Inequality in Pre-Industrial Mediterranean Spain:
Murcia in the 18th Century

José-Antonio Espín-Sánchez
Yale University

Salvador Gil-Guirado
Universidad de Alicante

W. Daniel Giraldo-Paez
Yale University

Chris Vickers
Auburn University

Abstract

Information about the income distribution in pre-industrial societies is sparse. We analyze income inequality in 18th century Murcia, a city in Mediterranean Spain. The historical income distribution of this region is relatively unknown, despite it having the highest urbanization rates in Europe in the pre-industrial era. We first use a census conducted in the 1750s which collected information on income and occupation. We then use this income information to conduct analyses of the income distribution in the 1730s and 1780s using censuses with information about the occupational distribution. We find large changes in the distribution of occupations across the censuses. We show that the results are sensitive to assumptions regarding household composition and within-occupation distribution of income, but not to the definition of household income. Nonetheless, we find that income inequality decreased in Murcia over the 18th century under a robust set of assumptions about occupational income.

JEL Codes: D31, J31, N33

Keywords: Income Inequality; Spain; Murcia; Pre-Industrial Economies

*Discussions with Armando Alberola Romá, Metin Cosgel, Neil Cummins, Joseph Ferrie, Oscar Gelderblom, Claudia Goldin, Tim Guinnane, Naomi Lamoreaux, Jason Long, Enrique Llopis Agelán, José Miguel Martínez Carrión, Angel Pascual Martínez Soto, Cayetano Mas Galván, Joel Mokyr, Nathan Nunn, Yannay Spitzer, Francesca Trivellato, Nico Voigtlaender, Jan Luiten van Zanden, and seminar participants at Yale University, University of Vienna, University of Munich, University of Utrecht, Stanford University, Harvard University, John Hopkins University, Middlebury College, EHES (Tübingen) have benefited this work. We would also like to express our gratitude to Kevin Lai and Sarah Merchant for superb research assistance. We acknowledge financial support from the Economic Growth Center at Yale University. All errors are our own. Espín-Sánchez: jose-antonio.espin-sanchez@yale.edu Giraldo-Paez: william.giraldo@yale.edu Gil-Guirado: salvador.gil1@um.es Vickers: czvickers@auburn.edu
1 Introduction

Studies of pre-industrial inequality, since the seminal work of Van Zanden (1995), rely on a variety of idiosyncratic data sources, including the ratio of wages to land rents, the distribution of occupational status, and property tax registers. As Lindert (2014) notes, while information on wealth can greatly advance our understanding of inequality, ultimately wealth inequality is less important than the inequality of a person’s total lifetime resources. For most people, individual labor earnings are much more important determinants of resource availability than capital, at least excluding human capital. Despite its clear advantages as a measure of welfare, information about the distribution of income in pre-industrial economies is sparse. The history of income distribution is important not only to understand the effects of the current growth in inequality, but also to explain the causes and origin of pre-industrial economic growth. Both theoretical and empirical work has postulated a causal link between industrialization and inequality (Kuznets 1955), and new evidence from various regions and times has renewed interest in this question (Alfani 2017).

In this paper, we first compute income distribution measures directly using records in the Ensenada cadastre of 1755 from Murcia, Spain, in the 18th century. The Ensenada is particularly notable for including information about income across the entirety of the population, rather than real estate wealth, which is concentrated in the upper income brackets. Moreover, the Ensenada contained information about the family structure of taxpayers, including their marital status and number of children. We use this information to study the effects of household composition and multiple occupations on calculated inequality. We then extend the analysis in time by using the Milicias registry of 1734 and the Floridablanca census of 1786. All three sources contain information about the occupation of the head of household. The Ensenada cadastre covered all of Castile and the census of Floridablanca the entire nation, whereas the Milicias was one of a long series of local registries in Murcia, similar to many local censuses in other cities in the Spanish Empire (Chacón Jiménez 1991), making comparisons across locations straightforward. Because the information about incomes is imputed from occupations from these years, this paper also examines the effects of various assumptions on the income distribution for calculated inequality.

We begin by analyzing the income distribution of Murcia in 1755 using the Ensenada. This allows us to study inequality in a pre-industrial society for which information about inequality is
extremely limited and which differed in important ways from previously examined areas in Spain. Most studies on inequality on pre-industrial Spain focus on cities on the interior of Castile, such as Nicolini and Ramos Palencia (2016), who use the 1755 Ensenada cadastre to study inequality in Palencia. As shown by Correas (1988) and Vries (1984), the economic situation on the Mediterranean coast was very different from that in Castile. Reher (1990) notes that the arc from Cadiz to Valencia had the highest urbanization rate in Europe in the 18th and into the 19th century, with only England and Wales more urbanized by 1850s. In contrast to the decline of the interior of Spain, Murcia remained an urbanized economy, increasingly so throughout the 18th century. During the 17th, 18th and 19th centuries, the cities in the interior of Castile lost their most qualified human assets to the Mediterranean periphery. Thus, during this period, the interior regions of Castile, despite their administrative power, tended to ruralize and continued to maintain their agrarian-based economy. While the interior experienced demographic stagnation, the maritime periphery grew in population (Camps i Cura, 1993), as can be seen in Figure 1. Alvarez-Nogal and Prados De La Escosura (2007, Table 7) report an urbanization rate of 24.7% for Murcia in 1750, and 53.5% in 1787. Old Castile and Leon, the region including Palencia, instead is recorded with urbanization rates of 4.5% and 6.2% in these respective years. Murcia and other Mediterranean cities were not “agro-towns,” but rather dynamic cities engaged in trade with each other and with the major European trading centers such as Genoa, Marseille, London and Amsterdam. Population growth is reported to be more than twice as high, at an annual rate of 0.68% in Murcia versus 0.32% in Old Castile and Leon (Alvarez-Nogal and Prados De La Escosura, 2007, Table 7). The reason for this overrepresentation of the stagnant interior in prior work is the selection in the survival or the archival documents.

First, we find a Gini coefficient of 0.51 in Murcia, lower than the figure of 0.58 for Palencia in Nicolini and Ramos Palencia (2016, Table 3). This suggests that the well-documented increase in 1

1 For example, cities in the Mediterranean coast were subject to bombing from foreign navies, such as Alicante in the early 1700s during the war of Spanish succession. In contrast, cities in the interior were spared. Fortuitously, Murcia is close to the Mediterranean, on the Segura riverside, but far enough to the coast so as not to suffer from foreign bombing. Of the Mediterranean provinces of Castile, to the best of our knowledge, the household level records of the Ensenada registries from Huelva, Cadiz, Seville, Malaga, and Granada, have all been lost (Nicolini and Ramos Palencia, 2016). This means that data on Mediterranean Castile is only available for Murcia. See the Appendix A for details on the sources and their survival.

2 Nicolini and Ramos Palencia (2016) include data from people in the military as well as for households with female heads. Armario Sánchez (1993) reports a Gini coefficient for land ownership of 0.783 for the Kingdom of Murcia and 0.598 for the city of Murcia, using the Ensenada Cadastre. The lower inequality for the city is a product of irrigation agriculture in the city, which requires much smaller optimal land size than dry agriculture, common in most of the
inequality in Europe was not necessarily a consequence of urbanization *per se*. Along with documenting the Gini from this source in Murcia, we take advantage of the information in the *Ensenada* to analyze the effects of different sources of income inequality. In particular, we consider information from secondary occupations for the head of household as well as employment of other household members. To our knowledge, this information about secondary occupations is not available in the *Ensenada* in other regions of Spain, allowing us to study a dimension of inequality for which information is in general extremely sparse (See Appendix A for details.). We find that while secondary occupations are common, their inclusion or exclusion makes virtually no difference to calculated Gini. The income from other members of the household is also largely irrelevant. However, the calculated Ginis do change based on the size of the household, as higher income households also have more individuals in them.

Second, we use new sources to extend the analysis over a longer time period. Although of these three censuses only the *Ensenada* cadastre contains the actual recorded incomes, we can use this information to impute income by occupation for the other censuses, as in **Milanovic, Lindert and Williamson (2011)**. **Modalsli (2015)** shows that the use of social tables can bias income inequality estimates downward if the estimates are not adjusted for the within group dispersion; however, with the estimates from the *Ensenada* cadastre, we can compute this variance directly and adjust the income inequality estimates for the earlier and later periods. Moreover, we can use the information on the whole within-occupation distribution of income, not just the variance, to perform robustness checks on several inequality measures. The most striking feature of these estimates is the drop in the Gini coefficient over time, as the city of Murcia becomes increasingly urbanized. When we assume that the distribution of income within-occupation is log-normal, as suggested by **Modalsli (2015)**, we find a large fall in the Gini coefficient from 0.558 to 0.473 from 1755 to 1786. This change is entirely missed if one computes the Gini coefficient based on the mean salaries of various occupations, in which case the Gini is virtually unchanged over those years. We perform a sensitivity analysis to show how the results vary with within-group dispersion. Moreover, to the best of our knowledge, this is the first paper that uses quantile bounds (**Manski, 1990**) to input income by occupation and analyze inequality. The bulk of these imputation methods suggest

*Note the calculation using this technique gives a higher Gini in 1755 than we observe directly (0.558 vs 0.511).*

*This could also explain why Murcia was more equal than cities in the interior of Castile (**Perez Picazo and Lemeunier, 1987**).*
a decrease in inequality from 1734 to 1786, although without further assumptions the bounds on inequality in any given period are wide.

Following the famous hypothesis of Kuznets (1955) regarding the long-run trend in income inequality, a large literature has developed trying to quantify the timing of the increase in income inequality usually associated with industrialization. As noted by Milanovic, Lindert and Williamson (2011), information about the income distribution for pre-industrial economies worldwide is limited. Their calculation of Gini coefficients contains only twelve observed societies from before 1800. Of the six observations from the 18th century, only one, the survey of Old Castile from the Ensenada cadastre, uses actual income data, with the others relying on estimated income based on social tables or housing rents. This analysis was on data from the towns of Patredas, Palencia, Frechilla, Villarramiel and Villalpando in the interior of Castile, an area of economic stagnation at the time. Our study thus calculates pre-industrial inequality from an area that, while in the same present country as prior work, was experiencing radically different and substantially more modern economic conditions than the interior.

There is a growing literature studying the relation between inequality and economic growth. This relation is particularly interesting for Europe in the eve of the industrial revolution. Van Zanden (1995) uses property tax records from Holland and finds an increase in inequality from 1561 and 1732, but relatively little change between 1732 and 1808. The absolute level of inequality he found was higher than that in Great Britain despite the dominance of large landholders in Britain; Van Zanden (1995) attributes this difference to the higher levels of urbanization and a wealthy bourgeoisie. He posits the existence of a “super Kuznets curve” based on the increase in inequality during a period of positive growth in a pre-industrial period. Alfani (2016) finds a gradual increase in wealth inequality over the pre-industrial period in the southern Low Countries, with the change concentrated in the 18th century when focusing on the richest households. Similarly, Ryckbosch (2016) finds an increase in inequality in Flanders and Brabant prior to and during industrialization. Lindert (2000) reviews the various evidence for different starting points for the increase in (nominal) income inequality in the United Kingdom, with various dates in the 19th century generally proposed, though he suggests a large increase in inequality in real terms over the 18th century. Allen (2005) argues for a decline in income inequality over the late 18th century in the United Kingdom, with a sharp increase in inequality from 1800 to 1840 as industrialization
proceeds.

The evidence then suggests that while industrialization increased inequality, generally it increased during the pre-industrial period of slow economic growth. However, recent literature (Alfani, 2015; Alfani and Ammannati, 2017) has shown that this increase in inequality was by no means confined to areas experiencing positive economic growth. His dataset contains information about taxable wealth rather than income. To further complicate the issue, the rise in inequality was not universal across Europe. Santiago-Caballero (2011) uses agricultural tithe (tazmías) records and finds a decrease in income inequality in the central Spanish province of Guadalajara over the last third of the 18th century, which he attributes to a land reform. Work on the long-run distribution of income in Spain using the ratio of land rent to wages suggests a rise in inequality in Spain between the 1730s and 1800s (Alvarez-Nogal and Prados De La Escosura, 2013). Estimates for the magnitude and even direction of changes in income inequality in Spain over the 18th century are thus highly dependent on the particular source of information about income as well as the geographic area from which the data are gathered. This paper adds to this debate by adding information from an area of high and increasing urbanization, which has been previously understudied.

2 Data

In this section we describe the data sources used in this article and the variables that can be constructed from them. Because we primarily use the head of household and his or her income as the unit of analysis, we also provide details on how we classify and define household heads for each source. Appendix A discusses the data in more detail.

2.1 Milicias Registry

The Milicias registries were performed for military purposes. These registries were population registers recording the age, occupation, marital status and physical condition of all men for the recruitment of militias in times of war and the draft for military service (Melgarejo-Galera, 1987). The data is collected at the parish level, and for each household the records indicate the main occupation and other occupations of each household head, social treatment (that is, their status as a Don), social class (aristocracy), age, and marital status. The relationship between the household
head and the rest of the males in the household is also noted in the records.

While these censuses usually specified who was the household head, there are two special cases we had to deal with in order to end up with only one head per household. The first was households in which there was no head designated. In these households, we designated the oldest person as the head of household. The second case was households with multiple heads of household designated. For these households, we knew who was which head’s son, and so we split each multiple-head household into separate households in which each son was assigned to the household with his corresponding father. We did not split the household if only one of the heads had a listed job. In that case, we simply designated the individual with the job as the only head of household. In the rare case we did not know which son belonged to whom, we gave half the sons to one head and half the sons to the other.

2.2 Ensenada Cadastre

The Ensenada cadastre is an extremely detailed census conducted by the Spanish prime minister, the Marquis of Ensenada. It records the income and assets of all subjects in each town within Castile. The individual records for Murcia contain the name and social status as well as information regarding the main occupation and other occupations of each household head, social class (aristocracy), age and marital status. It also reports information regarding other members of the household children and other relatives, servants and other occupants of the household, such as whether they are adults.

The Ensenada itemizes the sources of income for each household by job and individual. Almost every head of household has a job, and some heads of household have additional jobs or sources of income. The Ensenada indicates which of the jobs is the individual’s main occupation. We designate the head of household’s income from their main occupation as the household’s “main income.” The income from the head of household’s other jobs or sources were added to the head of household’s main income and designated the as “full head-of-household (HOH) income.” Some households had other individuals who were not the head but earned income. We designated the total income of the people who were not the head of household, plus the “full HOH income” as the “full household income.”

Consider, as an example, the household headed by Don Juan Vazquez Yegros. Vazquez’s main
occupation was accountant, and from it he earned 3,300 reales. He also worked as a solicitor, and from that job he earned 550 reales. His son belonged to the household and earned 480 reales from his job. Finally, a servant also lived in their household, and he earned 480 reales from his job. In our categorization of income, the households main income was 3,300 reales; its full HOH income was 3,850; and its full household income was 4,810.

2.3 Floridablanca Census

The Floridablanca census is a detailed census conducted by the Spanish secretary of state, the Count of Floridablanca, born in Murcia. It tabulates the number of people in each household by three marital categories: married, widowed, and single. For each marital category, it contains the number of people in the household who fall in that marital category, their age bands, and their social status. Sometimes it lists the name and occupation of one person who falls in that marital status in the household. Often, the married category contains the name and occupation of the married man in the household. Unlike the Ensenada, the Floridablanca has less information regarding income and only age bands, but it has information on the parish name.

The Floridablanca does not indicate who is the head of household. We designated a head for each household. First, if an individual was the only person in the household, she was designated as the head. Next, we designated as the head all individuals who were married, named, and had a listed occupation; when there were no married individuals in the household and the named widow in the household had an occupation, then the widow was designated the head. If after these designations the household still did not have a head, we designated as the head of household anyone whose name was listed. Sometimes households had no one with a listed name or occupation in the household. In these cases, we designated the individual entry recorded as “married” as containing the head of household. If there was no one married in the household, then the individual entry for the widow was designated as containing the head of household.

3 Descriptive Statistics and Methods

In this section, we provide summary statistics and a detailed description of the data. In what follows and for simplicity, we will refer to the three sources as “censuses.” We also explain our method for
classifying occupations and linking them across time, which is used to assign income in the Milicias and Floridablanca censuses. The goal is twofold. First, we want to provide the reader a sense of the variables and their magnitudes, so that the inequality measures can be put into context. Second, the detailed description would be useful when we compute the robustness checks, to better interpret the changes in the inequality measures.

3.1 Summary Statistics of Censuses

In Table 1, we provide summary statistics about the information available in each census we employ. We restrict attention to male heads of household and exclude clergy, nobility, and men with military occupations entirely. We do this for consistency across the censuses: they were not consistent in recording households with female heads, and the Ensenada census did not list the income of clergy, nobility, and men in the military. The fraction of individuals who were married or widowed is relatively constant over the three censuses. We report the fraction of individuals in different age bands. The age distribution is also stable across the censuses. We also report the fraction of individuals who are listed as a don in the census. Don is a Spanish honorific title representing an individual of high, though generally non-noble, social status.

3.2 Occupational Coding, Income Assignment, and Effect on the Gini Coefficient

In the Floridablanca and Milicias censuses, individuals’ jobs are listed, but no income is reported. The Ensenada census, on the other hand, does list both individuals’ jobs and their incomes. To assign salaries to the Floridablanca and Milicias individuals and households, we match the jobs in those censuses to job salary summaries statistics for different occupations from the Ensenada census. As shown by Modalsli (2015), this method underestimates inequality when there is significant within-occupation variation in income. In Section 4, we examine how the Gini coefficient in the Ensenada compares to the Gini coefficient obtained using the within-occupation average to estimate the possible bias from using this method.

---

4 The Floridablanca census reported ages in bands, while the Milicias and Ensenada censuses reported exact ages, although with significant heaping.

5 In marriage registers we have transcribed for Murcia (unpublished), the fraction of grooms listed as a don decreases slightly over time, from 5.9% in the 1730s to 5.6% in the 1750s and 5.1% in the 1780s.

6 Modalsli (2015) studied the bias from using average income from social tables to estimate Gini coefficients. However, the impact should be similar when using occupation rather than social class averages.
The first part of the job-matching process involved assigning jobs in the *Ensenada* to a job category. They were assigned to at least one category—a narrow category—and some were assigned to a second category—a broad category. The narrow category was nearly always a direct translation of the job title. Sometimes, however, the narrow category was too fine to allow proper matching across censuses. For example, the *Ensenada* contained many specific types of “Escrivano” (Scribe), such as “Escrivano del numero” (Numbers Scribe) or “Escrivano Real” (Royal Scribe) but had no people with the title of just “Escrivano” (Scribe). On the other hand, the *Milicias* and *Florida Blanca* census had numerous individuals with the title of just “Escrivano” or with a specification of scribe not found in the *Ensenada*, such as “Escrivano de Aduanas” (Customs Scribe). To allow for greater flexibility and generality in the salary assigning process, when issues like these arose, relevant jobs were given a broad category in addition to their narrow category. Scribes in the *Ensenada* were then assigned the broad category of “Scribe” in addition to the narrow category that was a more direct translation of the job title.

The use of broader job categories for assigning income adds another potential layer of bias when calculating inequality. To a certain extent, the effect should be similar to the effect from assigning the narrow job category average income. Broadening the job category would then underestimate the Gini if the amount of within-broad-category income variation is substantial. There is, on the other hand, a second influence that has an ambivalent effect on the bias of the Gini estimation when imputing income using the broad job categories. Taking the example of the scribes above, suppose the broader category of Scribe assigns to the Customs Scribe occupation (which did not appear in the *Ensenada*) a mean income different from the actual mean income of the Custom Scribe job. This discrepancy could lead to an overestimation (or underestimation) of the between-group income difference between Custom Scribe and all other occupations.

After matching jobs in the *Milicias* and *Florida Blanca* censuses to a narrow and (when applicable) broad job category, we produced salary summary statistics by narrow and broad job categories. Because the *Ensenada* census listed many sources of income in a household, such as income from the head of household’s main employment, income from his by-employment, and income from other members in the household, we produced three variants of salary summary statistics. We produced summary statistics for the salary from just the head of household’s primary occupation (Main Income), from the head of household’s main occupation and by-employment (Full Head
of Household Income) and from the income of all household members (Full Household Income). Older household heads have higher incomes than younger ones, and older household heads are also more likely to have income from by-employment. Thus, in general, using only the income from their main occupation could bias the results. We address this issue below by examining the Gini coefficient when allowing for different sources of income. Finally, we matched each of the occupations listed in the Milicias and Floridablanca census to either a narrow job category or a broad category. Once this matching was complete, it was possible to assign a salary, based on the salary summary statistics from the Ensenada, to the individuals in the Floridablanca or Milicias with listed occupations.

We also classified occupations using the Historical International Standard Classification of Occupation (HISCO) system, a job classification system intended to consistently categorize jobs across different periods and countries (van Leeuwen et al, 2002). This job classification system has been used in previous studies of the Ensenada census in other regions of Spain (Álvarez and Ramos Palencia, 2018). Each Ensenada job category, both narrow and broad, was assigned a HISCO code based on the job. We then classified these HISCO-coded jobs into the HISCLASS system of van Leeuwen and Maas (2011). This system categorizes jobs by whether or not they are manual or non-manual, the degree of skill involved, whether or not the job involves the supervision of others, and whether or not they are in the primary sector (agriculture).

### 3.3 Common Occupations

In Table 2, we show the twenty most common occupations in the Ensenada, after the regularization of occupations described above. We use the broad job category, if applicable. Otherwise, we use the narrow job category. The mean salaries in reales of the occupations are shown along with the medians. The ratio of means to medians shows considerable heterogeneity, suggesting dispersion in within-occupation inequality. For example, for journeymen barbers the mean and median are almost identical, whereas the mean for millers is almost twice that of the median. In general, the dispersion in within-occupation wages is very low for journeymen occupations. There is no clear positive relationship between higher earning salaries and a higher ratio of mean to median salaries. In fact, the highest paid occupation, bar owners (tabernero), has a lower mean than median salary. To examine the within-occupation income dispersion further, we report the standard
deviation and the ratio of the interquartile ratio to the median (expressed in percents). We focus on
the latter number because the former is particularly susceptible to large outliers given the relatively
small number of individuals in each occupation. A number of occupations, particularly journey-
men occupations, have an interquartile range of zero. Others, such as bakers, show a large ratio of
the interquartile range to the median, suggesting the dispersion in the wages of these occupations
is not driven by the presence of a few outliers, but rather represents variation across the distribution
of within-occupation wages.

3.4 HISCLASS Distribution Over Time

Figure 2 shows the distribution of occupations across skill groups for each of the three censuses.
For clarity we collapse the HISCLASS variables into four categories. There is a striking increase
in the percentage of individuals listed as being in the lower parts of the occupational distribution.
From 1734 to 1755, and then from 1755 to 1786, the proportion of individuals in the unskilled or
low skilled HISCLASSes increases from under two-fifths to about three-fifths of the population.
The proportion of “skilled” occupants declines from 1734 to 1755 and is relatively constant to the
next census. This trend suggests that the growth of the city of Murcia over the 18th century was
accompanied by a broad “deskilling” in the population.

The upper HISCLASSes, comprising “higher managers” and “higher professionals,” is stable
from 1734 to 1755 before shrinking dramatically by 1786. This, by itself, would lead to a decrease in
inequality. This is contrasted by the growth of the unskilled and lower skilled classes, which would
have lead to an increase in inequality. Hence the consequences of the changes in social class are not
clear from the changes in HISCLASS composition alone. This figure also raises doubts about the
usefulness of imputation methods relying on the mean or variance in income based on only a small
number of groups.

4 Inequality in the Ensenada

4.1 Basic Statistics

In the second panel of Table 3 we produce the Gini coefficients derived from the incomes in the
Ensenada census. We do so under several methods. We first compute the Gini coefficients by treating
each household as a single unit. This is how one would calculate income inequality if one only had a roster of heads of household and their incomes, with no other information about the structure of the household. While making these computations, we compute the Gini coefficient in three different ways. First, we compute the Gini coefficient using only the income from the main occupation listed in the Ensenada. When doing so, we find a Gini coefficient of 0.511. This is lower than the figure of 0.581 found by Nicolini and Ramos Palencia (2016) for Palencia city, although higher than their Gini for the province as a whole. If we include the income from the other jobs held by the head of household (full HOH income), the Gini is essentially unchanged, at 0.518. The similarity between these numbers suggests that virtually no information about inequality is lost by focusing on the main job held by the head of household. We finally compute the Gini coefficient using income of the entire household attributed to the head of household (full household income), and again the Gini coefficient is virtually unchanged, at 0.513. Thus when computing the Gini coefficients, the income from other members of the household has little effect on the figures.

In the second column of the second panel of Table 3, we adjust the Gini by the number of males in the household. We do so primarily because the 1734 census records males only, and this number facilitates comparisons across the three censuses. In the third column, we compute the Gini coefficients attributing the income, calculated in any of the three ways above, apportioning the income among family members. If, for example, higher income households had more people in the household, inequality computed in this way would be lower than above, as the income would be spread across more people. Across all three specifications, the Gini coefficients are higher than the numbers calculated above. Thus, it is not the case that higher income households are spreading resources across more people. Higher income households tend to be larger, but their incomes are much larger, thus making the per capita income of higher income households larger than those of lower income households. The numbers in the second and third columns are virtually identical, suggesting that little is lost by adjusting the Gini coefficients for male household numbers only, when there is no information available about women. In the third column, we include all family members, though not non-family household members. In the fourth column, we include all household members, including those such as servants who are not relatives of the household head. The numbers are mostly similar to the other columns with one exception. When income from the en-

---

7See Section 2.2 for a definition of (1) main income (2) full HOH income and (3) full household income.
tire household is included, the adjustment for household income makes the Gini coefficient smaller than in the other cases.

4.2 Robustness to Imputation Methods

We estimate bounds for the Gini coefficient under various assumptions (Manski, 1990). To obtain the upper bound on inequality we assign individuals with low income occupations the minimum income from those occupations, and we assign individuals with high income occupations the maximum income from those occupations. This way we “maximize” inequality. It is not clear \textit{a priori} where to make the cut, from low income to high income. Therefore, we compute inequality for each possible threshold, assigning the minimum income from that occupation to those at or below the threshold, and assigning the maximum from that occupation to those above the threshold. The threshold that maximized inequality for 1755, corresponds to \textit{hand-cart operators}, which is the 83\textsuperscript{th} percentile (2,542 reales) of the mean income distribution. To compute the lower bound on inequality, we assign individuals with low income occupations the maximum income from those occupations, and we assign individuals with high income occupation, the minimum from those occupations. The threshold that minimized inequality corresponds to \textit{servants of notables}, which is the 41\textsuperscript{st} percentile (900 reales) of the mean income distribution.

Because we impute salary information for the \textit{Milicias} and \textit{Floridablanca} census using the data from the \textit{Ensenada} census, it is helpful to examine how the Gini coefficient in the \textit{Ensenada} census, using the imputed incomes, compares to the actual calculation of the Gini. In the second row of Table\textsuperscript{4} we show the actual Gini coefficient of the \textit{Ensenada} census against the Gini coefficient when we impute to each individual their job category’s mean, minimum, and maximum salary as well as the lower bound and upper bound Gini coefficient found using the method described above. All of the Gini coefficients were calculated by imputing the summary statistics from that job category’s main income source, and no adjustments were made for the number of people in the household.

We find that assigning individuals the mean salary of their job category leads to an underestimation of the Gini by 0.06 points, thus underestimating the level of inequality in the society as described by the Gini coefficient. This underestimation is intuitive, as failing to account for the within-occupation inequality may lead to understating the degree of inequality. The use of the minimum salary for the job category leads to an underestimation of about 0.08, while use of the
maximum salary leads to an overestimation of the Gini by about 0.1 points. Finally, the upper bound overestimates the Gini by 0.24 points and the lower bound underestimates it by about 0.14 points.

We also compute the Gini coefficient on based on the method of Modalsli (2015), which assumes a log-normal distribution for each group for which a mean and standard deviation of income exist. As in his data, we find that using the mean income for everyone in a group to compute the gini results in a substantially lower estimate than the log-normal assumption. However, we find that assuming the log-normal distribution within groups results in an overestimate of the degree of inequality. Specifically, this assumption results in a calculated Gini of 0.558 in 1755, as compared to the actual value of 0.511.

5 Inequality Over Time

5.1 Income Imputation

We use actual income values from the 1755 census and imputed income values for the 1734 and 1786 censuses to measure the changes in inequality over time. Our baseline analysis looks at only income from the primary occupation. For the 1734 and 1786 censuses, after matching each job to a job category and its summary statistics (as described in Section 3.2), we used the average of the within-job-category income from the primary occupation (Main Income) as the imputed income values. Figure 3 shows the Lorenz curves for the different census. For the 1755 census we include both the actual Lorenz curve and the Lorenz curve when we impute as the 1755 income the mean of the within-job-category income from the primary occupation. Table 4 reports the income-imputed Gini coefficients in the column “Mean.” We perform robustness checks on this income imputation by calculating the Gini coefficient using the within-job-category minimum and the maximum income values for the primary occupation. These values are reported in Table 4 under the columns “Minimum” and “Maximum.”

Notice that the underlying assumption for assigning means, but also for the validity of the robustness checks, is that the income generating process within occupation is the same across the three censuses. Since the imputation is only 21 and 31 years back and forth respectively, we believe that this is a reasonable assumption. Notice that this is a good assumption to the extent that
the variation of income within occupation is small, especially in relation to the variation between occupations. This is an assumption that is prevalent in the literature not only for the analysis of inequality but also for social mobility (Abramitzky et al., 2014; Goldin and Margo, 1992). Moreover, the literature usually makes this assumption extrapolating to periods further in time then we do, and usually for much larger geographical units, while we do it for a few decades and within the same city. Many of the occupations that we observe in the data show little or no income variation within group. Unskilled workers (jornaleros) always report an income of 480 reales a year, or, to be precise, the enumerators were instructed to assign an income of 3 reales a day, and to compute 160 working days a year for jornaleros. Also, many of the public servants have occupations that are very specific, to the point that there is only one person with that occupation, e.g., the city executioner. Most of the variation in within income occupation comes from guild workers. Apprentices who live with their masters tend to report zero income. Journeymen of different guilds, however, report very different incomes depending on their guild. As we can see in Figure 4 though, there is very little within occupation income variation for journeymen in most of the guilds. The exceptions are architect and painter, and combined they account for only 39 workers. The evidence for masters is more complicated. In Figure 5 we can see how there is substantial variation both across and even within guilds. However, guild masters belong to the high income section of the population anyway. Thus variation in their income imputation have little impact on measures of inequality.

5.2 Household Size Adjustments

A second dimension we consider during the Gini robustness checks is the number of people in the household. Our baseline analysis calculates the Gini coefficient and Lorenz curve by treating the household as a single unit. Households were sorted by the head’s income from his primary occupation (or the within-job-category average, when imputing). Starting with the poorest household and moving towards the richest household, the cumulative proportion of income and cumulative proportion of households was graphed, as in the Lorenz curves in Figure 5.

This baseline method for calculating inequality might lead to a systematic mismeasurement of inequality. For example, if richer households had larger households, then the baseline analysis would (likely) overestimate “true” inequality as rich households would have to spread out the income over more people and thus would not be as wealthy relative to the rest of the households as
the baseline analysis would make them out to be. For this reason, we adjust for household size in the robustness checks. To adjust the baseline example for the household size, we calculate the per capita income for each household. Then, we sort the households according to this per capita income. Finally, we produce the Lorenz curve by starting with the lowest per capita income household and, moving to the household with the highest per capita income, plotting the cumulative proportion of total income against the cumulative proportion of people.

Due to the different motivations that produced them, the censuses do not report members of the household consistently across censuses. The 1734 census reports almost exclusively male family members of the household head. The 1755 census, by contrast, records all the people in the household, including non-family individuals, who are usually servants or apprentices. The robustness checks therefore adjust for different measures of household size. When we adjust for “Male Family Members,” we calculate the per capita income by dividing income by the number of males in the household who are related to the head (including the head). Likewise when we adjust for “All Family Members,” we divided by the number of people in the household who are related to the head, and when we adjust for “Household Members” we also include non-family who are listed as being in the household. Table 3 shows the results of these household adjustments.

The row in each of the panels indicates the kind of income used. For the 1755 panel, the row “Main” income reports the Gini considering only income from the head of household’s main occupation. The row “Full HOH” reports the Gini when considering the head of household’s income from all sources. “Full Household” reports the Gini when considering the income of all people in the household, not just the head. Because the 1734 and 1786 censuses did not report the head of household’s income, only occupation, individuals in those censuses were matched according to their occupations to occupations in the 1755 census. The estimated income for the individuals in the 1734 and 1786 censuses was then the average income of the matched occupation in the 1755 census. The rows “Main” report the Gini when the average was taken over main income of 1755 heads-of-household with the matched occupation. The rows “Full HOH” report the Gini when the average was taken over all sources of income of 1755 heads-of-household with the matched occupation in the 1755 census. “Full Household” report the Gini when the average was taken over all sources of income of 1755 households whose head of household had the matched occupation.

Table 3 show how accounting for family composition can affect the inequality measures. The
effects are not homogeneous across censuses. If in the data, households with higher income usually have more family members, we would expect that adjusting for family size would reduce the inequality measure, or decrease the Gini coefficient. However, this is not the case uniformly. Whereas the Gini increases in 1734 and 1755 when adjusting for the number of males in the household, the Gini is virtually unchanged in 1786. Adjusting for all family members, however, increases inequality in both 1755 and 1786, the two censuses where complete household information is available. The difference when adjusting for household composition suggests that in 1786 there is a gender imbalance that is different for different income households. In particular, the results are consistent with higher income households having a higher proportion of males than lower income households. This could be a direct consequence of older emancipation age for males in high income households. Finally, adjusting for all household members, i.e., including servants, seems to reduce the inequality measured as compared to the measure including only family members. This is because higher income households tend to have more servants.

Another important difference for 1786 relates to how the Gini changes depending on the income definition. In 1734 and 1755 the Gini changes little when we use different definitions of income. In 1786, however, the differences are large, specially when comparing the main specification to the Full HOH. This means that, especially by 1786 but to a lesser extent earlier, the income generated by other activities of the household head and by members of the household was significant, and that it was particularly important for lower income households. Moreover, whereas in 1734 the main difference is between full HOH and full Household, emphasizing the importance of income generated by other household members, in 1786 the main difference is between Main and Full HOH, emphasizing the importance of the secondary occupations of the HOH.

5.3 Changes in Inequality

Because using the mean salary of the individual’s job category produced the closest estimate to the actual Gini of the Ensenada census, we focus first on changes in inequality when imputing salaries for the Milicias and Floridablanca censuses using the job categories’ mean salary. The results are shown in the column “Mean” in Table 4. When comparing these Ginis across censuses, there is

---

8The Gini is slightly changed when using the broad income categories for mean income for the Ensenada, declining from 0.448 to 0.441.
about a 0.05 point drop from the 1734 to the 1755 census, while there is barely a difference between the 1755 and 1786 estimate. This would seem to imply that inequality fell a good amount between 1734 and 1755 but did not really change between 1755 and 1786. However, recall that using the mean will tend to underestimate inequality insofar as it removes within-occupation dispersion. This led to an underestimation of about 0.06 in the case of the Ensenada census. However, the magnitude of underestimation is likely to be much smaller for the 1786 census—the reason is that the occupations that dominate this census are “Farmer” and “Day-Laborer,” both occupations that had almost no within-occupation variation in the Ensenada. As a result, the actual Gini for 1786 is likely to be much closer to the Gini using the mean than it is for the 1755 census. This suggests that there was a decline in inequality from 1755 to 1786, just as there was from 1734 to 1755.

Using other summary statistics for the imputation of income generally supports the conclusion that inequality decreased from 1734 to 1786. Imputing the minimum value produces a Gini about 0.045 points higher in the 1734 census than in 1786 census; the bound projections are also higher for the upper bound projection and lower bound projection for 1734 (by about 0.025 and 0.027 points, respectively). The only case in which the 1786 census has a higher Gini is when the maximum value is used to impute salary: in that case the 1786 Gini is about 0.026 points higher. Note that when we use the imputation method of [Modalsli (2015)], the calculated inequality falls only slightly from 1734 to 1755, and then more dramatically by 1786.

It is more difficult to examine changes in inequality relative to 1755 using the non-mean imputation methods because of the asymmetry in the assignment of job categories. Every job in the Ensenada can be assigned to a narrow job category—its own. Therefore, summary stats are taken only over jobs with the same name. This stands in contrast with the jobs in the Milicias and Floridablanca censuses. For those jobs, an exact narrow job category match is not always possible, so these are sometimes matched a broad job category. For example, in the Ensenada cadastre there are a few different kinds of scribes, such as Royal Scribe, Numbers Scribe, or Salt Rent Scribe. However, there is no occupation named Customs Scribe, a title which does appear in the Milicias registry. Therefore the Customs Scribe is matched to the broad job category of Scribe, which summarizes income over all people with a scribe job. As a result, jobs in the Milicias and Floridablanca censuses will tend to have lower minimum values and higher maximum values, since the broad job category always selects these statistics over a larger set than its constituent narrow categories. This will push the
Gini coefficients using the minimum imputation in the 1734 and 1786 censuses downward as minimums will tend to be lower relative to the 1755 census. Conversely, Gini coefficients for those two censuses will tend to be higher relative to the 1755 census when using the maximum salary for job categories. In the scribes example, the *Ensenada* minimum, mean, and maximum figures are: Royal Scribe (550, 1023, 2200); Numbers Scribe (1100, 2517, 3300); and Tobacco Rent Scribe (4400, 4400, 4400). The minimum, mean, and maximum income values over all scribes are (550, 1850, 4400).

In summary, using a broader category means that the within-occupation distribution of income would have a larger support. This will always increase (decrease) the upper (lower) bounds. Occupations with name mismatched that need to be “broadened” tend to earn high income, which will increase (decrease) the inequality measure when using the maximum (minimum).

### 5.4 Discussion

Much of the research on industrialization and inequality has focused on countries which successfully industrialized. These experienced high (and growing) levels of inequality, and the conclusion is that industrialization led to higher inequality [Van Zanden 1995]. Recent work in Spain and Italy [Nicolini and Ramos Palencia 2016; Álvarez and Ramos Palencia 2018; Alfani 2015] has shown that inequality was similarly high in these countries which failed to industrialize. These studies focus on areas which perhaps were inevitably going to fail to industrialize, for reasons such as low urbanization or lack of access to Atlantic trade. In contrast, Mediterranean Spain, including Murcia, seemed to have all the necessary ingredients for industrialization. Scheidel (2017, p. 95) suggests that over this period “in the more dynamic north, the disequalizing forces of global trade and urbanization were complemented by growing wage dispersion”. Murcia was urbanized and in global trade networks [Molina Molina 1992], and yet its income inequality is less than the declining rural interior, and seems to have been declining.

Previous research has analyzed the levels of inequality in pre-industrial Spain and Italy. For Spain, the literature has focused on parts of the interior and found high levels of inequality in a region of declining or stagnant economic activity [Nicolini and Ramos Palencia 2016; Álvarez and Ramos Palencia 2018]. This seems to go against the correlation found for northwestern Europe.

---

9One way to reconcile these trends is that the inequality generally measured in this period is for wealth, not income, and while capital income may have been increasingly unequal, perhaps income was not.
The most logical explanation is that the economic decline in the interior of Spain caused the high inequality. Alfani (2015) also presents a contrasting case for northern Italy. The region was wealthy and urban, yet it did not industrialize. However, it shows similar trends in inequality as Holland (Van Zanden, 1995), and an even higher level of inequality. Notice that, whereas Van Zanden (1995) and Alfani (2015) look at wealth inequality, we look at income inequality, and their relation to economic growth might be very different.

Regions differ on other characteristics besides inequality that make them more or less likely to industrialize, complicating the analysis of a causal relationship between inequality and economic growth. While the interior of Spain showed low urbanization rates, the Piedmont region in northern Italy was highly urbanized. Both regions, however, lacked access to the Atlantic trade, instead focusing on trade over land. Mediterranean Spain, England, and Holland, however, were both highly urbanized and very active in the Atlantic trade. The available evidence then suggest that, among the regions that have the proper ingredients to industrialize, there is a positive correlation between industrialization and inequality. Other factors besides inequality may cause industrialization, which then causes an increase in inequality.

In the measures discussed above, inequality decreased in Murcia during the 18th century. Santiago-Caballero (2011) uses a measure of agricultural inequality, for the Spanish province of Guadalajara during the 18th century. Although he finds a decrease in inequality at the end of the 18th century, the results suggest that the trends in inequality during the 18th century were different in the interior and in the coast of Spain. In Murcia, the reasons for a decrease in inequality are apparent when looking at Figure 2, which is computed without imputing any income. The explanation according to Figure 2 has to do with a reduction in skills or human capital, i.e., the is an steady increase in the fraction of workers that are unskilled or low skilled. The low human capital in Murcia is a recurrent topic for historians of the 19th and 20th century Martínez-Carrión (2011), and the results in Figure 2 suggest that the drop in human capital that happened during the 18th century has not recovered yet. Pérez Picazo and Lemeunier (1994) suggest that the main reason behind this drop in human capital has to do with improvement in irrigation and the increase in irrigable area.

Armario Sánchez (1993) reports a Gini coefficient for land ownership of 0.598 for the city of Murcia, using the Ensenada Cadastre, which is higher than the Gini estimated by Santiago-Caballero (2011) using tithes. However, similarly to wealth (stock) and income (flow) inequality, inequality from land ownership (stock) might be higher than from grain production (flow).
workers that would have otherwise been apprentices and journeyman in some guild instead moved to be self-sufficient farmers with a small irrigated plot. Because farmers are “low skilled” workers, but may earn more than guild members, this produced a drop in human capital and a decrease in inequality. This hypothesis reinforces the importance of studying human capital for pre-industrial societies (Álvarez and Ramos Palencia 2018).  

6 Conclusion

Information on income inequality in pre-industrial societies is sparse. Pre-census sources typically do not record income or information on household composition, and do not cover the whole population. Moreover, in the survey conducted by Milanovic, Lindert and Williamson (2011) there is only one article with income data for the 18th century. Due to the lack of data, most articles have relied on proxies for income to estimate income inequality.

The first direct contribution of this paper is to provide one of the few accounts of income distribution in the pre-industrial era. We do so in an area that is crucial for our understanding of industrialization, but which study has been neglected due to data limitations. Mediterranean Spain failed to industrialize despite having a recipe for success: the highest urbanization rates in Europe, high living standards and access to the Atlantic trade. This study suggests that whatever held it back from development was not high inequality: despite its high urbanization, it was relatively more equal and inequality seems to have been declining during the 18th century. Instead, what appeared to be happening was a broad deskilling: the upper income occupations became less prevalent in Murcia over the 18th century. Declining inequality, then, was not a sign of a robust society but rather a sign of one on the verge of relative economic stagnation.

We also analyze the effect of household composition and secondary occupation income on measured inequality. The latter is particularly important as many studies rely on information about primary “occupation,” but for many individuals there were multiple sources of income. However,

\[^{11}\]One can think of the increase in irrigation due to the silk boom during the 18th century, as a Dutch disease type of effect, which have long lasting effects. The temporary increase in silk prices during the middle of the 18th century, together with technological change in the construction of dams and canals, created an increase in the construction of dams and canals in Spain and elsewhere in Europe. This created a short-term increase in rents for small holding in agriculture, which meant that workers that would have otherwise been apprentices and journeyman in some guild, move to be self-sufficient farmers with a small irrigated plot. This temporary shock destroyed many of the local guild, at least those not related to the silk. When the silk boom was over, there were no guilds jobs to return to.
we find that the effect of excluding this information is very small. In addition to the contributions above, we analyze income inequality over time, under a robust set of assumptions about how to assign income information when only the occupation is known. In addition to imputing income based on the mean income by occupation, we perform a series of robustness checks by assigning the maximum and the minimum by occupation. We also show how household composition can affect inequality measures: when richer households have more members, inequality is lower. Generally, the results are consistent: Inequality declined in Murcia over the 18th century.
References


24


A Appendix: Detailed Data Description

In this section we provide a broader description of the data, and the relevant literature that has used similar sources.

A.1 Milicias

Milicias registries were performed at the local level periodically. Their goal was to have an estimation of the potential size of a conscripted army. Due to their local character, their periodicity and time span varies from place to place, but most towns in Spain performed them at least once every decade during the 16th to 19th centuries. Milicias registries are one of the less studied demographic sources. This is due to the unequal survival of records across towns, the fact that they only contain information regarding males, and the heterogeneity on the information contained. In any case, and to the best of our knowledge, all of them contain the name, age, occupation and marital status of all men of age, also distinguishing the clergy and the nobility, and those exempt from military duty for any reason. To the best of our knowledge, the only work that have used a Milicias registry for demographic analysis is Melgarejo-Galera (1987). However, he does not use any economic information or family composition.

A.2 Ensenada

The Ensenada Cadastre is the first modern census in Europe and it contains detailed information about the subjects of Castile. It was performed for fiscal reasons in 1750-1756. The goal was for the Crown to establish an annual lump sum tax in each city, rather than the arbitrary and ad valorem taxes inherited from medieval times. Thus, the royal envoys sent the enumerators to each city, and the citizens had no incentive to lie regarding their assets or income. Moreover, if found to be lying, they were subject to punishment. The tax was never implemented because the cities were concerned that after the tax was implemented, the Crown would just increase it when it needed more revenue. This project resulted in a vast amount of information comprising 84,000 books, containing geographic, demographic, economic, and sociological information of the Castilian Crown.

With respect to the use of the sources, there is a common misnaming of the classification of sub sources, which are the Respuestas Generales and Respuestas Particulares. There is a confusion
between Respuestas Particulares and Relaciones de Particulares (also called Memoriales). The former corresponds to point (2) below, and it encompasses all information at the household level. The latter corresponds to point (2.a) below, and it encompasses the raw surveys performed by the royal officials, without checks by the local experts. Many authors claim that by using (2), they are using all the information, including the corrected information, when they are really using (2.a). The reason is typically that (2.a) (Relaciones de Particulares) are the only surviving sources. This mis-naming begins with the earliest uses of this source and Camarero Bullón (1985) already pointed out the error. The correct classification is between: 1) Autos y diligencias de la averiguación; and 2) Libros elaborados a nivel local. The former are reports with aggregate data written in Madrid to provide a summary of the tax potential of the cities and territories. The latter correspond to the micro data and to extended summaries at the local level. Following Montojo (1997) and Camarero Bullón (2002), the Ensenada Cadastre can be classified as follows:

1. Autos y diligencias de la averiguación (Respuestas Generales)

2. Libros elaborados a nivel local (Respuestas Particulares)

   (a) Libros de relaciones de particulares (Memoriales).

   (b) Libros de lo raíz, reales, maestros o de hacienda.

   (c) Libros personales, de familia o padrones o vecindarios.

While the information in (1) is aggregated always at the municipal level, the information in (2) is typically at the household level. In (2.a), also called Memoriales, each household head would declare his real estate properties (urban and rural), assets and household composition. This was not an official document, and was only based on the declaration of the household head. (2.b), divided into secular and clergy, provides a description of the assets owned by each household head, verified by the royal technocrats, based on the information contained in (2.a). Finally, (2.c) contained personal information of each household head. It is summary of the information in (2.a), this time emphasizing family composition and the income generated and assets owned by each household member. This information was validated by bureaucrats at the City Hall. In summary, (2.a) are long texts detailing interviews with each household head. (2.b) and (2.c) are tabulated. (2.b) contains information regarding each asset owned by the household and (2.c) contains information
regarding the household members and their income and assets.

The Memoriales (2.a) is the best preserved of the sources mentioned above. Therefore, most of the literature in agrarian history has focused on this source (Camarero Bullón, 2010). However, as mentioned above, this information was not confirmed by either royal or local authorities, which make it subject to error. Moreover, its structure and content is very heterogeneous, which make comparisons across locations hard. In this paper we use the Libros personales (2.c). This has the advantage of the information on family composition being codified and confirmed by the local authorities.

Although the Ensenada Cadastre is well known among Spanish historians, and it contains very detailed information, most of the literature has focused on the aggregate sources (1). The lack of use of the local sources is due to several reasons: the difficulty of handling such large volume of data, and the immense transcription work load associated with it, and non-surviving of the sources in many municipalities due to fires, flooding, or war (Camarero Bullón, 1985; Rueda Solano, 2015 and Garrido-González, 2016). Santiago-Caballero (2011) uses the aggregated data in the Respuestas Generales to study inequality in Castile during the 18th century. The few authors that have use the local sources have focused on the wealth distribution and production means, as a classic question in agrarian history (Donézar, 1981; Garcia Latorre, 1998). They have focused mainly on (2.a) (Amalric, 1985). There are a series of recent articles using the Ensenada Cadastre to study income inequality at the individual level (Alvarez and Ramos Palencia, 2018; Nicolini and Ramos Palencia, 2016). However, they focus on the interior of Castile, not the Mediterranean region.

To best of our knowledge, for the city of Murcia, the existing literature has focused exclusively on the question of wealth distribution. The best work using (2.a) has been done by Donézar (1981) and especially by Armario Sánchez (1993). Armario Sánchez (1993) used the sources in (2.a) for all the towns in the Kingdom of Murcia and produced data from 222,000 households, to study land ownership. However, he did not collect information regarding family composition, occupation or other types of assets.

A.3 Floridablanca

The Floridablanca census is considered the most reliable census for Spain during the 18th century. The census was performed in 1786. A set of questionnaires was sent to the royal representatives in
each province with the order to perform the census. Although the goal of the census was to assess the depopulation of the interior in favor of the coasts, it was used to as a propaganda tool to show the population growth of Spain (García Sestafe, 1992). Other authors have claimed that the goals were to increase taxes or conscription (Jiménez et al., 1992). Enumerators were instructed to go “street by street and house by house,” enumerating the number of individuals, their age, marital status and occupation (Royal Order, July 25, 1786). They were aided by the local authorities and priests (Dopico and Rowland, 1990). Because the information was always collected at the local level, the nature of the information is disaggregated. Nonetheless, most of the literature has focused on municipal or provincial summaries (Dopico and Rowland, 1990; Eiras Roel, 1992). There has been studies using this census for most provinces in Spain (Chacón Jiménez, 1992), usually focusing on demography and family composition. However, to the best of our knowledge this is the first paper using the Floridablanca census to study social inequality. For the province of Murcia, to the best of our knowledge, we are the first to use the disaggregated data in the Floridablanca census.
Table 1: Summary Statistics.

<table>
<thead>
<tr>
<th></th>
<th>1734</th>
<th>1755</th>
<th>1786</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don Status</td>
<td>12.2</td>
<td>11.6</td>
<td>8.78</td>
</tr>
<tr>
<td>Married</td>
<td>89.4</td>
<td>89.4</td>
<td>94.0</td>
</tr>
<tr>
<td>Widowed</td>
<td>2.53</td>
<td>4.52</td>
<td>3.64</td>
</tr>
<tr>
<td>Age 16-24</td>
<td>5.62</td>
<td>7.82</td>
<td>5.92</td>
</tr>
<tr>
<td>Age 25-39</td>
<td>35.7</td>
<td>36.9</td>
<td>34.8</td>
</tr>
<tr>
<td>Age 40-49</td>
<td>25.1</td>
<td>24.4</td>
<td>23.8</td>
</tr>
<tr>
<td>Age 50+</td>
<td>28.6</td>
<td>26.0</td>
<td>34.7</td>
</tr>
<tr>
<td>N</td>
<td>1814</td>
<td>3053</td>
<td>3595</td>
</tr>
</tbody>
</table>

Notes: Table displays summary statistics of male heads of households across the three censuses. Each variable is binary and the sample average listed as percents. "Don status" refers to if the individual is listed with the honorific "Don" in the census.
Table 2: Most Common Occupations in the Ensenada.

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev</th>
<th>IQR/Median</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mule Driver</td>
<td>1505</td>
<td>1080</td>
<td>938</td>
<td>135</td>
<td>249</td>
</tr>
<tr>
<td>Handcart Operator</td>
<td>2541</td>
<td>1440</td>
<td>2685</td>
<td>100</td>
<td>245</td>
</tr>
<tr>
<td>Flax Weaver (Master)</td>
<td>645</td>
<td>630</td>
<td>94</td>
<td>14</td>
<td>111</td>
</tr>
<tr>
<td>Tailor (Journeyman)</td>
<td>699</td>
<td>720</td>
<td>72</td>
<td>0</td>
<td>105</td>
</tr>
<tr>
<td>Silk Weaver (Master)</td>
<td>688</td>
<td>720</td>
<td>171</td>
<td>25</td>
<td>102</td>
</tr>
<tr>
<td>Miller</td>
<td>2382</td>
<td>1100</td>
<td>2580</td>
<td>100</td>
<td>79</td>
</tr>
<tr>
<td>Tailor (Master)</td>
<td>1148</td>
<td>1080</td>
<td>391</td>
<td>33</td>
<td>74</td>
</tr>
<tr>
<td>Silk Weaver (Journeyman)</td>
<td>542</td>
<td>540</td>
<td>21</td>
<td>0</td>
<td>73</td>
</tr>
<tr>
<td>Silk Spinner (Journeyman)</td>
<td>895</td>
<td>900</td>
<td>68</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Shoemaker (Journeyman)</td>
<td>527</td>
<td>540</td>
<td>32</td>
<td>0</td>
<td>64</td>
</tr>
<tr>
<td>Textile Carder (Journeyman)</td>
<td>900</td>
<td>900</td>
<td>0</td>
<td>0</td>
<td>62</td>
</tr>
<tr>
<td>Servant of Notables</td>
<td>1114</td>
<td>1095</td>
<td>437</td>
<td>46</td>
<td>60</td>
</tr>
<tr>
<td>Breadbaker</td>
<td>1476</td>
<td>480</td>
<td>1470</td>
<td>350</td>
<td>50</td>
</tr>
<tr>
<td>Spice Dealer</td>
<td>1470</td>
<td>1100</td>
<td>2111</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>Bar Owner</td>
<td>9950</td>
<td>10200</td>
<td>7910</td>
<td>143</td>
<td>48</td>
</tr>
<tr>
<td>Barber (Journeyman)</td>
<td>553</td>
<td>550</td>
<td>21</td>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>Silk Spinner (Master)</td>
<td>1536</td>
<td>1620</td>
<td>563</td>
<td>33</td>
<td>45</td>
</tr>
<tr>
<td>Ironmonger</td>
<td>2694</td>
<td>2500</td>
<td>1997</td>
<td>88</td>
<td>44</td>
</tr>
<tr>
<td>Baker</td>
<td>1667</td>
<td>1430</td>
<td>1018</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>Flax Weaver (Journeyman)</td>
<td>470</td>
<td>450</td>
<td>56</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1737</td>
<td>1080</td>
<td>2851</td>
<td>90</td>
<td>3053</td>
</tr>
</tbody>
</table>

Notes: Table depicts the mean, median, standard deviation (reales per year), and number of each of the twenty most common occupations in the Ensenada cadastre (census).
Table 3: Ginis with Income and Household Member Variations by Census.

<table>
<thead>
<tr>
<th>Year</th>
<th>Income Used</th>
<th>Single Unit</th>
<th>Male Family</th>
<th>All Family Members</th>
<th>Household Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>1734</td>
<td>Main</td>
<td>0.493</td>
<td>0.569</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Full HOH</td>
<td>0.503</td>
<td>0.582</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Full Household</td>
<td>0.478</td>
<td>0.561</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1755</td>
<td>Main</td>
<td>0.511</td>
<td>0.565</td>
<td>0.553</td>
<td>0.534</td>
</tr>
<tr>
<td></td>
<td>Full HOH</td>
<td>0.518</td>
<td>0.570</td>
<td>0.558</td>
<td>0.537</td>
</tr>
<tr>
<td></td>
<td>Full Household</td>
<td>0.513</td>
<td>0.555</td>
<td>0.545</td>
<td>0.514</td>
</tr>
<tr>
<td>1786</td>
<td>Main</td>
<td>0.444</td>
<td>0.442</td>
<td>0.451</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Full HOH</td>
<td>0.376</td>
<td>0.378</td>
<td>0.387</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Full Household</td>
<td>0.367</td>
<td>0.368</td>
<td>0.377</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: Table shows the Gini coefficient calculated using the different possible income sources and household size adjustments. The year on the top left of each of the three panels indicates the year of the census for the Ginis reported in that panel. The column "Single Unit" treats the household as a unit and makes no household size adjustments. The column "Male Family" adjusts for the number of male family members in the household. Likewise, the column "All Family Members" adjusts for all members of the household who are related to the head of household. Finally, the column "Household Members" adjusts for all members reported as living in the household, regardless of their relation to the head of household. Columns without reported values indicate that the census did not provide enough information to reliably calculate the Gini using that household adjustment.

The row in each of the panels indicates the kind of income used. For the 1755 panel, the row "Main" income reports the Gini considering only income from the head of household's main occupation. The row "Full HOH" reports the Gini when considering the head of household's income from all sources. "Full Household" reports the Gini when considering the income of all people in the household, not just the head. See Section 2.2 for a more detailed explanation of income categorization in the 1755 census.
Table 4: Imputation Ginis By Census.

<table>
<thead>
<tr>
<th>Census</th>
<th>Lower Bound</th>
<th>Min</th>
<th>Mean</th>
<th>Actual</th>
<th>Modalsli</th>
<th>Max</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1734</td>
<td>0.323</td>
<td>0.360</td>
<td>0.493</td>
<td>0.574</td>
<td>0.621</td>
<td>0.739</td>
<td></td>
</tr>
<tr>
<td>1755</td>
<td>0.366</td>
<td>0.430</td>
<td>0.448</td>
<td>0.511</td>
<td>0.558</td>
<td>0.616</td>
<td>0.753</td>
</tr>
<tr>
<td>1786</td>
<td>0.296</td>
<td>0.314</td>
<td>0.444</td>
<td>0.473</td>
<td>0.647</td>
<td>0.714</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Table shows the Gini coefficient using different imputation methods, by census year. Here, we take the household as the unit of analysis and do not take into account number of people in the household.
Figure 1: Map of Spain and population statistics.

<table>
<thead>
<tr>
<th>Year</th>
<th>Palencia</th>
<th>Guadalajara</th>
<th>Toledo</th>
<th>Valladolid</th>
<th>Murcia</th>
<th>Almeria</th>
<th>Granada</th>
<th>Malaga</th>
<th>Sevilla</th>
<th>Cadiz</th>
<th>Huelva</th>
<th>Alicante</th>
<th>Barcelona</th>
<th>Valencia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12,556</td>
<td>7,916</td>
<td>45,674</td>
<td>33,588</td>
<td>14,051</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>73,666</td>
<td>2,448</td>
<td>4,360</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1631*</td>
<td>7,520</td>
<td>-</td>
<td>9,744</td>
<td>22,160</td>
<td>18,788</td>
<td>4,728</td>
<td>42,900</td>
<td>18,204</td>
<td>42,900</td>
<td>16,052</td>
<td>2,500</td>
<td>4,980</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1712*</td>
<td>6,380</td>
<td>-</td>
<td>9,744</td>
<td>14,152</td>
<td>24,092</td>
<td>-</td>
<td>82,900</td>
<td>40,408</td>
<td>42,900</td>
<td>21,695</td>
<td>5,740</td>
<td>4,980</td>
<td>29,616</td>
<td>-</td>
</tr>
<tr>
<td>1755</td>
<td>10,064</td>
<td>5,718</td>
<td>18,509</td>
<td>21,201</td>
<td>59,625</td>
<td>7,829</td>
<td>38,200</td>
<td>41,692</td>
<td>41,692</td>
<td>42,779</td>
<td>5,740</td>
<td>16,834</td>
<td>29,616</td>
<td>-</td>
</tr>
<tr>
<td>1768</td>
<td>9,323</td>
<td>4,736</td>
<td>15,074</td>
<td>18,820</td>
<td>54,357</td>
<td>7,882</td>
<td>84,400</td>
<td>41,692</td>
<td>51,098</td>
<td>42,779</td>
<td>5,740</td>
<td>16,834</td>
<td>130,114</td>
<td>-</td>
</tr>
<tr>
<td>1786</td>
<td>10,345</td>
<td>6,712</td>
<td>18,021</td>
<td>23,284</td>
<td>65,515</td>
<td>14,958</td>
<td>84,306</td>
<td>51,098</td>
<td>51,098</td>
<td>42,779</td>
<td>5,740</td>
<td>16,834</td>
<td>183,787</td>
<td>130,114</td>
</tr>
<tr>
<td>1857</td>
<td>12,811</td>
<td>6,650</td>
<td>17,275</td>
<td>41,943</td>
<td>89,314</td>
<td>27,036</td>
<td>80,915</td>
<td>51,098</td>
<td>94,293</td>
<td>70,811</td>
<td>8,519</td>
<td>21,359</td>
<td>273,000</td>
<td>-</td>
</tr>
<tr>
<td>1900</td>
<td>15,940</td>
<td>11,144</td>
<td>23,317</td>
<td>68,789</td>
<td>111,539</td>
<td>47,326</td>
<td>112,529</td>
<td>94,293</td>
<td>130,109</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: *The data is an estimation from multiplying by 4 the number of neighbors recorded in each census as suggested by Lemeunier (2004). **Cities in the Kingdom or Aragon do not appear in the population censuses of 1591, 1631, 1752. (1) Census of the Castilian Crown, 1591. (2) Census of the Salt, 1631. (3) Campoflorido Census, 1712. (4) Ensenada Cadastre, 1755. (5) Aranda Census, 1768. Data not available for Barcelona. (6) Floridablanca Census, 1786. (7) First modern Spanish census, 1857. The source from all numbers comes from the Instituto Nacional de Estadistica (INE). For the case of Murcia, the population data include all the villages surrounding the city, while our censuses only include the parishes within the city limits.
Notes: Figure depicts the distribution of HISCLASS occupations across the Census of 1734, the Ensenada (1755), and the Floridablanca census (1786). “Higher professional” includes HISCLASSes 1 (“Higher managers”) and 2 (“Higher professionals”). “Lower professional” includes HISCLASSes 3 (“Lower managers”), 4 (“Lower professionals, clerical, and skilled personnel”), and 5 (“Lower clerical and sales personnel”). “Skilled” includes HISCLASSes 6 (“Foremen”), 7 (“Skilled Worker”), and 8 (“Farmer”). “Unskilled/Low Skilled” includes HISCLASSes 9 (“Lower-skilled workers”), 10 (“Lower skilled farm workers”), 11 (“Unskilled workers”), and 12 (“Unskilled farm workers”).
Notes: The figure depicts Lorenz curves calculated for the different censuses. The figure includes the actual Ensenada (1755) Lorenz curve as well as the imputed Ensenada (1755) curve. All imputed curves use only mean salary information from the main income source. None of the curves adjust for the number of people in the household. Households headed by nobles, military men, clergy, or women were excluded. The “Equality” curve demonstrates the Lorenz curve under the condition of perfect equality.
Figure 4: Income Distribution for Head of Household Guild Journeymen.

Notes: The figure depicts box plots showing the distribution of earnings for Guild journeymen, for each Guild. Guild journeymen earning 0 reales were retired, thus making no earnings, but they kept their title as journeymen. There were no Pastry Cook journeymen.
Figure 5: Income Distribution for Head of Household Guild Masters.

Notes: The figure depicts box plots showing the distribution of earnings for Guild Masters, for each Guild. Guild masters earning 0 reales were retired, thus making no earnings, but they kept their title as masters. One Surgeon who earned 7,700 reales is not included. The four Pastry Cooks are also not included. They had earnings of 1,500, 1,500, 13,000, and 13,700 reales.