

House prices in the Ottoman Empire: evidence from eighteenth-century Edirne[†]

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This study uses a new dataset of 2,246 notarial deeds of house sales from one of the major cities of the Ottoman Empire, Edirne, covering the period from 1720 to 1814. It estimates real hedonic house prices and urban wealth inequality for the housing market. It shows that house size, proximity to the commercial centre, access to fresh water, and family ties were important determinants of relative house prices. These findings also apply to the different quartiles of the market, indicating limited market segmentation. It demonstrates that there was an increase in housing wealth inequality during the eighteenth century as house prices became more dispersed. The hedonic house price index provides evidence that inflation-adjusted house prices declined substantially following the Russo-Turkish war of 1768–74. The decline is mainly explained through demographic shocks induced by plague epidemics, natural disasters, and other population movements driven by wars, army mobilization, and political upheavals.

Residential real estate was one of the key assets held by a wide range of groups in the early modern period. Yet we know little about how real estate prices evolved in pre-industrial economies. This article offers a formal analysis of urban residential house prices in one of the major cities of the Ottoman Empire, Edirne, during the eighteenth and early nineteenth centuries. We collect property-level data by hand, using 2,246 notarial deeds of house sales from 1720 to 1814. Our sources provide us with invaluable information on house prices, their physical and neighbourhood characteristics, and their location. We use this information to analyse trends in house prices, market segmentation, and urban wealth inequality (approximated by house prices).

We create a hedonic house price index for the period 1720–1814 and calculate real house prices by using wheat prices, unskilled labour wages, and the consumer price index (CPI) in Edirne and Istanbul as deflators. We then compare real hedonic house prices in Edirne with other eighteenth-century urban centres for

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[†] The authors thank Şevket Pamuk, Erdem Kabadayı, and anonymous referees for their detailed comments on previous drafts. The article has also benefited from discussions with the participants of the 2016 Economic History Society Annual Conference in Cambridge, the 2016 European Macrohistory Workshop in Bonn, Boğaziçi University's Atatürk Institute for Modern Turkish History seminar in Istanbul, and the Middle East Technical University (METU) Department of Economics seminar in Ankara in 2016. This research has received funding from METU under Scientific Research Project no. BAP-01-07-2014-001, and from the University College London Global Engagement Fund under project no. 554882. The usual disclaimer applies.

which data are available. We find that house prices were mainly driven by their proximity to the commercial centre of the city and their size measured by several physical attributes of the houses, including the number of rooms, storeys, and storage spaces. We show that nominal house prices increased almost three-fold during the eighteenth century, whereas prices and wages increased on average ten-fold and the silver content of the Ottoman currency declined by more than 75 per cent. This points to a real decline in house prices compared to silver, unskilled wages, and consumer prices. Although the debasements of the coinage by the Ottoman government had an inflationary impact, house prices were held back by events that had a major impact on the city's demographics, such as plague epidemics, natural disasters, and wars, as well as political upheavals.

As for urban wealth inequality, we calculate the coefficient of variation for all house prices for selected benchmark years and test for market segmentation by wealth with the help of quantile regressions. Across the eighteenth century house prices became more dispersed, suggesting an increase in urban wealth inequality as approximated by house prices. Yet we do not find strong evidence of market segmentation, since the determinants of house prices remained broadly the same for the first, second, and third quartiles of the market. Overall, our findings indicate a stagnating urban economy with rising wealth inequality in Edirne during the eighteenth century.

The rest of the article is organized as follows. In section I, we present the historiographical framework by highlighting the links between our research, the economic history literature, and Ottoman historiography. Section II provides a brief history of Edirne during the eighteenth and early nineteenth centuries, gives an account of our sources, discusses their potential limitations, and presents descriptive statistics including trends in the dispersion of house prices. In section III, we put forward an econometric model to estimate the hedonic house price index and the quantile regressions, and compare our results with Amsterdam and Beijing. In the concluding section, we discuss the broader implications of our findings.

I

The study of long-term house prices has gained momentum in the economics literature in recent years, as real estate is one of the key components of household wealth. Many studies point out that there is a multidirectional link between house prices and the wider economy through money and credit channels. Moreover, fluctuations in house prices play an important role in housing wealth and the evolution of aggregate capital values, and consequently for individual households.¹ Empirical studies in real estate economics focus on explaining the determinants and volatility of long-term aggregate house prices with reference to demographics, income, credit availability, interest rates, land prices, construction costs, transaction costs, and tax policies, among other things.² As for the relative prices of houses, studies show that differences in size, style, and age of houses usually play a key

¹ Knoll, Schularick, and Steger, 'Global house prices'; Bordo and Landon-Lane, 'House price booms'; Shiller, 'Trends in house prices'; Goodhart and Hoffman, 'House prices'; Piketty, *Capital*, p. 48.

² Capozza, Hendershott, Mack, and Mayer, 'Real house price dynamics'; Eichholtz, Huisman, and Zwinkels, 'Fundamentals or trends'.

role, as well as aspects of their location, such as proximity to key commercial or political centres, and access to transport facilities. 'Neighbourhoods' as subsections of larger communities, and even the particular position of properties within the same building, can matter for relative house prices and rents.³

The economic history literature, in comparison, offers a relatively limited insight into historical house prices and their determinants. One main difficulty is that houses, unlike standard consumer goods or asset prices, have a high level of heterogeneity, which makes constructing a long-term price index particularly challenging. The quality of houses changes temporally and spatially: each house is unique and is composed of a combination of location, neighbourhood, and building-specific characteristics. As a result, using simple metrics like 'median' or 'mean' becomes problematic in analysing house prices, since they do not correctly represent long-term quality-adjusted prices in the market. This can only be addressed by either a repeat-sale index or detailed information on the physical and location characteristics of houses. Given that houses are not frequently traded, and there is a scarcity of reliable primary sources containing detailed information on them, constructing long-term data series becomes either impossible or costly in terms of research time.

Yet, despite data limitations, a handful of studies focusing on the early modern period offer important insights into the functioning of housing markets and the determinants of house prices in pre-industrial economies. Eichholtz provides one of the first attempts in the literature to construct a long-term price index for a sample of high-quality properties along the Herengracht canal in Amsterdam from 1628 to 1973. He uses the hedonic repeated-sale method and finds a modest real increase in prices, unlike previous studies, which overstate the long-term performance of the housing market.⁴ Raff et al., by relying on 498 surviving house sale contracts, construct a hedonic price index for Beijing covering the period from 1645 to 1840.⁵ They explain house prices mainly with reference to the size of each property and their proximity to commercial centres. They show that house prices declined in real terms in the first half of the eighteenth century and remained constant for the rest of the period. A parallel line of research employs similar methods in the context of house rents. In analysing rental data for 183 properties in early modern Toledo, Drelichman and Agudo find that distance to key centres and size of the properties determined the rents, yet the rental market was segmented in terms of income groups.⁶ More recently, Casson and Casson focus on the rental market in medieval Gloucester with an analysis of the rents for 447 properties, using hedonic regression methods. They show that medieval rents in Gloucester were driven by economic factors such as location and property characteristics.⁷ These studies together highlight that there is a strong link between demographic factors, urbanization, urban inequality, and the dynamics of house prices in pre-industrial economies. Nonetheless, given the scarcity of data and individual case studies, the

³ Margo, 'Housing in New York City'; Glaeser, *Spatial equilibrium*; Nicholas and Scherbina, 'Great Depression'; Smith, Engquist, Carvajal, Johnston-Zimmerman, Algara, Gilliland, Kuznetsov, and Young, 'Neighbourhood formation'; Lesger and van Leeuwen, 'Residential segregation'.

⁴ Eichholtz, 'Herengracht Index'.

⁵ Raff, Wachter, and Yang, 'Real estate'.

⁶ Drelichman and Agudo, 'Housing'.

⁷ Casson and Casson, 'Property rents'.

literature still lacks a long-term comparative perspective on pre-industrial housing markets.⁸

Ottoman historiography is also characterized by a shortage of research on this subject. The few studies that discuss real estate markets in Ottoman urban centres are not concerned with offering a systematic analysis of house prices in these cities. Instead, they are primarily engaged in questioning the premises of the traditional orientalist literature on the ‘Ottoman city’.⁹ In his study of the eighteenth-century real estate market in Aleppo, Marcus finds a dynamic real estate market that operated on the basis of free market principles. In the absence of other forms of industrial investment, real estate represented a major form of household wealth in this Ottoman city. Islamic law also favoured property ownership and investment by offering protection of property rights and intergenerational transfer of houses. Yet Marcus openly states that he is not concerned with ‘supply, demand and prices, but rather with people who owned and dealt in real estate’.¹⁰ Faroqhi goes one step further in her study of house property and owners in seventeenth-century Ankara and Kayseri by compiling extensive tables summarizing aggregate house prices according to their physical characteristics, and sellers’ religion and profession. Her work gives a snapshot of the real estate markets in Ankara and Kayseri in the seventeenth century; however, she too does not attempt to construct a price index.¹¹

As far as the Ottoman historiography is concerned, a systematic analysis of long-term house prices also has the potential to contribute to ongoing research on wealth inequality in the Ottoman Empire in the pre-industrial era. Studies of individual Ottoman cities analyse wealth inequality by using inheritance inventories and chart its evolution in different periods. Coşgel and Ergene estimate wealth from the inheritance inventories of Muslim male adults and show that there was a rise in several measures of wealth inequality during the eighteenth century, as in pre-industrial Europe.¹² Canbakal’s study of Ayntab during the seventeenth and eighteenth centuries reaches a parallel conclusion by using similar sources.¹³ However, given the variation in the degree to which non-Muslims used the Islamic courts for probate registration across different cities, there are doubts about the

⁸ Two recent working papers emphasize the importance of long-term house prices and rents for economic activity and inequality for selected west European cities: Francke and Korevaar, ‘Birth or death’; Eichholtz, Korevaar, and Lindenthal, ‘500 years’.

⁹ The latter saw the ‘European city’ as the representation of economic rationality, which played an essential role in the emergence of capitalism in the west. By contrast, the ‘Islamic city’ was characterized by irrationality and anarchy. The origins of these views can be traced back to the accounts of western travellers in the major Ottoman cities. On Edirne, for instance, see Careri, *Voyage*; and Montagu, *Letters*. For the later literature see Weber, *City*; Grunebaum, ‘Sacred character’; Hourani and Stern, eds., *Islamic city*; Raymond, ‘Orientalist myths’, pp. 5–6. For notable critiques of this literature, see Todorov, *Balkan city*; Ergenç, ‘Administration units’; Faroqhi, *Modest substance*; Marcus, ‘Men, women and property’; Behar, *Kasap Ilyas*; Uğur, ‘Historical interaction’; al-Qattan, ‘Across the courtyard’.

¹⁰ Marcus, ‘Men, women and property’, p. 140.

¹¹ Faroqhi, *Modest substance*, pp. 15–16, notes the complexity of such a task due to ‘the difficulties of correctly allowing for periodical debasement and revaluation of the currency ... Houses were mortgaged, and the sums mentioned as their more or less fictitious “price” may have been considerably lower than the marketable value of the property concerned. Relatives probably allowed each other a better price than would have been demanded from an outsider’. We discuss these concerns in detail later.

¹² Coşgel and Ergene, ‘Inequality of wealth’.

¹³ Canbakal, ‘Distribution of wealth’. See also the working paper by Canbakal and Filiztekin, ‘Wealth and inequality’, which notes an increase in inequality during the eighteenth century for a number of Ottoman cities.

spatial and temporal comparability of these sources across different ethnoreligious groups.¹⁴

In this article, for the first time, we offer an estimate and analysis of house prices by using a novel dataset and hedonic techniques for one of the major cities of the Ottoman Empire during the eighteenth century. We analyse the role and weight of different attributes of houses in determining prices, identify the location of houses within the city, and show the long-term changes in nominal and real house prices. Therefore, we contribute to the ongoing conversation in the economic history literature on the long-term evolution of house prices and their determinants through this in-depth analysis of an Ottoman city. We also argue that house sale records can be an alternative source for studying urban wealth and inequality in the Ottoman Empire in the context of housing markets, since they are likely to have better ethnoreligious representation compared to inheritance inventories. We elaborate on these points in detail in the following sections.

II

Edirne was the third capital city of the Ottoman Empire until 1453, when the Ottomans conquered Istanbul. From that year onwards, it was overshadowed administratively by the new capital but maintained its economic and military importance. In the seventeenth century, it became the de facto seat of the sultan. This unofficial capital status led the city to flourish and strengthened its political influence, but it came to an end when the imperial seat irreversibly returned to Istanbul after the 'Edirne Incident of 1703'.¹⁵ During the eighteenth century, the central government still regularly used Edirne as its second administrative centre, and the city served as the main staging point for the army in the Balkans. Available estimates suggest that the city was home to around 40,000 inhabitants in more than 150 quarters (*mahalle*) in the late seventeenth and early eighteenth centuries.¹⁶ It held a Muslim majority, with a significant number of non-Muslims making up almost 20 per cent of the entire population. Orthodox Greeks constituted more than half of the non-Muslims, followed by Armenians and Jews.¹⁷ By the early decades of the nineteenth century, Edirne faced serious upheavals, which shifted the balance of the population. In 1826, following the abolition of the Janissary corps

¹⁴ Several studies show that the capitulations provided non-Muslim Ottoman subjects with a more advantageous legal jurisdiction compared to Muslims and contributed to the exclusion of Muslims from the most dynamic sectors of the global economy; Kuran, *Long divergence*, pp. 189–208. This point makes the ethnoreligious representativeness of primary sources essential, especially in the context of wealth inequality research.

¹⁵ This was a rebellion started by Istanbul-centred military groups against the rising power of Şeyhülislam Feyzullah Efendi in the absence of the Sultan Mustafa II, who was keen to spend his entire time in Edirne during this period. He was eventually removed from power, and the new Sultan Ahmed III restored the imperial seat back to Istanbul in 1703. See Abou-el-Haj, *1703 Rebellion*.

¹⁶ Unfortunately, we only have approximate population figures for Edirne for the period we study, since the official figures during this period provide only the total number of households, not individuals. According to a surety register (*kefalet defteri*) dated 1703, there were in total 8,239 *households* in Edirne, of which 576 were Jewish and 998 were Christian (Armenian and Greek Orthodox). Estimates based on the first population censuses of the Ottoman Empire conducted in 1831 and 1844 suggest a total population of c. 44,000; Karagedikli, 'Bir payitaht', p. 226; Uğur, 'Historical interaction', p. 167; Behar, *Population*, pp. 26–8.

¹⁷ When we refer to different religious groups, we follow the ethnoreligious classification in the Ottoman historiography. We use Greeks, Orthodox Greeks, and Orthodox Christians interchangeably to refer to the term *zimmi*, as used in the original documents. Armenians and Jews are two other distinct religious groups in the sources; Braude and Lewis, *Christians and Jews*.

as part of a broader modernization process initiated by the central government in Istanbul, members of these military units, who made up a significant portion of Edirne's population, left the city. Three years later, in 1829, the Russian Army occupied the city, leading to the eviction of a substantial portion of its Muslim population.¹⁸ These demographic and economic turning points also determine our periodization, and we limit our analysis of the housing market to the period before the 1820s. Overall, for the period under study, Edirne maintained its characteristics as a representative medium-sized Ottoman city similar to Salonica or Bursa. Due to its proximity to Istanbul, it remained integrated with the economy of the larger city. These characteristics of Edirne make it an ideal case to investigate the dynamics of the housing market and how they changed during the eighteenth century.

Our dataset is based on notarial deeds of house sales (*menzil mübaya'a hücceti*) extracted from the Islamic court registers (*kadı sicilleri*) of Edirne between 1720 and 1814. Islamic court registers do not just comprise cases of litigation that might be related to inheritance, divorce, or common crimes such as murder, assault, and theft. Most of the time they contain records of transactions documented at the local court, such as sales and loans. These registers also include inheritance or probate inventories, as well as imperial orders sent from Istanbul to the local judge concerning his jurisdiction or other matters. Large Ottoman cities such as Cairo, Aleppo, Edirne, and Bursa had separate books registering the documents related to inheritance issues and imperial orders.¹⁹ Some of these large urban centres also had more than one court branch. Aleppo, for instance, had four court branches in the eighteenth century.²⁰ These branches did not specialize in dealing with specific judicial matters; each of them could register sales, loans, and the like. During the eighteenth and early decades of the nineteenth century, Edirne also had four different court branches.²¹ No matter which court handled the transaction, in the end all the sale deeds were brought together chronologically in one single volume.²² If the pages in a volume ended, the clerk continued to register the deeds in a new volume. Given the vast number of records available for the eighteenth century (almost 20,000 deeds registered in more than 100 volumes), we choose a sampling strategy that enables us to do both cross-sectional and time series analysis. First, we identify six benchmark years and rely on the full set of transactions for these years. For Edirne, the first available record appears in the archives for the Islamic year 1132, which corresponds to 1720/1 in the Gregorian calendar. As this is the earliest available volume containing house sales, we take this year as our starting point. The second available volume corresponds to 1734 and we also include this volume in our dataset as one of our benchmark years and record the full set of house sales. We identify the remaining benchmark years roughly at 20-year intervals, but we make sure that the benchmark years do not coincide with significant events such as wars and rebellions, which could potentially distort our results. Moreover, given that

¹⁸ Gökbilgin, 'Edirne', pp. 683–6.

¹⁹ Faroqhi, 'Sdjill'.

²⁰ Marcus, 'Men, women and property', p. 141.

²¹ These were the Great Court (*Mahkeme-i Kübra*), the Little Court (*Mahkeme-i Suğra*), the Deputy Court (*Bab Mahkemesi*), and the Haremeyn Waqf Court (*Haremeyn Evkafı Müfettişliği Mahkemesi*); Karagedikli, 'Overlapping boundaries', pp. 655–6.

²² Each volume also contains information on the sale of commercial properties, personal belongings (for example, furniture or clothes), properties with shops, and property located in the rural hinterland of Edirne. For the purposes of this article, we limit ourselves to the residential property deeds.

Islamic years do not always contain all the months in the Gregorian calendar, we choose years that cover sales for a full calendar year to avoid any seasonality bias that may be present.²³ In addition to six benchmark years with full sets of sales (1720/1, 1734, 1756/7, 1777, 1794/5, 1814), we compile a second sample consisting of randomly selected house sales from each month for every available volume in the archives.²⁴ Altogether, this sample gives us a dataset of a minimum of 12 house sales each year over the period 1720–1814. The number of observations we use in our analysis together with descriptive statistics on house prices are summarized in column 1 of online appendix table S1. We use the combined sample of 2,246 observations to estimate our hedonic price index. To test for market segmentation and show how wealth inequality (approximated by house prices) changed across time, we use the data from only six benchmark years (*c.* 1,480 observations).

In the deeds, each price is recorded in the official Ottoman currency, *kuruş* (piaster).²⁵ The Ottoman monetary system during this period was characterized by frequent debasements of the currency; hence the increase in nominal prices may be interpreted as the direct result of these debasements.²⁶ We revisit this question after we estimate the nominal hedonic house price index in the next section to discuss whether the changes in house prices follow trends in consumer prices and wages.

Although we work with the assumption that the prices in the deeds reflect the actual transaction and the market price, a few studies cast doubt on their reliability, implying that they may be understated. This is based on the observation that many house sales in Ottoman cities may have taken place between family members with a lower than usual price.²⁷ Second, in certain cases the transaction could be a mortgaged sale (*bey' bi'l-istiğlâl*) used to disguise the advancement of a loan.²⁸ Indeed, we also come across these types of transactions in Edirne during the eighteenth century. We handle the first problem by controlling for intra-family sales in our hedonic price estimates. As for the mortgaged houses, we simply do not include them in our sample, since this form of transaction was explicitly stated in the original records and was therefore easy to identify.

Given the limitations of the availability and quality of primary sources for Ottoman price history, it is nearly impossible to answer for certain the question of whether the house prices found in the deeds reflected actual market prices. The

²³ National Library of Turkey, Ankara (hereafter NLT), *Muslim Court Registers of Edirne* (hereafter *EŞS*), 108 (Islamic year 1132, Gregorian year 1720/1), 123 (Islamic year 1146, Gregorian year 1734/5), 156 (Islamic year 1170, Gregorian year 1756/7), 195 and 198 (Islamic year 1191, Gregorian year 1777/8), 221 and 226 (Islamic year 1209, Gregorian year 1794/5), and 299 and 303 (Islamic year 1229, Gregorian year 1813/4). These documents are stored at the National Library of Turkey in Ankara. For an overview of the use of Ottoman court records in the context of economic history research, see Coşgel and Ergene, *Ottoman justice*, pp. 65–102.

²⁴ NLT, *EŞS*, 132, 133, 136, 137, 141, 144, 664, 149, 155, 156, 158, 161, 163, 164, 165, 172, 178, 183, 184, 187, 195, 198, 199, 205, 209, 212, 214, 216, 220, 221, 226, 228, 232, 233, 677, 236, 240, 242, 246, 248, 254, 257, 263, 266, 269, 271, 276, 279, 282, 284, 286, 290, 294, 297, 299, 303.

²⁵ We occasionally come across prices recorded in the old Ottoman currency, *akçe*. In these few instances, we convert the sale price to *kuruş* with the exchange rate of 1 *kuruş* = 120 *akçe*. See Pamuk, *Monetary history*, p. 160. See also col. 8 of online app. tab. S1.

²⁶ Pamuk, *Monetary history*, pp. 188–204.

²⁷ Faroqhi, *Modest substance*, pp. 15–16.

²⁸ In these cases, the lending was disguised as an ordinary sale of a property of the borrower to the seller in return for the cash. The borrower could then rent this property back from the seller (for a year or so) for, say, 10% of the sale price of the asset. Once she paid her debt to the seller (the initial sale price), she could get back her property. In this case, the ‘interest’ on the borrowed money was disguised as the rent. See Karagedikli and Tunçer, ‘Microcredit in the Ottoman Empire’, for a discussion of this type of lending in the context of *vaqfs*.

only other source we are aware of for house prices in the Ottoman Empire during this period is inheritance inventories.²⁹ Inventory records were compiled upon the death of individuals to describe in detail the deceased's belongings and their worth. In certain cases, part or all of the estate was sold at an auction, which signalled the actual market prices.³⁰ On the positive side, in the case of Edirne, inheritance inventories explicitly stated whether the asset or commodity in question was sold at auction in the market or not.³¹ On the negative side, however, these sources may pose several problems for our analysis. First, it is not possible to identify *ex ante* whether a particular inheritance inventory contains the valuation of a house and whether this valuation is based on an auction. Second, inheritance inventories lack a degree of detail and consistency in the deeds. In most cases, only the name of the deceased, the price, and the location (that is, the quarter) of the house would be recorded, but not the physical and micro-neighbourhood characteristics. This lack of information makes the construction of a house price index based on inheritance records neither feasible nor desirable.

Nonetheless, we go through the inheritance inventories for Edirne for our six benchmark years and record the prices and location of the first five auctioned houses we come across in the volumes.³² We then compare them with the prices of houses in the same location collected from the deeds, but we do not find a systematic bias. Except for two observations, prices reported in inheritance inventories fall within the range of prices from the deeds in the same location and year. The average price in inheritance inventories is 15 per cent higher than the average price in the deeds, yet in the majority of cases the prices in inheritance inventories are *lower* than the average price in the deeds (see online appendix table S2). Therefore, in the absence of any contradicting counterevidence, we conduct our analysis on the assumption that the house prices collected from the deeds reflect actual market prices.

Besides the reliability of prices, another possible concern with the Islamic court records is the potential for selection bias. In theory, it would be possible to carry out a sale without going to court. In practice, however, the main incentive to register a sale at an Islamic court was to make the transaction official before witnesses. Registration of ownership entitled owners and investors to a broad set of legal rights similar to fee simple or freehold ownership in common law countries. The local courts acted as protectors of these property rights and if necessary verified claims and enforced compensation.³³ The courts charged a notarial fee for registering house sales (*bedel-i hüccet*), which was determined by the central government, and was set at 32 *akçe* during the reign of Mehmed II (1451–81). This rate was reduced to 25 *akçe* at the beginning of the seventeenth century and remained constant for the rest of our period.³⁴ At its highest, in 1734, this fee corresponded to 0.4 per cent

²⁹ Although Ottoman inheritance inventories have often been criticized by historians as unreliable sources of information, a recent study by Ceylan, 'Ottoman inheritance inventories', challenges this established view, showing that inventory valuations are closely correlated with market prices and can be reliably employed for historical research.

³⁰ *Ibid.*, p. 133.

³¹ This would be expressed in Ottoman Turkish as 'sük-ı sultanide ba'de'l-müzâyede semeni misline bey' olunan'.

³² NLT, *EŞS*, 109, 122, 157, 196, 244, 300.

³³ Marcus, 'Men, women and property', p. 139.

³⁴ Coşgel and Ergene, *Ottoman justice*, p. 80.

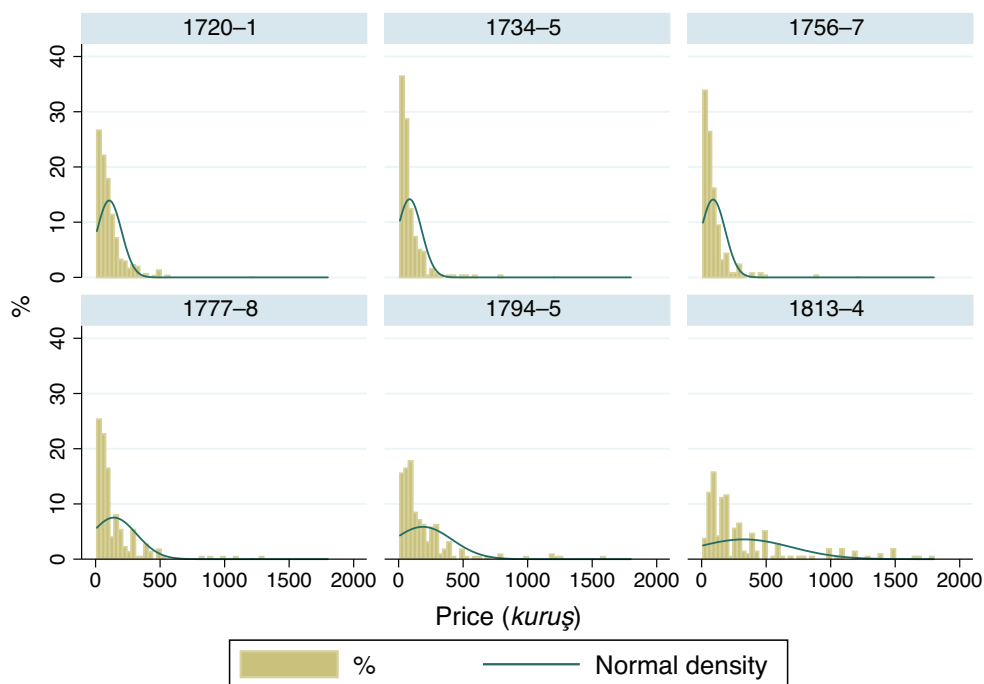


Figure 1. Histogram and normal density plots for house prices (*kuruş*)
 [Colour figure can be viewed at wileyonlinelibrary.com]

Sources: NLT, *EŞS*, 108 (Islamic year 1132, Gregorian year 1720/1), 123 (Islamic year 1146, Gregorian year 1734/5), 156 (Islamic year 1170, Gregorian year 1756/7), 195 and 198 (Islamic year 1191, Gregorian year 1777/8), 221 and 226 (Islamic year 1209, Gregorian year 1794/5), and 299 and 303 (Islamic year 1229, Gregorian year 1813/4).

of the median house price in Edirne.³⁵ Thus, the cost implications of registering sales at the courts were minor throughout our period. It remained constant in nominal terms and even declined in real terms due to debasements, implying no major financial motives to evade the courts. However, since we have no information on the number of sales carried out outside the courts or the total housing stock, it would be misleading to interpret the number of total deeds in our benchmark years as a proxy for the size of the housing market.

It is also possible that our dataset is systematically biased towards a particular income group because registering a sale at the courts may have been the privilege of wealthier property owners. However, the descriptive price statistics suggest that price distribution was right-skewed, and 50 per cent of houses in Edirne were priced at less than 80 *kuruş* and 75 per cent at less than 160 *kuruş* (see figure 1).³⁶ The distribution of house prices changed as the century progressed, and became more dispersed. This is parallel to the behaviour of prices under inflation, in this case

³⁵ This fee could buy around 11 kilos of wheat in the same year. Edirne's wheat price for 1734 is from Sahillioğlu, 'Buğday fiyatları', p. 267, which reports it as 64.5 *akçe/kile*. 1 *kile* in Edirne corresponded to around 36 litres (28–32 kilograms). There are no wage data for Edirne for this year, yet in 1737, daily wages of unskilled construction workers in Istanbul were 30.1 *akçe*, 20% higher than the fee; Pamuk, *500 Yıllık Fiyatlar*, p. 194.

³⁶ This sort of right-skewed price distribution is consistent with the patterns in other Ottoman cities. See Todorov, *Balkan city*, pp. 144–65; Faroqhi, *Modest substance*, p. 123; Marcus, *Aleppo*, pp. 320–1.

Table 1. *Distribution of house sales (% of total sales)*

	1720/1	1734/5	1756/7	1777/8	1794/5	1813/14
<i>Religious distribution</i>						
Muslim-to-Muslim	78	82	71	65	64	54
Greek-to-Greek	15	11	20	25	31	43
Armenian-to-Armenian	2	1	5	3	0	2
Jewish-to-Jewish	0	0	1	1	1	0
Inter-religious sales	5	6	3	6	4	1
<i>Contract characteristics</i>						
Intra-family sale	16	17	8	14	17	20
Share sale	2	2	3	5	3	6
Joint seller	10	15	17	13	18	18
<i>Micro-neighbourhood characteristics</i>						
Next to buyer's house	9	7	6	8	9	5
Next to seller's house	11	7	4	6	4	6
Next to commercial property	2	5	4	6	4	6
Next to <i>wagf</i>	7	5	4	7	8	5
Next to mosque	3	1	4	2	2	2
Next to church	1	4	1	1	1	3
Next to Muslim cemetery	3	2	4	2	1	1
Next to public building	2	0	0	0	0	1
Next to hill	1	2	2	0	1	0
Next to lake or river	1	0	0	2	4	0
N (total sales)	308	258	254	225	225	216

Sources: NLT, EŞS, 108 (Islamic year 1132, Gregorian year 1720/1), 123 (Islamic year 1146, Gregorian year 1734/5), 156 (Islamic year 1170, Gregorian year 1756/7), 195 and 198 (Islamic year 1191, Gregorian year 1777/8), 221 and 226 (Islamic year 1209, Gregorian year 1794/5), and 299 and 303 (Islamic year 1229, Gregorian year 1813/4).

caused by the debasements, and it may have had a more significant impact on cheaper properties than at the higher end of the market. We revisit this point later when we discuss price dispersion as a proxy for wealth inequality in the context of the housing market.

A final potential selection bias in our dataset, similar to that of inheritance inventories, may be towards a particular ethnoreligious group. Our sources allow us to identify the religion of sellers and buyers thanks to naming practices in the Ottoman documents. We record this information for each sale for our six benchmark years under four groups: Muslims, Orthodox Greeks (*zimmi*), Armenians, and Jews. As summarized in table 1, 95 per cent of all sales took place within the same religious community; that is, the buyer's religion was the same as that of the seller. We also find that both the relative weight and the number of Muslim-to-Muslim sales in the housing market declined across the eighteenth century. Studies of other Ottoman cities also show that issuing an official sale certificate (that is, a notarial deed) was under the monopoly of the Islamic courts and not any other institution. Moreover, carrying out sales outside the courts did not favour any particular ethnoreligious group. To the best of our knowledge, besides the Islamic court record books we study, there are no other community record books for Orthodox Greeks and Armenians in Edirne during our period. The Jewish community is the only religious group with a surviving record book. As a cross-check, we investigate these records but do not come across a single house

sale.³⁷ In the absence of any other house sale records, we work with the assumption that the Islamic courts held a monopoly on issuing notarial deeds in eighteenth-century Edirne for all religious groups.

This assumption is also consistent with the summary statistics that we provide in table 1. The numbers of Muslim and Greek Orthodox buyers and sellers seem to reflect the relative population of these two groups in the city of Edirne during the years 1720–1814. The very small number of Jewish house buyers in the market is also supported by the fact that a significant number of Jewish residents lived as tenants in buildings (*yahudihane*) belonging to pious foundations (*waqfs*).³⁸ Moreover, there is also evidence that the Jewish community had a preference for holding liquid assets.³⁹ Overall, although we cannot find any indication of systematic religious bias in our documents, we recognize that it is impossible to establish precisely the extent of underrepresentation of certain ethnoreligious groups. Such underrepresentation would not constitute a problem for our analysis of *aggregate* house prices and their determinants, but we remain cautious in interpreting our results in the context of the ethnoreligious distribution of wealth, as approximated by house prices.

The deeds contain detailed information on physical characteristics of the houses sold, which is essential for the estimation of a hedonic price index. For each transaction, we can determine the number of rooms, storage spaces, kitchens, barns, halls, courtyards, wells or fountains, and baths. We use this information in our analysis in the form of continuous variables as they are stated in the original Ottoman documents. The records also mention whether houses had any porches, outdoor kitchens, or more than one floor. These characteristics enter into the analysis as dummy variables.⁴⁰ As summarized in table 2, the majority of the houses in the deeds did not have a storage room, kitchen, barn, hall, bath, porch, or outdoor kitchen. The majority of them had a courtyard, one or two rooms and a hall, and only one floor. Overall, the configuration of houses did not change significantly across the eighteenth century, yet there seems to have been a slight increase in the reported number of rooms, storage spaces, kitchens, and wells.

Most of our documents make an explicit reference to certain contractual characteristics of the house sale, as summarized in table 1. One of these features indicates whether more than one person owned the property in question. Joint ownership was quite common in early modern Ottoman cities, mainly in inheritance cases. We keep a record of the properties sold by joint owners as a potential determinant of the price, based on the hypothesis that these sales could be subject to further transaction costs. Moreover, in a relatively smaller number of sales, we come across a situation where one of the co-owners sells his or her share of the property. In these cases, the records explicitly state the numbers of total and sold shares. Given that selling part of the property instead of the whole property

³⁷ The original copies of these books are held in the Colombia University Library. We thank Yaron Ben-Naeh for this information. See also Ben-Naeh, *İevs*, p. 297.

³⁸ Gökbilgin, *Paşa Livası*, pp. 51–3.

³⁹ Ben-Naeh, *İevs*, pp. 387–90.

⁴⁰ If houses consist of multiple storeys, the deeds include words such as *fevkani* (upstairs) and *tahtani* (downstairs). As for the physical specifications, we encounter the following Ottoman words which we translated into English: *oda*: room; *sofa*: hall; *havlu*: courtyard; *ahur*: barn; *matbah*: kitchen; *hamam* or *gaslhane*: bath; *kuyul/çeşme*: well/fountain; *sundurma*: porch; *yaz ocağı*: outdoor kitchen.

Table 2. *The configuration of houses (% of total sales)*

	1720/1	1734/5	1756/7	1777/8	1794/5	1813/14
<i>Room</i>						
1	36	29	29	24	19	19
2	38	45	39	36	46	44
3+	27	26	31	40	35	37
<i>Storage</i>						
0	70	75	69	61	58	59
1+	30	25	32	39	41	41
<i>Kitchen</i>						
0	90	89	85	88	78	75
1+	10	10	15	12	21	25
<i>Barn</i>						
0	81	81	85	80	83	84
1+	19	19	15	20	17	15
<i>Hall</i>						
0	42	45	42	34	28	40
1	47	47	56	53	60	51
2+	11	8	2	13	11	9
<i>Courtyard</i>						
0	10	6	1	0	2	2
1+	90	94	99	100	98	98
<i>Well/fountain</i>						
0	70	64	57	50	51	50
1+	30	36	43	50	49	50
<i>Bath</i>						
0	99	96	96	97	96	97
1	1	4	4	3	4	3
<i>Porch</i>						
0	94	95	97	95	97	96
1	6	5	3	5	3	4
<i>Outdoor kitchen</i>						
0	98	98	96	96	98	100
1	2	2	4	4	2	0
<i>Storey</i>						
0	56	56	59	56	55	58
1	44	44	41	44	45	42
N	308	258	254	225	225	216

Sources: As for tab. 1.

could affect the price, we keep an account of these numbers. The final piece of information regarding the contract type is whether the sale took place within the family. An intra-family sale could happen in the context of inheritance, marriage, and divorce.⁴¹ It enters into the model in the form of a dummy variable, which takes the value of 1 if a sale was conducted among the family members, and 0 if otherwise. The number of shares sold is calculated as a continuous variable ranging from 0 to 1, where 1 represents the full share. Finally, in the case of a joint seller, we use a dummy variable, which takes the value of 1 if there is more than one seller, and 0 if otherwise.

Location is another piece of information that appears in the deeds and is of major importance for estimating a hedonic price index. The inhabitants of Ottoman cities were identified by their name, religion, and the name of the ‘quarter’ (*mahalle*)

⁴¹ Faroqhi, *Modest substance*; Marcus, ‘Men, women and property’.

they resided in.⁴² The quarter was the smallest legal administrative unit, as well as a social and economic entity.⁴³ Unlike the Arabic-speaking lands of the Ottoman Empire where distinct Jewish or Christian quarters (*mahallat al-Yahud* or *mahallat al-nasara*) existed and were represented in the court documents as such, the spatial logic of Edirne was not articulated in the same manner.⁴⁴ Across 2,246 sale records spanning a century, we come across around 139 unique quarter names covering the entire city space. These are usually named after an important building, such as a mosque, a church, a historical monument, a public building, or the tomb of an important person. A significant number of these buildings did not survive to the twenty-first century. Therefore, for each quarter, we check the city histories and historical maps (see figure 2) to pinpoint the location of this major building.⁴⁵ We treat this building as the centre point of the quarter and identify its coordinates with the help of geo-referencing methods. We use the same approach to find the coordinates of the political and commercial centres of the city.

The spatial patterns in our dataset are summarized in figure 3, in which the first panel shows the central location of the quarters, and the political and commercial centres. The blank areas in these maps do not necessarily mean lack of information or lack of residential settlement. Quarters may have differed in terms of density and area, but there is no information on their borders, so we treat each quarter as a *point* on the map. In other words, blank areas belong to one or more quarters, which we already include in our dataset, but we are unable to make any assumptions about their precise borders because no such information exists in the archival records. Although this prevents us from applying spatial autocorrelation or dependency methods in our econometric analysis, we address this problem by including location (quarter) fixed effects and by clustering the standard errors over quarters in our model, as elaborated in the next section. As for the key centres, the commercial centre was close to the most densely populated area in the city, the citadel (*kaleiçi*); and the political centre was across the Tundzha (Tunca) River, on the north side. The state offices responsible for security in the city were mostly located in the quarters around this centre. The fact that the political and economic centres were located in different parts allows us to test explicitly whether property buyers paid a premium to remain close to the political or commercial centres. In the next section, we include this information in our model by calculating the linear distance in kilometres from the centre of each quarter to the commercial and political centres.

To provide a better sense of geographical patterns, we show how the sales were spatially distributed in the second panel of figure 3. The number of sales per quarter could reach up to 88, but on average they remained around 16 sales per quarter during the period 1720–1814. Although the sales seem to be spread more or less evenly across the city, the map suggests that in the outskirts of the city, a higher

⁴² Only a few records refer to the profession of buyers and sellers, all of whom were Muslim. As the professions of non-Muslims were not reported in this type of court document, we decide to exclude them from our analysis. For an overview of Ottoman professions, see Faroqhi, *Artisans of empire*.

⁴³ Ergenç, 'Administration units'; Behar, *Kasap Ilyas*, p. 6.

⁴⁴ Compare al-Qattan, 'Across the courtyard', pp. 17–19; and Karagedikli, 'Overlapping boundaries', pp. 660–4.

⁴⁵ Two historical sources we use for this purpose are the earliest detailed map of Edirne produced by the French General Osmont, and Ahmet Badi Efendi's city inventory, which gives a detailed account of all historical buildings in Edirne including their approximate location. For the Osmont map, see Ministère de la Défense-Service Historique de l'Armée de Terre, Paris, Armée Française d'Orient, carte 4.10. B.225, General Osmont, *Plan d'Adrianople*; also Yerolympos, 'Topography'. For Badi's inventory, see Badi Efendi, *Rüyaz-ı belde*.

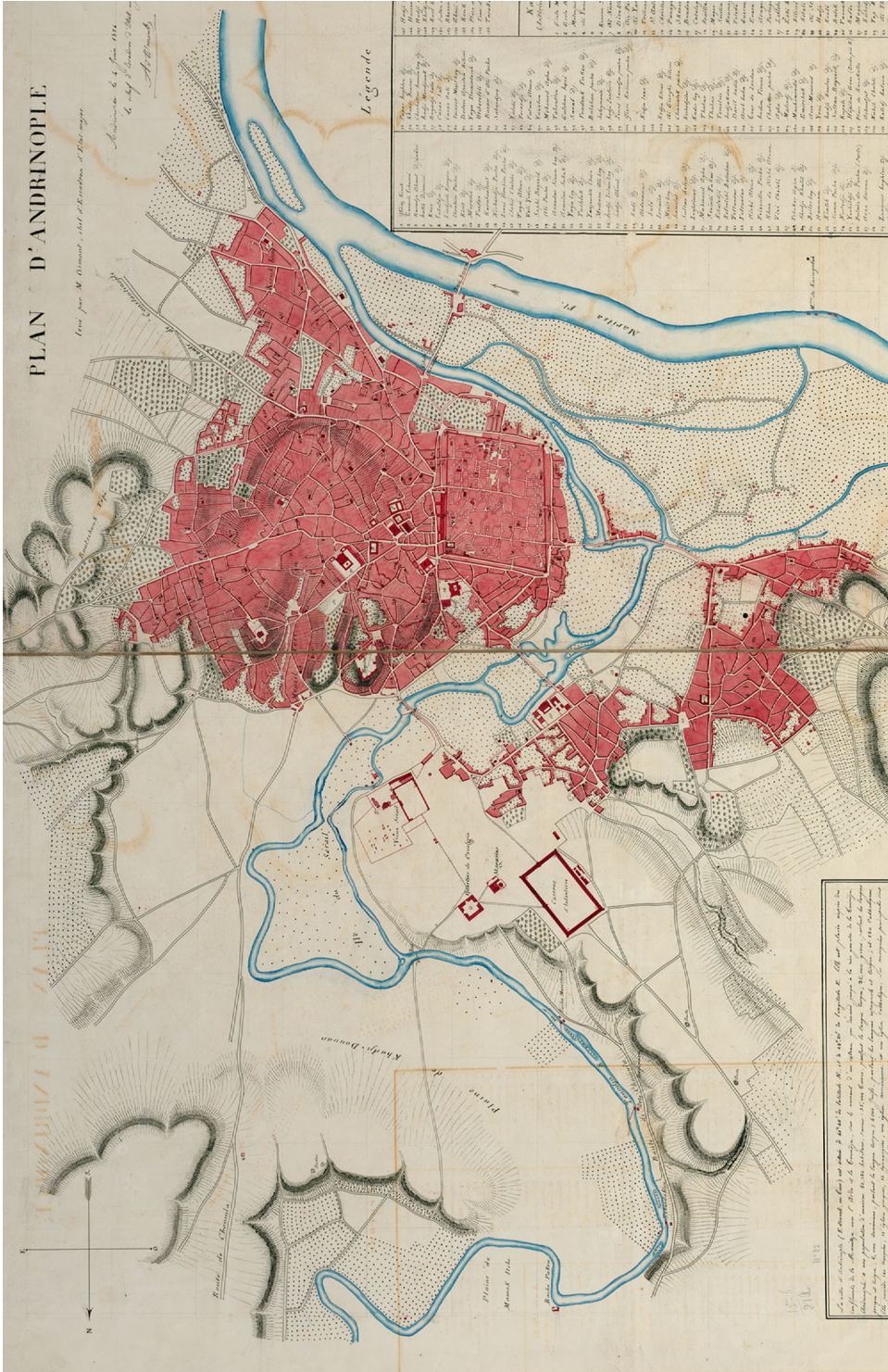


Figure 2. City of Edirne, 1854
 [Colour figure can be viewed at wileyonlinelibrary.com]
 Source: Osmont, *Plan d'Adrianople* (see n. 45).

Quarters and centres, 1720–1814



No. of sales, 1720–1814

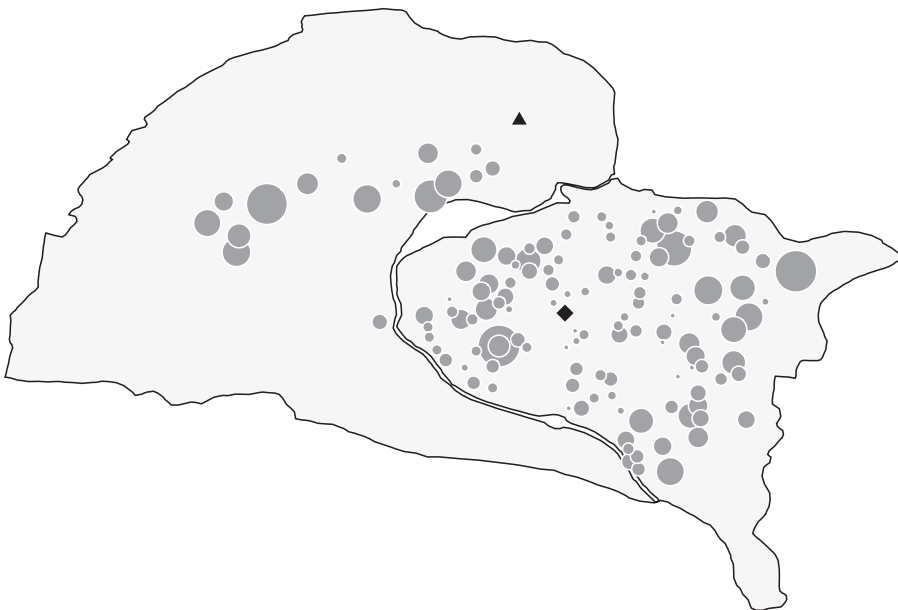


Figure 3. *Spatial distribution of house sales by quarters, 1720–1814*

Notes: In both maps, the ‘triangle’ is the political centre, the ‘diamond’ is the commercial centre, and the ‘circles’ are the quarters. In the second panel, the size of circles is proportional to the frequency of sales in that particular quarter.

Sources: The location information is based on Osmont, *Plan d’Adrianople* (see n. 45), and Badi Efendi, *Riyaz-ı belde*. For the rest, as for tab. 1.

number of transactions per quarter took place. This is because the area that each quarter occupied in the outskirts was larger, with more sales per point.

In addition to this general location information, the sale records also give a detailed account of the surroundings of each property. We name this the ‘micro-neighbourhood’, a term that is used in the modern urban studies literature to define the immediate neighbourhood of a property.⁴⁶ In Ottoman records, micro-neighbourhood information is occasionally in the form of a reference to the nearest physical and geographical landmarks, such as a castle wall, *waqf* buildings, commercial buildings, a cemetery, a church, a hill, a lake, a river, and so on (see table 1). Although it is not possible to identify based on the records how close these landmarks are to the property in question, we create a dummy variable for each of them to test their impact on prices. In certain cases, the records also indicate whether the buyer or the seller already owned an adjacent house. We also keep track of this information as part of the micro-neighbourhood characteristics, since buyers or sellers may have priced houses differently in these cases.

The descriptive statistics offer us some insights into the characteristics of buyers, sellers, and houses in the Ottoman city of Edirne during the years 1720–1814. In the next section, we use this information to construct a long-term price index for the houses.

III

In estimating the determinants of house prices, we rely on a hedonic model, which is considered to be the ideal choice for commodities with unique individual attributes. The model starts with the assumption that each good is composed of n attributes, z_1, \dots, z_n . The price of this particular good (in this case houses) depends on the number of these various attributes; hence the price can be expressed as a function of the attributes, $P(Z)$.⁴⁷

We use logarithmic nominal house prices as the dependent variable and create four groups of independent variables that aim to capture the unique attributes of houses in eighteenth-century Ottoman Edirne: physical features of houses relating to size and style, micro-neighbourhood characteristics that give information on ‘what is nearby’, locations of houses measured by distance to key centres, and contract characteristics. In terms of approach, we pool together the data summarized in online appendix table S1 and use year and location (quarter) fixed effects, and dummy variables for each month to control for potential seasonality, as well as other time and location-specific factors.

The regression we use in our analysis is as follows:

$$\log P_{m,t} = \alpha + \sum_k \beta_k X_{k,m,t} + \sum_j \theta_j D_{m,j,t} + \sum_l \eta_l D_{m,l,t} + \sum_t \delta_t D_{m,t} + \varepsilon_{m,t} \quad (1)$$

Equation 1 pools data from T time periods, and explains the price of each house, m , sold at time t , ($P_{m,t}$, $i = 1, \dots, M_t$), as a function of the quantities of physical house characteristics ($X_{k,m,t}$, $k = 1, \dots, K$), year dummy variables ($D_{m,t}$, $t = 1, \dots, T$), and location dummy variables ($D_{m,l}$, $l = 1, \dots, L$) defined

⁴⁶ See Sager, ‘Residential segregation’.

⁴⁷ Brown and Harvey, ‘Hedonic price models’; Aizcorbe, *Hedonic techniques*.

in terms of 139 unique quarters where each property is based. Finally, the equation also includes other dummy variables ($D_{m,j}$, $j = 1, \dots, \mathcal{J}$), controlling for seasonality, micro-neighbourhood characteristics, and contract features.

In order to estimate why certain quarters enjoyed higher prices than others, we estimate the alternative model and include in the equation for each sale the distance of each quarter to the commercial and political centres. Given that the distance variables would be collinear to the quarter dummy variables, in equation 2 we replace the location fixed effects with the distance variables that are listed as part of the house characteristics ($X_{k,m,t}$, $k = 1, \dots, K$):

$$\log P_{m,t} = \alpha + \sum_k \beta_k X_{k,m,t} + \sum_j \theta_j D_{m,j,t} + \sum_t \delta_t D_{m,t} + \varepsilon_{m,t} \quad (2)$$

In both cases, $D_{m,t} = 1$ if a price for house m observed at time t , and $D_{m,t} = 0$ if otherwise. Finally, α , β , δ , η , θ are parameters to be estimated and $\varepsilon_{m,t}$ is an unobserved random disturbance term. We use robust standard errors to address any potential heteroscedasticity, and cluster the standard errors by ‘location’ (that is, quarter) to deal with any correlation within the clusters (that is, quarters).⁴⁸ The results for the ordinary least squares (OLS) regressions based on equations 1 and 2 with clustered robust standard errors are presented in table 3. The final row of the table shows the mean variance inflation factors as a test for any potential multicollinearity among the independent variables. Given that we have two kinds of location variables in the model that are correlated with each other, namely location fixed effects (that is, dummy variables for quarters) and distance measures (to the commercial and political centres), we run the first model with only quarter fixed effects and exclude distance measures. Model 2 includes only ‘distance to the political centre’ but not quarter fixed effects. Finally, model 3 only shows ‘distance to the commercial centre’ but not the other two location controls.

In terms of the physical characteristics of houses, the table shows that extra space, as measured by the number of rooms, an extra floor, a storage space, a kitchen, or a barn, had a positive impact on prices across all three models.⁴⁹ Each additional room and storage space increased house prices by 18–19 per cent, whereas having a kitchen and a barn increased prices by more than 25 per cent. Altogether, these indicators show that the size of a property was an important factor in determining its value. In terms of property features, the most important factor seems to be access to fresh water (having either a well or a fountain), which increased prices by around 19 per cent. This is similar to the findings of Raff et al., who show that having a well added a premium of 75.6 per cent to the market value of property in Beijing during the period 1645–1840.⁵⁰

As for micro-neighbourhood characteristics, we do not find that being next to a *waqf* property, a mosque, a church, or a commercial or public building had a statistically significant impact on house prices. This may be due to the relatively

⁴⁸ Parente and Santos, ‘Quantile regression’.

⁴⁹ As a robustness check, we also estimated an alternative ‘property size’ indicator by combining the number of rooms, storage spaces, kitchens, halls, and barns. The idea behind this exercise was to check whether the results would still hold given that these five indicators may be potentially correlated. As the results remained largely the same, we report here only the disaggregated version.

⁵⁰ Raff et al., ‘Real estate’, p. 380.

Table 3. *OLS regression results with hedonic determinants, 1720–1814*

<i>Variables</i>	(1)	(2)	(3)
<i>Physical characteristics</i>			
Rooms	0.184*** (0.025)	0.214*** (0.021)	0.212*** (0.021)
Storey	0.224*** (0.042)	0.310*** (0.048)	0.253*** (0.043)
Storage	0.196*** (0.030)	0.264*** (0.031)	0.269*** (0.030)
Kitchen	0.260*** (0.048)	0.304*** (0.044)	0.286*** (0.044)
Barn	0.251*** (0.038)	0.184*** (0.041)	0.193*** (0.037)
Hall	0.117*** (0.023)	0.115*** (0.023)	0.113*** (0.023)
Courtyard	0.217** (0.085)	0.085 (0.081)	0.124 (0.078)
Well/fountain	0.198*** (0.028)	0.178*** (0.030)	0.159*** (0.028)
Outdoor kitchen	0.097 (0.081)	0.104 (0.085)	0.102 (0.083)
Bath	0.076 (0.105)	-0.028 (0.103)	-0.013 (0.102)
Porch	0.079 (0.068)	0.079 (0.067)	0.067 (0.066)
<i>Micro-neighbourhood</i>			
Next to buyer's house	0.041 (0.058)	0.060 (0.063)	0.061 (0.060)
Next to seller's house	0.079 (0.062)	0.088 (0.064)	0.072 (0.063)
Next to commercial property	-0.018 (0.105)	-0.057 (0.106)	-0.057 (0.103)
Next to <i>wagf</i>	-0.015 (0.065)	0.045 (0.061)	0.014 (0.063)
Next to mosque	-0.024 (0.103)	-0.028 (0.100)	-0.053 (0.101)
Next to church	-0.019 (0.210)	0.443** (0.212)	0.364* (0.203)
Next to Muslim cemetery	0.077 (0.132)	-0.101 (0.132)	-0.075 (0.127)
Next to public building	0.052 (0.093)	0.129* (0.073)	0.070 (0.077)
Next to hill	-0.377*** (0.112)	-0.460*** (0.124)	-0.489*** (0.118)
Next to lake or river	-0.276* (0.157)	-0.442*** (0.130)	-0.427*** (0.133)
<i>Contract characteristics</i>			
Joint seller	-0.035 (0.043)	-0.038 (0.045)	-0.043 (0.044)
Share sold	0.828*** (0.253)	0.967*** (0.251)	0.924*** (0.253)
Intra-family sale	-0.364*** (0.045)	-0.355*** (0.044)	-0.367*** (0.043)
<i>Location</i>			
Distance to political centre		0.005 (0.030)	

(Continued)

Table 3. *Continued*

<i>Variables</i>	(1)	(2)	(3)
Distance to commercial centre			-0.196*** (0.046)
Constant	2.798*** (0.256)	2.547*** (0.257)	2.820*** (0.258)
Observations	2,206	2,188	2,188
R ²	0.673	0.607	0.618
Month dummy variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Location fixed effects	Yes	No	No
Mean variance inflation factors	1.41	1.26	1.26

Notes: * = Significant at the 10% level. ** = Significant at the 5% level. *** = Significant at the 1% level. Clustered robust standard errors in parentheses.

low number of observations of micro-neighbourhood characteristics.⁵¹ Only two variables are significant in this category, and both of them are related to the physical geography of the quarter. They suggest that if a property is next to a hill or a lake or river, its value could decrease by 37 per cent and 27 per cent respectively. A closer look suggests that the majority of these sales were in quarters at the hilly edge of the city in the west, where security could be a concern. In other words, if a property was at the far end of a remote quarter, its value was lower. Similarly, being next to a lake or river possibly indicates the flood risk of a particular location, since Edirne was known to be vulnerable to flooding.⁵²

As for the contract characteristics, we find that the price of the property increased in proportion with the share sold: more than 80 per cent for each additional share and more than 90 per cent in two specifications of the model. The sale of shares of houses was common in cases of an inheritance that was divided among siblings and other heirs according to Islamic law. Another important factor in terms of contractual characteristics is the more than 35 per cent discount on houses sold among family members. Intra-family sales could happen between parents and children in the context of marriage, between couples in the case of divorce, or between siblings in the case of inheritance. Our finding of the decline in prices is in line with studies of other Ottoman cities, but in addition we establish the extent of intra-family sales' impact on house prices.⁵³

It is not possible to measure the impact of location on prices with model 1, given that it controls for this through quarter fixed effects. In models 2 and 3 we address this question, and estimate the coefficients for the same set of independent variables, but replace the location fixed effects with a distance variable that measures the distance of quarters to the commercial and political centres. We find that being closer to the political centre did not influence the price. On the other hand, every additional kilometre away from the commercial centre decreased

⁵¹ We are not sure whether this is due to inconsistent recording practices. Although not reported here, as a robustness check, we run the same model without any of the micro-neighbourhood indicators. Overall, our results remain the same.

⁵² Faroqhi, 'Flooding'.

⁵³ Faroqhi, *Modest substance*, pp. 217–18; Marcus, 'Men, women and property', pp. 154–5; al-Qattan, 'Litigants and neighbors', p. 521.

the value of the property by around 20 per cent. The largest covered bazaars, inns, religious buildings, public baths, and public kitchens (*imaret*) were concentrated in the commercial centre of the city, and residents valued these properties more due to their easy access to these major urban services.⁵⁴

So far, we have worked under the assumption that the housing market in eighteenth-century Edirne was not segmented. In other words, the determinants of house prices at the lower and higher end of the market would be the same. It is possible to test the accuracy of this assumption with the help of quantile regressions, which provide a framework to test the market segmentation by income/wealth group (approximated by house prices).⁵⁵ We conduct this analysis only for the benchmark years for which we have collected full price data, as they provide us with the full distribution of prices in a certain year. In table 4 we present the results for hedonic quantile regressions that are estimated at the 25th, 50th, and 75th percentile of the price distribution. Models 1–3 show the results with location fixed effects and models 4–6 replace them with our distance indicators to test whether proximity to the commercial (or political) centre mattered more or less at different price levels.

There are only a few noteworthy changes in the size or significance of certain coefficients at different price levels. First, we observe that property size was an important determinant of house prices at any level and there is no discernible upward or downward pattern in coefficients of property size indicators. This observation is also true for access to fresh water, which remained an equally important component of any property at different price levels. The change in the significance of the variables ‘outdoor kitchen’, ‘next to seller’s house’, ‘next to Muslim cemetery’, and ‘joint seller’ at different price levels is likely to be due to the few numbers of observations (less than 17) in these cases. One statistically meaningful change is the ‘next to church’ variable. We find that, in the upper quartile, being close to a church increased the value of the houses.⁵⁶ Another observation is for the ‘next to hill’ variable, which shows that in the upper quartile, the negative impact of being next to a hill on the house price was higher. In other words, at the cheap end of the housing market being next to a hill had a less negative impact on house prices. Perhaps the most interesting finding in our quantile regressions concerns intra-family sales, which shows that this became a less important factor as the price of the house increased.

Overall, however, our results refute the presence of strong market segmentation, since the significant variables in the models presented in table 4 for the whole price range also apply to the median (0.5), lower (0.25), and upper quartile (0.75) price levels, with only minor changes in the sign and size of the coefficients. Nevertheless, the lack of market segmentation does not necessarily mean that there was no wealth inequality in the housing market in Edirne during the eighteenth century. To test this hypothesis, we calculate the coefficient of variation in house prices for six benchmark years as a measure of price dispersion in the housing market or housing

⁵⁴ Uğur, ‘Historical interaction’, pp. 127–43.

⁵⁵ Parente and Santos, ‘Quantile regression’; Drelichman and Agudo, ‘Housing’.

⁵⁶ We are cautious about this finding, given the low number of observations. Yet it is similar to Drelichman and Agudo, ‘Housing’, p. 40, which shows that in the context of early modern Toledo, only upper quartile rents valued proximity to the cathedral.

Table 4. *Quantile regressions with hedonic determinants*

<i>Variables</i>	(1) 0.25	(2) 0.5	(3) 0.75	(4) 0.25	(5) 0.5	(6) 0.75
<i>Physical characteristics</i>						
Rooms	0.189*** (0.028)	0.210*** (0.026)	0.211*** (0.024)	0.214*** (0.026)	0.221*** (0.027)	0.235*** (0.037)
Storey	0.269*** (0.068)	0.262*** (0.070)	0.227*** (0.050)	0.230*** (0.052)	0.269*** (0.072)	0.297*** (0.074)
Storage	0.136*** (0.060)	0.194*** (0.052)	0.206*** (0.052)	0.248*** (0.056)	0.252*** (0.041)	0.275*** (0.059)
Kitchen	0.318*** (0.078)	0.315*** (0.084)	0.273*** (0.091)	0.296*** (0.068)	0.272*** (0.065)	0.307*** (0.072)
Barn	0.238*** (0.092)	0.241*** (0.078)	0.230*** (0.065)	0.250*** (0.088)	0.243*** (0.064)	0.215*** (0.061)
Hall	0.123*** (0.043)	0.121*** (0.033)	0.154*** (0.047)	0.0956*** (0.034)	0.136*** (0.040)	0.145*** (0.041)
Courtyard	0.146 (0.100)	0.169** (0.070)	0.146* (0.077)	0.126* (0.075)	0.062 (0.079)	0.021 (0.104)
Well/fountain	0.165*** (0.054)	0.208*** (0.048)	0.191*** (0.061)	0.152*** (0.052)	0.185*** (0.048)	0.153*** (0.054)
Outdoor kitchen	0.226* (0.131)	0.038 (0.087)	0.319* (0.165)	0.088 (0.177)	0.138 (0.115)	0.122 (0.146)
Bath	-0.050 (0.264)	-0.024 (0.131)	-0.030 (0.148)	-0.115 (0.144)	-0.006 (0.167)	0.039 (0.149)
Porch	0.108 (0.131)	0.053 (0.075)	0.078 (0.118)	0.095 (0.086)	0.115 (0.097)	0.052 (0.120)
<i>Micro-neighbourhood</i>						
Next to buyer's house	0.064 (0.081)	0.049 (0.075)	-0.009 (0.103)	0.043 (0.077)	0.125 (0.085)	0.008 (0.092)
Next to seller's house	0.040 (0.085)	0.084 (0.097)	0.220** (0.109)	0.022 (0.059)	0.190 (0.117)	0.224* (0.120)
Next to commercial property	0.081 (0.231)	-0.055 (0.112)	0.179 (0.145)	0.0003 (0.134)	-0.059 (0.115)	-0.018 (0.281)
Next to <i>waqf</i>	-0.025 (0.121)	0.018 (0.082)	0.014 (0.095)	0.082 (0.161)	0.118 (0.090)	0.011 (0.122)
Next to mosque	-0.147 (0.228)	0.041 (0.161)	-0.078 (0.132)	-0.103 (0.222)	0.115 (0.140)	0.021 (0.108)
Next to church	-0.088 (0.276)	-0.191 (0.176)	0.487** (0.218)	0.385 (0.258)	0.328 (0.214)	0.401 (0.256)
Next to Muslim cemetery	-0.231** (0.107)	-0.132 (0.112)	0.011 (0.151)	-0.110 (0.109)	-0.280** (0.128)	-0.024 (0.115)
Next to public building	-0.067 (0.283)	0.232 (0.158)	-0.090 (0.134)	-0.135 (0.138)	0.075 (0.196)	0.037 (0.256)
Next to hill	-0.372* (0.191)	-0.336** (0.156)	-0.427*** (0.147)	-0.368** (0.177)	-0.471*** (0.145)	-0.540*** (0.133)
Next to lake or river	-0.305 (0.359)	-0.239 (0.287)	-0.233 (0.156)	-0.492* (0.287)	-0.199 (0.224)	-0.243 (0.169)
<i>Contract characteristics</i>						
Joint seller	-0.014 (0.099)	0.062 (0.073)	0.109* (0.064)	-0.010 (0.064)	0.080 (0.077)	0.097 (0.091)
Share sold	0.888*** (0.340)	0.882* (0.460)	0.666* (0.378)	1.027** (0.428)	1.248*** (0.404)	1.234*** (0.326)
Intra-family sale	-0.418*** (0.074)	-0.365*** (0.077)	-0.252*** (0.080)	-0.344*** (0.073)	-0.334*** (0.058)	-0.324*** (0.075)
<i>Location</i>						
Distance to commercial centre				-0.163*** (0.048)	-0.211*** (0.059)	-0.209*** (0.064)

(Continued)

Table 4. *Continued*

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)	(6)
	0.25	0.5	0.75	0.25	0.5	0.75
Distance to political centre				0.051 (0.038)	0.041 (0.038)	-0.042 (0.042)
Constant	2.950*** (0.575)	3.014*** (0.654)	3.040*** (0.680)	3.162*** (0.491)	3.387*** (0.669)	3.924*** (0.459)
Observations	1,482	1,482	1,482	1,479	1,479	1,479
R ²	0.657	0.674	0.662	0.596	0.612	0.607
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Location fixed effects	Yes	Yes	Yes	No	No	No

Notes: As for tab. 3.

wealth inequality.⁵⁷ Based on these six observations we find that the coefficient of variation in house prices increased 45 per cent during the years 1720–1814, indicating a rise in housing wealth inequality, yet this increasing inequality did not make the housing market more segmented.⁵⁸

In the final stage of our analysis, we estimate a hedonic price index based on the coefficients of the time dummy variables of model 1 in table 3.⁵⁹ The nominal hedonic prices reveal two major episodes in the housing market: a period of stability during 1720–88 and an increase after 1789 (figure 4). During the first period, the nominal house prices remained stable even as the Ottoman currency lost more than 50 per cent of its value. One explanation for this possible real price decline is a range of natural disasters and social transformations that significantly affected the city's demographics. First, the irreversible return of the royal palace from Edirne to Istanbul brought about a considerable fall in population, especially state officials, in the first half of the eighteenth century. In the middle of the century, the Great Fire of 1745 and the major earthquake of 1751 led to drastic declines in Edirne's population and wiped out part of its housing stock.⁶⁰ Moreover, being located at the crossroads of commercial and military routes, Edirne suffered from two major plague epidemics during 1759 and 1780. These epidemics spread from Istanbul to Edirne, and then made their way to the west and other major towns in the Balkans.⁶¹

Overall, disease and natural disasters had detrimental effects on the population, which may have led to a decline in house prices despite repeated debasements of the currency. The only exception during this period was the Russo–Ottoman War of 1768–74, when Edirne's demography significantly changed due to the mobilization of the Ottoman army and the settlement of Zaporozhian Cossacks who fled to the Ottoman Empire in the 1770s and formed a sizeable community in Edirne. This is reflected in a short period of increase in house prices, possibly due to the

⁵⁷ See col. 6 of online app. tab. S1. We calculate the coefficient of variation for every single year. However, the interpretation is only meaningful for years for which we have a full set of observations.

⁵⁸ Our findings on the increase in wealth inequality are consistent with Coşgel and Ergene, 'Inequality of wealth', p. 314, which shows that there was also a 45% increase in the coefficient of variation in probate estate inventories in 1713–1802.

⁵⁹ As a robustness check, we calculate the index for the different models we present in tab. 3, but the difference in results is negligible.

⁶⁰ Gökbilgin, 'Edirne'.

⁶¹ Panzac, *La peste*, pp. 60, 166.

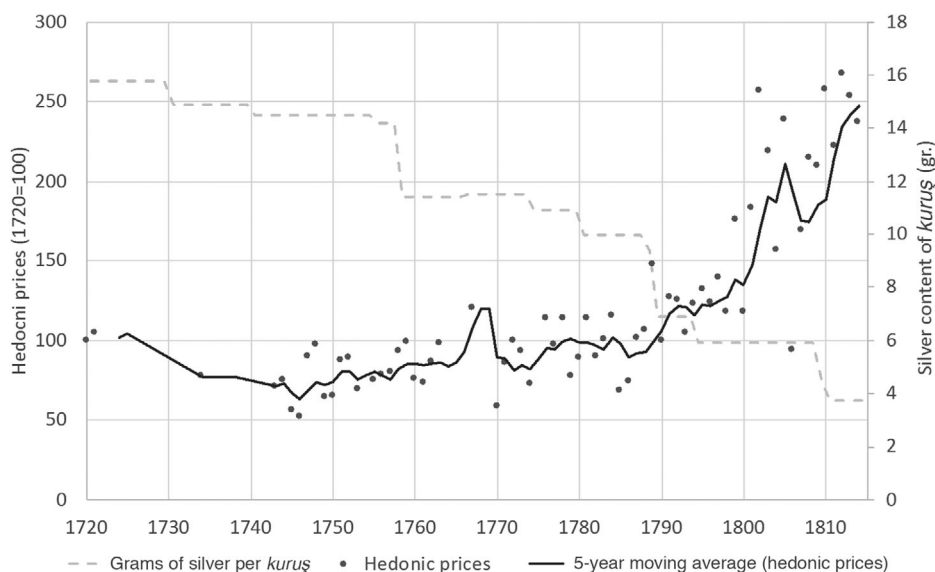


Figure 4. Hedonic house prices in Edirne and silver content of Ottoman currency, 1720–1814

Notes: The hedonic prices are based on tab. 3, model 1.

Sources: See online app. tab. S1.

rise in population. The post-1789 period coincided with another catastrophic war with Russia in 1787–92, when Edirne served once again as the major staging point of the army.⁶² Moreover, from 1786 to 1834 Ottoman state finances experienced large budget deficits that were addressed through debasements.⁶³ Both of these factors led to a rapid increase in nominal house prices. This trend was momentarily reversed when a major uprising known as the Edirne Incident of 1806 took place. This event was characterized by local resistance to the central government's attempt to reform the army and introduce the new troops (*Nizam-ı Cedid*) to Rumelia. The large volatility in house prices during these years reflects the response of urban households to this major political event.⁶⁴ The final episode of increasing house prices coincided with the first stage of the Great Debasement of 1808–34, starting with Mahmud II's ascent to the throne in 1808, which led to a rapid increase in prices in Istanbul and elsewhere in the Ottoman Empire.⁶⁵

The hedonic price index addresses the heterogeneity in house and location characteristics. Therefore, in comparison to simple metrics like mean or median, it shows less volatility and captures historical trends more accurately (see online appendix figure S1). To understand the impact of the above events on *real* prices, the nominal price index still needs to be deflated with a measure of inflation. In the absence of time series for prices and wages for Edirne, we compare our nominal house prices with the daily wages of unskilled labourers and a consumer price index

⁶² Roberts, *Migration and disease*, p. 96; Aksan, 'Russo-Turkish War'.

⁶³ Pamuk, *Monetary history*, pp. 188–92.

⁶⁴ Yildiz, *Crisis and rebellion*.

⁶⁵ Pamuk, *Monetary history*, pp. 193–5.

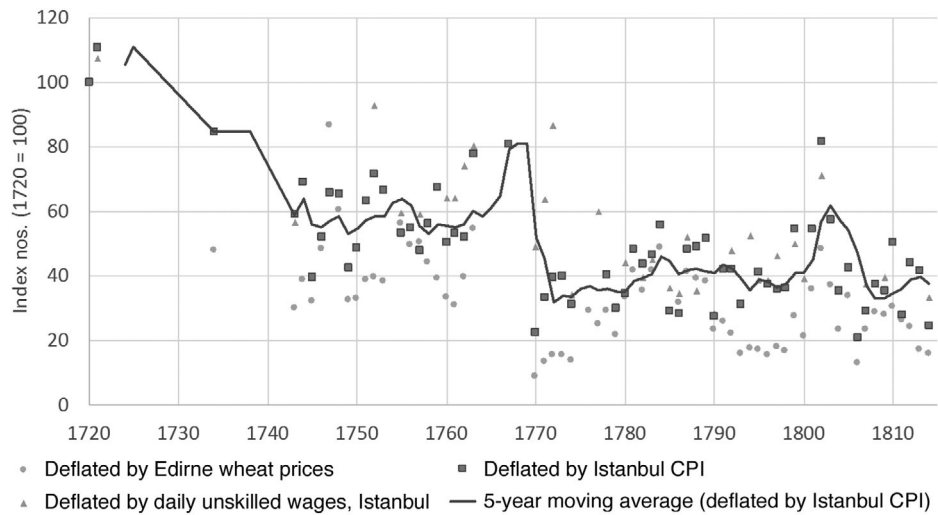


Figure 5. *Real hedonic house prices (1720 = 100)*

Notes: The hedonic prices are based on tab. 3, model 1.

Sources: See online app. tab. S1.

in the neighbouring capital city, Istanbul, for which the data are readily available.⁶⁶ We also use the prices of wheat in Edirne and estimate missing years by linearly interpolating Istanbul wheat prices.⁶⁷ By using the three series (see online appendix table S1), we deflate our hedonic price index and reach three different real house price indices during this period.

As shown in figure 5, the results are sketchier due to the incompleteness of wheat price and wage data for the period we study, but the Istanbul consumer price index (CPI)-deflated series produce a relatively more consistent picture. Regardless of the measure we use, our real price indices show that during the eighteenth century house prices in Edirne declined on average by 75 per cent in real terms. The impact of the aforementioned events on house prices can also be observed in the real series, especially the one deflated by Istanbul's CPI, for which we have more observations during the eighteenth century. The real index also confirms that following the Russo-Ottoman War of 1768–74, house prices entered a period of decline. The major plague epidemic of 1780–8 was one potential factor behind the lack of increase in real house prices, as the epidemic acted as a positive check on the city's demographic growth. Finally, the recovery from the late 1790s to the early 1800s came to a halt due to the political instability caused by the Edirne Incident of 1806, as outlined above.

It is important to contextualize the scale of decline in house prices in the city of Edirne during the eighteenth century. There are currently only a few studies that provide estimates for house prices during this period, as outlined above in our literature review. In figure 6, we combine our estimates for Edirne with Amsterdam

⁶⁶ Istanbul wages and prices are from Özmucur and Pamuk, 'Real wages'; and Pamuk, *500 Yıllık Fiyatlar*, pp. 124–34. Coşgel and Ergene, 'Inequality of wealth', p. 325, uses a similar approach for Kastamonu in the eighteenth century.

⁶⁷ Edirne's wheat prices are from Sahillioğlu, 'Buğday fiyatları'; and Pamuk, *500 Yıllık Fiyatlar*, pp. 177–9.

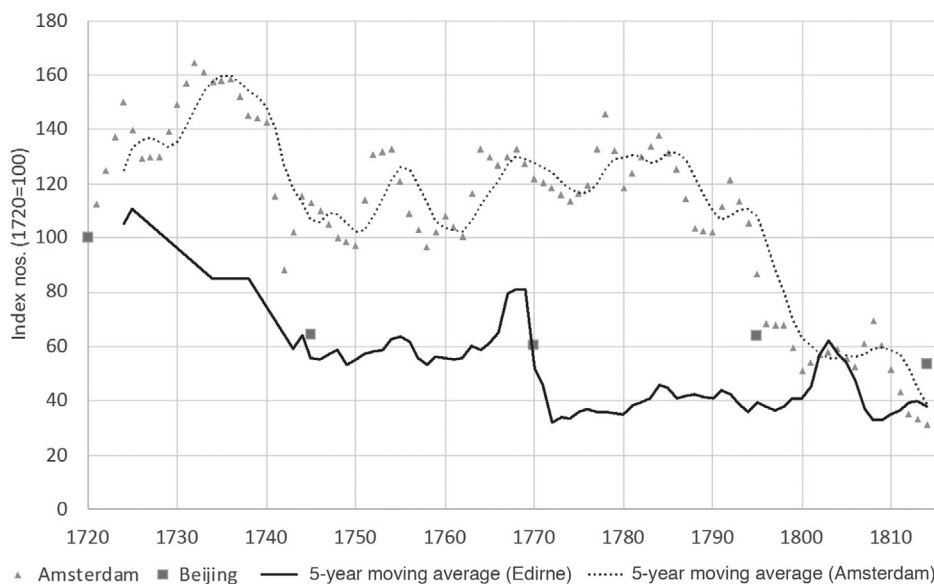


Figure 6. Trends in real house prices: Amsterdam, Beijing, and Edirne, 1720–1814

Sources: For Edirne prices, see online app. tab. S1. Beijing prices are elaborated from Raff et al., 'Real estate'. Amsterdam prices are based on Eichholtz, 'Herengracht Index'.

and Beijing, for which real hedonic house price indices are available. These three urban centres operated within different institutional frameworks and they were at different stages of their economic development. Yet a closer look suggests that in all three cases a combination of demographic shocks, political turbulence, and wars led to a decline in house prices. In the case of Amsterdam, the significant decline in house prices took place during the French Revolutionary Wars and the foundation of the Batavian Republic (1795).⁶⁸ The main driver behind declining prices in Beijing was government policy, which alleviated population pressure through tight controls on the movement of people from other provinces.⁶⁹ Finally, in Edirne, the Russia-Ottoman war in the 1770s, the plague epidemic in the 1780s, and political instability in the early nineteenth century drove down house prices.

IV

In this article, we have offered insights into house prices in the Ottoman Empire in the eighteenth century by using a new dataset and hedonic techniques. Our dataset, based on the notarial deeds extracted from the Islamic court registers in Edirne, provides us with detailed information on house prices, as well as their location and physical characteristics. We find that house prices were mainly driven by property size, as measured by the number of rooms, storage spaces, storeys, kitchens, barns, and other physical characteristics, such as having access to fresh water. Our model shows that certain micro-neighbourhood characteristics, potentially related to the

⁶⁸ Eichholtz, 'Herengracht Index', p. 187.

⁶⁹ Raff et al., 'Real estate', p. 383.

flood risk or safety of the neighbourhood, reduced the value of houses. Intra-family sales were another factor that led to a significant decrease in house prices. Finally, houses closer to the commercial centre of the city enjoyed a premium on the market. These findings are in line with the literature on early modern housing markets elsewhere in the world: location and size mattered for relative house prices.

The evidence we bring together also allows us to test for market segmentation and estimate housing wealth inequality by using quantile regressions and price dispersion measures for selected benchmark years. Although we do not find any evidence that the housing market was segmented during the eighteenth century, we show that house prices became more dispersed as the century progressed, implying a rise in wealth inequality approximated by house prices, a finding that is consistent with studies of other Ottoman cities.

In the final stage of our analysis, we estimate a hedonic house price index for the period 1720–1814 that reveal an increasing trend in nominal terms, mainly driven by frequent debasements of the coinage by the Ottoman government. The real house price index, however, shows almost a 75 per cent decline. We explain the substantial decline in inflation-adjusted house prices, especially following the Russo-Turkish War of 1768–74, through demographic shocks induced by plague epidemics and natural disasters, other population movements driven by the mobilization of the army, and political upheavals. A comparison with Beijing and Amsterdam suggests that urban households elsewhere in the world experienced similar demographic and political challenges and uncertainties during the eighteenth century which held back house prices.

DOI: 10.1111/ehr.13001

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. House prices and comparative indicators, 1720–1814

Table S2. Comparison of house prices: inheritance inventories and deeds

Figure S1. Different metrics for house prices, 1720–1814