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East of Eden: Polish living standards in a European perspective, ca. 1500-1800

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Abstract: This research contributes to the debate on economic growth and income inequalities in early modern Europe by estimating real wages expressed in subsistence-ratios in the rural and urban sectors of the Kingdom of Poland. Furthermore, a method of weighting the wages with data on the employment structure is outlined and implemented. A comparison of the Polish-weighted real wages with the English and Italian suggests two waves of supremacy of the North Sea Region. The first divergence occurred prior to the early modern period and the second resumed in the 17th century. The paper incorporates non-wage-earning farmers and agricultural workers paid partially in kind into the analytical framework.

Keywords: Real Wages, Little Divergence, Pre-industrial economic growth, Poland

JEL Codes: N33, N01

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INTRODUCTION

Timing the origins of the superior economic performance of the North Sea Area is known in the historiography as the Little or the Great Divergence debate depending on the scope of the research. Accounting for economic dissimilarities consists of a reconstruction and a subsequent comparison of either GDP per capita or real wages, with, in case of the latter, a strong focus on juxtaposing un-weighted wages of corresponding labour groups.

The historiography of income dissimilarities and economic growth, understood as an increase in income levels within Europe in the early modern period provides three concurrent narratives that compose what is known as the Little Divergence debate. It primarily focuses on a comparison of the South with the Northwest of the Continent. According to the classical view of the so-called 'Stagnationists' like Abel (1966) and Le Roy Ladurie (1974), there was little economic growth on the Continent, whose stagnant agrarian economy was dominated by the Malthusian forces. As a result, before the advent of the Industrial Revolution, Europeans were equally impoverished. This view has been challenged by so-called 'Early Modernists' who argue that there was an acceleration of growth of the North Sea Region attributable to various technological and institutional developments prior to the Industrial Revolution (De Vries & Van Der Woude 1997; Van Zanden 2002). According to Malanima (2013), English economic superiority over Italy originated in the 18th century. In contrast, Allen (2001) argued that the divergence of the region from the rest of the Continent occurred in the 17th century. Furthermore, Pamuk (2007) claimed, that this might have happened already around the time of the Black Death in the 14th century. Lastly, according to Broadberry et al. (2012), Malanima (2010), Álvarez-Nogal and De La Escosura (2007), the economies of Italy and Spain also grew already in the middle ages. However, this development was not persistent, and these Mediterranean economies impoverished over the early modern period.

As far as the Great Divergence is concerned, the evidence for Western Europe is often taken as an indicator for the entirety of the continent despite the fact that relatively little is known as to how it relates to the standards-of-living in Eastern Europe. This research wishes to test the alleged superiority of the North Sea Region, which is based primarily on the comparison of the region with Southern Europe, by looking at the problem from the Eastern European perspective. According to conventional knowledge, this mostly agrarian region is regarded as stagnant and impoverished. Van Zanden (2001) supported this intuition with a study of GDP in

several countries including Poland. A comparison of the country with Italy, England and the Netherlands showed a gap in the GDP levels dating back to before the 16th century. Recent studies point to inconsistencies between the GDP and the real wage evidence (Angeles 2008; Blondé & Hanus 2009). The latter is argued to be: 'targeted more closely to the masses of population' (Allen et al. 2005). The previous studies of grain wages and real wages based on the so-called 'respectability basket' presented contradictory images of Polish relative growth levels. Deflating wages solely by prices of rye implied high standards-of-living, whereas accounting for a consumption of bread and other produce signalled a relative poverty (Mączak 1995 [1983]; Van Zanden 1999; Allen 2001).

The above-mentioned studies of real wages focused on a comparison between international urban sectors. Such estimates account only for the marginal amount of the total populations that they are intended to represent. In order to reconstruct a representative picture of standards-of-living in a country one should expand the research and account for the inequality within and between the sectors. Thus far, Van Zandens's (2009) preliminary empirical inquiry into the Polish skill-premium suggested a high stratification of incomes within the cities. Furthermore, following the classical line of reasoning of Domar (1970), the Polish corvée system and constraints on labour mobility should have resulted in a relatively high income-gap between the rural and urban sectors. Additionally, different levels of urbanization and employment structures in the rural areas in Europe reinforce the overall effects of these income gaps and are believed to signify the character of various economies (Allen 2000).

This research reconstructs real wages in the Kingdom of Poland between the 16th and the 18th century, and compares them with Italy (Malanima 2008) and England (Allen 2001). This study uses the so-called 'barebones basket methodology' introduced by Allen et al. (2011). It builds on two comparative datasets edited by Allen: one on prices and wages in Europe (2001) and another on employment structures (2000). This study adds evidence on prices and wages for Lublin (Adamczyk 1935), Moscow and St Petersburg (Global Price and Income History Group, hereafter GPIH Group), and Poznań (Więcławski 1989; GPIH Group). Furthermore, next to the urban sector the paper introduces two novel wage series for agricultural workers based on their remuneration in silver (Kamler 1990), or payment in kind (Wyczański 1964; 1969). Furthermore, this research reconstructs the net-income of small farmers to investigate the standards-of-living of the non-wage-earning rural population (Guzowski 2008). The results show a high stratification

of incomes within the wage-earning population in Poland attributed to both the highest skill-premium and the widest income-gap between urban and rural sectors in the sample. The accounts also indicate a much higher volatility of the living conditions of workers paid only in money in comparison to these paid also in kind.

This research subsequently weights the novel Polish real wage series as well as the English and Italian ones by the respective shares of labour in industry, proto-industry (rural non-agricultural production) and agriculture in the countries (Allen 2000). A simple juxtaposition of the urban real wage series disproves the argued persistent premium of the North Sea Region over Eastern Europe in the period. However, the evidence based on the weighted real wages suggests two waves of divergence: one before, and another after the 16th century.

I METHODOLOGY

The bulk of the literature illustrates the past differences in standards-of-living between the countries by juxtaposing the real wages of the unskilled urban labour (Mączak 1995 [1983], Van Zanden 1999, Allen 2001, Malanima 2013). The limitation of this approach is that the relative positions between this group and that of the skilled labour and the agricultural workers, the two other major labour formations, differ between the countries. The representativeness of the unskilled urban labour is therefore limited. These income inequalities are argued to be crucial characteristics of their various growth trajectories. This research contributes to the Little Divergence debate by accounting for the differences in the employment structure and the income stratification within and between the countries by: (1) reconstruction of the real wages in the urban and rural sectors of the Polish economy; (2) weighting both the novel and the already existing estimates by the information on the local occupational distribution.

This study aims to reconstruct real wages with the novel subsistence-ratio-method based on the so-called 'barebones baskets' composed of prices of rye and basic manufactured products (Allen et al. 2011). It is a middle point between Van Zanden's (1999) grain wages and Allen's (2001) real wages based on prices of bread and manufactured products that provided contradictory images of the Polish economy. Each real wage is computed to represent a situation in one year. In order to compute the annual income a silver day-wage of an unskilled labourer is taken and multiplied by 250 – the number of days a worker is assumed to have worked per year. This income is then divided by the hypothetical annual consumption of the worker's household

represented by the barebones baskets. A worker is assumed to singlehandedly provide for a household of two adults and two children. Together these individuals are expected to need 3.15 full baskets. The additional 0.15 points are supposed to account for the cost of housing. If we divide the annual income by the final cost of the household's basket we obtain a figure known as a 'subsistence-ratio'.

The information on the employment structure in Europe comes from Allen (2000). This previously reconstructed distribution of labour between the Polish industry, proto-industry (rural non-agriculture production) and agriculture is outlined in Table 1. Allen equated the population working in 'industry' with the population living in cities that have more than 5,000 inhabitants with the use of the dataset of Bairoch (1988). The population not living in these cities was considered to be rural. Following Wrigley (1985), for the year 1500, Allen assumed that 80 per cent of the rural population performed purely agricultural activities. The remaining 20 per cent was employed in 'proto-industry'. This category breaks down into two subsets. The first consists of the people living in cities with population below 5,000 inhabitants. The residents of those small towns in Poland worked in artisanal as well as agricultural production. The second sub-type of 'proto-industry' consists of people living in the villages and employed in rural manufactures, the putting-out system or simply performing various crafts (Ogilvie & Cerman 1996). Whereas urban development is largely perceived as a sign of economic growth, it is being debated what the significance was of an increase in the size of rural non-agricultural production. One stream of literature recognizes such a development as a beneficial transition from agriculture towards industry that is associated with an increase in income levels. Conversely, others see it as a sign of proletarianization of the peasantry, i.e. separation from the means-of-production, which was not beneficial for their standards-of-living (Brenner 1989; Ogilvie & Cerman 1996; Myška 1996). All in all, the well-being of the people employed in the proto-industry dependent greatly on their socio-political freedom and could be much lower under serfdom (Kamińska 1964).

In order to estimate the changes in the proportion of the people employed in 'proto-industry', Allen interpolated the remaining unknown shares for the period between 1500 and 1800 with the knowledge about the probable distribution in 1800. The information used to represent the situation at that time was based on the Russian census of 1897. The resulting estimates indicate an increase in the share of 'proto-industry' in the rural areas from 20 to 41 per cent between 1500 and 1800.

Table 1: Employment structure in Poland, in millions, 1500-1800.

	Population	Industry	Proto-Industry	Agriculture
1500	4	0.24 (6%)	0.75 (19%)	3.01 (75%)
1600	5	0.38 (8%)	1.25 (25%)	3.37 (67%)
1700	6	0.26 (4%)	1.95 (33%)	3.79 (63%)
1750	7	0.31 (4%)	2.54 (36%)	4.15 (60%)
1800	9	0.43 (5%)	3.51 (39%)	5.06 (56%)

Source: Allen (2000).

One can account for the differences in the real wages within and between the counties by weighting them by the employment structure. Equation 1 outlines the method used in this research:

$$WI_t = \Sigma_i (P_t * S_{it} * I_{it}) / P_t \quad (1)$$

Where: 'WI' is the weighted real wage; 'P' is the total population, 'S' is the share of the people employed in a sector, 'I' is the real wage typical for the sector, 't' is the time and 'i' is the sector. Allen (2000) data provides us with the 'S's' and 'P's'. There are three main sectors: 'industry', 'proto-industry' and 'agriculture', also referred to as: 'urban', 'rural-non-agricultural' and 'agricultural'. This research builds real wage series for three major types of labour i.e. 'skilled', 'unskilled' and 'agricultural' workers in Poland, and compares them with real wages in England (Allen 2001) and Italy (Malanima 2008) (see appendix). In order to obtain 'I' one needs each of the three types of labour in each of the three sectors. One can reasonably assume that the 'agricultural' sector was characterised by the wages of the agricultural workers. However, reconstructing the proportions of the various types of labour in the other sectors requires stronger assumptions. This research assumes that 20 per cent of the labour in the 'industry' was skilled. This value stems from the relations observed in the Kingdom of Poland presented in Table 2. Furthermore, the 'proto-industry' was composed of the non-agricultural workers living in the small rural cities and villages. There is little wage data available for these two kinds of labour. This research assumes that a shift from agricultural to non-agricultural production is a development that affects real wages positively. One can speculate, that the remuneration in proto-industry must have been higher than that of the agricultural labour due to the skills and capital involved in industry, but also lower than that characteristic of 'industry' due to the competition of the agricultural workers. To account for this rural character of 'proto-industry' the real wage typical for this sector is assumed to be an arithmetic average of that of 'agriculture' and

that of 'industry'. Thus obtained estimates correspond to the scarce and anecdotal information on the known wages from the Polish proto-industry: Kamińska (1964) provides data on the annual income of the employees of a glass manufacture in a rural town of Urzecz near Warsaw in the late 18th century. In 1790s its employees were paid 264 złp annually that translates into a subsistence-ratio of 1.35. This value corresponds to the estimate of the real wage in 'proto-industry' based on the abovementioned assumptions that is equal to 1.33. Lastly, when computing the weighted values, in the cases of multiple simultaneous observations coming from different cities of the wages of the same type of labour, for the sake of persistency and comparability, the calculations are based on the highest value.

Table 2: The share of masters in the total 'industrial' population in the early modern Poland.

	Number of Workshops I	People in masters' households[a] II	Total population III	'(Proto-)Industral' population[b] IV	Share of skilled labour in '(proto-)industry'[c] II / IV
Gdańsk in 1650	2644	10576	53000	53000	0.20
Cracow in 1581	577	2308	17000	17000	0.14
Cracow in 1650	909	3636	20000	20000	0.18
Cracow in 1760	834	3336	26000	26000	0.13
Toruń in 1650	624	2496	15000	15000	0.17
Biecz in 1581	100	400	3700	1850	0.22
Nowy Sącz in 1581	137	548	5000	2500	0.22

Sources: Małecki (1963; 1984), Bogucka (1956), Ceckowski (1994), a) Assuming four people in a household and one master per workshop; b) Following Allen (2000), agricultural production in the big cities was marginal and all of the population was related to the industrial sector; Following Bogucka and Samsonowicz (1986) half of the inhabitants of the small cities, here assumed to be less than or equal to 5,000 inhabitants, worked in agriculture. The rest, following Allen's framework, was located in 'proto-industry'.

II SOURCES

Prices and wages are available for Gdańsk (Furtak 1935; Pelc 1937), Warsaw (Adamczyk 1938), Lublin (Adamczyk 1935), Cracow (Pelc 1935; Tomaszewski 1934), Lwów (Hoszowski 1928; 1934) and Poznań (Więcławski 1989; GPIH Group). Most of the price data come from the records of institutions such as monasteries or orphanages. This indicates that, on the one hand, these are retail prices, which were usually higher than the wholesale prices (Mączak 1972), yet on the other hand they could have been lower than the prices for which citizens were buying their supplies, due to possible long-term contracts of these institutions with their retailers. Only prices for 18th century Poznań are in the most part based on price regulations issued by local officials, which might have been lower than the actual prices for which people were purchasing food.

Furthermore, in this study prices and wages from Moscow and St Petersburg (GPIH Group) are used to provide some insight into the situation in Russia. This will hopefully allow for broader generalizations about Eastern Europe.

Most of the editions of prices and wages for Poland and Russia were already digitalised, converted into metric units and represented in grams of silver, a standard measure of value for pre-industrial economies. Allen (2001) created such digital datasets with standardised and interpolated data for Northern Italy, England, Gdańsk, Warsaw, Cracow and Lwów, which are used to conduct this research. Supplementary information was taken from Malanima (2008). These were indexed accounts of: (1) costs of a differently specified basket (CPI), and (2) real wages of agricultural workers. The Italian indexed values were transformed in order to make them comparable with the ones used in this research (see appendix). Allen did not include the already mentioned data for Moscow, St Petersburg, Lublin and Poznań in his 2001 dataset. This required preparation of new datasets (see appendix).

The editions of the Polish wages usually group the data into four seasons. There are many missing observations. These were interpolated using OLS regressions. Namely, all the observations for each of the seasons were regressed on those for all the other seasons as independent variables separately. These regressions were performed for every century independently to account for possible long-term changes in seasonality. The missing observations were filled in with the averages of all the predictions resulting from all the combinations of the seasons. The arithmetic average of the thus obtained complete wage series was used to represent a wage in any given year

III COSTS OF LIVING AND SILVER WAGES

Table 3 plots different levels of prices of the barebones baskets across Poland and Europe. In general, price levels in Eastern Europe were lower than elsewhere on the continent. There were vast differences in the nominal costs of living between the Polish cities. Until around 1650s the costs of living were fairly similar. Thereafter, Lwów and Lublin experienced high inflation whereas prices in Cracow decreased and remained at a relatively low level. The differences in prices of the baskets were mostly driven by the costs of rye in the cities. These chiefly depended on: (1) integration of the grain markets, (2) agricultural output in the region and (3) success of the nobility in imposing price regulations that would enforce high terms-of-trade between the demesnes and the cities (*taxy Wojewodzińskie*) (Adamczyk 1935). The inflation in Lwów and Lublin, cities located on navigable rivers, might have been caused by market disintegration after the wars of the 1650s (Malinowski 2013). Conversely, Cracow could have profited from being located in *Polonia Minor*, one of the more agriculturally developed regions in the country (Guzowski 2008). Moreover, Cracow, as the traditional Polish capital, enjoyed unique, for a city, noble-like rights. This possibly allowed it to negotiate price regulations in favour of its citizens rather than the nobility.

Table 3: Cost of a barebones basket in grams of silver in Poland, Russia, Northern Italy, England and The Netherlands in selected years, 11-year centred average, 1500-1795.

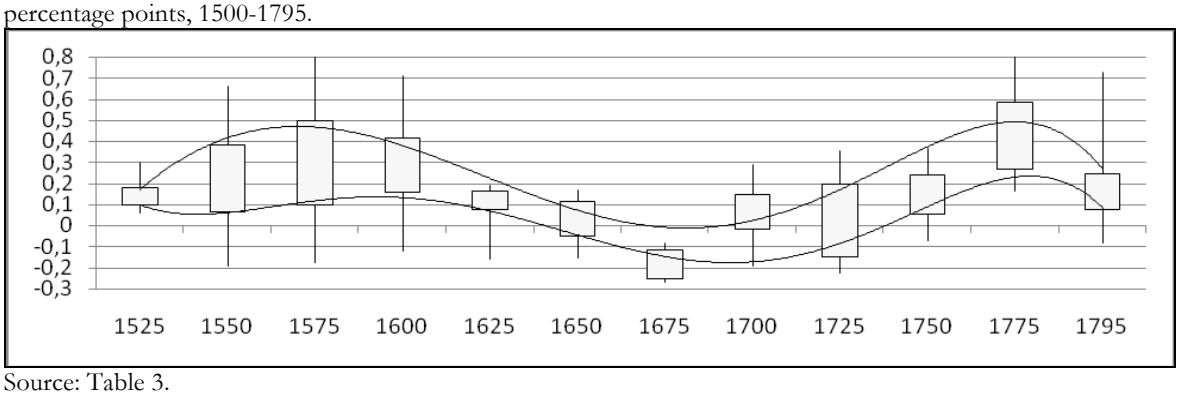
	Gdańsk	Cracow	Lwów	Warszawa	Lublin	Poznań	Moscow	St Petersburg	England	N. Italy	NL
1500		35							105	109	115
1525		37	34						116	141	135
1550	74	51	46		68[b]				93	150	175
1575	110	56	96	76	137	114	64		181	191	267
1600	151	90	104	91	122	142			310	271	234
1625	174	100	88	105	156				359	227	228
1650	178	110	152	118	219		82		406	199	267
1675	134	80		59	117		61		373	181	214
1700	153	65	135	103	168		60	96	366	204	226
1725	118	57	114	112	145		81	96	319	159	191
1750	127	61	168	135	189	96	98	120	297	216	200
1775	171	82	231[a]	138	180	128	191	212	428	276	248
1795	213	93		188		125	219	263	543	290	283

Source: See the text; England and N. Italy based on wheat not rye; a) centred average for 1768; b) centred average for 1563.

Whereas the price levels between and within the studied regions of Europe differed, there were pan-European trends in their changes. Graph 1 plots percentage changes in prices of baskets

between two consecutive periods. The results show similar trends across the continent. In general, the costs-of-living grew through the 16th century and levelled out around the first half of the 17th century. The second half of the 17th century was a period of deflation, which ceased around the first quarter of the 18th century. Subsequently, inflation returned and lasted until the end of the studied period.

Graph 1: Distribution of the changes in the prices of the barebones baskets between two consecutive periods in Poland, Russia, England, Italy and The Netherlands, polynomial trends for the upper and the lower quartile, percentage points, 1500-1795.



Source: Table 3.

This study of the real wages in the urban sector is based on three series corresponding to three different types of labour: (1) unskilled workers, (2) journeymen/skilled aid/masters' assistants, and (3) masters. The two latter series are based on the incomes of masons and carpenters. There is an issue of representativeness of the building industry. Allen (2001) argued that these wages might have been driven by factors specific only to this sector, i.e. supply of and demand for construction, which do not have to change in tandem with the other urban sectors. Polish historiography seems to support this intuition. In more detail, Karpiński (1983) compared wages of workers from various sectors in 17th century Warsaw. According to his studies, wages in the construction sector moved differently in comparison to the other studied series. In addition, even the available series for the people specialising in masonry and carpentry showed different patterns. Furthermore, according to the author, the remuneration of the people depended on the skills required to finish a project. Therefore, for the years when a municipality was hiring labourers to build a clock tower there were relatively higher wages paid in the construction industry than in the years when the same people were employed to work on maintaining the city walls. The only 'universal' urban series available for the study of the Polish real wages is the one representing the unskilled labour. These were the people hired to perform various simple tasks

for short periods of time in various sectors of the economy. Workers of this type changed jobs often, depending on the current demand in the market.

The journeymen/skilled aid/assistants (*czeladnicy)* were the people on the second level of the guilds' training system after the apprentices (*uczniowie*). They usually lived together with their teachers, i.e. the masters that employed them in their workshop. This may have had several implications: (1) they were part of the master's household and were receiving food and shelter for their work; (2) they were likely not to have families of their own; (3) Karpiński (1983) argued that part of their earnings was being taken by the masters to cover expenses related to their alimentation. Therefore, the income gap between masters and their assistants might have been partly a result of financial operations inside their households not a price of human capital.

Table 4: Silver daily wages of unskilled workers, skilled aid and masters in Poland in selected years, centred 11-year averages, 1525-1795.

	Gdańsk		Cracow			Lwów			Warsaw			Lublin			Poznań
	Unsk.	Aid	Unsk.	Aid	Master	Unsk.	Aid	Master	Unsk.	Aid	Master	Unsk.	Aid	Master	Unsk.
1525		2.5	1.2	1.9		1.1	1.9	2.7							
1550	1.6	4.3	1.5	2.6	4.9	1.1	2.1	2.7				1.5	2.6		
1575	2.1	5.6	2.2	3.4	5.9	2.0	3.6	4.1	1.9		4.7	2.0	4.5		2.2
1600	2.4	4.7	2.6	4.2	5.3	2.1	4.3	5.3	2.7	6.4	7.4	2.4	5.8		2.5
1625	3.3	6.5	2.2	3.4	4.2	2.0	3.5	3.7	2.3	4.1	7.6	3.2	4.5		
1650	5.2	3.8	2.8	4.6	6.2	3.0	4.6	4.2	3.1	4.5	8.6	5.2	6.8		
1675	4.2	3.4	1.5	2.6	3.6	1.9	2.9		1.8	2.1	4.4	2.2	3.9		
1700	3.9	2.9	1.9	3.0	4.1	1.9	3.0	2.8	2.0	2.4	4.4	2.0	3.5		
1725	3.5	2.9	1.6	2.8	3.8	1.6	2.7	2.7	1.9	1.9	5.1	1.7	2.9	3.4	
1750	3.4	2.9	1.6	3.3	4.1	1.6	2.7	2.7	2.5	2.4	5.4	1.7	2.9	3.7	2.7
1775	3.6	4.2	1.5	3.3	4.0	2.2	3.8	3.8	3.9	3.4	7.1	2.5	3.0	3.7	3.3
1795	3.9		1.8	3.1	4.0	2.7	5.3	4.8	3.6	3.2	7.3	2.6	4.0	4.3	2.9

Source: See the text.

Wage data for the same city provides first impressions of the stratification of incomes in Poland between various labour groups. Table 4 clearly reinforces Van Zanden's (2009) statement about the high skill-premium in Poland defined in this research as a ratio of wages of masters to those of unskilled labour. According to the novel estimates, the premium was on average around 250 per cent. Cracow in the middle of the 16th century and Warsaw in the first quarter of the 17th century enjoyed a premium higher than 300 per cent. This was most probably attributed to the construction of the royal palaces in these cities.

The skill-premium of the skilled aid presents a more complicated pattern. One would expect the wage of the journeymen to be constantly higher than that of the unskilled workers and lower than the remuneration of the masters. This was, however, not the case in Gdańsk, Lwów and Warsaw, where the wage of the skilled aid at some point converged with one or other of the two other series. In fact, the results suggest a general downward trend in the living standards of the skilled aid. Only Cracow was characterised by a persistently higher skill-premium for this group. According to Adamczyk (1935), this phenomenon can be linked to the condition of the guilds in these cities. In the cities where the guilds were strong they had an impact on the labour market and could promote the position of their members against the general population. A collapse of the guilds would, therefore, bring the wage level of the unskilled labour up to a new equilibrium shared with the skilled aid no longer protected by these institutions. Conversely, the guild system is argued to have ensured a stratification of incomes among its members, according to their place in the hierarchy (Karpiński 1983). A collapse of the guilds would place masters and their assistants on a free market that would likely stimulate a convergence in their incomes (Malinowski 2012).

IV REAL WAGES IN THE URBAN SECTOR

The price and wage evidence combined allows for a comparative investigation of the economic growth patterns of the Polish urban sector over time and space. Real wages of unskilled labour are the best base for such an analysis for several reasons. First, they provide an overview of many professions whereas the 'skilled aid' and 'masters' series are biased by the trends specific to the construction sector. Second, the results are not driven by the factors influencing *ceteris paribus* a separate formation of the skill-premium. Third, the unskilled labour was the most populous group of the urban society, which makes it also most representative.

Table 5: Real wages of skilled and unskilled labour in the urban sector in Poland and Russia in selected years, presented in subsistence-ratios, based on centred 11-year averages, 1525-1795.

	Gdańsk	Cracow	Lwów	Warszawa	Lublin	Poznań	Moscow	St Peters.
				Unskilled Labour				
1525		2.65	2.80					
1550	2.01	2.45	2.08					
1575	1.62	3.23	1.80	2.03	1.48	1.56		
1600	1.25	2.41	1.62	2.41	1.29	1.53		
1625	1.76	1.88	1.95	1.85	1.86			
1650	2.52	2.13	1.45	2.24	2.07			
1675	2.71	1.64		2.53	1.63			
1700	2.17	2.43	1.15	1.68	1.05		1.65	
1725	2.48	2.44	1.19	1.39	0.98		0.92	1.27
1750	2.29	2.16	0.80	1.56	0.77	2.37		
1775	1.73	1.48	0.53	2.29	1.21	2.25	1.55	
1795	1.56	1.56	0.65	1.64				
				Skilled Aid				
1525		4.21	4.69					
1550	3.06	4.28	4.06					
1575	3.89	4.84	3.21		2.99			
1600	3.20	4.20	3.38	5.80	4.22			
1625	2.41	2.72	3.52	3.13	2.58			
1650	3.26	3.41	2.46	3.17	2.66			
1675	2.48	2.70		2.94	2.78			
1700	1.93	4.06	1.81	2.03	1.83			
1725	2.04	4.27	2.01	1.45	1.70			
1750	1.97	4.45	1.37	1.53	1.32			
1775	1.43	3.29	0.93	2.04	1.47			
1795	1.52	2.10	1.31	1.50				
				Masters				
1525			6.50					
1550		8.39	5.05					
1575		8.90	3.73	5.13	3.13			
1600		4.95	4.21	6.78				
1625		3.49	3.59	6.02	2.09			
1650		4.72	2.51	6.18	2.14			
1675		4.24		6.21	1.97		2.75	
1700		5.35	1.93	3.75				
1725		5.63	2.01	3.90	1.98			2.39
1750		5.77	1.36	3.54	1.62			2.20
1775		4.10	0.92	4.39	1.87			
1795		3.58	1.29	3.70				

Source: See the text.

An analysis of the real wages in the urban sector in Poland presented in Table 5 yields several interesting generalizations. To begin with, there was a clear divergence in the real wage series that originated in the second half of the 17th century, after a period of uniform standards-of-living in the country, excluding the offshoot of Cracow and Warsaw in the second half of the 16th century. After the middle of the 17th century two groups of cities emerged, namely (1) 'Robust' composed of Cracow, Gdańsk and Poznań that managed to sustain their standard-of-living and (2) 'Poor' made up of Lwów and Lublin, where real wages dropped continuously until the end of the studied period. This coincided with the pan-European crises argued by Allen (2001), with a difference that the crisis did not affect all of the Polish cities. Warsaw seemed to have been in the 'Robust' group until the turn of the 17th century, when it joined the 'Poor' one only to return to the better off company around the middle of the 18th century. Moreover, where the 'Robust' group is concerned, there was no clear descending or ascending trend in the formation of the standards-of-living throughout the whole period. Conversely, the first half of the 16th century and the period between the second quarters of the 17th century to the middle of the 18th century were characterised by a solid sustainability. However, lower levels of real wages dominated the second half of the 16th century, excluding Cracow and Warsaw, as well as the last decades of the 18th century. These correspond to the periods of high inflation as presented in Graph 1. Lastly, none of the Polish cities enjoyed a constant supremacy over the others. This observation contradicts the widely used prime-city-assumption that dictates that the biggest city, which is usually the only city with available data in a region, represents the highest wage in a country.

The inter-Polish divergence could have been caused by a disintegration of the Polish grain markets. In the 1650s the country suffered from many devastating calamities like Ukrainian uprising (1648-1655), Deluge (1655-1660), and the war with Russia (1654-1667). Studies by Gieysztorowa (1981) showed a decrease in the Polish population by about 25 per cent between 1650 and 1659. These military operations were devastating also for the urban trade network (Bogucka & Samsonowicz 1986). As a result Lwów and Lublin located off the navigable rivers might have been deprived of market access and their supply basins. This in turn would allow Malthusian pressure to decrease the standards-of-living of their inhabitants (Malinowski 2013). The results for Lwów demonstrate the origins of the infamous and well-documented poverty in the region that after 1772 would become the Kingdom of Galicia and Lodomeria.

V REAL WAGES IN THE RURAL SECTOR

A study of real wages in the agricultural sector is more complicated due to source material limitations and to the different characteristics of this sector, namely (1) ownership of means of production and self nourishment of small farmers, and (2) more likely partial payment 'in kind' for labour. This research assumes commercialization, i.e. access of the people from the rural areas to the markets and income in cash. The Polish rural sector under 'second serfdom' consisted both of coerced cash-crop labour and wage-earning agricultural workers. According to the evidence provided by Guzowski (2008), the payment for rent in moneys had always been a part of the duties of the tenants. Furthermore, a survey of 275 villages in the Voivodeship of Cracow in 1564 indicated that only one third of them paid the rent in corvée duties whereas the rest either had always paid the rent in money or bought the right to do so (Trzyna 1963). Furthermore, Guzowski's (2011) research suggests at least partial commercialization of the Polish rural sector. The author points at numerous evidence indicating a widespread use of money in the sector: (1) most of the duties of the peasantry were defined in the currency; (2) tax instructions from 1578 expected all the peasants to contribute to the royal budget in cash; (3) paid service was a part of the life cycle of the agricultural workers before inheriting or purchasing the right to use the land. Additionally, studies by Kamler (2005) indicate that most of the landlords were hiring additional labour from the market, as the labour input of their tenants usually did not match the demand of the manors.

It is customary to base estimates of real wages of agricultural workers on their daily wages deflated by the cost of the basket from the closest city, due to lack of data from the rural sector. This study intends to present this specification of the real wages of agricultural workers to allow for a meaningful interregional comparison. However, it is possible to broaden the study by: (1) adding small farmers/hereditary tenants to the picture with the use of data on their net-income; (2) relaxing the assumption of perfect commercialization, i.e. payment in silver and obtaining all goods by purchasing them in the market, with the use of the data on the payments in kind. All in all, this research estimates the (net-)income in the rural sector according to three specifications, i.e. (1) small farmers who were financing their subsistence with the fruits of their work; (2) agricultural workers paid partially in kind; (3) 'traditionally specified' agricultural workers paid only in moneys.

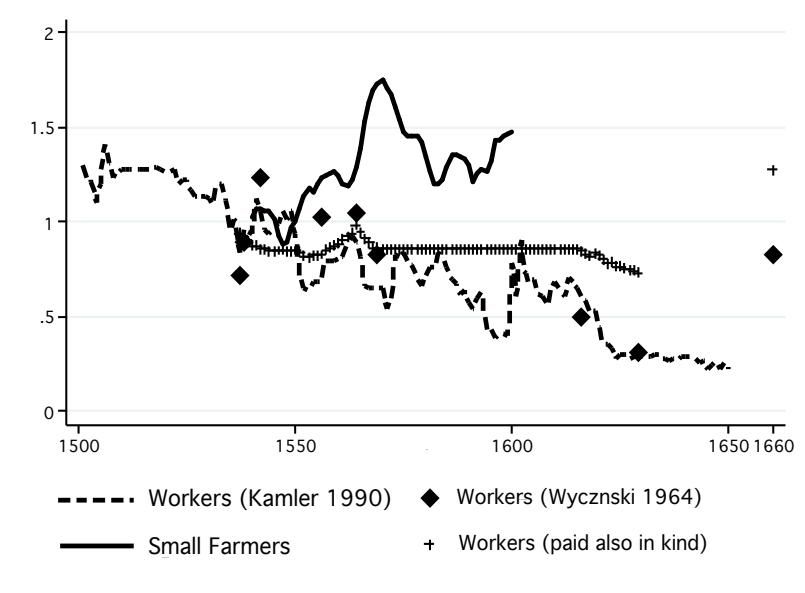
Concerning the small farmers, Guzowski (2008) reconstructed net-income of families living in the rural areas in Southern Poland and cultivating their own plots in the second half of the 16th century. In doing so he accounted for: estimated agricultural output, harvest, seeding, taxes and rents (see appendix). An assumption that the produced food was sold and the revenue was used to purchase the barebones baskets allows for a computation of the real wages represented in the subsistence-ratios. Due to the peculiarity of the rural areas this group's basket has been stripped of firewood, to which the peasantry had free access (Trzyna 1936), and self-produced meat as crops dedicated to grazing were already excluded when accounting for the income (Guzowski 2008). Guzowski constructed two budgets: one for households living on one *mannus* (ca. 16 ha) plots of land, and a second for these who lived on the more typical half a *mannus* plots (ca. 8 ha). He assumed that a family consisted of four adults and two children (five baskets) in contrast to the assumption used in this paper, i.e. two adults and two children (three baskets). Specifications: 'a small household on a big plot' and 'a big household on a small plot' yield respectively implausibly too high and too low results. The two remaining specifications show fairly similar and believable values. The arithmetic average of these two specifications is presented in Graph 2. The minimal difference in the standard-of-living between these two groups supports Chayanov's idea that, assuming that an increase in the plot size always coincided with household expansion, it did not resolve in an upturn in the well-being of a peasant household (Thorner et al. 1966).

Concerning the agricultural workers with the known payment in kind, Wyczański carefully studied employees working at manors in the Nowe Miasto Korczyn Starorty in the *Polonia Minor* region. He gathered information about nourishments provided for the workers by the employers, additional nominal wages and money spent on purchasing food for the workers (Wyczański 1969; 1964). A ratio of the calories in the diet to the money spent on the food by the employers represents the price of the calories on the market. Together with the information on prices of manufactured products from the closest city (Cracow), these data allow for computation of a real wage represented in the subsistence-ratios. This specification also exempts the group from paying for housing and fuel.

The final specification is tailored for an interregional comparison of living standards of agricultural workers. The wages come from studies of Wyczański (1964) and Kamler (1990) who presented how much money landlords spent on their workers annually, per worker. This

approximates their average market earnings. The wages are deflated by the cost of the basket from the closest studied city, i.e. Cracow. An advantage of this data is that it simplifies the problem of labour supply. One no longer needs to assume the 250 days of work in a year, but 'knows' the probable income of this group.

Graph 2: Real wages of small farmers and agricultural workers in the Polish rural sector presented in the subsistence-ratios, 1500-1660.



Source: See the text.

Graph 2 juxtaposes all the specifications. It yields several important generalizations. First, the real wages of the agricultural workers with known nourishment were stable and less dependent on inflation. However, together with the whole sector they remained on a relatively low level around the subsistence threshold. This validates the theoretical insights of Kula (1962) and Hagen (1986) who argued that the standards-of-living of workers in the areas with limited market access who consumed many non-purchases were relatively resilient to inflation. Second, it seems that the small farmers were able to profit from the price revolution of the second half of the 16th century as suggested by Wyczański (1978). Whereas prior to the inflation the living standards were relatively similar, the inflation caused the divergence between the workers and the small farmers. One can speculate that once the rise in prices was over the series converged. Third, there was a dramatic change in the living standards in the rural areas between 1650 and 1660. As has already been mentioned, this was a period of numerous calamities. The results suggest that this, in a

Malthusian parlance, 'positive check' restored the previous equilibrium of the higher standards-of-living after the nose-down drop in the first half of the 17th century.

Lastly, an international comparison of the real wages indicates an underdevelopment of the rural areas in Poland (see Table 6). This supports Domar's (1970) claims about the connection between constraints on labour mobility and an increase in the income gap between the sectors. The evidence reinforces the argued convergence between the wage series in Italy as presented by Malanima (2010) as well as an existence of inter-sectorial divergence in England as presented by Clark (2007), with use of different data. The data gathered by Allen (2001) and used in this text indicate an earlier take-off of the cities in England and, therefore, gradually wider income gap in comparison to the ones used by Clark (2007).

Table 6: Ratio between the maximum observed urban unskilled worker's real wage and the maximum observed agricultural worker's real wage in England, Poland and Northern Italy in selected years, centred 25 years averages.

	England	Poland	Northern Italy
1500	1.21	2.47	1.34
1600	1.37	4.78	1.83
1700	1.81	3.40	1.31
1750	1.96	3.20	1.14
1800	1.98	2.58	1.09

Source: See the text.

Can this evidence from the 16th and the second half of the 17th century cast some light on the situation in the 18th century? According to Kula, (1962) in the reality of the 'second serfdom' the sizes of the plots of land would be adapted to changing conditions so that the tenants would remain around subsistence-level. These theoretical insights together with the observed persistence of the real wages of the agricultural workers paid partially in kind suggest a sustainability of the low living standards in the Polish countryside. This continuity is supported by a study of agricultural workers in the Wizna region in 1790 (Assorodobraj 1946). This daily wage data deflated by the price of the basket from the nearest city (Warsaw) yields nearly exactly the same result as the one based on Wyczański's series for 1660, i.e. a subsistence ratio of 0.83. All in all, due to lack of wage data, this research assumes constant real wages in agriculture in the 18th century.

VI A EUROPEAN COMPARISON

Usually, an interregional comparison of the real wages consists of contrasting the cities with the highest value in a region. As has been shown, none of the Polish cities enjoyed a constant supremacy. Thus far, in order to make the real wages series comparable, the representative series for Poland and Russia are based on the maximum value from all the cities in a country at any given time. A comparison of Tables 5 and 7 suggests that cities in Russia enjoyed a similar standard-of-living to the cities in the 'Poor' group in Poland before the 1750s and converged to the 'Robust' group in the second half of the 18th century. More importantly, the accounts presented in this research that are based on the barebones basket differ to the ones presented in the studies based on baskets including bread. Namely, Malanima (2013) recently demonstrated that wages in the urban sector in England (London) were lower than the Italian series before the 18th century. Additionally, Allen (2001) argued that the Polish urban labour was at par with the English one in the 16th century and impoverished only after the 17th century. Both the studies were based on baskets including bread. Conversely, a comparison of real wages from the urban sector based on a barebones basket suggest: (1) higher standards-of-living in Poland than in Western Europe in the 16th century; (2) convergence of the North Sea Region due to its growth as argued by the Early Modernists; (3) widening divergence between Italy and the rest of Europe. Moreover, the evidence from the agricultural sector suggests an overall downward trend in the standards-of-living in the European countryside.

Table 7: Real wages in Poland, Italy, England, and Russia in selected years, presented in subsistence-ratios, centred 51-year averages, 1500-1795.

	Agricultural Workers			Unskilled Workers				Skilled Labour[d]		
	Poland	N.Italy	Engl.	Poland	N.Italy	Engl.	Russia	Poland	N.Italy	Engl.
1500	1.16	1.48	2.18	2.86	1.97	2.62		7.56	3.71	4.18
1600	0.61/0.85[e]	0.99	1.27	2.90	1.81	1.73		7.43	3.33	2.63
1700	0.83[a]	1.19	1.38	2.82	1.56	2.51	1.52	6.02	3.00	3.45
1750	0.83[b]	1.09	1.44	2.65	1.24	2.83	1.87	5.04	2.39	4.16
1795	0.82[c]	0.78	1.06	2.14	0.85	2.10	1.63	4.29	1.60	3.38

Source: See the text; a) single value for 1660; b) interpolated; c) single value for 1790; d) based on the Masters e) payment in kind specification.

Conversely, a comparison of weighted real wages suggests a Little Divergence originating in Europe in the early modern period. In contrary to the evidence from the urban sector solely,

there had never been supremacy of the Polish living standards. All the countries enjoyed the highest standards-of-living in the late middle ages, i.e. ca. 1500, and a drop in living conditions at the end of the 18th century. The weighted real wages show the same trends as identified by the GDP evidence, namely: (1) the rise of the North Sea Region; (2) the decline of the Mediterranean Sea Area; (3) the stagnation of Eastern Europe. This study identifies two waves of divergence: before and after the period of convergence in the 16th century. The results, therefore, support both Pamuk's (2007) claim that the income dissimilarity existed already in the late middle ages as well as Allen's (2001) statement that the divergence began in the 17th century. The results show the crucial impact of conditions in the agricultural sector that accounted for bulk of the population in all of the countries.

Table 8: Weighted real wages presented in the subsistence-ratios, the distribution of the generated income between the sectors, urban- and skill- premiums, and urbanization levels in: Poland, England and Italy, 1500-1800.

	Share in the total generated income			Urbanization[c]	Premium[b]		Weighted real wage
	Agriculture	Proto-industry	Industry	(%)	Urban-	Skill-	
England							
1500	0.70	0.21	0.09	0.07	1.21	1.59	2.29
1600	0.63	0.25	0.13	0.10	1.37	1.52	1.41
1700	0.43	0.32	0.25	0.17	1.81	1.38	1.79
1750	0.31	0.35	0.34	0.23	1.96	1.47	2.10
1800	0.22	0.37	0.41	0.29	1.98	1.61	1.66
Poland							
1500	0.56	0.30	0.14	0.06	2.47	2.64	1.56
1600	0.33	0.44	0.23	0.08	4.78/3.41[a]	2.56	1.25/1.44[a]
1700	0.38	0.51	0.11	0.04	3.40	2.13	1.37
1750	0.37	0.53	0.10	0.04	3.20	1.90	1.35
1800	0.37	0.53	0.10	0.05	2.58	2.00	1.25
Italy							
1500	0.54	0.16	0.30	0.22	1.34	1.88	1.70
1600	0.46	0.18	0.36	0.23	1.83	1.84	1.31
1700	0.51	0.19	0.30	0.23	1.31	1.92	1.37
1750	0.54	0.18	0.28	0.23	1.14	1.92	1.19
1800	0.54	0.20	0.26	0.22	1.09	1.89	0.83

Sources: See the text; a) agricultural workers based on the 'payment also in kind' specification, all the other series based on the 'traditional specification of agricultural workers', i.e. paid only in silver; b) relations between the highest noted values in the country of: urban-premium – unskilled/agricultural workers, skill-premium – masters/unskilled workers; c) total population divided by the population in the cities greater than 5,000 (Allen 2000).

The results also indicate that 'proto-industry' accounted for over half of the generated income in Poland. This is due to the marginal urbanization and the poverty of the agricultural sector. As it

has been mentioned 'proto-industry' breaks down into two main categories: (1) inhabitants of the small cities and (2) peasants engaged in non-agricultural production. Furthermore, especially under serfdom the latter group might have not enjoyed a significant premium to their standards-of-living. By 1750 around 12 per cent of the Polish population lived in the small cities (Gieysztorowa 1981; Table 1). If we assume that the rest (24%) did not enjoy any premium over the agricultural workers, 'proto-industry' would account for only 20 per cent of the total income and the weighed real wage would drop by around 30 per cent. However, even if all the people working in the English proto-industry were assumed not to enjoy any premium over the agricultural workers, this would not negate the argued income gaps between England and Poland.

By contrast, the urbanization levels in Italy were stable and remained on a relatively high level of 22 per cent. However, this did not translate into a constantly high weighted real wage. The decline in the Italian overall standards-of-living was driven by impoverishment of the cities. As a result, the urban-premium in the country was relatively low and the country could not enjoy the benefit of high urbanization levels. Having said that, due to the high urban-premium in Poland, the weighted real wage was related to the levels of urbanization. The latter, together with the shares of the overall income generated in the big cities were the highest around 1500 and 1600. These were the periods of the highest overall standards of living in the country. The dis-urbanization in the middle of the 17th century, contributed to the progressing decline in the weighted real wages. All in all, this empirical evidence suggests the importance of urbanization levels on economic growth in the early modern period, provided the existence of a significant urban-premium.

SUMMARY AND CONCLUSION

This research explored the real wages in the Kingdom of Poland in the early modern period. Next to a presentation of the novel data sets on real wages of masters, skilled aid, unskilled workers, agricultural labourers and small farmers, the paper proposed several methodological advancements. First, the research used studies of the budgets of small farmers in order to reconstruct their income and investigate their standard-of-living in comparison to the wage earners. Second, the research outlined a method of weighting the real wage series. This operation allowed for a more meaningful comparison of the real wages between regions than a simple juxtaposition.

The results of this empirical investigation into the Polish economic growth and inequality suggest two waves of income dissimilarities in Europe. The first originated prior to the early modern Period and was linked to the superiority of the English agricultural sector. The second came about the 17th century and was linked to urbanization. The results show that the kingdom experienced high inequality within the urban sector and between its urban and rural sectors. This suggests that this presumably underdeveloped Malthusian economy could have been characterised by the highest inequality among the wage earning populations in Europe. This challenges the motion of the famous Kuznets' Curve, which signifies that inequality and growth come hand-in-hand. The results suggest that special attention be paid to the institutional background of a country when attempting to proxy economic growth with changes in inequality.

Appendix 1: Preparation of the baskets.

General
In cases of multiple observations for one year, preference was given to the chronologically first one. Missing observations of rye predicted by OLS regressions first on wheat and second on oats. Missing prices of butter predicted by regressions on prices of meat and *vice versa*. In cases of missing observations for rye or wages assumed linear trends up to 11 years. In cases of commodities with smaller volatility of prices, gaps interpolated assuming linear trends up to 40 years. Quarter of beef assumed to weight 60kg, car (*wóz*) of firewood 162 kg. One cubic meter of wood assumed to weigh 700 kg. Density of rye assumed 0.721 kg/litter. 100kg of firewood assumed to provide 9.254 million BTU.

Lublin
Missing observations of oil and all the prices of soap taken from the Warsaw's series. The price of beef was predicted from two regressions on 1) price of one calf, and then 2) prices of one cow.

Moscow and St Petersburg
Beans omitted as a source of calories. The gap filled by the higher consumption of rye (200 kg). Oil series based on soap. Missing observations for candles based on prediction from the regression on tallow.

Poznań
Prices of the manufactured products and fuel from the Warsaw series. For the 16th century, prices of rye come from the Warsaw's series.

England
Data from Allen (2001); English basket based on wheat not rye. The series based primarily on London and it's surroundings. They represent, on average, the highest observed wage series in the country (Malanima 2013).

Italy

CPI and agricultural wage index from Malanima (2008). Price and wage data from Allen (2001). Cost of barebones basket calculated for 1750 with use of Allen (2001) data. The basket was based on wheat not rye. Costs of the basket for the other years recreated by connecting the cost of the basket in 1750 to the Malanima's (2008) index based on a slightly different basket. Assumed constant linear relation between the reconstructed barebones basket and the basket used by Malanima. Wages of masters and unskilled labour from Allen (2001) dataset. Wages in agriculture predicted from regressions of the Malanima's (2008) wage indices on the wage data from Allen (2001). There were 75 simultaneous observations of Allen's wages and Malanima's indices for agriculture and their correlation coefficient was high and equal 0.85.

Appendix 2: Summary of the assumptions used to construct the models of the budgets of peasants households for the second half of the 16th century.

Total size of the plots	1 łan (*mannus*)= 16 ha	0.5 łan (*mannus*)= 8 ha
Harvest after tithe from one seed	rye -5 wheat- 5 barley (and others) – 5 oats- 4	rye -5 wheat- 5 barley (and others) – 5 oats- 4
Density of seeding	140 kg per 1 ha	140 kg per 1 ha
Shares of seeding	rye – 40% wheat- 15% barley (and others) – 10% oats- 35%	rye – 40% wheat- 15% barley (and others) – 10% oats- 35%
Size of taxation	17-24 *Grosze*	12-17 *Grosze*
Duties towards the Church other than the tithe	2 *ćwiartnia* of wheat and oats	1 *ćwiatnia* of wheat and oats
Rent in money	48 *Grosze*	24 *Grosze*
Duties towards the landlord	2 *ćwiartnia* of wheat and of oats	1 *ćwiatnia* of wheat and of oats
Rent in work	3 days per week	1.5 day per week

Source: Guzowski 2008; One *Grosz* at that time contained c. 0.77 grams of silver; 1/3 of land used for lay farming.

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