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Market Integration in the Ottoman Empire and Eastern Mediterranean from the Sixteenth Century until World War I

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ABSTRACT

Making use of large volumes of mostly archival price data, this study examines wheat market integration in the Ottoman Empire and around the Eastern Mediterranean against a background of trends across Europe during the same period. While recent studies for Europe show a gradual, drawn-out process going back to the late medieval era, we found that rates of integration in the Ottoman Empire fluctuated without a clear trend during the early modern era followed by greater international integration and spatially uneven domestic integration in the nineteenth century. Overall, gains in Ottoman market integration were slower than those in western and central Europe in both periods. We emphasize the role of technological and institutional changes including changes in state capacity for this pattern.

INTRODUCTION

Recent studies on wheat market integration in Europe, China and other regions began to provide new insights into the broader discussion of the role of market integration in the Great Divergence and more specifically, the onset of the Industrial Revolution and modern economic growth. Studies employing historical wheat prices have shown that market integration in Europe was a long-term, continent-wide process that began in the mid-fifteenth and continued into the nineteenth century with accelerations and setbacks. Chilosi et al (2013) and Federico et al. (2021) and others have also suggested there were strong regional variations in the timing and pace of integration within the continent and that the Little Divergence within Europe coincided with more advanced market integration among the economic leaders during 1500-1800. At the same time, geographical patterns of integration, particularly the timing and extent of participation of regions such as Southern and Eastern Europe in the broader trend of integration have attracted limited attention in this recent literature.

Studies on the historical trajectory of market integration in the Ottoman Empire and around the Eastern Mediterranean and its role in global economic divergence have also been few in

number and limited in scope.[1] Making use of large volumes of mostly archival price data, this study examines wheat market integration in this region against a background of trends across Europe during the same period. We first construct a wheat price dataset for the Ottoman Empire and Eastern Mediterranean, relying on both primary and secondary sources. This dataset is the most comprehensive in the literature, covering 2,548 annual wheat price observations for 26 Ottoman cities from the sixteenth to the twentieth century. Of these, 1,854 observations pertain to 11 major cities, enabling the construction of long-term price series to analyze trends. To put Ottoman trends in context, we also used price series for 42 European cities from the same period, based on Federico et al (2021) and other country-specific data.

We then use the new dataset to construct several market integration indices. Measuring market integration is complex due to its multidimensional nature and the variety of methodologies available, each with distinct data requirements and advantages. To provide a comprehensive perspective, we adopt a diverse methodology, constructing indices for domestic and international integration based on the coefficient of variation, bilateral price differences, pairwise correlations, and factor analysis.

Our findings suggest that the Ottoman Empire should be regarded as part of the European trade network rather than an isolated entity during the early modern centuries and until World War I. However, it is also evident that the Ottomans, along with other east European polities, occupied a position on the periphery of the European trade system. While recent studies for Europe found a gradual, drawn-out market integration process going back to the sixteenth century and even earlier, we found that rates of integration in the Ottoman Empire fluctuated without a clear trend during the early modern era followed by greater international integration and spatially uneven domestic integration in the nineteenth century. Overall, gains in market integration were slower than those in western and central European regions and countries in both periods.

Our results also show that core areas of the empire connecting coastal areas close to the capital city stand out with a higher degree of wheat market integration in the early modern era. During the seventeenth and eighteenth centuries, level of price convergence between the capital city of Istanbul and three other cities in this core area for which we have more detailed price data, was comparable to many parts of western and central Europe. Before the nineteenth century,

[1] Quantitative studies of Ottoman market integration include Özmucur and Pamuk (2007), Ceylan (2016), Li, Panza and Song (2019) and Panza (2023).

Ottoman political system was relatively decentralized and local notables could develop autonomous fiscal and military capacity and bargain with the center. As one moved away from the core regions, the central authority weakened, resulting in different measurement standards, inadequate transportation infrastructure, and occasional local conflicts—all of which disrupted markets. Moreover, unlike many parts of Europe, most of the rivers in the Ottoman Empire were not suitable for year-round navigation and costs of overland transportation often by camel caravans remained prohibitively high. As a result, we find there were large differences in the degree of integration of locations on the coast and the interior. For both the core area and the entire empire, seventeenth and eighteenth centuries were characterized by medium term fluctuations but no secular trend towards greater market integration. Since technological change remained limited, patterns of market integration in the Ottoman Empire during the early modern centuries was related mostly to political and institutional changes.

In contrast, significant increases in market integration emerged in the nineteenth century, driven by new technologies, institutional reforms, centralized state-building and open trade policies. While it is not easy to disentangle and measure the impact of each separately, it is clear that both technological changes such as the steam engine and telegraph and institutional changes including changes in Ottoman state apparatus and capacity contributed to the integration of Ottoman wheat markets. Railroads built mostly by European companies arrived relatively late, in the third and last quarter of the 19th century, and gave priority to the needs of international trade. We find their impact on wheat market integration remained regionally uneven. On the eve of World War I, areas in the interior without railroads remained isolated from international trade networks. Overland transportation costs remained high and markets remained fragmented in these regions.

The rest of the article proceeds as follows. The next section reviews debates on the causes and consequences of market integration. Section three provides an overview of Ottoman wheat markets and policies. Section four introduces the dataset and discusses the empirical methodology. Section five presents the results, and section six situates them within the broader context of debates on market integration and Ottoman economic history. The final section concludes. Appendices provide details on the dataset, methodology, and robustness checks.

MARKET INTEGRATION, ITS DRIVERS AND LONG-TERM ECONOMIC GROWTH

Economists and economic historians have for long regarded the expansion of markets and the resulting increase in the division of labor and specialization as powerful sources of economic growth, especially in the pre-industrial era. Among recent explanations of the Great Divergence, for example, an influential view holds that well-functioning and efficient markets supported by a certain set of institutions in Europe, not only led to higher per capita incomes during the early modern period but also contributed to the emergence of the Industrial Revolution and its rapid spread in the continent during the nineteenth century. Alongside complementary institutions like a non-distortionary pricing system, robust legal frameworks, and well-defined property rights, the integration and increased efficiency of markets from the Middle Ages onward are believed to have fostered effective resource allocation and productivity gains in Europe (De Vries 1994; Persson 1988; van Zanden 1999; 2002). This phenomenon, often referred to as Smithian growth, contrasts with the situation in China, India, Russia, and other regions. In these latter areas, the lack of an institutional environment conducive to trade and the underperformance of markets are argued to have hindered pre-industrial growth (Studer 2008).

In recent decades, along with the shift of scholarly focus to markets and institutions in explaining long-term economic growth and divergence, there has been an increase in studies of wheat market integration, not only for Europe but also for Asia. Wheat prices are among the best quantitative evidence available especially for earlier periods: they are abundant and, given the fairly homogenous nature of wheat, relatively easy to standardize. As economic historians increasingly used wheat price data, market integration has emerged as one of the topics where quantitative methods have made major inroads into research on pre-modern economic history.

In these recent studies, market integration is usually defined as “opening and development of trade between heretofore autonomous markets and their integration into a single operative entity” (Jacks 2004: 286).” Markets integrate when trading costs decline, enabling profitable trade over longer distances. These costs involve various costs associated with trade such as transportation costs, information costs, costs associated with different measures and currencies, policy barriers including tariff and non-tariff barriers, negotiation and contract enforcement costs, legal and regulatory costs and local distribution costs.

One important cause of market integration or the decline in trade costs is technological change. Technological innovations decrease material and time costs of trade by curtailing transportation and information costs, as well as costs concerning storage and spoilage. There is a long list of specific technological innovations that facilitated trade, going back to the wheel. However, these innovations were relatively limited in number during the early modern era. The key breaks that the literature has focused on were the invention of steam engine which led to the proliferation of steam ships and railroads and later of telegraph during the nineteenth century.

There is growing recognition in recent decades that institutional change and improvement could be an at least equally powerful cause of market integration in the long run. Those who emphasize the role of institutions argue that technological innovations only set the potential upper bound for market integration. The degree of actual market integration actually depended on how closely historical economies operated in relation to the technological frontier. This view argues that higher transaction costs (information, negotiation, enforcement, exaction costs, and the like) associated with inefficient institutions were more important than freight charges in hampering trade (Epstein 2000; Ogilvie and Carus 2014). Consequently, market integration literature considers institutional innovations which spread risks (i.e., marine insurance), increased the mobility of capital (i.e., bills of exchange, improvements in the banking system), and reorganized commercial activity (i.e., new firm models), as important in fostering integration (Jacks 2004).

Within institutions and institutional change, one area the recent literature has placed a good deal of emphasis on is the role of the state and state capacity which began to increase in many parts of Europe well before the nineteenth century (Karaman and Pamuk 2013). State capacity is conjectured to have contributed to market integration by making it possible to build physical infrastructure for deploying old or new transportation technologies, i.e canals, railroads, postal systems, ports. It also allowed the building, standardizing and enforcing of the institutional infrastructure, including the legal system, measurement units, monetary system, and tariffs and taxation. More broadly, it has been pointed out that in addition to market institutions, well-functioning markets need to be supported by a wide range of institutions that provide the critical functions of monetary and fiscal stability, regulation, redistribution and conflict management. The state played key roles in the development and functioning of these institutions (Rodrik, 2013).

However, there are many examples indicating that the role of state in the functioning of markets cuts both ways, and that state could also harm trade by interfering with markets. States seeking revenue could also impose higher taxes, destabilize monetary systems and support monopolies including local monopolies on trade. They could also foreclose and crowd out private technological and institutional innovations, banning legal and financial devices, preying on autonomous economic organizations. It is also possible that stronger states that removed domestic barriers to trade could begin to build new barriers with the outside world, which could lead to greater domestic but lower international integration.

Pre-modern states have for long been actively involved in grain markets. Many of them adopted the provisioning of major urban centers, especially of grains, as a key policy objective and implemented various policies including price controls, and restrictions on the movement of goods. The example of the Roman *annona* which provided free grain and later bread to parts of the population of the capital city and which continued in more limited form in the Byzantine empire until the seventh century is well known (Teall 1959; de Vries 2019). Early modern Chinese governments also adopted various policies including granaries in order to stabilize grain markets in both urban and rural areas (Will, Wong, and Lee 2020).

In medieval Europe, city administrations sought to secure adequate food deliveries to their markets by developing a range of provisioning policies designed to protect the interests of urban consumers. From the sixteenth and seventeenth century, states in northwest Europe began a process of fiscal centralization. Tax revenues of central administrations first in the Netherlands and later in England exceeded 10 percent (Dincecco, 2009; Karaman and Pamuk, 2013). State capacity also began to rise in other regions of the continent during the seventeenth and the eighteenth centuries. Along with the rise in state capacity, infrastructure investment in roads, canals, rivers and ports increased. Improvements occurred also in market supporting institutions, including the legal system, measurement units, monetary system, and tariffs and taxation (Ogilvie 2022). Not unrelatedly, there also emerged a retreat from the more interventionist policies and growing reliance on markets, which contributed to integration of markets. The Dutch Republic and England began to move away from state interventionism in wheat markets before others.

Unfortunately, attempts to assess, quantitatively or even qualitatively, the relative importance of technological as opposed to institutional change have been rather rare in market integration studies (Jacks 2004, 2006; Keller and Shiue 2008, 2020; Uebele 2011; Uebele and Gallardo-

Albarrán 2015). Based on large sets of wheat price data from many locations across Europe, two recent papers (Chilosi et al 2013 and Federico, Schulz and Volckart 2021) showed that wheat market integration was not a sudden and unprecedented phenomenon triggered by the nineteenth-century improvements in transportation technology but rather a continent-wide phenomenon that started much earlier with improvements in the institutional environment, including removal and/or lowering of duties on internal trade and tariffs on external trade. They argue that even if a continental market emerged only in the nineteenth century, there were multiple phases of regional integrations with a gradually expanding geographical reach in the early modern centuries. This recent evidence for early market integration have further strengthened the view that the trajectory of pre-industrial commodity markets depended on the improvements in the institutional environment.

In contrast, the available evidence about early modern wheat market integration in Asian countries is scarce and findings that have emerged in recent decades is rather mixed. Shiue and Keller (2007) conducted the first quantitative comparison between China and western Europe. They provided econometric evidence showing that grain markets functioned with comparable levels of efficiency in the two areas on the eve of the Industrial Revolution, which they considered as an indicator that both public and private, official and non-official institutions in pre-industrial China effectively supported trade. However, more recent research on Chinese markets have found a secular trend of deterioration in market performance from the second half of the eighteenth century onwards. In a series of papers, Bernhofen et al. (2017, 2018, 2022) and more recently Cui, Yang, and Xiong (2021) have suggested that in northern and southern China, as well as in the most advanced region of the Lower Yangzi River, market integration began to decline from the 1760s, and European markets were outperforming Chinese markets before 1800. These studies point to political instability and the decrease in state capacity as the most likely cause behind the decline in grain market integration.

Studer (2008) also found significant discrepancy between Europe and India in terms of the extent of market integration between 1750 and 1914. His results show that Indian wheat markets remained largely isolated due to high transportation costs and political fragmentation, and there were no observable gains in market integration before the mid-nineteenth century. In comparison, political integration in Mughal India was significantly higher from the second half of the sixteenth century until the early decades of the eighteenth century. However, we do not have quantitative evidence on the level of integration of wheat markets during this earlier period.

At the present state of research, available empirical evidence from the non-Western world is still insufficient to conclude to what extent the “distinctive advantage” of Europe lay in markets and market-supporting institutions and the state’s capacity to provide the necessary public goods and the legal framework.

Thanks to the availability of large volumes of wheat price data for pre-modern periods, recent studies on wheat market integration have begun to provide significant insights into the extent and timing of market integration in both Europe and Asia and any role market integration may have played in the Great Divergence. Our brief review of the recent literature also suggests that wheat market integration studies can also provide new insights into the roles played by the leading determinants of market integration, namely technological change and institutional change including the rise of states and state capacity.

WHEAT MARKETS IN THE OTTOMAN EMPIRE

The Ottoman Empire was “one of the greatest, most extensive, and longest-lasting empires in the history of the world” (Quataert 2005, p. 3). At its apogee, the Ottoman realm stretching from the Balkans through present day Turkey to Syria and Egypt was a “vast domestic economic entity,” (Panzac 1992, p. 202) and one of the world economies as defined by Braudel (1982). The economic interdependence of its provinces was seen as essential not only for the welfare of the subjects but also for the political cohesion of the empire (Inalcık and Quataert 1994)

The Ottoman Empire encompassed vast landlocked regions and many of its rivers were not suitable for year-round navigation. During the early modern era, costs of overland transportation remained prohibitively high. Available estimates suggest that the price of wheat almost doubled as it was transported 100 kilometers overland (Grehan 2007; Ceylan 2016). Overland transportation costs did not decline until the arrival of railroads in the second half of the nineteenth century. Maritime transport thus remained central to the food supply of large urban areas. Lower costs in maritime transportation and shorter journey times facilitated the exchange of foodstuffs, particularly grains, among coastal areas (Panzac 1992). As a result, a pattern of economic interdependence emerged amongst the coastal regions of the empire while the interior regions including large parts of Anatolia continued to rely primarily on their own vicinity for grains well into the nineteenth century and even until the interwar period.

During the early modern centuries political institutions and economic policies and practices of the Ottoman central government often reflected the interests and priorities of the state elites. The economic elites, landowners, merchants, manufacturers and moneychangers enjoyed a good deal of local power and autonomy but their influence over economic matters, and more generally over the policies of the central government remained limited. Institutional change thus remained selective. For example, there were more institutional changes in public finance than in private finance during these centuries. Many of the key institutions of the Ottoman order such as state ownership of land, urban guilds and restrictions on private capital accumulation remained intact until the nineteenth century (Pamuk 2004; 2009).

The central state exerted greater control over core regions near the capital city, with political power held by local powerbrokers as one ventured farther from the center. This was particularly evident in the Asian and African provinces. Physical infrastructure investments by the central government also concentrated in the core provinces. Local governments undertook investments in their own regions with or without the direct support of the central government. The Ottoman Empire had a reasonably well functioning legal system with large numbers of local courts. However, the effectiveness of the courts and the level of security across the empire fluctuated with state capacity. This framework resulted in a system where institutions and policies, including those relevant to long-distance trade and functioning of markets, relied not solely on the central government but also on the coordination and collaboration of local governments and local elites (Salzmann 1993; Gounaris 2008; Mikhail 2011; Veinstein 1975).

The Ottoman state played a crucial role in the establishment and promotion of a complex network of food production and consumption that encompassed the empire's territories on three continents. The capital city was much larger than other urban centers and depended for its grain supply on a large area from the Black Sea to the Mediterranean, primarily through maritime routes. The central government made use of a large set of measures including export prohibitions, delivery quotas on grain producing coastal regions, state purchases at below market prices, licenses to designated merchants and other measures to secure the wheat supply of the capital city and the army. These policies and tools as well as their monitoring involved the cooperation and coordination of local governments and local agents including merchants and were supported partly by local taxes and organizations. Merchants organizations and other non-governmental entities also participated in this process. However, these policies and tools were implemented in a flexible fashion. Well aware of the limitations on

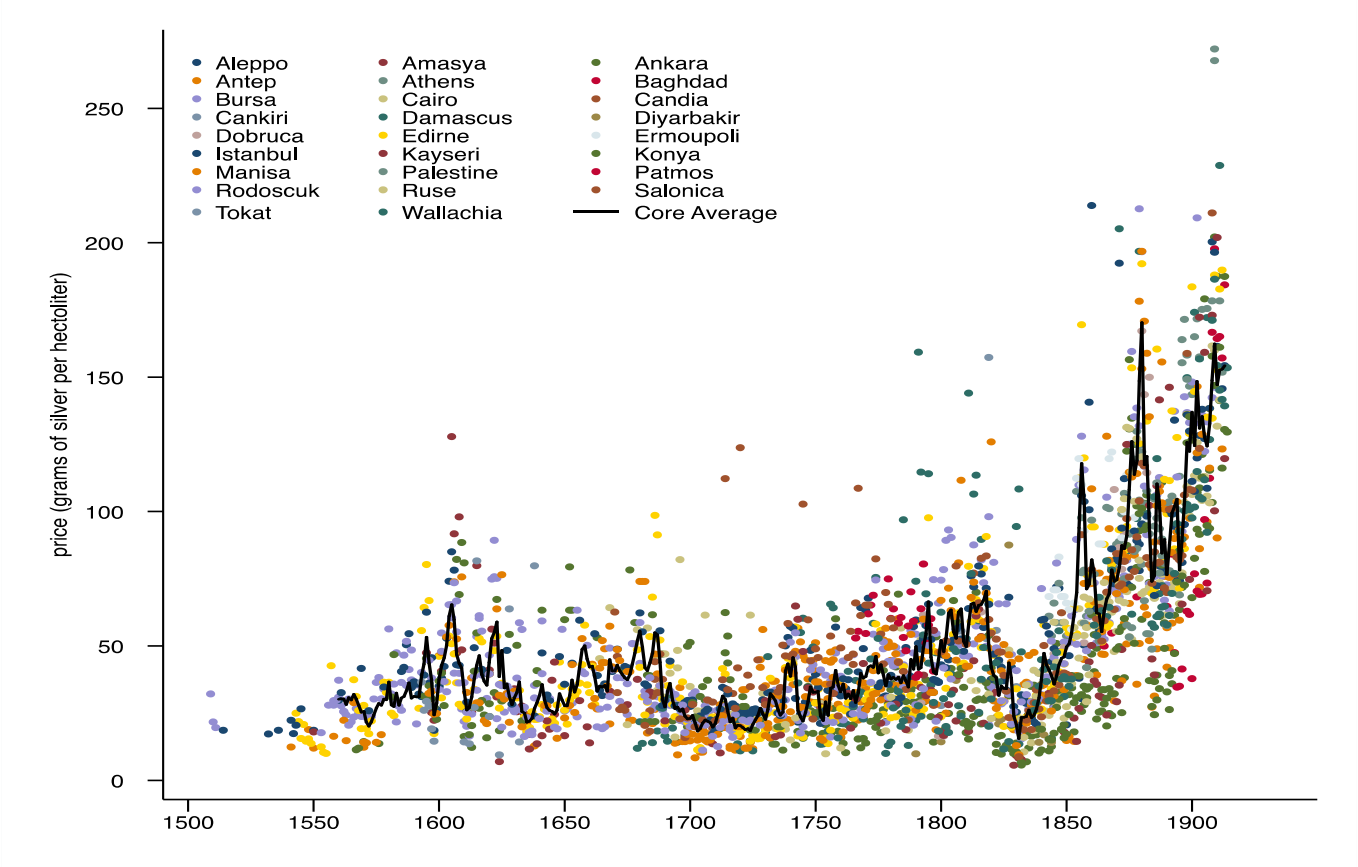
its capacity, the central government intervened selectively in markets (Coşgel 2015). During normal times, state involvement was limited, and private merchants played a large role in securing the food supply of the capital city. Many of the non-market measures and tools were adopted during periods of shortages or war. The food supply problems of other smaller and food deficit urban centers were also addressed by a combination of markets and non-market measures by the local governments and secured normally within the hinterland of these urban centers (Güçer 1952, 1964; Alexandrescu-Dersca Bulgaru 1958, 1992; Murphey 1987; Güran 1988; Aksan 1995; Aynural 2002; Yıldırım 2003; Ağır 2013; Kazdağlı 2022).

DATA AND METHODOLOGY

Price Data

A major contribution of the study is to build the first comprehensive historical price dataset for the Ottoman Empire and more broadly Eastern Mediterranean from the 16th century to early 20th century. For this purpose, we collected wheat price data from a large number of archival records, including Ottoman court registers, inheritance registers, public foundation records and consular reports, as well as secondary sources. Because the measurement and monetary units varied greatly across different parts of the Empire and over time, we standardized them. We then cross verified price data across different sources and regions, investigated inconsistencies, corrected them when possible, and recorded any remaining issues. The resulting dataset covers 26 cities and a total of 2546 annual price observations. The sources, the conventions used in data collection, and potential issues with the data are discussed in Appendix A.

Figure 1. Wheat Prices in Ottoman cities



Sources: See Appendix A

Figure 1 gives an overall picture of the price dataset. It covers 26 cities or regions, but there is significant variation in terms of the availability and the start date for the price series.[2] To address these differences, in the empirical analysis, we work with two separate Ottoman samples. The "core" sample includes four cities around the capital: Istanbul, Edirne, Bursa, and Manisa. This core region is at the heartland of the Empire, where political control was direct. In terms of geographic area, the core is comparable to medium sized European states. In terms of data quality, the core cities allow building a balanced price dataset from 1560s to 1914 with some interpolation. The second, "wide" sample, consists of the four core cities listed above plus an additional seven cities.[3] For this wide sample, a balanced dataset can be constructed from 1680 to 1914, but with more interpolation and hence overall lower quality of data. For the remaining

[2] Table A1 in the appendix discusses data availability for different cities and periods.
[3] These seven cities are Ankara, Konya, Antep, Salonica, Damascus, Kayseri, Cairo.

fifteen cities, the price data provides insights on relative price levels, but is too fragmentary to be included in the empirical models.[4]

To better interpret Ottoman market development patterns, we also put Ottoman evidence in comparative perspective with other European regions. European price data is mainly taken from Federico, Schulze and Volckart (2021) dataset. For London, Vienna, Lisbon, Madrid, Valencia, we also rely on other sources.[5]

Figure 2. Map of Cities in the Sample

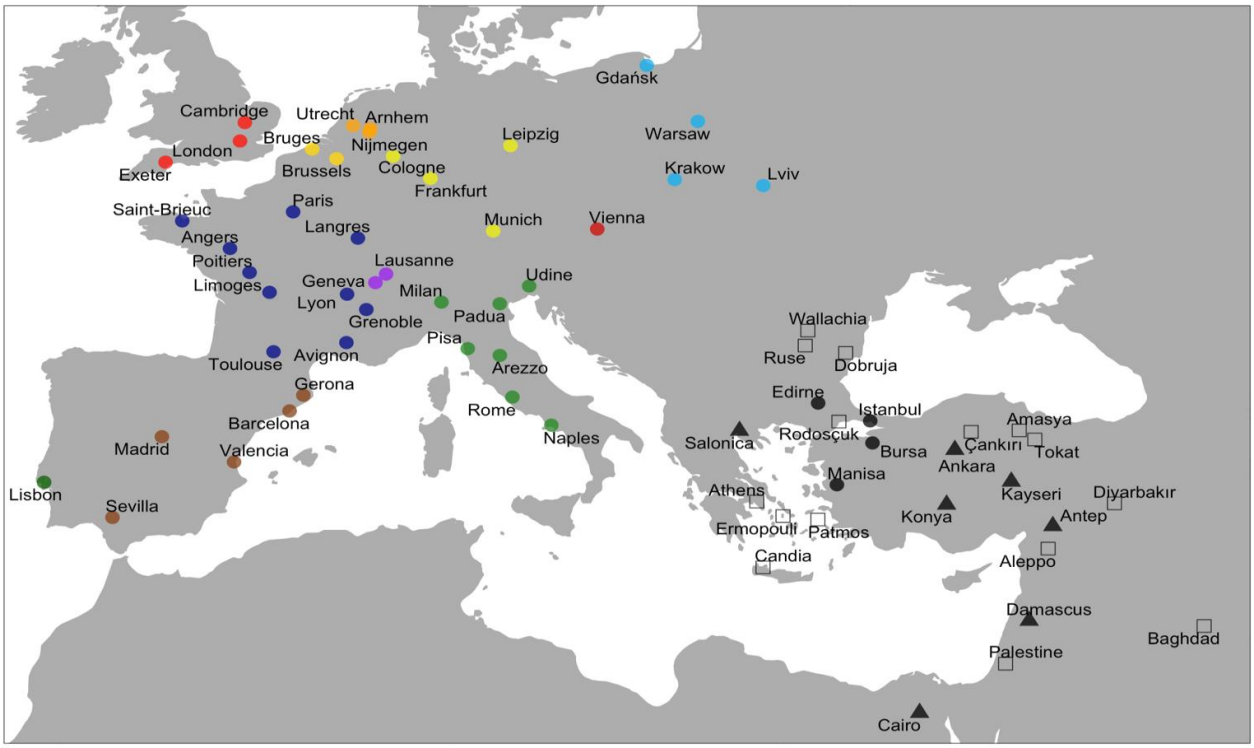


Figure 2 gives a geographic overview of the sample. We have price data for four core Ottoman cities (black circles) and seven outlying cities (black triangles) that are included in the empirical analysis. There is also more fragmentary price data for fifteen other Ottoman cities (hollow squares), but they are not included in the empirical analysis due to gaps in the series. As for

[4] The sharp rise in wheat prices in the decades before World War I as shown in Figure 1 is not due to a rise in wheat prices expressed in local currency but due to the sharp decline in the value of silver against gold in international markets coupled with the shift in the Ottoman currency from a regime based on gold and silver to one centered on gold. European prices of wheat expressed in grams of silver also show a similar rise during this period.

[5] For London, Clark (2001). For Vienna, Knapp, and Adelsberger (2021) before 1850, Allen (2001) afterwards. For Lisbon, Palma and Reis (2019) before 1850, Reis (1979) afterwards. For Madrid, Losa and Zarauz (2021) before 1800, Segova series from Federico, Schulze and Volckart (2021) for 1800-1857. For Valencia between 1806-1855, Telesforo (1978).

Europe, we rely on price data for a total of 42 cities. In some empirical models, we group these cities into polities/regions, identified in the map with different colors.

Methodology

This section gives an overview of the methodology of the article. We adopt a diverse methodology, relying on several different measures of market integration, analyzing integration both domestic and international levels. This methodological diversity is motivated by presenting a comprehensive and robust picture.

In the literature, the focus is on two dimensions of market integration: price convergence and price comovement. Price convergence refers to the extent to which equilibrium price levels tend to equate and law of one price holds. Price comovement, on the other hand, refers to the degree to which price movements across different markets are synchronized. Both convergence and comovement can be assessed using a range of measurement methods (Federico 2012).

In the light of this methodological diversity, we also adopt a diverse approach, and construct indices of both price convergence and price comovement. To analyze price convergence, we construct coefficient of variation indices and analyze bilateral price gaps. For comovement, we use factor models and pairwise correlation analysis. The details of each of these methods are presented in the next section.

We adopt a diverse methodology for three main reasons. For one, convergence and comovement are related but separate dimensions of market integration, and do not necessarily move together.[6] Second, different methodologies have different data requirements, allow analysis at different aggregation levels, and hence can offer different insights. Third, to the extent that the findings are consistent across methodologies, it provides evidence for robustness.

We also make a distinction between domestic and international integration and construct separate indices for each. Domestic integration refers to integration between markets within the borders of a given polity. International integration refers to integration across all markets in different polities. This distinction is relevant because governments adopted different trade

[6] A decrease in trade costs might cause convergence, but not necessarily increase comovement. A decrease in information costs, on the other hand, might make arbitrage easier and increase comovement, but does not necessarily result in convergence. See Federico, Schulze and Volckart (2021) for a more detailed discussion.

policies for domestic and international trade, potentially leading to different developments in market integration.

Finally, we aggregate and present the findings of the analysis both at the individual city level and polity level. Individual city level results have the advantage of not imposing any predetermined structure on the data and allow capturing the role of city-specific factors such as local geography (Chilosi et al. 2013). Polity level results, on the other hand, allows investigating the role of polity-level factors, such as state capacity and physical, monetary and legal infrastructure.

EVIDENCE ON MARKET INTEGRATION

We review the empirical evidence on market integration in two subsections. The first subsection reviews domestic integration, and the second international integration. In both subsections, we rely on both measures of price comovement and price convergence

Domestic Integration

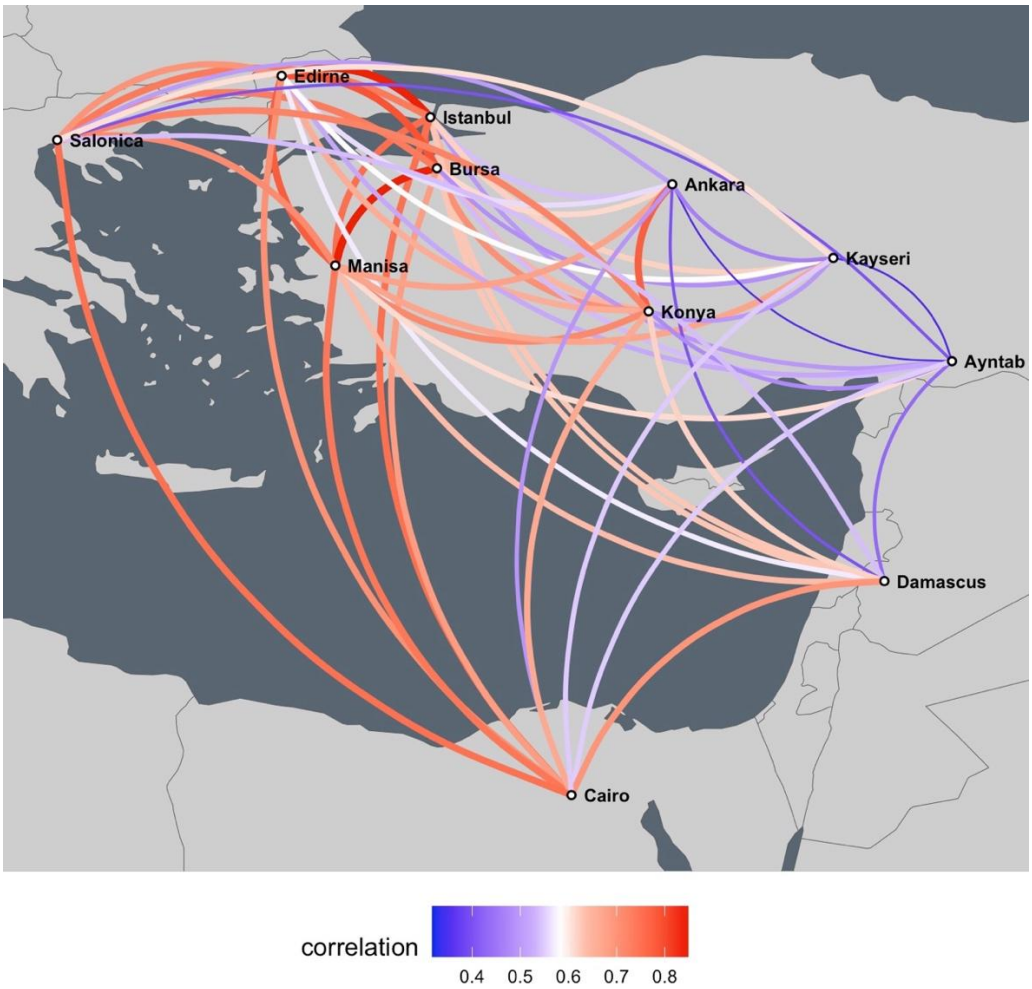
We start by giving an overview of the geography of Ottoman domestic integration. For this purpose, we first compute the most basic indicator of price comovement, pairwise correlations of prices between 11 Ottoman cities from 1680 to 1900:

$$r_{i,j} = \frac{\sum_{t=1}^{T}(p_{i,t} - \overline{p_i})(p_{j,t} - \overline{p_j})}{\sqrt{\sum_{t=1}^{T}(p_{i,t} - \overline{p_i})^2 \sum_{t=1}^{T}(p_{j,t} - \overline{p_j})^2}}$$

where $p_{i,t}$ and $p_{j,t}$ are prices for cities I and j for year t, and the variables with overlines denote the sample means.

Figure 3 plots the calculated bilateral correlations. The figure indicates a concentric pattern of market integration for Ottoman cities. Core cities around the capital and to a lesser extent cities with access to the Mediterranean have relatively synchronized price movements. In contrast, peripheral and inland cities not only had low price correlations with core cities but also between themselves.

Figure 3. Bilateral Price Correlations between Ottoman Cities, 1680-1900



Source: Authors' estimations

Next, we next calculate the most basic indicator for price convergence, the coefficient of variation. For each year, the coefficient of variation is calculated by dividing the standard deviation of wheat prices for different cities in a country by the country average:

$$\mathrm{COV}_t = \frac{\sqrt{\frac{1}{N}\sum_{i=1}^{N}\left(p_{i,t} - \mu_t\right)^2}}{\mu_t}$$

In the formula, $p_{i,t}$ represents the price for city i in year t, and μ_t represents the average price in year t. The underlying idea of this measure is that increasing market integration will reduce price gaps and, consequently, the coefficient of variation.

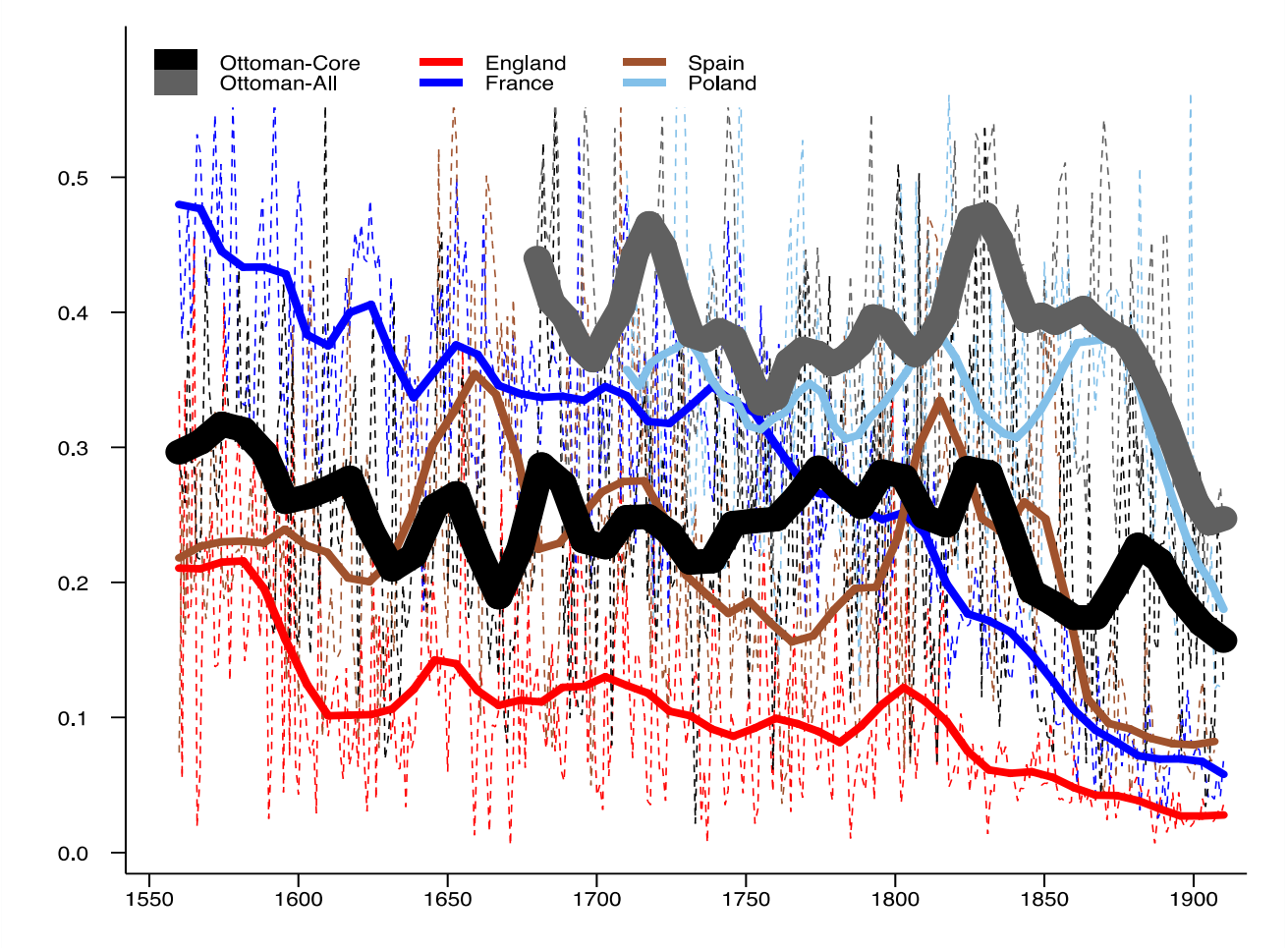
Figure 4 plots the domestic coefficient of variation series for two separate Ottoman samples. The black line represents the core sample of four cities, while the gray line reflects the wider

sample of eleven cities. To put Ottoman evidence in comparative perspective, we also plot domestic coefficient of variation for four European states, England, France, Spain, and Poland-Lithuania.[7] We smooth the coefficient of variation series with a kernel-weighted local polynomial regression to make the figure more tractable. The dashed lines plot the actual coefficients of variation, and the smooth lines the smoothed series.

Figure 4 shows that for the Ottomans, prior to the mid-19th century, there is no evidence of sustained gains in domestic market integration. The 19th century, however, marks a significant improvement in convergence for both the core and wide Ottoman samples. In contrast, in other European countries, the decline in the coefficient of variation began as early as the 16th century and continued steadily over the subsequent centuries.[8]

[7] Poland-Lithuania was gradually partitioned between Prussia, Austria-Hungary and Russian Empire in the second half of the 18th century and is not a unified political entity in the 19th century.
[8] Figure C1 in the appendix also includes coefficient of variation series for three other regions, Italy, Germany and Dutch Republic, showing similar trends.

Figure 4. Domestic Coefficient of Variation Indices for Ottoman Empire and Other European States, 1560-1910



Source: Authors' estimations

The limitation of the coefficient of variation analysis in Figure 4 is that it does not fully account for geographic size. Larger countries tend to face higher transportation costs and greater price differences, leading to higher coefficients of variation. To control for the impact of geographic size, we next calculate another measure of domestic price convergence, bilateral absolute price differences for city pairs within each country:

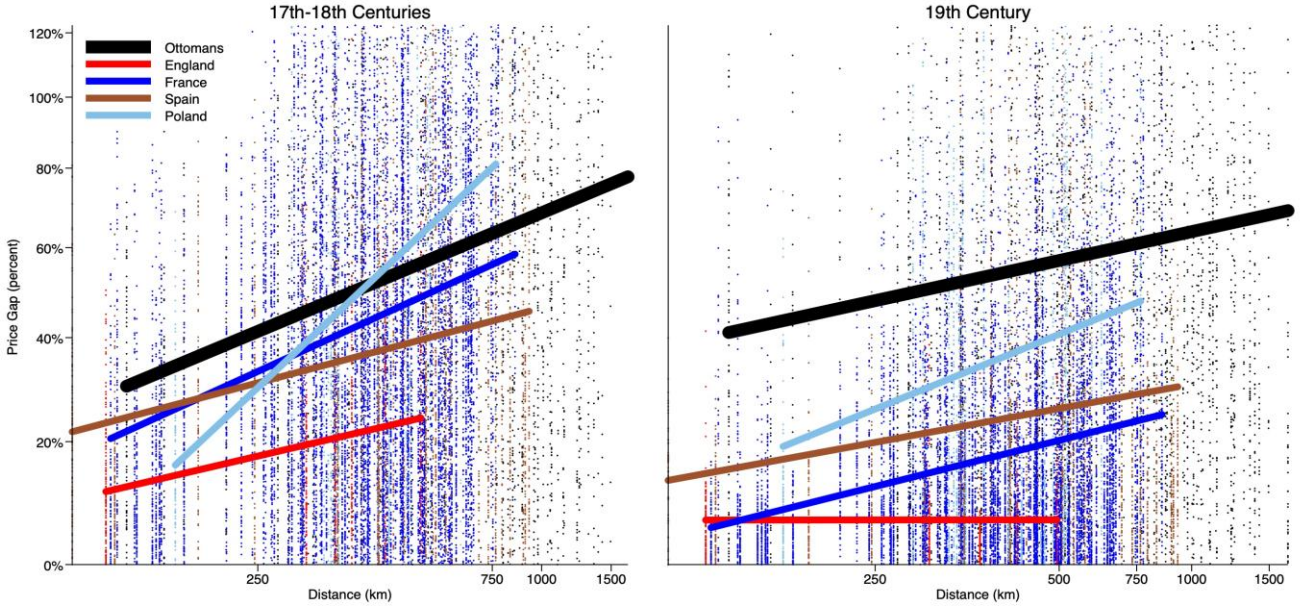
$$\text{logpricedif}_{i,j,t} = \left|\log(p_{i,t}) - \log(p_{j,t})\right|$$

In words, the log absolute bilateral price difference is calculated as the absolute value of the difference between the logarithms of the prices of two cities, for each city pair (i, j) within a country and each year (t).

Figure 5 shows the results. The y-axis shows the absolute price differences (converted to percentages) and the x-axis shows the geodesic distance between city pairs. Observations are plotted separately for the 17th-18th and 19th centuries. In the figures, each point corresponds to one price difference observation, and the lines are the best fit lines for each country.

Figure 5 shows that bilateral price differences tended to be positively correlated with bilateral distance, evident from the positive slopes. However, even after controlling for distances, Ottoman and Polish cities exhibit larger price gaps compared to England, France, and Spain, as evident in the higher levels. In the 19th century, the best-fit lines for all countries shift downward, reflecting improved integration, though the gaps between countries remain.[9]

Figure 5. Bilateral Price Differences Between Pairs of Cities Within Different Countries



Source: Authors' estimations

To further investigate bilateral price differences, the following equation is estimated for Ottoman cities:

$$\text{logpricedif}_{i,j,t} = \sum_{s}(\gamma_s * \text{decade}_s) + \sum_{i}(\alpha_i * \text{city}_i) + \sum_{j}(\alpha_j * \text{city}_j) + +\beta * \log(\text{distance}_{i,j}) + u_{i,j,t}$$

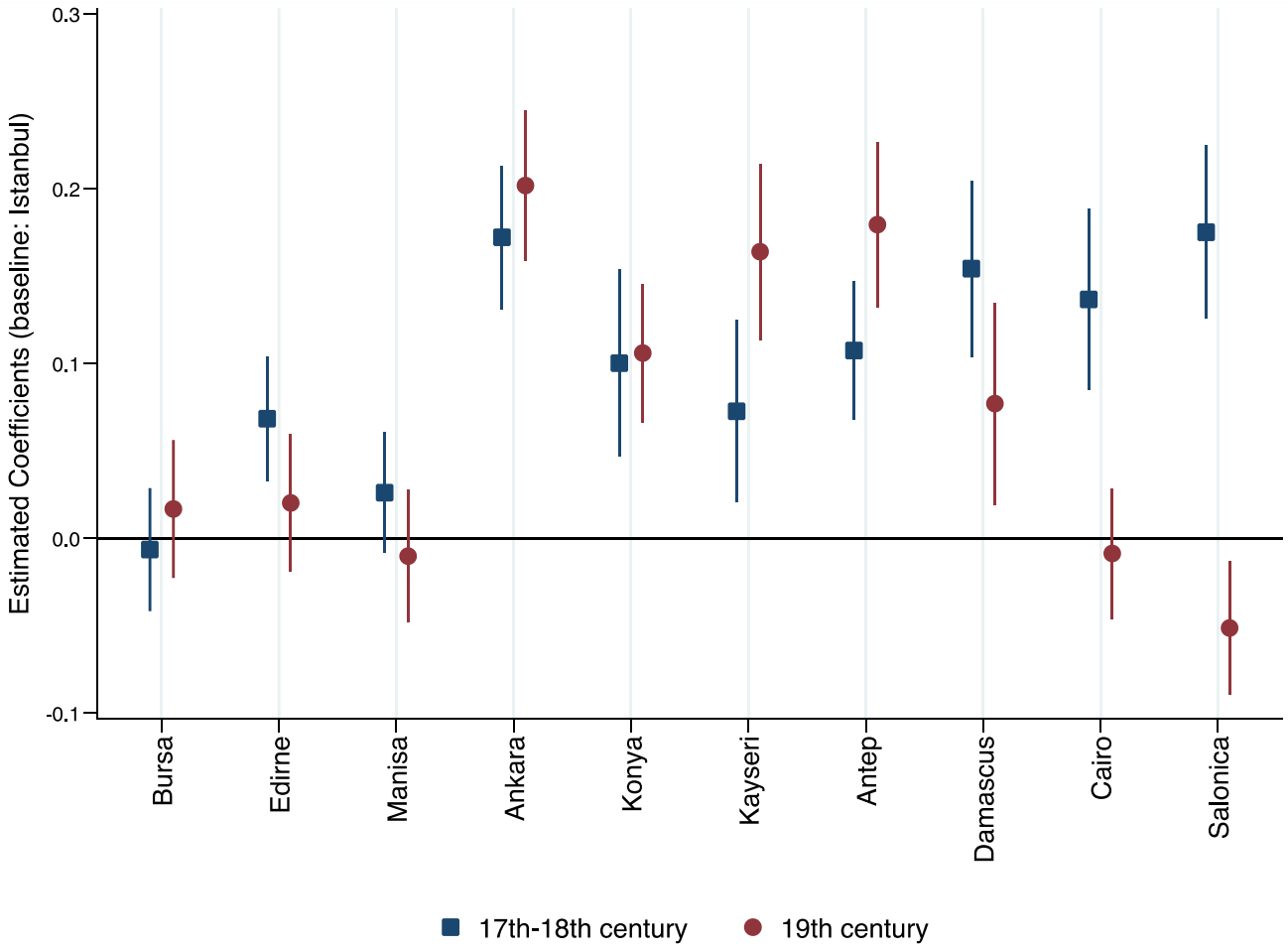
[9] Figures C2 and C3 in the appendix plot bilateral price correlations between pairs of cities within different countries. These figures corroborate that bilateral price correlations tend to decrease with distance, as would be expected. They also show that even after controlling for distance, Ottoman cities tend to have lower bilateral price correlations, consistent with the findings of Figure 5.

In this equation, $\mathrm{logpricedif}_{i,j,t}$ is once again the log absolute price difference between cities i and j at year t, decade_s is an indicator variable that takes value 1 if year t is in decade s and 0 otherwise, city_i and city_j are indicator variables that respectively take values 1 if i and j are in the city pair and 0 otherwise, and $\mathrm{distance}_{i,j}$ is the geodesic distance between cities I and j. The premise underlying the equation is that price difference between any two cities can be decomposed into a common time trend for the country (γ_s), city specific factors (α_i), and the effect of distance between the two cities (β). We estimate the equation separately for before and after 1800, to get a sense of evolution of price gaps in the 19th century.

Figure 6 plots the estimated city fixed effects (α_i),. The x-axis lists the cities, while the y-axis shows the estimated coefficients. Blue markers represent the 17th–18th centuries, and red markers represent the 19th century, with 90% confidence intervals. Istanbul is the baseline, so for each city, the estimated coefficients compare its average price gap with other cities with Istanbul's average price gap. Higher coefficients indicate greater price gaps with other cities and hence lower integration, while lower coefficients indicate smaller price gaps and higher integration.

The first three cities—Bursa, Edirne, and Manisa—are part of the Empire's western Anatolian core and closely align with Istanbul in terms of integration. The next four cities—Ankara, Konya, Kayseri, and Antep—located in central and southeastern Anatolia without waterway access, show consistently larger price gaps compared to Istanbul throughout the period, indicating no significant catch-up in integration. In contrast, Cairo and Salonica, major port cities, display significant price gaps relative to Istanbul in the 17th and 18th centuries but have similar levels of price gaps in the 19th century. Similarly, Damascus experiences some reduction in price gaps in the 19th century, though less pronounced than Cairo and Salonica. These trends suggest that the 19th-century improvements in market integration were driven primarily by port cities, while inland cities experienced more limited progress.

Figure 6. City Fixed Effects for Price Differences between Ottoman Cities, Relative to Istanbul Price Difference Levels



Source: Authors' estimations

Finally, we estimate another measure of price comovement, domestic comovement indices. These indices are calculated first by estimating common factor series for each country, and then measuring the extent to which prices in different cities in that country move together with the estimated common factor.[10] Hence the domestic comovement indices capture the extent to

[10] Formally, domestic comovement indices are calculated as follows. First, for each 51-year window and all cities in the sample, we estimate two domestic common factor series. Second, for each city in the sample, we calculate the share of variation in its price series explained by the estimated common factor series. We then iteratively repeat these steps for each 51-year rolling window, and calculate a comovement index for each city over the period 1580-1900. Third, for each polity, we calculate the polity comovement index as the average of the indices of the cities in that polity. Finally, for ease of comparison, we smooth the indices with a kernel-weighted local polynomial regression and plot them in Figure 7. For the resulting domestic comovement indices, a higher value indicates higher average comovement with the common domestic factor series. The factor model is discussed in more detail in Appendix B.

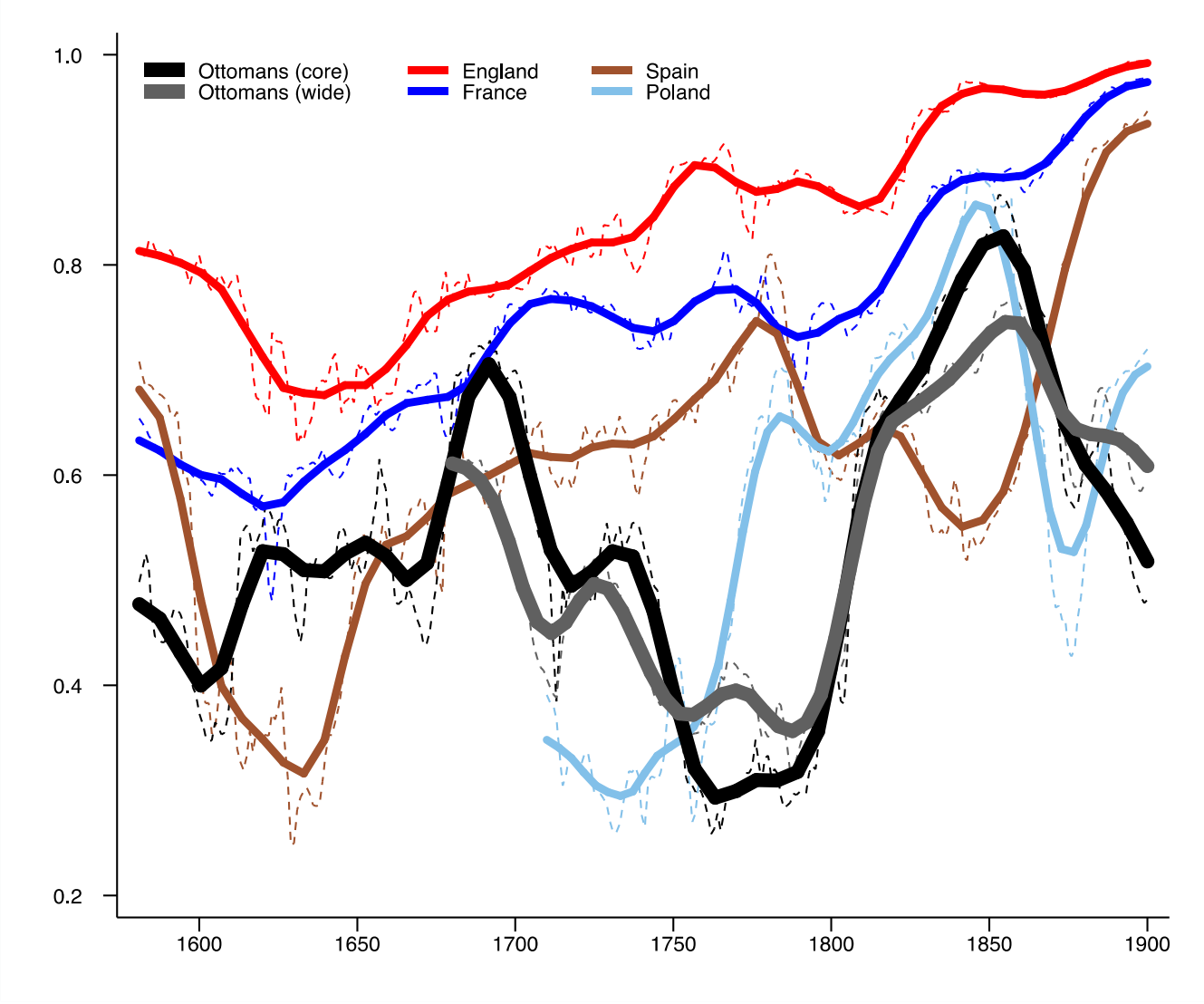
which prices in different cities are synchronized within a country. We estimate domestic comovement indices for the core and wide Ottoman samples and four European countries.

Figure 7 plots the estimated comovement indices. The black line is for the four city Ottoman core sample and the gray line for the eleven city Ottoman wide sample. The evidence suggests only modest gains in the long-run, occurring primarily in the early 1800s. Instead of a trend, the overall trajectory is characterized by fluctuations that align closely with major political events. Notably, the increase from 1600 to 1700 coincides with the stabilization and consolidation of government authority, the collapse in the second half of the 1700s with the disintegration due to the pressure of Austrian and Russian wars, and the increase in the early 1800s with the modernizing reforms and the build-up of modern state.

When Ottoman domestic comovement patterns are put in comparative perspective with other European polities, the Ottoman levels once again appear at the lower end of the spectrum. Other polities with low levels of comovement are Poland-Lithuania, characterized by a weak central government and subsequent disintegration in the 19th century, and Spain, marked by jurisdictional fragmentation. On the opposite end of the spectrum is compact and politically centralized England. France, with its larger territory, falls somewhere in-between.[11] As for the time trends, the rest of Europe exhibits an overall movement toward greater domestic comovement, a process that started in the early modern period and accelerated in the first half of the 19th century and then slowed down in the second half.

[11] Figure C4 in the appendix also plots domestic comovement series for Dutch Republic, Germany and Italy, with similar trends. Figure C5 plots comovement indices calculated based on the analysis of the cyclical components of the HP-filtered wheat price series. The trajectories are once again similar but more attenuated, and overall gains in comovement are lower. Figure C6 plots correlations of individual Ottoman city price series with the common Ottoman domestic factors, indicating higher integration for core cities and lower integration for peripheral cities.

Figure 7. Domestic Comovement Indices for Different Polities/Regions, 1580-1900



Source: Authors' estimations

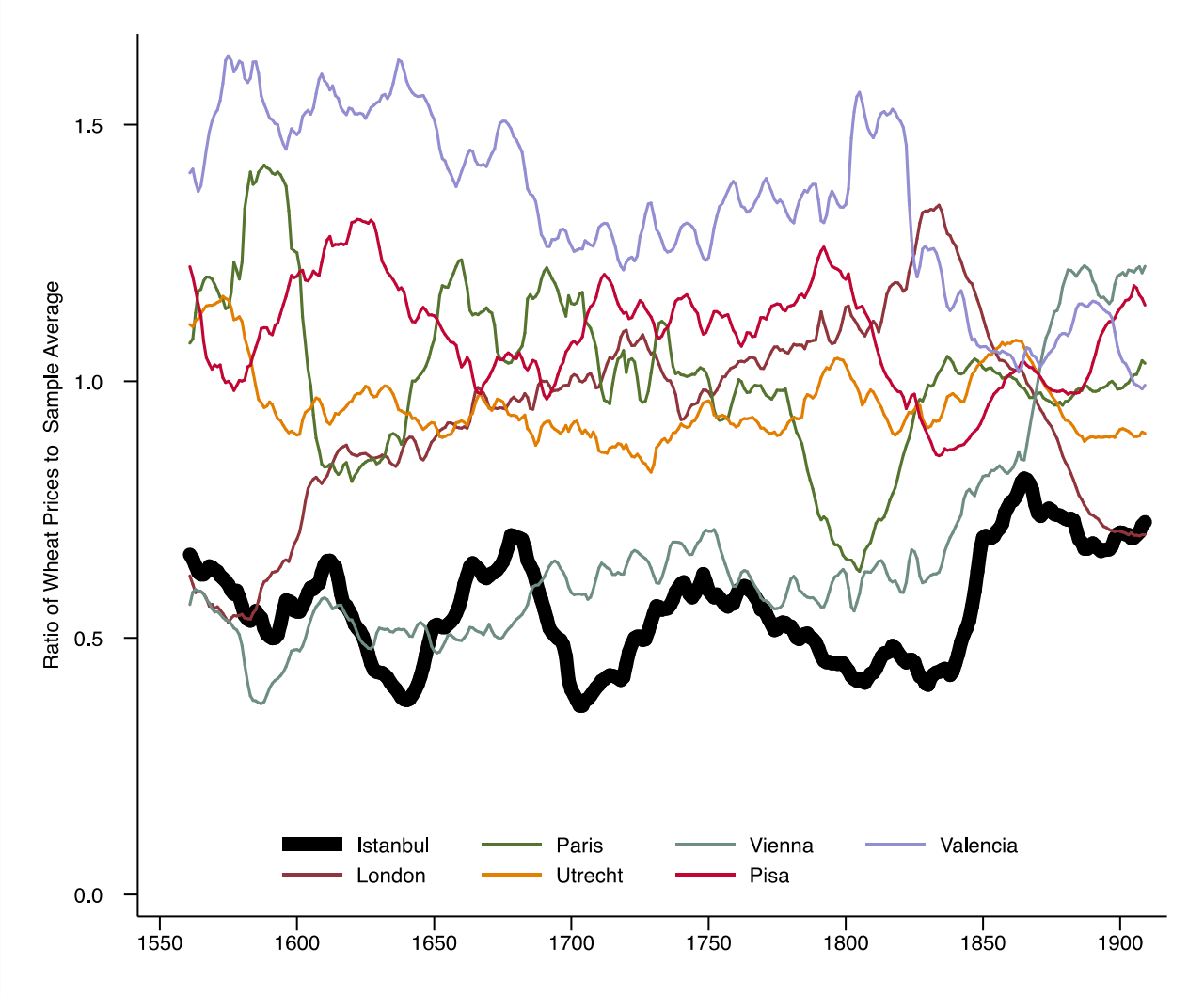
International Integration

This subsection reviews the evidence on the integration of Ottoman cities to international markets.

First, to get a sense of convergence of Ottoman prices with international prices over time, Figure 8 plots the ratio of wheat prices in Istanbul to the average of a European city sample, together with the same ratio for other European cities. The figure indicates that Ottoman wheat prices remained below the European average, but there was a clear convergence in the 19th century.

In other words, for the Ottomans, 19th century was not only a period of domestic price convergence, but also an international one.

Figure 8. Ratio of Wheat Prices in Ottoman and European Cities to Sample Average



Source: Authors' estimations

For a more formal measure of international price convergence, we next estimate a model of the evolution of absolute price differences between Ottoman cities and other European cities:

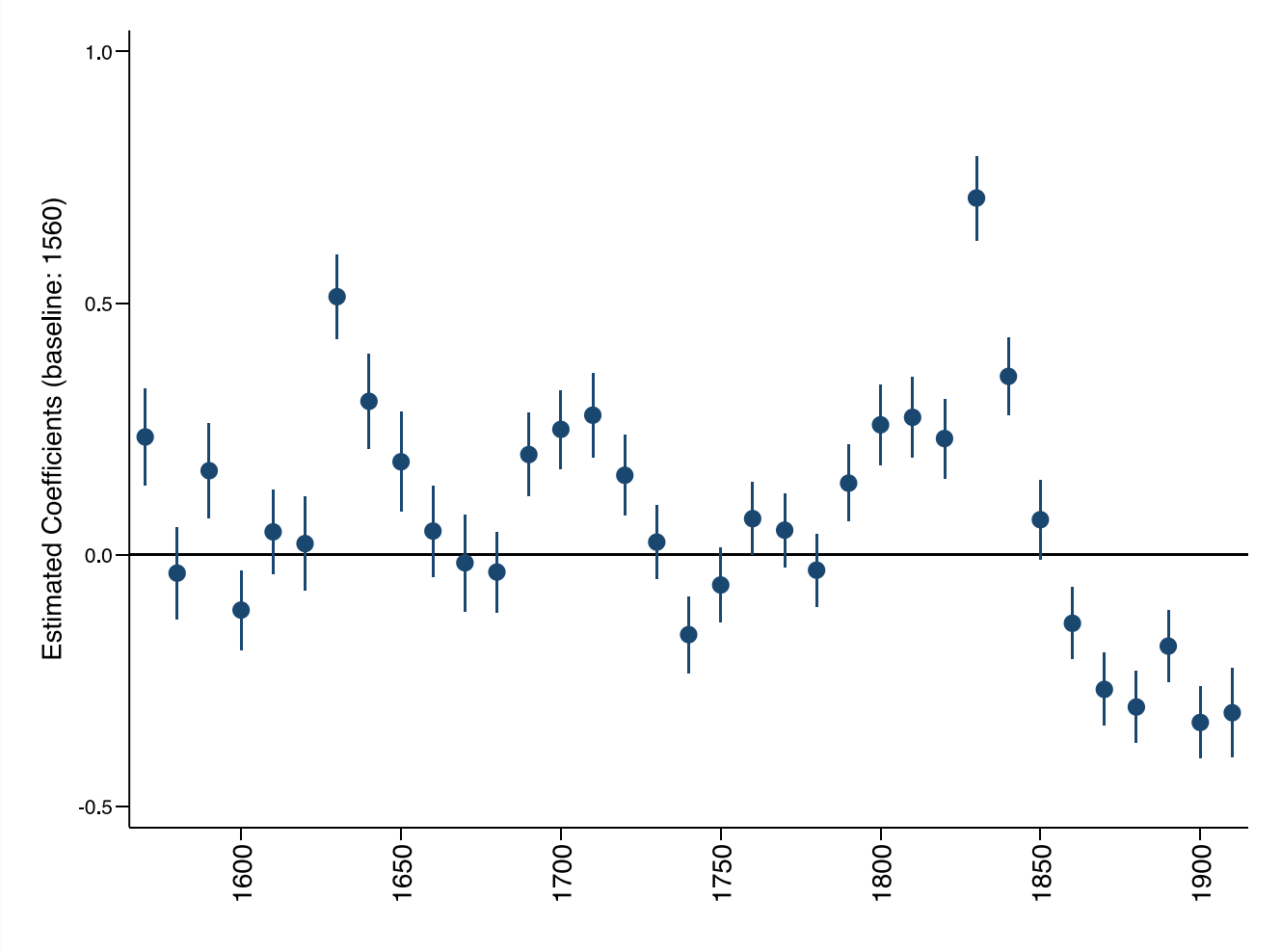
$$\text{logpricedif}_{i,j,t} = \sum_{s}(\gamma_s * \text{decade}_s) + \sum_{i}(\alpha_i * \text{city}_i) + \sum_{j}(\alpha_j * \text{city}_j) + +\beta * \log(\text{distance}_{i,j}) + u_{i,j,t}$$

where I are the eleven Ottoman cities in the wide sample and j are London, Utrecht, Paris, Valencia, Vienna and Pisa. Hence, the equation estimates the price differences between

Ottoman and European cities as a function a time trend (γ_s), city specific factors (α_i), and distance (β).

Figure 8 plots the estimated coefficients for decade fixed effects (γ_s). A higher coefficient indicates greater price difference with European cities. The figure highlights a permanent decline in the gap after the mid-19th century, which is consistent with greater Ottoman integration to international markets in this period. It also highlights two notable periods of rising price differences with Europe: the 1620s–1650s and the 1830s–1840s. These periods were marked by significant monetary instability, characterized by a decline in the silver content of coins. This instability likely led Ottoman coins to trade above their intrinsic silver value, artificially inflating the recorded price gap with Europe.

Figure 9. Time Trends for Price Differences between Ottoman and European Cities relative to 1560 Price Difference Levels



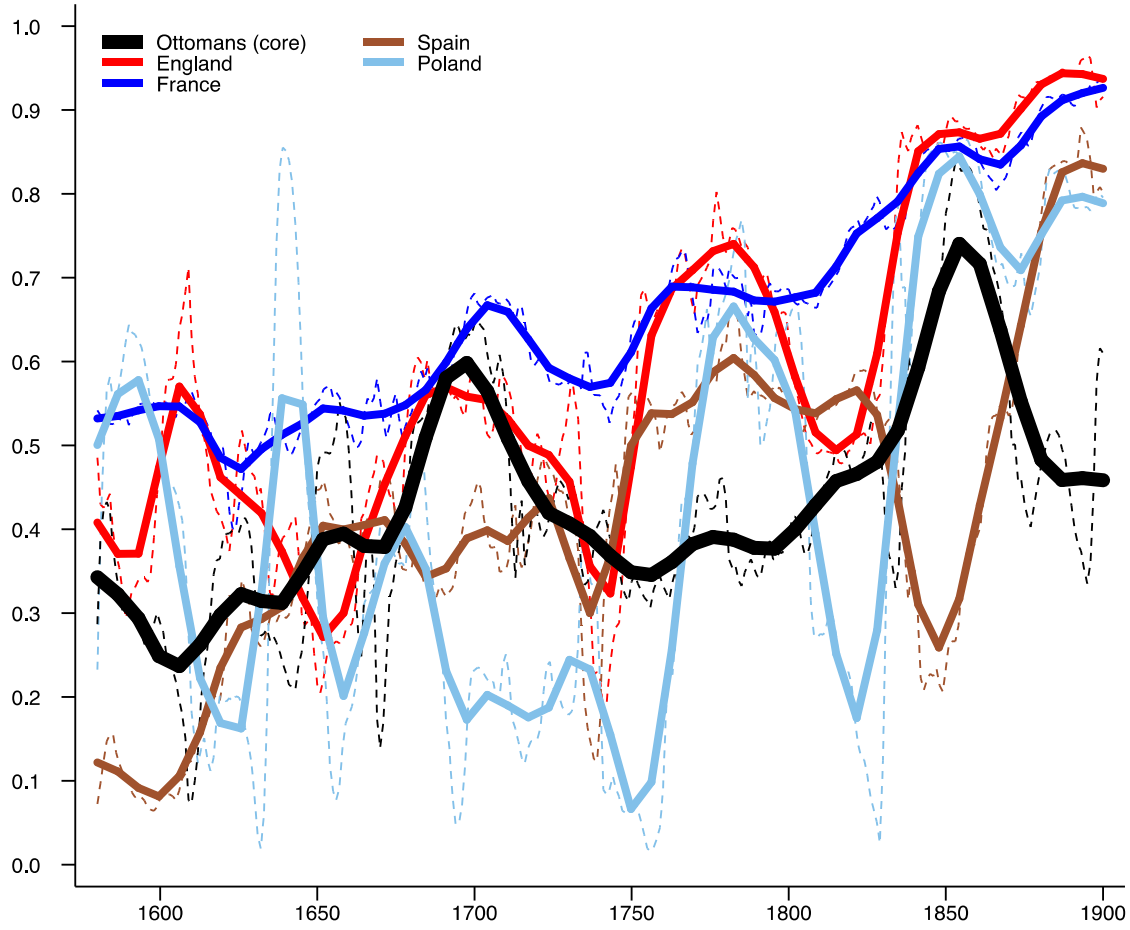
Source: Authors' estimations

Lastly, we compute international comovement indices, employing a methodology similar to that used for the domestic comovement indices illustrated earlier in Figure 3. The difference lies in the reference series: while domestic indices measure comovement with country-specific domestic common factors, international indices assess comovement with common European factors. The factor model is estimated using prices for four core Ottoman cities and thirty-nine other European cities.[12] The resulting international comovement indices for the Ottomans, England, France, Spain and Poland are plotted in Figure 10.[13]

What insights does Figure 10 offer for Ottoman integration to international markets? The figure suggests Ottoman Empire takes part in broader European trend towards enhanced international comovement over time. The gains, however, are modest relative to other European countries in the sample. Consequently, while in the earlier part of the period Ottoman international comovement levels compare favorably with countries such as Spain, by the end of the period, it lags behind. Moreover, significant fluctuations occurred over time, with comovement increasing in the 1600s, collapsing in the 1700s, increasing in the early 1800s and collapsing in late 1800s.[14] Note also that the trajectory of Ottoman international comovement broadly mirrors that of Ottoman domestic comovement, hinting at similar underlying processes.[15]

[12] Gdansk, Lviv and Warsaw drop from the European sample because of the late start date of their price series.
[13] Figure C7 in the appendix also plots international comovement indices for Italy, Germany, Dutch Republic and Austria, left out of Figure 10 for tractability.
[14] For robustness, in the appendix, Figure C8 plots the international comovement indices for HP-filtered series, Figure C9 plots estimated common European factor series, and Figure C10 plots price correlations of individual Ottoman and European cities with common European factor series.
[15] A caveat for this observation is the potential double counting for domestic and international comovement indices. Specifically, if two domestic cities independently synchronize more with international price movements, that could also increase domestic price synchronization between them. Similarly, if they improve their integration with each other due to domestic factors, this could also increase their international comovement. See Kose, Prasad, and Terrones (2003) and Uebele (2011).

Figure 10. International Comovement Indices for Different Polities/Regions, 1580-1900



Source: Authors' estimations

DISCUSSION

The integration indices discussed in the previous section indicate a gradual trend of increasing wheat market integration across Europe dating back to the sixteenth century. This trend gained momentum in the early nineteenth century but decelerated towards its end. Geographically, there were notable regional differences in the timing of integration. Northwest Europe led in both domestic and international market integration, while Southern and Eastern Europe joined the broader trend of enhanced integration later and at a slower pace, as highlighted by Federico et al. (2021, p. 294).

This pattern of market integration can be linked to both technological and institutional changes. One important cause of the decline in trade costs and market integration is technological change. There is a long list of specific technological innovations that facilitated trade but these were limited in number during the early modern era. The key breaks that the literature has focused on were the invention of steam engine which led to the proliferation of steam ships and railroads and later of telegraph during the nineteenth century.

Amongst institutional changes, the timeline and geography of market integration in Europe overlapped with the rise of modern states. The literature on state building has established that early modern Europe witnessed the transformation of states with fragmented fiscal, military and judicial systems into high-capacity states with centralized administrative systems. This transformation also involved gradual standardization of laws, tariffs and taxation, development of monetary systems and public and private finance, and declines in domestic violence levels.

Our empirical results allow us to locate the Ottoman Empire in relation to this broader European context. Our findings suggest that the Ottoman Empire should be regarded as part of the European trade network rather than an isolated entity during the early modern centuries and until World War I. While exports of wheat from the Ottoman Empire were subject to many restrictions including outright prohibitions until the second quarter of the nineteenth century, these measures were typically enforced only during periods of poor harvest, war and more generally, during periods of shortage. Over the long term, secular trends in wheat prices in Ottoman markets were correlated with prices in international markets, indicating a certain degree of integration with European markets.

However, it is also evident that the Ottomans, along with other east European polities, occupied a position on the periphery of the European trade system. The Ottoman Empire clearly took part in the broader European trend towards greater market integration in wheat over time. The gains, however, were more modest relative to most other European regions and countries. Additionally, although a Europe-wide trend of gradual price convergence emerged during the early modern period, our findings suggest that such a trend did not extend to Ottoman markets until the nineteenth century. There were only limited improvements in domestic comovement, and we did not identify a sustained pattern of price convergence, whether in the core regions or in the more remote territories of the empire (Figures 4, 7, 8, 9 and 10). Integration in the empire was hence, marked by short and medium-term fluctuations often correlated with political developments rather than a clear trend during the early modern era. A comparison of distance-

controlled price gaps across European regions and Ottoman markets also indicates that, both before and after 1800, trade costs were higher in the Ottoman lands – similar to Eastern Europe- compared to other parts of Europe (Figure 5).

Geography appears as a significant factor inhibiting integration of the empire's markets prior to the nineteenth century. Unlike many parts of Europe, most of the rivers in the Ottoman realm were not suitable for year-round navigation and costs of overland transportation remained prohibitively high during the early modern era. Maritime transport thus remained central to the food supply of large urban areas. While shorter journey times and lower costs in maritime transportation facilitated the exchange of foodstuffs, particularly grains, among coastal areas, the integration between coastal cities and other coastal locations and the towns in the interior often remained limited (Panzac 1992). As a result, a pattern of economic interdependence emerged amongst the coastal regions of the empire while the interior regions including large parts of Anatolia continued to rely primarily on their own vicinity for grains well into the nineteenth century and even until the interwar period. This picture is in line with the existing literature highlighting a distinct pattern of economic interdependence among the coastal regions of the empire, encompassing the western Black Sea coast, areas along the Danube, western Anatolia, Thrace, Macedonia, Thessaly, Morea, the Egyptian delta, and the Arabian coasts of the Red Sea.

Our results also indicate that core areas of the empire connecting coastal areas close to the capital city in the Balkans, the Black Sea and western Anatolia stand out with a higher degree of wheat market integration in the early modern era (Figure 3). The level and trends of wheat market integration within the provisioning network centered around Istanbul, connected by sea suggest that during normal times, the food supply policies of the central government worked reasonably well. These policies involved the cooperation and coordination of local governments and were implemented in a selective and flexible fashion (Güçer 1952, 1964; Aynural 2002; Yıldırım 2003). However, government attempts to secure the urban food supply created gains and losses for the rural producers and urban consumers. Government programs to purchase wheat and other grains from rural producers, to the extent that the price paid by the government remained below the market price, amounted to a tax on the rural producers as well as on the intermediaries as they were all acutely aware. Consequently, incentives to evade government measures and demands remained high.

Closer or weaker political ties between different regions of the empire depending on the relations between central and local governments and elites as well as wars and other events emerged as the key reason for changes in the level of integration of the empire's wheat markets. During the seventeenth and eighteenth centuries, the central government's reach over the provinces, as well as the level of cooperation and coordination with local *ayan* or urban notables varied over time and from region to region. The central state exerted greater control over these core regions while local powerbrokers exerted greater control as one ventured farther from this core. Physical infrastructure investments by the central government also concentrated in the core provinces.

Notably, the central government was able to bring to center only a fraction of the taxes collected in the provinces. Per capita tax collections of the central government, often used as a measure of state capacity, remained around 3 percent of the Empire's GDP until the end of the eighteenth century, lower than most states in Europe. A large part of the tax collections was retained by local elites (Pamuk 2012; Karaman and Pamuk 2010). This lower state capacity had far-reaching implications, including reduced capacity to maintain the legal framework, pursue infrastructure investments and monitor grain trade policies. It thus resulted in increased coordination failures and rent-seeking behavior on the part of intermediaries and local actors involved in the grain trade.

In regions where the local elites and their networks cooperated with the central government, long distance markets usually maintained better integration with the capital city. Conversely, in areas where the local elites pursued alternative strategies, rural producers and merchants sought to evade the demands for grains, sold outside official networks, smuggled wheat and other grains to international markets. In such contexts, coordination failures and rent-seeking behavior on the part of intermediaries and local actors involved in the grain trade, became more prevalent. Salonica during most of the eighteenth century and Egypt during the seventeenth and especially the eighteenth century are examples of urban centers which are linked by sea to the capital city and where the local elites gained greater autonomy and adopted different strategies in the marketing of the local wheat and other grain supplies (Gounaris 2008; Cuno 1993; Mikhail 2011). In addition, after military defeats to Russia during the closing decades of the eighteenth century, the central government lost its monopoly of control over navigation in the Black Sea making it easier for the key grain growing regions to participate in international trade (Güran 1986).

The noticeably smaller price gaps among Ottoman markets, as well as between Ottoman and European markets (Figures 5, 6, and 9) indicate that the period from the turn of the nineteenth century until World War I marked a new phase of greater international and domestic integration of Ottoman wheat markets. The results suggest that the gradual integration of the empire's ports and coastal regions with European markets started at the turn of the nineteenth century and gained momentum after the 1830s. While it is not easy to disentangle and measure the impact of each separately, it is clear that both technological and institutional changes on the Ottoman as well as the European side contributed to integration of Ottoman wheat markets during this second period.

In terms of technological change, steamships arrived early in the century linking Ottoman ports to each other and more importantly to European ports, thus ensuring significant decline in transportation costs between Ottoman and European markets. Improvements in communications technology began with the arrival of the steamships and continued with telegraph and other innovations later in the century (Lewis 2018). In contrast, railroad construction inside the Ottoman Empire began in the second half of the century and proceeded slowly (Schoenberg 1977). The Anatolian Railway, linking Istanbul to central Anatolia, began operations to Ankara in late 1892 and extended its service to Konya by mid-summer 1895 (Quataert 1977).

The adoption of these technological innovations within the Ottoman Empire unfolded against a backdrop of significant institutional and political transformations. The modernizing reforms in military, administration, tax collection, law and other areas that began in the last decades of the eighteenth century, reducing political fragmentation and introducing a modern, centralized bureaucratic apparatus in the empire. Per capita tax collections of the central government increased steadily during the nineteenth century and exceeded 10 percent on the eve of World War I (Pamuk 2018). Consequently, the central government successfully reasserted its authority over the provinces for the remainder of the century (Zürcher 1993). It was more actively engaged in improving conditions for domestic and external trade. Key measures included improving the security of trade routes, modernization of the harbor infrastructure, constructing new ports, establishing modern postal services and standardizing measurement units.

The Ottoman Empire also entered a new era in economic institutions and policies in 1838 when the central government agreed to sign free trade treaties with European countries that would

keep tariffs on both imports and exports at very low levels until World War I in return for support for the territorial integrity of the empire and its ongoing reforms (Özveren 2001). This shift towards free trade, accompanied by an emphasis on market-oriented policies, led to the abandonment of previous food supply measures for the capital city and other urban areas for the rest of the century. These changes significantly enhanced the empire's integration into the European trade network.

As a result, wheat prices in the coastal areas of the Ottoman Empire and of Egypt which also stayed with the free trade treaties converged towards the prices of ports in other free trade countries across Europe such as the United Kingdom. However, countries in continental Europe including France, Germany, and Italy raised their tariffs in order to protect their wheat producers against imports from North America during the second half of the century. Prices between these countries and Ottoman and Egyptian ports diverged significantly until World War I (Findlay and O'Rourke 2003; Uebele 2011; Federico, Schulze and Volckart 2021).

While wheat market integration of the Ottoman ports to each other and to European ports proceeded, the connection between the coastal regions and inland locations remained uneven over time and space. Our findings reveal that, although railroad technology significantly reduced overland transportation costs, its impact on Ottoman trade patterns and market integration in the empire remained limited until the twentieth century. Built and operated by European companies, the railroads primarily linked regions with high potential for primary products to port cities. Export shipments dominated railroad traffic, accounting for 80 to 85 percent of total freight, with agricultural goods and raw materials—particularly grain—forming the majority (Quataert, 1977, p. 147-8). As a result, during the decades leading up to World War I, the Anatolian Railway facilitated significant price convergence between Ankara and Konya, situated in the heart of Central Anatolia, and coastal as well as international markets.

The Anatolian Railway's reach, however, was limited to a relatively small area of approximately 125 thousand square kilometers, serving an estimated population of 2 million (Quataert 1977, p. 147-8). Interior regions lacking railroad access remained largely isolated from both domestic and international trade networks. In these regions, overland transportation costs remained high and markets remained fragmented even though local customs duties on domestic trade were eliminated in the second half of the century. This pattern which reveals the importance of international integration in shaping the dynamics of domestic integration, was similar to the

pattern observed in other regions of the developing world during the nineteenth century. (Tirado-Fabregat, Badia-Miro, and Willebald 2020)

CONCLUSION

Expansion of markets and the resulting increase in the division of labor and specialization have for long been regarded as powerful sources of economic growth, especially in the era before the Industrial Revolution. It has also been argued that unequal market development was one of the key differences that led to divergence in economic performances within Europe and across different parts of the world. Technological change was initially identified as the main source of market integration. However, there is growing recognition in recent decades that institutional change could be an at least equally powerful cause. Within institutions and institutional change, the recent literature has placed a good deal of emphasis on the role of the state and state capacity. Thanks to the availability of large amounts of wheat price data for many countries, wheat market integration is one area where quantitative history may provide new and comparative answers to these questions.

This study examined wheat market integration in the Ottoman Empire and around the Eastern Mediterranean from the second half of the sixteenth century until World War against a background of trends across Europe during the same period. We found that rates of integration in the Ottoman Empire fluctuated without a clear trend during the early modern era followed by greater international integration and spatially uneven domestic integration in the nineteenth century. Overall, gains in market integration were slower than those in western and central European regions and countries in both periods. Our findings align with Federico et al.'s (2021, pp. 293–294) study, which highlights significant regional variations in the timing and pace of integration across the continent. Their research suggests that the Little Divergence coincided with more advanced market integration among leading economies between 1500 and 1800.

One debate our findings offer insights on is how Ottoman political evolution affected its economic performance. Since technological change remained limited, patterns of market integration in the Ottoman Empire during the early modern centuries was related mostly to institutional and political changes. From late sixteenth to early nineteenth century, Ottoman political system was relatively decentralized and local notables could develop autonomous fiscal and military capacity and bargain with the center. There is a debate in Ottoman

historiography regarding whether this decentralized political equilibrium was a flexible and effective governance model, or a tenuous settlement born out of necessity with negative economic consequences. Our findings for wheat markets lend support to the latter view, as we find that the seventeenth and eighteenth centuries were characterized by medium term fluctuations but no secular trend towards greater market integration. Consistent with this view, the nineteenth century state-building reforms, together with introduction of steam engine and telegraph, resulted in market integration gains.

The timing of the gains in market integration as well as our comparisons between western Europe and the Eastern Mediterranean suggest that patterns of market integration during the early modern centuries were closely related not only to technological changes but also to institutional changes and the rise of centralized states. During the early modern period, Europe underwent a significant institutional transformation, with the rise of state capacity at its core. This transformation started in northwest Europe and gradually spread to the east and south of the continent, but did not occur in other parts of the world. Although this rise in state capacity is empirically well documented, its economic impact and role in preparing the ground for the take-off modern growth in the nineteenth century need further study. Our findings for the Ottoman Empire suggest that increases in state capacity and market integration may be closely related. Our results point to similarities between Ottoman case and China and India in this respect. This pattern challenges the notion that states and markets are alternative and rival mechanisms for resource allocation. Historically, the evidence suggests, states and markets complemented each other. We hope future research will shed additional light on the relationship between the rise of state capacity and market integration.

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