.4</b>	<b>185.5</b>
Legumes/Pulses	39.0	0.0	12.0	2.5
Other vegetables and fruites	0.0	66.6	0.0	0.0
Fruits and vegetables total	39.0	66.6	12.0	2.5
<b>Foods total</b>	<b>299.0</b>	<b>317.2</b>	<b>464.4</b>	<b>188.0</b>
Milk & Cheese	5.2	8.3	108.0	142.5
Wine and Beer & Spirits	182.0	74.6	0.0	56.4
<b>Total drinks</b>	<b>187.2</b>	<b>82.9</b>	<b>108.0</b>	<b>198.9</b>
<p>Note: The 1860 numbers pertain to average per capita consumption calculated from total production and net imports and population. The 1890 – 1897 numbers came from a study into worker living standards, conducted by the management of a mining company. The 1910 – 1912 value also come from a survey of working class households. Sources: MSW stands for Mühlpeck, Sandgruber and Woitek (1979). For SAS see list of archival sources in Appendix 1.</p>				

<b>Table 3 - Consumption basket</b>		
<b>Item</b>	<b>Allen (2009)</b>	<b>This paper</b>
Wheat bread (kg)	234	40
Rye bread (kg)		200
Oatmeal (kg)		10
Rice (kg)	0	5
Butter (kg)	5.2	4
Milk (lit)	5.2	65
Potatoes (kg)	0	61
Peas (kg)	39	1.8
Beans (kg)		3
Lentils (kg)		1.5
Wine (lit)	0	10
Beer (lit)	182	100
Beef (kg)	26	30
Sugar (kg)	NA	9
Salt (kg)	NA	11

Table 4 - Provincial nominal day wages by source, relative to Vienna (Vienna = 1)

Period	Source	Lower Austria	Upper Austria	Styria	Carinthia	Carniola	Littoral	Tyrol	Bohemia	Moravia	Silesia	Galicia	Bukowina	Dalmatia	Hungary	Western Slovakia	Eastern Slovakia	Croatia/ Slavonia	Banat	Transylvania
1856-1860	OSH Austria	0.79	0.71	0.71	0.70	0.71	0.82	0.83	0.54	0.45	0.41	0.44	0.51	1.01	0.71	0.63	0.62	0.89	0.85	0.66
		0.82	0.88	0.75	0.71	0.82	1.11	0.99	0.56	0.56	0.47	0.52	0.56	0.98	0.74	0.74	0.78	0.88	0.94	0.78
1861-1865	OSH Austria	0.73	0.70	0.64	0.65	0.62	0.72	0.85	0.51	0.39	0.39	0.39	0.45	1.01	0.60	0.53	0.50	0.80	0.64	0.49
		0.77	0.91	0.82	0.82	0.70	0.74	1.04	0.62	0.52	0.48	0.50	0.44	1.05	0.67	0.61	0.61	1.10		0.64
1866-1870	OSH Austria	0.83	0.73	0.71	0.68	0.64	0.79	0.83	0.58	0.48	0.50	0.44	0.48	1.09	0.67	0.60	0.53	0.85	0.76	0.56
		0.81	0.92	0.81	0.72	0.66		1.00	0.58	0.63		0.61	0.51	0.88						0.68
1876-1880	OSH Tabak	0.79	0.76	0.66	0.67	0.60	0.68	0.83	0.59	0.45	0.47	0.40	0.46	0.94	0.62	0.48	0.43	0.00	0.70	0.45
		0.95	0.75	0.69	0.79	0.92	0.73	0.78	0.69	0.71		0.53								
1881-1885	OSH Tabak	0.76	0.74	0.65	0.64	0.58	0.65	0.78	0.57	0.45	0.47	0.38	0.42	0.92	0.63	0.49	0.46	0.00	0.69	0.44
		0.75	0.71	0.61	0.76	0.76	0.63	0.68	0.65	0.62		0.53								
1886-1890	OSH Tabak	0.77	0.77	0.66	0.64	0.61	0.68	0.82	0.57	0.50	0.50	0.41	0.43	0.93	0.59	0.48	0.49	0.00	0.66	0.43
		0.89	0.76	0.64	0.76	0.74	0.70	0.70	0.66	0.63		0.52								
1891-1895	OSH Tabak	0.77	0.74	0.65	0.65	0.61	0.71	0.80	0.55	0.51	0.50	0.42	0.45	0.89	0.50	0.42	0.49	0.00	0.52	0.41
		0.96	0.77	0.67	0.77	0.80	0.73	0.67	0.70	0.70		0.50								
1896-1900	OSH Tabak	0.77	0.72	0.65	0.65	0.61	0.71	0.78	0.56	0.50	0.49	0.43	0.47	0.87	0.48	0.42	0.46	0.48	0.46	0.37
		0.81	0.71	0.63	0.71	0.77	0.68	0.63	0.68	0.66		0.48								
1901-1905	OSH Tabak	0.77	0.75	0.68	0.68	0.63	0.78	0.81	0.58	0.52	0.50	0.47	0.51	0.96	0.46	0.44	0.51	0.52	0.46	0.37
		0.79	0.73	0.66	0.68	0.75	0.64	0.64	0.68	0.65		0.51								
1906-1910	OSH Tabak	0.77	0.78	0.71	0.71	0.66	0.80	0.84	0.59	0.55	0.53	0.51	0.56	0.98	0.55	0.50	0.55	0.53	0.52	0.39
		0.84	0.82	0.70	0.69	0.81	0.68	0.71	0.69	0.68		0.55								

Note: "OSH" stands for the main official statistical series (TSOM-SJOM-OSH – see Appendix 1 and 2). These are the nominal wages used in sections

4 and 5. "Austria" was an economic and business newspaper that reported various prices and daily wages in quarterly intervals in years 1855 – 1869. "Tabak" stands for the statistical publications on the tobacco monopoly published by the government from the year 1860s onwards. See Appendix 1 for more details. The values in the table are ratios of local nominal day wage and the Viennese nominal day wage in each period as reported in these various sources. The purpose is to compare and corroborate the official wage data in the OSH source against other sources.

<b>Table 5 - Cross-sectional correlations with Schulze's (2007) results</b>		
	GDP p. c.	
	<b>1870</b>	<b>1910</b>
WR - Full basket	-0.111	0.283
WR - Full basket, w/o Dalmatia	0.110	0.571
WR - Food only	-0.131	0.391
WR - Food only, w/o Dalmatia	0.007	0.676
WR - Omitting rent	-0.086	0.351
WR - Omitting rent, w/o Dalmatia	0.099	0.719
Nominal earnings	0.169	0.289
Nominal earnings, w/o Dalmatia	0.424	0.644



<b>Table 6 - Changing growth rates in real wages in the provinces of the Habsburg Empire</b>				
	1829 - 1848	1849 - 1873	1874 - 1895	1896 - 1910
Vienna	-0.44%	<b>1.23%</b>	1.24%	0.46%
Lower Austria	-0.36%	<b>1.41%</b>	0.76%	0.28%
Upper Austria	-0.15%	<b>0.61%</b>	0.55%	<b>1.17%</b>
Salzburg	-0.14%	<b>0.74%</b>	-0.16%	<b>1.09%</b>
Styria	0.72%	0.52%	0.69%	0.73%
Carinthia	-0.52%	<b>0.66%</b>	0.56%	0.39%
Carniola	-0.24%	0.10%	<b>0.72%</b>	0.90%
Littoral	-0.23%	0.12%	<b>1.22%</b>	1.11%
Tyrol	0.23%	<b>0.77%</b>	0.19%	0.78%
Bohemia	-0.18%	<b>1.30%</b>	0.54%	0.73%
Moravia	-0.61%	<b>0.91%</b>	<b>1.61%</b>	0.62%
Silesia	-0.77%	<b>2.11%</b>	0.83%	0.71%
Galicia	0.52%	0.75%	0.84%	1.34%
Bukowina	-1.20%	<b>0.59%</b>	0.08%	<b>1.77%</b>
Dalmatia	-1.86%	<b>1.44%</b>	0.01%	<b>0.75%</b>
All Cisleithania	-0.35%	<b>0.88%</b>	0.65%	0.86%
Hungary	0.82%	0.32%	-0.73%	<b>1.50%</b>
Western Slovakia	0.19%	0.12%	-0.40%	<b>1.69%</b>
Eastern Slovakia	0.30%	-0.37%	<b>1.16%</b>	1.54%
Croatia/Slavonia	-0.30%	0.14%	0.14%	<b>1.38%</b>
Banat	-0.45%	<b>-0.35%</b>	-1.14%	<b>1.27%</b>
Transylvania	0.71%	-1.24%	<b>0.06%</b>	0.47%
All Transleithania	0.21%	-0.23%	-0.27%	<b>1.34%</b>

Note: Cisleithanian and Transleithanian growth rates are unweighted averages of provincial growth rates. Highlighted growth rates are those that were statistically significantly different from the growth rate in the previous period.

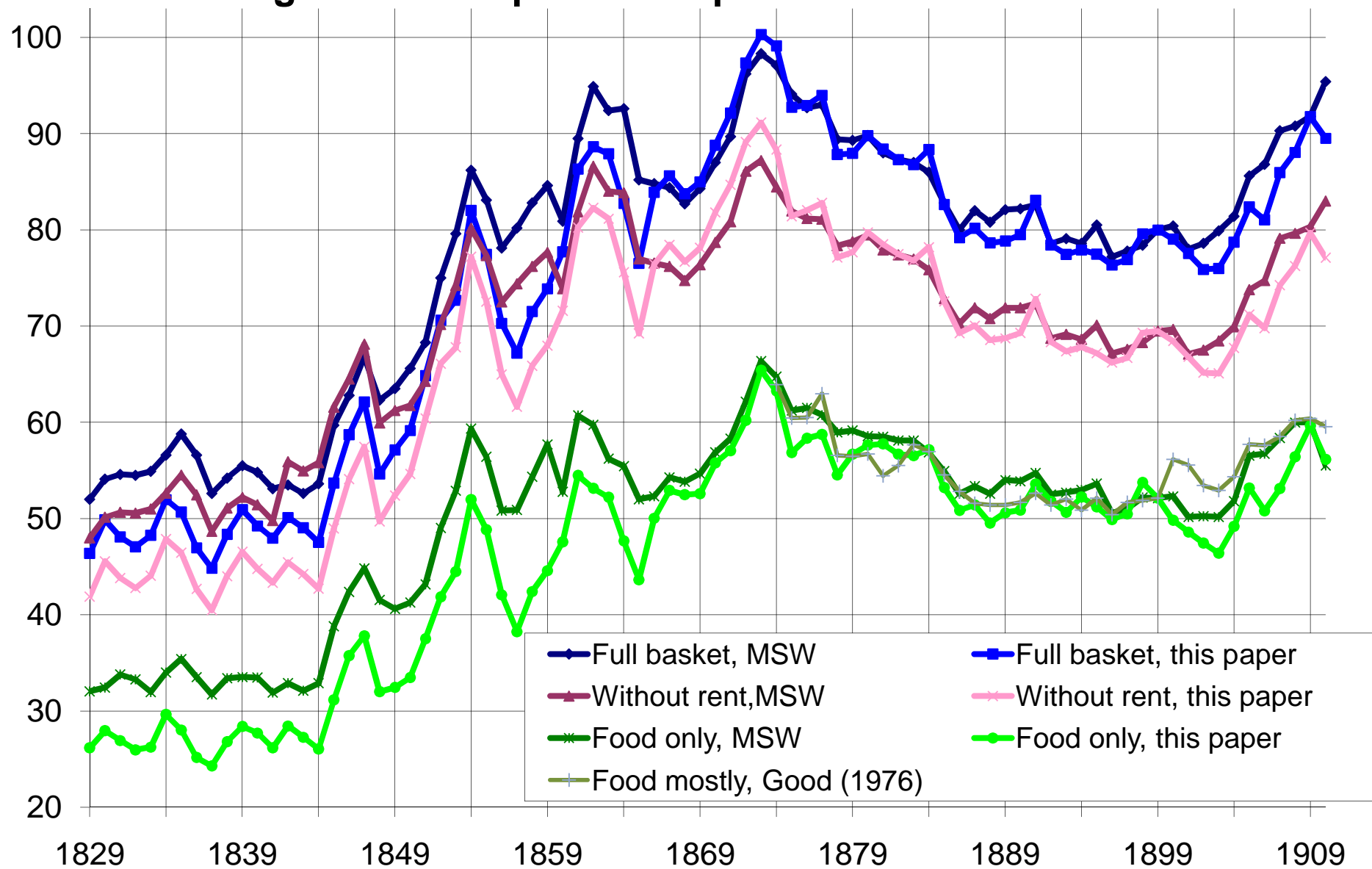
Table 7 - Regression report					
	Whole period all provinces	1829 - 1848 all provinces	1848 - 1873 all provinces	1848 - 1873 without Dalmatia	Whole period Cisleithania
Initial level	-0.0068 (0.0030)	-0.0118 (0.0045)	-0.0125 (0.0075)	-0.0207 (0.0070)	-0.0069 (0.0017)
Population growth	0.4286 (0.2246)	-0.5314 (0.3442)	0.4264 (0.2612)	0.3376 (0.2230)	0.2024 (0.1320)
Constant	-0.0047 (0.0029)	-0.0084 (0.0045)	-0.0073 (0.0064)	-0.0149 (0.0061)	-0.0012 (0.0018)
N	21	21	18	17	15
Adjusted R <sup>2</sup>	0.3257	0.2195	0.266	0.4725	0.6014
Implied $\beta$	0.99%	1.34%	1.47%	2.82%	1.02%
Note: Standard errors are in parentheses.					

Figure 1 - Map of the Habsburg Empire in its 1914 borders

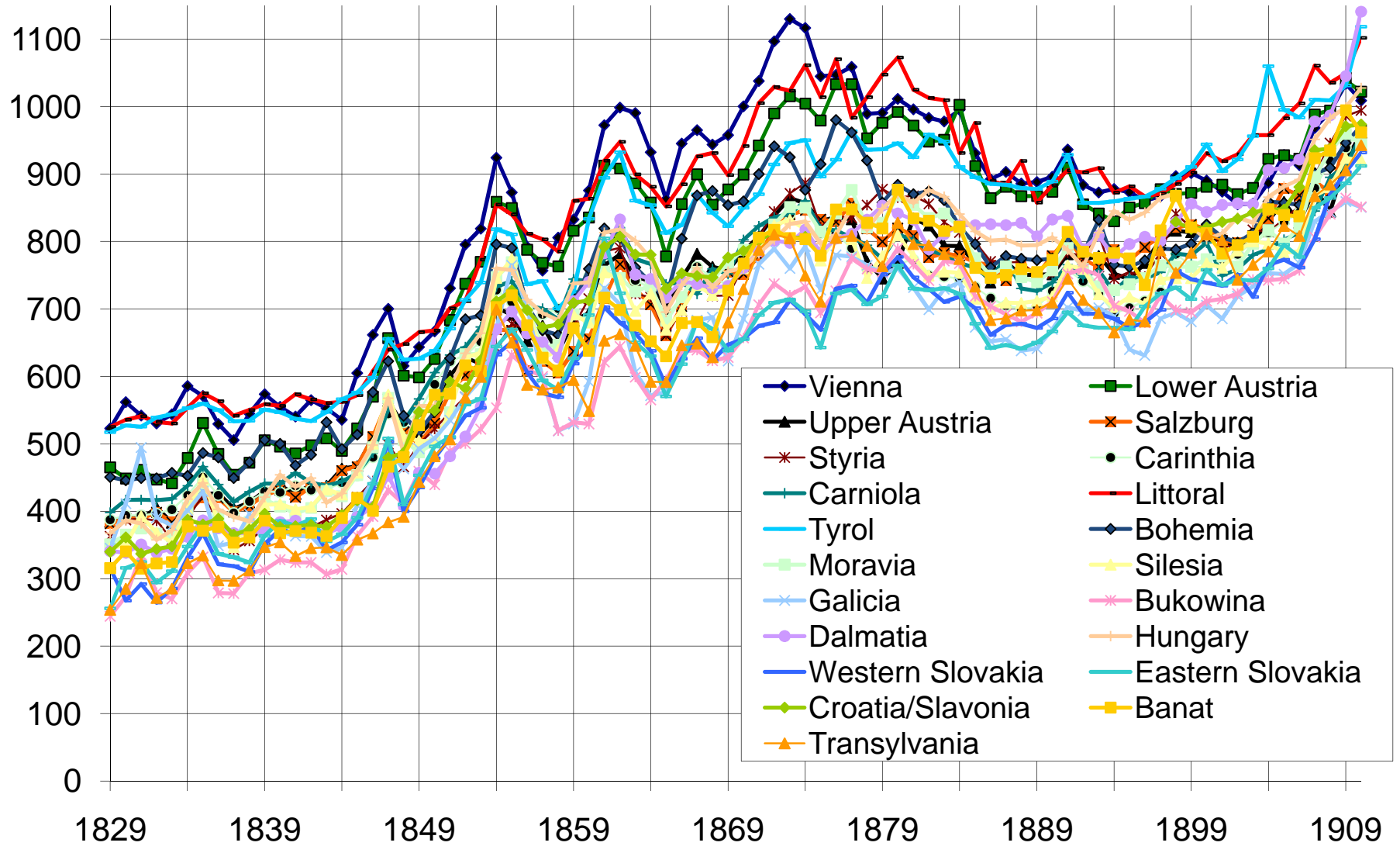


Note: Not all provinces were in existence at all times. Bosnia-Hercegovina was an Austrian protectorate between 1878 – 1908, after which it was annexed. Source: Wikimedia commons.

**Figure 2 - Comparison of price indices - Vienna**



**Figure 3: Cost of Living - full basket (annual outlay in K)**



### Figure 4 - Cost of living across provinces

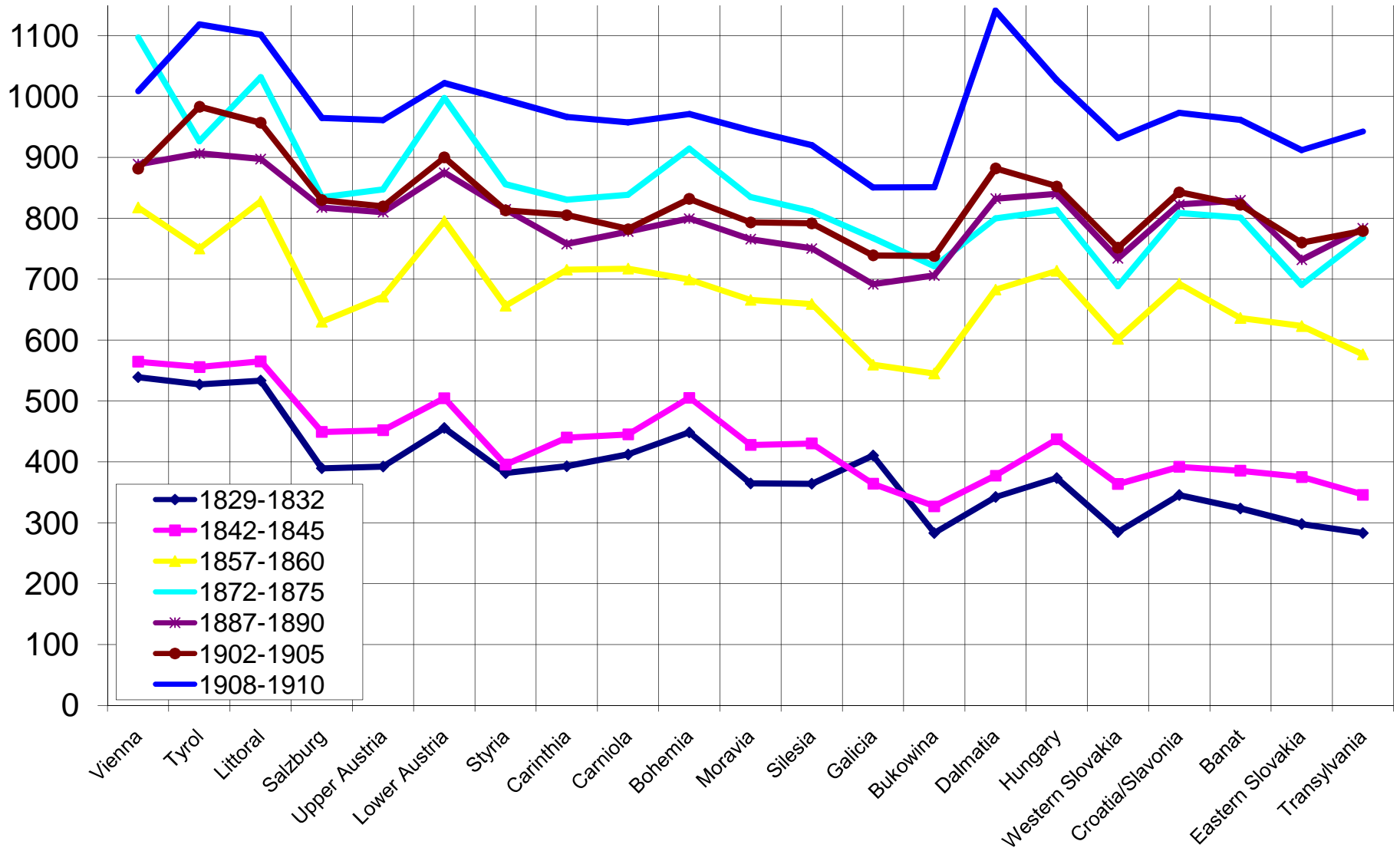
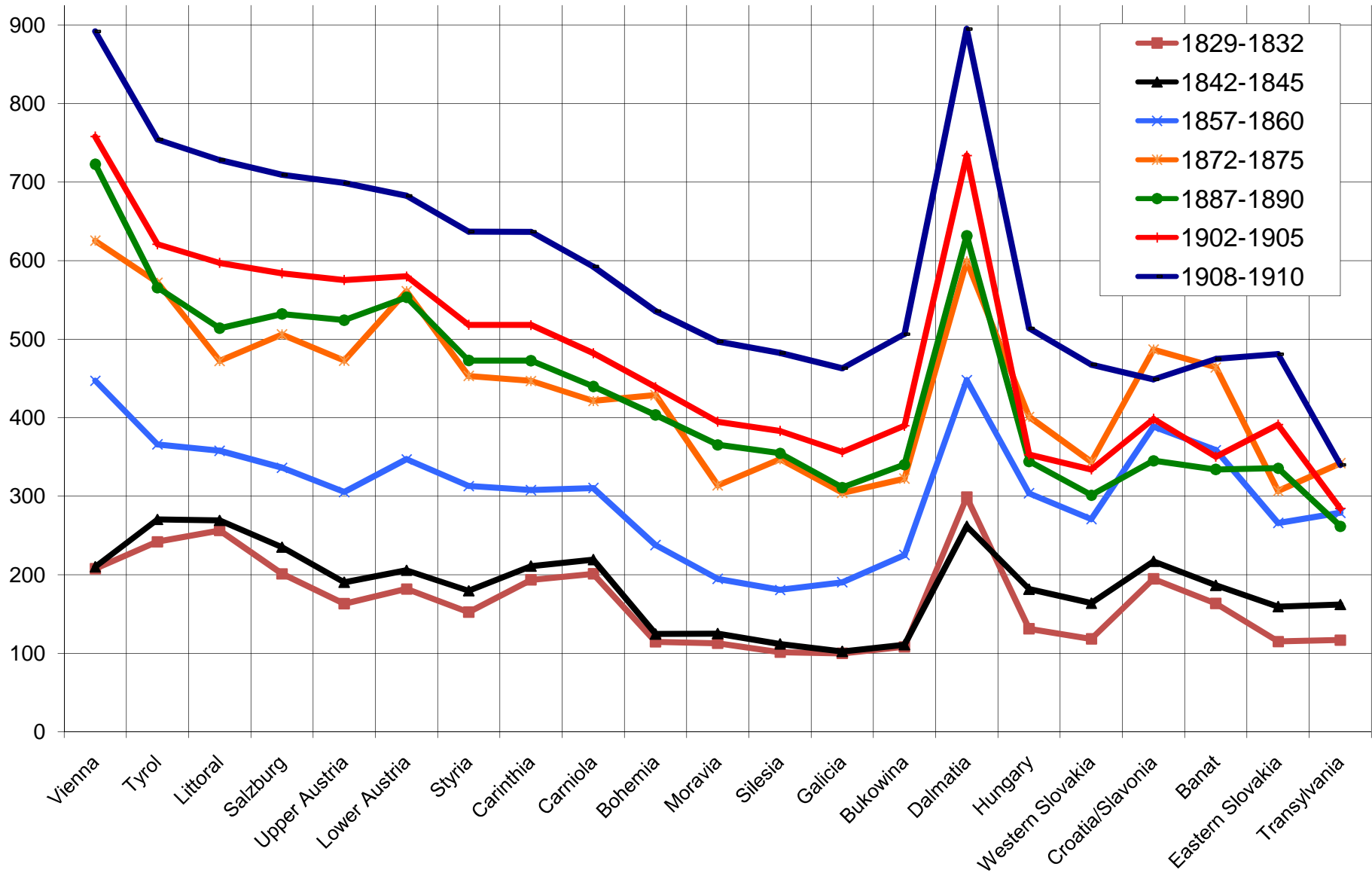
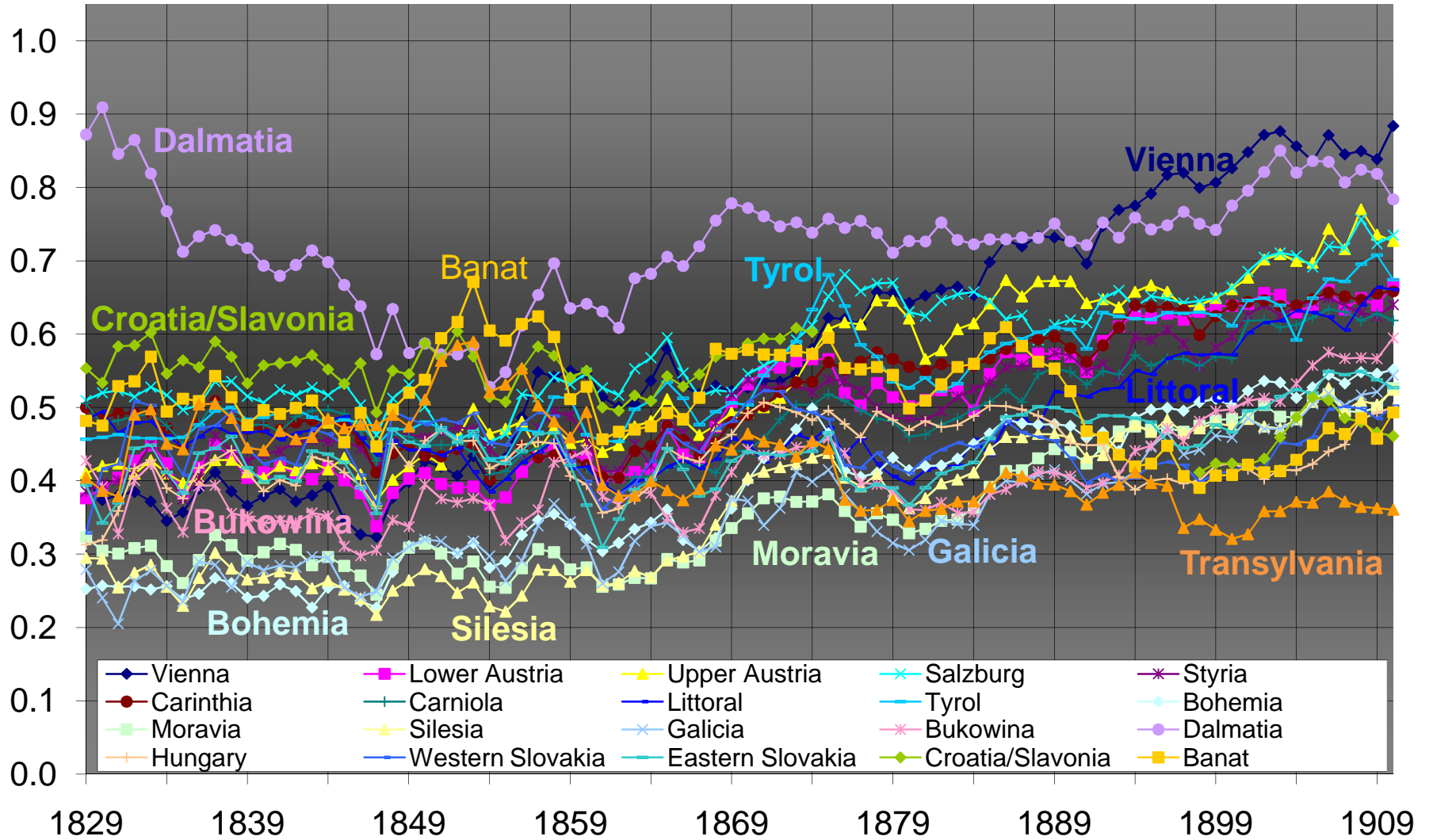


Figure 5 - Nominal annual earnings by province (in K)



**Figure 6 - Welfare ratios: Full basket**





**Figure 7 - Welfare ratios by province and period**

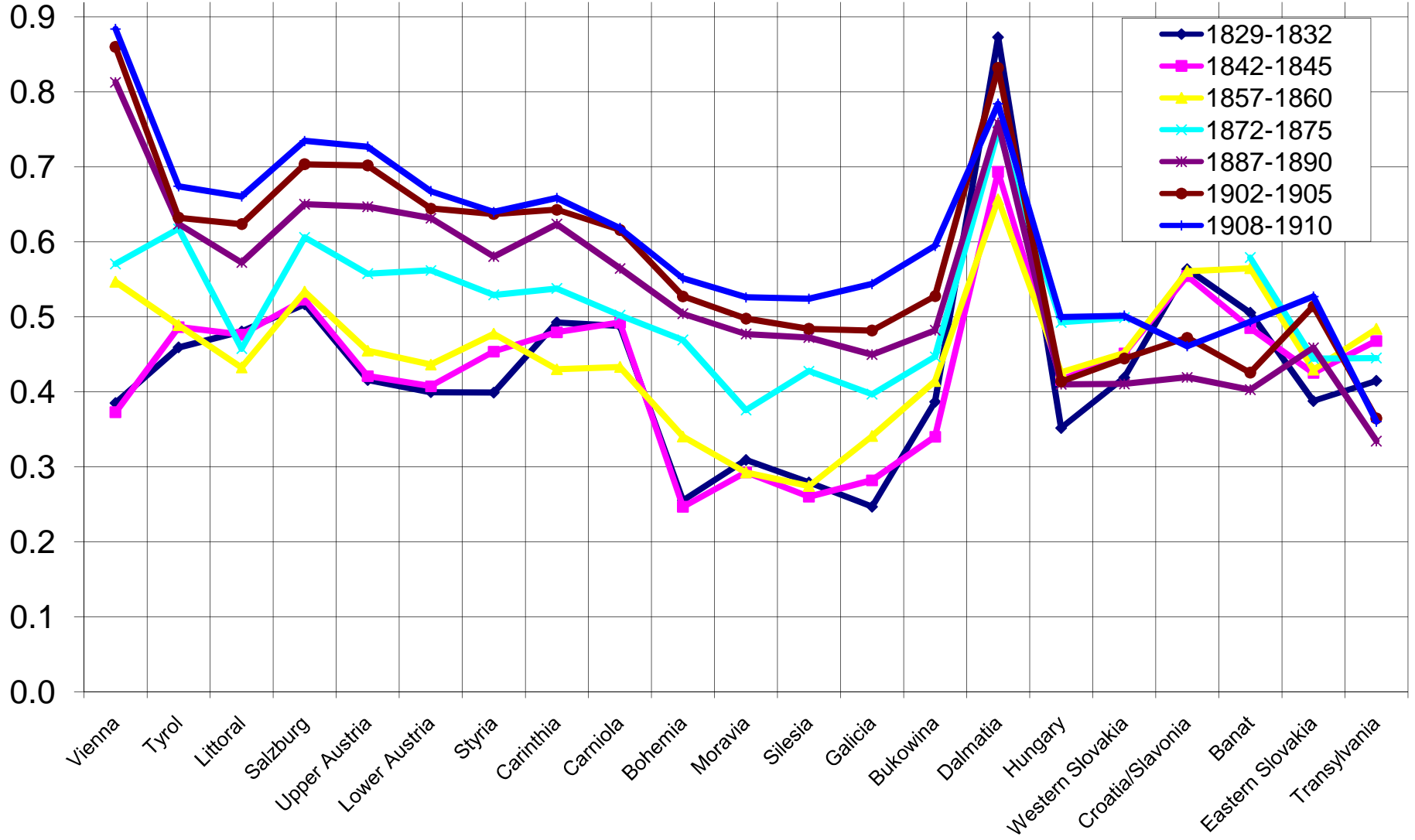
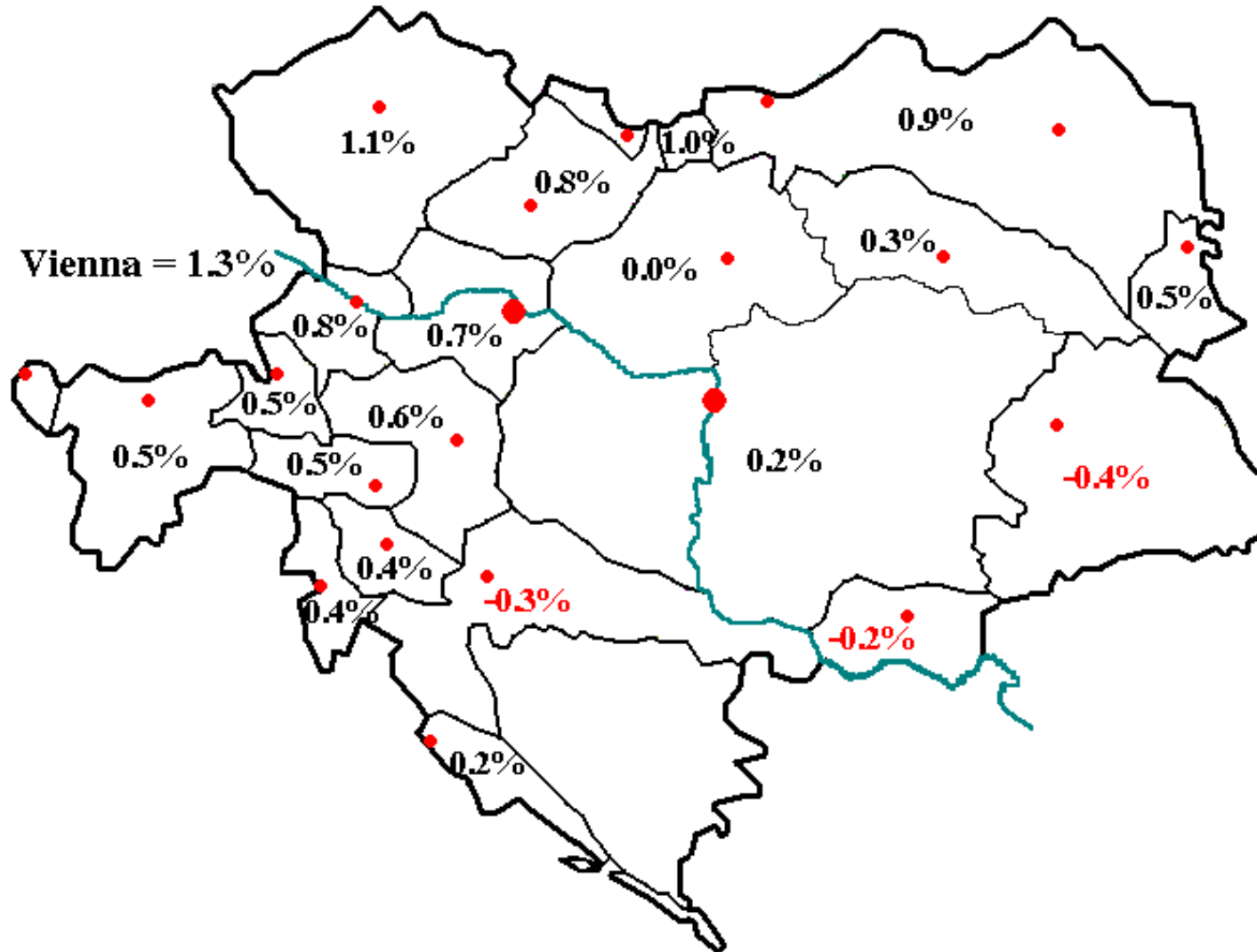
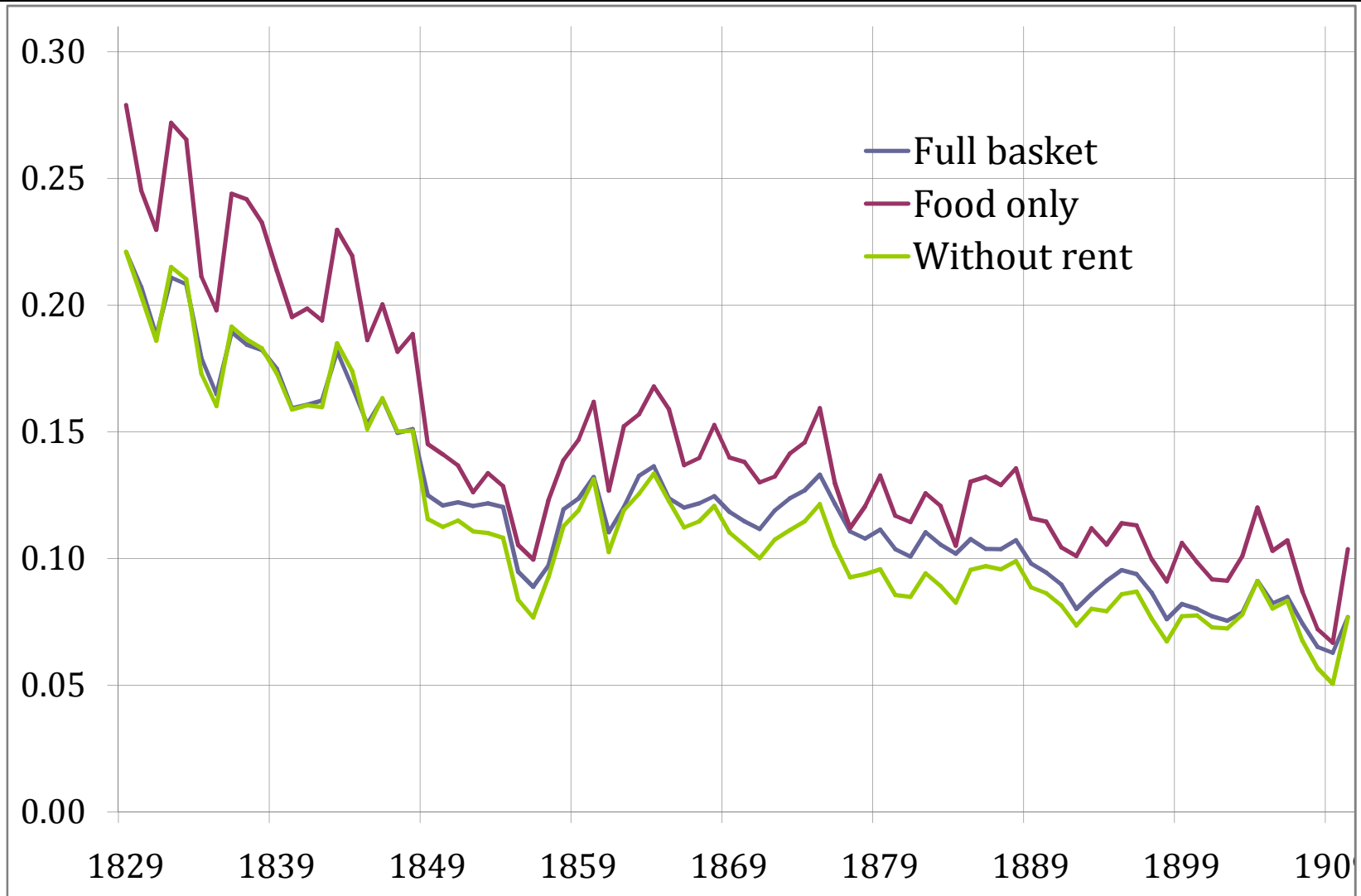


Figure 8 - Average annual rate of growth of real wages by province, 1829 - 1910

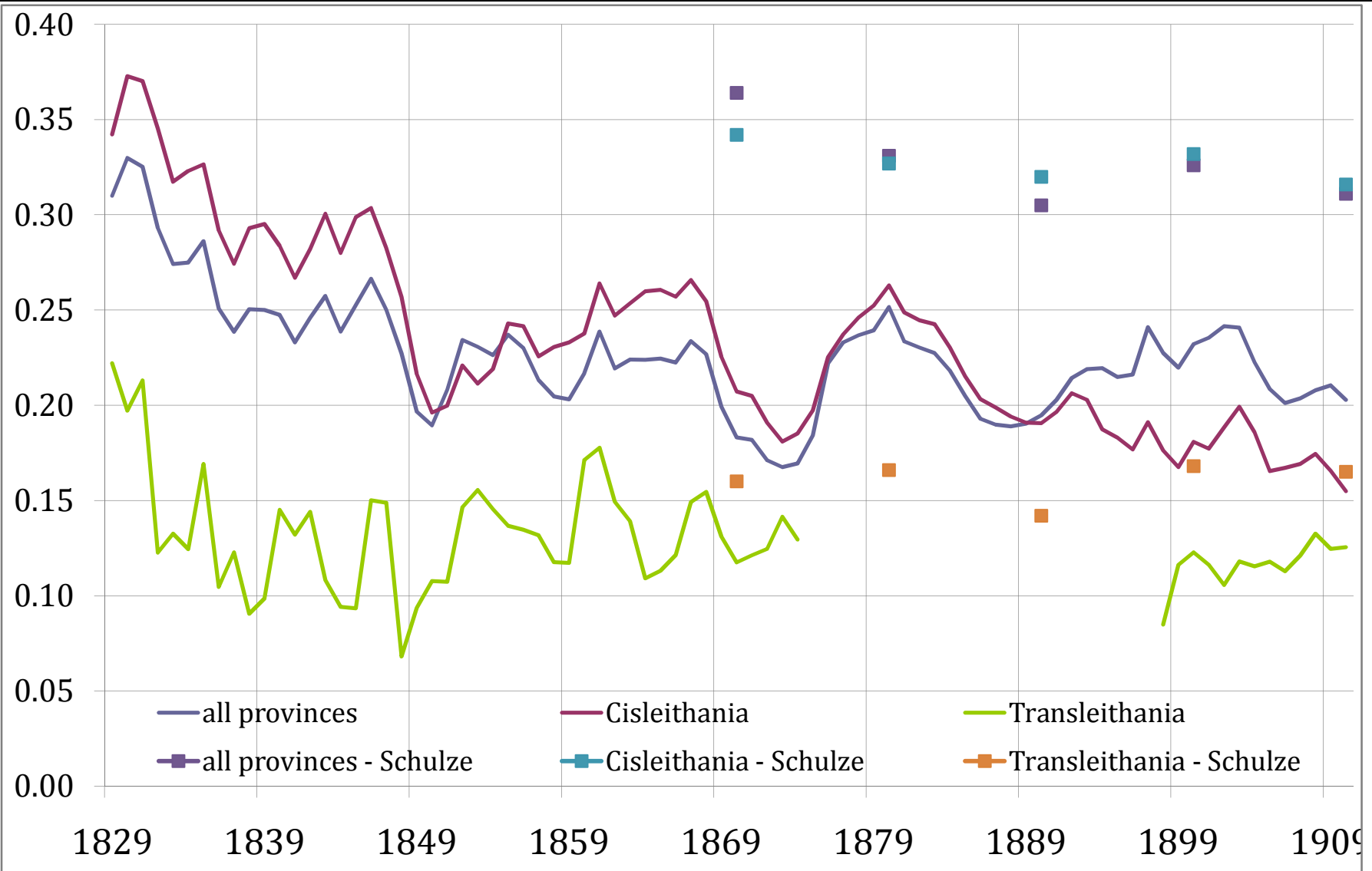


**Figure 9 - Coefficient of variation of cost of living across 21 provinces of the Habsburg Empire**



Note: The coefficient is calculated across all provinces even though no data are available for Croatia in 1874 - 1898. However, recalculating the statistic without Croatia does not produce different results.

Figure 10 - Coefficients of variation of welfare ratios and GDP per capita across the provinces of the Habsburg Empire



Note: "Schulze" refers to values calculated from estimated real GDP per capita in each province in Schulze (2007).

