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Galicia's escape from the Malthusian trap : A long and short-term analysis of demographic response to the economic conditions in the population of Galicia 1819–1913

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GALICIA'S ESCAPE FROM THE MALTHUSIAN TRAP. A LONG AND SHORT-TERM ANALYSIS OF THE DEMOGRAPHIC RESPONSE TO ECONOMIC CONDITIONS IN THE POPULATION OF GALICIA 1819–1913[1]

> "Each Galician does one-quarter of a man's work and eats one-half of a man's food"[2].

This famous statement by Stanisław Szczepanowski highlighted the main problems in late nineteenth-century Galicia – the extremely low productivity of local agriculture and low standard of living among its residents. These two closely related factors created a vicious circle of 'Galician misery' which soon became proverbial and manifested itself as a gloomy symbol in culture and the arts. While no one questioned the extreme poverty of Galician people, the depth and scale of its backwardness compared with other countries and provinces have been the subject of public and academic debate since the late nineteenth century[3] to this

[1] This paper presents the first stage of research regarding Malthusian mechanisms in nineteenth-century Polish lands which was discussed during the Warsaw Frontier Research in Economic and Social History (FRESH) Meeting "Understanding the Economic development of Eastern Europe" held on 6–7 July 2013. I have greatly benefited from the help of Prof. Jacek Kochanowicz and two anonymous reviewers.

[2] S. Szczepanowski, *Nędza Galicyi w cyfrach i program energicznego rozwoju gospodarstwa krajowego*, Lwów 1888, p. 22.

[3] M. Marassé, *Gospodarcze stosunki w Galicyi, odbitka z Zeszytu XXI-go, Tomu II-go Encyklopedyi Rolnictwa*, Warszawa 1874; R. Łubieński, *Nieurodzaj i głód w Galicji r. 1879–1880*, Kraków 1880; T. Pilat, *Uwagi nad książką p. Stanisława Szczepanowskiego pod napisem "Nędza Galicyi"*, Warszawa 1888; J. Kleczyński, "Stosunki włościańskie w Galicyi", in: *Ekonomiczne stosunki Galicyi na podstawie materyałów zebranych w drodze ankiety przeprowadzonej przez Wydział krajowy w latach 1877 i 1878. Wiadomości statystyczne o stosunkach krajowych*, ed. by T. Pilat, Lwów 1881; id., "Stan ekonomiczny Galicji", *Przegląd Polski*, 88, 1888.

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today.[4] However, there was no consensus among scholars and politicians as to whether this peripheral province of the Austro-Hungarian Empire was indeed "the poorest and most miserable country in the world."[5] Contemporary research shows that in the period of our interest Galicia experienced one of the lowest GDP per capita in the Austro-Hungarian Empire – only Bukovina, Dalmatia and Croatia-Slavonia recorded lower values between 1870 and 1910.[6] On the other hand, synthetic economic indices hardly ever touch the most rudimentary aspects of human experience as biological performance expressed by the timing and intensity of demographic events. Moreover, the aggregated value of production does not take into account social inequalities, which usually determine the distribution of wealth. This article aims to put the problem of "Galician misery" in the setting of a Malthusian regime using a known demographic methodology to both estimate the level of the standard of living, understood as the ability to overcome short-term economic stress,[7] and compare it with other populations. To do so, first a brief history of the idea of the empirical verification of the Malthusian relationship is discussed in order to relate this study to the foundations of Malthusian studies. This consideration leads to the choice of sources and methods necessary to perform a comparative analysis of this kind. The discussion of the results is split into two parts which reflect the division among the long- and short-term relationships between economic and demographic variables. Finally, several concluding remarks are made highlighting the main findings as well as the potential drawbacks of the study.

[4] J. Łukasiewicz, "Wpływ urodzajów na poziom życia społeczeństwa polskiego w latach 1820–1860", in: *Nędza i dostatek na ziemiach polskich od średniowiecza po wiek XX*, ed. by J. Sztetyłło, Warszawa 1992, pp. 183–192; M. Śliwa, "Nędza galicyjska. Mit i rzeczywistość", in: *Galicja i jej dziedzictwo*, vol. 1: *Historia i polityka*, ed. by W. Bonusiak, J. Buszko, Rzeszów 1994, pp. 145–156; M. Kopczyński, "O »Nędzy Galicji« po raz kolejny", in: *Gospodarka, społeczeństwo, kultura w dziejach nowożytnych. Studia ofiarowane Pani Profesor Marii Boguckiej*, Warszawa 2010, pp. 239–250.

[5] S. Szczepanowski, op. cit., p. 7.

[6] D.F. Good, "The Economic Lag of Central and Eastern Europe. Income Estimates for the Habsburg Successor States, 1870–1910", *The Journal of Economic History*, 54, 1994, no. 4, pp. 869–891; M.-S. Schulze, "Regional Income Dispersion and Market Potential in the Late Nineteenth Century Hapsburg Empire", *Department of Economic History London School of Economics Working Papers*, 2007, no. 106/07.

[7] T. Bengtsson, C. Cambell, J.Z. Lee et al., *Life under Pressure. Mortality and Living Standards in Europe and Asia, 1700–1900*, Cambridge–London 2009, pp. 34–35.

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Testing Malthus – prices and population:

Since T.R. Mathus' groundbreaking work on the mutual relationship between resources and population growth, many scholars have tried to verify his claims by means of a statistical analysis of price movements and population dynamics in various countries and regions around the world. It seems worth briefly mentioning the most important works on that topic. While Malthus was certainly more concerned with food production, he treated the price of labour and provisions as an indicator of population pressure.[8] This relation has been carefully scrutinized by historians of agriculture, among whom Wilhelm Abel was probably the most influential. His classic work on crises and economic cycles in Europe from the thirteenth to the twentieth century remains a milestone in this field of study.[9] The association between prices and natural increase in population also lay within the scope of the "Annales" school of historiography thanks to the pioneering work of Jean Meuvret.[10] Although Meuvret did not refer to Malthus' works he empirically proved the presence of the Malthusian subsistence crises at least in the second half of the seventeenth century. Despite the absence of Malthus' work among the inspirations of Meuvret's work, it is mentioned because of its influence on generations of social and economic historians.[11] A far more sophisticated investigation of the price-demography relationship was part of a monumental effort by *The Cambridge Group for the History of Population and Social Structure* founded in 1964. One of its impressive products, *The Population History of England 1541–1871*,[12] included a modern approach to the testing of Malthusian mechanisms. The investigation indicated a clear association between prices and wages and population growth in the early modern

[8] T.R. Malthus, *An Essay on the Principle of Population*, Cambridge 1992, p. 100.

[9] W. Abel, *Agrarkrisen und agrarkonjunktur in Mitteleuropa vom 13. bis zum 19. Jahrhundert*, Berlin 1935. Surprisingly the book was translated into English as late as 1980: id., *Agricultural Fluctuations in Europe. From the Thirteenth to Twentieth Centuries*, London–New York 1980.

[10] J. Meuvret, "Les crises de subsistances et la démographie de la France d'Ancien Régime", *Population* (French Edition), 1946, pp. 643–650.

[11] J. Meuvret's work was taken up primarily by Pierre Goubert (see: P. Goubert, *Beauvais et le Beauvaisis de 1600 a 1730. Contribution a l'histoire sociale de la France du 17e siècle*, Paris 1960). This current of research is significantly present also in the works of Emmanuel Le Roy Ladurie (see: E. Le Roy Ladurie, "Les paysans de Languedoc", Paris 1966; id., "L'histoire immobile", *Annales*, 1974, pp. 673–692).

[12] E.A. Wrigley, R.S. Schofield, *The Population History of England 1541–1871. A Reconstruction*, London 1981.

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period up until the very beginning of the nineteenth century.[13] The novelty of the Cambridge Group's approach was examining the mortality, fertility and nuptiality reaction to changes in economic factors also in the short-term.[14] This method, developed by Robert Lee, revealed the relatively higher importance of preventive population checks, while positive checks accounted only for a modest fraction of the population limitations. The immediate response of the populations' demographic performance was the main preoccupation of Lee's disciple, Patrick Galloway, who scrutinized Malthusian relationships in more than a dozen regions and cities.[15] Thanks to his works, using a unified methodology it is possible to come up with cross regional comparisons which are also widely used in this paper. Of course works by Galloway were not the only ones on the topic, but they almost universally referred to his efforts.[16] The completely new quality of the statistical testing of Malthus' ideas was generated by another research group collaborating on the *EurAsia Project on Population and Family History*.[17] The main innovations here, basically the employment of individual level micro data which, together with the use of a life-event history analysis

[13] Ibid., pp. 402–453.

[14] R. Lee, *Short-term Variation. Vital Rates, Prices, and Weather*, in: E.A. Wrigley, R.S. Schofield, op. cit., pp. 356–401.

[15] P.R. Galloway, "Basic Patterns in Annual Variations in Fertility, Nuptiality, Mortality and Prices in Pre-industrial Europe", *Population Studies*, 42, 1988, no. 2, pp. 275–302; id., "Annual Variations in Deaths by Age, Deaths by Cause, Prices, and Weather in London 1670 to 1830", *Population Studies*, 39, 1985, no. 3, pp. 487–505; id., "Differentials in Demographic Responses to Annual Price Variations in Pre-revolutionary France", *European Journal of Population/Revue européenne de Démographie*, 2, 1987, nos. 3–4, pp. 269–305; id., *Population, Prices, and Weather in Preindustrial Europe*, Diss. University of California, Berkeley 1987; id., "Short-run Population Dynamics among the Rich and Poor in European Countries Rural Jutland and Urban Rouen", in: *Old and New Methods in Historical Demography*, ed. by D.S. Reher, R. Schofield, Oxford 1993, pp. 84–108; E.A. Hammel, P.R. Galloway, "Structural and Behavioural Changes in the Short Term Preventive Check in the Northwest Balkans in the 18th and 19th Centuries", *European Journal of Population/Revue européenne de Démographie*, 16, 2000, no. 1, pp. 67–108.

[16] For a concise summary of 37 studies see: P.R. Galloway, "Secular Changes in the Short-term Preventive, Positive, and Temperature Checks to Population Growth in Europe, 1460 to 1909", *Climatic Change*, 26, 1994, no. 1, pp. 3–63. Another volume dedicated mostly to the topic of the analysis of the Malthusian regime: *Pre-industrial Population Change. The Mortality Decline and Short-term Population Movements*, ed. by T. Bengtsson, G. Fridlizius, R. Ohlsson, Stockholm 1984.

[17] T. Bengtsson, C. Cambell, J.Z. Lee et al., op. cit.; N.O. Tsuya et al., *Prudence and Pressure. Reproduction and Human Agency in Europe and Asia, 1700–1900*, Cambridge–London 2010.

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combined with a time-series approach, resulted in the possibility of acquiring information of unprecedented detail about past populations. It brought insight not only into the behaviour of individuals and household members during periods of economic stress but also allowed for meaningful comparisons between the efficiency of the performance of European and Asian demographic systems. Highlighting the role of human agency in combating the disastrous effects of subsistence crises, and precisely detecting the mechanisms of both positive and preventive checks, the work of the *EurAsia Project* remains until today the most complete and credible test of the Malthusian regime. It is worth noting, however, that some scholars question the impact of economic welfare on demographic performance, as described by Malthus, showing that "the world before Malthus was not so Malthusian after all."[18] At the same time, recent publications on the topic show that the Malthusian debate is far from being resolved.[19] This proves the relevance of the use of the Malthusian regime as a theoretic model and a strong need to perform similar analysis of the populations which have been widely neglected by scholars, among them the population of Central Europe. Since one of the aims of this paper is to perform a comparative analysis of the occurrence and strength of Malthusian mechanisms in Galicia and other parts of Europe, it is capitalising on the methodology of P.R. Galloway and the resulting studies. At the same time this article adapts the idea of the *EurAsia Project*, that in fact, demographic responses to economic crises, measured in the short-term, can be treated as a measure of the standard of living.

Sources

Data on the population size and dynamics was published in various periodicals of the Central Statistical Commission in Vienna, mainly in

[18] E.A. Nicolini, "Was Malthus Right? A VAR Analysis of Economic and Demographic Interactions in Pre-industrial England", *European Review of Economic History*, 11, 2007, no. 1, pp. 99–121; B. Chiarini, "Was Malthus Right? The Relationship between Population and Real Wages in Italian History, 1320 to 1870", *Explorations in Economic History*, 47, 2010, no. 4, pp. 460–475; N. Crafts, T.C. Mills, "From Malthus to Solow. How did the Malthusian Economy Really Evolve?", *Journal of Macroeconomics*, 31, 2009, pp. 68–93.

[19] A. Rathke, S. Sarferaz, "Malthus was Right. New Evidence from a Time-varying VAR", Institute for Empirical Research in Economics, University of Zurich, *Working Paper* 2010, no. 477; id., "Malthus and the Industrial Revolution. Evidence from a Time-Varying VAR", *CESifo Working Paper*, 2014, no. 4667.

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Tafeln zur Statistik der österreichischen Monarchie, *Statistisches Jahrbuch der österreichischen Monarchie*, and *Österreichische Statistik*. The most important figures are fully accessible through the work of other scholars.[20] The demographic data used in this study was extracted from the work of Bolognese-Leuchtenmüller. Similarly, the basic economic data for Galicia is known thanks to the work of scholars of the "Franciszek Bujak school",[21] as well as the recent activities of the Global Price and Income History Group, enabling us to use fully-comparable information on converted rye prices and nominal wages in Lwów and Kraków.[22] Whenever the rye price for Galicia is mentioned in this article it refers to the average of the prices noted in Lwów and Kraków. Some recent research on the prices and wages' movement has resulted in the construction of a Consumer Price Index and Real Wages for both Lwów and Kraków.[23] Despite this, we have used the traditional approach of employing rye prices and the grain wage. This can be justified by the fact that Allen's CPI and the rye price are almost parallel throughout the whole period investigated, showing the importance of this particular cereal in the constructed basket of goods.[24] Some concerns about data quality have to be taken into account, but it is clear that it potentially affects only the long-term analysis. The commonly noticed improvements in registration throughout the course of the nineteenth century probably confound the levels of demographic rates, but they should not be significant enough to alter the direction of the long-term trend.[25] In the short-term analysis, data is detrended, so that the improvement in the registration factor, most probably being

[20] K. Zamorski, *Informator statystyczny do dziejów społeczno-gospodarczych Galicji. Ludność Galicji w latach 1857–1910*, Kraków–Warszawa 1989; B. Bolognese-Leuchtenmüller, *Bevölkerungsentwicklung und Berufsstruktur Gesundheits- und Fürsorgewesen in Österreich 1750–1918, Wirtschafts- und Sozialstatistik Österreich-Ungarns*, vol. 1, Wien 1978.

[21] M. Górkiewicz, *Ceny w Krakowie 1796–1914, Badania z dziejów społecznych i gospodarczych*, vol. 16, Poznań 1950; S. Hoszowski, *Ceny we Lwowie 1701–1914, Badania z dziejów społecznych i gospodarczych*, Lwów 1934.

[22] http://gpih.ucdavis.edu/Datafilelist.htm (18 I 2013).

[23] R.C. Allen, "The Great Divergence in European Wages and Prices from the Middle Ages to the First World War", *Explorations in Economic History*, 38, 2001, no. 4, pp. 411–447. Datafiles accessed through http://gpih.ucdavis.edu/Datafilelist.htm (18 I 2013).

[24] The Pearson's R correlation coefficient between these two series is equal to 0.91 for raw data and 0.97 for smoothed data.

[25] I. Gieysztorowa, *Wstęp do demografii staropolskiej*, Warszawa 1976, pp. 62–77; ead., "Niewiarygodność statystyki demograficznej ziem polskich w XIX w. i potrzeba jej korekty", *Przeszłość Demograficzna Polski*, 12, 1980, pp. 179–190.

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systematic, is removed. Furthermore we consider only a five year lag in response to demographic events, so the presence of any substantial changes in such a short period of time is doubtful. Another problem could be associated with the level of aggregation of the data, since we are dealing with quite a large population, from 4.5 million at the beginning of the period studied to more than 8 million at the end. At the same time, it covers a very diverse society in many contexts (religious, cultural, geographical, etc.), but perhaps the most significant disadvantage for this study is the absence of age-specific and social stratification in this data, which implies an inability to see the frailty of respective age categories and separate net-producers from net-consumers of cereals, and consequently, the potential beneficiaries from the victims of high food prices. These issues can be resolved only with the use of high-quality individual level micro data. However, such detailed studies cannot be performed before the time- and labour-intensive database creation process which is yet to come for the population of Poland's historical lands.

Methods

The data gathered for the analysis was prepared using the Hodrick-Prescott filter (λ=6.25).[26] The application of such a procedure results in obtaining smoothed series which were used in the long-term approach, and series of residuals which were the basis for the short-term analysis. In the case of the long-term analysis, all series, except for natural increases, have been previously transformed by taking their natural logarithm to better indicate the rate of change instead of absolute values. Tracing the long-standing relationship between economic and demographic trends was performed by comparing graphs of the smoothed time series of demographic and economic indicators.[27] This shows a rather general trend and direction of the relationship between population growth and its components, and economic pressure, however it is useful to determine the potential Malthusian mechanisms governing population growth.

The short-term analysis was based on the residuals of Hodrick-Prescott filtering. The series obtained in this way show only deviations

[26] Value postulated in literature for yearly data: M. Ravn, H. Uhlig, "On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations", *The Review of Economics and Statistics*, 84, 2002, no. 2, pp. 371–375.

[27] E.A. Wrigley, R.S. Schofield, op. cit.

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from the trend and were checked for the presence of unit root with the Dickey-Fuller test, which indicated their stationarity. Because the detrending procedure removes structural and cyclical fluctuations from the data, absolute numbers of demographic events could be used instead of rates, whose value for the investigated period is sometimes questioned because of the unknown quality of the population counts. To determine the scale and timing of demographic response to short-term economic stress, a regression model with time dependence, given by the general formula below, was employed:

$$D_v = a + \sum_{k=0}^{4} \beta_1 * P_{t-k} + e_t$$

Here Dv is a dependent variable (the number of births, deaths, marriages), a is a constant, ß is a regression coefficient, P are the prices, k indicates the time lag, and e is an error term. The number of lags has been set to five years (including lag 0, therefore the year of the price change). In some models, non-infant death numbers were added as a control variable. Because of the detrending procedure and characteristics of the model, the results are given as elasticities, i.e. they show the reaction of an explained variable on a one percent rise in prices.[28] Because of the potential serial autocorrelation in residuals within several models, indicated by the results of the Durbin-Watson test, the Cochrane-Orcutt iteration procedure was imposed in these cases.[29]

In both cases – the long and short-term analysis – rye prices and grain wages are only economic indicators, proxy for the cost of living, so we do not imply the causal relationship between the price of rye and demographic variables, but rather between economic pressure and the demographic response.

Results and discussion

Long-term relationships

According to Malthus' "law of population", the means of subsistence growth rate is much lower than population growth, which in

[28] P.R. Galloway, "Basic Patterns..., pp. 275–302.

[29] This is one of the solutions proposed in the literature to deal with the problem of serial autocorrelation in residuals: D. Cochrane, G.H. Orcutt, "Application of Least Squares Regression to Relationships Containing Auto-Correlated Error Terms", *Journal of the American Statistical Association*, 44, 1949, no. 245, pp. 32–61.

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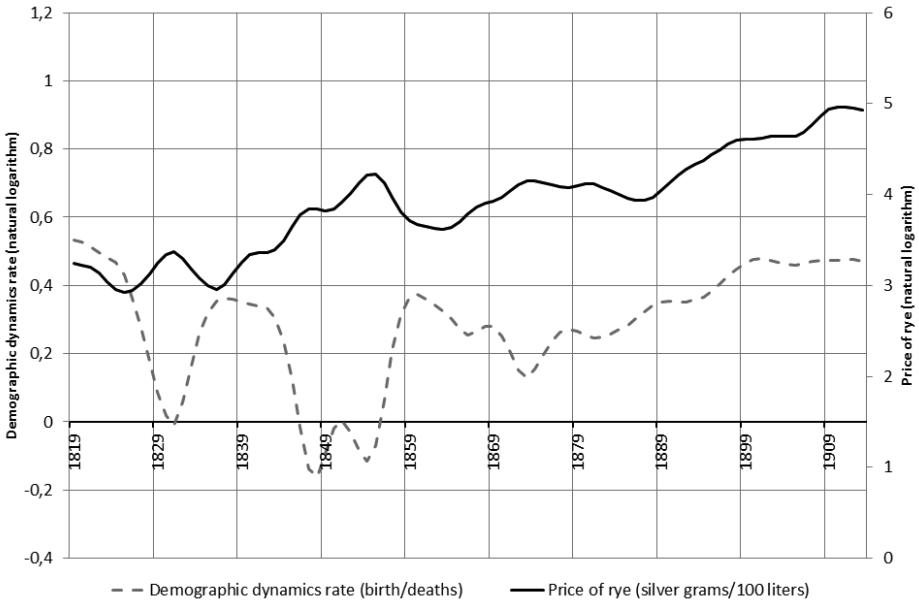
the longer term perspective leads to a scarcity of resources, and so to a rise in prices. This relationship influences both variables: fast population growth results in an increase in prices, but a longer period of high prices can lead to a subsistence minimum and, in consequence, a decline in population, which again results in a drop in the economic variable.[30] This kind of relationship indicated in pre-industrial England, by Wrigley and Schoefield, and sometimes referred to as the "Malthusian trap", governed population conditions in European countries until the "industrial revolution".

Figure 1. Smoothed natural logarithm of the demographic dynamics rate (left axis) compared to the smoothed natural logarithm of rye prices (right axis) in Galicia between 1819 and 1913



Source: own calculations based on B. Bolognese-Leuchtenmüller, *Bevölkerungsentwicklung und Berufsstruktur Gesundheits- und Fürsorgewesen in Österreich 1750–1918, Wirtschafts- und Sozialstatistik Österreich-Ungarns*, t. 1, Wien 1978; K. Zamorski, *Informator statystyczny do dziejów społeczno-gospodarczych Galicji. Ludność Galicji w latach 1857–1910*, Kraków–Warszawa 1989; M. Górkiewicz, *Ceny w Krakowie 1796–1914, Badania z dziejów społecznych i gospodarczych*, t. 16, Poznań 1950; S. Hoszowski, *Ceny we Lwowie 1701–1914, Badania z dziejów społecznych i gospodarczych*, Lwów 1934.

[30] T.R. Malthus, op. cit.; see also: D.S. Reher, J.A. Ortega Osena, "Malthus Revisited. Exploring Medium-Range Interactions between Economic and Demographic Forces in Historic Europe", in: *Population and Economy. From Hunger to Modern Economic Growth*, ed. by T. Bengtsson, O. Saito, Oxford 2000, pp. 183–212.

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Figure 1 shows that such relationship can also be considered in the case of Galicia. Unfortunately we do not have precise data on population numbers, but the demographic dynamics rate[31] gives us a good idea of the general direction of population growth during the period investigated. However, it should be remembered that, especially in the latter half of the century, Galicia's population was subject to heavy emigration. In general, we can observe several aspects of the Malthusian regime. In the first decades we can see that the natural increase fell substantially from very high levels to almost no increase, but at the same time prices were roughly constant with some fluctuations. After a period of compensation, from the 1830s the natural increase stayed high for more than a decade, but this time we can clearly notice there was a significant rise in the price of rye, which lasted up until the late 1850s. The subsistence margin must have soon been surpassed, hence the natural increase tended to fall and eventually was negative for almost a decade. The falling prices at the beginning of the second half of the century can be perceived as a basis for the boost in demographic development, but as soon as they had risen back to around the previous levels, the natural increase dropped and remained only moderate. This situation changed around 1880 when the demographic transition set in – the natural increase began its secular growth to constantly high values from the turn of the century. Although this caused an almost parallel rise in rye prices, the demographic development remained unaltered, and in the last quinquennium of our study prices started to decline. In the Malthusian setting it can therefore be noted that the long-term subsistence – population relationship operated until the last years of the nineteenth century.

However, since Galician society was dominated by an agricultural population it is worth looking at Figure 2 which compares demographic development with the movement of the grain wage for Lwów unskilled workers (helpers). The interactions of these two series seems even more striking than in Figure 1. The periods of rising wages correspond with the increase in the population growth. A possible break between the series could be placed similarly, i.e. around 1890, when despite the falling and fluctuating wages, the population tended to grow faster, and later,

[31] The demographic dynamics rate defined as the number of births divided by the number of deaths is used here instead of the natural increase to allow for taking a logarithm. The positive value of the logarithmized demographic dynamics rate indicates the surplus of births over deaths, while the negative value shows the natural decrease. The property of the logarithm is that $\ln\left(\frac{births}{deaths}\right) = \ln births - \ln deaths$.

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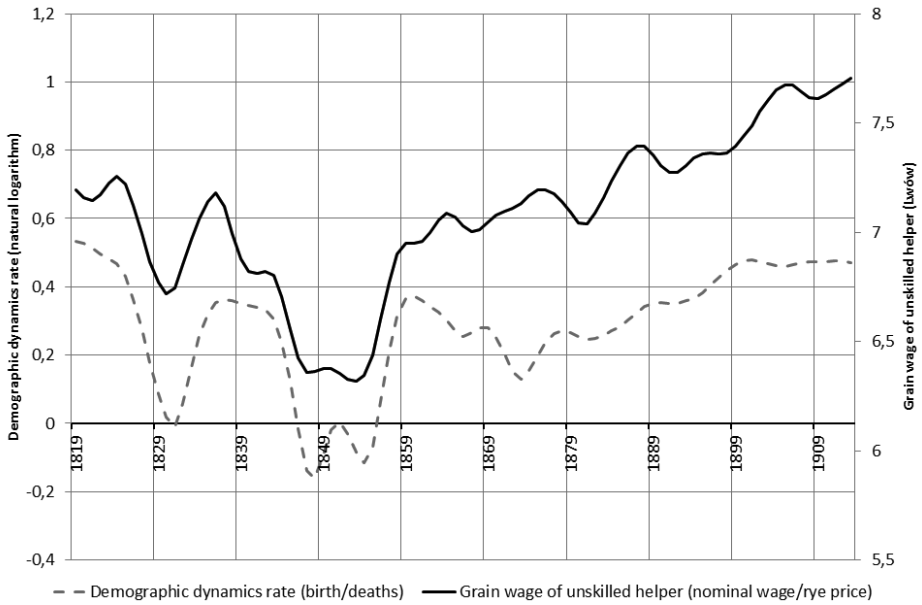
Figure 2. Smoothed natural logarithm of the demographic dynamics rate (left axis) compared to the smoothed natural logarithm of the grain wage (right axis) of unskilled workers (helpers) (Lwów) in Galicia between 1819 and 1913



Source: as in Figure 1.

although natural, the increase from 1900 onwards remained at a constant high level, wages continued to grow. So far, we have considered demographic behaviour jointly, in the form of a natural increase, but, in his writings, Malthus clearly distinguished between positive and preventive checks on population growth, as those connected to mortality on the one hand, and nuptiality as well as fertility on the other. Figures 3 to 5 expand the long-term economic – demographic relationship in this manner.

It seems to have been mortality which governed the natural increase in population, especially in the first half of the century. It is quite obvious that cyclical mortality crises, being typical of the demographic "ancien régime" are closely connected to reaching the subsistence minimum which, in extreme cases, results in hunger, epidemics and social turmoil, and in a lesser form leads to the population's malnourishment and lower immunity. A stabilization in the fluctuations and a decline in incipient mortality can be observed in Galicia from the 1880s, but during the first decade it was accompanied by slightly falling prices. From the 1890s there was a definite split between mortality and economic factors, as the crude death rate continued to fall at an accelerating rate, while prices grew.

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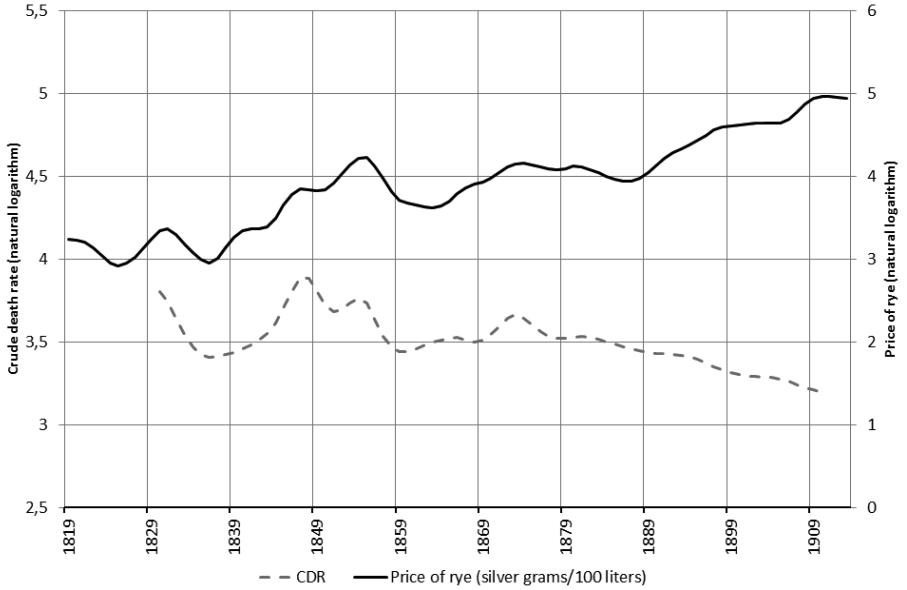
Figure 3. Smoothed natural logarithm of the crude death rate (left axis) compared to the smoothed natural logarithm of rye prices (right axis) in Galicia between 1819 and 1913



Source: as in Figure 1.

Figure 4. Smoothed natural logarithm of the inverted crude birth rate (left axis) compared to the smoothed natural logarithm of rye prices (right axis) in Galicia between 1819 and 1913

Source: as in Figure 1.

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Figure 5. Smoothed natural logarithm of the inverted crude marriage rate (left axis) compared to the smoothed natural logarithm of rye prices (right axis) in Galicia between 1819 and 1913

Source: as in Figure 1.

The results of the analysis presented above, showing the long-term relationship between economic factors and demographic development result in several important observations. It seems that the closest fit between the movement of series can be perceived between the late 1840s and 1890s, this chronology applies more or less to all demographic variables. In this period, the rising prices in the longer run were accompanied by the worsening demographic performance of the population investigated (rising mortality, falling nuptiality and fertility). Before then, a clear pattern was quite similar but less pronounced and sometimes inverted. Towards the end of the century this relationship seems to disappear. There could be a number of reasons for this situation, but most probably in the first period, in which the majority of the population were peasants within a manorial system, it is to be suspected that a form of natural economy existed without the use of an official currency. This does not imply this period was free from Malthusian population checks, but it could indicate that the economic variable shown here (i.e. the price of rye) does not describe economic pressure in a good way. On the other hand, a close relationship between natural increase and the grain wage of unskilled workers is striking

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throughout almost the whole period. Since more than 70% of Galicia's population consisted of agricultural workers, it is hard to interpret, but it should be remembered that in a situation in which arable land was highly fragmented, many farmers (including cottagers and lodgers) owned too little land to maintain a family and tried to hire themselves out.[32] The long-term relationships between the 1840s and 1890s in general confirm the Malthusian mechanism with the presence of both preventive and positive checks. The high level of mortality, connected with quite rapid fluctuations (despite the smoothing factor), could indicate that the population of Galicia lived very close to the subsistence margin. The first signs of escaping the Malthusian Trap are present around the 1890s, when the mortality trend was negative, and the fertility and nuptality trends rose despite the unfavorable economic conditions indicated by rising rye prices and the falling grain wage. It is worth noting that this change began to occur around the years 1870–1900, in which Franciszek Bujak saw Galicia's "preparation for independent economic development."[33] To understand the potential mechanisms behind the departure from the Malthusian regime, we will analyse briefly four possible explanations: migrations, the rise of agricultural productivity, the rise of real wages and state interventionism connected to the political and economic autonomy of Galicia.

Malthus noted in his essay that after several years of positive natural increase, which would surpass gains in food production, "we may be perfectly certain that unless an emigration takes place, deaths will shortly exceed births."[34] It is easy to see that in the situation described, emigration plays the role of a safety valve. In the light of the long-term relationships shown above, it is worth examining migration in a little more detail. There is no doubt that during the last decades of the nineteenth and the beginning of the twentieth centuries, the population of Galicia contributed massively to the migrations to both Americas, most notably to the United States.[35] According to estimates, between 1902 and 1905 alone, overseas emigration from Galicia high – approximately 340,000 people. With regards to emigration to the United States dur-

[32] F. Bujak, *Galicja*, vol. 1, Lwów–Warszawa 1908, pp. 390–402; id., "Maszkienice. Wieś powiatu brzeskiego. Stosunki gospodarcze i społeczne", *Rozprawy Akademii Umiejętności. Wydział Historyczno-Filozoficzny*, 16, 1902, pp. 88, 117; id., *Żmiąca. Wieś powiatu limanowskiego. Stosunki gospodarcze i społeczne*, Kraków 1903, p. 87.

[33] Id., *Rozwój gospodarczy Galicji (1772–1914)*, Lwów 1917.

[34] T.R. Malthus, op. cit., chapter 7.

[35] *Emigracja z ziem polskich w czasach nowożytnych i najnowszych (XVIII–XX w.)*, ed. by A. Pilch, Warszawa 1982, pp. 9–10, 270–283.

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ing the years 1902–1905, the outflow from Galicia contributed to more than 70% of US immigration from Austrian lands.[36] However, emigration from Galicia dates back to the period shortly after the emancipation of the serfs; its intensification is usually placed at the turn of the nineteenth century.[37] More importantly the overseas movement of the population played only a minor part in the broad picture of migration from Galicia. The majority of emigrants, so-called "obieżysasi",[38] were temporary migrants who treated their annual excursions to work, mainly to German lands as "an ordinary way of earning money."[39] Although the statistics are far from complete, from the various estimations, we are able to calculate that between 1907/1908 and 1909/1910 temporary workers constituted almost 63% of all migrants from Galicia.[40] What could the benefits of the migration phenomenon be in the context of the Malthusian regime? Primarily, a reduction in the number of inhabitants resulted in lower population pressure, i.e. fewer people competed for the same number of products. Even if they eventually returned, during their period of absence, they did not contribute to Galicia's consumption. Secondly, migration reduced the province's demographic potential because the migrants frequently postponed setting up a new household and childbearing. Another advantage was the money earned abroad. These savings could be used to cover household budgetary deficits, buy land or serve as an insurance for when times were bad.[41] Finally, the migrants brought back with them ideas of modernization and knowledge about improvements in agricultural production, e.g. the use of machines and artificial fertilizers.[42]

From Table 1 we can see clearly that the acceleration of the estimated outmigration correlates in time with the moment of the Galician population's escape from the Malthusian trap. This situation, however, does not imply any causation as both processes are endogenous. Migration might reduce population pressure and competition for goods

[36] A. Benis, *Emigracya. Studyum o Galicyjskiem wychodźctwie*, Kraków 1907, p. 13.

[37] *Emigracja z ziem polskich*..., p. 10; K. Remian, "Studia nad emigracją zagraniczną ludności powiatu brzeskiego 1860–1962", *Problemy Polonii Zagranicznej*, 4, 1964/1965, pp. 153–184; F. Bujak, "Maszkienice..., p. 120; W. Styś, *Drogi postępu gospodarczego wsi. Studium szczegółowe na przykładzie zbiorowości próbnej wsi Husowa*, Wrocław 1947, p. 75.

[38] This term could be translated into English as "round trippers to Saxony".

[39] A. Benis, op. cit., p. 7.

[40] L. Caro, *Emigracja i polityka emigracyjna ze szczególnem uwzględnieniem stosunków polskich*, Poznań 1914, p. 58.

[41] A. Benis, op. cit., pp. 8–14.

[42] W. Styś, op. cit., p. 149.

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Table 1. Estimation of the migration balance of Galicia, 1869–1910

Years	Absolute population growth (from censuses)	Intercensal natural increase	Difference (migration balance)	Net migration rate (per 1000 population)
1869–1880	514 218	520 153	-5 935	-1.04
1881–1890	648 909	710 330	-61 421	-9.78
1891–1900	708 123	1 011 276	-303 153	-43.54
1901–1910	709 736	1 198 757	-489 021	-63.75

Sources: own calculations based on B. Bolognese-Leuchtenmüller, *Bevölkerungsentwicklung und Berufs struktur Gesundheits- und Fürsorgewesen in Österreich 1750–1918*, *Wirtschafts- und Sozialstatistik Österreich-Ungarns*, vol. 1, Wien 1978.

resulting in a rise in the standard of living, but a departure from the subsistence margin could also be the main reason for the reductions in mortality which create significant population growth, which in turn allows for massive emigration. Another aspect of progress which could certainly have allowed the population of Galicia to liberate itself from positive and preventive checks was the rise in agricultural output. Although Malthus assumed that the growth in food production universally follows an arithmetical pattern, he did not take into account potential innovations in agriculture which lead to higher efficiency in farming.[43] There is partial evidence that this was the case in Galicia in the period we have indicated as being the approximate time of departing from the Malthusian regime (Figure 6, Figure 7). The rise in total output was generated by both the rise in the surface area of arable land and greater efficiency resulting from the improvements in farming.[44] Although in the case of cereals this process did not take place before the beginning of the twentieth century, when it came to potatoes, the acceleration in efficiency began in the period 1869–1875. We should remember that the rise in average values for the whole of Galicia was the outcome of various modernization processes which had diverse trajectories in different parts and regions of the country.[45] Interest-

[43] E. Boserup, "The Impact of Scarcity and Plenty on Development", *Journal of Interdisciplinary History*, 14, 1983, no. 2: *Hunger and History. The Impact of Changing Food Production and Consumption Patterns on Society*, pp. 383–407.

[44] P. Franaszek, *Produkcja roślinna w Galicji doby autonomicznej*, Kraków 1995, pp. 30–35.

[45] Bujak indicated a moment of agricultural modernization in Żmiąca a few years after 1880, Styś proposed an earlier date, by one decade, for Husów; see: F. Bujak, *Żmiąca...*, p. 86; W. Styś, op. cit., p. 149.

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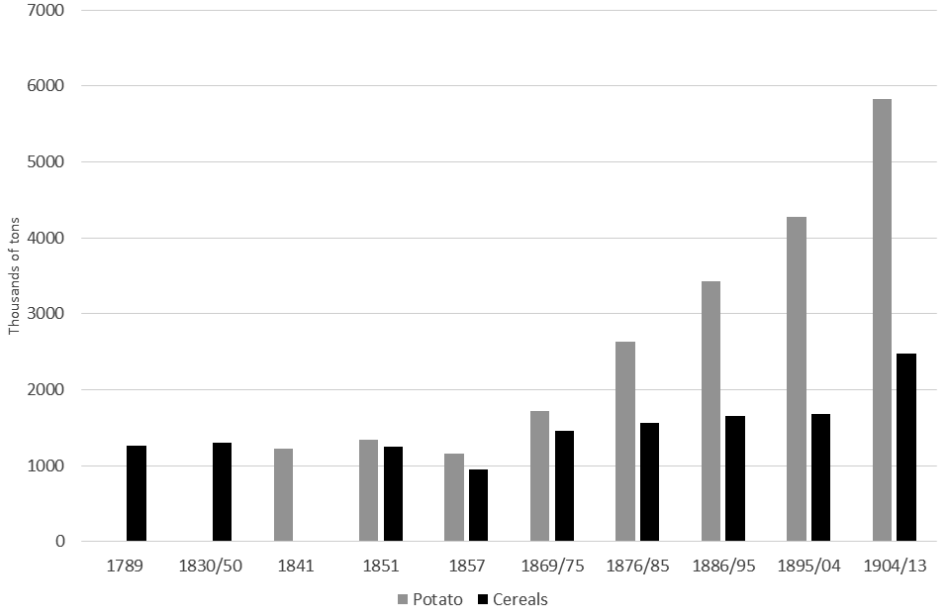
ingly, Michał Kopczyński found that the first symptoms of increasing well-being in Galicia started between the 1860s and 1880s and were connected to the rise in agricultural output as well as initial modernization, reflected in better education and use of better tools for farming.[46] Modernization also involved changing from the archaic three-field rotation system to modern crop rotation.[47] Since Galicia's economy was dominated by agriculture, the aforementioned improvements in the performance of farms was reflected in the rise of GDP.[48]

Figure 6. Average yearly output (thousands of tonnes) of potatoes and cereals in Galicia 1789–1913



Source: R. Sandgruber, "Österreichische Agrarstatistik 1750–1918", in: *Wirtschafts- und Sozialstatistik Österreich-Ungarns*, vol. 2, ed. by A. Hofmann, H. Matis, München 1978, pp. 162, 169.

The next factor which may have helped combat the negative impact of population pressure was the rise in real wages. As noted above (see Figure 2), the grain wage showed a remarkable growth from the early 1850s. However, until the 1870s this growth was clearly recuperation to the levels noted in the first decades of the nineteenth century. Only

[46] M. Kopczyński, "Agrarian Reforms, Agrarian Crisis and the Biological Standard of Living in Poland, 1844–1892", *Economics & Human Biology*, 5, 2007, no. 3, pp. 458–470.

[47] W. Styś, op. cit., p. 149.

[48] M.-S. Schulze, op. cit.

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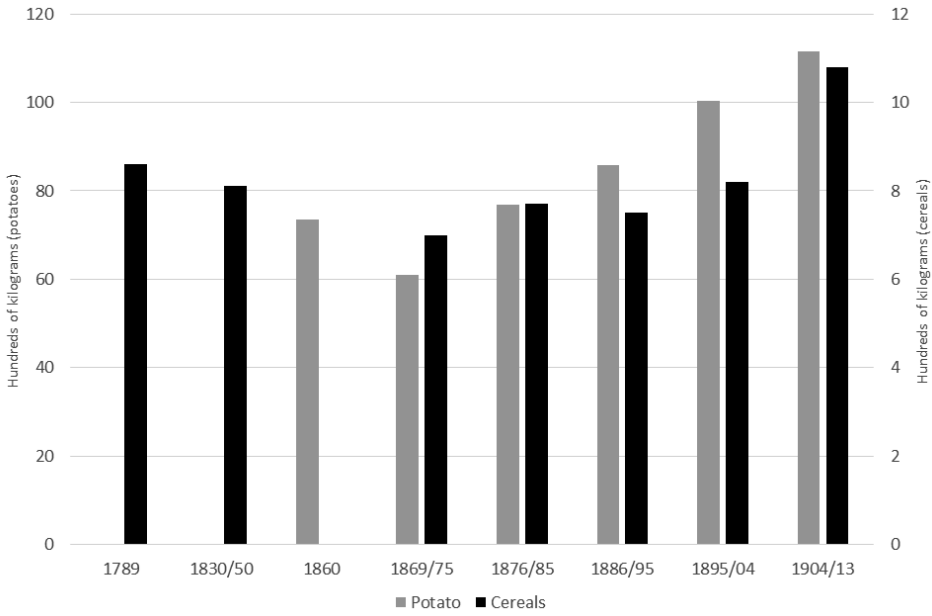
Figure 7. Average yields in 100 kilograms from 1 hectare of potatoes (left axis) and cereals (right axis) in Galicia 1789–1913



Source: R. Sandgruber, "Österreichische Agrarstatistik 1750–1918", in: *Wirtschafts- und Sozialstatistik Österreich-Ungarns*, vol. 2, ed. by A. Hofmann, H. Matis, München 1978, pp. 177–180.

around 1880 did the rise in wages speed up significantly. Such situation could lead to an accumulation of wealth and it allowed the population to become less vulnerable to periods of high prices. Finally, in the case of seriously backward regions we cannot ignore the role of state interventions in an attempt to develop their economic performance.[49] It is worth noting that the first efforts to improve Galicia's situation were taken after the crisis of 1873. This included investing in education and transport, but also setting up banking institutions and agricultural societies.[50] However, the direct impact of such policies is hard to assess; it may also have enhanced the spread of innovations. As an example, Styś connected the presence of the railway in Husów with the introduction of the iron plough.[51] The activities of the local authorities were accom-

[49] A. Gerschenkron, *Economic Backwardness in Historical Perspective*, Cambridge 1962, pp. 5–30; I.T. Berend, G. Ránki, *Economic Development in East-Central Europe in the 19th and 20th Centuries*, New York–London 1974, pp. 81–83.

[50] A. Jezierski, C. Leszczyńska, *Historia gospodarcza Polski*, Warszawa 2010, pp. 212–214; F. Bujak, *Galicja...*, vol. 1, pp. 504–549.

[51] W. Styś, op. cit., p. 149.

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panied by the liberalization of economic and public life in the so-called "autonomous period" in Galicia's history which could be one of the reasons behind the intensification of agricultural and industrial production.

Short-term relations

A short-term analysis of the fertility response to the rise in food prices shows a clear and statistically significant pattern of preventive checks (Figure 8). Taking into account the whole period of the study there is a strong decrease in the number of births one year after the price rise (-11.73% corresponding to a 100% price rise), but the next year brings almost as strong a compensation in fertility (+9.9%). The negative effect of economic pressure is present and significant also in lag 3 (-5.66%). This general pattern is virtually identical for the period 1819–66, but the period after 1866 brought some important changes in the mechanism and strength of the fertility response. Although the directions of the coefficient remain unaltered, now the only significant reaction took place in the same year as the rise in prices (lag 0: -10.5%). In subsequent lags the effect of the price increase was negligible.

Preventive checks are also governed by the reactions of nuptiality, however their timing and importance differ from those shown by fertility. During the whole period there was a corresponding drop in marriages in the same year as a price boost (-15.05% when there was a 100% price rise), whereas two and three years after the price shock, nuptiality was again on the increase. Lags three and four have a slightly negative effect. Again the first sub-period much resembles the general pattern, but the coefficients lose significance. During the latter half of the nineteenth century, the positive effect of price rises on nuptiality became more pronounced. There was a 13.78% increase in the number of marriages in the year following a price shock. This positive correlation lasted until lag 3, but lag 4 shows an insignificant negative effect.

Positive checks, clearly shown by the response of non-infant mortality to price increases, tend to be very strong when analyzing the whole period and sub-period number 1. During 1819–1866 a price rise of 100% brought a devastating 37.89% increase in the number of non-infant casualties in lag 0. This negative effect concentrated in lags 0 and 1, while 4 years after the price shock, we can see a significant fall in the number of deaths (-26% for the whole period). It is very interesting that positive checks are totally absent in the second sub-period (after 1866). The only significant value of the coefficient indicates a fall in the number of deaths three years after the price rise (-25,02%).

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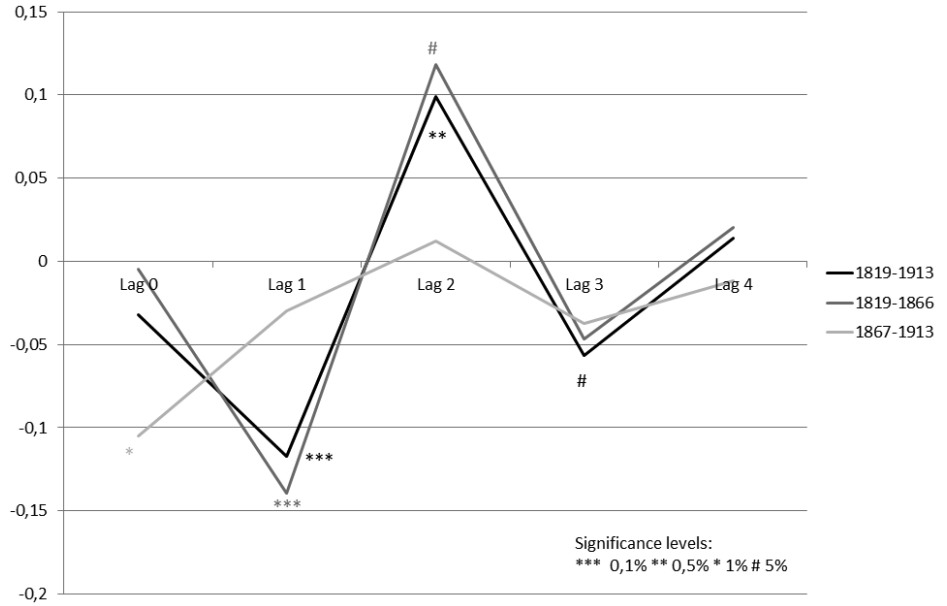
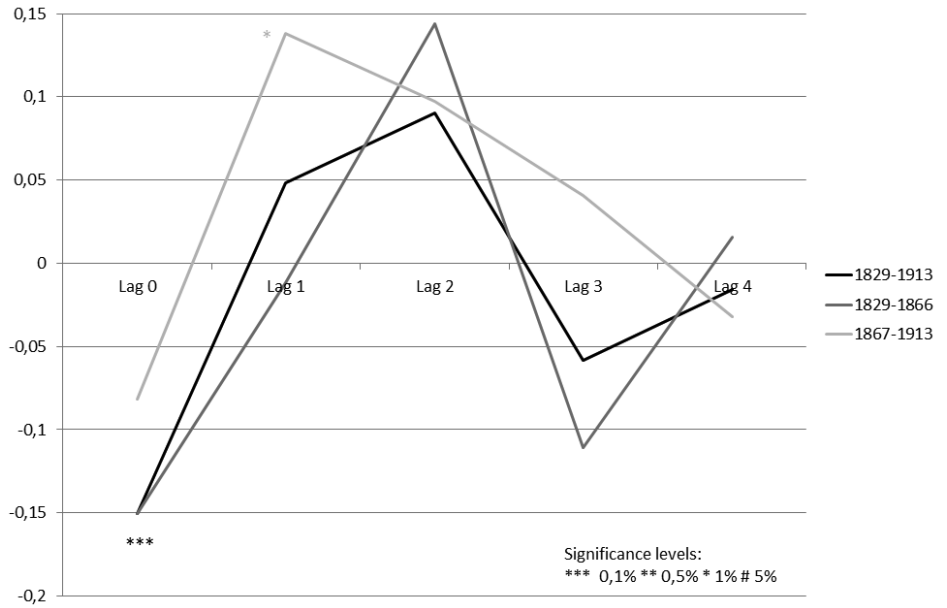
Figure 8. Response of fertility to a 1% rise in the rye price (controlled for non-infant mortality)



Source: own calculations.

Figure 9. Response of nuptiality to a 1% rise in the rye price (controlled for non--infant mortality)



Source: own calculations.

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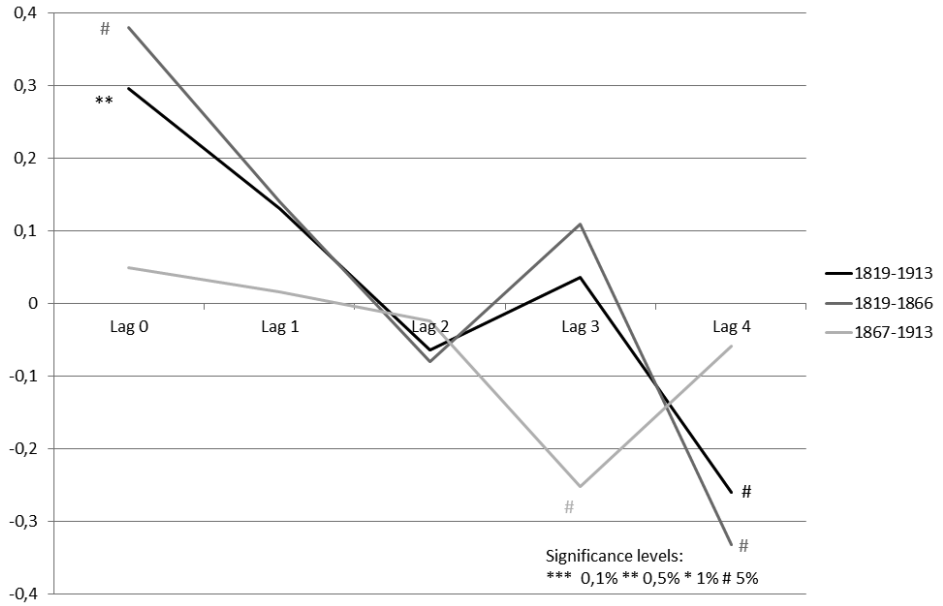
Figure 10. Response of non-infant mortality to a 1% rise in the rye price



Source: own calculations.

A possible interpretation of the strength and directions of demographic responses to price shocks in the short-term, as well as their changes over time, could, in general, confirm the results of the long-term approach. Firstly, fertility constraints were present in Galicia's population during the whole period of study. However, the differences in shape of the reactions over time between the sub-periods shows a potential change in the nature of the regulation of fertility which took place during the nineteenth century. In the period before 1867 a substantial reduction in fertility took place the year after a rise in prices and was repeated moderately two years later. This pattern is usually associated with a reduction in the number of conceptions during a period of high prices, due to both biological (famine, morbidity or stress amenorrhea, loss of libido, spontaneous abortion) and human-agency based (reduction in coital frequency, contraception) factors, which results in a lower number of births one year after a price shock.[52] On the other hand, the positive influence in lag 2 could be explained by postponing fertility. The nature of the significant reduction in fertility in lag 0 during the second sub-period had to be connected to more immediate reasons.

[52] T. Bengtsson, M. Dribe, "Deliberate control in a natural fertility population: Southern Sweden, 1766–1864", *Demography*, 43, 2006, no. 4, pp. 727–746.

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Among them one can list induced abortions, a rise in the number of stillbirths and voluntary fertility control if the individuals were able to predict an economic crisis.[53] According to this categorization, we could suppose that the shift in the significant, negative response of fertility, from lag 1 in the first sub-period to lag 0 in the second, was the result of wider use of various forms of contraception and methods or simply a better ability to predict a crisis. It is much less probable that this shift resulted from an increase in stillbirths and spontaneous abortions in the latter half of the century when sanitation standards were slowly improving. Given the results of the models, the softening of economic checks on fertility in the second half of the nineteenth century is hard to question, as the coefficients become flattened and statistically insignificant.

The pattern of the nuptiality response to high prices is far more consistent over time. The negative effect found in lag 0 can be associated with difficulties in setting up an independent household during a period of economic stress. When this obstacle is removed, the coefficients become positive as postponed unions are formed. There is a slight difference of one year in the timing of this process between the sub-periods. The less pronounced negative effect, along with the faster recovery of nuptiality in the second sub-period could be another sign of the diminishment of preventive checks during the nineteenth century. It is worth noting that the response of nuptiality to non-infant mortality remains unaltered during the whole century, with a drop in lag 0 and a rise in lag 2, confirming the impact of the mourning period and remarriage rate on the general nuptiality pattern.

Not only did preventive checks in Galicia tend to disappear during the latter half of the nineteenth century, as can be seen from the clear shift in the pattern of mortality response to price shocks. Although the initial reaction of mortality was extremely strong and lasted until two years after the price increase both for the whole period and first sub-period; between 1867 and 1913 it was almost nil. This immediate response could indicate how close Galicia's population was to the subsistence level. At the same time, the disappearance of positive checks is a clear sign of the improvement in the standard of living in the second half of the nineteenth century. Another aspect here is the negative response of non-infant mortality several years after a price shock. When we compare the positive effect in lag 4 for the whole period and sub-period 1 and in lag 3 for sub-period 2 with the fertility response it becomes clear that this delayed positive effect concerns mainly child

[53] Ibid.

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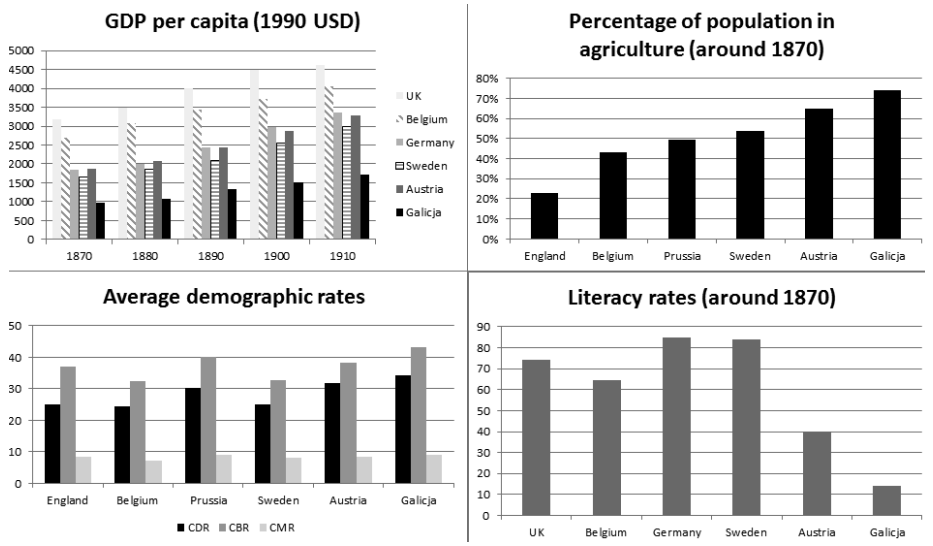
mortality, as it is probably a delayed consequence of the lower number of births right after a price shock (in lag 1 for the whole period and first sub-period, in lag 0 for the second sub-period).

According to the results of the long- and short-term analyses, it is clear that there was a significant rise in the standard of living during the latter half of the nineteenth century. Both preventive and positive checks tended to disappear, so the pessimism expressed by scholars at that time was invalid, although it does not necessarily mean that Galicia's population was not worse off than the inhabitants of other European countries. From Figure 11 it becomes clear that Galicia's level of "backwardness", measured in different ways, was substantial. Despite keeping in mind all reservations with regard to these kinds of comparisons which ignore, among others, the population structure, the distances between Galicia and other countries are striking.

Figure 11. Basic development characteristics of compared populations



Sources: A. Maddison, *Development Centre Studies, The World Economy Historical Statistics: Historical Statistics*, Paris 2003, D.F. Good, "The Economic Lag of Central and Eastern Europe. Income Estimates for the Habsburg Successor States, 1870–1910", *The Journal of Economic History*, 54, 1994, no. 4, pp. 869–891; P.R. Galloway, "Basic Patterns in Annual Variations in Fertility, Nuptiality, Mortality and Prices in Pre-industrial Europe", *Population Studies*, 42, 1988, no. 2; *The New Comparative Economic History. Essays in Honor of Jeffrey G. Williamson*, ed. by T.J. Hatton, K.H. O'Rourke, A.M. Taylor, Cambridge (MA) 2007; own calculations based on: B. Bolognese-Leuchtenmüller, *Bevölkerungsentwicklung und Berufsstruktur Gesundheits- und Fürsorgewesen in Österreich 1750–1918*, *Wirtschafts- und Sozialstatistik Österreich-Ungarns*, vol. 1, Wien 1978; T. Pilat, "Najważniejsze wyniki spisu ludności Galicyi z 31. grudnia 1880 według tymczasowych zestawień powiatowych", in: *Wiadomości statystyczne o stosunkach krajowych*, Lwów 1880. Note: the literacy rate for the population older than 6, in the case of Galicia for the year 1880 (*sic*!); average demographic rates for England 1756–1870, Belgium 1811–1870, Prussia 1756–1870, Sweden 1756–1870, Austria 1827–1870, Galicia 1830–1913.

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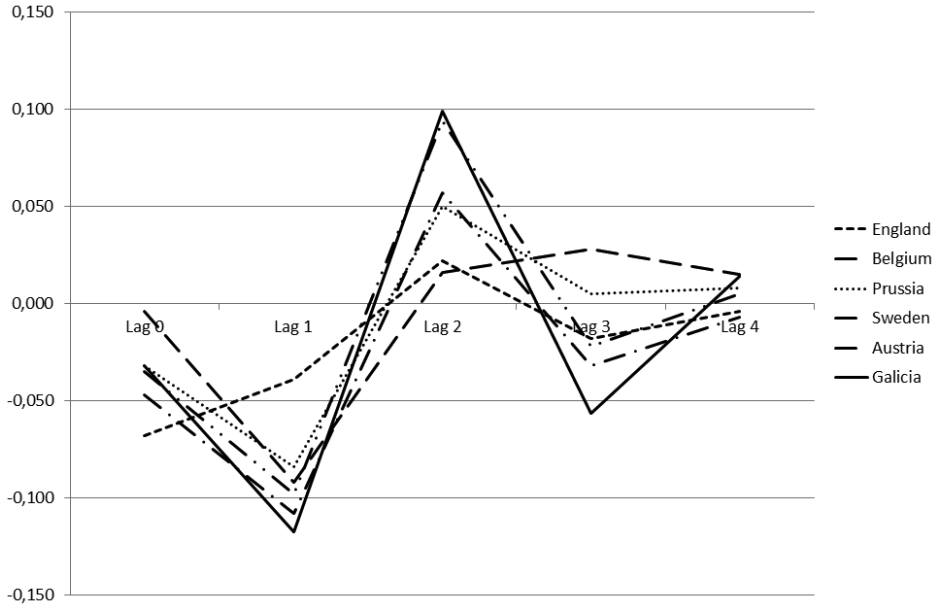
Another question is whether these large differences could be translated into differences in demographic reactions to price shocks. Figures 10–12 present a comparison in the form of graphs showing the patterns of these reactions between several European countries and Galicia. We should bear in mind that such comparisons are also rather cumbersome because of the different time periods, potential data comparability issues, the different demographic structure and, perhaps most notably, the unknown rate of net-producers/net-consumers of grain/cereals. Regarding the fertility pattern of Galicia's population, the reaction is almost identical to that in most of the countries compared, but we can perceive that the negative response in lag 1 for the Galician population was somehow stronger, so was the postponement effect in lag 2. These differences are not enormous however, as we could have expected due to Galicia's economic and social "backwardness". Importantly, the distance between Galicia and the whole of Austria is small; in this case potential comparison biases are the least probable, therefore Galicia cannot be perceived as having a much lower standard of living

Figure 12a. The fertility response to price increases independent of the non-infant mortality effect in Galicia and five selected European countries



Source: own calculations, P.R. Galloway, "Basic Patterns in Annual Variations in Fertility, Nuptiality, Mortality and Prices in Pre-industrial Europe", *Population Studies*, 42, 1988, no. 2. Note: for different time periods – England 1756–1870, Belgium 1811–1870, Prussia 1756–1870, Sweden 1756–1870, Austria 1827–1870, Galicia 1819–1913.

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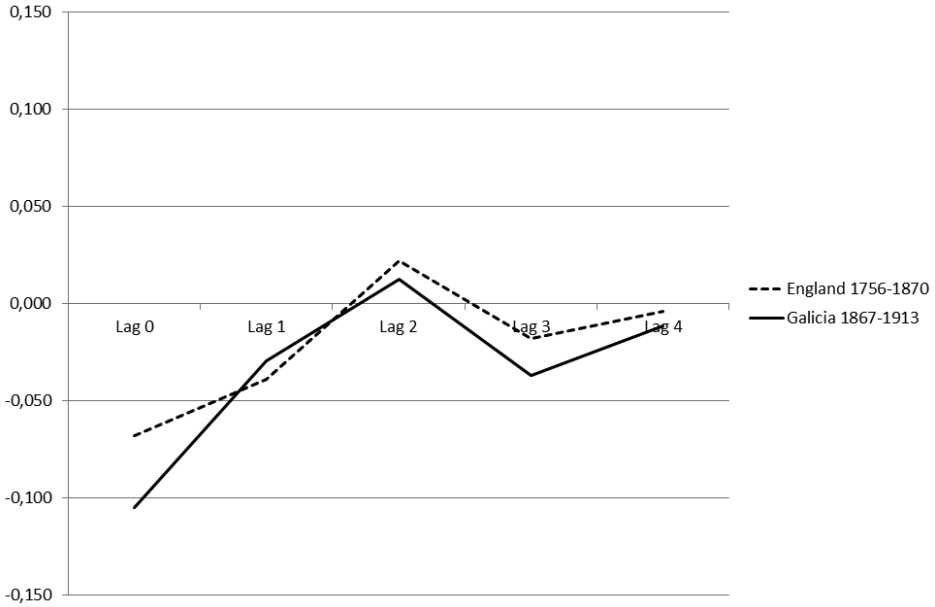
Figure 12b. The fertility response to price increases independent of the non-infant mortality effect in Galicia (1867–1913) and England (1756–1870)



Source: as in Figure 12a.

than the rest of the Monarchy, at least regarding the fertility response aspect. The above-mentioned shift in the pattern of fertility reaction in the latter half of the century, so far arbitrarily associated with modernization, could probably be better understood compared to the reaction found in its industrialization forerunner, i.e. England (Figure 13b). Again the similarity is remarkable, even though there is an almost one-hundred-year difference between the starting dates of the data for the two countries. This could also be illustrative of the intensity of the changes taking place in nineteenth-century Galicia.

The divergence between the patterns and levels of nuptiality response to price shocks may seem greater than in the case of fertility. Here Belgium and Sweden differ substantially from Galicia, Austria and Prussia. This could, of course, be explained by the different family models in Western and Central Europe. Compared with the whole of Austria, the positive effect in Galicia is more distributed between lags 1 and 2, also the initial drop in marriages is twice as strong in Galicia. This second aspect could indicate the differences in the standard of living as well as the different extent of wealth accumulation in the households of the respective populations.

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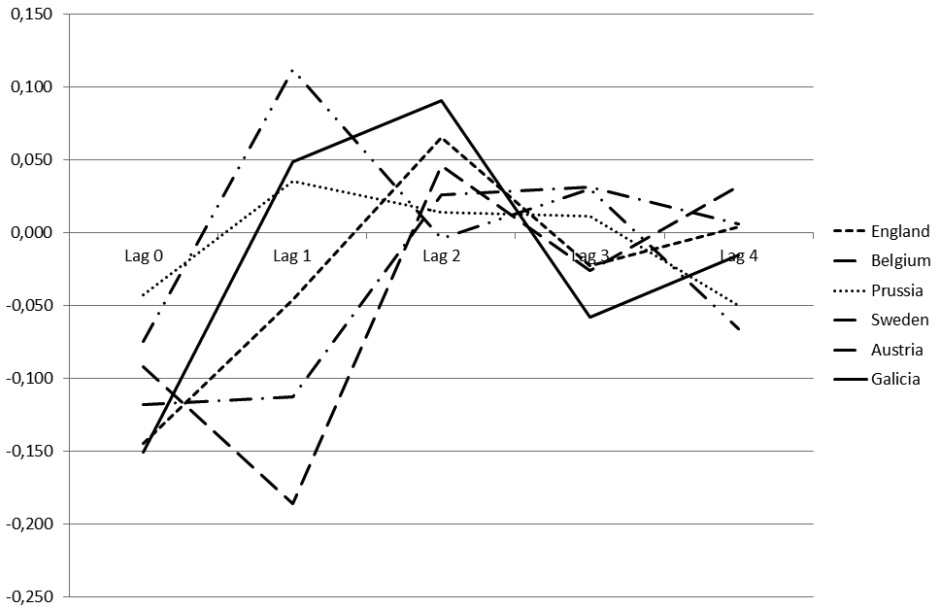
We expected that "Galician misery" would be the most apparent in the case of mortality reactions, but the outcomes of the comparison are not that clear. On the one hand, the immediate reaction in Galicia is 2–3 times greater than in Prussia or Sweden, yet on the other hand it is more than 30% lower than in the whole of Austria. At the same time, the rise in non-infant mortality in lag 1 is lower in Galicia than in the three abovementioned countries, but still much higher than in Belgium or England.

Figure 13. The nuptiality response to price increase independent of the non-infant mortality effect in Galicia and five selected European countries



Source: as in Figure 12a. Note: for different time periods – England 1756–1870, Belgium 1811–1870, Prussia 1756–1870, Sweden 1756–1870, Austria 1827–1870, Galicia 1829–1913.

Keeping in mind that there is almost fifty years difference in the period analysed between Galicia and other countries (excluding Belgium and Austria where the starting date is almost the same) it could indicate a similar developmental lag. Moreover, the comparison with Austria shows it is hard to support the thesis about Galicia's exceptional poverty within the Habsburg Empire resulting in chronic malnutrition and the commonness of starvation among its inhabitants. These results indicate that there ought to be other regions of Cisleithania experiencing much lower standards of living than Galicia during the nineteenth century.

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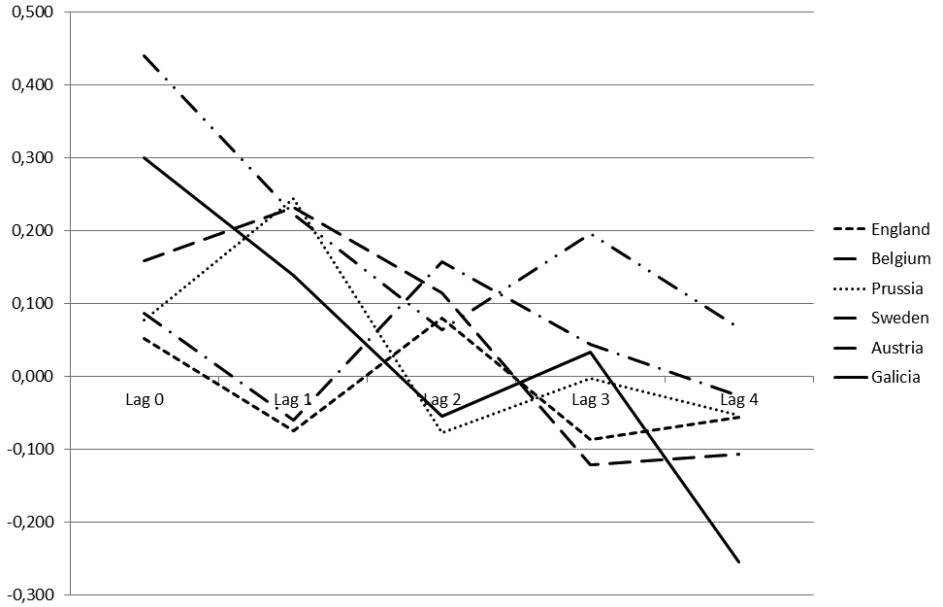
Figure 14. The non-infant mortality response to price increases in Galicia and five selected European countries



Source: as in Figure 12a. Note: for different time periods – England 1756–1870, Belgium 1811–1870, Prussia 1756–1870, Sweden 1756–1870, Austria 1827–1870, Galicia 1819–1913.

Conclusions

Long-term relations reveal that Galicia's escape from the Malthusian Trap could have taken place in the last decade of the nineteenth century, but because such a process could not be rapid, it probably started several years earlier and was almost certainly later disturbed by the tragedy of the Great War.[54] Thanks to the short-term analysis, we learn that positive checks were completely absent from Galicia's population in the so-called autonomous period (from 1867), also fertility checks lost their severity during that time, and changed from biologically – governed into human-agency based. The similarity in responses among countries with such varied economic and social characteristics once again reveals the universality of human experience in nineteenth century Europe, in its most rudimentary aspects. At the same time it should be noted that the demographic performance of Galicia's population

[54] The last early spring hungers were noted in Husów as late as in 1925; see W. Styś, op. cit., p. 150.

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in the face of economic stress was found to be better than expected. Although the fertility and nuptiality responses can be considered worse than in other countries and the Austrian part of the Habsburg Empire, the adult mortality reactions in Galicia tend to be comparable to those of Prussia and Sweden several years earlier and better than in the whole of Cisleithania during the same period. These findings allow us to question the widespread opinion regarding the uniquely dire situation of Galicia in the nineteenth century against the background of Austria and other European countries. While these results contradict the dramatic picture of "Galician misery" they do not imply that the standard of living in Galicia was similar to the levels noted in the more developed parts of the Monarchy or Western Europe. It should be made clear that despite the similar reactions of demographic events to the changes in prices, the other needs of Galicia's population could be satisfied to a lesser extent.[55] Moreover, conversely to what Malthus claimed, the subsistence levels are relative and depend among other factors on the biological characteristics of the population.[56] At the same time it should be noted that Galicia's population was highly heterogeneous during the period investigated. The ethnic, religious and economic composition of society is totally ignored in the study presented here, so drawing fundamental conclusions about the general state of well-being and standard of living in Galicia have to be withheld until further research is undertaken. Differentiating between the categories of inhabitants can be extremely important as it determines both the economic and demographic performance of individuals – their socio-economic status, household composition and nuptiality preferences. Hence, the extension of the study has to rely on an improvement in two areas: data and methods. The aggregative data on demographic events used here should be enriched with micro-level data allowing us to trace individuals with distinctive characteristics throughout the time of the analysis.[57] On the other hand more efficient statistical tools could be used to improve the robustness of the results and their interpretability.[58] Nevertheless, the preliminary findings on the timing and

[55] See F. Bujak, "Maszkienice..., pp. 117–169. Bujak claimed that even at the end of the nineteenth century the population of Maszkienice experienced a "barbaric" standard of living.

[56] R.W. Fogel, *The Escape from Hunger and Premature Death, 1700–2100: Europe, America, and the Third World*, vol. 38, New York 2004, pp. 23–27.

[57] T. Bengtsson, C. Cambell, J.Z. Lee, et al., op. cit.

[58] E.g. Vector Auto Regressive models (VAR) or vector auto regressive moving average models, see: T. Bengtsson, G. Broström. "Distinguishing Time-series Models by

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intensity of Malthusian mechanisms in nineteenth Galicia remain valid and bring some new evidence on the economic history of Eastern Europe.

Appendix regression results

Table 1. Model 1 (fertility) whole period of study

Time lag	**Effect of prices**			**Effect of non-infant mortality**			**1819–1913**	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	90
Lag 0	-0.032	0.024	0.188	-0.053 #	0.026	0.049	F (10, 79)	18.28
Lag 1	-0.117***	0.025	0.000	-0.048	0.024	0.053	Prob. > F	0
Lag 2	0.099**	0.033	0.004	0.048	0.030	0.116	R-squared	0.6982
Lag 3	-0.057 #	0.025	0.024	0.022	0.024	0.358	Adj. R-squared	0.66
Lag 4	0.014	0.025	0.572	0.010	0.026	0.698	Root MSE	0.0269
Durbin-Watson statistic (original) 2.700396								
Durbin-Watson statistic (transformed) 2.165025								

Note: significance levels *** 0,1%, ** 0,5%, * 1%, # 5%.

Table 2. Model 1 (fertility) sub-period 1

Time lag	**Effect of prices**			**Effect of non-infant mortality**			**1819–1866**	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	43
Lag 0	-0.005	0.033	0.883	-0.061	0.035	0.092	F (10, 32)	12.42
Lag 1	-0.139***	0.037	0.001	-0.057	0.035	0.111	Prob. > F	0
Lag 2	0.118 #	0.047	0.018	0.048	0.042	0.258	R-squared	0.7951
Lag 3	-0.047	0.036	0.206	0.008	0.034	0.827	Adj. R-squared	0.7311
Lag 4	0.020	0.036	0.580	0.014	0.037	0.702	Root MSE	0.0315
Durbin-Watson statistic (original) 2.612831								
Durbin-Watson statistic (transformed) 2.074483								

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Table 3. Model 1 (fertility) sub-period 2

Time lag	Effect of prices			Effect of non-infant mortality			1867–1913	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	46
Lag 0	-0.105*	0.038	0.009	-0.062	0.054	0.256	F (10, 35)	3.59
Lag 1	-0.030	0.036	0.414	0.077	0.050	0.136	Prob. > F	0.0023
Lag 2	0.012	0.053	0.818	-0.035	0.052	0.503	R-squared	0.5064
Lag 3	-0.037	0.037	0.327	0.079	0.042	0.069	Adj. R-squared	0.3654
Lag 4	-0.012	0.039	0.768	-0.021	0.043	0.631	Root MSE	0.0205
Durbin-Watson statistic (original)				2.779751				
Durbin-Watson statistic (transformed)				2.081473				

Table 4. Model 2 (nuptiality) whole period 1829–1913

Time lag	Effect of prices			Effect of non-infant mortality			1829–1913	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	85
Lag 0	-0.150***	0.045	0.001	-0.153 **	0.050	0.003	F (10, 74)	17.98
Lag 1	0.048	0.048	0.311	0.243 ***	0.046	0.000	Prob. > F	0
Lag 2	0.090	0.064	0.160	-0.086	0.058	0.142	R-squared	0.7084
Lag 3	-0.058	0.047	0.218	0.112 #	0.046	0.017	Adj. R-squared	0.669
Lag 4	-0.016	0.047	0.742	-0.164 ***	0.049	0.001	Root MSE	0.0502
Durbin-Watson statistic (original)				2.737459				
Durbin-Watson statistic (transformed)				2.186139				

Table 5. Model 2 (nuptiality) sub-period 1829–1866

Time lag	Effect of prices			Effect of non-infant mortality			1829–1866	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	38
Lag 0	-0.151	0.076	0.059	-0.153	0.081	0.068	F (10, 27)	8.92
Lag 1	-0.012	0.088	0.893	0.290	0.079***	0.001	Prob. > F	0
Lag 2	0.144	0.119	0.239	-0.130	0.107	0.234	R-squared	0.7677
Lag 3	-0.111	0.086	0.212	0.158	0.079	0.054	Adj. R-squared	0.6817
Lag 4	0.016	0.083	0.850	-0.186	0.086 #	0.039	Root MSE	0.0697
Durbin-Watson statistic (original)				2.512993				
Durbin-Watson statistic (transformed)				1.986485				

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Table 6. Model 2 (nuptiality) sub-period 1867–1913

Time lag	Effect of prices			Effect of non-infant mortality			1867–1913	
	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t	Number of obs.	46
Lag 0	-0.081	0.055	0.145	-0.051	0.072	0.481	F (10, 35)	6.46
Lag 1	0.138*	0.048	0.007	0.119	0.069	0.094	Prob. > F	0
Lag 2	0.097	0.067	0.153	-0.109	0.064	0.096	R-squared	0.6485
Lag 3	0.041	0.050	0.423	0.061	0.061	0.318	Adj. R-squared	0.5481
Lag 4	-0.032	0.056	0.566	-0.168*	0.058	0.006	Root MSE	0.0295
Durbin-Watson statistic (original)				1.907037				
Durbin-Watson statistic (transformed)				2.113705				

Table 7. Model 4 (non-infant mortality) whole period of study

Time lag	Effect of prices			1819–1913	
	Coef.	Std. Err.	P>t	Number of obs.	90
Lag 0	0.295 **	0.103	0.005	F (5, 84)	7.23
Lag 1	0.131	0.099	0.191	Prob. > F	0
Lag 2	-0.065	0.119	0.587	R-squared	0.3009
Lag 3	0.036	0.098	0.719	Adj. R-squared	0.2593
Lag 4	-0.261 #	0.102	0.012	Root MSE	0.142
Durbin-Watson statistic (original)		1.994804			
Durbin-Watson statistic (transformed)		1.984437			

Table 8. Model 4 (non-infant mortality) sub-period 1

Time lag	Effect of prices			1819–1866	
	Coef.	Std. Err.	P>t	Number of obs.	43
Lag 0	0.379 #	0.153	0.018	F (5, 37)	4.31
Lag 1	0.140	0.150	0.356	Prob. > F	0.0035
Lag 2	-0.080	0.173	0.649	R-squared	0.3679
Lag 3	0.109	0.150	0.471	Adj. R-squared	0.2825
Lag 4	-0.332 #	0.153	0.036	Root MSE	0.1909
Durbin-Watson statistic (original)			1.843865		
Durbin-Watson statistic (transformed)			1.876083		

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Table 9. Model 4 (non-infant mortality) sub-period 2

	Effect of prices			**1867–1913**	
Time lag	Coef.	Std. Err.	P>t	Number of obs.	46
Lag 0	0.049	0.124	0.692	F (5, 40)	2.68
Lag 1	0.016	0.108	0.881	Prob. > F	0.0353
Lag 2	-0.025	0.147	0.869	R-squared	0.2507
Lag 3	-0.252 #	0.107	0.023	Adj. R-squared	0.157
Lag 4	-0.060	0.117	0.612	Root MSE	0.0707
Durbin-Watson statistic (original)			2.030277		
Durbin-Watson statistic (transformed)			2.097493		

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Bartosz Ogórek

Galicia's escape from the Malthusian trap. A long and short-term analysis of demographic response to the economic conditions in the population of Galicia 1819–1913 (Summary)

The purpose of the article is to analyze Malthusian mechanisms to be found in operation in the population of Galicia in the years 1819–1913. Relying on published sources which record both the condition and the natural movement of the Galician population, as well as price movements in key food staples on the Lwów and Kraków markets, the author has examined the relationship between the population's economic conditions and demographic trends in the long and short-term. The analysis of the long-term relationships shows that it was not until the last decades of the nineteenth century that Galicia set itself free from Malthusian mechanisms. At that time, the demographic situation began to improve for the first time. The improvement came despite some adverse economic phenomena such as falling wages and rising prices. The author points to a number of causes of this situation: the advancement in agricultural production, mass emigration and some institutional changes. The analysis of short-term relationships shows that the nineteenth-century Galicia – although it was lagging behind the countries of Western Europe in terms of GDP per capita, the percentage of those who were literate, or the industrialization processes – was affected by the operation of Malthusian mechanisms to only a slightly greater extent than the western part of the Old Continent. The comparison of the Galician population's demographic response to an increase in the staple food prices with the way in which the population of the whole of Austria reacted to this increase justifies the conclusion that, with regard to this response, the inhabitants of Galicia were doing as well as the people inhabiting the whole of Cisleithania. This of course does not mean that living standards in Galicia were similar to those typifying Austria or Western Europe, but it does allow one to contest the opinion that the Galician population was considerably vulnerable/prone to economic crises. In defiance of the myth of "Galician misery", one can say that there actually existed no positive (that is, those bound up with the death rate) constraints on the growth of the Galician population in the period of autonomy.

Key words: Malthusian studies, subsistence crises, standard of living, Galicia

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