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International and National Wheat Market Integration in the 19th Century: A Comovement Analysis

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Abstract

This paper analyses 19th century wheat market integration using comovement analysis borrowed from international business cycle research. This allows for tracking each single city's integration into its respective national market while controlling for international developments. I find that the biggest push to global wheat market integration happened before 1860, before the railroad could have had substantial effects. Thus, the increase of U.S. wheat supply after 1870 was not that revolutionary than the established convergence literature suggests. It seems to be fair instead to speak of a major producer accessing the world's biggest market for wheat – Western Europe. The results also call for reconsidering on how national and international markets evolved alongside as the timing turns out to be diverse across Europe. Some countries like Austria-Hungary developed national markets only at the end of the 19th century; others like England integrated nationally early in the 1800s, and later internationally.

Keywords: market integration; 19th century; dynamic factor analysis; wheat prices

JEL codes: N70, N71, N73, C32, F15, E32

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1 Introduction

Although market integration is one of the subjects in 19th century economic history that has always drawn much attention, there is still room for improvement in terms of analytical tools. As more and longer prices become available, demand for dynamic methods that can accommodate large cross-sections of price data increases. The origin of market integration – local, national or international – becomes a matter of interest as data size increases in the cross-section.

This paper draws from the literature on international business cycles and uses its tools for market integration research. Bayesian dynamic factor models are especially promising, since they measure comovement of many time series and go beyond bivariate comparisons.[1] Their complexity therefore grows only proportionally in the cross-section and along the time axis, but not exponentially as that of bivariate models including almost all cointegration frameworks. The dynamic setup allows for quantifying the share of price fluctuations due to world price movements, changes in national market conditions and local shocks.

According to the results obtained here, the largest boost toward global wheat market integration occurred earlier than 1860, before the railroad or the steamship could have had substantial effects. In the last quarter of the 19th century world wheat market integration accelerated further, but at a slower pace than before 1860. Thus, the increase of U.S. wheat supply after 1870 was perhaps not particularly revolutionary to world wheat trade in contrast to what the established convergence literature à la O'Rourke (1997) suggests ("The Grain Invasion").[2] It seems to be fair instead to speak of a major producer accessing the world's biggest market for wheat – Western Europe, including the U.K.

This contrasts sharply with the "Grain Invasion"-story by O'Rourke (1997) whose main focus, as in the bulk of the literature on market integration in the past three decades or so, was on transatlantic market integration after 1870 (Harley 1980, Harley 1988, O'Rourke and Williamson 1999). Their main argument stated that markets on both sides of the Atlantic merged because of lower transport costs. Recent developments in the literature call for considering a wider spectrum of explanations, however.

A technology-neutral explanation for decreasing transport costs are economies of scale in the production of transport services. For example, Brautaset and Grafe (2005) show that the Norwegian sailing fleet in the first half of the 1800s experienced significant decreases in per unit freight costs because of the increase in the number of trips and the size of the ships, among others.

The demand side in the market for transport services is another neglected aspect of the discussion. In the absence of transport cost changes, trade may still increase and price gaps decrease if supply for the shipped good increases exogenously. Sharp (2008) claims that the main reason for declining price gaps between the U.K. and the U.S. was the increase of American wheat supply. Similarly, Jacks and Pendakur

[1] The dynamic factor is referred to as common component in this paper.

[2] My sample consists of European and North-American Markets. If I refer to them as "world" or "global" this must not be misunderstood as classifying Asian, African or South-American wheat trade as unimportant. It rather reflects my ambition to create a truly global wheat trade model which is, however, not yet met by the available data.

(2008) argues that the trade boom of the late 19th century was triggered mainly by income growth and convergence. Thus, freight rates should be regarded endogenous to trade and not the other way round.

Much can be learned from treating international and national market integration as two related processes. For example, the U.S.'s national transport network was crucial for selling large quantities of wheat on the world market. The method used here allows to analyse how each single market integrated either nationally or internationally. That allows to consider demad side argument at the national level while controlling for international integration. In particular, an argument developed by Kopsidis (1998) states that industrialization creates urban demand centers for agricultural goods, and leads to regionally or nationally integrated markets holding agricultural and transport productivity constant. This theory may explain national differences in the timing of the relative development of national and international market integration. The conventional view – using transport costs as the main argument – is that national markets would integrate first, since relatively short distances imply low transport costs, and then international trade links are created as technology reduces the cost of distance. I find that England underwent this development. However, this is only one possibility. In underdeveloped economies some cities may already be linked quite well to international wheat markets due to, for example, a strategic geographical location, while land-locked rural areas are separated from national and international wheat trade. As industrialization sets in, urban demand increases and nationwide specialization begins, fostering national markets on the basis of international integration. The case of Austria-Hungary seems to fit into this pattern.

This paper therefore contributes to recent developments of the 19th century market integration literature that call for reconsidering some of the stylized facts about the origin and timing of the First Globalization. It especially adds a long-run view that allows to analyse globally and nationally intertwined events comprehensively.

The main methodological contribution of this paper consists in abandoning bivariate price comparisons and therefore escaping the curse of dimensionality while adding degrees of freedom. In the past few years scholars have begun to gather data from more markets spanning longer periods and applied improved econometric tools, mainly based on cointegration or price dispersion (Jacks 2005, Federico and Persson 2007, Persson 1999, Sharp 2008). The methodological arms race was aimed at accommodating the increasing amounts of data in a meaningful way and resolving the question as to how market integration should actually be measured.[3] However, the curse of dimensionality has not yet been overcome, at least in the case when dynamic relations are to be accounted for. The number of parameters in bivariate models increases exponentially in the number of markets analysed. In contrast to that, the complexity of the method proposed here grows only linearly in data size and allows for studying a large number of markets over a long period incorporating dynamic relationships between prices.

Federico (2008) proposes to use the coefficient of variation as a measurement tool for market integration. While this method can handle many markets, it does not incorporate dynamic relationships. The obvious patterns of covariance in commodity

[3] Federico (2008) discusses the most popular methods so far.

prices are not exploited. Comovement analysis uses these patterns to estimate an unobserved common component that is used as a benchmark against which each single price series is compared. This corresponds directly with Federico's (2008) critique of bivariate price comparisons. He calls for comparing prices against a hypothetical world price. Interestingly, this is exactly in the spirit of Veblen (1893) who discussed wheat prices after the American Civil War in the very first issue of the *Journal of Political Economy*. Thus, there appears to be a long tradition of analyzing local wheat prices on the basis of a latent world price.

With this paper I aim to abandon the purely technical need to use bivariate comparisons and contribute to reviving a more intuitive approach of analyzing market prices across time and space. As methods based on the coefficient of variation go to a certain extent in that direction, they cannot track each market's development over time, which is a natural feature of comovement analysis. Moreover, it uses Bayesian econometrics, which enables the results to hold even if the sample is not representative for the whole population or the unit root properties of the data are not guaranteed (Uhlig 1994).

The next section reviews related attempts in the literature using comovement methods in integration research and bordering fields. Thereby I demonstrate why the way I use comovement is new. The explanation of the method and discussion of the results follow right after that.

2 Related Comovement Literature

There are various approaches to market integration using comovment in the literature. For instance, Qin, Cagas, Ducanes, Magtibay-Ramos, and Quising (2006) employed a dynamic factor in a vector error correction model (VEC) of trade as an aggregate of all "foreign" commoditity prices and compare it to an observed "home" price. By doing so, they augmented the bivariate VEC model to the multivariate case. In contrast, the model proposed here is simpler, because it uses the common component (or dynamic factor) of all prices as as a manifestation of the law of one price. The explanatory power of that common price is than taken as a measure of market integration.

Common factors can also be used in panel cointegration frameworks to increase the power of multivariate unit root tests, which goes back to Bai and Ng (2004) and Pesaran (2007). Applying this method in a recent study on German regional prices levels, Dreger and Kosfeld (2007) found a persistent lack of price convergence among German regions in the period from 1995 to 2004.

Principal component analysis, a variant of static factor analysis, has been used by Sánchez-Albornoz (1974) in a truly pioneering study. He analyzed annual Spanish wheat and barley prices between 1856 and 1889 and focused on the causal effects of wheat trade between regions. He successfully identified trading regions along geographical and agricultural borders. However, being more interested in dynamic relationships in later studies turned to univariate time series analysis and abandoned the common component approach.

There is also a strand in the international finance literature that is similar to this paper. Bekaert and Harvey (1995) proposed a time-varying measure for integration of national financial markets into the world market for capital assets. In their model country returns are explained jointly by a world benchmark portfolio and idiosyncratic country risk. The varying degree to which each of the two factors explained national returns was interpreted as a measure of world capital market integration, which is comparable to the explanatory power of the respective international and national common price component in this paper.

Technically, this study is closest to Kose, Otrok, and Whiteman (2003), although their research interest is on international and national business cycles. They estimated the common component of output, consumption and investment between 1960 and 2001 for the G7 countries, and identified a world component and national components of cyclical activity in these aggregates. My focus is on price data and market integration, but I use the same model as they do.

There is an obvious relation between international business cycle transmission and world market integration, since both describe different strata of globalization. While I measure market integration as it is manifested in the price comovement of a traded and important commodity, business cycles represent integrated markets subject to common output variations.[4]

In the spirit of Kose, Otrok, and Whiteman (2003), Aiolfi, Catao, and Timmermann (2005) worked out the importance of international business cycles for Latin American economies in the last quarter of the 19th century, i.e., Argentina, Brazil, Chile and Mexico. They found strong exogenous shocks on the cyclical activities of Argentina, Chile and Mexico. Brazil was obviously better insulated from external influences. It remains a field of future research if this result was reflected in the behavior of traded goods prices in these countries.

Another related field using comovement is the analysis of inflation and money neutrality. Reis and Watson (2006) interpret the common component of a consumer basket of prices as the part of price fluctuations with stable relative prices (see also Bryan and Cecchetti (1993)). They use it to analyze the degree of money neutrality in the U.S. after 1960 and find that prices were not neutral in that time. In contrast to them I use prices of only one good and interpret the common component as a world market price, and deviations due to local shocks that are not transmitted.

3 The Model

3.1 Intuition

Comovement measures synchronous price movements in large cross-sections. It is similar to correlation, only that correlation is defined over pairs. Another important difference is that comovement measures linear dependence not only in a given period but across time. It represents the whole spectral matrix of leading and lagging correlations (Kose, Otrok, and Whiteman 2003, p. 1218).

While correlation can be understood as a simple bivariate counterpart of comovement, convergence captures a different aspect of relative prices. Take for example Harley's (1980) classic paper about convergence among U.K. and U.S. wheat prices

[4] The theoretical literature is inconclusive about the correlation of trade flows and output variations, and I do not attempt to contribute to this question.

in the second half of the 19th century, which begins with a graph showing a shrinking price gap between Chicago wheat and the British Gazette price (Figure 1). Harley, as well as other scholars succeeding him, refers to this closing gap when defining market integration (O'Rourke and Williamson 1999). However, Figure 1's second striking element – which Harley does not discuss – is the degree of correlation between the two prices. This element, i.e. short run comovement rather than long run convergence, is used as the main argument in this paper.

Figure 1: Price convergence between Chicago and Britain (Harley, 1980).

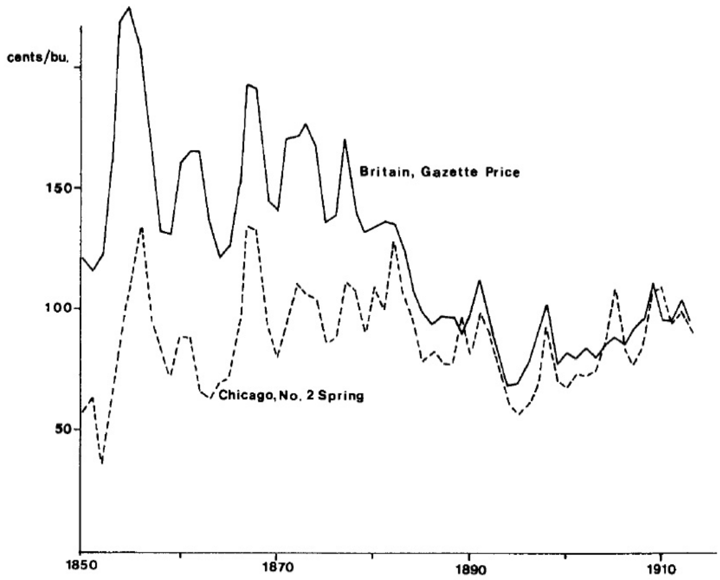


FIG. 1. Wheat prices: Chicago and Britain, 1850–1913.

A comparison of more than two market prices can be done by comparing all single prices with a benchmark. Consider a simple steady state example. Imagine splitting up each single price p_i into a part c that is the same in all markets and a part u_i that is the deviation of p_i from c:

$$p_i = c + u_i \tag{1}$$

The common part c could be any number, but optimally it should be the one that minimizes the sum of the deviations u_i. The absolute deviations u_i can be expressed in percent of p_i to show how much the common price element explains in each market i. An example is given in Table 1.

In the left Column of Table 1 the observed prices are given. An arbitrarily chosen common component is given in Column 2 and the respective deviations in Column 3. Column 4 contains a normalized measure of how well the common component explains single prices in Column 1. The lower the percentage number, the less the common component leaves unexplained.

This is an example in the steady state, but what if we include dynamics? How would the common component change if the prices in Column 1 changed? These questions are answered in the following formal discussion. It starts with a dynamic extension of Equation 1.

Table 1: Numerical example of common component.

Price	Common Component	Deviation	Absolute Percentage Deviation
p_i	c	u_i	$\|u_i\|/p_i$
3.41	3.00	0.41	12%
2.67	3.00	-0.33	12%
2.95	3.00	-0.05	2%
2.29	3.00	-0.71	31%
3.00	3.00	0.00	0%
5.08	3.00	2.08	31%
3.45	3.00	0.45	13%
1.85	3.00	-1.16	63%

3.2 Single Common Component

Given the relation between N prices and their common component in time t, consider what happens if all prices changed in the same direction and to the same degree. In this case their variation should be only due to the common part c_t but not the remaining part $u_{i,t}$, $i = 1, \dots N, t = 1, \dots T$. If some prices changed to a different degree or in different direction from the others, the common part will explain only a fraction of the price variation and the rest will be due to the specific component $u_{i,t}$. Thus, the dynamic formulation of Equation 1 for each $p_{i,t}$ is

$$p_{i,t} = a_i + \lambda_i c_t + u_{i,t} \tag{2}$$

Here, c_t represents the common component, which is the same for all markets and therefore not indexed by i. There is a constant a_i and a weight λ_i that links the common price component to the i-th variable. $u_{i,t}$, the idiosyncratic or specific component, accounts for local, market specific influences, e.g. local crop failures or temporary demand fluctuations.

However, the idiosyncratic parts may experience their individual dynamic processes, i.e., they may be serially correlated, which is expressed as an AR(p)-process:

$$u_{i,t} = \theta_{i,1} u_{i,t-1} + \dots + \theta_{i,p} u_{i,t-p} + \chi_{i,t} \tag{3}$$

Equation 2 resembles a linear regression, only that we do not observe the regressor c_t. We can instead describe c_t's dynamics by an AR(q)-process and treat it (together with Equation 3) as the transition equation in a state space model:

$$c_t = \varphi_1 c_{t-1} + \dots + \varphi_q c_{t-q} + \nu_t \tag{4}$$

These three equations describe the basic setup. However, since many, not only one, common components are strived for, Section 3.4 extends the model to the case with K common components. In Section 3.5 I will show how the model parameters and the common component can be estimated. The error term assumptions will be discussed next.

3.3 Error Term Assumptions

The local market shocks $u_{i,t}$ are assumed to be normal and uncorrelated in the cross-section:

$$E\left[u_{i,t}u_{j,t-s}\right] = \sigma^2_{u_i} \; \forall\, i = j; 0 \; otherwise.$$

The error term $\chi_{i,t}$ in the local market shock's process is likewise normal, and serially and cross-sectionally uncorrelated:

$$E\left[\chi_{i,t}\chi_{j,t-s}\right] = \sigma^2_{\chi_i} \; \forall\, i = j \;\; \wedge s = 0, \; 0 \; otherwise.$$

The common component's error term ν_t is normal with

$$E\left[\nu_t \nu_{t-s}\right] = \sigma^2_{\nu} \; for \; s = 0, \; 0 \; otherwise.$$

The error of the common component ν_t is uncorrelated with the error of the local component $\chi_{i,t}$:

$$E\left[\chi_{i,t}\nu_{t-s}\right] = 0 \; \forall \; i, s.$$

3.4 Multiple Common Components

So far I have explained the estimation of only one common price component. If this represents comovement of all prices in the sample this will be referred to as the "world component" or "global component" in the following (even if the sample does not represent the world). Each local price series is thus explained by its comovement with the world price and local shocks. However, additional shocks may arise from the "national level", an intermediate level that is common to some places but not to others. In the framework proposed here it is possible to estimate both global and national common components in one model and assess their relative explanatory power. Essentially, the world component explains the variance in all price series and therefore its corresponding weights are all different from zero, while the national components explain only the variance of some price series identified by nationality. For example, the national component of Spain is identified by setting all weights that belong to cities outside Spain to zero. Identifying national components *ex ante* is opposed to obtaining multiple orthogonal common components endogenously and identifying them *ex post*.

In this setup, Equation 2 can be formulated as:

$$P_t = \Lambda C_t + U_t, \tag{5}$$

where P_t is an $N \times 1$ vector of N price series, C_t is a $(K+1) \times 1$ vector of common components (a column of ones plus common components), Λ is a $N \times (K+1)$ matrix of weights and U_t is a $N \times 1$ vector of idiosyncratic components. In the case of an international and several national common components, there is one international common component, and $R < N$ national components, with R being the number of nations in the model. For example, in the case of 10 markets and 2 countries, each being represented by half of the sample, $K = 1 + R = 3$. The $10 \times (K + 1)$

matrix Λ contains a column of constants, one column of N elements for the world component and then R columns of weights for each country, which are only nonzero for the observations for the respective country.

Then, I reformulate Equation 5 as:

$$P_t = A + \lambda^w c_t^w + \lambda^1 c_t^1 + \lambda^2 c_t^2 + U_t,$$

where P_t consists of 10 price observations in period t, $A = [a_1, a_2, \ldots, a_{10}]'$ is a vector of constants, $\lambda^w = [\lambda_1^w, \lambda_2^w, \ldots, \lambda_{10}^w]'$ is a vector of weights that are nonzero for all i, c_t^w is the value of the world price component in t, $\lambda^1 = [\lambda_1^1, \lambda_2^1, \ldots, \lambda_{10}^1]'$ is the national component for country 1, where only those λ_i^1 are nonzero that correspond to cities of country 1. All other λ_i^1 are set to zero. Accordingly, the elements contained in λ^2 are only nonzero if corresponding to cities in country 2. U_t is a 10×1 vector and contains price elements not explained by either the world component or the respective national component.

The transposed matrix of weights Λ' in Equation 5 consists of the following elements:

$$\begin{array}{l} \\ \textit{world component} \\ \textit{national component}\ 1 \\ \textit{national component}\ 2 \end{array} \left[\begin{array}{cccccccccc} a_1 & a_2 & a_3 & a_4 & a_5 & a_6 & a_7 & a_8 & a_9 & a_{10} \\ \lambda_1^w & \lambda_2^w & \lambda_3^w & \lambda_4^w & \lambda_5^w & \lambda_6^w & \lambda_7^w & \lambda_8^w & \lambda_9^w & \lambda_{10}^w \\ \lambda_1^1 & \lambda_2^1 & \lambda_3^1 & \lambda_4^1 & \lambda_5^1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \lambda_6^2 & \lambda_7^2 & \lambda_8^2 & \lambda_9^2 & \lambda_{10}^2 \end{array} \right] = \Lambda'$$

Accordingly, a single price observation $p_{i,t}$ is composed of the following elements:

$$p_{i,t} = a_i + \lambda_i^w c_t^w + \lambda_i^1 c_t^1 + \lambda_i^2 c_t^2 + u_{i,t}, \tag{6}$$

where either λ_i^1 or λ_i^2 equals zero.

The rest of the model is the same as in the single component model above, only that there are $K = 1 + R$ common component AR-processes now:

$$c_t^k = \varphi_1^k c_{t-1}^k + \ldots + \varphi_q^k c_{t-q}^k + \nu_t^k, \tag{7}$$

where $k \in \{w, 1, \ldots, R\}$ and

$$E\left[\nu_t^k \nu_{t-s}^j\right] = \sigma_{\nu^k}^2 \;\forall\; k = j \;\wedge\; s = 0;\; 0 \;\forall\; k, s.$$

3.5 Estimation

The classical estimation of a state space system is standard in multivariate time series econometrics (Hamilton 1994, Stock and Watson 1989, Geweke 1977). However, I follow the Bayesian way of estimation, in part because the dimensionality is much less of a problem as I can use Gibbs sampling that reduces the curse of dimensionality.[5] Another reason is that it is a convenient way to deal with uncertainty about the unit root properties of the variables (Uhlig 1994).

I follow Kose, Otrok, and Whiteman (2003) in estimating the multiple common components. They apply a sequence of single common component models. c_t^1 and c_t^2 are estimated for the variance unexplained by c_t^w. The challenging aspect of the estimation is that both a linear regression with serially correlated errors and the AR-coefficients of c_t have to be determined simultaneously. This is done in classical statistics by utilizing the linearity of the model in the observables. A Kalman filter-smoother procedure leads to the unobserved parameters' likelihood function. It is Gaussian and can be estimated by maximum likelihood (Stock and Watson 1998). However, if the the model becomes large in the cross-section it is difficult to estimate, since dimensionality increases exponentially (Kose, Otrok, and Whiteman 2003, p. 1220f).

Bayesian methods allow for estimating the common component c_t and the other parameters $(\phi, \theta_i, \sigma_u, etc.)$ of the model separately. In Bayesian statistics the unknowns are treated as random variables, as opposed to classical statistics where they are treated as constants. Treating the model parameters and the common component as random implies determining their probability distribution. Unfortunately, for the model above, the joint distribution of the parameters and the common price component is nonstandard. This problem can be solved by decomposing the joint distribution of the parameters and the common component into conditional marginal distributions. One is the distribution of the parameters conditional on c_t, and the other is the distribution of c_t conditional on the model parameters. These conditional distributions have standard forms and are therefore computable. Moreover, the optimization problem for the variable specific parameters is done separately for each observable $p_{i,t}$ and does not increase exponentially with the number of variables, since the covariance matrix of the $u_{i,t}$ is diagonal, i.e., all cross-sectional correlation is contained in the common components (Kose, Otrok, and Whiteman 2003, p. 1220).

The sampling, i.e., making random draws from posterior distributions derived from the model, is done by a Markov chain Monte Carlo procedure; Gibbs sampling. Upon iterating on sampling, the Markov property of the marginal distributions, which is to converge asymptotically to an ergodic distribution, is utilized.

To begin with, a vector of arbitrary starting values is chosen for the common component. The distribution of the parameters conditional on that value is then determined and a vector of values for the parameters is sampled, which finishes the first iteration. In the second iteration, a new value for the common component is drawn conditional on the draw for the parameters from the previous iteration. Then, new values for the parameters are sampled conditional on the new common component draw. The procedure is repeated until convergence is achieved. It can be shown that the conditional posterior distributions converge to the true desired marginal posterior distributions as the number of iteration steps goes to infinity (Geman and Geman 1984). Here the number of draws is 24,000 of which I use 20,000

[5]GAUSS code for the model used here is available from Chris Otrok's website at `http://people.virginia.edu/~cmo3h/research/wfac3b.prg`. The code with the necessary modifications is available from the author upon request.

for inference, and discard the first 4000. The latter is done in case the starting value was chosen inferiorly. As a convergence check, I repeat the procedure several times with different starting values and compare the respective results. The AR-order for the world common components is chosen as $q = 8$, which reflects business cycle frequency with annual data (Burns and Mitchell 1946). For the variable specific processes, $p = 3$ is chosen following Kose, Otrok, and Whiteman (2003). I have estimated several variations of this setup and found that the results are robust to the choice of the AR-orders. In the appendix I formally describe the sequence of draws.

3.6 Identification

The identification issue is twofold. First, the weights λ_i and the latent variable c_t are determined jointly in Equation 2 and the following two cases are observationally equivalent: $\lambda_i c_t$ and $(-\lambda_i)(-c_t)$. This problem can be solved by pinning down one (and only one, since this in turn pins down c_t) λ_i to be positive. In the example chosen above identification is achieved through setting λ_1^w greater than zero, as well as λ_1^1 and λ_6^2, the first national factor loadings in rows 3 and 4, respectively (Kose, Otrok, and Whiteman 2003, p. 1219). Here I choose the weight corresponding to the price of wheat in London to be positive; i.e., to be positively correlated with the world price, which does not seem to be a very strong restriction. The cities whose prices are assumed to be positively correlated with their respective national common component are Paris for France, Berlin for Germany, Stockholm for Sweden, Vienna for Austria-Hungary, Brussels for Belgium, New York for the U.S., Oslo for Norway, and Santander for Spain.

A similar problem arises if for example c_t is measured in centimeters and λ_i in inches. The scale of the common component is undetermined, which is due to the fact that the variance of the common components' error term ν_t is not identified. Following, among others, Sargent and Sims (1977) it is set to one, but it could be set to any other constant likewise.

3.7 Priors

The priors I use are the same as those in Kose, Otrok, and Whiteman (2003, p. 1221). Five prior distributions must be chosen. The first two are the distributions of the AR-parameters for the common component (Equation 7) and the local shocks (Equation 3). Next is the prior distribution of the factor loadings λ followed by the prior distributions of the variances of the local shocks' and the common components' error terms, $\sigma^2_{\nu^k}$. The latter is the easiest, since for identification purposes explained above it must be set to a constant and thus has no distribution (Section 3.6).

The variance of the local shock's error term has an inverted gamma prior distribution:

$$\sigma_\chi^{prior} \sim \mathcal{IG}\left(6, 0.001\right)$$

which implies a fairly loose prior. Thus I do not claim to have important prior knowledge about the idiosyncratic error variance and leave the setting of its value mostly to the data.

The AR-parameters of both the common component and the local shocks have normally distributed prior distributions with zero mean, implying the assumption that they are not serially correlated. The more distant the lag is, the more certain this assumption becomes, and thus the variance around zero decreases exponentially:

$$\varphi^{prior} \sim \mathcal{N}(0_{q\times 1}, \Sigma)$$

where

$$\Sigma = \begin{bmatrix} 1 & 0 & \cdots & 0 \\ 0 & \frac{1}{2} & \vdots & \vdots \\ \vdots & \cdots & \ddots & 0 \\ 0 & \cdots & 0 & \frac{1}{x} \end{bmatrix},$$

with $x = p$ or q.

3.8 Presentation of Results

This section explains how the results from the estimation are presented. It especially describes how the variance decomposition is carried out.

In order to capture changes of market integration over time I choose subperiods. It means that the model is estimated separately for subsequent time periods. In each subperiod, a new world price component and new national price components are derived from the data. Section 5 starts with showing the importance of working in subperiods.

I have experimented with different subperiods, and finally decided to choose periods of about 25 years starting from 1806 in order to divide 19th century into even quarters:

1. 1806-1830
2. 1831-1855
3. 1856-1880
4. 1881-1907

This choice is supported by the major historical events over these 102 years. The first quarter captures a period of potentially still disintegrated world markets, as a result of the Napoleonic Wars and British Corn Laws that came into effect in 1815. The next period up to the mid-1850s possibly exhibits increasing market integration as new new technologies, and organizational improvements started to proliferate, fewer wars occurred on the European continent, and liberal trade politics became more widespread. The following quarter should continue that development although it includes the American Civil War, which is likely to have had a negative impact on world wheat trade. In the same subperiod, tariffs were reduced due to the treaties induced by Cobden-Chevalier, which however seemed to have little effect on wheat trade (Lampe forthcoming). The last subperiod starting in 1881 is likely to exhibit a strong drive toward Atlantic market integration according to O'Rourke and Williamson (1999). On the other hand, some countries reintroduced tariffs that had been lowered or abolished earlier in the century.

In order to assess the relative explanatory power of the components for each price series I follow Kose, Otrok, and Whiteman (2003) who decompose the variance of each price series i in the following way:

$$var(p_i) = (\lambda_i^w)^2 var(c^w) + (\lambda_i^1)^2 var(c^1) + (\lambda_i^2)^2 var(c^2) + var(u_i) \qquad (8)$$

resulting in the fraction of volatility explained by e.g. the world component:

$$\frac{(\lambda_i^w)^2 var(c^w)}{var(p_i)}. \qquad (9)$$

Since sampling from conditional distributions yields sampling error, the orthogonality of the common components is not automatically given, although they are uncorrelated. Thus, at each step of the Markov chain the national components are orthogonalized relative to the world component. Numerically, this does not change the results in any relevant way, but ensures that the volatility shares add up to 1 (Kose, Otrok, and Whiteman 2003, p. 1226). In order to give valuable insights into the relative explanatory power of each component, I present arithmetic averages of the volatility shares.[6]

4 Data

The data set is taken from Jacks (2005), Jörberg (1972, Sweden), and Jacobs and Richter (1935, Germany). I do not use all series, because some start too late or end too early, and I need all series to be of the same length. For several reasons, I work with annual data here: first, it increases data coverage. Second, the problem of seasonality does not arise, and third, it is interesting for economic historians if the proposed method is applicable to low frequency data. The data set with which I finally work contains between 48 and 70 annual wheat price series ranging from 1806 to 1907. For the sake of readability I present the results from different data sets in the respective subperiods in the same table. Strictly speaking, however, these results may not be directly comparable, because they refer to different common components. The appendix lists all results in separate tables showing that no relevant differences arise from including more cities in later periods.

I include wheat prices series from the following markets:

- Austria-Hungary (5): Vienna, Lwow, Krakow, Ljubljana, Budapest (subperiod (sbp.) 4) (Krakow did not belong to the Hapsburg monarchy for the whole period)

- Germany (4): Königsberg/Kaliningrad, Hamburg, Berlin, Munich

[6] I carried out the same for the standard errors of the decomposed variances, which can be found in the appendix. This was not done at every step of the Markov chain, but still provides a good view of the average accuracy of results of the variance decomposition.

- Belgium (3): Ghent, Bruges, Brussels
- U.K. (12): London, Manchester, Liverpool, Exeter, Carmarthen, Dover, Gloucester, Worcester, Cambridge, Norwich, Leeds, Newcastle
- France (12): Bayeux, Saint-Brieuc, Toulouse, Bordeaux, Chateauroux, Mende, Barleduc, Arras, Pau, Lyon, Paris, Marseille (sbp. 3-4)
- U.S. (8): New York, Alexandria, Philadelphia, Cincinnati (sbp. 2-4), Ithaca (sbp. 3-4), San Francisco (sbp. 4), Chicago (sbp. 3-4), Indianapolis (sbp. 3-4)
- Sweden (11): Stockholm, Uppsala, Södermanland, Östergötland, Kalmar, Halland, Skaraborg, Örebro, Västmanland, Gästrikland, Hälsingland
- Spain (12): Cordoba, Gerona , Granada, Lerida, Oviedo, Segovia, Zaragoza, Santander, Burgos, Coruna (sbp. 4), Toledo (sbp. 4), Leon (sbp. 4)
- Norway (3): Bergen, Christiania/Oslo, Stavanger (sbp. 4)

Figure 2 shows the geographical extent of the European markets in the sample. Figure 3 presents the same for the U.S. markets.

Although scattered data exists for Italy, Odessa and more German cities, the coverage is not sufficient. Odessan prices exist, but start in the 1880s (Goodwin and Grennes 1998). There are also 19th century wheat prices for some more German cities, but only up to the 1860s (Oberschelp 1986). Italian data is plentiful, too, but prices from some cities start in the 1860s, while others end during that time (see Federico (2007)). The reason why there is sometimes better data coverage for the first half of the 1900 may be that administrations tried to control prices to preserve domestic peace, but progressing political and economic liberalization led the states to abandon those attempts after the middle of the 19th century.[7]

For the empirical model employed here it is not necessary to convert monetary or volume units as long as they remain constant over time. Unit differences only represent permanently different means that do not affect comovement. The means of all data series are therefore normalized to 0. Similarly, the variance of each series is normalized to 1.

The price data provided by Jacks (2005) is converted to American dollars per 100kg. I verified that all prices are expressed in gold dollars but not in greenbacks. There are large relative price variations during the 1860s, which make such an exercise advisable. Using gold denominated benchmark price series from independent sources I compared Jacks's series with with the original prices. Also, I looked directly into the relevant exchange rates from the Global Financial Database (GFD). The appendix documents this in detail. I found that Spanish, Austria-Hungarian, and English prices were converted to gold dollars, while the others had to be deflated by a greenback series (Series XRUSGLDD from GFD, see also Willard, Guinnane, and Rosen (1996)).

[7]I thank Michael Kopsidis for this remark.

Figure 2: European markets.

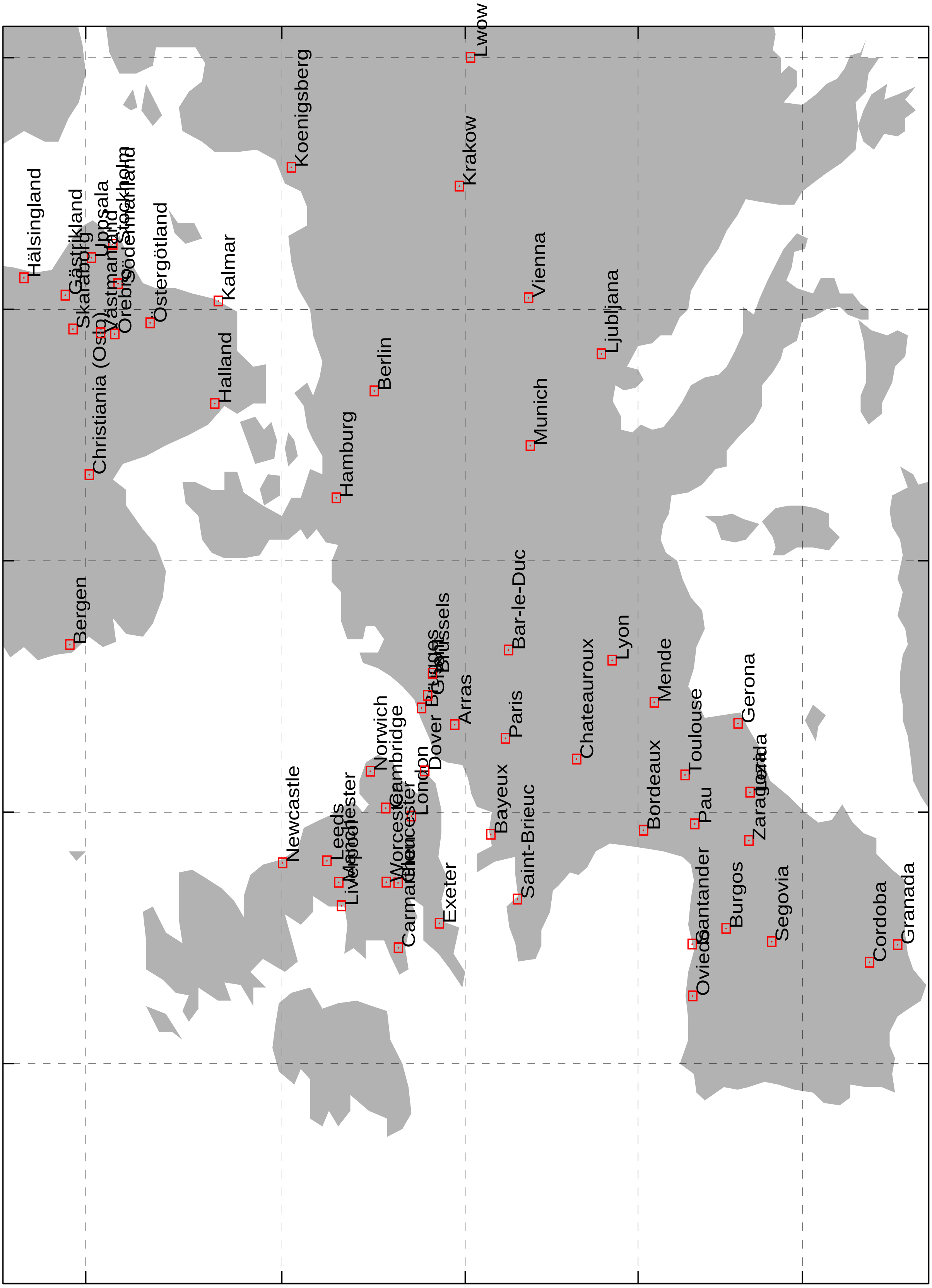
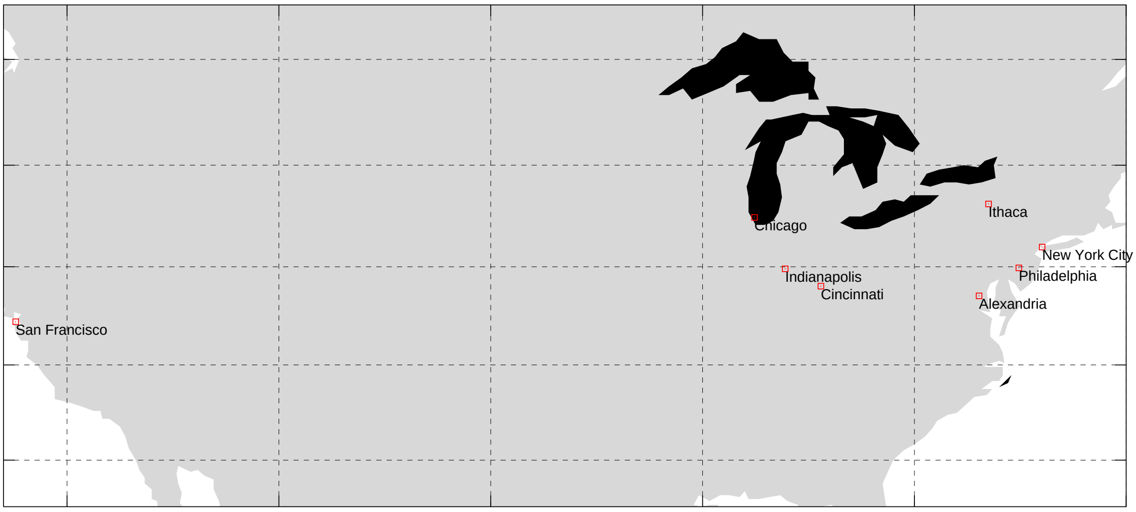


Figure 3: American markets.



Although overall inflation in the 19th century was small, I take out long run trends from the data by applying a Hodrick-Prescott filter with the Ravn-Uhlig lambda of 6.25.[8]

Note also that a second row of robustness tests is document in Table 30, where a country averages a presented that have been calculated using different sample sizes. It shows that varying the number of markets per country has effectively no impact on the results discussed here. However, this is not a general result and should always be checked.

5 Results

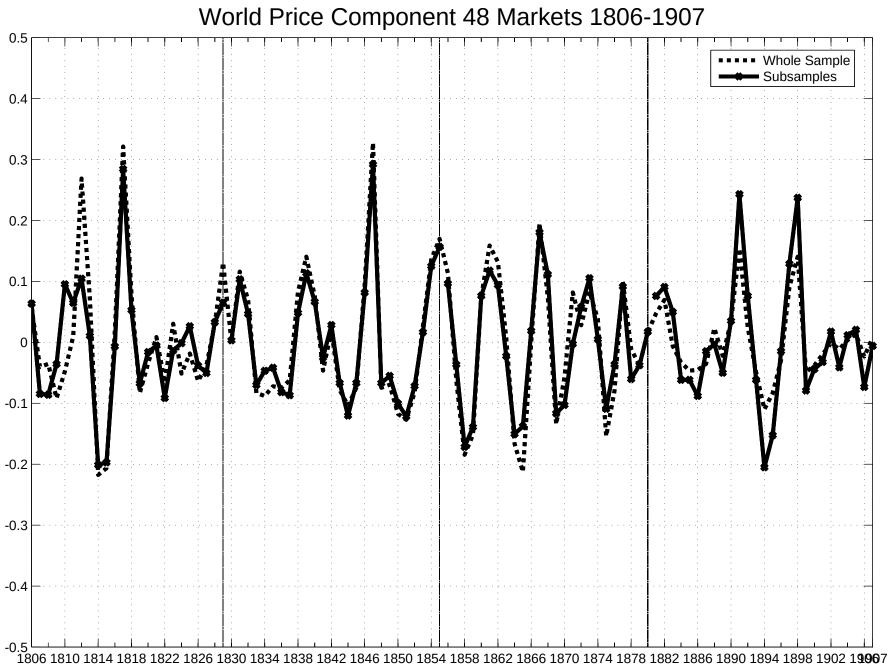
In order to give an impression of the changing character of wheat price comovement in the 19th century Figure 4 plots a common world component estimated from prices between 1806 and 1907 against subperiod world price components, each spanning a quarter century. The standard deviation of all common components is normalized to 0.1, which is the average standard deviation of English wheat prices in the 19th century. The fluctuations are percentage deviations around a smooth trend as discussed in the data section. The vertical lines depict subperiods.

We can clearly observe the price peak in 1847, which was induced by bad harvests throughout Europe in 1846 (Berger and Spoerer 2001). The common component confirms also the notion that wheat prices were not influenced very much by the worldwide "speculative" inflation of 1870-73 Veblen (1893, p. 20).

If structural change did not matter, estimating the model for the whole period or breaking it up would make no difference to the common price component. What Figure 4 demonstrates instead is that, in three out of four periods, the subsample world price (solid line) is different from the world price estimated from the full

[8]Alternative filters like Baxter-King and Christiano-Fitzgerald yield very similar results (Baxter and King 1999, Christiano and Fitzgerald 2003). Results are partially presented in the appendix. Additional results can be obtained from me on request.

Figure 4: World price component during 19th century. Whole sample estimate vs subsample estimates.



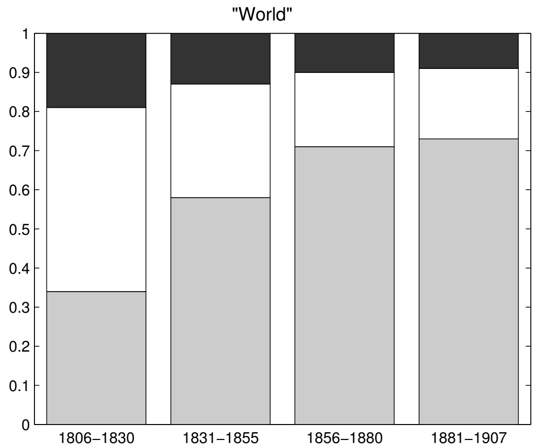
sample (dotted line). Before 1830 the subperiod world component does not exhibit the strong peak around 1812 as the full sample component does. Conversely, the M-shaped price deviations centered on 1895 are much stronger when taking only information after 1880 into account. In the 1850s and 1860s, the restricted sample world price fluctuates less than its full sample counterpart.

Apart from misspecification of the common component, taking the period as a whole prohibits the relative weights λ_i to change over time. They represent each market's sensitivity to world price fluctuations. Thus, only by breaking the sample up, it is be possible to capture changes in the degree of how much each single market take part in international and national wheat trade.

5.1 International Market Integration

The trend obtained for worldwide comovement is shown in Figure 5 as a cross country average. It reveals the integrating forces of world trade in the 19th century. Globalization manifested itself in a strong increase of international price comovement between the first and the second quarter of the 19th century: the international component (gray areas) explains on average 34% of price fluctuations between 1806 and 1830, but 58% between 1831 and 1855. This first shift to integrated markets is followed by a second, albeit smaller one, as the lesser increase of the world price component between the second and the third quarter in Figure 5 shows. At the same time, national market integration (white areas), as represented by the average variance share explained by the respective national common components, steadily declined in the 1800s, first quickly, then at a slower pace. These two developments add up to decreasing market separation as the black areas show. On average, 18% of price variance was subject to local shocks before 1831, compared to only 8% after 1880.

Figure 5: Variance shares, full sample averages. Gray: international component, white: national component, black: local component.



These results emphasize the role of market integration in the first half of the 19th century, as opposed to the "First Wave of Globalization" story famously put forward by O'Rourke (1997), among others. Recently there has been greater recognition of the former point, the post-Napoleonic improvement of world commodity market integration. Jacks (2005) finds decreasing transport costs for wheat before 1860 and Federico (2008) reports declining price dispersion in European wheat prices from the early 1800s on. Kaukiainen (2001) proposes decreasing information costs on why markets could come to function so much better without the widespread use of steam technology and the telegraph. He finds that business letters to and from London traveled on average twice as fast in the middle of the 19th century than at the beginning. Factual transport cost in sail shipping decreased impressively, as Brautaset and Grafe (2005) find. They argue that economies of scale can explain these cost reductions in shipping. This debate also reflects the discussion between Knick Harley (1988) and Douglass North (1958, 1968): North repeatedly rejected the advantage of steam power and metal hulls in decreasing freight rates, and claimed that organizational improvements played a more important role in lowering transport costs and spurring change in international market integration in the first half the 1800s. The results shown here lean strongly towards North's side.

A possible explanation for the strong increase in comovement in the first half of the 19th century may be the distorsions of the Napoleonic Wars, which lasted until 1815 and thus cover half of the first subperiod. This would potentially render my results trivial. I therefore conducted an experiment by excluding the years 1806-15 and estimating the model again. As comparison of the first two rows of Table 2 shows, the average explanatory power of the world price component does not increase when excluding the war years, it even decreases slightly. Similarly, national comovement explains on average about the same regardless of including the war years or not. [9]

While full sample averages do not change very much, the distribution of international and national comovement across nations is affected by the experiment. Most striking is the little amount of international comovement of the English markets (Table 2) after the exclusion of the first 10 years. Now, only a marginal variance share of 7% is explained by the world price. In comparison, if all years are taken into account about half of English price variations are explained by international comovement.[10]

Obviously, including all years, the optimization procedure leads to a more prominent representation of UK markets in the world price, and therefore to a higher explanatory power of the world price in British price fluctuations. Restricting the data to 1816-30, however, leads to higher weights to continental markets, and thus to a higher share of the international component in continental market prices. Two two major events in the period under analysis may serve as explanations: the continental system, lasting until 1815, and the Corn laws, starting in 1816 (Sharp 2006). They were repeatedly changed and effectively abolished in 1846.

The results obtained here suggest that the continental system was much less effective in insulating the UK from international wheat trade than the Corn Laws, since the inclusion of the war years shifts leads to higher weights for UK markets in the latent world price. Judging from the literature, this is a plausible result. Crouzet (1964, p. 580) shows that food trade into Britain was relatively unaffected by the war, but that the Corn Laws created the major import restriction. Similarly, Sharp (2006, p. 3) cites cites Fay (1932) with the assertion that the war years represented basically a period of free corn trade.

Summing up, the increase of comovement during the first half of the 19th century between wheat prices can not trivially be explained by trade disruptions caused by war. Neither can it be due to steam related transport cost reductions in long distance trade, since railroad and steam ship were not widespread enough before mid-century. It is thus likely that organizational improvements and gradual technological improvements as well as demand factors in the market for transport services explain most of the comovement increase (North 1968, Jacks and Pendakur 2008).

5.2 National Developments

The country averages are presented in Figures 6-7. Figure 6 contains averages for the so-called core countries such: U.K., U.S., France, Belgium and Germany; while Figure 7 shows results for Norway, Sweden, Belgium and Spain. The results in each period have been obtained with the maximum number of cities available in the respective period. The full set of results is presented in the appendix.

The gray areas show the degree to which market prices are explainable by international price movements ("international component"), the white areas the respective

[9] Note, however, that the margins of error in the first subperiod are consistently larger than in the following subperiods. This means that the reported median values of the parameter distributions have to be interpreted cautiously. See Tables 16 and 19.

[10] The results for each city can be found in Table 18 in the appendix. Robustness to restricting the sample to an almost balanced panel of 26 cities is dcumented in Table 8.

Table 2: Robustness to excluding the years 1806-1815. Medians of explained variances of 48 markets.

Impact of Napoleonic Wars				
Avg. over	Start	World	National	Local
Full Sample	1806	0.35	0.48	0.17
	1816	0.30	0.52	0.18
Austria-Hungary	1806	0.15	0.41	0.44
	1816	0.52	0.17	0.28
Belgium	1806	0.56	0.40	0.05
	1816	0.52	0.44	0.04
France	1806	0.52	0.35	0.13
	1816	0.52	0.27	0.20
Germany	1806	0.23	0.51	0.26
	1816	0.54	0.26	0.19
UK	1806	0.48	0.44	0.07
	1816	0.07	0.84	0.09
US	1806	0.39	0.50	0.11
	1816	0.52	0.25	0.21
Sweden	1806	0.06	0.68	0.26
	1816	0.04	0.72	0.23

When the difference between "1806" and "1816" is at least 10 percentage points, the higher figure is underlined.

national shares ("national component"), and the black upper areas the remaining part of price variation ("local component"), where the scale 0 to 1 refers to the international component. Compared to the full sample averages from Figure 5, the results shown here allow to differentiate country by country.

The increasing importance of international market integration during the first half of the 19th century becomes obvious when regarding the gray bars of Figure 6. The national view, however, makes clear that the U.S. did not contribute to this increase (lower left panel). The international component in North-American wheat prices becomes only considerably large after the Civil War in the period 1881-1907. The average increase is therefore due to European markets and occurs mainly in the first half of the 19th century. Especially Germany and Belgium experience a strong rise of exposure to international movements after 1830. The increase for English markets is bigger between the second and third subperiod however. This may be explained by gradual repeal of the Corn Laws starting in 1828 (Sharp 2006). It is maybe also noteworthy that except of the U.S. only protectionist nations maintain a considerable amount of price variations not explained by international comovement; i.e. the white and black areas combined. While that share is higher in France than in Germany, remember that only four large markets with water connections are part of the German sample, while there are many landlocked markets included in the French sample.

The periphery countries present a not so clear picture (Figure 7). Austria-

Figure 6: Core country variance shares, country averages. Gray: international component, white: national component, black: local component.

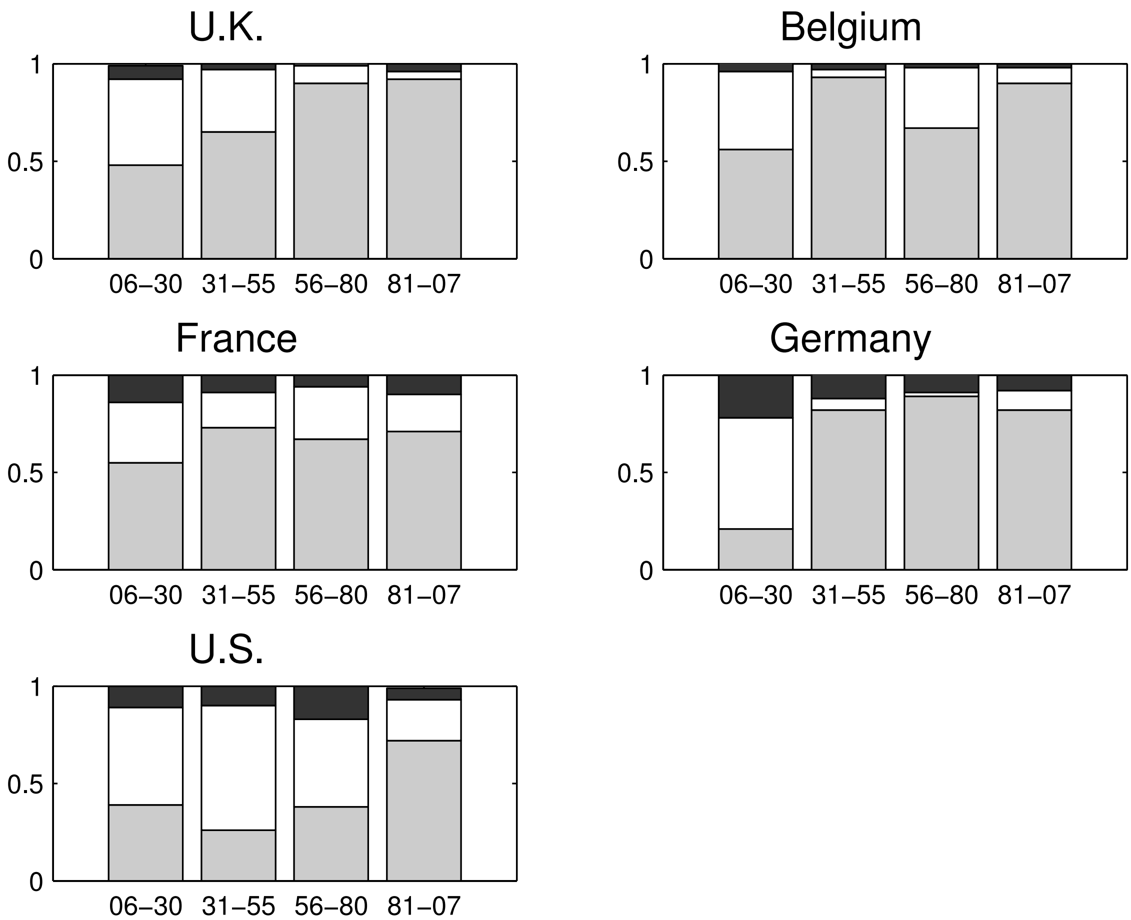
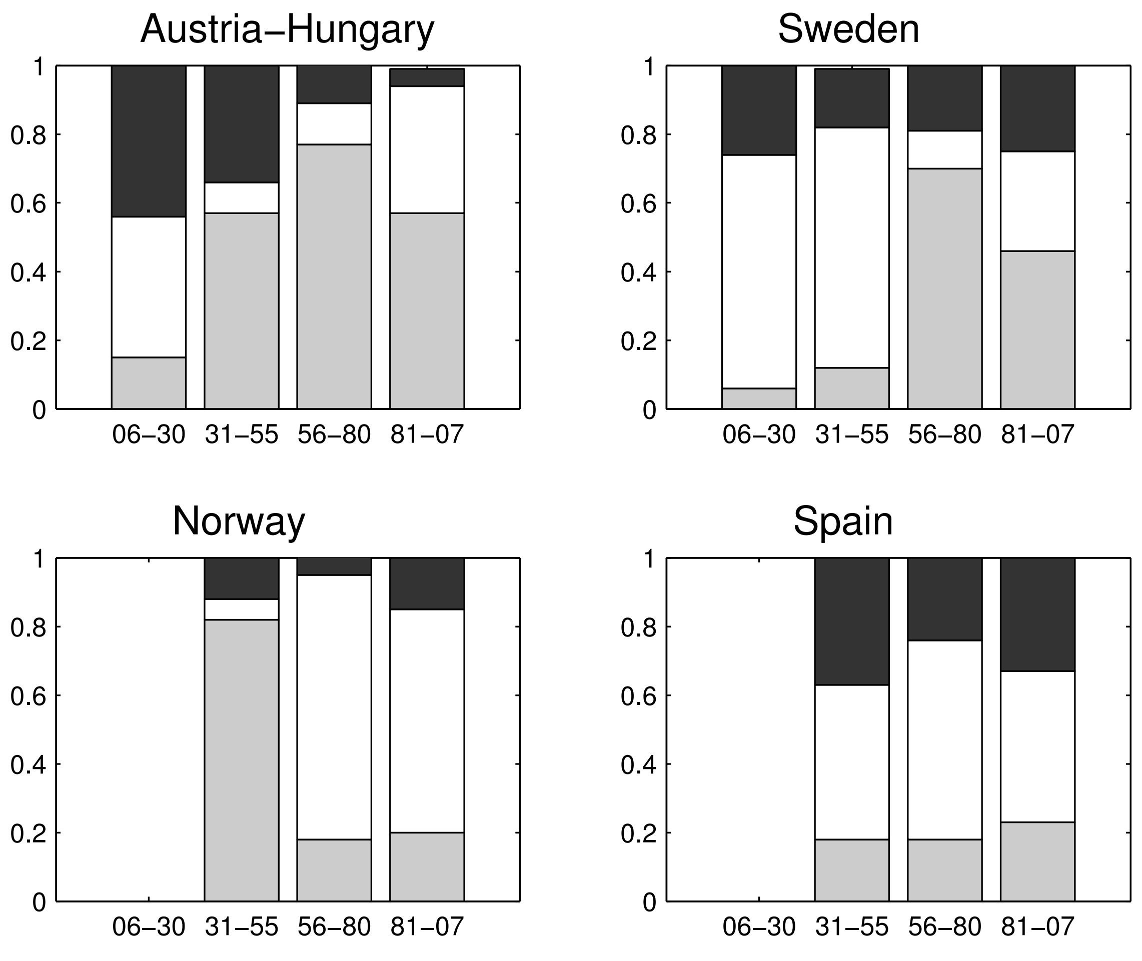


Figure 7: Periphery country variance shares, country averages. Gray: international component, white: national component, black: local component.



Hungary's and Sweden's experiences are comparable in that international price swings (gray areas) explain more and more until the third subperiod, but that is not the case for Norway and Spain which will be discussed in the country section below. Austria-Hungary seems to develop a national economy at the end of the 19th century, as the white area in the last quarter shows. (The large national variance share in the first period, however, is solely due to Vienna and Ljubljana.) The development of a national market may be due to its regionally diverse industrialization and will be analyzed in detail when looking at the results city by city.

The punchline after looking at these finer grained results does not change. European market integration in the first half of the 19th century has been somewhat neglected in the literature relative to transatlantic market integration. The European market should not be considered as the consequence of a return to protectionism under Bismarck & Co in the 1880s but a result of strengthening market forces before the middle of the century. Likewise, until the end of the Civil War no trend in American international market integration can be detected. This puts the "Grain Invasion" as the defining moment of the "First Globalization" into perspective, because international market integration happened earlier, it happened in Europe and not across the Atlantic, and it happened to a good deal without the help of steam. At the end of the century the level of international integration of the U.S. markets is comparable to that of France's the gray areas in Figure 6 show. While the U.K.'s markets are integrated best in the last quarter of the 19th century, major German cities come second, well above the U.S. markets. If the U.S. markets are placed between France and Germany, two protectionist countries, then a changed perspective relative to the traditional story of protectionist and free market nations after 1880 seems to be justifiable (see O'Rourke and Williamson (1999) for the established view).

5.3 Country Results

5.3.1 U.K.

The U.K. is certainly the country of which the highest world market integration and lowest separation of markets can be expected. Easy access to most U.K. cities by waterways and early commercialization are some of the often cited reasons for why industrialization first developed in England. Shiue and Keller (2007) for example find that at the beginning of the 1800s the U.K. was internally much better integrated than Western Europe on average. One has to bear in mind, however, that the first few decades witnessed the Napoleonic Wars and the Corn Laws that potentially had an insulating effect on the U.K. wheat markets (Sharp 2006). Thus, one may find some limited world market integration but very low local market separation before 1830. Figure 8 shows exactly this. Note that there were some differences in the degree to which markets were globally integrated at the beginning of the observation period. 76% of wheat prices in Exeter were already determined by the world market, while prices in all other cities stayed at or below 60% (gray areas). In the aftermath, all cities converged to the same path of world market integration with shrinking nationally specific price components. Together with Belgium, the U.K. emerged clearly as the most integrated wheat market during the second half of the

19th century.

5.3.2 France

In comparison, France's markets experienced a rather marginal development with considerable geographic heterogeneity (Figure 9). While early in the 1800s cities such as Paris, Lyon and Arras were better integrated into the world market than most U.K. cities, after the 1850s there was rather an anti-global tendency. The French average for world integration did not decrease, however, because Toulouse, Mende and Pau followed a path of increasing integration. Similarly, Marseille adds to the international component of France, but seems to be rather excluded from the national market, corroborating evidence found by Persson (1999). is France ended the early 1900s as an intermediately globally integrated country with the largest national specific component among the European nations (Figure 6).

5.3.3 Belgium

The figures showing market integration in Belgium speak very much for themselves (Figure 10). All three markets behave almost identically. The largest part of price variation is subject to worldwide shocks (gray areas). The only peculiarity is the swing with a short setback to national specific price variation during the third quarter of the 19th century (3rd bars). It is striking that the Belgian markets in the sample were always fully insured against local shocks, reflected in the extremely low level of separation of all three markets over all periods (black areas at the top).

5.3.4 Germany

The disaggregated view allows for detailed insights into the development of German market integration. The gray areas of Figure 11 describe the astonishingly strong international integration of the German wheat markets. A global focus arose already in the second quarter of the 19th century, too early to be fully explained by railroad or telegraph. At first sight, the German tariff union serves as a candidate for an explanation. But this would imply strong explanatory power of the national component after 1830, and an increase relative to the first quarter (white areas). Unfortunately, the small set of markets presented here is not suitable to confirm or refute this hypothesis, because Hamburg never became part of the tariff union, while Königsberg and Berlin have never been divided by tariff boarders. However, it is still interesting to find an already well integrated national market *before* the tariff union ever existed. Similar results were also found by Fremdling and Hohorst (1979) and Shiue (2005).[11] The evidence rather fits into a picture of increasing Baltic and North Sea trade that included the major Prussian and former Hanseatic cities. The introduction of the railroad was apparently not without effect, though. It became important where waterways were missing: Munich, not connected to the Rhine-Weser-Elbe water network, has not been well integrated into the North-German

[11] See Dumke (1991) for details on the German tariff union.

market, as can be seen from its high local components, the black areas. Its separation from the North-German market was probably attenuated with the help of the railroad in last quarter of the 19th century.

5.3.5 U.S.

The United States are the only major nation that developed no strong connections with the world market before the last quarter of the 1900s (Figure 6). This seems astonishing given the fact that the U.S. already supplied about half of the U.K.'s wheat imports in the 1850s (Sharp 2006). British-North American trade was apparently more intense than trade between the U.S. and continental Europe (see Bairoch (1974, p. 572)). What matured earlier, however, was a national market. Between the first and the the second quarter of the 19th century comovement between the three East Coast cities New York, Philadelphia and Alexandria increased to such an extent that 60-70% of the variance of their prices was explained by the national component (white areas in Figure 12). The sample in the first half century is, however, restricted to four cities. After the 1850s, Chicago, Ithaca and Indianapolis as additional landlocked markets and San Francisco representing the Pacific coast are included. The picture emerging from this is that during the third subperiod (which includes the Civil War) in all cities at most half of price variations are explained by the world price (gray areas). The price series explained best is from Chicago, a leading forwarder of midwestern wheat, and New York City, the main port for exports to Europe. The interior markets such as Cincinnati experience lower levels of world market integration, but prices their are largely determined nationally. It is striking to see that San Francisco, not connected to the east coast by rail before 1869, was completely separated in the third quarter, and later became part of the international but never of the national market as the large black areas show (see also Taylor (1964, pp. 111, 389)).

The reason why comovement was strong but distinct from the world business cycle in the third quarter must have been the Civil War in the 1860s, accompanied by harvest failures in the U.K. and Europe (Fite 1906, p. 264). Agricultural production in the American Midwest during the first Civil War years soared dramatically due to the increase in acreage and harvest luck. After the Civil War, internal and external trade flourished: all markets integrated into the world market to a very high degree (72%).

Thus, exports to Europe could probably have increased much earlier. A test of this hypothesis is to exclude the war years from the third subperiod, and reestimate the variance shares. As Table 26 shows the explanatory power of the international component in the midwestern and Atlantic wheat markets increased immediately. It is thus likely that comparable international integration levels could have been attained earlier if it had not been for the Civil War.

5.3.6 Austria-Hungary

The case of Austria-Hungary seems to be a good example for prices within the same nation ovolving differently. Before 1830, the eastern markets of Lwow and Krakow were separated from both national and international markets (black areas), while

Ljubljana and Vienna were forming a national market in the west (white area). After 1830, they became exposed to international price movements (gray areas). This seems plausible as they were closer to the rest of the European markets than Lwow and Krakow (see the map in Section 4). With progressing industrialization, the eastern part of the monarchy became the major grain supplier of the western cities, and a national market developed (Kopsidis 1998, Kopsidis 2002). Consequently, the degree to which the now-industrialized urban centers integrated into international market declined, as the gray areas in Figure 13 show. This effect is described in Komlos (1979, p. 43) using agricultural production data for the years between 1790 and 1877. He also provides potential explanations for the increased international exposure of Lwow and Krakow in the second and third subperiod, mainly food shortages and trade liberalizations. This resulted in high net wheat imports in the early 1850s (second superiod) especially in the provinces Hungary and Galicia, and high net wheat exports in the late 1850s (third subperiod) (Komlos 1979, pp. 59).

5.3.7 Spain

The Spanish national market was comparatively underdeveloped, as can be seen in Figure 14. It is especially striking that there was no clear direction of development. It is tempting to compare the results to Sánchez-Albornoz's (1974) principal component analysis of 48 annual wheat prices for 1856-1890, and thus covering the third subperiod plus 10 years. It has to be kept in the back of the mind, though, that the results shown here are conditional on international comovement, while Sánchez-Albornoz looks only for interior trading regions without controlling for external trade.

He identified at least four regions that correspond well with my results: The north-eastern interior markets Lerida und Zaragoza were both practically unaffected by international market conditions, but nationally well integrated as the large white areas show (a bit better in Zaragoza, which is situated at the river Ebro). Similarly, Granada and Cordoba in the very south were virtually cut off from interntional trade (almost no gray areas). Between a third and half of their price variations could neither be explained by national comovement (black areas). In the north-western region of Galicia and Asturia, however, the cities Coruna and Oviedo were at least somehow internationally integrated, although this was not the case anymore in the last subperiod. Finally, both according to my and Sánchez-Albornoz's results, the central tablelands mainly north of Madrid can be identified as a trading region, represented here by Burgos, Leon, Segovia and Toledo with large white areas demonstrating national comovement. Santander at the Atlantic coast, although being close as the crow flies, is however separated from that area by mountains, is not part of that trading region (small white areas). It even seems this did not benefit its international market integration but rather abstinence from wheat trade. This contrasts strongly with qualitative evidence, because Santander was Castilians port of exit for wheat and wheat flower (Sánchez-Albornoz 1974, p. 742).

Overall, Spanish speed of world integration is the lowest in my sample for most of the observation period. Jacks (2005, p. 397) reports similar results from a TAR model. Pena and Albornoz (1984, p. 371) find underdeveloped intraregional wheat markets despite the import prohibition instituted in 1820. According to them, the situation was alleviated only in the 1880s when the railway network was improved. Some of their results can be found here, but still I rather find a secular decline than an improvement in efficiency. Comparing the impact of globalization on factor price relations, O'Rourke, Rosés, and Williamson (2007) mention the differences in grain trade between the U.K. and Spain, which are clearly reflected in the results presented here: while U.K. was a free trade country at least after 1846, Spain had an embargo on wheat imports from 1820, which was replaced from 1869 on by high import tariffs.

5.3.8 Sweden

When observing the average level of separation of the Swedish markets (black areas in Figure 15), one could be tempted to group them into the same category as Spain's. However, there are differences in both development over time and the degree of similarity between the markets.

While the Spanish markets do not show any clear trend, there is an obvious tendency in Sweden toward more international market integration, which becomes visible in the gray areas of Figure 15. Moreover, only a small number of markets such as Uppsala and Hälsingland do not really join international market integration. The high level of national market integration in the first and second quarter of the observation period is remarkable (white areas). Considering the Austria-Hungarian national wheat market for example, most cities' price comovements are comparable to Vienna's and Ljubljana's, while none are so asynchronous as Lwow's or Krakow's. In contrast to Spain, almost all Swedish cities are better integrated between 1806 and 1830 than any Spanish market in the following 25 years. The level of national specific shocks falls continuously in almost all Swedish cities, where the period of fastest fall is between the second and the third quarter of the 19th century. This seems rather late compared to other European nations such as Germany, Austria-Hungary and Belgium. Similar to Austria-Hungary and France, however, we observe a general increase of national comovement between the third and the last subperiod, joined by higher local price components (black areas) in 4 out of 10 markets.

5.3.9 Norway

Commenting on Norway, the results in Figure 16 are exceptional. The results show a *decreasing* integration into the world market accompanied by *increasing* variance shares of the national component (gray and white areas). The local price component stays always well below 25%. Norway, being a sailing and trading nation, with Bergen a former Hanse-city and only limited grain production is likely to be well integrated internationally (Daudin, O'Rourke, and de la Escosura 2008, p. 23). However, the failure is maybe to set up the model along national boundaries in the case of Norway. For instance, Norway became independent only in 1905, and mountains divide east and west of Norway. Inspite of these considerations, regrouping Bergen and Stavanger with Germany or England, respectively, and Oslo with Sweden did not change the results in any meaningful way. The results, however, are very similar to outcomes presented by Jacks (2005, p. 390, 396) using the same data. Thus, the high share of unexplained variance in the Norwegian price data is most likely due to data errors.[12]

Overall, the picture painted here is one showing a stronger wave of globalization in the first half of the century than in the second. The Napoleonic Wars may have suppressed possible trade relations that soon blossomed as the war was over (Federico (2008) follows this track), but even controlling for that effect draws a similar picture. When dating the start of globalization, certainly we should look somewhere before 1850 as suggested by O'Rourke and Williamson (2002). The slowdown of the speed of globalization in the second half of the century should be emphasized more in the literature. Railroad, telegraph and steamship were not the only forces of world and national wheat market integration, and potentially not for trade in general, either. A more comprehensive explanation should include the impact of wars (or better their absence), demand shifts in the market for trade services, gradual technological improvements and the market creating forces of regional specialization in connection with economies of scale in market efficiency.

6 Conclusion

In this paper, I evaluate comovement among wheat prices in different localities to investigate 19th century market integration. Each price is decomposed into an international, a national, and a local component in four subperiods representing stages of market development. The explanatory power of the common components is used to assess changing degrees of market integration over time.

I find that there was a tendency toward closer integration over the 19th century, but stronger in the first half than in the second. A high degree of international wheat market integration was reached before the telegraph, steamship and railroads could reach their full cost saving potentials.

The 1860s was a decade of slower improvements of market integration, even when I control for exchange rate fluctuations in my dollar denominated data set caused by greenback inflation. The American Civil War is likely to be one of the reasons, as it hampered intra-U.S. and Atlantic trade, while the Cobden-Chevalier network had no impact on wheat trade.

The U.S. markets were only fully integrated into the world market after the Civil War. Even then, they did not call the tune, but rather played second fiddle.

The North-German markets became integrated before 1830, while Munich was separated until after the German Reich was founded and railroad connections were established.

The introduction of comovement into the market integration literature has the advantage of forming a benchmark against which each market price can be assessed. Thus, it is not dependent on a battery of bilateral comparisons. Large amounts of price data can be processed and transformed into an intuitive measure of integration. The possibility for looking at each market individually is maybe the strongest argument for this method. Zooming into local circumstances while keeping an eye on the aggregate picture can be accomplished easily. Therefore, this method appears to

[12] I thank Jan-Tore Klovland for his insightful comment on this topic.

be a useful means to throw light on questions of market integration in other regions and periods.

Figure 8: Variance shares England, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

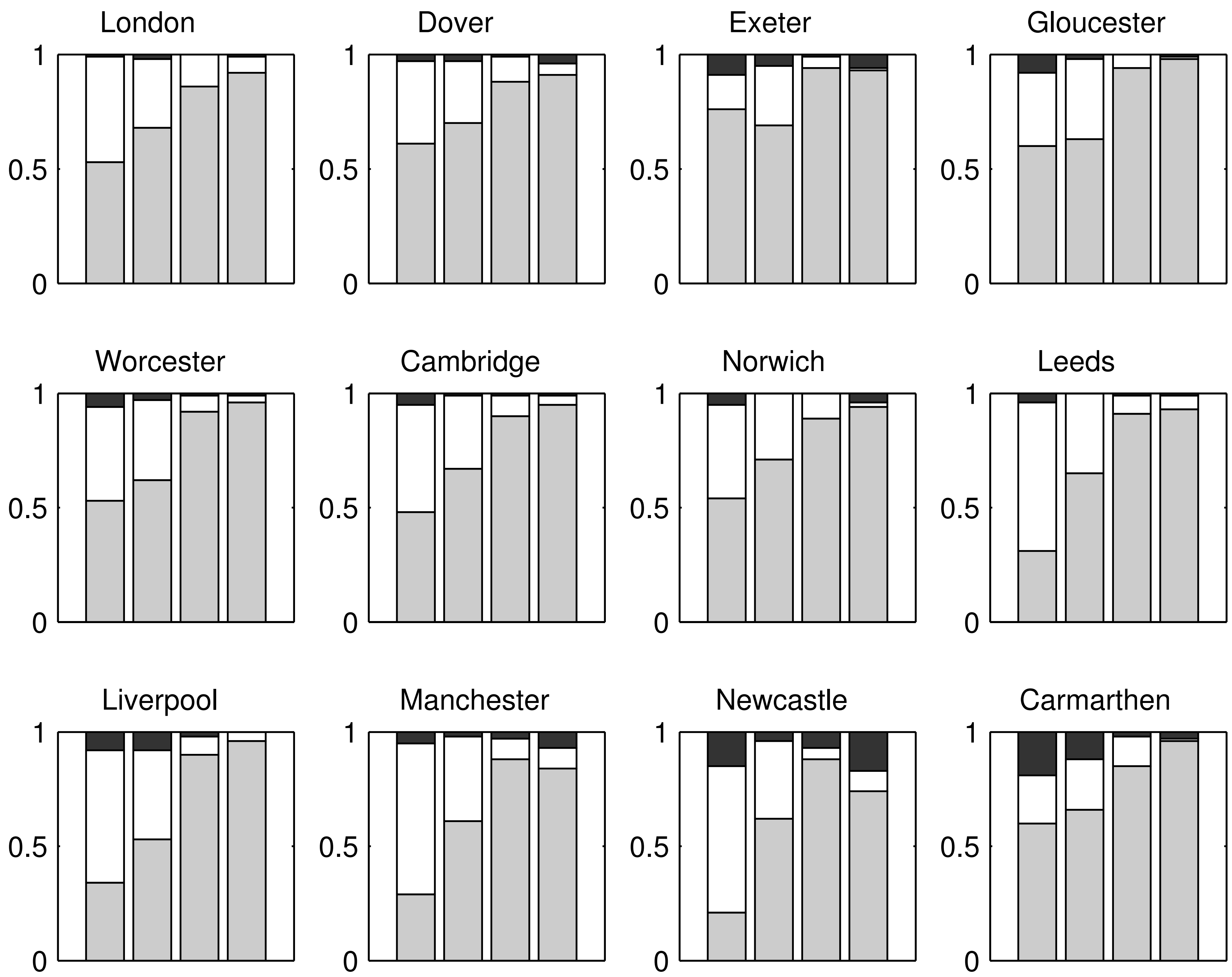


Figure 9: Variance shares France, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

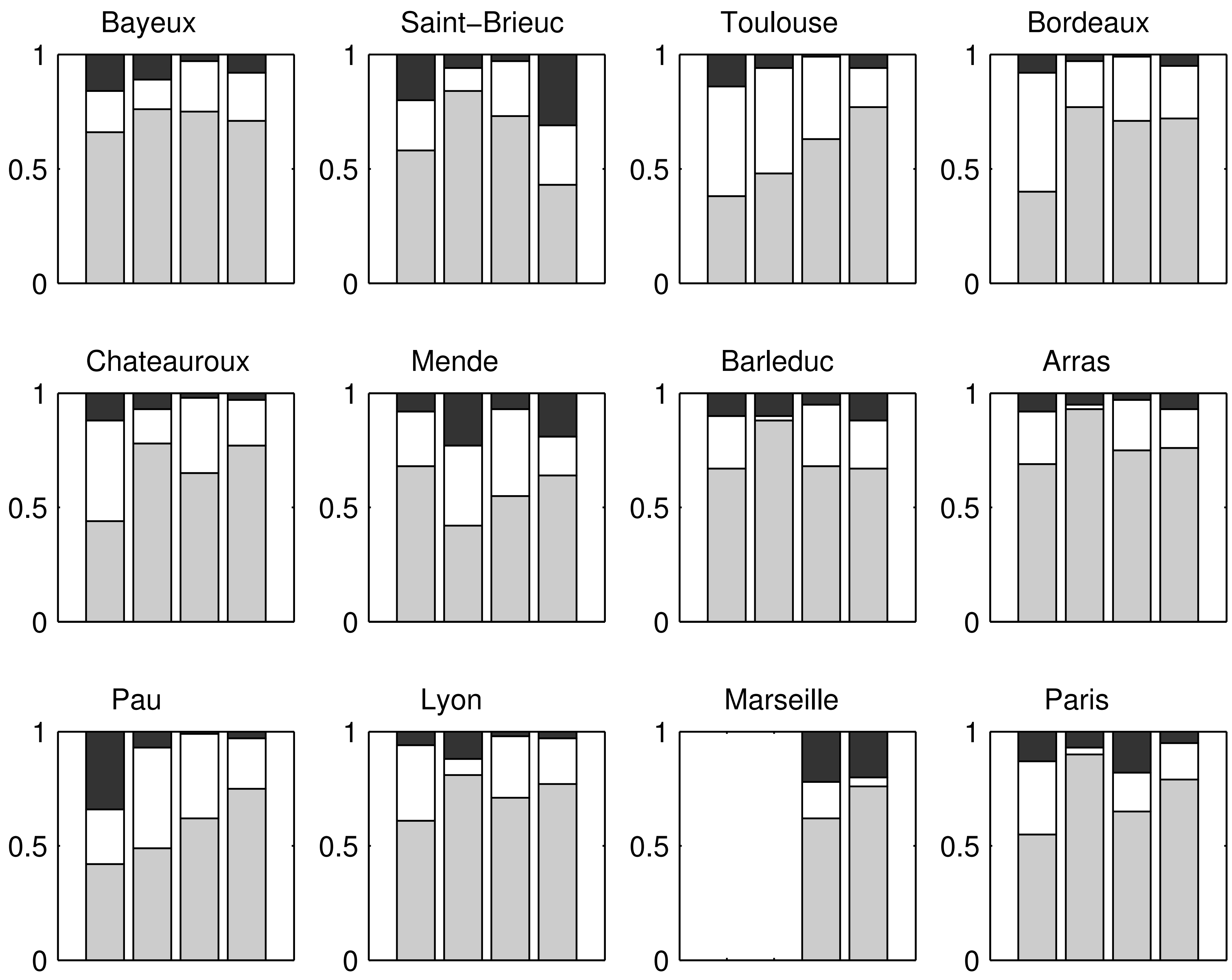


Figure 10: Variance shares Belgium, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

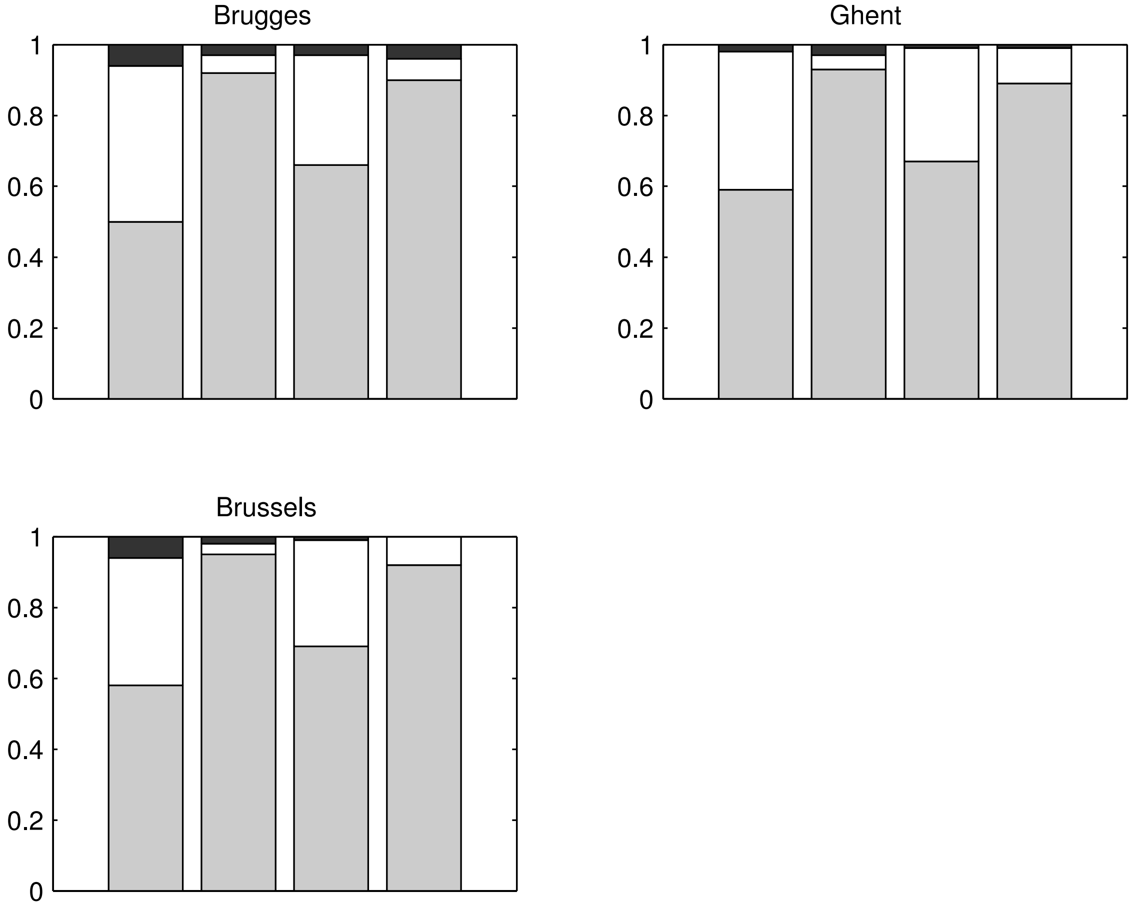


Figure 11: Variance shares Germany, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

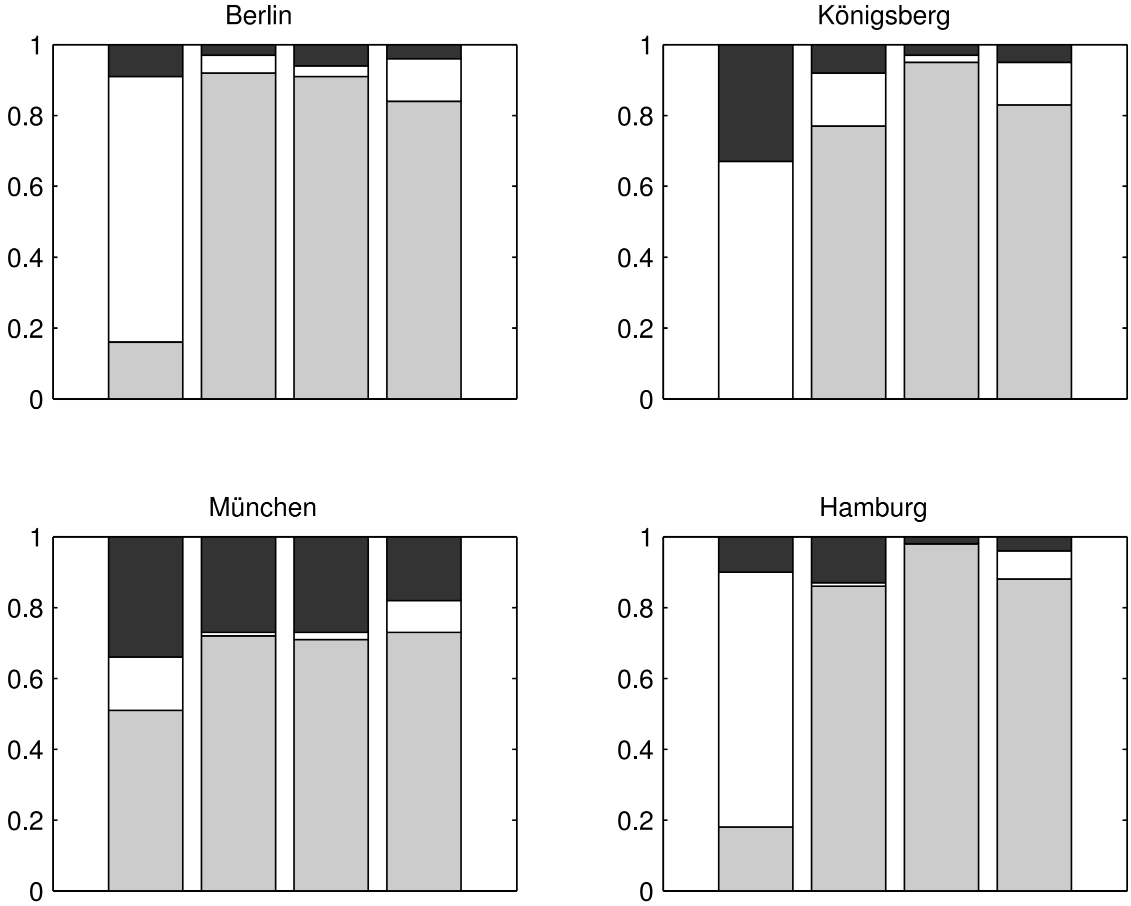


Figure 12: Variance shares U.S., 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

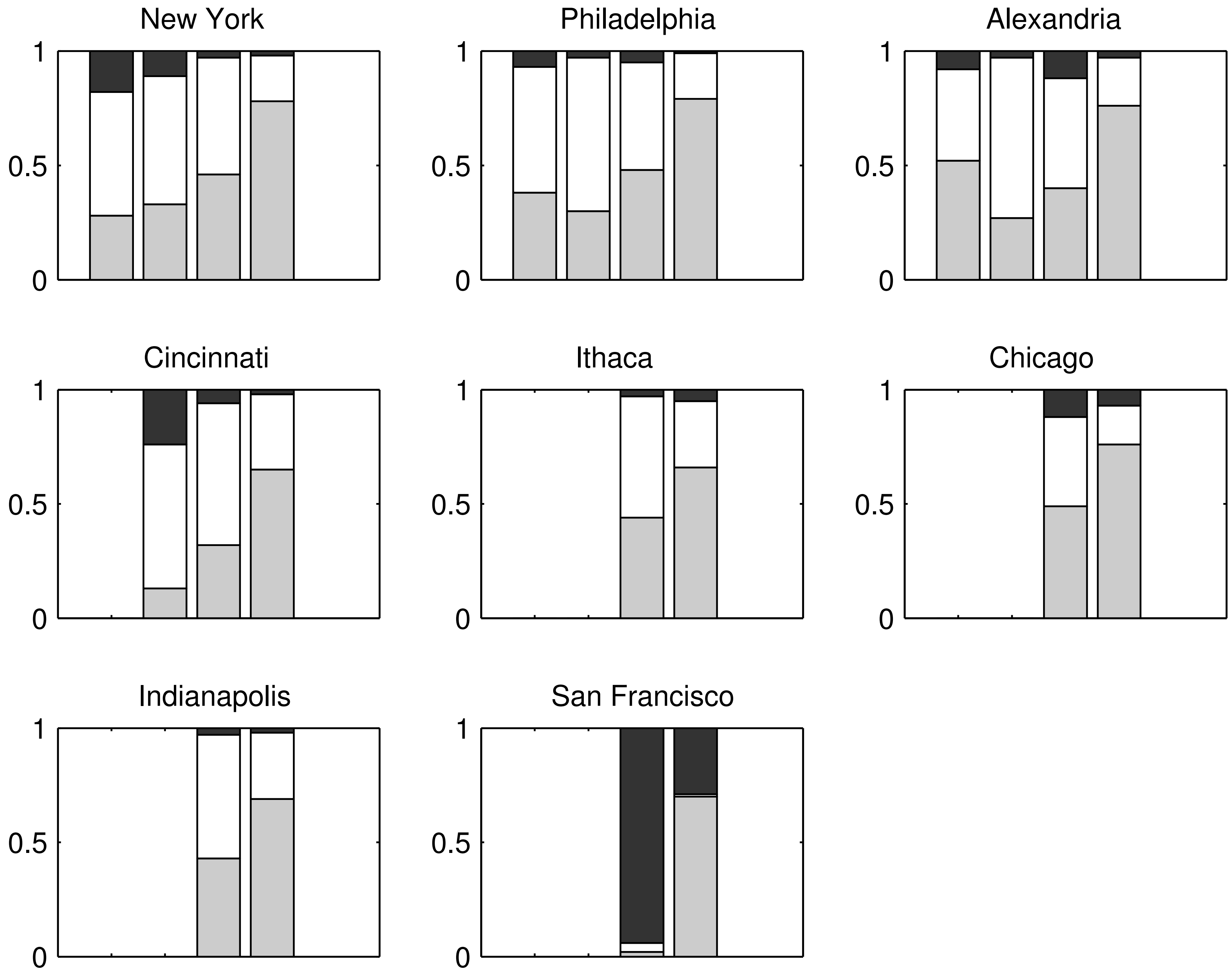


Figure 13: Variance shares Austria-Hungary, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

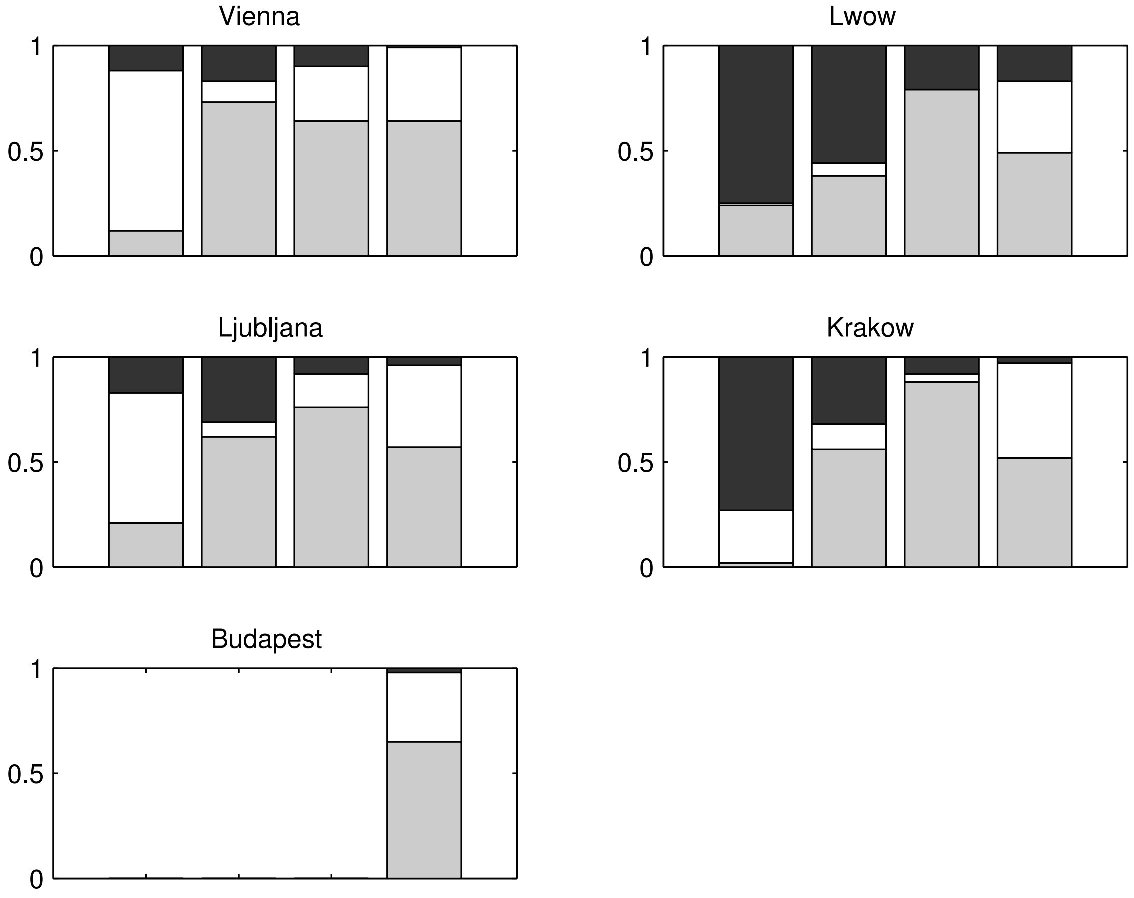


Figure 14: Variance shares Spain, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

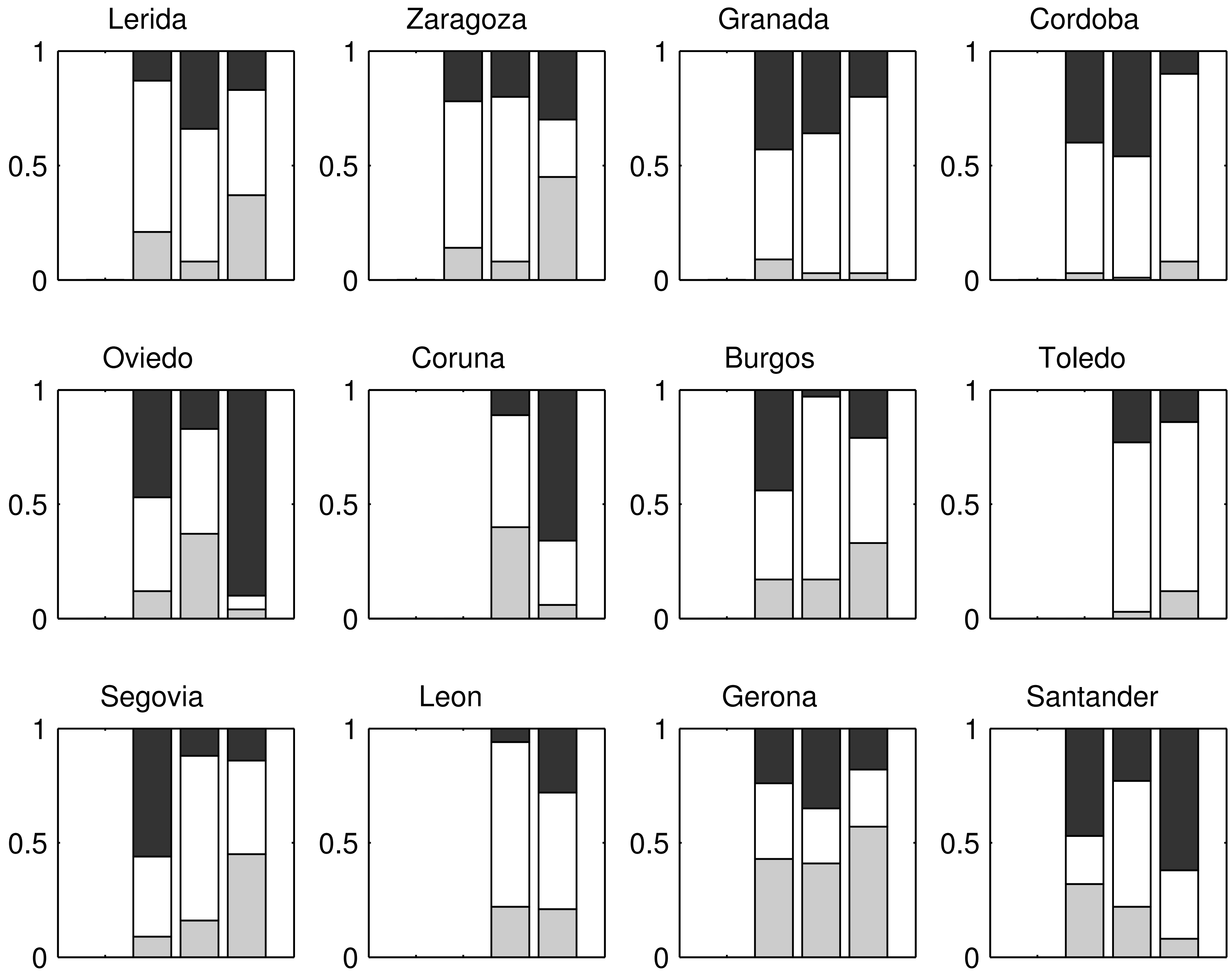


Figure 15: Variance shares Sweden, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.

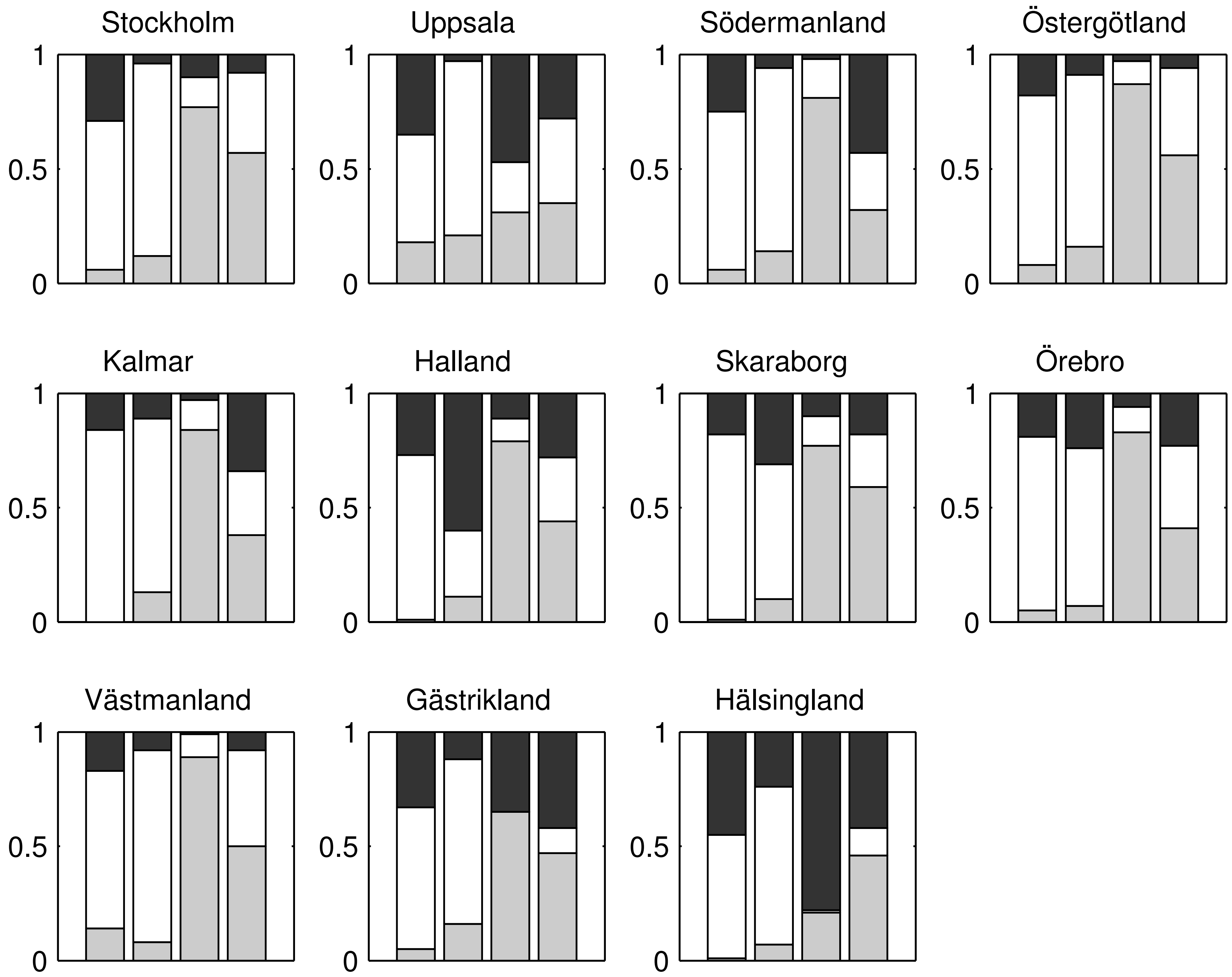
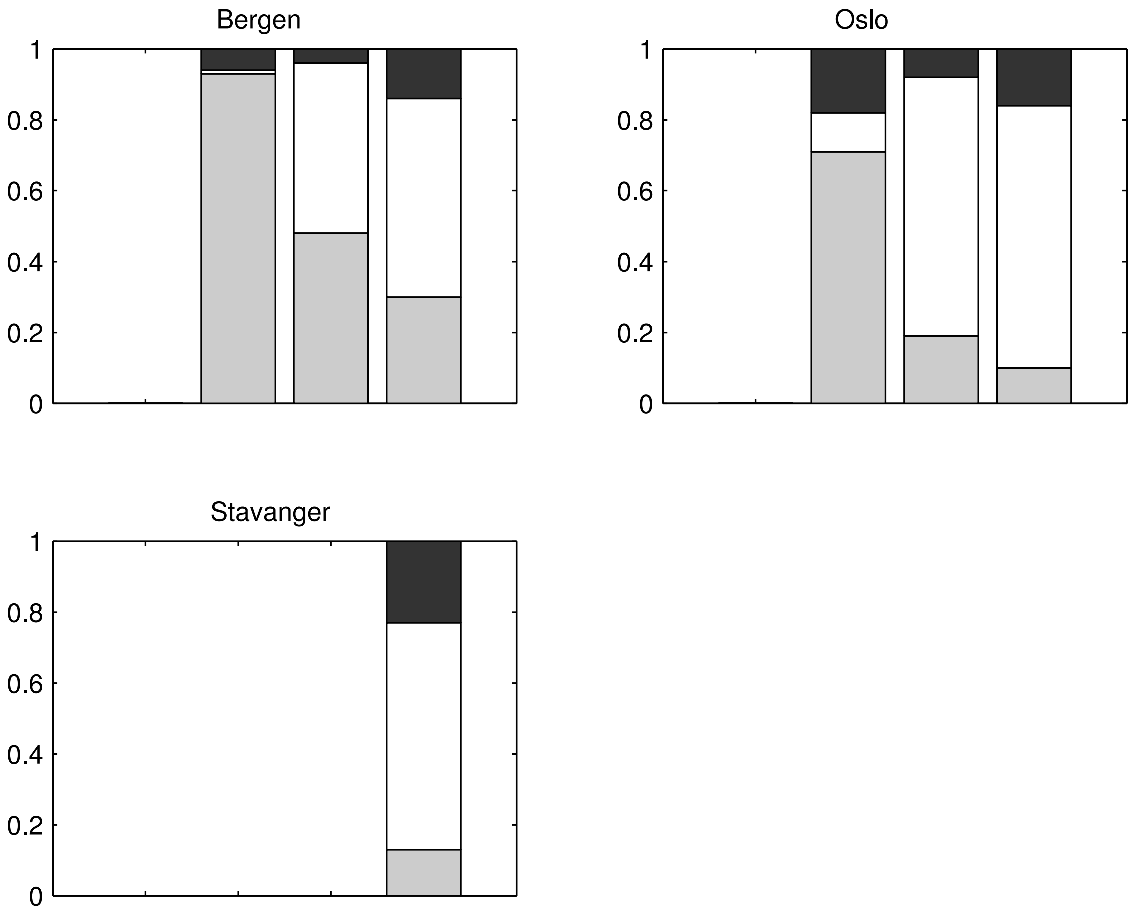


Figure 16: Variance shares Norway, 1806-1907. Gray: international component, white: national component, black: local component. 1st bar: 1806-1830, 2nd bar: 1831-1855, 3rd bar: 1856-1880, 4th bar: 1881-1907.



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7 Appendix: Full Set of Results

Table 3: Overview of all tabulated results.

		Data Sets					
	No of cities	26	31	48	60	68	70
	Cities per country	3-4	3-4	3-12	2-12	2-12	3-12
	No of countries	6	8	6	9	9	9
1806-1830	Median	Tab. 4	–	Tab.14	–	–	–
	Std. Dev.	Tab. 6	–	Tab. 16	–	–	–
1816-1830	Median	Tab. 8	–	Tab. 18	–	–	–
	Std. Dev.	Tab. 9	–	Tab. 19	–	–	–
1831-1855	Median	Tab. 4	Tab. 12	Tab.14	Tab. 20	–	–
	Std. Dev.	Tab. 6	Tab. 13	Tab. 16	Tab. 21	–	–
1856-1880	Median	Tab. 5	Tab. 12	Tab. 15	Tab. 20	Tab. 24	–
	Std. Dev.	Tab. 7	Tab. 13	Tab. 17	Tab. 21	Tab. 25	–
1866-1880	Median	Tab. 10	–	–	Tab. 22	Tab. 26	–
	Std. Dev.	Tab. 11	–	–	Tab. 23	Tab. 27	–
1866-1890	Median	Tab. 10	–	–	Tab. 22	Tab. 26	–
	Std. Dev.	Tab. 11	–	–	Tab. 23	Tab. 27	–
1881-1907	Median	Tab. 5	Tab. 12	Tab. 15	Tab. 20	Tab. 24	Tab. 28
	Std. Dev.	Tab. 7	Tab. 13	Tab. 17	Tab. 21	Tab. 25	Tab. 29

Table 4: Medians of explained variances. 26 markets, 1806-1855.

26 Markets. 1806-1855								
		μ		1806-1830			1831-1855	
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.14	0.73	0.11	0.77	0.13	0.09
2		Lwow	0.22	0.01	0.77	0.54	0.02	0.43
3		Ljubljana	0.20	0.63	0.17	0.64	0.16	0.19
4		Krakow	0.12	0.15	0.72	0.70	0.02	0.28
5	Belgium	Brugges	0.69	0.26	0.05	0.82	0.15	0.03
6		Ghent	0.76	0.22	0.02	0.80	0.17	0.03
7		Brussels	0.81	0.14	0.05	0.86	0.12	0.02
8	France	Toulouse	0.75	0.15	0.09	0.32	0.60	0.07
9		Bordeaux	0.80	0.13	0.07	0.63	0.34	0.03
10		Lyon	0.84	0.07	0.09	0.68	0.20	0.12
11		Paris	0.79	0.04	0.16	0.77	0.12	0.11
12	Germany	Berlin	0.36	0.56	0.08	0.93	0.03	0.03
13		Königsberg	0.03	0.70	0.26	0.88	0.01	0.10
14		München	0.53	0.07	0.40	0.60	0.03	0.37
15		Hamburg	0.34	0.55	0.11	0.78	0.10	0.12
16	UK	London	0.26	0.71	0.03	0.65	0.35	0.01
17		Dover	0.33	0.60	0.07	0.67	0.32	0.01
18		Liverpool	0.15	0.81	0.04	0.46	0.47	0.07
19		Manchester	0.10	0.87	0.02	0.56	0.41	0.03
20	USA	N.Y.C.	0.26	0.56	0.18	0.25	0.63	0.12
21		Phila.	0.39	0.54	0.06	0.21	0.76	0.03
22		Alexandria	0.55	0.38	0.07	0.16	0.82	0.02
23	Sweden	Stockholm	0.12	0.65	0.22	0.22	0.72	0.05
24		Uppsala	0.16	0.51	0.32	0.31	0.65	0.03
25		Halland	0.09	0.57	0.34	0.23	0.17	0.60
26		Gästrikland	0.10	0.67	0.23	0.26	0.64	0.10

Table 5: Medians of explained variances. 26 markets, 1856-1907.

			26 Markets. 1856-1913					
		μ	1856-1880			1881-1913		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.65	0.24	0.11	0.68	0.29	0.02
2		Lwow	0.79	0.00	0.21	0.51	0.34	0.15
3		Ljubljana	0.73	0.20	0.07	0.60	0.37	0.04
4		Krakow	0.86	0.05	0.09	0.59	0.39	0.02
5	Belgium	Brugges	0.70	0.28	0.02	0.95	0.01	0.04
6		Ghent	0.70	0.28	0.01	0.90	0.09	0.01
7		Brussels	0.73	0.26	0.01	0.94	0.06	0.00
8	France	Toulouse	0.66	0.32	0.02	0.58	0.36	0.06
9		Bordeaux	0.73	0.26	0.01	0.53	0.40	0.06
10		Lyon	0.73	0.24	0.03	0.58	0.38	0.03
11		Paris	0.65	0.17	0.18	0.59	0.33	0.07
12	Germany	Berlin	0.92	0.01	0.07	0.87	0.09	0.03
13		Königsberg	0.95	0.02	0.03	0.89	0.06	0.05
14		München	0.70	0.12	0.17	0.83	0.02	0.14
15		Hamburg	0.97	0.01	0.02	0.90	0.04	0.06
16	UK	London	0.86	0.13	0.01	0.89	0.10	0.01
17		Dover	0.87	0.12	0.01	0.91	0.06	0.03
18		Liverpool	0.90	0.08	0.02	0.92	0.07	0.01
19		Manchester	0.87	0.10	0.03	0.82	0.12	0.06
20	USA	N.Y. City	0.18	0.74	0.09	0.73	0.24	0.03
21		Philadelphia	0.19	0.79	0.02	0.70	0.30	0.01
22		Alexandria	0.12	0.82	0.07	0.66	0.31	0.03
23	Sweden	Stockholm	0.76	0.20	0.04	0.57	0.35	0.08
24		Uppsala	0.31	0.42	0.27	0.29	0.27	0.44
25		Halland	0.80	0.08	0.13	0.48	0.33	0.20
26		Gästrikland	0.70	0.00	0.29	0.43	0.15	0.43

Table 6: Standard deviations of explained variances. 26 markets, 1806-1855.

			26 Markets. 1806-1855					
		μ	1806-1829			1830-1855		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.05	0.12	0.11	0.04	0.08	0.06
2		Lwow	0.04	0.03	0.05	0.05	0.10	0.11
3		Ljubljana	0.05	0.11	0.09	0.04	0.10	0.08
4		Krakow	0.05	0.08	0.07	0.04	0.06	0.06
5	Belgium	Brugges	0.08	0.08	0.02	0.04	0.04	0.01
6		Ghent	0.08	0.08	0.01	0.05	0.05	0.01
7		Brussels	0.07	0.07	0.01	0.04	0.04	0.01
8	France	Toulouse	0.12	0.12	0.03	0.05	0.06	0.04
9		Bordeaux	0.09	0.09	0.02	0.05	0.05	0.02
10		Lyon	0.10	0.09	0.03	0.05	0.05	0.02
11		Paris	0.07	0.05	0.04	0.04	0.04	0.02
12	Germany	Berlin	0.12	0.12	0.04	0.03	0.03	0.01
13		Königsberg	0.05	0.09	0.07	0.03	0.03	0.03
14		München	0.09	0.05	0.06	0.04	0.06	0.06
15		Hamburg	0.12	0.13	0.04	0.05	0.07	0.05
16	UK	London	0.07	0.07	0.02	0.04	0.04	0.01
17		Dover	0.07	0.07	0.02	0.04	0.04	0.01
18		Liverpool	0.06	0.07	0.02	0.04	0.04	0.01
19		Manchester	0.06	0.06	0.01	0.04	0.04	0.01
20	USA	N.Y. City	0.05	0.07	0.05	0.03	0.04	0.02
21		Philadelphia	0.05	0.06	0.03	0.03	0.04	0.03
22		Alexandria	0.06	0.06	0.03	0.03	0.04	0.03
23	Sweden	Stockholm	0.04	0.09	0.08	0.04	0.05	0.03
24		Uppsala	0.03	0.08	0.08	0.04	0.05	0.03
25		Halland	0.04	0.09	0.08	0.03	0.04	0.03
26		Gästrikland	0.03	0.08	0.07	0.04	0.05	0.03

Table 7: Standard deviations of explained variances. 26 markets, 1856-1855.

26 Markets. 1856-1913								
		μ	1856-1880			1881-1913		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.03	0.06	0.05	0.02	0.02	0.01
2		Lwow	0.02	0.01	0.02	0.02	0.03	0.01
3		Ljubljana	0.03	0.05	0.04	0.02	0.02	0.01
4		Krakow	0.02	0.02	0.02	0.02	0.02	0.01
5	Belgium	Brugges	0.02	0.02	0.01	0.02	0.02	0.01
6		Ghent	0.03	0.03	0.01	0.02	0.02	0.01
7		Brussels	0.02	0.02	0.01	0.02	0.02	0.00
8	France	Toulouse	0.02	0.02	0.01	0.02	0.03	0.02
9		Bordeaux	0.02	0.02	0.01	0.02	0.03	0.01
10		Lyon	0.02	0.02	0.01	0.02	0.02	0.01
11		Paris	0.02	0.02	0.01	0.02	0.03	0.02
12	Germany	Berlin	0.02	0.01	0.01	0.03	0.03	0.02
13		Königsberg	0.02	0.02	0.01	0.02	0.02	0.01
14		München	0.04	0.09	0.11	0.02	0.02	0.02
15		Hamburg	0.01	0.01	0.01	0.02	0.02	0.01
16	UK	London	0.02	0.02	0.00	0.02	0.02	0.00
17		Dover	0.01	0.01	0.00	0.02	0.02	0.00
18		Liverpool	0.01	0.01	0.01	0.02	0.02	0.00
19		Manchester	0.02	0.02	0.01	0.02	0.02	0.01
20	USA	N.Y. City	0.02	0.03	0.02	0.02	0.02	0.01
21		Philadelphia	0.02	0.02	0.02	0.02	0.02	0.01
22		Alexandria	0.01	0.03	0.02	0.02	0.02	0.01
23	Sweden	Stockholm	0.02	0.05	0.04	0.03	0.05	0.04
24		Uppsala	0.03	0.13	0.13	0.02	0.06	0.06
25		Halland	0.02	0.04	0.03	0.02	0.06	0.05
26		Gästrikland	0.02	0.02	0.03	0.03	0.05	0.04

Table 8: Robustness to choice of subperiods. Exclusion of Napoleonic Wars. Medians of explained variances, 26 Markets.

26 Markets. 1816-1830					
			World	National	Local
1	Aut-Hun	Vienna	0.70	0.13	0.07
2		Lwow	0.08	0.14	0.77
3		Ljubljana	0.74	0.09	0.08
4		Krakow	0.73	0.05	0.21
5	Belgium	Brugges	0.35	0.62	0.02
6		Ghent	0.53	0.45	0.02
7		Brussels	0.65	0.30	0.05
8	France	Toulouse	0.65	0.20	0.16
9		Bordeaux	0.54	0.29	0.16
10		Lyon	0.56	0.22	0.23
11		Paris	0.60	0.08	0.31
12	Germany	Berlin	0.68	0.26	0.05
13		Königsberg	0.22	0.34	0.45
14		München	0.88	0.02	0.09
15		Hamburg	0.51	0.42	0.06
16	UK	London	0.10	0.87	0.03
17		Dover	0.11	0.85	0.04
18		Liverpool	0.03	0.87	0.10
19		Manchester	0.02	0.95	0.02
20	USA	N.Y. City	0.51	0.33	0.15
21		Philadelphia	0.39	0.56	0.03
22		Alexandria	0.58	0.39	0.01
23	Sweden	Stockholm	0.01	0.72	0.27
24		Uppsala	0.00	0.76	0.23
25		Halland	0.15	0.63	0.21
26		Gästrikland	0.07	0.65	0.28

Table 9: Robustness to choice of subperiods. Exclusion of Napoleonic Wars. Standard deviations of explained variances, 26 Markets.

26 Markets. 1816-1830					
			World	National	Local
1	Aut-Hun	Vienna	0.15	0.17	0.13
2		Lwow	0.04	0.20	0.22
3		Ljubljana	0.14	0.15	0.11
4		Krakow	0.07	0.07	0.08
5	Belgium	Brugges	0.14	0.15	0.02
6		Ghent	0.15	0.15	0.02
7		Brussels	0.12	0.13	0.02
8	France	Toulouse	0.09	0.11	0.07
9		Bordeaux	0.15	0.17	0.08
10		Lyon	0.06	0.10	0.08
11		Paris	0.07	0.08	0.06
12	Germany	Berlin	0.15	0.16	0.04
13		Königsberg	0.10	0.13	0.09
14		München	0.07	0.06	0.06
15		Hamburg	0.17	0.18	0.06
16	UK	London	0.05	0.06	0.03
17		Dover	0.05	0.06	0.03
18		Liverpool	0.03	0.05	0.04
19		Manchester	0.03	0.04	0.02
20	USA	N.Y. City	0.11	0.12	0.05
21		Philadelphia	0.13	0.14	0.06
22		Alexandria	0.13	0.13	0.04
23	Sweden	Stockholm	0.01	0.10	0.10
24		Uppsala	0.01	0.10	0.10
25		Halland	0.07	0.10	0.08
26		Gästrikland	0.04	0.09	0.09

Table 10: Medians of explained variances after civil war. 26 markets, 1866-1880/90.

26 Markets. 1866-1880/90								
		μ		1866-1880			1866-1890	
			World	National	Local	World	National	Local
1.00	Aut-Hun	Vienna	0.78	0.12	0.10	0.68	0.24	0.08
2.00		Lwow	0.82	0.10	0.08	0.64	0.15	0.21
3.00		Ljubljana	0.83	0.11	0.05	0.70	0.24	0.06
4.00		Krakow	0.89	0.03	0.08	0.68	0.21	0.10
5.00	Belgium	Brugges	0.65	0.31	0.04	0.74	0.19	0.06
6.00		Ghent	0.70	0.27	0.03	0.77	0.20	0.03
7.00		Brussels	0.71	0.28	0.01	0.79	0.20	0.01
8.00	France	Toulouse	0.54	0.43	0.03	0.64	0.30	0.05
9.00		Bordeaux	0.63	0.36	0.00	0.72	0.25	0.03
10.00		Lyon	0.63	0.31	0.06	0.66	0.26	0.08
11.00		Paris	0.63	0.32	0.05	0.69	0.24	0.07
12.00	Germany	Berlin	0.92	0.04	0.04	0.82	0.14	0.05
13.00		Königsberg	0.95	0.03	0.02	0.91	0.06	0.02
14.00		München	0.93	0.01	0.06	0.81	0.03	0.16
15.00		Hamburg	0.96	0.01	0.02	0.90	0.06	0.04
16.00	UK	London	0.80	0.18	0.02	0.85	0.12	0.02
17.00		Dover	0.82	0.16	0.02	0.86	0.11	0.03
18.00		Liverpool	0.88	0.12	0.00	0.91	0.08	0.01
19.00		Manchester	0.83	0.15	0.02	0.83	0.13	0.04
20.00	USA	N.Y. City	0.76	0.21	0.03	0.74	0.23	0.03
21.00		Philadelphia	0.67	0.31	0.02	0.65	0.34	0.01
22.00		Alexandria	0.65	0.28	0.07	0.62	0.31	0.07
23.00	Sweden	Stockholm	0.75	0.13	0.12	0.62	0.31	0.06
24.00		Uppsala	0.40	0.37	0.23	0.30	0.28	0.41
25.00		Halland	0.71	0.05	0.24	0.53	0.32	0.16
26.00		Gästrikland	0.50	0.16	0.33	0.42	0.04	0.53

Table 11: Standard deviations of explained variances after civil war. 26 markets, 1866-1880/90.

		26 Markets. 1866-1880/90						
		μ	1866-1880			1866-1890		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.05	0.06	0.04	0.04	0.04	0.03
2		Lwow	0.04	0.05	0.03	0.03	0.04	0.03
3		Ljubljana	0.05	0.05	0.03	0.03	0.04	0.03
4		Krakow	0.04	0.02	0.03	0.04	0.05	0.03
5	Belgium	Brugges	0.04	0.04	0.01	0.05	0.05	0.01
6		Ghent	0.04	0.04	0.01	0.05	0.05	0.01
7		Brussels	0.04	0.04	0.01	0.06	0.06	0.01
8	France	Toulouse	0.04	0.05	0.02	0.06	0.06	0.02
9		Bordeaux	0.04	0.04	0.02	0.05	0.05	0.01
10		Lyon	0.04	0.04	0.02	0.06	0.06	0.02
11		Paris	0.04	0.04	0.02	0.06	0.06	0.02
12	Germany	Berlin	0.04	0.04	0.02	0.06	0.06	0.02
13		Königsberg	0.04	0.05	0.01	0.04	0.04	0.01
14		München	0.03	0.02	0.02	0.04	0.03	0.02
15		Hamburg	0.03	0.03	0.01	0.04	0.04	0.01
16	UK	London	0.04	0.04	0.01	0.04	0.04	0.01
17		Dover	0.04	0.04	0.01	0.04	0.04	0.01
18		Liverpool	0.04	0.04	0.01	0.04	0.03	0.01
19		Manchester	0.05	0.06	0.01	0.05	0.05	0.01
20	USA	N.Y. City	0.04	0.04	0.01	0.06	0.06	0.01
21		Philadelphia	0.04	0.05	0.01	0.06	0.06	0.01
22		Alexandria	0.04	0.04	0.02	0.06	0.06	0.01
23	Sweden	Stockholm	0.05	0.09	0.07	0.05	0.07	0.05
24		Uppsala	0.05	0.14	0.13	0.04	0.11	0.10
25		Halland	0.04	0.08	0.07	0.05	0.08	0.06
26		Gästrikland	0.04	0.13	0.13	0.05	0.06	0.06

Table 12: Medians of explained variances. 31 markets, 1830-1907.

		31 Markets, 1830-1907									
		μ	1830-1855			1856-1880			1881-1907		
			World	National	Local	World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.78	0.07	0.13	0.65	0.25	0.11	0.70	0.28	0.02
2		Lwow	0.45	0.03	0.50	0.79	0.00	0.21	0.53	0.32	0.14
3		Ljubljana	0.67	0.06	0.25	0.73	0.20	0.07	0.63	0.34	0.03
4		Krakow	0.62	0.07	0.30	0.86	0.05	0.09	0.60	0.38	0.02
5	Belgium	Brugges	0.88	0.09	0.03	0.70	0.28	0.02	0.97	0.00	0.03
6		Ghent	0.87	0.10	0.03	0.71	0.28	0.01	0.93	0.06	0.01
7		Brussels	0.91	0.07	0.02	0.73	0.26	0.01	0.96	0.03	0.00
8	France	Toulouse	0.39	0.54	0.07	0.67	0.31	0.02	0.71	0.24	0.05
9		Bordeaux	0.69	0.27	0.03	0.74	0.25	0.01	0.64	0.30	0.06
10		Lyon	0.75	0.14	0.11	0.73	0.24	0.03	0.71	0.25	0.03
11		Paris	0.83	0.07	0.10	0.65	0.17	0.18	0.74	0.20	0.07
12	Germany	Berlin	0.93	0.04	0.03	0.92	0.01	0.07	0.85	0.13	0.02
13		Königsberg	0.82	0.08	0.10	0.95	0.02	0.03	0.89	0.06	0.05
14		München	0.66	0.01	0.33	0.70	0.12	0.17	0.81	0.03	0.16
15		Hamburg	0.83	0.02	0.14	0.97	0.01	0.02	0.88	0.09	0.04
16	UK	London	0.66	0.33	0.01	0.86	0.13	0.01	0.89	0.10	0.01
17		Dover	0.68	0.30	0.02	0.87	0.12	0.01	0.90	0.07	0.03
18		Liverpool	0.48	0.44	0.08	0.90	0.08	0.02	0.93	0.07	0.01
19		Manchester	0.58	0.39	0.03	0.87	0.10	0.03	0.81	0.13	0.06
20	USA	New York City	0.32	0.57	0.11	0.17	0.75	0.08	0.78	0.20	0.02
21		Philadelphia	0.28	0.69	0.03	0.19	0.79	0.02	0.77	0.22	0.01
22		Cincinnatti	0.10	0.67	0.23	0.32	0.10	0.58	0.67	0.30	0.03
23		Alexandria	0.24	0.73	0.03	0.12	0.81	0.07	0.75	0.22	0.03
24	Sweden	Stockholm	0.15	0.80	0.05	0.76	0.20	0.03	0.60	0.34	0.06
25		Uppsala	0.24	0.72	0.04	0.31	0.43	0.26	0.32	0.25	0.43
26		Halland	0.15	0.21	0.63	0.80	0.08	0.13	0.52	0.29	0.19
27		Gästrikland	0.20	0.70	0.10	0.70	0.00	0.30	0.43	0.13	0.43
28	Spain	Cordoba	0.03	0.53	0.43	0.02	0.82	0.15	0.04	0.87	0.09
29		Gerona	0.38	0.31	0.32	0.46	0.22	0.32	0.49	0.33	0.18
30		Granada	0.09	0.52	0.39	0.06	0.85	0.10	0.01	0.90	0.09
31		Santander	0.26	0.15	0.59	0.28	0.28	0.44	0.13	0.27	0.61

Table 13: Standard deviations of explained variances. 31 markets, 1830-1907.

		31 Markets, 1830-1907									
		μ	1830-1855			1856-1880			1881-1907		
			World	National	Local	World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.05	0.07	0.06	0.02	0.06	0.05	0.02	0.02	0.01
2		Lwow	0.05	0.14	0.14	0.02	0.00	0.02	0.02	0.02	0.01
3		Ljubljana	0.05	0.08	0.08	0.03	0.04	0.03	0.02	0.02	0.01
4		Krakow	0.05	0.10	0.09	0.02	0.02	0.02	0.02	0.02	0.01
5	Belgium	Brugges	0.05	0.05	0.01	0.02	0.02	0.01	0.02	0.01	0.01
6		Ghent	0.05	0.06	0.01	0.03	0.03	0.01	0.02	0.02	0.01
7		Brussels	0.04	0.04	0.01	0.02	0.02	0.01	0.02	0.02	0.00
8	France	Toulouse	0.06	0.07	0.04	0.02	0.02	0.01	0.02	0.02	0.02
9		Bordeaux	0.06	0.06	0.02	0.02	0.02	0.01	0.02	0.03	0.02
10		Lyon	0.06	0.05	0.02	0.02	0.02	0.01	0.02	0.02	0.01
11		Paris	0.04	0.04	0.02	0.02	0.02	0.01	0.02	0.02	0.02
12	Germany	Berlin	0.03	0.03	0.01	0.02	0.02	0.01	0.02	0.03	0.01
13		Königsberg	0.04	0.05	0.04	0.02	0.01	0.01	0.01	0.02	0.01
14		München	0.05	0.04	0.05	0.04	0.09	0.11	0.02	0.02	0.02
15		Hamburg	0.05	0.06	0.03	0.01	0.01	0.01	0.02	0.03	0.01
16	UK	London	0.04	0.04	0.01	0.01	0.01	0.00	0.02	0.02	0.01
17		Dover	0.05	0.05	0.01	0.01	0.01	0.00	0.01	0.01	0.00
18		Liverpool	0.05	0.05	0.01	0.01	0.01	0.00	0.01	0.01	0.00
19		Manchester	0.04	0.04	0.01	0.02	0.02	0.01	0.02	0.02	0.01
20	USA	N. Y.-City	0.03	0.04	0.02	0.02	0.03	0.02	0.02	0.02	0.00
21		Philadelphia	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.01
22		Cincinnatti	0.02	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.01
23		Alexandria	0.03	0.04	0.02	0.01	0.03	0.03	0.02	0.02	0.01
24	Sweden	Stockholm	0.03	0.06	0.05	0.02	0.05	0.05	0.02	0.05	0.04
25		Uppsala	0.03	0.06	0.05	0.03	0.14	0.13	0.02	0.07	0.06
26		Halland	0.03	0.04	0.03	0.02	0.04	0.03	0.02	0.05	0.05
27		Gästrikland	0.03	0.06	0.05	0.02	0.02	0.03	0.03	0.05	0.05
28	Spain	Cordoba	0.01	0.15	0.15	0.01	0.07	0.07	0.01	0.05	0.05
29		Gerona	0.04	0.10	0.10	0.02	0.03	0.03	0.02	0.03	0.03
30		Granada	0.02	0.12	0.12	0.01	0.06	0.06	0.01	0.04	0.04
31		Santander	0.04	0.08	0.08	0.02	0.05	0.05	0.01	0.05	0.05

Table 14: Medians of Explained Variances. World, National and Local Components of Wheat Prices, 48 Markets, 1806-1855.

48Markets, 1806-1955								
		μ	1806-1830			1831-1850		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.12	0.76	0.12	0.75	0.13	0.12
2		Lwow	0.24	0.01	0.75	0.43	0.02	0.55
3		Ljubljana	0.21	0.62	0.17	0.62	0.13	0.25
4		Krakow	0.02	0.25	0.73	0.62	0.06	0.32
5	Belgium	Brugges	0.50	0.44	0.06	0.88	0.09	0.03
6		Ghent	0.59	0.39	0.02	0.89	0.08	0.03
7		Brussels	0.58	0.36	0.06	0.92	0.06	0.02
8	France	Bayeux	0.66	0.18	0.16	0.73	0.17	0.10
9		Saint-Brieuc	0.58	0.22	0.20	0.80	0.14	0.06
10		Toulouse	0.38	0.48	0.14	0.42	0.52	0.06
11		Bordeaux	0.40	0.52	0.08	0.71	0.26	0.03
12		Chateauroux	0.44	0.44	0.12	0.74	0.20	0.06
13		Mende	0.68	0.24	0.08	0.37	0.39	0.24
14		Barleduc	0.67	0.23	0.10	0.85	0.05	0.10
15		Arras	0.69	0.23	0.08	0.90	0.04	0.06
16		Pau	0.42	0.24	0.34	0.43	0.50	0.07
17		Lyon	0.61	0.33	0.06	0.76	0.11	0.13
18		Paris	0.55	0.32	0.13	0.88	0.05	0.07
19	Germany	Berlin	0.16	0.75	0.09	0.92	0.05	0.03
20		Königsberg	0.00	0.67	0.33	0.82	0.07	0.11
21		München	0.51	0.15	0.34	0.69	0.01	0.30
22		Hamburg	0.18	0.72	0.10	0.83	0.02	0.15
23	UK	London	0.53	0.46	0.01	0.69	0.30	0.01
24		Dover	0.61	0.36	0.03	0.70	0.28	0.02
25		Exeter	0.76	0.15	0.09	0.68	0.27	0.05
26		Gloucester	0.60	0.32	0.08	0.63	0.35	0.02
27		Worcester	0.53	0.41	0.06	0.61	0.36	0.03
28		Cambridge	0.48	0.47	0.05	0.67	0.32	0.01
29		Norwich	0.54	0.41	0.05	0.70	0.29	0.01
30		Leeds	0.31	0.65	0.04	0.64	0.35	0.01
31		Liverpool	0.34	0.58	0.08	0.53	0.39	0.08
32		Manchester	0.29	0.66	0.05	0.61	0.37	0.02
33		Newcastle	0.21	0.64	0.15	0.60	0.36	0.04
34		Carmarthen	0.60	0.21	0.19	0.66	0.22	0.12
35	USA	N. Y.-City	0.28	0.54	0.18	0.28	0.60	0.12
36		Philadel.	0.38	0.55	0.07	0.24	0.73	0.03
37		Alexandria	0.52	0.40	0.08	0.20	0.77	0.03
38	Sweden	Stockholm	0.06	0.65	0.29	0.16	0.79	0.05
39		Uppsala	0.18	0.47	0.35	0.24	0.71	0.05
40		Södermanland	0.06	0.69	0.25	0.18	0.75	0.07
41		Östergötland	0.08	0.74	0.18	0.21	0.71	0.08
42		Kalmar	0.00	0.84	0.16	0.16	0.73	0.11
43		Halland	0.01	0.72	0.27	0.13	0.31	0.56
44		Skaraborg	0.01	0.81	0.18	0.13	0.53	0.34
45		Örebro	0.05	0.76	0.19	0.10	0.64	0.26
46		Västmanland	0.14	0.69	0.17	0.11	0.81	0.08
47		Gästrikland	0.05	0.62	0.33	0.19	0.68	0.13
48		Hälsingland	0.01	0.54	0.45	0.09	0.69	0.22

Table 15: Medians of Explained Variances. World, National and Local Components of Wheat Prices, 48 Markets, 1856-1907.

48 Markets, 1856-1907								
		μ	1856-1880			1881-1807		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.62	0.28	0.10	0.65	0.33	0.02
2		Lwow	0.81	0.00	0.19	0.51	0.33	0.16
3		Ljubljana	0.73	0.19	0.08	0.58	0.39	0.03
4		Krakow	0.85	0.06	0.09	0.54	0.43	0.03
5	Belgium	Brugges	0.64	0.34	0.02	0.89	0.07	0.04
6		Ghent	0.65	0.34	0.01	0.89	0.10	0.01
7		Brussels	0.67	0.32	0.01	0.91	0.09	0.00
8	France	Bayeux	0.75	0.20	0.05	0.61	0.30	0.09
9		Saint-Brieuc	0.73	0.23	0.04	0.32	0.35	0.33
10		Toulouse	0.62	0.35	0.03	0.71	0.25	0.04
11		Bordeaux	0.71	0.28	0.01	0.65	0.30	0.05
12		Chateauroux	0.65	0.33	0.02	0.69	0.28	0.03
13		Mende	0.55	0.36	0.09	0.59	0.23	0.18
14		Barleduc	0.68	0.27	0.05	0.63	0.24	0.13
15		Arras	0.75	0.22	0.03	0.69	0.23	0.08
16		Pau	0.61	0.36	0.03	0.66	0.31	0.03
17		Lyon	0.70	0.27	0.03	0.69	0.28	0.03
18		Paris	0.67	0.16	0.17	0.72	0.22	0.06
19	Germany	Berlin	0.88	0.04	0.08	0.83	0.13	0.04
20		Königsberg	0.90	0.07	0.03	0.83	0.12	0.05
21		München	0.70	0.01	0.29	0.72	0.11	0.17
22		Hamburg	0.95	0.03	0.02	0.86	0.10	0.04
23	UK	London	0.87	0.12	0.01	0.91	0.08	0.01
24		Dover	0.90	0.09	0.01	0.90	0.07	0.03
25		Exeter	0.95	0.04	0.01	0.92	0.03	0.05
26		Gloucester	0.96	0.04	0.00	0.95	0.04	0.01
27		Worcester	0.94	0.05	0.01	0.94	0.04	0.02
28		Cambridge	0.91	0.08	0.01	0.92	0.07	0.01
29		Norwich	0.90	0.09	0.01	0.91	0.06	0.03
30		Leeds	0.91	0.07	0.02	0.91	0.07	0.02
31		Liverpool	0.91	0.07	0.02	0.94	0.05	0.01
32		Manchester	0.90	0.08	0.02	0.83	0.09	0.08
33		Newcastle	0.87	0.06	0.07	0.76	0.07	0.17
34		Carmarthen	0.87	0.11	0.02	0.94	0.02	0.04
35	USA	N. Y.-City	0.22	0.69	0.09	0.76	0.22	0.02
36		Philadelphia	0.24	0.74	0.02	0.73	0.26	0.01
37		Alexandria	0.14	0.80	0.06	0.70	0.27	0.03
38	Sweden	Stockholm	0.75	0.14	0.11	0.58	0.35	0.07
39		Uppsala	0.34	0.18	0.48	0.29	0.35	0.36
40		Södermanland	0.78	0.19	0.03	0.34	0.26	0.40
41		Östergötland	0.83	0.14	0.03	0.56	0.38	0.06
42		Kalmar	0.81	0.15	0.04	0.41	0.26	0.33
43		Halland	0.75	0.15	0.10	0.50	0.24	0.26
44		Skaraborg	0.71	0.20	0.09	0.63	0.21	0.16
45		Örebro	0.76	0.19	0.05	0.35	0.32	0.33
46		Västmanland	0.79	0.18	0.03	0.52	0.40	0.08
47		Gästrikland	0.63	0.03	0.34	0.49	0.13	0.38
48		Hälsingland	0.20	0.03	0.77	0.47	0.11	0.42

Table 16: Standard Deviations of Explained Variances. World, National and Local Components of Wheat Prices, 48 Markets, 1806-1907.

			48Markets, 1806-1955					
		μ	1806-1830			1831-1850		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.03	0.11	0.10	0.03	0.08	0.07
2		Lwow	0.05	0.03	0.05	0.04	0.13	0.12
3		Ljubljana	0.05	0.10	0.09	0.03	0.10	0.09
4		Krakow	0.03	0.09	0.09	0.04	0.09	0.08
5	Belgium	Brugges	0.15	0.15	0.02	0.03	0.03	0.01
6		Ghent	0.15	0.15	0.01	0.03	0.03	0.01
7		Brussels	0.16	0.16	0.02	0.03	0.03	0.01
8	France	Bayeux	0.19	0.19	0.03	0.05	0.05	0.01
9		Saint-Brieuc	0.18	0.18	0.03	0.04	0.04	0.01
10		Toulouse	0.16	0.17	0.05	0.05	0.05	0.02
11		Bordeaux	0.17	0.18	0.03	0.05	0.05	0.01
12		Chateauroux	0.18	0.19	0.03	0.05	0.05	0.01
13		Mende	0.17	0.17	0.02	0.04	0.05	0.03
14		Barleduc	0.17	0.17	0.02	0.04	0.03	0.01
15		Arras	0.19	0.19	0.02	0.03	0.03	0.01
16		Pau	0.10	0.11	0.04	0.05	0.05	0.02
17		Lyon	0.17	0.17	0.02	0.04	0.04	0.01
18		Paris	0.18	0.19	0.03	0.04	0.03	0.01
19	Germany	Berlin	0.08	0.09	0.05	0.02	0.02	0.02
20		Königsberg	0.02	0.06	0.06	0.03	0.05	0.03
21		München	0.10	0.09	0.04	0.03	0.03	0.05
22		Hamburg	0.07	0.09	0.05	0.03	0.04	0.02
23	UK	London	0.18	0.18	0.01	0.03	0.03	0.01
24		Dover	0.19	0.19	0.01	0.03	0.03	0.01
25		Exeter	0.20	0.19	0.02	0.04	0.03	0.01
26		Gloucester	0.20	0.20	0.02	0.03	0.03	0.01
27		Worcester	0.19	0.19	0.01	0.04	0.04	0.01
28		Cambridge	0.17	0.17	0.01	0.03	0.03	0.01
29		Norwich	0.18	0.18	0.01	0.03	0.03	0.01
30		Leeds	0.13	0.13	0.02	0.04	0.03	0.01
31		Liverpool	0.15	0.15	0.01	0.03	0.04	0.01
32		Manchester	0.13	0.13	0.01	0.03	0.03	0.01
33		Newcastle	0.09	0.09	0.03	0.04	0.04	0.01
34		Carmarthen	0.18	0.17	0.02	0.03	0.03	0.01
35	USA	N. Y.-City	0.07	0.11	0.09	0.03	0.03	0.02
36		Philadelphia	0.06	0.10	0.08	0.03	0.03	0.02
37		Alexandria	0.07	0.09	0.06	0.03	0.03	0.02
38	Sweden	Stockholm	0.03	0.04	0.03	0.03	0.03	0.01
39		Uppsala	0.05	0.06	0.04	0.03	0.03	0.01
40		Södermanland	0.02	0.06	0.05	0.03	0.03	0.01
41		Östergötland	0.03	0.05	0.03	0.03	0.04	0.01
42		Kalmar	0.06	0.05	0.04	0.03	0.03	0.01
43		Halland	0.06	0.06	0.05	0.02	0.03	0.02
44		Skaraborg	0.03	0.04	0.03	0.02	0.03	0.02
45		Örebro	0.02	0.04	0.03	0.02	0.03	0.02
46		Västmanland	0.04	0.06	0.03	0.02	0.03	0.01
47		Gästrikland	0.03	0.04	0.04	0.03	0.04	0.02
48		Hälsingland	0.07	0.06	0.06	0.02	0.03	0.02

Table 17: Standard Deviations of Explained Variances. World, National and Local Components of Wheat Prices, 48 Markets, 1806-1907.

			48 Markets, 1856-1907					
		μ	1856-1880			1881-1807		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.03	0.06	0.05	0.06	0.06	0.01
2		Lwow	0.04	0.02	0.03	0.06	0.06	0.02
3		Ljubljana	0.03	0.04	0.03	0.06	0.07	0.01
4		Krakow	0.03	0.03	0.02	0.07	0.08	0.01
5	Belgium	Brugges	0.03	0.03	0.01	0.04	0.03	0.01
6		Ghent	0.03	0.03	0.01	0.03	0.03	0.01
7		Brussels	0.03	0.03	0.01	0.04	0.03	0.01
8	France	Bayeux	0.03	0.03	0.01	0.07	0.07	0.01
9		Saint-Brieuc	0.03	0.03	0.01	0.05	0.06	0.02
10		Toulouse	0.03	0.03	0.01	0.05	0.05	0.01
11		Bordeaux	0.03	0.03	0.01	0.06	0.06	0.01
12		Chateauroux	0.03	0.03	0.01	0.08	0.08	0.01
13		Mende	0.04	0.04	0.01	0.05	0.05	0.02
14		Barleduc	0.03	0.03	0.01	0.08	0.09	0.02
15		Arras	0.03	0.03	0.01	0.08	0.08	0.01
16		Pau	0.03	0.03	0.01	0.06	0.06	0.01
17		Lyon	0.03	0.03	0.01	0.07	0.07	0.01
18		Paris	0.03	0.03	0.01	0.07	0.07	0.01
19	Germany	Berlin	0.03	0.03	0.02	0.05	0.05	0.01
20		Königsberg	0.05	0.05	0.02	0.04	0.04	0.02
21		München	0.03	0.03	0.04	0.05	0.06	0.03
22		Hamburg	0.04	0.04	0.01	0.05	0.05	0.01
23	UK	London	0.05	0.05	0.01	0.08	0.08	0.00
24		Dover	0.04	0.04	0.00	0.08	0.08	0.00
25		Exeter	0.04	0.04	0.00	0.06	0.06	0.01
26		Gloucester	0.04	0.04	0.00	0.08	0.07	0.01
27		Worcester	0.05	0.04	0.00	0.07	0.07	0.00
28		Cambridge	0.05	0.04	0.00	0.08	0.08	0.00
29		Norwich	0.04	0.04	0.00	0.09	0.09	0.01
30		Leeds	0.05	0.05	0.00	0.06	0.06	0.01
31		Liverpool	0.05	0.05	0.00	0.07	0.07	0.00
32		Manchester	0.05	0.05	0.00	0.07	0.06	0.01
33		Newcastle	0.04	0.04	0.01	0.06	0.06	0.02
34		Carmarthen	0.05	0.05	0.01	0.07	0.06	0.01
35	USA	N. Y.-City	0.02	0.03	0.02	0.04	0.04	0.01
36		Philadelphia	0.02	0.03	0.02	0.05	0.05	0.01
37		Alexandria	0.02	0.03	0.03	0.04	0.04	0.01
38	Sweden	Stockholm	0.04	0.04	0.01	0.07	0.07	0.02
39		Uppsala	0.03	0.04	0.03	0.03	0.04	0.04
40		Södermanland	0.04	0.04	0.01	0.07	0.10	0.04
41		Östergötland	0.04	0.04	0.01	0.06	0.06	0.02
42		Kalmar	0.04	0.04	0.01	0.06	0.06	0.02
43		Halland	0.04	0.04	0.01	0.06	0.06	0.02
44		Skaraborg	0.05	0.05	0.01	0.06	0.05	0.02
45		Örebro	0.04	0.04	0.01	0.03	0.05	0.03
46		Västmanland	0.05	0.04	0.01	0.05	0.05	0.02
47		Gästrikland	0.04	0.03	0.01	0.05	0.05	0.02
48		Hälsingland	0.02	0.02	0.02	0.04	0.04	0.02

Table 18: Robustness to choice of subperiods. Exclusion of Napoleonic Wars. Medians of explained variances.

48 Markets. 1816-1830					
			World	National	Local
1	Aut-Hun	Vienna	0.59	0.31	0.06
2		Lwow	0.15	0.06	0.76
3		Ljubljana	0.61	0.27	0.07
4		Krakow	0.73	0.04	0.24
5	Belgium	Brugges	0.37	0.59	0.03
6		Ghent	0.52	0.45	0.02
7		Brussels	0.66	0.29	0.06
8	France	Bayeux	0.34	0.46	0.20
9		Saint-Brieuc	0.25	0.45	0.30
10		Toulouse	0.62	0.07	0.28
11		Bordeaux	0.51	0.17	0.30
12		Chateauroux	0.46	0.27	0.27
13		Mende	0.55	0.31	0.14
14		Barleduc	0.72	0.22	0.06
15		Arras	0.75	0.18	0.07
16		Pau	0.40	0.17	0.42
17		Lyon	0.61	0.27	0.12
18		Paris	0.54	0.38	0.08
19	Germany	Berlin	0.66	0.29	0.03
20		Königsberg	0.17	0.29	0.54
21		München	0.84	0.02	0.13
22		Hamburg	0.49	0.44	0.06
23	UK	London	0.08	0.92	0.00
24		Dover	0.08	0.91	0.01
25		Exeter	0.27	0.65	0.08
26		Gloucester	0.09	0.84	0.07
27		Worcester	0.05	0.90	0.06
28		Cambridge	0.06	0.89	0.05
29		Norwich	0.08	0.87	0.05
30		Leeds	0.02	0.97	0.01
31		Liverpool	0.03	0.82	0.15
32		Manchester	0.02	0.92	0.05
33		Newcastle	0.03	0.73	0.23
34		Carmarthen	0.07	0.66	0.27
35	USA	N. Y.-City	0.53	0.17	0.27
36		Philadelphia	0.41	0.34	0.23
37		Alexandria	0.61	0.24	0.12
38	Sweden	Stockholm	0.00	0.69	0.30
39		Uppsala	0.02	0.63	0.34
40		Södermanland	0.01	0.88	0.11
41		Östergötland	0.01	0.80	0.18
42		Kalmar	0.16	0.76	0.08
43		Halland	0.08	0.71	0.20
44		Skaraborg	0.05	0.75	0.20
45		Örebro	0.01	0.82	0.16
46		Västmanland	0.01	0.82	0.16
47		Gästrikland	0.03	0.58	0.39
48		Hälsingland	0.10	0.45	0.45

Table 19: Robustness to choice of subperiods. Exclusion of Napoleonic Wars. Standard deviations of explained variances.

48 Markets. 1816-1830					
			World	National	Local
1	Aut-Hun	Vienna	0.18	0.23	0.13
2		Lwow	0.11	0.16	0.20
3		Ljubljana	0.19	0.23	0.12
4		Krakow	0.18	0.10	0.13
5	Belgium	Brugges	0.14	0.15	0.03
6		Ghent	0.16	0.16	0.02
7		Brussels	0.17	0.17	0.03
8	France	Bayeux	0.20	0.23	0.10
9		Saint-Brieuc	0.18	0.23	0.10
10		Toulouse	0.18	0.18	0.09
11		Bordeaux	0.16	0.17	0.07
12		Chateauroux	0.16	0.16	0.04
13		Mende	0.17	0.17	0.04
14		Barleduc	0.19	0.19	0.02
15		Arras	0.20	0.19	0.03
16		Pau	0.13	0.17	0.09
17		Lyon	0.16	0.16	0.03
18		Paris	0.20	0.20	0.04
19	Germany	Berlin	0.19	0.19	0.05
20		Königsberg	0.08	0.12	0.09
21		München	0.20	0.12	0.12
22		Hamburg	0.17	0.18	0.07
23	UK	London	0.15	0.15	0.01
24		Dover	0.16	0.16	0.01
25		Exeter	0.16	0.16	0.03
26		Gloucester	0.15	0.15	0.01
27		Worcester	0.15	0.15	0.01
28		Cambridge	0.14	0.14	0.01
29		Norwich	0.15	0.15	0.01
30		Leeds	0.13	0.14	0.02
31		Liverpool	0.14	0.13	0.03
32		Manchester	0.14	0.14	0.02
33		Newcastle	0.09	0.11	0.04
34		Carmarthen	0.13	0.13	0.03
35	USA	N. Y.-City	0.19	0.18	0.14
36		Philadelphia	0.17	0.21	0.16
37		Alexandria	0.18	0.18	0.13
38	Sweden	Stockholm	0.04	0.05	0.04
39		Uppsala	0.04	0.08	0.08
40		Södermanland	0.07	0.09	0.05
41		Östergötland	0.06	0.08	0.05
42		Kalmar	0.10	0.10	0.05
43		Halland	0.07	0.08	0.04
44		Skaraborg	0.08	0.09	0.04
45		Örebro	0.06	0.08	0.05
46		Västmanland	0.05	0.07	0.05
47		Gästrikland	0.04	0.08	0.07
48		Hälsingland	0.07	0.09	0.07

Table 20: Medians of explained variances. 60 markets, 1830-1907.

			60 Markets, 1830-1907								
		μ	1831-1855			1856-1880			1881-1907		
			World	National	Local	World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.73	0.10	0.17	0.64	0.26	0.10	0.63	0.35	0.02
2		Lwow	0.38	0.06	0.56	0.80	0.00	0.19	0.51	0.34	0.14
3		Ljubljana	0.62	0.07	0.30	0.75	0.17	0.07	0.56	0.41	0.03
4		Krakow	0.56	0.12	0.32	0.86	0.05	0.09	0.53	0.45	0.02
5	Belgium	Brugges	0.92	0.05	0.03	0.64	0.33	0.02	0.90	0.06	0.04
6		Ghent	0.93	0.04	0.03	0.66	0.33	0.01	0.91	0.08	0.01
7		Brussels	0.95	0.03	0.01	0.68	0.31	0.01	0.92	0.08	0.00
8	France	Bayeux	0.76	0.13	0.11	0.76	0.19	0.05	0.65	0.26	0.09
9		Saint-Brieuc	0.84	0.10	0.06	0.74	0.22	0.04	0.36	0.30	0.34
10		Toulouse	0.48	0.46	0.07	0.62	0.36	0.02	0.74	0.21	0.05
11		Bordeaux	0.77	0.20	0.03	0.71	0.28	0.01	0.67	0.28	0.05
12		Chateauroux	0.78	0.15	0.07	0.65	0.33	0.02	0.72	0.25	0.03
13		Mende	0.42	0.35	0.24	0.55	0.37	0.08	0.64	0.19	0.18
14		Barleduc	0.88	0.02	0.10	0.69	0.26	0.05	0.64	0.24	0.12
15		Arras	0.93	0.02	0.05	0.76	0.21	0.03	0.72	0.20	0.08
16		Pau	0.49	0.44	0.07	0.61	0.37	0.02	0.72	0.26	0.02
17		Lyon	0.81	0.07	0.12	0.72	0.26	0.03	0.75	0.23	0.03
18		Paris	0.90	0.03	0.07	0.67	0.15	0.18	0.75	0.19	0.06
19	Germany	Berlin	0.92	0.05	0.02	0.89	0.04	0.07	0.82	0.15	0.03
20		Königsberg	0.77	0.15	0.08	0.88	0.08	0.03	0.83	0.12	0.05
21		München	0.72	0.01	0.26	0.71	0.01	0.27	0.72	0.11	0.17
22		Hamburg	0.86	0.01	0.13	0.94	0.03	0.02	0.86	0.10	0.04
23	UK	London	0.68	0.30	0.01	0.85	0.14	0.01	0.96	0.02	0.01
24		Dover	0.70	0.27	0.02	0.88	0.11	0.01	0.95	0.02	0.03
25		Exeter	0.69	0.26	0.05	0.94	0.05	0.01	0.94	0.01	0.05
26		Gloucester	0.63	0.35	0.02	0.94	0.06	0.00	0.97	0.02	0.01
27		Worcester	0.62	0.35	0.03	0.92	0.07	0.01	0.98	0.01	0.01
28		Cambridge	0.67	0.32	0.01	0.89	0.10	0.01	0.97	0.02	0.01
29		Norwich	0.71	0.29	0.01	0.88	0.11	0.01	0.95	0.02	0.03
30		Leeds	0.65	0.35	0.00	0.89	0.09	0.01	0.96	0.03	0.02
31		Liverpool	0.53	0.39	0.08	0.89	0.09	0.02	0.98	0.02	0.00
32		Manchester	0.61	0.37	0.02	0.87	0.10	0.02	0.89	0.06	0.06
33		Newcastle	0.62	0.34	0.04	0.86	0.08	0.07	0.80	0.04	0.17
34		Carmarthen	0.66	0.22	0.13	0.84	0.13	0.02	0.94	0.02	0.04
35	USA	N. Y.-City	0.33	0.56	0.11	0.22	0.70	0.08	0.75	0.23	0.02
36		Philadelphia	0.30	0.67	0.03	0.23	0.75	0.02	0.74	0.24	0.01
37		Cincinnatti	0.13	0.63	0.23	0.43	0.06	0.51	0.62	0.35	0.02
38		Alexandria	0.27	0.70	0.03	0.13	0.80	0.06	0.72	0.25	0.03
39	Sweden	Stockholm	0.12	0.84	0.04	0.74	0.15	0.11	0.55	0.38	0.07
40		Uppsala	0.21	0.76	0.04	0.34	0.18	0.49	0.30	0.33	0.37
41		Södermanland	0.14	0.80	0.07	0.77	0.20	0.03	0.32	0.29	0.39
42		Östergötland	0.16	0.75	0.09	0.82	0.15	0.03	0.55	0.40	0.05
43		Kalmar	0.13	0.76	0.11	0.81	0.15	0.04	0.39	0.28	0.33
44		Halland	0.11	0.29	0.60	0.75	0.15	0.10	0.48	0.26	0.25
45		Skaraborg	0.10	0.59	0.32	0.70	0.22	0.09	0.61	0.23	0.16
46		Örebro	0.07	0.69	0.24	0.75	0.20	0.05	0.35	0.33	0.32
47		Västmanland	0.08	0.84	0.08	0.78	0.19	0.03	0.51	0.41	0.08
48		Gästrikland	0.16	0.72	0.12	0.61	0.04	0.35	0.48	0.15	0.38
49		Hälsingland	0.07	0.69	0.23	0.19	0.03	0.78	0.44	0.13	0.42
50	Norway	Bergen	0.93	0.01	0.06	0.46	0.49	0.04	0.38	0.46	0.14
51		Christiania	0.71	0.11	0.18	0.18	0.74	0.08	0.15	0.65	0.19
52	Spain	Burgos	0.17	0.39	0.44	0.14	0.78	0.07	0.31	0.46	0.23
53		Cordoba	0.03	0.57	0.40	0.00	0.62	0.38	0.07	0.81	0.12
54		Gerona	0.43	0.33	0.23	0.37	0.35	0.28	0.53	0.28	0.19
55		Granada	0.09	0.48	0.43	0.02	0.73	0.25	0.04	0.78	0.18
56		Lerida	0.21	0.66	0.13	0.07	0.72	0.21	0.33	0.52	0.15
57		Oviedo	0.12	0.41	0.46	0.34	0.48	0.18	0.02	0.05	0.93
58		Segovia	0.09	0.35	0.56	0.13	0.69	0.17	0.39	0.43	0.19
59		Zaragoza	0.14	0.64	0.23	0.06	0.82	0.12	0.44	0.28	0.28
60		Santander	0.32	0.21	0.47	0.20	0.56	0.25	0.07	0.27	0.65

Table 21: Standard deviations of explained variances. 60 markets, 1830-1907.

60 Markets, 1830-1907											
		μ	1830-1855			1856-1880			1881-1907		
			World	National	Local	World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.02	0.08	0.07	0.03	0.06	0.05	0.05	0.05	0.01
2		Lwow	0.02	0.13	0.12	0.02	0.01	0.03	0.05	0.05	0.01
3		Ljubljana	0.02	0.09	0.08	0.03	0.04	0.03	0.06	0.06	0.01
4		Krakow	0.02	0.10	0.09	0.03	0.03	0.02	0.06	0.06	0.01
5	Belgium	Brugges	0.01	0.02	0.01	0.03	0.03	0.01	0.03	0.03	0.01
6		Ghent	0.01	0.01	0.01	0.03	0.03	0.01	0.02	0.02	0.00
7		Brussels	0.01	0.01	0.01	0.03	0.03	0.01	0.03	0.03	0.00
8	France	Bayeux	0.02	0.02	0.01	0.02	0.02	0.01	0.06	0.06	0.01
9		Saint-Brieuc	0.02	0.02	0.01	0.02	0.02	0.01	0.05	0.06	0.02
10		Toulouse	0.03	0.03	0.02	0.03	0.03	0.01	0.04	0.04	0.01
11		Bordeaux	0.02	0.02	0.01	0.03	0.03	0.01	0.05	0.05	0.01
12		Chateauroux	0.02	0.02	0.01	0.03	0.03	0.01	0.06	0.06	0.01
13		Mende	0.02	0.04	0.03	0.03	0.04	0.01	0.04	0.04	0.02
14		Barleduc	0.02	0.01	0.01	0.02	0.02	0.01	0.07	0.08	0.02
15		Arras	0.01	0.01	0.01	0.02	0.02	0.01	0.07	0.07	0.01
16		Pau	0.03	0.03	0.02	0.03	0.03	0.01	0.05	0.05	0.01
17		Lyon	0.02	0.02	0.01	0.02	0.02	0.01	0.06	0.06	0.01
18		Paris	0.02	0.01	0.01	0.02	0.02	0.01	0.06	0.06	0.01
19	Germany	Berlin	0.01	0.02	0.01	0.02	0.02	0.01	0.03	0.04	0.02
20		Königsberg	0.02	0.04	0.04	0.03	0.04	0.02	0.03	0.03	0.02
21		München	0.02	0.02	0.03	0.02	0.03	0.04	0.04	0.05	0.03
22		Hamburg	0.01	0.01	0.01	0.02	0.02	0.01	0.04	0.04	0.01
23	UK	London	0.02	0.02	0.00	0.04	0.04	0.01	0.06	0.06	0.00
24		Dover	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.06	0.00
25		Exeter	0.02	0.02	0.00	0.03	0.03	0.00	0.05	0.05	0.01
26		Gloucester	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.05	0.01
27		Worcester	0.02	0.02	0.00	0.03	0.03	0.00	0.05	0.05	0.00
28		Cambridge	0.02	0.02	0.00	0.04	0.03	0.00	0.06	0.06	0.00
29		Norwich	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.06	0.00
30		Leeds	0.02	0.02	0.00	0.04	0.03	0.00	0.04	0.04	0.01
31		Liverpool	0.02	0.02	0.01	0.04	0.03	0.00	0.05	0.05	0.00
32		Manchester	0.02	0.02	0.00	0.04	0.04	0.00	0.05	0.05	0.01
33		Newcastle	0.02	0.02	0.00	0.03	0.03	0.01	0.04	0.04	0.02
34		Carmarthen	0.02	0.02	0.00	0.04	0.04	0.01	0.06	0.05	0.01
35	USA	N.Y.-City	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.01
36		Philadelphia	0.02	0.02	0.02	0.02	0.03	0.02	0.04	0.04	0.01
37		Cincinnatti	0.01	0.03	0.03	0.03	0.02	0.02	0.04	0.04	0.01
38		Alexandria	0.02	0.02	0.01	0.02	0.03	0.02	0.04	0.04	0.01
39	Sweden	Stockholm	0.01	0.02	0.01	0.03	0.03	0.01	0.04	0.04	0.02
40		Uppsala	0.01	0.02	0.01	0.03	0.04	0.03	0.02	0.04	0.03
41		Södermanland	0.01	0.02	0.01	0.04	0.03	0.01	0.05	0.09	0.04
42		Östergötland	0.02	0.02	0.01	0.04	0.03	0.01	0.03	0.04	0.02
43		Kalmar	0.01	0.02	0.01	0.03	0.03	0.01	0.03	0.04	0.02
44		Halland	0.01	0.02	0.02	0.03	0.03	0.01	0.04	0.04	0.02
45		Skaraborg	0.01	0.02	0.02	0.05	0.05	0.01	0.05	0.04	0.02
46		Örebro	0.01	0.02	0.02	0.04	0.04	0.01	0.02	0.04	0.03
47		Västmanland	0.01	0.02	0.01	0.04	0.04	0.01	0.02	0.03	0.02
48		Gästrikland	0.01	0.02	0.02	0.03	0.03	0.02	0.03	0.04	0.02
49		Hälsingland	0.01	0.02	0.02	0.02	0.02	0.01	0.03	0.03	0.02
50	Norway	Bergen	0.01	0.01	0.01	0.03	0.04	0.03	0.06	0.10	0.09
51		Christiania	0.02	0.10	0.09	0.02	0.06	0.05	0.04	0.12	0.12
52	Spain	Burgos	0.02	0.07	0.06	0.03	0.04	0.03	0.05	0.06	0.04
53		Cordoba	0.01	0.07	0.07	0.00	0.04	0.04	0.02	0.05	0.04
54		Gerona	0.02	0.04	0.04	0.04	0.05	0.03	0.02	0.04	0.03
55		Granada	0.01	0.06	0.06	0.01	0.03	0.03	0.01	0.06	0.06
56		Lerida	0.01	0.05	0.05	0.02	0.04	0.03	0.02	0.04	0.03
57		Oviedo	0.01	0.06	0.06	0.04	0.04	0.02	0.01	0.03	0.03
58		Segovia	0.01	0.07	0.06	0.03	0.05	0.03	0.06	0.07	0.04
59		Zaragoza	0.01	0.05	0.04	0.02	0.04	0.03	0.04	0.05	0.03
60		Santander	0.02	0.04	0.04	0.03	0.04	0.03	0.02	0.06	0.07

Table 22: Medians of explained variances after civil war. 60 markets, 1866-1880/90.

		60 Markets, 1866-1880/90						
		μ	1866-1880			1866-1890		
			World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.71	0.19	0.10	0.67	0.24	0.09
2		Lwow	0.77	0.16	0.07	0.69	0.11	0.20
3		Ljubljana	0.77	0.17	0.05	0.71	0.24	0.05
4		Krakow	0.83	0.07	0.10	0.64	0.25	0.10
5	Belgium	Brugges	0.65	0.30	0.05	0.68	0.26	0.06
6		Ghent	0.68	0.30	0.03	0.71	0.27	0.03
7		Brussels	0.69	0.30	0.01	0.73	0.25	0.01
8	France	Bayeux	0.63	0.31	0.06	0.66	0.25	0.10
9		Saint-Brieuc	0.63	0.32	0.05	0.60	0.25	0.15
10		Toulouse	0.55	0.44	0.01	0.56	0.41	0.03
11		Bordeaux	0.63	0.37	0.00	0.65	0.33	0.02
12		Chateauroux	0.51	0.48	0.01	0.53	0.45	0.01
13		Mende	0.47	0.42	0.11	0.45	0.43	0.11
14		Barleduc	0.50	0.38	0.12	0.54	0.27	0.18
15		Arras	0.64	0.32	0.04	0.68	0.25	0.07
16		Pau	0.48	0.50	0.01	0.49	0.49	0.01
17		Lyon	0.57	0.37	0.06	0.61	0.31	0.08
18		Paris	0.60	0.33	0.06	0.66	0.25	0.09
19	Germany	Berlin	0.91	0.05	0.04	0.79	0.17	0.05
20		Königsberg	0.96	0.02	0.02	0.86	0.11	0.03
21		München	0.88	0.04	0.08	0.77	0.06	0.16
22		Hamburg	0.95	0.02	0.03	0.90	0.06	0.04
23	UK	London	0.84	0.15	0.01	0.88	0.09	0.03
24		Dover	0.84	0.14	0.02	0.90	0.06	0.03
25		Exeter	0.92	0.07	0.01	0.95	0.03	0.02
26		Gloucester	0.93	0.06	0.01	0.94	0.04	0.02
27		Worcester	0.92	0.06	0.02	0.92	0.06	0.02
28		Cambridge	0.92	0.07	0.01	0.93	0.05	0.01
29		Norwich	0.88	0.11	0.01	0.91	0.05	0.03
30		Leeds	0.92	0.06	0.01	0.89	0.08	0.03
31		Liverpool	0.92	0.08	0.00	0.92	0.07	0.00
32		Manchester	0.88	0.09	0.02	0.83	0.13	0.03
33		Newcastle	0.90	0.05	0.05	0.70	0.12	0.18
34		Carmarthen	0.83	0.15	0.02	0.89	0.06	0.05
35	USA	N.Y-City	0.77	0.19	0.04	0.82	0.15	0.03
36		Philadelphia	0.70	0.28	0.02	0.73	0.25	0.02
37		Cincinnatti	0.48	0.17	0.35	0.61	0.07	0.31
38		Alexandria	0.68	0.24	0.07	0.69	0.23	0.08
39	Sweden	Stockholm	0.70	0.21	0.09	0.60	0.30	0.10
40		Uppsala	0.36	0.23	0.42	0.34	0.20	0.45
41		Södermanland	0.76	0.20	0.03	0.66	0.28	0.06
42		Östergötland	0.78	0.18	0.05	0.69	0.26	0.06
43		Kalmar	0.74	0.22	0.04	0.65	0.28	0.08
44		Halland	0.63	0.26	0.11	0.51	0.34	0.15
45		Skaraborg	0.82	0.09	0.09	0.70	0.18	0.11
46		Örebro	0.77	0.18	0.05	0.60	0.24	0.15
47		Västmanland	0.85	0.14	0.01	0.72	0.27	0.01
48		Gästrikland	0.50	0.01	0.50	0.41	0.09	0.50
49		Hälsingland	0.46	0.01	0.53	0.31	0.16	0.52
50	Norway	Bergen	0.65	0.21	0.14	0.42	0.38	0.18
51		Christiania (Oslo)	0.12	0.67	0.20	0.06	0.73	0.22
52	Spain	Burgos	0.24	0.69	0.07	0.15	0.79	0.06
53		Cordoba	0.01	0.46	0.53	0.02	0.53	0.44
54		Gerona	0.42	0.37	0.21	0.34	0.39	0.27
55		Granada	0.06	0.71	0.23	0.05	0.73	0.22
56		Lerida	0.10	0.74	0.16	0.05	0.78	0.16
57		Oviedo	0.45	0.34	0.22	0.26	0.21	0.53
58		Segovia	0.36	0.51	0.13	0.25	0.64	0.11
59		Zaragoza	0.19	0.74	0.07	0.11	0.77	0.12
60		Santander	0.20	0.46	0.34	0.04	0.46	0.49

Table 23: Standard deviations of explained variances after civil war. 60 markets, 1830-1907.

			60 Markets, 1830-1907								
		μ	1830-1855			1856-1880			1881-1907		
			World	National	Local	World	National	Local	World	National	Local
1	Aut-Hun	Vienna	0.02	0.08	0.07	0.03	0.06	0.05	0.05	0.05	0.01
2		Lwow	0.02	0.13	0.12	0.02	0.01	0.03	0.05	0.05	0.01
3		Ljubljana	0.02	0.09	0.08	0.03	0.04	0.03	0.06	0.06	0.01
4		Krakow	0.02	0.10	0.09	0.03	0.03	0.02	0.06	0.06	0.01
5	Belgium	Brugges	0.01	0.02	0.01	0.03	0.03	0.01	0.03	0.03	0.01
6		Ghent	0.01	0.01	0.01	0.03	0.03	0.01	0.02	0.02	0.00
7		Brussels	0.01	0.01	0.01	0.03	0.03	0.01	0.03	0.03	0.00
8	France	Bayeux	0.02	0.02	0.01	0.02	0.02	0.01	0.06	0.06	0.01
9		Saint-Brieuc	0.02	0.02	0.01	0.02	0.02	0.01	0.05	0.06	0.02
10		Toulouse	0.03	0.03	0.02	0.03	0.03	0.01	0.04	0.04	0.01
11		Bordeaux	0.02	0.02	0.01	0.03	0.03	0.01	0.05	0.05	0.01
12		Chateauroux	0.02	0.02	0.01	0.03	0.03	0.01	0.06	0.06	0.01
13		Mende	0.02	0.04	0.03	0.03	0.04	0.01	0.04	0.04	0.02
14		Barleduc	0.02	0.01	0.01	0.02	0.02	0.01	0.07	0.08	0.02
15		Arras	0.01	0.01	0.01	0.02	0.02	0.01	0.07	0.07	0.01
16		Pau	0.03	0.03	0.02	0.03	0.03	0.01	0.05	0.05	0.01
17		Lyon	0.02	0.02	0.01	0.02	0.02	0.01	0.06	0.06	0.01
18		Paris	0.02	0.01	0.01	0.02	0.02	0.01	0.06	0.06	0.01
19	Germany	Berlin	0.01	0.02	0.01	0.02	0.02	0.01	0.03	0.04	0.02
20		Königsberg	0.02	0.04	0.04	0.03	0.04	0.02	0.03	0.03	0.02
21		München	0.02	0.02	0.03	0.02	0.03	0.04	0.04	0.05	0.03
22		Hamburg	0.01	0.01	0.01	0.02	0.02	0.01	0.04	0.04	0.01
23	UK	London	0.02	0.02	0.00	0.04	0.04	0.01	0.06	0.06	0.00
24		Dover	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.06	0.00
25		Exeter	0.02	0.02	0.00	0.03	0.03	0.00	0.05	0.05	0.01
26		Gloucester	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.05	0.01
27		Worcester	0.02	0.02	0.00	0.03	0.03	0.00	0.05	0.05	0.00
28		Cambridge	0.02	0.02	0.00	0.04	0.03	0.00	0.06	0.06	0.00
29		Norwich	0.02	0.02	0.00	0.03	0.03	0.00	0.06	0.06	0.00
30		Leeds	0.02	0.02	0.00	0.04	0.03	0.00	0.04	0.04	0.01
31		Liverpool	0.02	0.02	0.01	0.04	0.03	0.00	0.05	0.05	0.00
32		Manchester	0.02	0.02	0.00	0.04	0.04	0.00	0.05	0.05	0.01
33		Newcastle	0.02	0.02	0.00	0.03	0.03	0.01	0.04	0.04	0.02
34		Carmarthen	0.02	0.02	0.00	0.04	0.04	0.01	0.06	0.05	0.01
35	USA	N.Y.-City	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.01
36		Philadelphia	0.02	0.02	0.02	0.02	0.03	0.02	0.04	0.04	0.01
37		Cincinnatti	0.01	0.03	0.03	0.03	0.02	0.02	0.04	0.04	0.01
38		Alexandria	0.02	0.02	0.01	0.02	0.03	0.02	0.04	0.04	0.01
39	Sweden	Stockholm	0.01	0.02	0.01	0.03	0.03	0.01	0.04	0.04	0.02
40		Uppsala	0.01	0.02	0.01	0.03	0.04	0.03	0.02	0.04	0.03
41		Södermanland	0.01	0.02	0.01	0.04	0.03	0.01	0.05	0.09	0.04
42		Östergötland	0.02	0.02	0.01	0.04	0.03	0.01	0.03	0.04	0.02
43		Kalmar	0.01	0.02	0.01	0.03	0.03	0.01	0.03	0.04	0.02
44		Halland	0.01	0.02	0.02	0.03	0.03	0.01	0.04	0.04	0.02
45		Skaraborg	0.01	0.02	0.02	0.05	0.05	0.01	0.05	0.04	0.02
46		Örebro	0.01	0.02	0.02	0.04	0.04	0.01	0.02	0.04	0.03
47		Västmanland	0.01	0.02	0.01	0.04	0.04	0.01	0.02	0.03	0.02
48		Gästrikland	0.01	0.02	0.02	0.03	0.03	0.02	0.03	0.04	0.02
49		Hälsingland	0.01	0.02	0.02	0.02	0.02	0.01	0.03	0.03	0.02
50	Norway	Bergen	0.01	0.01	0.01	0.03	0.04	0.03	0.06	0.10	0.09
51		Christiania	0.02	0.10	0.09	0.02	0.06	0.05	0.04	0.12	0.12
52	Spain	Burgos	0.02	0.07	0.06	0.03	0.04	0.03	0.05	0.06	0.04
53		Cordoba	0.01	0.07	0.07	0.00	0.04	0.04	0.02	0.05	0.04
54		Gerona	0.02	0.04	0.04	0.04	0.05	0.03	0.02	0.04	0.03
55		Granada	0.01	0.06	0.06	0.01	0.03	0.03	0.01	0.06	0.06
56		Lerida	0.01	0.05	0.05	0.02	0.04	0.03	0.02	0.04	0.03
57		Oviedo	0.01	0.06	0.06	0.04	0.04	0.02	0.01	0.03	0.03
58		Segovia	0.01	0.07	0.06	0.03	0.05	0.03	0.06	0.07	0.04
59		Zaragoza	0.01	0.05	0.04	0.02	0.04	0.03	0.04	0.05	0.03
60		Santander	0.02	0.04	0.04	0.03	0.04	0.03	0.02	0.06	0.07

Table 24: Medians of explained variances. 68 markets, 1856-1907.

68 Markets, 1856-1907								
		μ	1856-1881			1881-1907		
			World	National	Local	World	National	Local
1	Aust.-Hun.	Vienna	0.64	0.26	0.10	0.63	0.35	0.02
2		Lwow	0.79	0.00	0.21	0.51	0.34	0.15
3		Ljubljana	0.76	0.16	0.08	0.56	0.41	0.03
4		Krakow	0.88	0.04	0.08	0.53	0.46	0.02
5	Bel+NL	Brugges	0.66	0.31	0.02	0.90	0.06	0.04
6		Ghent	0.67	0.32	0.01	0.91	0.09	0.01
7		Brussels	0.69	0.30	0.01	0.92	0.08	0.00
8	France	Bayeux	0.75	0.22	0.04	0.66	0.25	0.09
9		Saint-Brieuc	0.73	0.24	0.03	0.36	0.30	0.34
10		Toulouse	0.63	0.36	0.02	0.75	0.20	0.05
11		Bordeaux	0.71	0.28	0.01	0.68	0.27	0.05
12		Chateauroux	0.65	0.33	0.02	0.73	0.24	0.03
13		Mende	0.55	0.38	0.07	0.64	0.18	0.18
14		Barleduc	0.68	0.27	0.05	0.65	0.23	0.12
15		Arras	0.75	0.22	0.02	0.73	0.19	0.08
16		Pau	0.62	0.37	0.01	0.72	0.25	0.03
17		Lyon	0.71	0.27	0.03	0.75	0.22	0.03
18		Marseille	0.62	0.16	0.23	0.71	0.07	0.21
19		Paris	0.65	0.17	0.18	0.76	0.18	0.06
20	Germany	Berlin	0.91	0.03	0.06	0.82	0.15	0.03
21		Königsberg	0.95	0.02	0.03	0.83	0.12	0.05
22		München	0.71	0.02	0.26	0.71	0.12	0.17
23		Hamburg	0.98	0.00	0.01	0.86	0.10	0.04
24	UK	London	0.86	0.14	0.01	0.97	0.02	0.01
25		Dover	0.88	0.11	0.01	0.95	0.02	0.03
26		Exeter	0.94	0.05	0.01	0.94	0.01	0.05
27		Gloucester	0.94	0.06	0.01	0.97	0.02	0.01
28		Worcester	0.92	0.07	0.01	0.98	0.01	0.01
29		Cambridge	0.90	0.09	0.01	0.97	0.02	0.01
30		Norwich	0.89	0.11	0.01	0.95	0.02	0.03
31		Leeds	0.91	0.08	0.01	0.96	0.03	0.02
32		Liverpool	0.90	0.08	0.02	0.98	0.02	0.00
33		Manchester	0.88	0.09	0.03	0.89	0.05	0.06
34		Newcastle	0.88	0.05	0.07	0.80	0.04	0.17
35		Carmarthen	0.85	0.13	0.02	0.94	0.01	0.04
36	USA	New York	0.46	0.51	0.03	0.76	0.23	0.02
37		Philadelphia	0.48	0.47	0.04	0.74	0.24	0.02
38		Alexandria	0.40	0.48	0.12	0.73	0.24	0.03
39		Cincinnati	0.32	0.62	0.06	0.62	0.36	0.02
40		Ithaca	0.44	0.53	0.03	0.63	0.32	0.05
41		Chicago	0.49	0.39	0.13	0.71	0.22	0.07
42		Indianapolis	0.43	0.54	0.03	0.65	0.33	0.02
43		San Francisco	0.02	0.04	0.94	0.64	0.01	0.35
44	Sweden	Stockholm	0.77	0.13	0.11	0.55	0.37	0.07
45		Uppsala	0.31	0.22	0.47	0.30	0.33	0.37
46		Södermanland	0.81	0.17	0.02	0.33	0.29	0.39
47		Östergötland	0.87	0.10	0.03	0.55	0.40	0.05
48		Kalmar	0.84	0.13	0.04	0.39	0.28	0.33
49		Halland	0.79	0.10	0.10	0.48	0.27	0.25
50		Skaraborg	0.77	0.13	0.10	0.61	0.23	0.16
51		Örebro	0.83	0.11	0.06	0.35	0.32	0.32
52		Västmanland	0.89	0.10	0.02	0.51	0.41	0.08
53		Gästrikland	0.65	0.00	0.35	0.48	0.14	0.38
54		Hälsingland	0.21	0.01	0.77	0.44	0.13	0.42
55	Norway	Bergen	0.48	0.48	0.04	0.37	0.48	0.14
56		Christiania (Oslo)	0.19	0.73	0.08	0.14	0.66	0.19
57	Spain	Burgos	0.17	0.80	0.03	0.32	0.47	0.22
65		Santander	0.22	0.55	0.24	0.08	0.24	0.68
66		Leon	0.22	0.72	0.06	0.16	0.53	0.31
63		Segovia	0.16	0.72	0.12	0.40	0.44	0.17
67		Toledo	0.03	0.74	0.23	0.11	0.75	0.14
62		Oviedo	0.37	0.46	0.17	0.02	0.04	0.94
68		Coruna	0.40	0.49	0.12	0.06	0.24	0.69
58		Cordoba	0.01	0.53	0.46	0.08	0.81	0.11
60		Granada	0.03	0.61	0.36	0.04	0.74	0.23
59		Gerona	0.41	0.24	0.36	0.53	0.27	0.19
61		Lerida	0.08	0.58	0.34	0.33	0.49	0.18
64		Zaragoza	0.08	0.72	0.20	0.45	0.27	0.28

Table 25: Standard deviations of explained variances. 68 markets, 1856-1907.

			68 Markets, 1856-1907					
		μ	1856-1881			1881-1907		
			World	National	Local	World	National	Local
1	Aust.-Hun.	Vienna	0.07	0.09	0.06	0.04	0.04	0.01
2		Lwow	0.13	0.11	0.03	0.04	0.04	0.02
3		Ljubljana	0.08	0.09	0.04	0.05	0.05	0.01
4		Krakow	0.12	0.11	0.02	0.05	0.05	0.01
5	Bel+NL	Brugges	0.08	0.08	0.01	0.02	0.02	0.01
6		Ghent	0.09	0.09	0.01	0.02	0.02	0.01
7		Brussels	0.08	0.08	0.00	0.02	0.02	0.01
8	France	Bayeux	0.08	0.07	0.01	0.04	0.04	0.01
9		Saint-Brieuc	0.07	0.07	0.00	0.03	0.05	0.02
10		Toulouse	0.07	0.07	0.00	0.02	0.02	0.01
11		Bordeaux	0.07	0.07	0.00	0.03	0.03	0.01
12		Chateauroux	0.07	0.07	0.00	0.04	0.04	0.01
13		Mende	0.07	0.07	0.01	0.03	0.03	0.02
14		Barleduc	0.07	0.07	0.01	0.05	0.05	0.02
15		Arras	0.08	0.07	0.01	0.05	0.05	0.01
16		Pau	0.07	0.07	0.00	0.03	0.03	0.01
17		Lyon	0.07	0.07	0.00	0.04	0.04	0.01
18		Marseille	0.10	0.08	0.05	0.05	0.04	0.02
19		Paris	0.09	0.12	0.03	0.04	0.04	0.01
20	Germany	Berlin	0.13	0.13	0.02	0.03	0.03	0.02
21		Königsberg	0.14	0.14	0.01	0.02	0.02	0.01
22		München	0.07	0.09	0.06	0.04	0.05	0.03
23		Hamburg	0.13	0.13	0.01	0.03	0.03	0.01
24	UK	London	0.11	0.11	0.00	0.05	0.05	0.01
25		Dover	0.12	0.12	0.00	0.04	0.04	0.01
26		Exeter	0.13	0.13	0.00	0.03	0.03	0.01
27		Gloucester	0.13	0.13	0.00	0.04	0.04	0.01
28		Worcester	0.13	0.13	0.00	0.03	0.03	0.00
29		Cambridge	0.12	0.12	0.00	0.04	0.04	0.00
30		Norwich	0.12	0.12	0.00	0.05	0.05	0.01
31		Leeds	0.12	0.12	0.00	0.03	0.03	0.01
32		Liverpool	0.12	0.12	0.00	0.04	0.04	0.00
33		Manchester	0.13	0.13	0.00	0.04	0.04	0.01
34		Newcastle	0.12	0.12	0.01	0.04	0.04	0.02
35		Carmarthen	0.12	0.11	0.00	0.04	0.03	0.01
36	USA	New York	0.10	0.10	0.01	0.03	0.03	0.01
37		Philadelphia	0.11	0.11	0.01	0.04	0.04	0.01
38		Alexandria	0.10	0.10	0.01	0.04	0.04	0.01
39		Cincinnati	0.08	0.08	0.01	0.04	0.04	0.01
40		Ithaca	0.09	0.09	0.01	0.03	0.04	0.01
41		Chicago	0.09	0.09	0.01	0.05	0.04	0.01
42		Indianapolis	0.10	0.10	0.01	0.04	0.04	0.01
43		San Francisco	0.01	0.01	0.02	0.04	0.00	0.04
44	Sweden	Stockholm	0.14	0.15	0.01	0.03	0.04	0.02
45		Uppsala	0.08	0.12	0.05	0.02	0.04	0.03
46		Södermanland	0.14	0.14	0.01	0.04	0.07	0.04
47		Östergötland	0.15	0.14	0.01	0.03	0.03	0.01
48		Kalmar	0.14	0.14	0.01	0.03	0.04	0.02
49		Halland	0.12	0.12	0.01	0.03	0.04	0.02
50		Skaraborg	0.12	0.12	0.01	0.04	0.03	0.02
51		Örebro	0.13	0.13	0.01	0.02	0.04	0.03
52		Västmanland	0.14	0.14	0.01	0.02	0.03	0.02
53		Gästrikland	0.09	0.08	0.02	0.02	0.03	0.02
54		Hälsingland	0.03	0.03	0.02	0.03	0.03	0.02
55	Norway	Bergen	0.10	0.11	0.05	0.04	0.10	0.09
56		Christiania (Oslo)	0.11	0.14	0.07	0.03	0.13	0.12
57	Spain	Burgos	0.05	0.05	0.01	0.04	0.05	0.03
58		Cordoba	0.02	0.04	0.03	0.02	0.04	0.03
59		Gerona	0.05	0.04	0.03	0.01	0.03	0.02
60		Granada	0.02	0.03	0.03	0.01	0.04	0.04
61		Lerida	0.02	0.03	0.03	0.02	0.03	0.03
62		Oviedo	0.05	0.05	0.02	0.01	0.02	0.03
63		Segovia	0.05	0.05	0.02	0.05	0.05	0.03
64		Zaragoza	0.03	0.03	0.02	0.03	0.04	0.03
65		Santander	0.04	0.04	0.02	0.02	0.05	0.06
66		Leon	0.06	0.06	0.01	0.03	0.05	0.03
67		Toledo	0.04	0.05	0.03	0.02	0.05	0.04
68		Coruna	0.05	0.06	0.02	0.02	0.04	0.05

Table 26: Medians of explained variances. 68 markets, 1866-1880/90.

			68 Markets, 1866-1880/90					
		μ	1866-1880			1866-1890		
			World	National	Local	World	National	Local
1	Aust.-Hun.	Vienna	0.69	0.21	0.10	0.63	0.28	0.09
2		Lwow	0.77	0.16	0.07	0.68	0.12	0.19
3		Ljubljana	0.76	0.17	0.06	0.67	0.27	0.05
4		Krakow	0.77	0.11	0.11	0.60	0.30	0.10
5	Bel+NL	Brugges	0.66	0.29	0.05	0.66	0.28	0.06
6		Ghent	0.67	0.30	0.03	0.68	0.29	0.03
7		Brussels	0.69	0.30	0.01	0.70	0.28	0.01
8	France	Bayeux	0.62	0.31	0.07	0.61	0.28	0.10
9		Saint-Brieuc	0.63	0.32	0.05	0.56	0.28	0.15
10		Toulouse	0.56	0.43	0.01	0.55	0.43	0.03
11		Bordeaux	0.65	0.36	0.00	0.63	0.35	0.02
12		Chateauroux	0.51	0.48	0.01	0.50	0.49	0.01
13		Mende	0.46	0.43	0.11	0.43	0.45	0.11
14		Barleduc	0.52	0.35	0.13	0.53	0.29	0.18
15		Arras	0.65	0.31	0.04	0.65	0.28	0.07
16		Pau	0.48	0.51	0.01	0.47	0.52	0.01
17		Lyon	0.56	0.38	0.07	0.56	0.36	0.09
18		Marseille	0.73	0.20	0.07	0.66	0.19	0.15
19		Paris	0.62	0.31	0.07	0.63	0.27	0.09
20	Germany	Berlin	0.85	0.11	0.04	0.77	0.19	0.04
21		Köigsberg	0.93	0.05	0.02	0.85	0.12	0.03
22		München	0.82	0.09	0.08	0.71	0.11	0.17
23		Hamburg	0.93	0.04	0.03	0.89	0.08	0.03
24	UK	London	0.91	0.07	0.01	0.93	0.04	0.03
25		Dover	0.92	0.06	0.02	0.95	0.02	0.03
26		Exeter	0.97	0.02	0.02	0.98	0.00	0.01
27		Gloucester	0.97	0.02	0.01	0.98	0.00	0.02
28		Worcester	0.97	0.02	0.02	0.96	0.02	0.02
29		Cambridge	0.97	0.02	0.01	0.96	0.02	0.01
30		Norwich	0.95	0.04	0.01	0.95	0.01	0.03
31		Leeds	0.97	0.01	0.01	0.92	0.05	0.03
32		Liverpool	0.97	0.02	0.00	0.97	0.03	0.00
33		Manchester	0.95	0.03	0.03	0.89	0.09	0.03
34		Newcastle	0.94	0.01	0.05	0.73	0.11	0.16
35		Carmarthen	0.91	0.07	0.02	0.94	0.01	0.05
36	USA	New York	0.82	0.17	0.00	0.88	0.12	0.01
37		Philadelphia	0.78	0.19	0.04	0.82	0.15	0.03
38		Alexandria	0.79	0.11	0.11	0.81	0.10	0.09
39		Cincinnati	0.59	0.37	0.04	0.66	0.30	0.04
40		Ithaca	0.82	0.17	0.00	0.85	0.13	0.01
41		Chicago	0.83	0.09	0.08	0.86	0.07	0.07
42		Indianapolis	0.76	0.21	0.02	0.79	0.20	0.01
43		San Francisco	0.20	0.02	0.78	0.21	0.07	0.72
44	Sweden	Stockholm	0.62	0.29	0.08	0.54	0.36	0.09
45		Uppsala	0.35	0.21	0.44	0.32	0.23	0.45
46		Södermanland	0.72	0.25	0.04	0.64	0.30	0.06
47		Östergötland	0.75	0.20	0.05	0.67	0.27	0.06
48		Kalmar	0.70	0.25	0.04	0.62	0.30	0.08
49		Halland	0.55	0.35	0.10	0.47	0.39	0.14
50		Skaraborg	0.76	0.14	0.09	0.69	0.20	0.11
51		Örebro	0.70	0.25	0.05	0.57	0.28	0.15
52		Västmanland	0.80	0.19	0.01	0.69	0.29	0.01
53		Gästrikland	0.46	0.01	0.52	0.42	0.09	0.49
54		Hälsingland	0.42	0.02	0.56	0.32	0.16	0.53
55	Norway	Bergen	0.57	0.23	0.18	0.38	0.40	0.22
56		Christiania (Oslo)	0.13	0.62	0.25	0.05	0.70	0.25
57	Spain	Burgos	0.20	0.75	0.04	0.15	0.80	0.05
58		Cordoba	0.01	0.43	0.55	0.03	0.51	0.46
59		Gerona	0.41	0.34	0.25	0.35	0.35	0.30
60		Granada	0.06	0.67	0.27	0.06	0.67	0.26
61		Lerida	0.07	0.69	0.23	0.06	0.74	0.21
62		Oviedo	0.41	0.37	0.22	0.25	0.20	0.55
63		Segovia	0.33	0.59	0.07	0.25	0.67	0.07
64		Zaragoza	0.16	0.75	0.09	0.12	0.73	0.15
65		Santander	0.15	0.58	0.27	0.04	0.52	0.44
66		Leon	0.31	0.61	0.08	0.21	0.65	0.13
67		Toledo	0.11	0.61	0.28	0.12	0.65	0.23
68		Coruna	0.39	0.48	0.14	0.23	0.47	0.30

Table 27: Standard dev. of explained variances. 68 markets, 1866-1880/90.

68 Markets, 1866-1880/90								
		μ	1866-1880			1866-1890		
			World	National	Local	World	National	Local
1	Aust.-Hun.	Vienna	0.03	0.05	0.04	0.02	0.04	0.03
2		Lwow	0.02	0.03	0.03	0.02	0.03	0.02
3		Ljubljana	0.02	0.03	0.03	0.02	0.03	0.02
4		Krakow	0.05	0.05	0.03	0.02	0.04	0.03
5	Bel+NL	Brugges	0.03	0.04	0.01	0.03	0.03	0.01
6		Ghent	0.03	0.03	0.01	0.03	0.03	0.01
7		Brussels	0.03	0.03	0.01	0.04	0.04	0.01
8	France	Bayeux	0.03	0.03	0.01	0.04	0.04	0.01
9		Saint-Brieuc	0.03	0.03	0.01	0.04	0.04	0.01
10		Toulouse	0.04	0.04	0.01	0.03	0.03	0.01
11		Bordeaux	0.03	0.03	0.01	0.03	0.03	0.01
12		Chateauroux	0.04	0.04	0.01	0.04	0.04	0.01
13		Mende	0.04	0.05	0.02	0.03	0.04	0.01
14		Barleduc	0.03	0.04	0.01	0.04	0.04	0.01
15		Arras	0.03	0.03	0.01	0.04	0.04	0.01
16		Pau	0.04	0.04	0.01	0.04	0.04	0.01
17		Lyon	0.04	0.04	0.01	0.05	0.05	0.01
18		Marseille	0.03	0.03	0.01	0.03	0.03	0.01
19		Paris	0.03	0.04	0.01	0.04	0.04	0.01
20	Germany	Berlin	0.06	0.06	0.02	0.02	0.03	0.02
21		Königsberg	0.04	0.04	0.01	0.02	0.02	0.01
22		München	0.05	0.05	0.02	0.03	0.03	0.02
23		Hamburg	0.04	0.04	0.01	0.02	0.02	0.01
24	UK	London	0.05	0.05	0.01	0.03	0.03	0.01
25		Dover	0.05	0.05	0.01	0.03	0.03	0.00
26		Exeter	0.03	0.03	0.01	0.02	0.02	0.01
27		Gloucester	0.03	0.02	0.01	0.02	0.02	0.01
28		Worcester	0.03	0.03	0.01	0.03	0.03	0.00
29		Cambridge	0.03	0.03	0.01	0.02	0.02	0.00
30		Norwich	0.04	0.04	0.01	0.02	0.02	0.01
31		Leeds	0.03	0.02	0.01	0.03	0.03	0.01
32		Liverpool	0.03	0.03	0.01	0.03	0.03	0.00
33		Manchester	0.04	0.03	0.01	0.04	0.04	0.01
34		Newcastle	0.03	0.02	0.01	0.04	0.04	0.03
35		Carmarthen	0.05	0.05	0.01	0.03	0.03	0.01
36	USA	New York	0.05	0.05	0.01	0.03	0.03	0.01
37		Philadelphia	0.05	0.05	0.01	0.03	0.03	0.01
38		Alexandria	0.05	0.04	0.01	0.03	0.03	0.01
39		Cincinnati	0.05	0.05	0.01	0.03	0.03	0.01
40		Ithaca	0.05	0.05	0.01	0.03	0.03	0.01
41		Chicago	0.04	0.04	0.01	0.02	0.02	0.01
42		Indianapolis	0.05	0.05	0.01	0.03	0.03	0.01
43		San Francisco	0.03	0.02	0.05	0.02	0.02	0.03
44	Sweden	Stockholm	0.06	0.07	0.01	0.04	0.04	0.01
45		Uppsala	0.04	0.05	0.03	0.03	0.04	0.02
46		Södermanland	0.04	0.04	0.01	0.03	0.03	0.01
47		Östergötland	0.04	0.04	0.01	0.03	0.03	0.01
48		Kalmar	0.04	0.04	0.01	0.03	0.03	0.01
49		Halland	0.06	0.07	0.02	0.03	0.03	0.01
50		Skaraborg	0.04	0.04	0.01	0.02	0.02	0.01
51		Örebro	0.05	0.06	0.01	0.03	0.03	0.01
52		Västmanland	0.05	0.05	0.01	0.02	0.02	0.01
53		Gästrikland	0.04	0.01	0.03	0.02	0.02	0.01
54		Hälsingland	0.04	0.02	0.03	0.02	0.03	0.02
55	Norway	Bergen	0.06	0.09	0.10	0.03	0.10	0.10
56		Christiania (Oslo)	0.03	0.22	0.21	0.01	0.17	0.17
57	Spain	Burgos	0.04	0.05	0.02	0.02	0.02	0.02
58		Cordoba	0.01	0.04	0.04	0.01	0.03	0.03
59		Gerona	0.02	0.04	0.03	0.02	0.03	0.02
60		Granada	0.01	0.04	0.04	0.01	0.03	0.03
61		Lerida	0.02	0.04	0.04	0.01	0.03	0.03
62		Oviedo	0.04	0.05	0.03	0.02	0.03	0.02
63		Segovia	0.04	0.05	0.03	0.02	0.03	0.02
64		Zaragoza	0.03	0.04	0.03	0.02	0.03	0.02
65		Santander	0.05	0.07	0.04	0.01	0.03	0.03
66		Leon	0.05	0.05	0.02	0.02	0.03	0.02
67		Toledo	0.02	0.05	0.04	0.01	0.03	0.03
68		Coruna	0.05	0.05	0.02	0.02	0.03	0.02

Table 28: Medians of explained variances. 70 markets, 1881-1907.

70 Markets, 1881-1907					
			World	National	Local
1	A+H	Vienna	0.64	0.35	0.00
2		Lwow	0.49	0.34	0.17
3		Ljubljana	0.57	0.39	0.04
4		Krakow	0.52	0.45	0.03
5		Budapest	0.65	0.33	0.01
6	Bel+Nl	Brugges	0.90	0.06	0.04
7		Ghent	0.89	0.10	0.01
8		Brussels	0.92	0.08	0.00
9		Bayeux	0.71	0.21	0.08
10	France	Saint-Brieuc	0.43	0.26	0.31
11		Toulouse	0.77	0.17	0.05
12		Bordeaux	0.72	0.23	0.05
13		Chateauroux	0.77	0.20	0.03
14		Mende	0.64	0.17	0.19
15		Barleduc	0.67	0.21	0.11
16		Arras	0.76	0.17	0.07
17		Pau	0.75	0.22	0.02
18		Lyon	0.77	0.20	0.03
19		Marseille	0.76	0.04	0.20
20		Paris	0.79	0.16	0.05
21	Germany	Berlin	0.84	0.12	0.04
22		Königsberg	0.83	0.12	0.05
23		München	0.73	0.09	0.18
24		Hamburg	0.88	0.08	0.04
25	UK	London	0.92	0.07	0.01
26		Dover	0.91	0.05	0.03
27		Exeter	0.93	0.01	0.05
28		Gloucester	0.98	0.01	0.01
29		Worcester	0.96	0.03	0.01
30		Cambridge	0.95	0.04	0.01
31		Norwich	0.94	0.02	0.03
32		Leeds	0.93	0.06	0.02
33		Liverpool	0.96	0.04	0.00
34		Manchester	0.84	0.09	0.07
35		Newcastle	0.74	0.09	0.17
36		Carmarthen	0.96	0.01	0.04
37	USA	New York	0.78	0.20	0.02
38		Philadelphia	0.79	0.20	0.01
39		Alexandria	0.76	0.21	0.03
40		Cincinnati	0.65	0.33	0.02
41		Ithaca	0.66	0.29	0.06
42		Chicago	0.76	0.17	0.07
43		Indianapolis	0.69	0.29	0.02
44		San Francisco	0.70	0.01	0.29
45	Schweden	Stockholm	0.57	0.35	0.08
46		Uppsala	0.35	0.37	0.28
47		Södermanland	0.32	0.25	0.43
48		Östergötland	0.56	0.38	0.06
49		Kalmar	0.38	0.28	0.35
50		Halland	0.44	0.28	0.28
51		Skaraborg	0.59	0.23	0.19
52		Örebro	0.41	0.36	0.23
53		Västmanland	0.50	0.42	0.08
54		Gästrikland	0.47	0.11	0.42
55		Hälsingland	0.46	0.12	0.41
56	Norway	Bergen	0.30	0.56	0.14
57		Christiania (Oslo)	0.10	0.74	0.17
58		Stavanger	0.13	0.64	0.23
59	Spain	Burgos	0.33	0.46	0.21
60		Cordoba	0.08	0.82	0.09
61		Gerona	0.57	0.25	0.18
62		Granada	0.03	0.77	0.19
63		Lerida	0.37	0.46	0.17
64		Oviedo	0.04	0.06	0.90
65		Segovia	0.45	0.41	0.14
66		Zaragoza	0.45	0.25	0.29
67		Santander	0.08	0.30	0.62
68		Leon	0.21	0.51	0.28
69		Toledo	0.12	0.74	0.14
70		Coruna	0.06	0.28	0.65

Table 29: Standard deviations of explained variances. 70 markets, 1881-1907.

70 Markets. 1816-1830					
			World	National	Local
1	A+H	Vienna	0.02	0.02	0.01
2		Lwow	0.02	0.02	0.01
3		Ljubljana	0.02	0.02	0.01
4		Krakow	0.02	0.02	0.01
5		Budapest	0.02	0.02	0.01
6	Bel+Nl	Brugges	0.01	0.01	0.01
7		Ghent	0.01	0.01	0.01
8		Brussels	0.01	0.01	0.00
9		Bayeux	0.01	0.02	0.01
10	France	Saint-Brieuc	0.01	0.03	0.02
11		Toulouse	0.01	0.02	0.01
12		Bordeaux	0.02	0.02	0.01
13		Chateauroux	0.01	0.01	0.01
14		Mende	0.01	0.02	0.02
15		Barleduc	0.02	0.02	0.02
16		Arras	0.02	0.02	0.01
17		Pau	0.01	0.02	0.01
18		Lyon	0.01	0.01	0.01
19		Marseille	0.01	0.01	0.01
20		Paris	0.01	0.02	0.01
21	Germany	Berlin	0.01	0.02	0.02
22		Königsberg	0.01	0.02	0.02
23		München	0.02	0.03	0.03
24		Hamburg	0.01	0.02	0.01
25	UK	London	0.02	0.02	0.00
26		Dover	0.02	0.02	0.00
27		Exeter	0.01	0.01	0.00
28		Gloucester	0.01	0.01	0.00
29		Worcester	0.01	0.01	0.00
30		Cambridge	0.02	0.02	0.00
31		Norwich	0.02	0.01	0.00
32		Leeds	0.02	0.02	0.00
33		Liverpool	0.01	0.01	0.00
34		Manchester	0.02	0.02	0.01
35		Newcastle	0.02	0.03	0.01
36		Carmarthen	0.01	0.01	0.01
37	USA	New York	0.01	0.02	0.01
38		Philadelphia	0.02	0.02	0.01
39		Alexandria	0.02	0.02	0.01
40		Cincinnati	0.02	0.02	0.01
41		Ithaca	0.02	0.02	0.01
42		Chicago	0.02	0.02	0.01
43		Indianapolis	0.02	0.02	0.01
44		San Francisco	0.01	0.00	0.01
45	Schweden	Stockholm	0.02	0.03	0.02
46		Uppsala	0.01	0.03	0.03
47		Södermanland	0.02	0.04	0.03
48		Östergötland	0.02	0.03	0.02
49		Kalmar	0.02	0.03	0.02
50		Halland	0.02	0.03	0.03
51		Skaraborg	0.02	0.02	0.02
52		Örebro	0.02	0.03	0.03
53		Västmanland	0.02	0.02	0.02
54		Gästrikland	0.02	0.02	0.02
55		Hälsingland	0.02	0.03	0.02
56	Norway	Bergen	0.02	0.05	0.05
57		Christiania (Oslo)	0.01	0.07	0.06
58		Stavanger	0.01	0.06	0.06
59	Spain	Burgos	0.02	0.03	0.03
60		Cordoba	0.01	0.03	0.03
61		Gerona	0.01	0.02	0.02
62		Granada	0.01	0.04	0.04
63		Lerida	0.02	0.03	0.02
64		Oviedo	0.01	0.02	0.02
65		Segovia	0.02	0.03	0.02
66		Zaragoza	0.02	0.03	0.02
67		Santander	0.01	0.04	0.04
68		Leon	0.01	0.03	0.03
69		Toledo	0.01	0.04	0.04
70		Coruna	0.01	0.04	0.04

Table 30: Robustness to sample selection. 26, 31, 48 and 60 markets. Medians of explained variances.

		Varying the number of markets per nation											
		1806-30			1831-55			1856-80			1881-1907		
Avg. Over	Sample Size	World	National	Local	World	National	Local	World	National	Local	World	National	Local
Full Sample	26	0.37	0.44	0.19	0.58	0.30	0.12	0.69	0.23	0.08	0.73	0.19	0.08
	31	−−	−−	−−	0.51	0.34	0.15	0.62	0.26	0.12	0.67	0.23	0.09
	48	0.35	0.48	0.17	0.54	0.34	0.11	0.72	0.20	0.08	0.69	0.20	0.10
	60	−−	−−	−−	0.58	0.29	0.13	0.59	0.31	0.10	0.72	0.20	0.08
Austria-Hungary	26	0.16	0.38	0.45	0.64	0.09	0.26	0.72	0.20	0.08	0.69	0.20	0.10
	31	−−	−−	−−	0.64	0.06	0.29	0.76	0.13	0.12	0.62	0.33	0.05
	48	0.15	0.41	0.61	0.61	0.09	0.31	0.75	0.13	0.12	0.57	0.37	0.06
	60	−−	−−	−−	0.57	0.09	0.34	0.73	0.14	0.14	0.55	0.40	0.05
Belgium	26	0.72	0.23	0.04	0.88	0.10	0.02	0.71	0.27	0.01	0.94	0.04	0.01
	31	−−	−−	−−	0.88	0.10	0.03	0.71	0.28	0.01	0.96	0.03	0.01
	48	0.56	0.40	0.05	0.90	0.08	0.03	0.65	0.33	0.01	0.90	0.09	0.02
	60	−−	−−	−−	0.93	0.04	0.03	0.61	0.37	0.02	0.90	0.07	0.02
France	26	0.80	0.08	0.11	0.65	0.27	0.08	0.69	0.25	0.06	0.68	0.26	0.05
	31	−−	−−	−−	0.66	0.27	0.08	0.70	0.24	0.06	0.70	0.25	0.05
	48	0.55	0.31	0.14	0.69	0.22	0.09	0.67	0.28	0.05	0.63	0.27	0.10
	60	−−	−−	−−	0.73	0.19	0.09	0.61	0.34	0.05	0.66	0.24	0.10
Germany	26	0.31	0.47	0.23	0.82	0.03	0.15	0.89	0.04	0.07	0.86	0.07	0.07
	31	−−	−−	−−	0.81	0.04	0.15	0.89	0.03	0.09	0.86	0.08	0.07
	48	0.21	0.57	0.22	0.82	0.04	0.15	0.86	0.04	0.11	0.81	0.12	0.08
	60	−−	−−	−−	0.82	0.06	0.13	0.74	0.15	0.12	0.82	0.11	0.07
UK	26	0.19	0.76	0.05	0.62	0.36	0.03	0.88	0.11	0.02	0.88	0.09	0.03
	31	−−	−−	−−	0.59	0.38	0.04	0.88	0.11	0.02	0.88	0.08	0.03
	48	0.48	0.44	0.07	0.64	0.32	0.04	0.91	0.08	0.02	0.90	0.06	0.04
	60	−−	−−	−−	0.65	0.32	0.03	0.73	0.24	0.02	0.91	0.04	0.05
US	26	0.37	0.53	0.10	0.25	0.69	0.06	0.16	0.78	0.06	0.73	0.25	0.02
	31	−−	−−	−−	0.22	0.68	0.10	0.20	0.61	0.19	0.74	0.24	0.02
	48	0.39	0.50	0.11	0.24	0.70	0.06	0.20	0.74	0.06	0.73	0.25	0.02
	60	−−	−−	−−	0.26	0.64	0.10	0.23	0.61	0.16	0.74	0.24	0.02
Sweden	26	0.11	0.60	0.29	0.23	0.58	0.19	0.64	0.18	0.18	0.47	0.25	0.28
	31	−−	−−	−−	0.20	0.60	0.21	0.65	0.17	0.18	0.47	0.25	0.28
	48	0.06	0.68	0.26	0.15	0.67	0.18	0.67	0.14	0.19	0.47	0.27	0.26
	60	−−	−−	−−	0.12	0.70	0.18	0.51	0.29	0.19	0.46	0.28	0.26
Spain	26	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	31	−−	−−	−−	0.16	0.52	0.32	0.23	0.54	0.23	0.23	0.56	0.22
	48	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−	−−
	60	−−	−−	−−	0.17	0.46	0.38	0.07	0.71	0.22	0.24	0.41	0.36