

Housing and the cost of living in early modern Toledo^{*}

Mauricio Drelichman
The University of British Columbia
and CIFAR

Mauricio.Drelichman@ubc.ca

David González Agudo
Universidad Complutense de Madrid

dgagudo@ccee.ucm.es

First draft: February 2012
This draft: July 2014

Abstract:

Data on housing costs and rental markets for the early modern period are notoriously scarce. Using a new database of rent paid on 183 properties belonging to the Cathedral Chapter of Toledo between 1489 and 1600, we reconstruct housing costs for various social groups and trace the effect of exogenous shocks on the rental market using hedonic techniques. We document a well-functioning market that responded swiftly and predictably to exogenous shocks. We then explore the impact of adding rent to early modern price indices and estimates of living standards. Price indices show a moderate effect. The addition of rent reduces the gap between Toledo and two northern European locations by up to 9.5%.

Keywords: housing, rent indices, living standards, hedonic analysis, early modern period, Spain

JEL codes: R21, R31, N34, N94

^{*} We are especially grateful to Robert Allen and Jean Passini for sharing their data with us. We also thank Heidi Deneweth, Oscar Gelderblom, Libertad González, Josh Gottlieb, Joost Jonker, Enrique Llopis, Giacomo Ponzetto, Diego Puga, Marit Rehavi, Jan Luiten Van Zanden, and seminar participants at Northwestern, Caltech, the 2013 EHA meetings, the 2012 EHS meetings, the University of Valencia, Utrecht University, University of Barcelona, and Pompeu Fabra University for useful discussions and exchanges. We acknowledge the assistance of staff at the Archivo Capitular de la Catedral de Toledo, as well as that of Fernando Valverde in obtaining access to the Museo Casa de El Greco. Felipe Valencia Caicedo provided valuable research assistance. Drelichman acknowledges financial support from SSHRCC and CIFAR. All errors remain our own.

I. Introduction

Housing is one of the most essential services consumed by human beings, and real estate has long been a key store of wealth. The decision of where to reside is a central one in the life of virtually every individual.¹ Yet, as the focus turns to times past, our knowledge about housing, real estate wealth, and location decisions declines exponentially. Few systematic data on real estate values or housing costs exist anywhere in the world before 1800. Without them, our knowledge about a crucial element of living standards remains incomplete.

We present a new database of rents for 183 urban properties owned by the Cathedral Chapter of Toledo, observed yearly between 1489 and 1650. Toledo was Castile's –and indeed Spain's– second largest city in the sixteenth century. It often hosted the royal court; it also served as the main spiritual centre and was a thriving commercial hub. Our sample is composed of houses and shops from a wide variety of neighborhoods in the city, rented to people of very diverse social extraction. Leases were adjudicated at public, competitive auctions, thus ensuring that we are observing market rents. Detailed data on location and property size allow us to identify housing costs for various groups with precision, and to estimate the hedonic determinants of demand for housing. We are thus able to produce a more accurate picture of living standards that has been possible so far.

While price history has long been a preoccupation of economic historians, most research on early modern Europe continues to rely on the efforts of the International Scientific Committee on Price History in the 1930s. Because ISCPH data were sourced almost entirely from institutional archives, two major items in the standard consumer basket are often absent from it: bread, which was often baked at the institutions themselves, and rent. Allen (2001) provides an elegant solution to estimating bread prices where they are not available, using the “parts plus labor” regulation in force in most European cities. As for rent,

¹ The field of urban economics studies the nature of cities, including their spatial distribution, the economies of agglomeration they generate, and the location decisions of individuals. For an introduction, see Glaeser (2008).

progress has been slow and spotty. Lindert and Williamson (1983) introduced a rent series for their eighteenth and nineteenth century English indices. Ormrod et al. (2011) have compiled a decadal index for London from 1580 onwards, but their rent data only covers a single city block. For the Netherlands, the work of Lesger (1986) has allowed a detailed view of rental costs in Amsterdam between 1550 and 1850. These data were used by Van Zanden (2005) to study living standards between 1450 and 1800, and by Eichholtz et al. (2011) to construct a quality-adjusted rental index. Scholliers (1962) provides an index of rents for Antwerp starting in 1500.² Indices constructed with Scholliers' methodology also exist for Brussels (Avondts 1971), Bruges (Mason 1959), and Ghent (Van Ryssel 1967). Barbot and Perocco (2013) study rents in Milan between 1560 and 1660. For Spain, Llopis et al. (2009) and Llopis and García Montero (2007) introduced rent in their price indices for the seventeenth and eighteenth centuries. With the exception of a handful of Flemish and Dutch cities, however, there is very little indication of rental costs for early modern Europe.³

Price histories are crucial for evaluating living standards, both in absolute and in comparative terms. Without the benefit of rent data, these exercises require assumptions on both the share of rent in expenditure and on the behavior of the series. On the first count, it is often assumed that rent did not exceed 5% of expenditure for a working class family.⁴ Our data suggests that, in sixteenth century Toledo, the norm for working class families was close to double that amount. On the second issue, the standard assumption is that rents behaved in the same way as the general price indices. Our data provide a clear counterexample, with the paths of rent and that of the general index diverging for periods that could span decades at a time. To assess the impact of rent on existing estimates, we reconstruct the analysis of

² Schollier's series are somewhat problematic. His methodology makes it impossible to back out actual rent costs, and the quality of the index is quite variable—for example, data on only 9 properties are used for the years before 1570. It is also not possible to determine to what extent these rents reflected market prices

³ Historical real estate purchase data are even more rare. Eichholtz (1997) constructed a quality-adjusted index of purchase prices of buildings in the Herengracht canal of Amsterdam between 1628 and 1973, while Raff et al. (2013) studied property transactions in Beijing between 1644 and 1840.

⁴ See section VI for a detailed discussion of this assumption and its effects.

comparative living standards in Allen (2001). Adding rent has a measurable, if not dramatic, impact on the consumer price index. However, when comparing living standards between different locations, the results can be noteworthy. The gap in living standards between Amsterdam and Toledo, for example, is reduced by 9.5% after the addition of housing costs.

In section II, we give some background on the history of Toledo and its Cathedral Chapter. Section III provides a detailed description of our data, and section IV teases out the main trends in the cost of housing. In section V we examine the determinants of housing costs and present hedonic rent indices for different quartiles of the rent distribution. In section VI, we explore the implications of adding rent to consumer price indices and estimates of living standards. Section VII concludes.

II. Historical background

The Golden Age of a City

Settled continuously since pre-Roman times, Toledo enjoys a privileged location almost at the geographical centre of the Iberian peninsula. Set atop a hill and surrounded on three sides by the Tagus river, the site is easily defended, while sitting at the crossroads of the major trade routes that cross the central plateau. Already the royal city –*urbs regia*– under the Visigothic monarchy in the High Middle Ages, Toledo retained a prominent position under Arab Rule between the eighth and the eleventh centuries.⁵ Since its reconquest by the armies of Alphonse VI of Castile and Leon in 1085, the city became one of the most important economic, political and spiritual centers in Christian Spain. By the mid-sixteenth century, Toledo was the second-largest city in Castile, surpassed only by Seville and its New World trade.⁶

⁵ Toledo first gained a prominent ecclesiastical role under the Visigoths, when King Recaredo converted to Catholicism and imposed it as the official religion in the Council of Toledo in A.D. 589 (Carrobles Santos et al. 1997).

⁶ In our historical sketch we follow Martz (1983) and Carrobles Santos et al. (1997).

The accession of the Catholic Kings to the Crowns of Castile and Aragon in 1474 ushered in an era of consolidation and expansion of royal power that would transform Spain into the most powerful empire of the age. Throughout this period, Toledo's fortunes were closely linked to those of the monarchy. The Court had no permanent seat until 1561. Before then, kings, queens, and their large entourages often spent long periods in the city. Charles V stayed in the Toledo at least fifteen times. Similarly, the Cortes –the representative assembly of Castilian cities– were often convened in Toledo, where they remained in session for long periods. These political events were a substantial economic engine for the town, while at the same time putting pressure on its already cramped living space.

Despite its closeness with the monarchy, Toledo retained a strongly independent urban character. When the cities of Castile rebelled against Charles V in the 1520 uprising known as the *Comunidades*, Toledo was the first to rise up and the last to surrender. At the beginning, the revolt had the support of virtually every social group, although the Cathedral clergy and the high nobility soon switched their allegiance to the royalist band. The repression that followed targeted mostly the popular classes.

The second half of the sixteenth century marked the high point of Toledo's splendor. Although Philip II permanently established the royal capital in Madrid in 1561, Toledo was swept in the wave of population growth and economic expansion that characterized the Castilian economy in the mid-1500s.⁷ The city reported 5,898 hearths in the 1528 census. In little more than 40 years, the figure had doubled: the 1571 census showed 12,412 hearths, or roughly 47,000 inhabitants.⁸ Large public works were undertaken, attracting architects and artists from all over Spain. In 1571 Juan de Herrera –the architect of El Escorial– tackled the

⁷ On the establishment of Madrid as the capital and the resulting implications for Toledo, see Ringrose (1973). On population growth and economic expansion see, for example, Nadal i Oller (1984), Marcos Martín (2000), Álvarez Nogal and Prados de la Escosura (2007).

⁸ Martz (1983, 93). We use a coefficient of 3.78 inhabitants per hearth. For a detailed discussion, see section V.

renovations of the *Alcázar*, and then worked on the main square of Zocodover. The painter Domenikos Theotokopoulos, known to history as El Greco, settled in the city in 1577.

Despite the spectacular expansion of the mid-sixteenth century, Toledo remained subject to the vagaries of plagues, extreme climate events, and subsistence crises. Particularly virulent episodes of the plague hit the city in 1489, in 1507-09, in 1583, and again in 1599. In 1570-71, some 2,000 rebel *moriscos* from Granada were forcibly relocated to Toledo, bringing typhus with them. Crop failures triggered subsistence crises in 1540-41, 1580, 1609, 1619, and 1624. The 1580 episode was especially hard on the population –baptismal records declined by about 30%, and the city lost about 1,500 hearths between 1571 and 1591.⁹ At the peak of the crises, the charitable organizations of the city attracted destitute people from the surrounding areas, further worsening living conditions and favoring the spread of disease.

Toledo's history, both as a crossroads for trade and culture as well as a political center, endowed it with a rich multicultural heritage. The city retained a strong Arabic influence, especially visible in the layout of the urban space, in the architectural elements of its houses, and in the names of its streets and squares.¹⁰ It also had, until the 1492 edict of expulsion, one of the most vibrant Jewish communities in Spain. Converted Jews remained a vital part of the merchant community of the city.¹¹ The visible elements of their presence were quickly adapted to the Christian rites and customs or eliminated. Their cultural and religious practices were relentlessly persecuted by the Inquisition, which had in Toledo one of its most important tribunals.

By the end of the sixteenth century, there were signs that Toledo's golden age was drawing to a close. The city was first hit by the Atlantic plague of 1599. By 1607, baptismal records show a further 30% decline relative to their 1590 levels.¹² Fiscal pressure, which had

⁹ See Martz (1983) and Montemayor (1995), who compile baptismal series for different parishes in the city.

¹⁰ On the Arabic influence on the urban structure of Toledo, see Montemayor (1995).

¹¹ See Martz (2003) for an account of the assimilation of *converso* families into Toledan society.

¹² Martz (1983).

been steadily increasing as a result of the financial straits of the monarchy, was particularly high in Toledo. The tax increases of 1575 and 1591 fell squarely on urban centers, weighing heavily on the cost of living and making subsistence ever more difficult for the poor. By 1645, Toledo had lost about half of its population to mortality and emigration.

The Primatial See

In 1088 Pope Urban II conferred on the Archbishop of Toledo the dignity of Primate of all the Spanish kingdoms.¹³ By the sixteenth century, the Diocese was among the wealthiest and most influential in all of Christendom.¹⁴ At some point in the Middle Ages a distinction emerged between the Diocese and the Cathedral, with each acquiring their own assets, functions, and governing bodies. The administration of its large, diverse holdings forced the Cathedral of Toledo to organize itself much like a modern enterprise.¹⁵

The governing body of the Cathedral was called the Chapter (*cabildo*). It was headed by a Dean, who was also the Cathedral's highest religious figure. Below him, 14 dignitaries and 60 canons were voting members of the Chapter, while 50 prebendaries (*raioneros*) were non-voting members.¹⁶ The Cathedral clergy also comprised over 200 chaplains, 40 clerics, and 4 lectors. In addition to its ecclesiastical roster, the Cathedral also employed a veritable army of lay workers, either directly or through the Cathedral Works (*obra y fábrica*).¹⁷

The Cathedral Chapter had several sources of income. It was the legal overlord (*señor*) of several towns, collecting a variety of taxes from them. It also collected tithes and special levies to finance the Cathedral Works. Its financial investments included loans and

¹³ The title of Primate bestowed a status of preeminence over the rest of the bishops of the peninsula. While the title did not have any specific attributions, the prestige it carried gave the Archbishop of Toledo a prominent role in domestic affairs and in international relations (Lop Otín 2008).

¹⁴ Lop Otín (2008) refers several contemporary descriptions of foreign travelers, who, impressed by the spiritual authority and material riches of the Archbishop of Toledo, compared him to kings and popes. Villaluenga de Gracia (2005) suggests that, in the sixteenth century, Toledo was the second richest diocese in Christendom – Rome being the first.

¹⁵ On the development of sophisticated management and accounting practices at the Cathedral during the sixteenth century, see Villaluenga de Gracia (2005).

¹⁶ In our description of the Cathedral Chapter we follow Sánchez González (2000) and Lop Otín (2008).

¹⁷ Fernández Collado (1999) provides a detailed description of the different lay and ecclesiastical positions of the Cathedral Chapter.

Crown annuities. Finally, it had a large amount of properties –urban and rural– that generated rental income.¹⁸ Importantly, these properties were rented exclusively for profit.¹⁹

By the sixteenth century, the Cathedral Chapter had accumulated a large share of the urban real estate of the city.²⁰ Its properties were administered directly through an office called the *Refitor*, which was responsible for renting out vacant houses, for ensuring that tenants complied with the terms of the leases, for overseeing the upkeep of the properties, and for collecting the rents and tributes owed on them. The records of this office, preserved in the Archive of the Cathedral Chapter of Toledo, are at the center of our inquiry.

III. Data

Sources

In 1491, the *Refitor* of the Cathedral Chapter commissioned a survey of its urban properties. Over the next two years, two canons visited each of the 557 houses, shops, inns, cellars, and corrals, meticulously recording the characteristics of each, the name of the current tenant, and the annual rent or tribute paid.²¹ The resulting inventory is the cornerstone of our data.²²

Each year, the *Refitor* recorded the amounts it collected in account books called *Libros de Carta Cuenta*. Their archival series starts in 1489 and runs through 1650, with only two gaps in 1540-41 and 1631-32.²³ The *Carta Cuenta* also conveys the name of the current

¹⁸ González Agudo (2009) has studied the rental income of the Chapter's rural properties.

¹⁹ On the separation between the commercial and charitable functions of the Cathedral Chapter, see Lop Otín (2008).

²⁰ Lop Otín (2008) documents three different ways in which the Cathedral acquired properties: 1) donations (from kings, nobles, prelates, and private citizens); 2) purchases; 3) trades. Of these, donations accounted for a large majority of acquisitions.

²¹ The archival documents refer to the properties of the Chapter in a somewhat loose way, using indistinctly the terms “casas” and “posesiones”, but also mixing descriptors for the use of the property, such as “mesón”, “tienda”, “casa tienda”, “bodega”, etc. For consistency, we use the term “property” to refer to a unit of real estate as described in the inventory of the *Refitor*; we use the term “house” to describe an exclusively residential property; and we use the term “building” to describe a self-standing structure, of which a property could –and most often did– have more than one.

²² ACT, O.F., Deslindes de Posesiones del Cabildo, 356. We are very grateful to Jean Passini for sharing his full transcription of this 150,000 word document with us.

²³ The archival references for the Carta Cuenta books for 1489-1599 are ACT, O.F., Refitor, Carta Cuenta, 1184-1234. Books for 1600-1650 do not have call numbers; they are identified by the corresponding year.

tenant and the type of lease the property was under. Sometimes the tenant's occupation was recorded as well. Whenever a property changed hands, the entry in the *Carta Cuenta* was slightly more detailed, recording the names of both the previous and the new tenant, as well as the new type of contract under which the property was being leased.²⁴

A final source is the notarial protocols containing the actual leases.²⁵ These were drafted and kept by the Chapter's own notaries. In addition to the entire text of the contract, they also record the details of the auction and, sometimes, the circumstances leading to the vacancy of the house. While the notarial protocols are undoubtedly the richest source, they are also the most unwieldy one, and hence we used them only to fill gaps in the rest of the documentary base. We especially relied on them to fill in information on the type of leases that was sometimes missing from the *Carta Cuenta*.

Properties

Our starting point was the subset of properties in the 1491/92 inventory for which Passini (2004) reconstructed the dimensions of the footprint of their component buildings, as well as the number of stories.²⁶ Of these, we could match 171 to the *Carta Cuenta* for 1492. Passini also gives the exact location of 156 of these houses.²⁷ We then added 12 properties from the Arrabal, which was the city's largest low-income neighborhood and was not represented in Passini's work.

²⁴ In addition, the *Refitor* kept a running inventory of the Chapter's holdings in the *Libros de Posesiones*. These books, however, were only updated sporadically with second-hand information from the *Carta Cuenta*, and hence tend to be out of sync with the actual holdings, sometimes by several years. We use them only to estimate the stock of properties held by the Chapter at the end of the sixteenth century. ACT, O. F., Posesiones del Refitor, 969, 980, 1016, 1043.

²⁵ ACT, O. F., Protocolos, 1095-1169.

²⁶ In some instances, Passini gives the measures of each of the buildings that make up the property, in addition to the patio. In others, he only gives the total footprint excluding the patio. For consistency, we have only coded this latter measure.

²⁷ Because Passini's properties have to be archaeologically identifiable, it is possible that his sample underrepresents poorer neighborhoods, which may have been subjected to more intense demolition and reconstruction activity; however, there is no obvious way of establishing the importance of this bias, if it actually exists.

Figure 1: Identified properties, by size and by neighborhood type



Source: Passini (2004), Martz (1983). Dark grey properties are located in rich neighborhoods, white properties in poor neighborhoods. Circle size indicates the total built area of a property. Base cartography © BC MAPS – used under license.

Figure 1 shows the 183 properties in our database overlaid on a modern map of Toledo. The Cathedral is the large compound in the center of the map; immediately to its west sits the palace of the Archbishop. The square-shaped building in the eastern side of town is the *Alcázar* –the military fort–, while the crosses mark the churches that headed city parishes.²⁸ The city’s main commercial square, Zocodover, is the triangle shown in a line pattern in the northeast quadrant. The size of the circles represents the total built area of each property.

²⁸ The street layout of modern-day Toledo is remarkably close to that of the sixteenth century. The map that most accurately reflects the urban grid in our period appears in a famous painting by El Greco, completed in 1610. We used it to identify the location of the city’s parochial churches.

Dark-shaded properties are located in rich neighborhoods, white-shaded properties in poor neighborhoods. The map gives the exact location for the 156 properties identified by Passini, and approximate locations based on the parish seat for the rest.

We traced the 183 properties identified in 1492 through the series of *Carta Cuenta* books between 1489 and 1650. For each year, we recorded the rent paid; the type of contract the property was leased under; the date on which the contract was signed; the name of the tenant and, when available, his or her occupation. We also noted family relationships between successive tenants. As time passed, some properties were subdivided, while others were consolidated into larger ones. In each case, we treat the divided or consolidated properties as new entries in the database, with their own set of characteristics. One house in our sample is recorded as being torn down, and we suspect several others suffered the same fate. By 1600, we are still able to track 145 properties from our original sample; by 1650, we are down to 113. In total, our database contains 24,273 unique property-year observations for which rent is being paid, plus an additional 32 observations where the property is recorded as being vacant and no rent is being paid.²⁹

Overall, our database covers 34% of the *Refitor*'s properties in 1492, gradually declining to 24% at the end of the sixteenth century.³⁰ By 1598, our sample contains approximately 6% of all residential properties in the city.³¹ The sample is thicker in the wealthier areas immediately surrounding the Cathedral. This is a result of two factors. First, the Cathedral Chapter owned a larger share of real estate in rich neighborhoods. Second, poor neighborhoods are somewhat underrepresented in our sample, as properties in wealthy areas were both better preserved and better documented. Our data nonetheless include 49 properties

²⁹ For two property-year pairs the property is recorded as being vacant, but a positive amount of rent is recorded as paid.

³⁰ The *Libro de Posesiones* for 1598 lists a total of 597 urban properties, a 7.2% increase in number over 106 years. The absence of a similar benchmark for 1650 prevents us from estimating the coverage of our sample in 1650.

³¹ See section VI for details on the calculation of our sample coverage.

in six different working class neighborhoods. They represent 58% of the holdings of the Chapter in those specific areas.³²

The Cathedral Chapter owned a mix of commercial and residential properties, as well as several that combined both uses. We code properties that are referred to as “houses” in the archival documents as exclusively residential and those that are referred to as “cellar”, “bakery”, “inn”, or “shop” as commercial. Several properties are described as a combination of a house and a commercial type, which we code as being of mixed use. In total, the 1492 sample contains 135 residential properties, 25 commercial ones, and 23 of mixed use. The largest concentration of commercial properties is in the square of Zocodover, to the northeast of the cathedral, while mixed use properties were distributed throughout the entire city.

Leases

Properties owned by the Cathedral Chapter could be leased under two main contractual forms: a perpetual lease, called *censo*, and a long-term lease, called *arrendamiento*.³³ Short-term leases, called *alquiles*, were very rare until 1625, but became common thereafter. These contractual forms were standard throughout Castile in the early modern period, and widely used by other landlords in Toledo itself (Barrios Sotos 1997).

Rent payments for perpetual leases never changed, and hence inflation steadily eroded their real value. The amount paid on them was called “tribute”. Although the Cathedral Chapter retained the eminent domain over the house, perpetual leases were considered the property of the leaseholder. They were transferable, provided the seller paid 10% of the sale price to the Cathedral Chapter.³⁴ When a perpetual lease was put up for sale, the Cathedral

³² The six working class neighborhoods in our data are Arrabal, San Lorenzo, Santa Leocadia, San Marcos, San Miguel el Alto, and San Soles. We followed Martz (1983) in determining which neighborhoods to classify as “working class”. Adding the 12 properties from the Arrabal –where the Cathedral Chapter owned 32 properties– was instrumental in keeping our sample balanced.

³³ Confusingly enough, the Chapter’s documents refer to long-term leases as *perpetuos*, while perpetual leases are called *censos* or *tributos*. In the interest of clarity, we do not follow this peculiar terminology.

³⁴ This payment was called *alicer*. Unfortunately, only one book of *alicer* survives, covering the years 1587-1623 (ACT, O. F., Libros de Aliceres, 362).

Chapter had the priority right of repurchasing it at the offered price, an option it does not seem to have ever exercised within our sample. Virtually all *censos* originated before the sixteenth century. In 1492, 61 houses out of 183 in our sample were leased in perpetuity. Throughout the entire period, we observe only one property being converted from a long-term lease to a perpetual one (to the benefit of a prominent Cathedral canon). In contrast, two properties under perpetual leases were converted to long-term leases.

Long-term leases granted a tenancy right for the duration of one, two, or three lives. One-life leases were typically granted for the life of the leaseholder, although it was possible to designate a different person. Two-lives leases were almost always signed for the life of a man and that of his wife, essentially conferring a right of survivorship. Three-lives leases were commonly taken for the life of a couple and one son or daughter (which could be designated at a later time). The rent did not change for the entire duration of the tenancy right. Leases expired at the death of the last person to whose life the tenancy right was tied, or when the leaseholder voluntarily surrendered the lease in a procedure called *dejamiento*. Abandoning a lease carried no penalty for a leaseholder.

The procedure for renting out the properties of the Cathedral Chapter is detailed in an operational handbook.³⁵ Properties whose leases had expired were put up for auction, and the new lease was adjudicated to the highest bidder.³⁶ This is a crucial feature of our data. Because prices were determined at a public auction in which multiple bidders participated, we can be reasonably sure that we are observing market rents.³⁷ The handbook does not

³⁵ ACT, O. F., *Oficios y Cargos*, Libro Manual, 909.

³⁶ Auctions were common in Toledo's rental market. The monastery of Santo Domingo el Real, which owned about 200 properties in the city, used them as well (Barrios Sotos 1997, 89–90).

³⁷ Notarial protocols show that it was also possible for a person surrendering a lease through a *dejamiento* to name the next tenant, but the conditions and procedure for doing so are not specified in the operational handbook. In these cases, although no auction took place, the price was often adjusted by the *Refitor*, and the new lease was issued under a new tenancy right. This procedure seems to have been somewhat common among Cathedral canons. The incomplete nature of the surviving notarial protocols makes it impossible to estimate the exact proportion of leases that were assigned by auction versus direct transfer. Our partial survey, however, suggests that auctions were the overwhelmingly predominant method.

specify how the duration of tenancy rights was determined. The notarial protocols documenting the auctions show that, in several instances, the *Refitor* determined the duration of the tenancy right prior to the auction, and bidders were only allowed to compete on price.

If the Cathedral Chapter was unable to obtain what it considered a fair price at an auction, it could opt for offering a short-term lease instead. These typically lasted for a year, although a few were signed for as little as four months. Short-term leases were rare, and before 1625 they appeared only in periods of extreme hardship. In the second quarter of the seventeenth century, as the population of Toledo declined dramatically, short-term leases grew to over 21% of total contracts.

Table 1: Lease types

	1489- 1500	1501- 1525	1526- 1550*	1551- 1575	1576- 1600	1601- 1625	1626- 1650**	Total
Perpetual leases	33.6%	33.2%	32.6%	33.1%	34.4%	35.4%	39.9%	34.4%
Long term leases								
<i>One life</i>	19.3%	12.6%	10.9%	12.4%	12.8%	12.2%	9.0%	12.5%
<i>Two lives</i>	15.2%	12.3%	9.6%	7.5%	3.0%	1.8%	0.6%	7.1%
<i>Three lives</i>	28.9%	28.7%	32.4%	37.4%	41.6%	41.0%	21.5%	33.7%
<i>Two / three lives⁺</i>	0.0%	2.3%	1.7%	1.1%	0.1%	0.0%	0.0%	0.9%
<i>Unspecified</i>	3.1%	10.3%	12.7%	8.5%	7.4%	8.7%	7.7%	8.8%
Total long term leases	66.5%	66.2%	67.3%	66.9%	64.9%	63.7%	38.8%	63.0%
Short term leases	0.0%	0.5%	0.0%	0.0%	0.4%	0.3%	21.3%	2.6%
Vacant	0.0%	0.0%	0.0%	0.0%	0.1%	0.8%	0.0%	0.1%

* Excludes 1540 and 1541, for which the account books are missing.

** Excludes 1631 and 1632, for which the account books are missing.

+ In some cases, we were able to infer that the tenancy right ran for more than one life (for example, because we observe a wife succeed her husband), but could not determine if it was for two or three lives. We classified these leases in the “two / three lives” category.

Table 1 shows the prevalence of each lease type by 25-year periods (with the exception of the initial 11-year one). Perpetual leases are stable at just over one third of all property-year pairs throughout the period. One-life leases start at almost 20%, but drop to 12% in the first quarter of the sixteenth century, and maintain the same proportion through 1625, only declining further in the last 25 years of our sample. The only real trend is the decline of two-lives

contracts in favor of three-lives ones. Vacancy rates were almost zero –only a total of 34 property-year pairs are reported as vacant in the account books. The reason is that vacant properties deteriorated very quickly, as buildings needed to be heated to keep the walls from accumulating too much moisture and rotting beyond repair. The Cathedral Chapter clearly prioritized occupancy over waiting to obtain better prices.

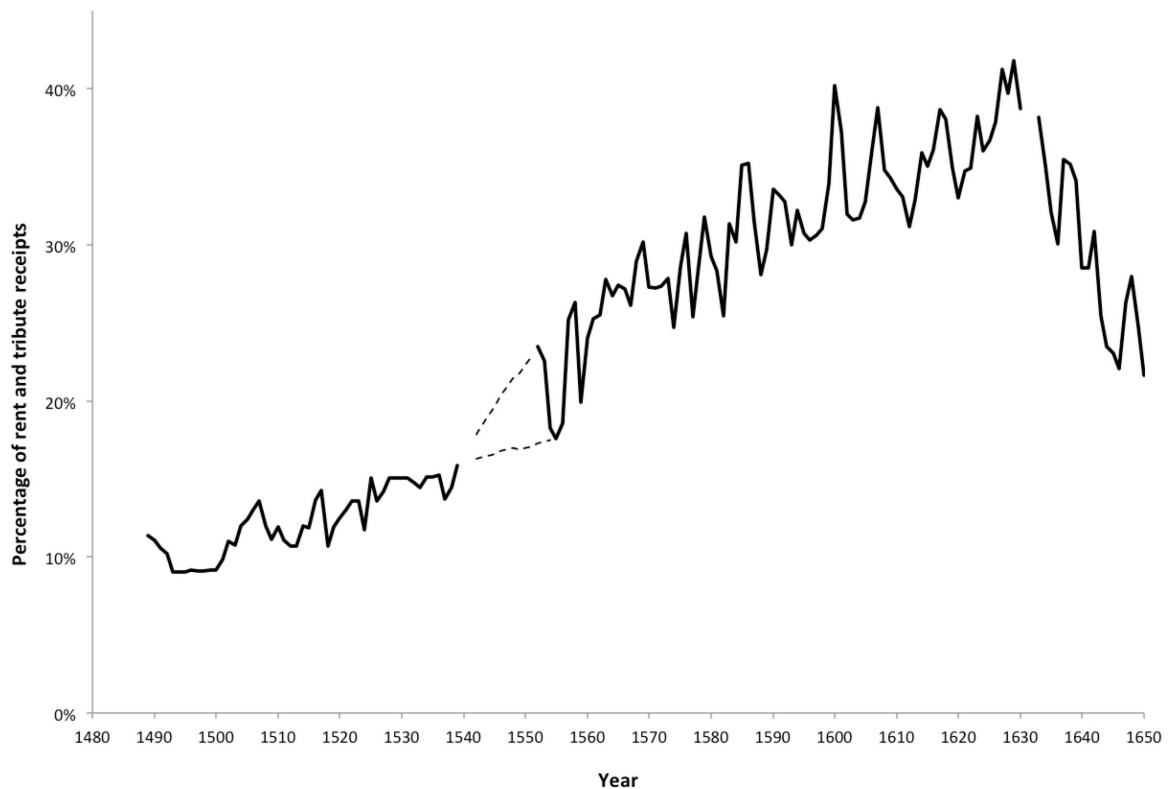
Rent

Rents and tributes on Chapter properties were specified as the combination of a monetary payment in maravedis –the Castilian unit of account– and a quantity of live hens per year.³⁸ The use of hens had at least two practical reasons. First, it gave the Chapter some protection against the effects of inflation on long leases. Second, since most salaries paid by the Chapter included a hen component, it helped match the “currencies” of accounts payable and accounts receivable. The monetary payments were split into three equal installments each year, while the hens were all due in a single payment.

In order to calculate total rent paid on each property, we multiplied the number of hens by their unit price in maravedis, and added it to the monetary payment. Hen prices from 1552 onwards were taken from Hamilton (1934). Before that, we used price quotations found in the *Carta Cuenta* itself. These were the prices at which the *Refitor* acquired the additional hens it needed to meet its obligations, or at which it sold the surplus hens it found itself with. There are quotations for 37 individual years between 1489 and 1539. We filled the gaps by linear interpolation.

³⁸ The monastery of Santo Domingo used the exact same mode of payment. See Archivo Histórico Nacional, Clero, Libro 15518.

Figure 2: Percentage of rent collected in live hens



Note: There is a very large difference between the 1552 and 1554 prices quoted by Hamilton. Rather than provide a single interpolated series for 1540-1551, which would be highly dependent on the 1552 price, we prefer to provide upper and lower bounds. These are represented as dashed lines in the figure.

Hen payments became an increasingly important component of rent in the inflationary context of the sixteenth century, climbing from an average in the low teens in the first few decades, to over 30% of total receipts after 1580. Hen payments peaked at 42% of the total rent generated by the properties in our sample in 1629.³⁹ Their subsequent decline is tied to the increase in short-term leases, which were settled exclusively in cash.⁴⁰

Tenants

All the entries in the *Carta Cuenta* include the name of the tenant. Tenant occupations are reported in somewhat less than half of the entries in the *Carta Cuenta*. Matching tenants to

³⁹ The ratio of hens to cash in the entire sample was 240 maravedis per hen, and was not statistically different across lease type.

⁴⁰ Hens played a somewhat lesser role when the total rents –urban and rural– of the Cathedral Chapter are considered. In the 1580s and 1590s, hen payments averaged 20% of total receipts, with a peak of 25% in 1585. This is because hen payments were much less prominent in rural property rents (González Agudo 2009).

the notarial protocols and using careful inference, we are able to expand the coverage of occupations to 14,490 house-year pairs, or 60% of the sample.⁴¹

Throughout the 161 years that we observe them, tenants are described as belonging to 210 different occupations. We group them into the 11 occupational categories described in Table 2.⁴² We also report the share of each occupational category within the property-year pairs for which we observe the occupation of the tenant.

Table 2: Occupational categories

Occupational category	Description	Percentage of observations
Artisans	Persons defined by their craft. They may have required a period of apprenticeship and some capital investment. Many would have kept their own shop.	28.6%
Shopkeepers	Retailers or service providers requiring their own shop. Generally less skilled than artisans (with the exception of apothecaries).	12.7%
Merchants	Persons engaged in long-distance or capital intensive trade. Includes bankers and moneychangers.	13.1%
Clergy low	Ecclesiastics of low rank.	5.4%
Clergy high	Ecclesiastics of high rank, including all those with Cathedral appointments.	20.6%
Service low	Low skill, mostly service occupations (for example, guards and messengers). Construction workers were included in this group for lack of a better fit.	1.1%
Service high	Higher skill service occupations. Includes the lead servants of noblemen and canons, and several non-ecclesiastical jobs at the Cathedral.	2.8%
Notaries	Lay and ecclesiastical notaries.	4.7%
Medical	Medical doctors, surgeons, and those with a medical degree.	0.7%
Civil servants	City officials, and those appointed to lead city-run organizations (such as hospitals)	7.2%
Artists	Performing and plastic artists, mostly employed by the Cathedral.	2.9%

The *Refitor* records virtually do not list any completely unskilled occupations. With the exception of a handful of construction workers, there are no references to any occupation that

⁴¹ In order to fill in missing data, we assumed that a person's occupation did not change throughout their life. Hence, if the account books reported an individual's occupation as a cobbler only for a particular year, we imputed the occupation "cobbler" to the entire period for which that person rented the same property. The exception were ecclesiastics, who had the possibility of progressing through a large variety of ranks, from lowly clerics all the way up to Cathedral canons. In this case, we only imputed the maximum rank going forward, or the minimum one going backward.

⁴² To determine the nature of the various occupations we relied on Gómez Menor (1970), Carrobbles Santos et al. (1997), Martz (1983), and especially on the job descriptions of the Cathedral Chapter in Fernández Collado (1999). We also used the job descriptions for the Cathedral Works found in ACT, O. F., Libros de la Obra.

would place its practitioner into the lowest rung of employed persons (for example, laborer, journeyman, servant, and the like). Furthermore, the category grouping the lowest skills occupations in our sample, service low, has a share of only 1.1% of the total. This is likely due to a combination of factors. First, in compiling censuses and tax rolls, it was common practice to only list the occupational or social status of prominent neighbors.⁴³ It is possible that the *Refitor* followed the same practice, noting only the occupations of those it deemed somewhat worthy. Our data provide some support for this view: while in rich neighborhoods we can identify the occupation of 64% of leaseholders, in poor areas the share falls to 48%. Second, unskilled laborers might have been unable to rent an entire house, being instead forced to sublease rooms from the principal tenants. Finally, most unskilled laborers would have worked in agriculture, and hence would have resided outside the city limits. The truly poor and indigent do not appear in our sample either, as they would have lived at one of the many charitable organizations of the city, or directly on the streets.

IV. The cost of housing

The characteristics of our data require some consideration prior to constructing summary measures of housing costs. First, it will be necessary to ignore the properties that were under perpetual leases. The “tribute” payments on these properties never changed, and hence any increase in the value of the property accrued directly to the leaseholder, who realized the gains when he sold the lease. While a record of lease sale prices would make it possible to reconstruct the value of properties under perpetual leases, these data do not exist.

A second issue is that, even for long-term leases, rents did not change for the duration of the tenancy rights. The average duration of a tenancy right was 14.6 years, and the median

⁴³ See Martz (1983, 104).

duration was 8 years.⁴⁴ 25% of tenancy rights exceeded 22 years of duration, and the maximum registered was 99 years.⁴⁵ This structure is akin to modern rent control schemes, where rents do not increase –or they do so at a maximum set rate– as long as the same leaseholder continues to rent the property. The methodology to calculate indices of housing costs will therefore vary depending on the intended application of the resulting index. If the indicator of interest is the out-of-pocket cost of housing to the consumer, then the observed yearly rent payments are a sufficient measure, and indices can be constructed in the usual way. In the next section, we will explore the behavior of the marginal value of housing services using a hedonic approach.

Groups of interest

The properties of the *Refitor* were rented to a diverse demographic, and were spread all over the city. In order to dissect meaningful trends in the cost of housing, we analyze rental rates for three different subgroups of properties and tenants. The first one comprises those identified as either artisans or shopkeepers. This group would have been the most sensitive one to the ups and downs of the economic cycle, as their ability to cover the rent on their houses and shops was directly linked to the health of their business. Together, artisans and shopkeepers make up 41% of all property-year pairs under a long-term lease.

The second group –which we call “privileged”– is composed by our clergy high, notaries, merchants, and medical occupational categories. The reason for this unusual grouping is that members of these four categories seemed to have exclusive access to a set of

⁴⁴ These figures include data for leases that are still ongoing in 1650. Since we do not know their end dates, the true average duration is likely to be slightly higher. The average duration of leases increased with the term of the lease: lifetime leases lasted on average 13 years, two-lives leases 19.5 years, and three-lives leases 23.4 years. Mean durations are skewed by a few very long leases; median durations were four years shorter than mean durations for all lease types.

⁴⁵ This contract is a good example of how we infer the duration of tenancy rights. The 99 year figure corresponds to a tenancy right in the upscale neighborhood of Adarve de Atocha. The house was leased to one Luisa de Mendoza in 1551, for three lives. In 1601, it passed to Alejo de Montoya, who kept it until 1650, without any change in rent. Although we cannot document a relationship between Luisa de Mendoza and Alejo de Montoya, the fact that the original contract was for three lives and that rent did not increase when the tenants changed desoute the 50 year gap are strong indications that we are looking at the same tenancy right.

houses that commanded a much higher rent than similar properties in their neighborhood, or were in highly desirable locations to begin with. We designate these properties as “prestige” houses, and discuss them further in the next section. These houses were never rented to people of a different occupational category in the course of 161 years. This leads us to suspect that the Chapter reserved them for persons of high standing, which was not an uncommon practice at the time.⁴⁶ One clear difference between the privileged and the rest of the occupational categories was that they used the one-life lease four times as often, as shown in Table 3.

Table 3: Lease type by category

	One life	Two lives	Three lives	Two / three lives	Short term	Unspecified long term
Non-privileged	10%	12%	61%	1%	4%	11%
Privileged	39%	8%	34%	1%	3%	14%

The third group of interest is the working poor. As discussed above, the poorest employed persons are not identified in the records of the *Refitor*. In order to capture them, we focus on the properties located in the six neighborhoods identified as “working class” in Martz (1983). Poor people likely did not rent an entire property, but rather subleased rooms from the principal tenant.⁴⁷ Since the principal tenant probably charged a markup for his intermediation services and for the assumption of risk implied in the lease, our estimate of housing costs in poor neighborhoods should be interpreted as a lower bound.

Rent trends

Figure 3 shows median real rents effectively paid each year for entire properties, for each of our groups of interest.⁴⁸ Rent values were deflated using the index in Martín Aceña (1992).⁴⁹

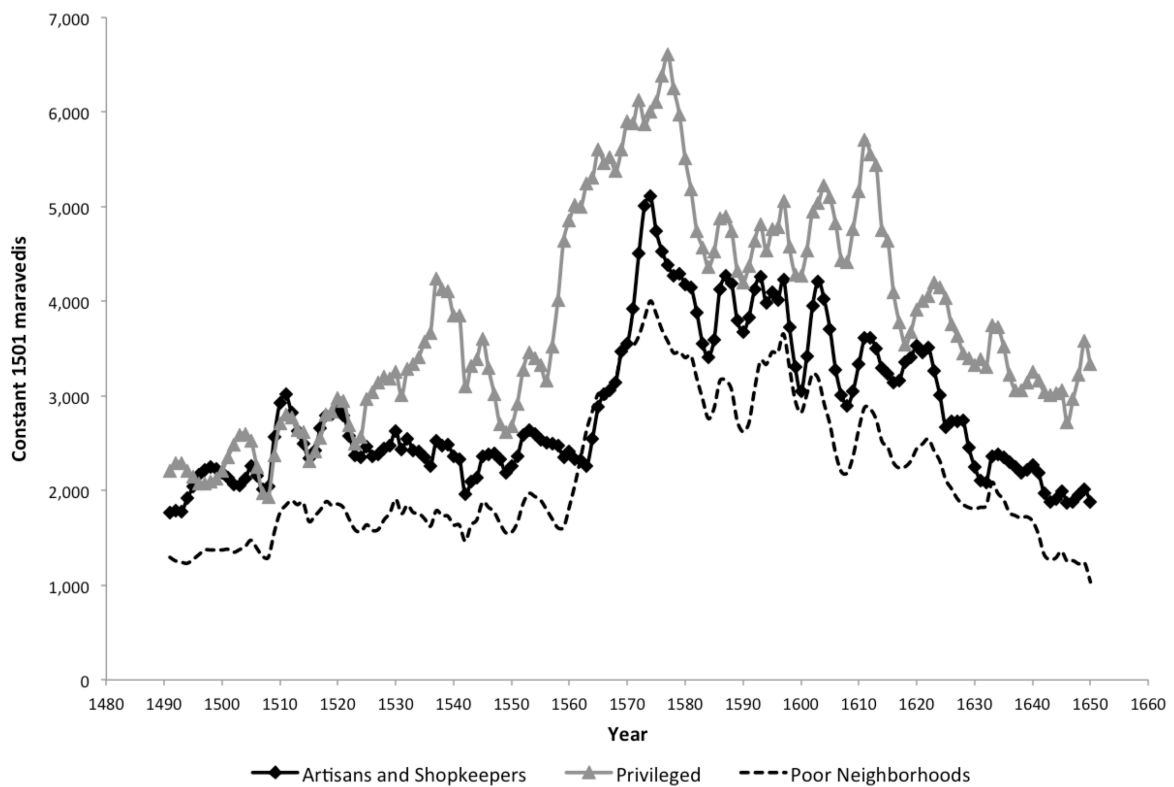
⁴⁶ The Cathedral of Avila, for example, reserved a set of properties for its canons, leasing them under an advantageous type of contract (Cuervo Fuente 2008).

⁴⁷ Properties were only leased to a single principal tenant, making subletting the only option for those who could not afford to lease an entire property on their own.

⁴⁸ The graph shows 5-year moving averages for visual clarity. The discussion in the text uses actual values.

⁴⁹ As usual, the long-run trends are only minimally affected if alternative price indices are used. The series computed with the New Castile index from Drelichman (2005) are very similar. The most commonly used long-

Figure 3: Median real rent for entire properties (5-year moving averages)



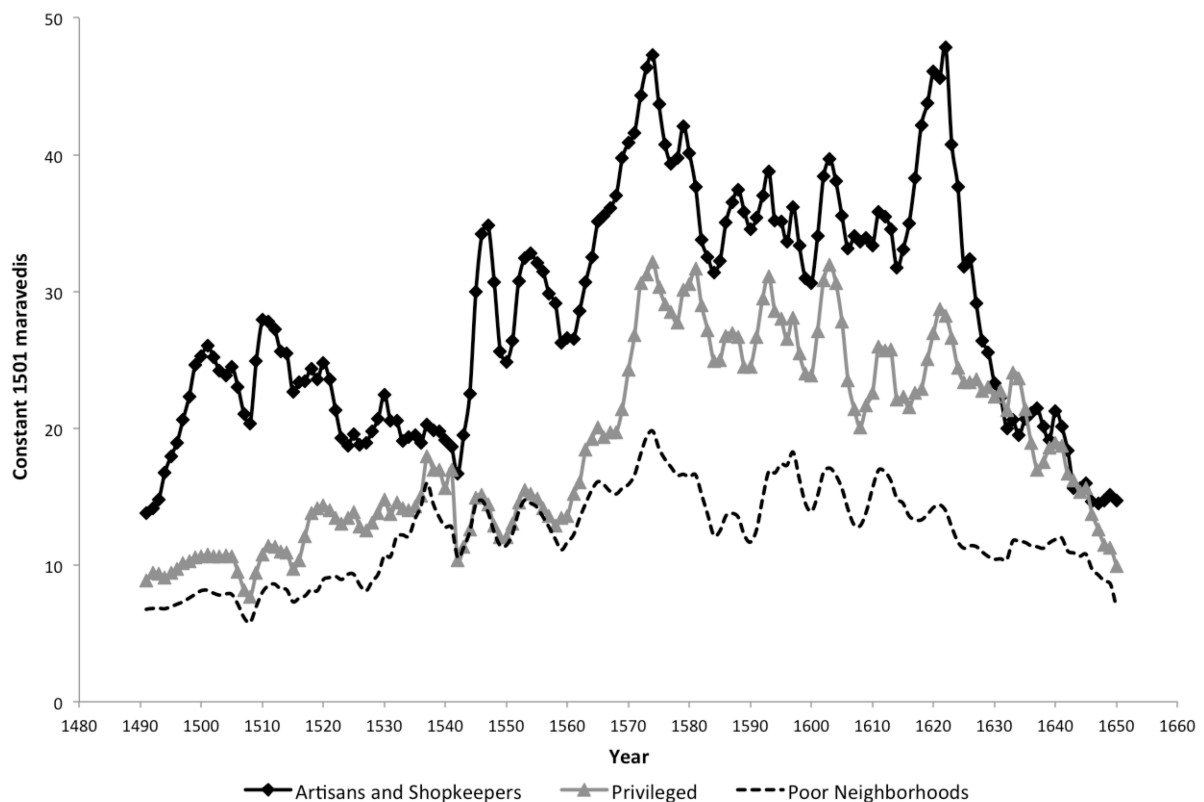
For the first three decades in our period, skilled workers and the privileged paid very similar amounts for their rental properties. The privileged opened up a first gap in the 1520s, coinciding with the crushing of the revolt of the *Comunidades* and the increase of noble power in the city. This difference peaked in the late 1530s and had all but vanished by 1550. Poor neighborhood rents, meanwhile, exhibited only a slow increase throughout the first half of the sixteenth century. In the 1550s, rents paid by the privileged group quickly shot up, more than trebling between their 1549 trough and their 1575 peak. Rents for skilled workers and for poor neighborhoods followed suit with a lag of a few years, peaking in the early 1570s. This pattern tracks well the increase in population and economic activity of the third quarter of the sixteenth century. Real rents fell from the mid-1570s, stabilizing in the 1580s at far higher levels than those of the first half of the century. Skilled workers paid on average 70% more in real terms in the 1580s than in the 1540s, while real rents in poor

run New Castilian index, compiled by Reher and Ballesteros (1993), merely replicates the values from Martín Aceña for its sixteenth-century portion.

neighborhoods increased by 74% during the same interval. The privileged, who experienced the most dramatic movements in real rents, ended up with the lowest increase: 53%. A new gap between the privileged and the rest opened between 1605 and 1615; thereafter, rents for all three groups entered a long-term decline through 1650.

In Figure 4, we repeat the exercise, this time first dividing the amount paid in rent by the total built area of each property. This yields a measure of the rental cost per square meter.

Figure 4: Median real rent per square meter (5-year moving averages)



The chart brings home why the privileged were privileged. Although they lived in far superior properties and neighborhoods, for large periods between 1489 and 1560 privileged groups paid virtually the same amount per square meter as working class individuals. In fact, two additional considerations suggest that the privileged probably paid less per square meter than poor families. First, our measure of built area does not include the patio, which was bigger in rich houses than in poor ones. Second, as discussed above, our estimate of housing costs for working class individuals should be interpreted as a lower bound.

This anomaly came to an end in the 1560s, when rent per square meter for the privileged gradually rose, eventually reaching a level roughly double that of poor neighborhoods. Merchants and moneychangers, both included in the privileged group, started benefiting from the silver inflows from Potosí and Zacatecas in the 1550s. A renovation reimbursement scheme introduced in 1542 may have also played a role in the privileged bidding up their rents.⁵⁰ The cost of a square meter for the privileged remained at about double the value in poor neighborhoods until the very end of our period, when both values converge once again. Artisans and shopkeepers, meanwhile, typically paid much higher rents per square meter, owing to their need for small shops in strategically located areas. An important share of their rent, however, would have been a business expense and not a residential cost. Unfortunately, the summary classification of commercial and residential properties in the *Refitor*'s inventory does not allow for a deeper analysis in this direction.

V. Determinants of housing costs and hedonic price indices

So far we have presented median rent payments in each year for every relevant property. Because of the nature of long-term leases, for which rent was not updated for the duration of the tenancy right, these figures carry considerable inertia. Median rents still are the best estimate for the housing cost faced by the average inhabitant of Toledo, and hence the relevant input when constructing consumer price indices and evaluating living standards. The behavior of the market, however, is better captured by the marginal rental cost, akin to that incurred by a newcomer to the city. The relevant measure for this analysis is the price of a newly signed lease, in the year in which it was signed. Our dataset contains 787 leases with

⁵⁰ The scheme allowed holders of one-life leases –three quarters of which were subscribed by the privileged– to obtain a deduction of 1,000 maravedís and 4 live hens per year for every 15,000 maravedís of approved renovations they financed in their homes. This scheme works like an annuity partially indexed for inflation (because of the hens component). By the 1580s, the real return associated with this scheme for a lease of average duration exceeded 6%, beating the 5.7% of top-grade tax backed securities.

complete enough data to be used in an econometric framework; in the following analysis, we consider each of them as a single observation in their year of inception.⁵¹

When restricting our attention to new leases, we will no longer observe the entire housing stock in our sample in each year – there are just under five new leases per year on average. Different types of properties may have turned over to new renters in different years depending on economic conditions and exogenous shocks. We must therefore parse our observations through a hedonic analysis to correct for the specific characteristics of the newly leased properties at each point in time.

The standard hedonic regression approach assumes that the goods or services transacted are of homogenous quality and purpose, only differentiated by their observable (hedonic) characteristics.⁵² Real estate does not exactly fit these assumptions. In particular, unobserved quality will almost certainly increase with a tenant's income. Towards the upper tail of the income distribution, a house may acquire additional purposes besides providing shelter; for example, it could be used as an object of conspicuous consumption, broadcasting the wealth or political clout of its resident. In the presence of product or model-specific unobservable attributes, the standard hedonic regression methods can yield considerably biased estimates (Requena-Silvente and Walker 2006). The assumptions of the standard approach, however, could reasonably hold in the neighborhood of a particular point of the income distribution of tenants. This suggests a quantile regression approach, a strategy already used for quality-differentiated agricultural products (Bekkerman, Brester, and McDonald 2011) and for art collectibles (Scorcu and Zanola 2011), in addition to real estate itself (Liao and Wang 2012). Table 4 reports hedonic quantile regressions for the determinants of real rents at the 25th, 50th, and 75th percentiles of the rent distribution.

⁵¹ Because the first year rent was prorated by the actual days of occupancy, we use the rent paid on the second year of the lease throughout the econometric analysis.

⁵² The classic treatment of hedonic regression is Rosen (1974). For a modern survey, see Diewert (2003).

Table 4: Hedonic determinants of rents

Percentile	25 th	50 th	75 th
One life	0.155 (1.46) [0.19]	0.311 (2.20) ** [1.04]	0.418 (4.15) *** [1.98] **
Two lives	0.257 (1.95) * [1.82] *	0.276 (1.57) [0.77]	0.352 (2.81) *** [1.07]
Three lives	0.405 (3.81) *** [2.29] **	0.348 (2.45) ** [1.17]	0.396 (3.93) *** [1.76] *
Log distance to square	-0.234 (-5.79) *** [-2.44] **	-0.297 (-5.51) *** [-4.16] ***	-0.363 (-9.50) *** [-4.27] ***
Log distance to cathedral	0.002 (0.04) [0.03]	0.012 (0.22) [0.13]	-0.081 (-2.02) ** [-0.97]
Log built area	0.096 (2.71) *** [1.14]	0.078 (1.65) * [0.65]	0.097 (2.88) *** [1.38]
Number of rooms	0.001 (0.12) [0.08]	0.014 (0.88) [0.51]	0.137 (1.20) [0.96]
Number of animal spaces	0.180 (6.48) *** [5.57] ***	0.151 (4.09) *** [3.53] ***	0.144 (5.45) *** [1.77] *
Number of storage spaces	0.076 (3.47) *** [1.63]	0.084 (2.87) *** [1.60]	0.096 (4.58) *** [1.92] *
Number of patios	0.194 (3.57) *** [2.54] **	0.141 (1.95) * [1.29]	0.017 (0.34) [0.15]
Mixed use property	0.295 (3.50) *** [2.03] **	0.260 (2.31) ** [1.23]	0.135 (1.69) * [1.05]
Commercial property	0.270 (3.47) *** [1.84] *	0.238 (2.29) ** [1.50]	0.141 (1.95) * [1.14]
Prestige property	0.608 (8.26) *** [4.77] ***	0.469 (4.78) *** [3.42] ***	0.388 (5.55) *** [4.03] ***
Constant	6.427 (13.74) *** [8.73] ***	7.457 (11.96) *** [7.39] ***	9.551 (21.56) *** [13.06] ***
Year Fixed Effects	YES	YES	YES
R ²	(0.51) [0.60]	(0.50) [0.64]	(0.55) [0.61]
N	787	787	787

Quantile regressions. Dependent variable is log of real rent per whole property. Excluded categories are short-term contracts and residential use properties. Standard t-statistics in parentheses. T-statistics based on clustered standard errors using the Machado et al. (2013) method in square brackets. Note that clustered standard errors have not been shown to be consistent in the context of quantile regressions. We report them for completeness, but strongly caution against relying exclusively on them.

Significance levels: * = 10%; ** = 5%; *** = 1%.

The results of the quantile regressions support the hypothesis that the rental market was segmented by income group (approximated by rent paid). Starting with type of contract, those in the lower quartile of rents were willing to pay 25% more for a two-life contract relative to a short-term lease, and 40% more for a three-life contract. While not statistically significant at conventional levels, one-life contracts were on average 15% more expensive than short-term leases. The results for the median rent group are broadly similar. Those in the top quartile, however, were willing to pay 40% more for a lifetime lease than for a short-term contract, but their willingness to pay did not increase any further for two or three-lifetime contracts. This is consistent with the occupational composition of the high income group, dominated by ecclesiastics and long-distance merchants. The former could not have legal heirs, and hence did not have any use for leases of more than one lifetime, while many among the latter group only lived in Toledo for a decade, at most, before moving on.

Geographic location also mattered. All groups valued proximity to the market square, with those in the lower quartile of rents paying 2.3% less in rent for each 10% increase in distance, while those in the upper quartile paying 3.6% less for the same increase. Only those in the upper quartile of rents valued proximity to the Cathedral, paying an additional 0.8% in rent to live 10% closer to the political and religious center of the city.⁵³

Additional space was valued equally across the rent distribution, with an extra 10% in built area resulting in a 1% increase in yearly rent. This seemingly small effect is explained because of our inclusion of the number of specific-use spaces, whose coefficients capture the bulk of the increase in rent associated with additional built area. The number of inhabitable

⁵³ The town hall was across the square from the main façade of the Cathedral.

rooms – a variable we included in an attempt to capture the subleasing value of a property – is not significant for any of the quartiles. Animal housing spaces are valuable in all regressions, but more so in more modest dwellings – households in the first quartile pay an extra 18% for each animal housing space, while those in the top quartile only pay an additional 14%. Storage spaces are also valuable – an additional storage room commands between 7% and 9% extra, increasing slightly across the rent distribution.

The coefficients for the number of patios require some discussion. High quality houses all had a patio, but seldom had more than one. Working class dwellings could either have one patio or none. The coefficient for the bottom quartile therefore suggest that the presence of a patio increased rent by 19% in a poor neighborhood. The lack of significance for the coefficient in the upper quartile is the result of the lack of variation in that segment of the rent distribution.

Properties that could be used for commercial activities (both those described as purely commercial and those categorized as of mixed residential and commercial use) commanded a premium over exclusively residential houses. This premium was highest in the lowest quartile of the rent distribution, where a commercial property rented for about 30% more than an equivalent residential one. In the upper quartile, the commercial premium was reduced to 15%, and its significance is marginal.

Prestige properties merit a special note. This designation is applied to 27 properties rented exclusively by the privileged, usually for very high absolute amounts, while their recorded physical characteristics were no different from those of other dwellings in their vicinity.⁵⁴ Eight of them are still standing in the canons' neighborhood, allowing us to

⁵⁴ Note that, since these properties were typically very large, their commanding a high rent does not contradict our earlier finding that the privileged tended to pay relatively low rents per square meter. Also, the privilege rented non-prestige properties too. Unfortunately, the relative scarcity of occupation data in our sample prevents us from placing informative bounds on the ratio between prestige and non-prestige properties rented by the privileged.

conduct a visual survey of their exteriors. We found that all of them had special features that would have rendered them especially desirable. One featured a Visigothic molding that was already seven centuries old at the time we observe it in our dataset. The entryways of two more had Islamic arches –over four centuries old at the time. The rest featured elaborate woodwork and stonework in their windows and entryways. All these features made these houses unique, explaining the very high rents they commanded. We identify our 27 prestige dwellings from a demand-side characteristic, occupation of the tenant, which technically violates the requirements of hedonic analysis. However, based on our on-site inspection, we are confident that this procedure accurately proxies for relevant supply-side hedonic characteristics, namely the presence of unique, prestigious features not otherwise documented. Prestige dwellings commanded high premiums, ranging between 39% over similar houses at the upper quartile of the rent distribution to 60% at the lower quartile.

Figure 5: Hedonic price index, 50th percentile (5-year moving averages)

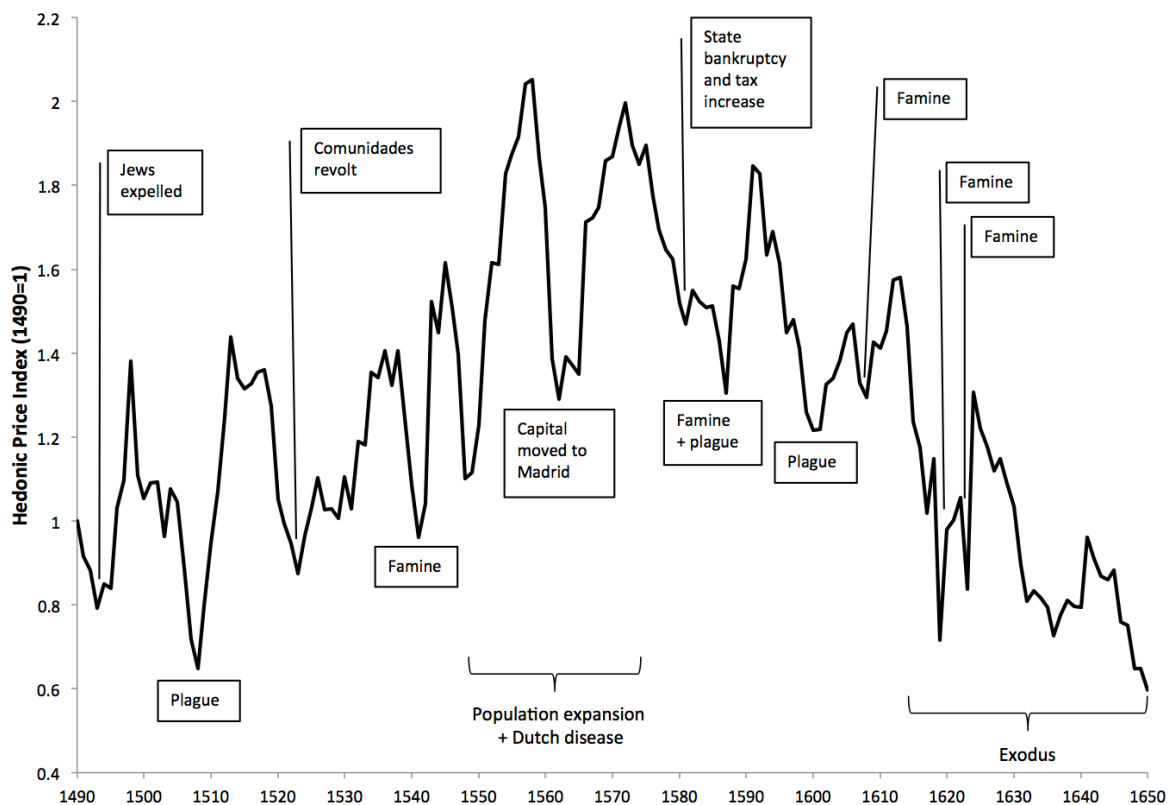


Figure 5 plots a hedonic price index based on the time dummy coefficients from the median regression, and normalized to the year 1490. The index, which reflects rents on new leases adjusted by their observable characteristics, closely tracks the economic shocks in the city. The expulsion of the Jews is registered in the initial dip. The plagues of 1507-9, 1580 and 1599, as well as the famines of 1609, 1619 and 1624 register as large percentage falls in rents. The *Comunidades* revolt of 1521 also appears as a large dip.

One of the most salient features in the long-run performance of the rental market is the spectacular increase in the price of new leases between 1550 and 1570, and the equally large fall culminating in 1581. As large and sudden as the price movements appear, they can be matched to the year to important events that affected the demand for housing. First, the large population expansion that started in the 1550s continuously shifted the demand curve to the right. Second, the “Dutch disease” associated with the influx of American silver caused a large, sudden increase in the price of non-traded goods between 1550 and 1575 (Drelichman 2005). Housing is, of course, the non-traded good *par excellence*.⁵⁵ The large dip that culminates in 1561 coincides exactly with the move of the capital to Madrid. Prices had been falling for a while leading up to the move, but they recovered quickly afterwards, as artists and rich merchants took advantage of the availability of prime living quarters vacated by the Court. The large fall that starts 1575 reflects the state bankruptcy of the same year and its associated tax increase (which, in turn, caused the end of the Dutch disease). The subsequent fall in prices coincides with the dual shocks of the subsistence crisis of 1580-81 and the plague of 1583.

A new run up in the price of new leases took hold in the last decade of the sixteenth century, as imports of American treasure peaked and the city engaged in large-scale

⁵⁵ Drelichman (2005) showed that the price of non-traded goods increased between 10 and 14 percent starting in 1550 and ending between 1575 and 1580. His data did not include housing costs. Incorporating the rental costs presented here would result in an additional increase in the price of non-traded goods of between 10 and 15 percent.

architectural projects. This brief revival came to an end after 1599, when the Atlantic plague arrived in Toledo. Subsequent recoveries were short-lived, as increased taxation and repeated subsistence crises drove the population away and the city became a shadow of its former self.

Although the series exhibits considerable volatility, there is no long-run trend in the price of new leases when considering the period as a whole. This is consistent with the findings in Eichholtz et al. (2011) and Raff et al. (2013), who also point out the absence of trends in the long-run.

Figure 6: Hedonic price indices, 25th and 50th percentiles (5-year moving averages)

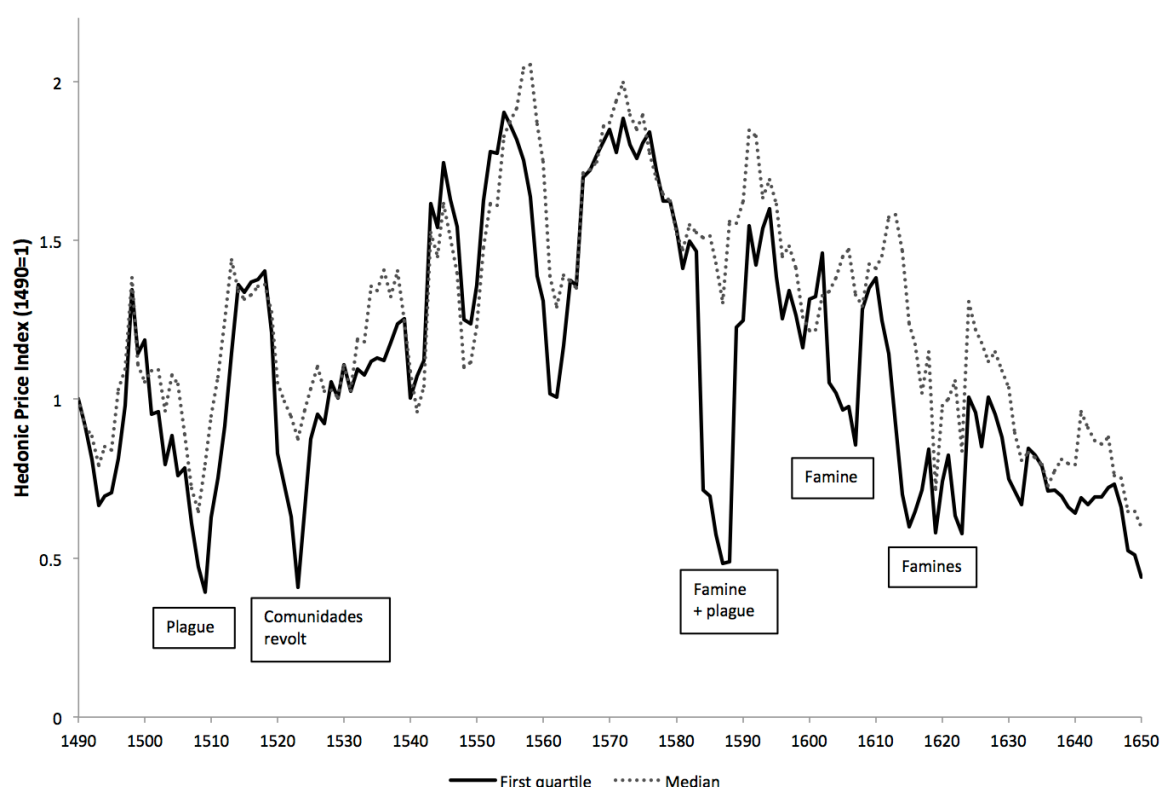


Figure 6 plots the hedonic price index obtained from the first quartile regression as a solid line, with the index obtained from the median regression as a dotted line from comparison. The chart shows how, while positive shocks increased prices for both segments of the rent distributions to roughly the same levels, those who paid rents in the lower quartile (presumably the poorest households) suffered much more when plagues and famines hit the

city. The same phenomenon is observed during the aftermath of the Revolt of the Comunidades, when imperial forces concentrated their repression on poor neighborhoods.

VI. Price indices and living standards

Very few early modern price indices contain rent in their consumption baskets. In an influential comparative study of the long run evolution of real wages and living standards, Allen (2001) identified the addition of rents as a priority area for further research. Van Zanden (2005) –who updates Amsterdam’s price indices with a rent series– argues that rent is a crucial component of any “second-generation price index.” Our data allows us make headway in that direction, exploring the impact of adding a rent series to existing price indices and examining its implications for estimates of living standards.

Allen (2001) constructed his price indices as the silver cost of actual consumption baskets, calibrated to approximate a subsistence diet. This approach is well suited to a comparative analysis of living standards across different geographical locations. Allen’s “Madrid” index is also an ideal baseline to study the impact of adding our rent series, as a large proportion of the prices he used were actually compiled by Hamilton (1934) from the records of Toledo’s Tavera hospital. In what follows, we refer to it as the “Toledo” index.

Housing consumption

The first step in modifying Allen’s index is to determine the quantity of housing consumed by the average working class person. This is a difficult task, as we do not have direct information on the number of people living in each house. To construct an estimate of individual housing consumption, we first note that the *Refitor* of the Cathedral of Toledo owned 597 properties in 1598.⁵⁶ This constituted roughly one quarter of all properties in the

⁵⁶ ACT, O. F., Posesiones del Refitor, 1043.

city.⁵⁷ Multiplying the *Refitor*'s holdings by four yields an estimate of 2,388 existing properties in all of Toledo. The average property size in our database has 255.78 square metres of built area; assuming our sample is representative, this gives a total of 610,793 built square metres in the entire city. The 1591 census reported a total of 10,933 hearths within the municipal term (Martz 1983, 99). Using a coefficient of 3.78 individuals per hearth, we obtain 41,327 inhabitants.⁵⁸ This yields an average housing consumption of 14.78 square metres per inhabitant. The estimate obviously relies on the assumption that our sample is representative, and on our 25% estimate for the proportion of *Refitor*-owned properties. The resulting figure is nonetheless plausible, both in terms of the vital space it allocates to each individual and in terms of its rental cost. Later in this section we consider the implications of lowering the estimate of living space to 10 square metres per person.

Expenditure on rent

Allen's indices are constructed around a consumption basket for the working poor. As discussed above, people belonging to the lowest employment categories are not identified in our sample, nor is there a clear correlation between the occupation of a person and the size and category of the property he or she rented. Some humble shopkeepers rented mixed-use properties in the priciest neighborhoods in order to serve a wealthy clientele. Others lived in very large houses, substantial portions of which must have been subleased to other, possibly poorer, people. 38% of our property-year pairs do not even identify the occupation of the

⁵⁷ Santolaya Heredero (1991) estimates that the Cathedral Chapter as a whole owned 35% of the houses in the city in the eighteenth century. In addition to the properties administered through the *Refitor*, the Chapter also held real estate through the Cathedral Works, the various Cathedral chapels, the Fraternity of Chaplains of the Choir, and other organizations. A rough estimate is that the *Refitor* accounted for 70% of the Cathedral Chapter's holdings. Furthermore, the holdings of the Cathedral increased over time as it inherited new properties.

⁵⁸ The number of individuals per hearth is the subject of a copious literature. While classic works used a coefficient between 4.5 and 5.5, micro studies have brought the number down significantly. Martín Galán (1985) is a good survey of the literature up to 1985. The coefficient for rural areas surrounding Madrid is 3.78 (Carasa Soto 1983); that for the neighboring province of Guadalajara is also 3.78 (Martín Galán 1985); the average for the region of La Mancha, 3.77 (López-Salazar Pérez 1976). For the parish of Santiago del Arrabal, in Toledo, the coefficient measured after the population crisis of the 17th century was 3.7 (Sánchez Sánchez 1981). We chose the higher coefficient of 3.78 as more reflective of sixteenth century conditions, as well as to keep our estimate of individual living space on the conservative side.

tenant. Rather than engage in a perilous handpicking of putatively poor individuals, we chose to focus on the properties located in poor neighborhoods. This has the added advantage that our sample contains virtually no purely commercial properties in these areas; all of them were, at least in part, used for residential purposes.

For each house in a poor neighborhood, we divided the yearly rent by the number of built square metres. We then took the median value for each year and multiplied it by 14.78 square metres –our estimate of living space per person– to obtain an individual’s yearly expenditure on rent. Finally, we added this amount to the remaining expenditures calculated by Allen to obtain the total yearly expenditures for a working class person.

In the first significant difference with the existing literature, the share of rent in our estimates is, on average, 9.5% of total expenditures. This number is substantially higher than the shares imputed by other scholars of the early modern period, for which 5% is usually the upper bound.⁵⁹ Although the lower figure might still be appropriate for rural rents, urban dwellers paid significantly more. Since most price histories are compiled on the basis of urban records, the higher share is clearly more appropriate for consumer price indices.

Impact on price indices

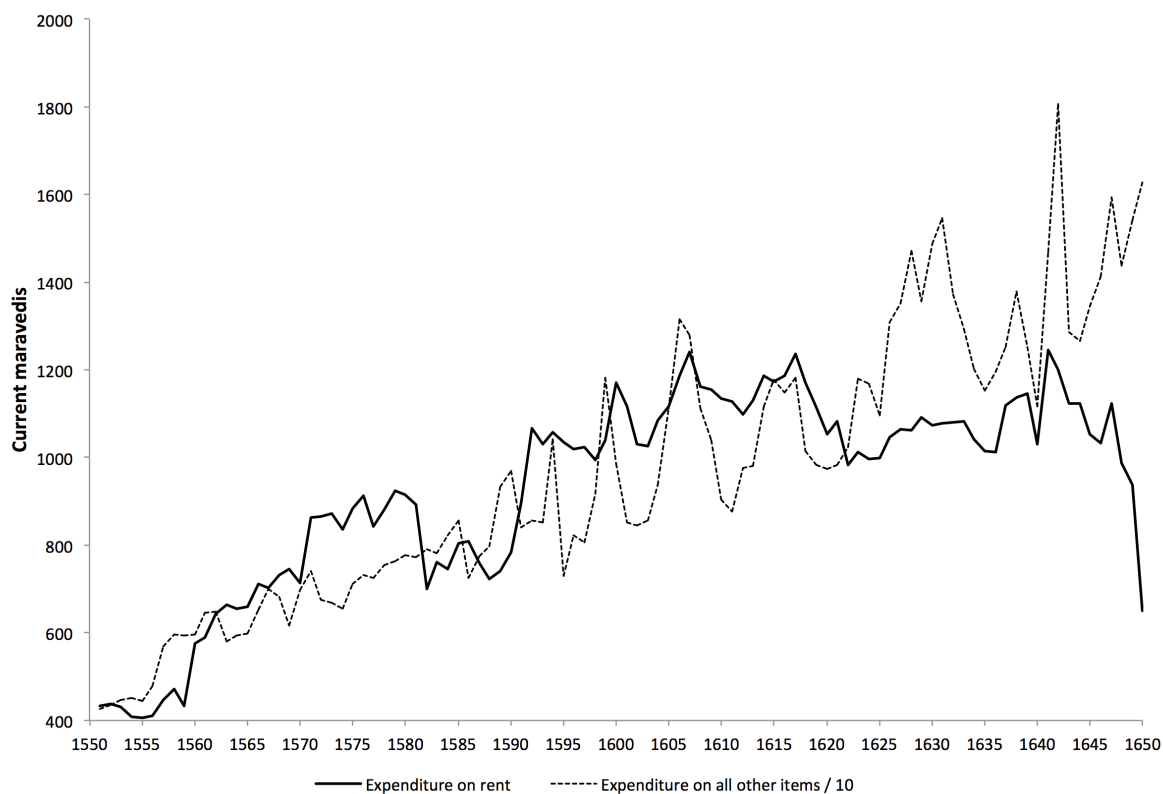
Figure 7 plots expenditures on rent and expenditures on all other items (divided by 10 for scale) between 1551 and 1650.⁶⁰ While both series follow the same long-run trend, there are some notable short and medium-run deviations. Between 1571 and 1581 rent expenditures opened up a gap of 22% on average, reaching a peak of 30% in 1573. This coincides with the population expansion and the boom in non-traded goods. Starting in 1595, the general price index becomes quite volatile, driven by the effect of crop failures and famines on the prices of basic foodstuffs. Expenditure on rent remains stable throughout the first half of the sixteenth century, largely thanks to the inertia introduced by long-term leases. At the very

⁵⁹ Allen (2001) uses an imputed value of 5% for rent. He cites Horrell (1996), who estimates that rent did not exceed 5% of expenditure in 18th and 19th century Southwestern Britain.

⁶⁰ The data needed to price Allen’s consumption basket exist only from 1550 on.

end of the period rents plummet, reflecting the depopulation of the urban core, while all other goods continue their upward trend in consonance with prices in other Castilian markets.

Figure 7: Nominal expenditure on rent and on other items



Despite the sometimes dramatic divergences on rent expenditures from those on the rest of the basket, the impact of adding rent to the overall price index is predictably small. Rent represents only 9.5% of total expenditures on average; even a 30% deviation from the general trend would result in a correction of just over 3% in the CPI. The maximum discrepancy between our new index and that of Allen occurs in the years 1649 and 1650, which are clear outliers. They are followed by discrepancies of 3.6% in 1595 and -3.2% in 1642.

Impact on relative welfare ratios

Allen defines the welfare ratio of an individual as his yearly earnings divided by the expenses needed to support a typical family at subsistence level. To calculate yearly earnings for his “Madrid” welfare ratio, Allen uses Hamilton’s (1934) unskilled construction wages, and multiplies them by 250 working days. He then assumes a typical family of two adults and two

children, where the children consume one half of an adult budget each.⁶¹ He therefore divides the yearly earnings of a laborer by 3.15 times the cost of the individual consumption basket (the .15 is the 5% rent allowance for three equivalent adults). Since the actual rent share that emerges from our data is roughly double that allowed by Allen, our welfare ratios are lower. We obtain a period average for 1550-1599 of 0.703 compared to that of 0.741 obtained using Allen's methodology –a difference of 5.4%.⁶²

In theory, a welfare ratio of one can be interpreted as an indicator that working families can afford a basic subsistence basket; higher values indicate relative affluence, while lower ones signal relative destitution. Because the computation of welfare ratios depends strongly on the maintained assumptions, one must proceed with caution before reaching conclusions based on their absolute values. In fact, since Castilian families –at 3.78 individuals per hearth– were somewhat smaller than Allen's assumption of 4, the ratios are already a lower bound. It would also be a mistake to focus on a welfare ratio of 1 as a hard threshold between subsistence and destitution. Nonetheless, a value of .703 is far below unity, indicating subsistence challenges for the working poor. This is consistent with the experience of a city that proved particularly susceptible to repeated plagues and famines.

Welfare ratios are most useful when used to compare living standards across different locations. In order to assess the impact of rents on relative welfare ratios between locations, we reconstructed Allen's calculations for two Northern European locations for which rent index series are available. We used Schollier's (1962) rent index for Antwerp and Van Zanden's (2005) Amsterdam rent index based on Lesger's (1986) data. Since these are

⁶¹ This is quite in line with the coefficient of 3.78 individuals per hearth we used to calculate the amount of living space per person.

⁶² The welfare ratio for 1550-1559 reported in table 6 of Allen (2001) is actually 0.8, but it contains two computational errors. First, the formula for calculating the index did not include cooking oil. Second, the welfare ratio was obtained multiplying the consumption basket by 3 instead of 3.15. Our reconstruction corrects both issues, yielding the 0.74 value we report in the text. The multiplication by 3 instead of 3.15 also affected the welfare ratios for other cities before 1600, and hence we correct them as necessary for the analysis that follows. We thank Bob Allen for his help in identifying the errors.

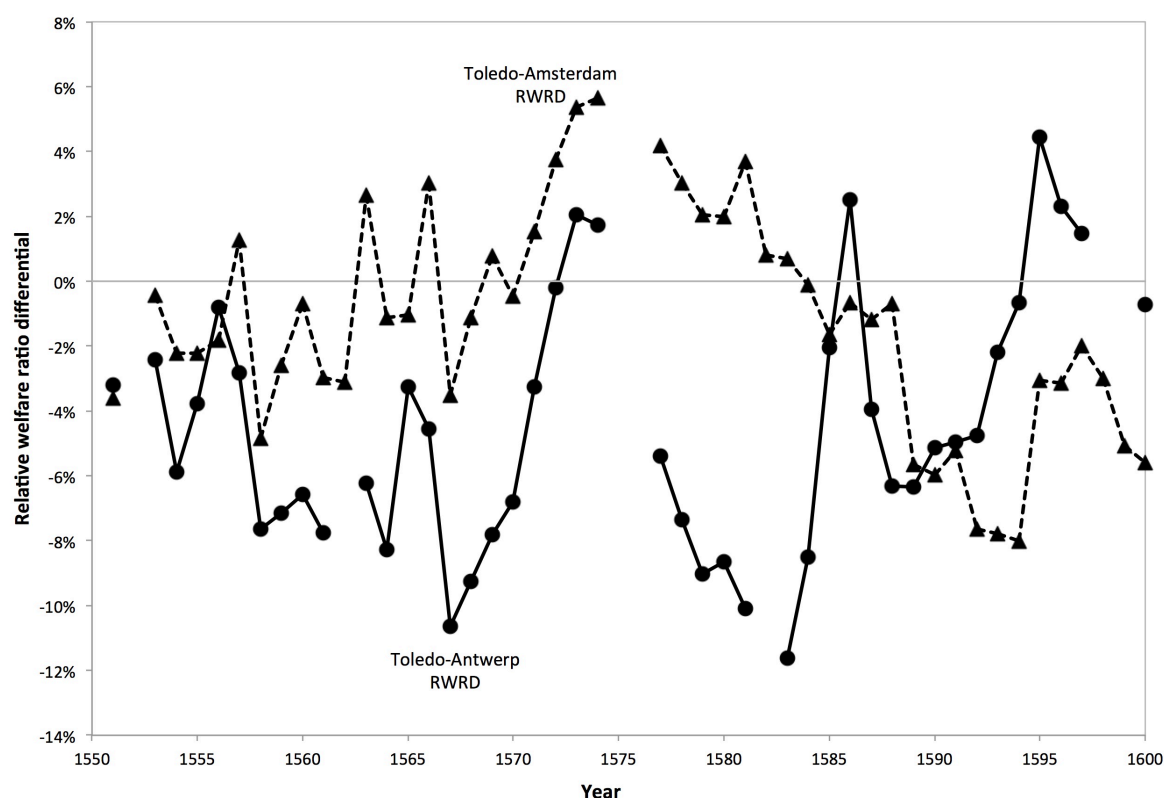
indices rather than actual expenditures on rent, we needed to adopt a somewhat different strategy to integrate them into the existing CPIs. We first converted Allen's CPIs to index form, using the same base as the rent indices. We then computed a combined index, allocating a 10% share to rent. Finally, we reconverted the resulting index into a monetary amount in order to calculate the welfare ratios. Once again, the addition of rent lowers the estimated welfare ratios. Antwerp's value declines from 1.21 to 1.13, while Amsterdam's falls from 1.02 to 0.93.

How does adding rent affect the estimates of relative living standards? To find out we computed the relative welfare ratio differential, defined in Equation 1 for the Antwerp-Toledo city pair. The subscript "new" indicates welfare ratios that include actual rent expenditures.

$$RWRD_{Ant-Tol} = (WR_{new,Ant} - WR_{new,Tol}) - (WR_{Allen,Ant} - WR_{Allen,Tol}) \quad (1)$$

If the gap in the welfare ratios between two cities did not change after adding rent, the RWRD value would be zero. Because we placed the city with the highest WR first in the equation, positive values indicate a widening of the gap, while negative values indicate a narrowing. Since a WR value of 1 indicates the theoretical subsistence level, values of the RWRD can be interpreted as percentages of that level. Figure 8 shows the evolution of the Antwerp-Toledo and Amsterdam-Toledo RWRDs between 1551 and 1600.

Figure 8: Toledo-Antwerp and Toledo-Amsterdam RWRDs



In the comparison with Antwerp the RWRD is almost always negative. In the one with Amsterdam, the RWRD is also negative overall, but the variance is higher. The Toledo-Antwerp average difference is -5% of the subsistence basket, and the Toledo-Amsterdam one -1.2%. The global minima are -12% and -8% respectively. The narrowing in measured living standards difference is large. As a percentage of the original gap measured by Allen, Toledo's living standards are now closer to Antwerp by 9.5%, and to Amsterdam by 4%.

Sensitivity analysis

Our results depend critically on our estimate of 14.78 square metres of living space per person. We arrived at this figure through two assumptions, namely that our sample is representative, and that the share of *Refitor*-owned properties in the city was 25%. Both these assumptions may be subject to error. In particular, our sample is heavy on rich households, and hence the average living space per person may be overestimated. We now consider the impact of lowering it to 10 square metres per person.

The cost of 10 square metres in a poor Toledo neighborhood was 6.6% of the poverty line consumption basket. This is closer to the 5% weight given to rent by the literature – although it remains an upper bound in the literature, and a lower bound for us. As expected, welfare ratios increase, and relative welfare ratio differentials fall. In particular, Toledo's welfare ratio increases from 0.7 to 0.73, Antwerp's from 1.13 to 1.17, and Amsterdam's from 0.93 to 1.00. Toledo's living standards are now 5% closer to Antwerp's than in the calculations without rent data, versus 9.5% with the higher living space estimate. With the Amsterdam data, the gap narrows from 4% to 1.1%. These results are still meaningful, considering that the weight of rent has shrunk to essentially the same value imputed by Allen. If the behavior of rent mirrored exactly that of all other goods, we should see minimal discrepancies. That the difference in the Toledo–Antwerp comparison is still in the order of 4% speaks to the power of short-term variation in housing costs to affect living standards.

VII. Conclusion

Housing costs have long been the neglected child of price history. While scholars have been aware of their absence, the lack of data has mostly precluded any serious analysis of their importance on estimates of price indices and living standards in the early modern period. Our rental data on 183 properties of the Cathedral Chapter of Toledo has allowed us to provide a first look at the cost of housing in a major Spanish city from the late fifteenth century through the end of the sixteenth. Our various series clearly reflect the exogenous shocks that affected the city, with population expansion and economic growth resulting in an increase in real rental rents, while revolts, plagues, tax increases and subsistence crises caused major drops. The data also shed light on the differences between the city's various social groups. In particular, they show how, in the first half of the sixteenth century, privileged groups were able to pay the same rates per square metre as working class persons despite living in vastly

superior accommodations. The hedonic price indices reveal how those living in more modest dwellings suffered the most from plagues, famines, and military repressions.

When used to modify existing price indices, the data have a detectable, but not dramatic, impact on the overall behavior of prices. Long-term trends remain unaffected, while in the short run the indices that include rent can differ from those that do not by up to 3.6% on specific years. The largest impact is felt in the calculation of welfare ratios, which are indicative of living standards. The cost of rent in Toledo represented at least 9.5% of the overall expenses of a working class individual –roughly twice as much as assumed by the previous literature. Welfare ratios therefore fall once rent is added, with an unskilled worker only earning enough to afford 70% of a subsistence basket. When comparing Toledo’s living standards with that of two northern European locations for which rent series are also available, the picture changes substantially. Toledo’s welfare gap with Antwerp and Amsterdam –both enjoying higher living standards– is reduced by 9.5% and 4% respectively.

Our work also suggests future research directions. The records of several institutional landowners, both in Spain and across Europe, contain a treasure trove of rent and real estate transfer data. Our results demonstrate that incorporating housing costs has a large potential impact on the estimates of relative living standards. The construction of second generation price indices, and their associated living standards indicators, should therefore be a priority area for scholars of the early modern period.

References

- Allen, Robert C. 2001. “The Great Divergence in European Prices and Wages from the Middle Ages to the First World War.” *Explorations in Economic History* 38 (4): 411–47.
- Álvarez Nogal, Carlos, and Leandro Prados de la Escosura. 2007. “The Decline of Spain (1500-1850): Conjectural Estimates.” *European Review of Economic History* 11 (3): 319–36.
- Avondts, G. 1971. *De Huishuren Te Brussel, 1500-1800*. Brussels: Unpublished Doctoral Dissertation.

- Barbot, Michela, and Marco Perocco. 2013. "A Good Neighborhood Is Not Always for Free. Housing Prices and the Rise of Social Interactions in Early Modern Milan (1560-1670)." *Unpublished Manuscript*.
- Barrios Sotos, José Luis. 1997. "Arrendatarios y Subarrendatarios de Inmuebles Urbanos En Toledo Durante El Siglo XV: Acceso Al 'Dominio Útil', Su Movilidad y Fragmentación." *Anales Toledanos*, 89–102.
- Bekkerman, Anton, Gary W. Brester, and Tyrel McDonald. 2011. "A Quantile Regression Approach to Analyzing Quality-Differentiated Agricultural Markets." In *Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management*. St. Louis, MO.
- Carasa Soto, Pedro. 1983. "Introducción." In *Censo de Ensenada 1756*. Madrid: Centro de Gestión Catastral y Cooperación Tributaria, Tabapress.
- Carrobbles Santos, Jesús, Ricardo Izquierdo Benito, Fernando Martínez Gil, Hilario Rodríguez de Gracia, and Rafael Del Cerro Malagón. 1997. *Historia de Toledo*. Toledo: Editorial Azacanes - Librería Universitaria de Toledo.
- Cuervo Fuente, Noemí. 2008. "Con El Rico y El Poderoso... Desigualdad Económica y Renta de La Tierra En La Mitad Norte de La Provincia de Ávila." *XII Congreso de Historia Agraria*.
- Diewert, Erwin. 2003. "Hedonic Regressions: A Consumer Theory Approach." In *Scanner Data and Price Indexes*, edited by Robert Feenstra and Matthew Shapiro. Chicago: University of Chicago Press.
- Drelichman, Mauricio. 2005. "The Curse of Moctezuma: American Silver and the Dutch Disease." *Explorations in Economic History* 42 (3): 349–80.
- Eichholtz, Piet. 1997. "A Long-Run House Price Index: The Herengracht Index, 1628-1973." *Real Estate Economics* 25 (2): 175–92.
- Eichholtz, Piet, Stefan Straetmans, and Marcel Theebe. 2011. "Housing Market Rents and the Economy. Amsterdam, 1550-1850." *University of Amsterdam Working Paper*.
- Fernández Collado, Ángel. 1999. *La Catedral de Toledo En El Siglo XVI. Vida, Arte y Personas*. Toledo: Diputación Provincial de Toledo.
- Glaeser, Edward L. 2008. *Cities, Agglomeration and Spatial Equilibrium*. Oxford: Oxford University Press.
- Gómez-Menor, José Carlos. 1970. *Cristianos Nuevos y Mercaderes de Toledo*. Toledo: Imprenta Gómez-Menor.
- González Agudo, David. 2009. "Renta Agraria y Coyuntura Económica En Castilla La Nueva Durante El Siglo XVI. El Cabildo de La Catedral de Toledo." *Mimeo*.
- Hamilton, Earl J. 1934. *American Treasure and the Price Revolution in Spain, 1501-1650*. Cambridge: Harvard University Press.
- Horrell, Sara. 1996. "Home Demand and British Industrialization." *The Journal of Economic History* 56: 561–604.
- Lesger, Clé. 1986. *Huur En Conjunctuur: De Woningmarkt in Amsterdam, 1550-1850*. Amsterdam: Historisch Seminarium.
- Liao, Wen-Chi, and Xizhu Wang. 2012. "Hedonic House Prices and Spatial Quantile Regression." *Journal of Housing Economics* 21 (1): 16–27.
- Lindert, Peter, and Jeffrey G. Williamson. 1983. "English Workers' Living Standards During the Industrial Revolution: A New Look." *Economic History Review* 36 (1): 1–25.
- Llopis, Enrique, Alfredo García Hiernaux, Héctor García Montero, Manuel González Mariscal, and Ricardo Hernández. 2009. "Índices de Precios de Tres Ciudades Españolas, 1680-1800: Palencia, Madrid y Sevilla." *América Latina En La Historia Económica* 32: 29–80.

- Llopis, Enrique, and Héctor García Montero. 2007. "Cost of Living and Wages in Madrid, 1680-1800." *Universidad Complutense de Madrid Working Paper*.
- Lop Otín, María José. 2008. *La Catedral de Toledo En La Edad Media*. Toledo: Instituto Teológico San Ildefonso.
- López-Salazar Pérez, J. 1976. "Evolución Demográfica de La Mancha En El Siglo XVII." *Hispania* 36: 233–99.
- Machado, J. A. F., P. M. D. C. Parente, and J. M. C. Santos Silva. 2013. *QREG2: Stata Module to Perform Quantile Regression with Robust and Clustered Standard Errors*. <http://ideas.repec.org/c/boc/bocode/s457369.html>.
- Marcos Martín, Alberto. 2000. *España En Los Siglos XVI, XVII y XVIII: Economía y Sociedad*. Barcelona: Crítica.
- Martín Aceña, Pablo. 1992. "Los Precios En Europa En Los Siglos XVI y XVII: Estudio Comparativo." *Revista de Historia Económica* 10 (3): 359–95.
- Martín Galán, Manuel. 1985. "Nuevos Datos Sobre Un Viejo Problema: El Coeficiente de Conversión de Vecinos En Habitantes." *Revista Internacional de Sociología*, [ser. 2] 43 (4): 593–633.
- Martz, Linda. 1983. *Poverty and Welfare in Habsburg Spain*. Cambridge: Cambridge University Press.
- . 2003. *A Network of Converso Families in Early Modern Toledo. Assimilating a Minority*. Ann Arbor: The University of Michigan Press.
- Mason, F. 1959. "Huishuren Te Brugge (1500-1796)." In *Dokumenten Voor de Geschiedenis van Prijzen En Lonen in Vlaanderen En Brabant*, edited by C. Verlinden, 3:3–94. Brugge.
- Montemayor, Julián. 1995. *Tolède Entre Fortune et Déclin (1530-1640)*. Limoges.
- Nadal i Oller, Jordi. 1984. *La Población Española: Siglos XVI a XX*. Barcelona: Ariel.
- Ormrod, David, James M. Gibson, and Owen Lyne. 2011. "City and Countryside Revisited. Comparative Rent Movements in London and the South-East, 1580-1914." *University of Kent Discussion Paper* 1117.
- Passini, Jean. 2004. *Casas y Casas Principales Urbanas. El Espacio Doméstico de Toledo a Fines de La Edad Media*. Toledo: Universidad de Castilla-La Mancha.
- Raff, Daniel, Susan Wachter, and Se Yan. 2013. "Real Estate Prices in Beijing, 1644 to 1840." *Explorations in Economic History* 50 (3): 368–86.
- Reher, David S., and Esmeralda Ballesteros. 1993. "Precios y Salarios En Castilla La Nueva: La Construcción de Un Índice de Salarios Reales, 1501-1991." *Revista de Historia Económica* 11 (1): 101–51.
- Requena-Silvente, Francisco, and James Walker. 2006. "Calculating Hedonic Price Indices with Unobserved Product Attributes: An Application to the UK Car Market." *Economica* 73 (291): 509–32.
- Ringrose, David. 1973. "The Impact of a New Capital City: Madrid, Toledo, and New Castile, 1560-1660." *The Journal of Economic History* 33 (4): 761–91.
- Rosen, S. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy* 82 (1): 34–55.
- Sánchez González, Ramón. 2000. *Iglesia y Sociedad En La Castilla Moderna. El Cabildo Catedralicio de La Sede Primada (siglo XVII)*. Cuenca: Universidad de Castilla-La Mancha.
- Sánchez Sánchez, J. 1981. *Toledo y La Crisis Del Siglo XVII. El Caso de La Parroquia de Santiago Del Arrabal*. Toledo: Caja de ahorro provincial de Toledo.
- Santolaya Heredero, Laura. 1991. *Una Ciudad Del Antiguo Régimen: Toledo En El Siglo XVIII (personas, Propiedad y Administración)*. Madrid: Universidad Nacional de Educación a Distancia.

- Scholliers, Etienne. 1962. "Un Indice Du Loyer: Les Loyers Anversois de 1500 à 1873." In *Studi in Onore Di Amintore Fanfani*, V:595–617. Milano: Giuffrè.
- Scorcu, Antonello, and Roberto Zanola. 2011. "The 'Right' Price for Art Collectibles: A Quantile Hedonic Regression Investigation of Picasso Paintings." *The Journal of Alternative Investments* 14 (2): 89–99.
- Van Ryssel, D. 1967. "De Gentse Huishoren Tussen 1500 En 1795: Bijdrage Tot de Kennis van de Konjunktuur van de Stad." *Pro Civitate Historische Uitgaven*, 8, , no. 15.
- Van Zanden, Jan Luiten. 2005. "What Happened to the Standard of Living Before the Industrial Revolution? New Evidence from the Western Part of The Netherlands." In *Living Standards in the Past. New Perspectives on Well-Being in Asia and Europe.*, edited by Robert C. Allen, Tommy Bengtsson, and Martin Dribe. Oxford: Oxford University Press.
- Villaluenga de Gracia, Susana. 2005. "The Emergence of Double-entry Bookkeeping in the Church: The Journal and the Ledgers of the Cathedral of Toledo, 1533-1539." *Spanish Journal of Accounting History* 3 (December).