

MEASURING INCOME INEQUALITY USING A GRADUATED POLL TAX: SPAIN, 1874–1943

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The logo for the World Inequality Lab features a grid of black dots. The dots are arranged in a pattern that suggests an upward-sloping curve or a staircase, with the number of dots increasing from left to right and bottom to top. The text 'WORLD', 'INEQUALITY', and 'LAB' is positioned to the left of the dot pattern, with 'WORLD' and 'LAB' aligned with the top and bottom rows of dots respectively, and 'INEQUALITY' centered vertically between them.

Measuring Income Inequality Using a Graduated Poll Tax: Spain, 1874–1943

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Abstract

Measuring income inequality in Spain from the long nineteenth century up to the emergence of modern household budgets is a daunting task, often requiring almost heroic assumptions given the scarcity and partial nature of the available sources. In this paper, we propose using a graduated poll tax levied from 1874 to 1943 on various proxies of personal income—such as salaries, direct tax payments, and rents—as a means of approximating the distribution of income. The results derived from the statistical summaries reveal levels and trends consistent with other sources, as well as a regional pattern of economic inequality largely shaped by economic development and local institutions. Moreover, the analysis of tax microdata from two case studies offers a wider array of opportunities for examining household income.

Introduction

This paper focuses primarily on the methodological problems involved in measuring income inequality in the past. During the last two decades, growing concern about rising income and wealth disparities has spurred the development of new research areas and methodologies. One rapidly advancing field measures income and wealth inequality using tax data. The main advantage of this approach is its ability to provide a consistent measure of income or wealth concentration across both present and historical contexts (Piketty 2001; Atkinson 2007). Other scholars have applied similar techniques to the pre-industrial era (Nicolini and Ramos Palencia 2016; Brea-Martínez and Pujadas-Mora 2019; Alfani 2015, 2021). A third group has relied on social tables, a methodology designed to reconstruct the income of different social groups using primarily contemporary evidence (Milanovic et al. 2011; Gómez León and De Jong 2019). There is broad agreement that inequality in Europe generally increased during the pre-industrial era and accelerated in the nineteenth century. By contrast, the interwar years and the post-World War II decades witnessed a sharp decline in inequality, a phenomenon widely known as the Great Levelling.

Unfortunately, Spain's specific path of historical development during the late modern era has been largely absent from these broader debates. This omission is partly attributable to the lack of data sources as reliable as those used elsewhere, which has led economic historians to rely on more limited evidence and, in turn, has made it difficult to generalize findings. To date, research on economic inequality in Spain can be broadly grouped into three main approaches. Prados de la Escosura (2008) offers the most ambitious attempt to bridge national accounts and personal income inequality for this period. Drawing on available GDP estimates together with data on wages and employment, he calculates the labour share of income, assigns the residual to property incomes, and projects inequality by modelling alternative scenarios for the dispersion of labour earnings, property income, and their potential overlap. Prados de la Escosura's study follows the Kuznets framework, concluding that inequality in Spain rose during early industrialization. Nonetheless, his Gini series are highly volatile, and his findings remain difficult to validate in the absence of microdata or an external robustness check.

Another significant strand of research has focused on inequality in factor incomes, particularly land ownership in rural communities and wage differentials in urban economies. Agrarian history has long examined patterns of landholding and redistributive conflict, which underpin competing interpretations of the long liberal era. Carmona et al. (2019) and Simpson and Carmona (2020) offer a more optimistic assessment, whereas Robledo and González Esteban (2017) and Robledo Hernández (2022) insist on the persistence of large estates. Additionally, there is a growing literature that connects land inequality with political cleavages (Domènech and Sánchez-Cuenca 2022), or with disparities in literacy rates (Beltrán Tapia and Martínez-Galarraga 2018).

A third, and more recent, strand of research on inequality draws on personal income tax statistics (Alvaredo and Saez 2009), intergenerational income gaps (Souto Nieves et al. 2025) and the growing role of taxes and transfers in shaping inequality (Torregrosa Hetland 2015, 2016). Nonetheless, this literature is more closely linked to present-day

debates on inequality in Spain, and its methodology is very difficult to extend to the pre-Civil War era, as comparable data sources are largely unavailable for earlier years.

The purpose of this paper is therefore to address the growing fragmentation of inequality studies and to fill the perceived gap in reliable historical sources for Spain in the 1870–1940 period. We focus on a largely forgotten graduated poll tax (the *impuesto de cédulas personales*) which offers valuable opportunities to study income and inequality. Although the *cédula* was not a modern income tax, both its summary statistics and microdata contain far more information than is generally recognised by economic historians. In recent years, this source has been employed by historians to analyse economic elites (Hidalgo Álvarez et al. 2023), regional inequality (Pujadas-Mora et al. 2023) or personal income inequality in specific years (Melis 2019). The main contribution of this paper is to deepen our understanding of this tax, to propose the best procedures for obtaining reliable estimates, and to demonstrate how its data can help bridge the gap between macro- and micro-based approaches.

This paper focuses on establishing a solid methodological foundation for measuring inequality, rather than on providing a comprehensive account of income and wealth disparities over the period. Nonetheless, the reader will encounter several sets of estimates, either at the national level or for specific locations. At each stage, we emphasize the importance of presenting a range of plausible outcomes rather than a single, definitive estimate. This paper should be read as a first step toward developing a new, systematic approach to the study of household income in Spain using tax sources. This approach may also be of interest to scholars working on other historical contexts in which graduated poll taxes were used, including the Spanish colonies (Cuba, Puerto Rico, and the Philippines), as well as other countries that failed to implement a modern income tax.

The paper is organized as follows. The section on data introduces the basic structure of the Spanish tax system and shows how the personal tax certificate condenses much of the information contained in the tax registers that economic historians would typically rely on. Thereafter, the methodology section explains how to construct estimates of personal income and inequality at the local level, drawing on tabulated data from the graduated poll tax. We then present microdata through two case studies: a single cross-section (Madrid in 1902) and a longitudinal sample for a medium-sized town in the province of Barcelona (San Feliu de Llobregat, 1882–1937). The paper concludes by summarizing the main findings and outlining directions for future research.

Data: The personal tax certificate

From the mid-19th century to the late 1970s, the Spanish tax system was characterized by a predominant reliance on indirect taxes, a rudimentary direct tax structure, a minimal administrative apparatus, and widespread taxpayer resistance to inspection (Comín 1988; Torregrosa Hetland 2021). These features, along with the failure to implement a modern income tax, might suggest that taxation offers limited insights into economic inequality in Spain. In this section, we propose a different interpretation. We start by arguing that existing direct taxes, particularly those levied on real estate and business activity, serve as useful proxies for economic activity and inequality, and have been used as such by previous scholars. Building on this evidence, we argue that results from these direct taxes can be further refined by turning to a less-studied source: the personal tax certificate.

To date, research on Spanish economic history has focused on the property tax (*Contribución Territorial*) levied on real estate assets, and on the business tax (*Contribución Industrial y de Comercio*) applied on industrial or commercial activities. In addition, though far less explored, a third direct tax –the *Contribución de Utilidades*– taxed salaries, capital income (including dividends and interest), and corporate profits separately.

These taxes shared two key administrative features. First, in the case of the real estate and business taxes, the authorities presumed rents or profits based on various external parameters –such as crop type, land quality, location, type of business– without investigating the taxpayer’s actual income. Second, tax administration was decentralized to the municipal level, meaning that taxes were assessed on a specific source and location. As a result, for example, a landowner with assets in multiple locations would be registered as a separate taxpayer in each municipality (García Orallo 2009). Consequently, most researchers working with these direct taxes focus on the distribution of property or business activity at the local level (Garrabou et al. 2014).

These direct taxes provide useful indicators of local economic activity and inequality derived from these income sources, but they are also inherently difficult to scale up for broader analysis. Even if a team of researchers were to locate and digitize all the property tax records—which, at the beginning of the 20th century, would potentially include up to five million records on local taxpayers– they would still face the daunting challenge of consolidating tax entries across multiple locations and linking them to their ultimate owners. Identifying these individuals in the census to retrieve basic sociodemographic information (such as place of residence, birthplace, age, marital status, education, and occupation) would be virtually impossible.

This bottleneck can be overcome by turning to the personal tax certificate (*Impuesto de Cédulas Personales*), which operated in Spain from 1874 to 1943. The *cédulas* tax was a graduated poll tax based on the principle that each taxpayer paid according to their assigned certificate class. The importance of the personal tax certificate lies in its classification system, which was based on three indicators: the amount of direct taxes paid on real estate or business activities, the salary earned by employees with annual contracts, and the rent paid for housing. Its principal advantage, as noted in an American diplomatic survey, was that “these three divisions operate as an automatic check upon the individual, not only in making it practically impossible to avoid payment of the tax, but also in determining the class to which he belongs” (Bernard 1925, 232). The certificate (*cédula*) was levied on all adults aged 14 and over, and taxpayers were required to keep the document throughout the year in order to carry out administrative procedures, obtain formal employment, or register a notarial act. The *cédula* thus served as the precursor to the Spanish personal identification card, which was introduced following the abolition of the personal tax certificate in the early 1940s (Díaz Sánchez 2023; Pérez-Olivares 2024).

In economic terms, the importance of the personal tax certificate lies in its classification system. From 1874 to 1925, the system comprised 11 or 12 certificate classes, with higher classes subject to higher levies. In 1926, the system was reformed in several ways. Most notably, the three criteria –taxes, salaries, and housing rents– were formally separated into distinct schedules. While the core principles remained intact, the new structure clarified

the assessment criteria for both statistical and fiscal purposes. The details of this system are presented in Table 1.

Table 1. The assessment for the personal tax certificate

Panel A, years 1884-1925

Certificate class	Salary (annual contract)		Direct taxes paid		Housing rents (in Madrid)		Tax due	Tax burden
Special	-----		>10.000		>10.000		200	
1	>30.000		5.000	10.000	7.500	1.000	100	0,33%
2	12.500	30.000	3.000	5.000	5.000	7.500	75	0,35%
3	10.000	12.500	2.500	3.000	3.500	5.000	50	0,44%
4	6.500	10.000	2.000	2.500	2.500	3.500	25	0,30%
5	4.000	6.500	1.500	2.000	2.000	2.500	20	0,38%
6	3.500	4.000	1.000	1.500	1.500	2.000	15	0,40%
7	2.500	3.500	500	1.000	1.000	1.500	10	0,33%
8	1.250	2.500	300	500	750	1.000	5	0,27%
9	750	1.250	25	300	500	750	3	0,25%
10	1	750	1	25	250	500	1	0,27%
11	Wage earners, domestic servants and women without income						0,5	

Note: All figures in pesetas. The special certificate class was created in 1905. Until then, taxpayers were classified in the certificates 1 to 11.

The tax pressure in the last column has been estimated by dividing the tax due by the average salary in each certificate class

Panel B, years 1926-1943

Certificate class	Schedule nº 1 Salary (annual contract)		Schedule nº 2 Direct taxes paid		Schedule nº 3 Housing rents (cities of more than 300.000 inhabitants)		Tax due	Tax pressure
1	>60.000		>15.000		>20.000		1.000	3,33%
2	50.001	60.000	10.001	15.000	10.001	19.999	750	1,36%
3	40.001	50.000	7.501	10.000	7.501	10.000	500	1,11%
4	30.001	40.000	5.001	7.500	5.001	7.500	350	1,00%
5	20.001	30.000	3.001	5.000	3.501	5.000	250	1,00%
6	15.001	20.000	2.501	3.000	2.501	3.500	210	1,20%
7	12.501	15.000	2.001	2.500	2.001	2.500	190	1,38%
8	10.001	12.500	1.501	2.000	1.501	2.000	120	1,07%
9	6.501	10.000	1.001	1.500	1.001	1.500	63	0,76%
10	5.001	6.500	501	1.000	751	1.000	50	0,87%
11	3.501	5.000	301	500	501	750	40	0,94%
12	2.501	3.500	26	300	251	500	25	0,83%
13	2.001	2.500	1	25	1	250	15	0,67%
14	1.501	2.000					11	0,63%
15	751	1.500					8	0,67%
16	1	750					3	0,80%
13 Bis	Wage earners, domestic servants and women without income						1,5	

Note: All figures in pesetas. The tax pressure in the last column has been estimated by dividing the tax due by the average salary in each certificate class

Each schedule was based on different controls and assumptions. The schedule based on direct taxes was originally intended as the default evaluation method. Tax agents used data from the real estate and business taxes collected at the local level, which typically distinguished between resident and absentee taxpayers. Taxing local residents for the personal tax certificate was straightforward. Yet, as a detailed memorandum from the Spanish tax agency explained (Dirección General de Contribuciones, Impuestos y Rentas 1910, 12–17), absentee owners were subject to special scrutiny. Information on such

individuals was forwarded to regional offices to ensure they were fully taxed in their place of residence. In this way, the personal tax certificate was designed to address the limitations of local real estate taxation by aggregating an individual's direct tax payments.

The two alternative indicators –annual salaries and housing rents– were originally introduced to better assess the urban population. The schedule on salaries was intended to capture income paid on annual contracts to public-sector employees (such as civil servants and military officers) as well as the growing number of private-sector workers in services (e.g. shop assistants, office clerks). These incomes were more closely monitored than one might initially assume, as the tax administration could access data on salaries submitted by employers through the *Contribución de Utilidades*. The housing rent schedule aimed to capture individuals with high incomes who might otherwise fall into a lower tax class—for example, rentiers who held financial assets but paid no direct taxes. Implicitly, higher rents were taken as indicators of higher income.

The personal tax certificate was based on the fundamental assumption that property and business owners, employees with an annual salary, and individuals paying high housing rents typically had higher incomes. Yet, the personal tax certificate always attempted to cover the entire adult population in the country, aged 14 years and over, and the only authorised exemptions were of relatively minor importance (soldiers, people living in charity wards, and members of religious orders)¹. Thus, every person who could not be placed in any of the above categories was eventually assigned to the lowest group (i.e., certificate class 11). The personal tax certificate had the ambition to fully assess and tax the population of the country.

The personal tax certificate has received little attention from economic historians interested in government finances. The small amounts collected (less than 0.1% of GDP) justify this choice, but it is still worth asking how successful the tax was. The annual summary statistics of this tax provide a relatively straightforward answer. In the appendix to this paper, we provide all the available records that we have been able to compile from government authorities during this period. A basic check of the data can be carried out by comparing the total number of registered taxpayers with the potential population that should appear. When conducting such analysis, it is especially important to distinguish whether the statistical summaries cover all the registered taxpayers or only those that actually had paid the tax and were in possession of their certificate (*cédula*). The difference is non-trivial, as it highlights the procedure by which the personal tax certificate actually operated. In April of each year the tax administration compiled a census after surveying every household and including all the potential taxpaying population. From these records, the local tax administration produced a summary statistic of the number of certificates. Later, from July to the end of September, the taxpayers paid the tax. Finally, there was a second collection period, in which taxpayers paid a penalty of twice the amount, or if not, faced an embargo of their salary or properties².

¹ The number of people exempted from the tax were estimated at around 100,000 in 1904. (Comisión Extraparlamentaria para la Transformación del Impuesto de Consumos 1910)

² The government passed a law (RD May 27, 1884) that set out the technical procedures behind this process.

Table 2. The population recorded in the personal tax certificate, 1908

Population aged 15+ (A)	Spain	<i>inc. Andalusia</i>	<i>inc. Castile and Leon</i>
	10.513.388	2.005.671	1.376.183
Population recorded in tax census, by cédula class			
Especial	33	17	
1	326	132	15
2	495	172	14
3	584	129	13
4	1.213	297	35
5	3.186	620	163
6	4.223	936	198
7	18.005	3.745	1.014
8	38.540	8.196	3.206
9	657.072	88.117	124.945
10	1.562.583	230.113	264.292
11	6.311.103	1.370.274	895.138
Total (B)	8.597.363	1.702.748	1.289.033
Coverage (B/A)	82%	85%	94%
Population paying the tax (as a share of those registered in the tax census), by cédula class			
Especial	103%	100%	—
1	97%	95%	100%
2	98%	94%	100%
3	96%	91%	100%
4	99%	96%	89%
5	99%	95%	99%
6	94%	88%	101%
7	88%	83%	97%
8	92%	83%	98%
9	81%	58%	97%
10	68%	34%	93%
11	55%	20%	85%
Total	59%	25%	88%

Source: Dirección General del Tesoro Público y Ordenación General de Pagos del Estado 1910

Note: The adult population is estimated by interpolating the figures from the 1900 and 1910 population censuses. In some cases, the number of people paying the tax within a given certificate class slightly exceeds the original count because tax agents revised upwards the economic variables used for classification.

The information available points to a significant gap between the recorded number of adults in the annual tax census and those that were actually paying the personal tax certificate. Table 2 provides this information for the year 1908, with information at a national level and detailed for two broad regions (Andalusia and Castile) to illustrate major regional differences. Results indicate that the administration was relatively successful in carrying out the census, as typically more than 80% of the adult population was included. The missing population was most likely concentrated among recent migrants, younger adults (aged 14–20), people absent from their place of residence, and individuals legally exempted. There are no substantial differences between regions in terms of potential coverage. However, it is remarkable that only 60% of individuals actually registered in the tax census were paying the certificate in that same year. The gap

was almost negligible in the top certificate classes, but substantial at the bottom. Furthermore, there were significant differences between regions, as for example, with higher compliance in Castile than in Andalusia. Researchers should always prefer using records related to the census of potential number of taxpayers, and not of those actually paying the tax.

Methods: Tax statistics as a proxy of economic development and inequality

The personal tax certificate is a long-standing historical source that serves as a good proxy for both economic activity and inequality in Spain in two ways: either by simply using the tabulated data on the number of individuals by certificate classes, or by actually collecting the tax census microdata on salaries, direct taxes, and rents. The second approach is clearly more refined, but it requires more time and resources to process. Therefore, the first approach, based on the published statistics on the number of registered individuals by certificate classes, provides useful insight into the same issue. This section is devoted to enhancing this perspective by arguing that the *cédula* classification system operates as a useful proxy of economic activity at regional and local levels, which can be used to measure inequality. In the next section we will show estimates based on microdata.

The starting point to use this source is that the personal tax certificate functioned as a graduated poll tax. Virtually every adult was required to pay, but the amount was scaled according to three proxies of income: salaries, property taxes, and housing rent. For this study, we focus on the fact that the relationship between the tax due per *cédula* class and the most direct income indicator –salaries– was almost perfectly proportional. As shown in Table 1A in the last column, the implicit tax burden remained nearly constant, at about 0.3 to 0.4 percent of assessed salaries. In the remainder of this section, we assume that this proportionality was maintained throughout all the classes and individuals registered for tax purposes.

To illustrate the analytical usefulness of personal tax certificates, we compare the estimated GDP per capita at a province level (Díez-Minguela et al. 2018) with the average personal tax certificate due per province. This last metric is obtained by multiplying, for each certificate class, the number of registered adults by the corresponding tax due. To this comparison we add the average tax per capita for the three major direct taxes (real estate, business, and salaries), as well as a combined measure of all three. As Table 3 shows, all variables show a positive relationship, but interestingly the highest coefficients are obtained with the business tax and the *cédula*. The personal tax certificate is thus a good synthetic indicator of economic activity that has two additional advantages. First, it includes information on the Basque Country and Navarre, which typically did not report data on the other direct taxes due to their unique tax regime (and therefore their observations are dropped in these correlations). Secondly, the *cédula* is potentially much easier to disaggregate to the local and individual level than the other direct taxes as we will show later on.

Table 3. Correlation between GDP per capita and tax collections per capita at a province level. Spain, 1900

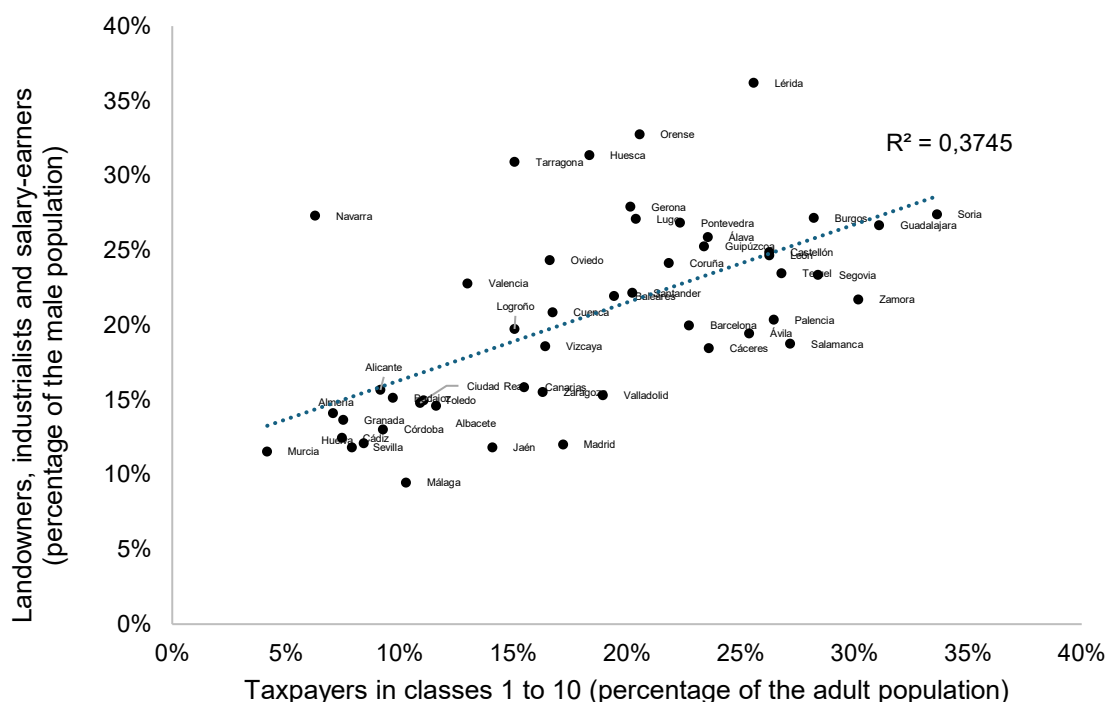
Variables	GDP	Cedula	Realestate	Business	Salaries	Total taxes (RE, business and salaries)
GDP	1					
Cedula tax	0,5762	1				
Real estate tax	0,5054	0,2711	1			
Business tax	0,7248	0,6714	0,7181	1		
Salaries tax	0,4145	0,3512	0,2752	0,384	1	
Total taxes (RE, business and salaries)	0,6523	0,4946	0,9537	0,8871	0,3715	1

Source. GDP per capita (Díez-Minguela et al. 2018), and tax revenues per capita (Intervención General de la Administración del Estado 1976).

The other major feature of the personal tax certificate is that it is a good proxy for economic status, in particular, of individuals who could be considered to be above subsistence level. Groups 1 to 10 in the personal tax certificate basically include individuals paying direct taxes, earning a salary from an annual contract, or living in a house with a higher rent. This group can then be compared with those that in population registers would employ occupational descriptions that refer to these circumstances. We draw on the 1907 electoral census (Dirección General del Instituto Geográfico y Estadístico 1908) and take the numbers of property owners and land tenants, industrialists, merchants and white-collar employees. These records are completely independent from tax records and only cover the male population over 25 years old.

In aggregate terms, *cédula* taxpayers in classes 1 to 10 numbered 2.1 million people, while the second group in the electoral census numbered 2.4 million. This almost perfect match at the national level should not conceal the fact that some significant variations exist across provinces, as Figure 1 shows. Some provinces show that the number of individuals in a respectable position exceeded by far the number of certificates in these classes, most likely because occupational categories and tax status did not match perfectly. There is also a significant difference in terms of gender (all individuals versus only males) and age composition (14-year-old and over versus 25 and over) between both records. This suggests that the personal tax certificate was correctly assessing the population it was supposed to capture.

Figure 1. Taxpayers in classes 1 to 10 versus the number of landowners, businessowners and salary earners. Spain, 1904-7



Based on these assumptions, the statistical summaries of the *cédula* tax can be used to estimate income inequality. The core inputs are the tabulated data showing the distribution of registered individuals by certificate class (as in Table 2), to which monetary values are assigned according to the tax owed (Table 1A). In the basic scenario, it is assumed that income is proportional to tax liability, so that the effective distribution of the tax serves as a proxy for the distribution of income. The main objection to this exercise is that it takes at face value the number and composition of the lowest certificate class, number 11, which grouped people that earned no annual salaries, paid no direct taxes or a high rent. It is tempting to think that such a single big class makes little sense and simplifies two matters. First, that labourers (*jornaleros*) were a very large group that included all wage-earners hired on a daily or weekly basis, ranging from the unskilled (agriculture) to the highest skilled crafts (mining or railways). Against this objection, it is worth noting that the tax administration created an alternative assessment system that would most likely classify the most affluent of the labouring classes in a higher certificate class. This could occur for labourers living in a house with a higher rent than the lowest class (see again, the rent scheme in Table 1) or for those who owned real estate and paid the property tax. Therefore, the better-off labourers were most likely classified in certificate classes above the lowest one (number 11).

A second major limitation of the tax scheme—shared with many other historical sources—is its tendency to overrepresent women as having little or no income. Although the tax was assessed on individuals rather than households, institutional practices systematically placed men in higher tax classes. Within married couples, real estate and business taxes were typically registered under the husband’s name. A similar pattern applied to the housing rent metric, which was assessed only on the household head –

almost invariably male— rather than on all adult individuals. However, the tax administration did not entirely erase women’s value: by assigning women with no registered sources to the lowest tax category, rather than exempting them altogether, it implicitly conferred them a residual monetary value. Furthermore, as will be demonstrated later through two case studies, a small yet significant share of women— around 5-10 percent of two selected cases—were classified above the lowest class.

If these explanations are not sufficient, it is feasible to provide different estimates on inequality that circumvent these two problems by turning to the household level, at least as proxied through the household head. Starting with the same input (the tabulated data by certificate class), it is safe to assume that almost all individuals registered in classes above the lowest (i.e. from 1 to 10) were household heads given the procedures just described. The number of households in the lowest class can then be estimated as a residual, calculated as the difference between the households already identified and the total number of households reported in the population census.

The results from these two approaches –individual and household levels– are summarized in Table 4, which reports the Gini index and top income shares. Notably, the household-based approach yields higher Gini values, as consolidating individuals into households reduces the number of observations in the lowest category, thereby increasing measured inequality. However, shifting from individuals to households has little effect on top-share estimates. More importantly, these results align closely with those obtained through other methodologies. Prados de la Escosura (2008) reports a rise in Spain’s Gini index from around 35 to nearly 50 between 1890 and 1920. Similarly, Alvaredo and Saez (2009), using income tax tabulations, estimate the top 0.01% share at approximately 1.5% during 1933–1935. Finally, Spain’s first modern household survey (Instituto Nacional de Estadística 1965), conducted in 1964—when inequality was likely lower than during the earlier period—placed the Gini index at 42. Overall, the estimates derived from the personal tax certificate appear historically consistent and comparable.

Table 4. Income inequality metrics for Spain

Year	Individual level information			
	Gini index	Shares of the top, percent of income		
		0,01%	0,10%	1,00%
1889	35,1	2,4	4,8	13,9
1904	38,3	2,3	5,5	16,0
1907	36,5	2,4	5,9	16,6
1926	52,7	1,7	7,6	22,9

Year	Household level			
	Gini index	Shares of the top, percent of income		
		0,01%	0,10%	1,00%
1889	44,8	1,6	5,0	15,1
1904	47,6	1,4	5,4	16,0
1907	48,5	1,4	6,2	17,3
1926	60,6	1,6	5,1	19,2

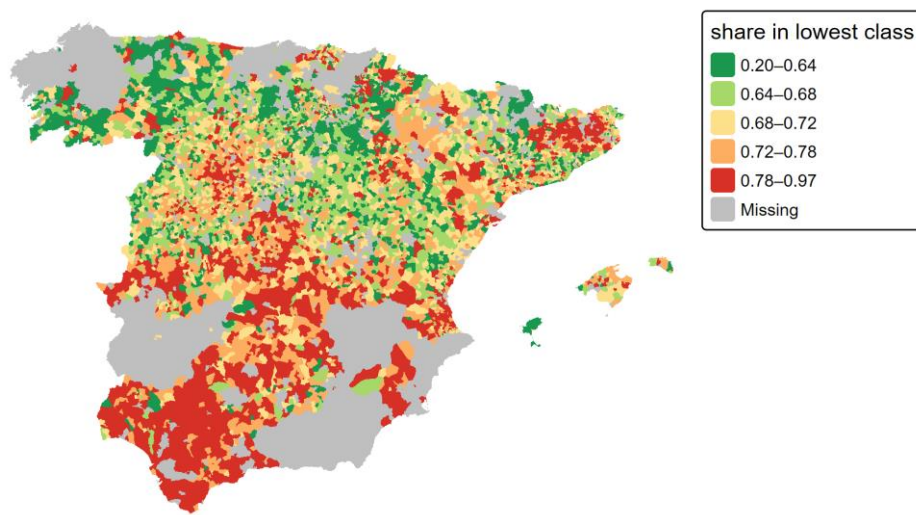
Source: Statistics on the graduated poll tax (*cédulas personales*) presented in the appendix

One notable advantage of the personal tax certificate is its ability to support disaggregated estimates at the local level. For this purpose, we explore a unique dataset covering

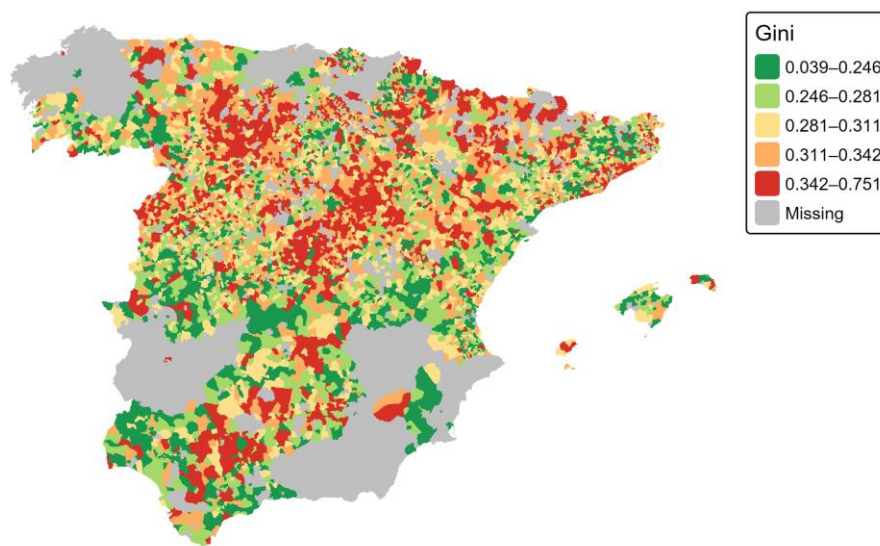
approximately 8,000 municipalities for the year 1919³. Figure 2A presents the distribution of municipalities according to the share of adults in the lowest certificate class, which provides a reasonably good proxy for the prevalence of labourers and poor workers in society. As expected, municipalities in southern Spain display much higher rates than those in the north. Figure 2B presents the Gini index calculated at the individual level. At first glance, no clear regional pattern emerges.

Figure 2. Share of adults in the lowest class and inequality at the municipal level. Spain, 1919

Panel A. Adults in the lowest class (cédula 11) as a percentage of total



Panel B. Gini index, individual level

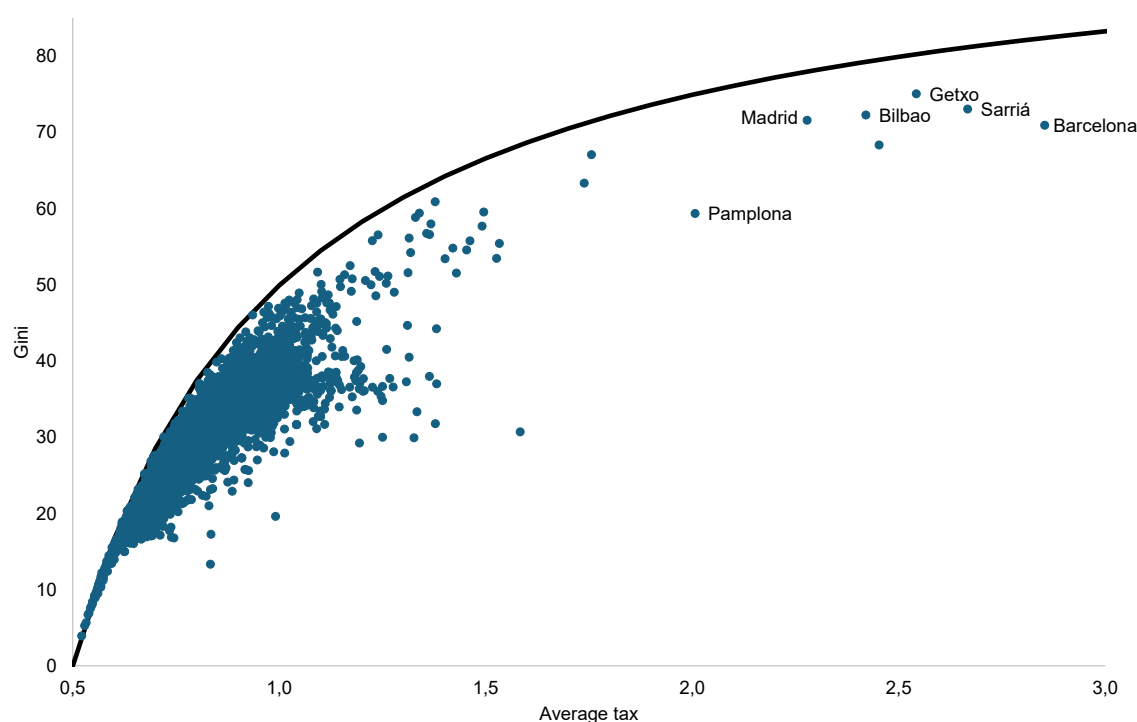


Note: Areas without information are coloured in grey. Municipalities are defined to modern borders, but the regression results are based on observations according to the historical borders.

³ Readers interested in this unique dataset compiled from Spanish historical archives can find further details in the appendix.

To analyse inequality, Figure 3 goes a step further by applying the framework developed by Milanovic, Lindert, and Williamson (2011), comparing tax per capita and the Gini index. The underlying logic is similar: tax per capita serves as a proxy for the level of economic development (analogous to GDP per capita), while the Inequality Possibility Frontier (IPF) defines the maximum feasible level of inequality at each development level. In this case, all estimates and assumptions rely exclusively on tax data, which ensures internal consistency and comparability. Moreover, in this simulation, no observation can exceed the IPF because the minimum tax per adult (0.5 pesetas) –the equivalent of a subsistence threshold in Milanovic, Lindert, and Williamson’s paper– is itself endogenous to the calculation of maximum inequality levels.

Figure 3. Average cédula tax and Gini index at the municipal level. Spain, 1919



As expected, municipalities with higher per capita incomes tend to exhibit higher levels of inequality, and the relationship is extremely strong (Table 5). Besides the obvious correlation, the most important challenge is to explain the variation observed among the many small villages and towns, whose average tax per capita ranged between 0.5 and 1. To address this, we ran a regression of the Gini index on the log of average tax per capita, population size, regional fixed effects, and a dummy variable identifying the capitals of a Partido judicial (PJ), that is, the approximately 500 mid-sized towns that served as administrative capitals of small administrative units.

The results align with expectations. At a time when Spain could be placed in the first phase of the Kuznets curve, higher incomes typically went together with greater inequality. This pattern may be explained not only by industrialization but also by the development of higher value-added services, as proxied by the presence of government and legal institutions (PJ). Regional dummies capture additional dimensions that at present are difficult to measure at the municipal level, such as land distribution or literacy rates. The effects derived from the personal tax certificate point in the expected direction:

inequality was consistently higher in the south (Andalusia, Extremadura, La Mancha and Murcia), but more moderately high in the Mediterranean (Cataluña, Valencia) and consistently lower in the north (Galicia, Asturias, Basque Country and Navarre). Future work will explore these local variations in greater depth.

Table 5. Regression of Gini index at the municipal level. Spain, 1919

VARIABLES	(1) Gini	(2) Gini	(3) Gini
Average tax per capita, log	40.49*** (0.198)	40.11*** (0.195)	40.30*** (0.201)
Municipal population (1919)	1.94e-05*** (5.14e-06)	1.96e-06 (5.14e-06)	-1.95e-06 (4.99e-06)
Partido Judicial capital, dummy = 1		3.099*** (0.173)	3.238*** (0.167)
1, Andalusia/Extremadura			0.758*** (0.196)
2, Aragon			0.977*** (0.188)
3, Balearic Island			-0.637* (0.347)
4, Canary Islands			-0.514 (0.538)
5, Catalonia			0.536*** (0.187)
6, Castile Leon			0.226 (0.178)
7, CastileMancha/Murcia			0.764*** (0.188)
8, Galicia/Asturias			-1.709*** (0.231)
9, Madrid			2.733*** (0.240)
10, Basque Country/Navarre			-0.965*** (0.209)
12, Valencia			0.0559 (0.210)
Constant	38.34*** (0.0509)	38.20*** (0.0506)	37.84*** (0.176)
Observations	8,006	8,006	8,006
R-squared	0.842	0.848	0.860
Regional FE	No	No	Yes
Partido Judicial	No	Yes	Yes
Baseline region			RIOJA

The microdata from the personal tax certificate

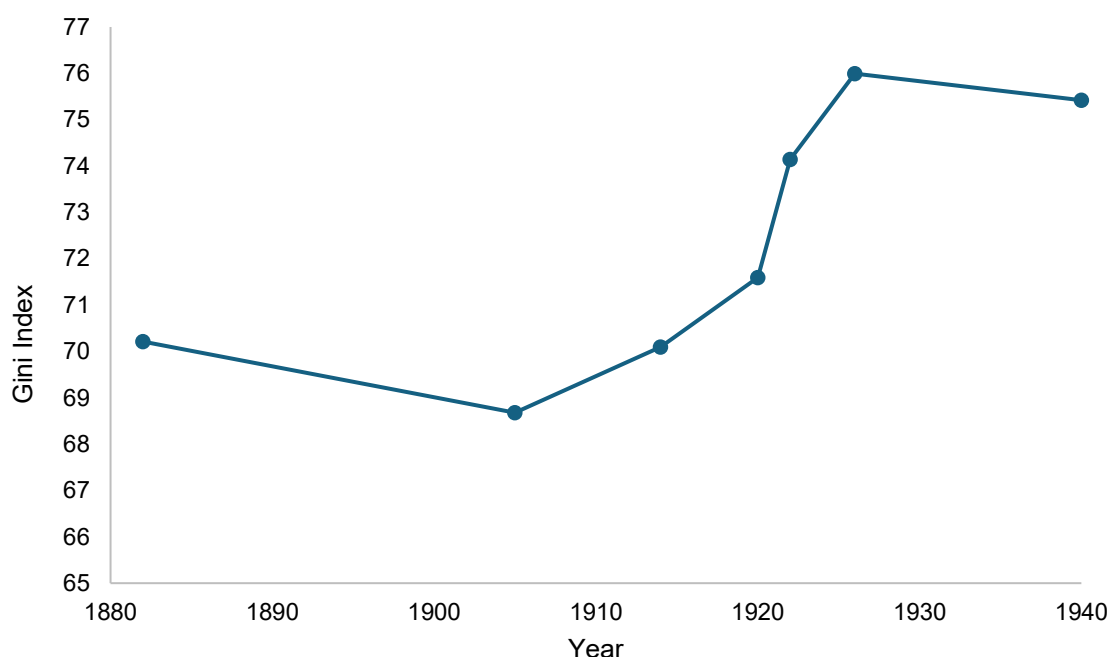
In this section, we propose a complementary approach by using the original microdata from the personal tax certificate. As previously mentioned, the tax administration conducted an annual census of potential taxpayers, with the basic objective of recording the number of individuals in each certificate class. This census followed a standardized format, with information organized by municipality, then by location (districts and streets) and by household. For each individual, the census included basic sociodemographic data (name, family name, place of birth, age, and occupation), as well as economic information on direct taxes, salaries, and rents.

Using this information, we explore personal incomes and inequality for two different locations and periods: Madrid in 1902, and San Feliu de Llobregat (Barcelona) between 1882 and 1937. The first case aims to address the feasibility of accurately measuring inequality in the capital city, while also illustrating the potential to capture incomes at the very top, even if it focuses on a single year. The second case examines how the personal tax certificate can be used to measure income and inequality in a context of urban expansion and industrialization, drawing on longitudinal data. Together, these results shed light on factors that have traditionally been little explored, while confirming the main assumptions that underpinned the analysis of the previous section.

Madrid, 1902

At the beginning of the twentieth century, Madrid, the capital of Spain, was the country's second-largest city and was primarily oriented towards a service-sector economy, with a clear specialization in trade, transportation, government services and finance (Otero Carvajal and Pallol Trigueros 2009; Carballo et al. 2008). Madrid also had a vibrant real estate market in which property ownership was highly concentrated among a small number of investors (Rodríguez Chumillas 2002). Moreover, Madrid was the principal place of residence of the Spanish landed aristocracy, and therefore received a significant amount of land rents from property located in other regions (Artola Blanco 2015). These factors help explain why the tabulated data from the personal tax certificate –when analysed under the assumptions outlined in the previous section– reveal extraordinarily high levels of inequality throughout this period. As shown in Figure 4, the Gini index at the individual level stood at around 70 at the beginning of the century and rose to approximately 75 in the years immediately before and after the Civil War. Such a high level of inequality is not surprising given similar estimates for income and wealth inequality in other European cities (Piketty et al. 2006; Bengtsson and Molinder 2024). Fortunately, an almost complete set of records for the tax census for the year 1902 is preserved in the national archives and these microdata illustrate the factors pushing inequality to such high levels. Our sampling strategy was based on gathering 1,000 random individuals from each of the ten districts in Madrid and thus assembling a dataset of 10,000 observations. These are then scaled up using the aggregate classification by certificate class as weighting factors.

Figure 4. Gini index on income inequality, city of Madrid, 1882-1940



Using this sample we conduct a two-step analysis of income inequality. The first step is to carry out an analysis on housing rent paid. The decision to focus solely on this variable reflects the fact that in large cities like Madrid, homeownership was extremely limited and only 3-4 percent of households actually owned their home⁴. Virtually all other households were tenants, so rent paid is a widely available variable and one that provides a useful proxy for disposable income. In a first approximation, it is possible to measure inequality directly by taking the reported rents. A more refined approach requires introducing a variable coefficient to account for the fact that, as income rises, households typically allocate a smaller share of their income to housing rent (Williamson 1985; Van Zanden 1995). This occurs both because more affluent families have a greater capacity to save and because rent represents a basic service with inherent limits, preventing it from absorbing a growing share of higher incomes. To perform this transformation, we rely on official contemporary estimates provided by the Ministry of Finance for the period⁵. These rent-to-income conversion coefficients are consistent with the evidence presented in the previous section –comparing the columns on salaries and rents in Table 1– while offering a more refined shift across the income distribution.

Table 6. Inequality metrics derived from rents and converting rent to income, Madrid, 1902

Metric	Gini	Bottom 50	Middle 40	Top 10	Inc. Top 1
Rent	60.45	12%	38%	49%	14%
Rent to Y	68.06	9%	33%	58%	22%

⁴ These percentages can be estimated from population and housing censuses (Ayuntamiento de Madrid 1917; Instituto Nacional de Estadística 1953)

⁵ We use as a reference the articles detailing these mechanisms from the law proposal of April 18, 1922, introduced by the Minister of Finance, Francisco Bergamín. Similar ratios were established in a different tax reform proposal for the city of Madrid. (Ruiz Giménez 1916)

The evidence on this set of estimates is presented in Table 6. Inequality appears already at high levels using rents (a Gini of 60.5) but was even higher with the transformation of rents into income (a Gini of 68). These measures can then be decomposed into different sections of the rent (or income) distribution as illustrated with the shares accrued to the bottom 50, middle 40 and top 10 of the distribution.

The second step of analysis explores the individuals that respectively report salaries and direct taxes to eventually calculate personal income. As a starting point, Table 7 summarizes the numbers of individuals with these two sources of income by sex and age groups. Annual salaries were the most widely reported source of income, even if only 10% of adults reported any information. This ratio increases substantially when only considering men (15%) and is lower for women (5.3%). The recipients of annual salaries comprised employees in both the public and private sectors, along with a significant share of domestic servants (who reported their earnings despite belonging to the lowest certificate class) and a small number of retired civil servants receiving government pensions. By definition, the compensation of this group is skewed toward the upper end of the income distribution (Artola Blanco 2024), excluding the middle and lower segments of the labour market represented by the large numbers of day labourers. This still represents an important advantage: whereas most research on labour compensation in this era relies on data for industrial workers and their daily pay (Silvestre 2006; Vilar Rodríguez 2004), the source presented here –alone or combined with the statistics from the tax on salaries (*Contribución de Utilidades, tarifa 1*)– offers a broader perspective by linking earnings to demographic characteristics such as age, place of birth, and household ties of top salary earners.

Table 7. Population reporting salaries or direct taxes. Madrid, 1902

Number of individuals		
By sex	Salaries	Direct taxes
Men	27.775	18.441
Women	12.006	3.860
Total	39.781	22.302
By age		
<=25	8.843	1.185
26-45	15.451	10.513
46-65	12.177	8.772
>= 66	3.272	1.764
Total	39.742	22.234
Average (in pesetas)		
By sex	Salaries	Direct taxes
Men	1.907	828
Women	751	1.100
Total	1.570	876
By age		
<=25	469	889
26-45	1.433	728
46-65	2.270	979
>= 66	2.215	1.105
Total	1.570	876
Memo. Adult population (+14)		
Men		178.425
Women		227.960
Total		406.384

The information on direct taxes includes a smaller group, of approximately 5% of the adult population, and with an ever-greater male predominance in its composition. It included individuals paying property taxes on their real estate holdings or the tax on business activities. This group was potentially the most difficult to assess in the *cédula* tax, given the potential for individuals to omit tax payments for activities or assets, especially of those located outside of Madrid. As reported in Table 8, the amount of taxes recorded in the census amounted in total to 18.6 million pesetas, while the summary statistics show that taxes paid on property or business activities carried out in the city of Madrid amounted to 15.8 million pesetas. In other words, the personal tax certificate appears to capture fairly accurately the assets (and related taxes) located outside the Madrid economy.

Table 8. The distribution of direct tax payments on real estate and business activities, Madrid 1902

Panel A: Observations from tax census			Panel B: Estimates of income sources			
Direct tax brackets, lower threshold	Number of individuals	Direct taxes	Number of individuals		Income	
			Property owners	Business owners	Property rents	Mixed income
1	889	13.093	168	722	16.384	123.207
25	1.280	46.015	260	1.020	54.681	440.020
50	4.166	291.622	483	3.683	194.179	3.101.241
100	3.351	458.257	656	2.695	517.391	4.437.574
200	2.593	599.287	629	1.965	901.741	5.341.460
300	1.998	678.381	551	1.446	1.127.652	5.825.868
400	1.278	561.338	282	996	719.538	5.260.180
500	1.168	632.131	452	716	1.446.249	4.616.462
600	720	448.660	154	566	560.128	4.234.901
700	518	379.217	261	258	1.132.895	2.222.622
800	623	527.221	145	478	737.986	4.811.678
900	297	275.236	59	238	327.082	2.631.778
1.000	965	1.164.892	457	508	3.208.136	7.397.771
1.500	651	1.107.552	392	259	3.989.216	5.103.204
2.000	517	1.176.831	291	225	3.876.182	6.171.882
2.500	768	2.651.621	653	116	13.372.420	4.339.811
5.000	520	7.605.552	416	104	40.705.589	7.767.976
Total	22.302	18.616.907	6.308	15.994	72.887.449	73.827.635
Memo, taxes due on activities/assets located in Madrid						
Real estate tax		11.063.677				
Business tax		4.769.161				
Total		15.832.838				

Note: All figures in pesetas. The real estate and business tax recorded as a memo item correspond to the actual revenues collected per the statistical summaries of these two taxes and are independent from the information reported by individuals in the *cédula* tax census, *Boletín Oficial de la Provincia de Madrid*, 31/12/1901

The final step of this estimate consists of adding the information on salaries, mixed and property incomes to approximate personal income, both at the individual and household level. To circumvent the main limitations of the tax census, namely the absence of direct information on daily wages, we suggest starting the analysis at a relatively high percentile of the population. We set the threshold at the 95th percentile, which in nominal terms corresponds to incomes of 2,000 pesetas per individual or 7,000 per household. These levels lie comfortably above the maximum earnings that could be attributed to a skilled day labourer, according to a detailed survey of Madrid's industry (Dirección General de Agricultura, Industria y Comercio 1907)⁶. Tax records therefore should be first used to approximate the level and composition of incomes at the upper end of the distribution.

⁶ In this industrial survey, the maximum daily wage recorded for the most skilled trades equals 5 pesetas. Assuming 300 working days a year it would amount to 1500 pesetas of annual earnings. Still, to provide a margin of safety, we increase this threshold to 2000.

Table 9. Income levels (in pesetas) and composition at the top 5% of the distribution, Madrid 1902

Individual level						
Percentile ranges	Income threshold	Income, average	Income composition			Inverted Pareto Coefficient (β)
			Salaries	Mixed income	Property income	
95-96	2.000	2.230	62,7%	30,8%	6,5%	4,30
96-97	2.500	2.941	51,9%	32,0%	16,2%	4,07
97-98	3.510	4.296	39,2%	48,2%	12,6%	3,59
98-99	5.158	7.003	32,5%	53,4%	14,1%	3,25
99-999	9.600	17.908	11,2%	45,1%	43,7%	2,77
99.9-1	67.503	110.334	0,4%	18,5%	81,1%	1,63

Household level						
Percentile ranges	Income threshold	Income, average	Income composition			Inverted Pareto Coefficient (β)
			Salaries	Mixed income	Property income	
95-96	7.000	7.636	38,5%	52,3%	9,2%	3,04
96-97	8.510	9.546	32,3%	52,9%	14,9%	2,90
97-98	10.800	12.465	30,3%	34,3%	35,4%	2,76
98-99	14.520	18.814	17,6%	43,7%	38,7%	2,65
99-999	25.563	46.270	3,8%	38,4%	57,8%	2,27
99.9-1	98.289	200.375	0,2%	0,0%	99,8%	1,66

Note: The inverted Pareto coefficient are calculated using the lower income threshold.

Table 9 summarizes the composition and concentration of income. As in other contemporary cases, as one moves up the upper tail of the distribution, the weight of salaries declines sharply, becoming virtually irrelevant in the top 0.1 % of the population. Property income rises in parallel and exhibits an extreme degree of concentration at the very top. Perhaps the most striking finding is the substantial role of mixed business income, which accounts for around 30–40 %. The table also reports the inverted Pareto coefficient (or β). As previous scholars have noted, a higher β means a fatter upper tail of the income distribution, and therefore a more unequal distribution. The comparison between the individual and household income distributions suggests that the first is more unequal by this measure, as in this scenario virtually all married women had no individual income.

The value of computing the β coefficient is that it allows us to approximate the Gini coefficient. As proposed by Alvaredo (2011), the Gini coefficient for the full distribution can be decomposed using information on the top share,

$$G = \frac{\beta - 1}{\beta + 1} PS + G^*(1 - P)(1 - S) + S - P \quad (1)$$

In expression (1), the Gini G for the full distribution is calculated assuming that the shape at the top (above percentile P) takes the Pareto form and follows the β coefficient. The main omitted variables in our case are the share (S) of the top percentile groups (P) in total income, and the Gini (G^*) for the population falling below this percentile.

To approximate a set of possible estimates, we focus on percentile 95 of the household definition of income. Then, drawing on the methodology used in the top incomes literature, we take Madrid's GDP as the denominator and compute the income share of

the top 5 percent, allowing the income denominator to range between 50 and 65 percent of Madrid's gross value added, which is the typical value of fiscal income to GDP in other contemporary cases. Finally, we fix 53 as our preferred estimate of Gini coefficient for the bottom 95%, which is the value derived from the distribution in the rent-to-income scenario. The final estimates are presented in Table 10 and confirm that the Gini for the income distribution could lie between 59 and 66.

Table 10. Gini estimates for household income distribution conditional on the income denominator (% of Madrid GDP) and inequality in the bottom 95. Madrid, 1902

Income denominator, share of Madrid GDP	Share top 5%	Gini Bottom 95		
		50	52,91	55
65%	30%	58,8	60,7	62,1
64%	30%	59,0	61,0	62,4
63%	31%	59,3	61,2	62,6
62%	31%	59,6	61,5	62,9
61%	32%	59,9	61,7	63,1
60%	32%	60,1	62,0	63,4
59%	33%	60,4	62,3	63,6
58%	33%	60,8	62,6	63,9
57%	34%	61,1	62,9	64,2
56%	34%	61,4	63,2	64,5
55%	35%	61,8	63,5	64,8
54%	36%	62,1	63,9	65,2
53%	36%	62,5	64,2	65,5
52%	37%	62,9	64,6	65,9
51%	38%	63,3	65,0	66,2

Note: This table presents a range of plausible scenarios of income inequality in Madrid. The first two columns stress that the income shares of the top 5% are conditional on the selected income denominator. The remaining columns provide an estimate of the Gini index based on the presumed distribution (or Gini) within the bottom 95%.

San Feliu, 1882-1937

The second case study is San Feliu de Llobregat, a mid-sized town in the province of Barcelona that functioned as the principal economic and administrative centre of the local *partido judicial*. By the end of the nineteenth century, San Feliu had a population of over 3,000 inhabitants. This figure began to increase significantly in the 1920s with the arrival of migrants, more than doubling in size by the eve of the 1936 Civil War. The local economy was diversifying, with the development of textile and metal industries, the presence of a railway station, and a range of commercial and administrative services. The absence of a single dominant employer made the town's economic structure broadly representative of many other small and mid-sized towns in Spain.

For San Feliu, we have compiled original tax censuses from the local archives spanning fourteen years between 1882 and 1937. Using this longitudinal dataset, we evaluate the utility of personal tax certificate data in analysing the structural transformation of the local economy. Furthermore, this analysis assesses the robustness of the source material; although the legal framework of the tax remained largely consistent, its administrative effectiveness fluctuated significantly throughout the period. At each point, we will discuss the main drawbacks and the best ways to address the limitations arising from missing or incomplete data.

Figure 5. Number of Tax Certificates for All Groups and for Classes 1–10, and Coverage Relative to the Census Population.

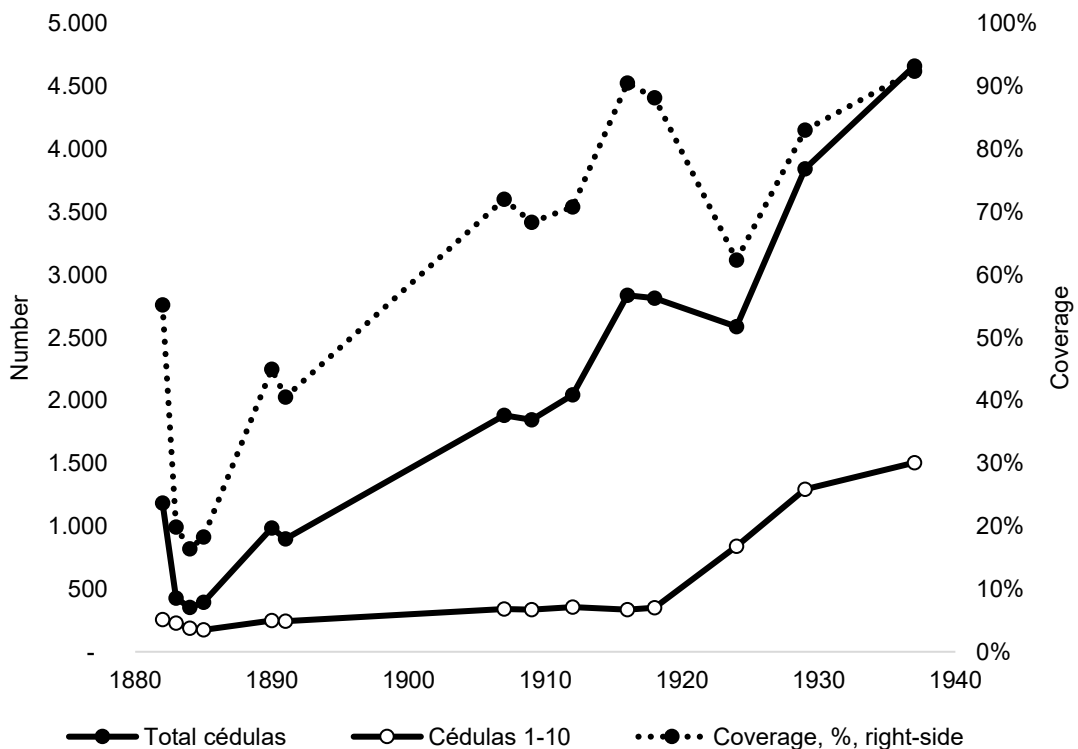


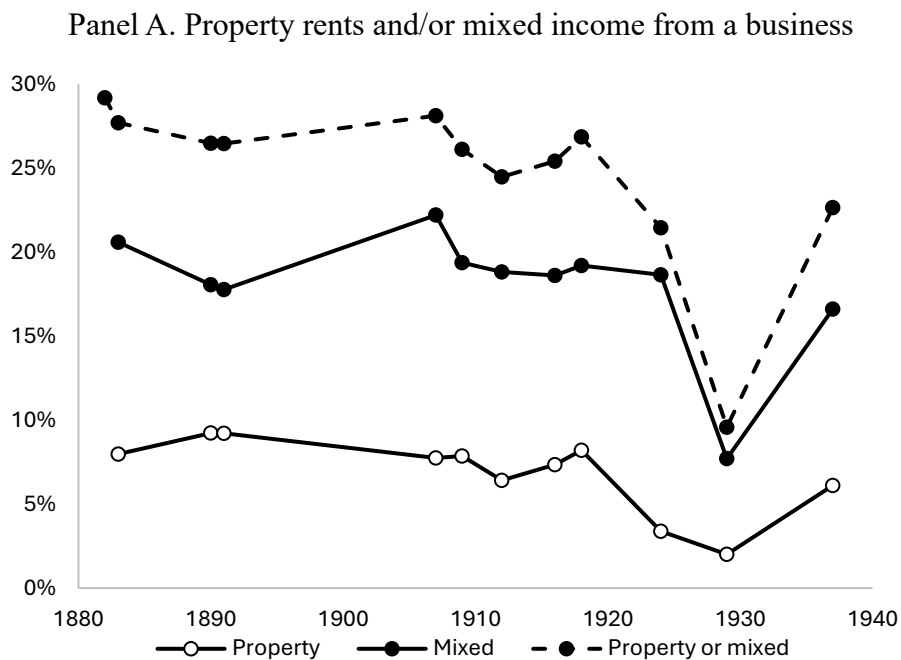
Figure 5 plots the number of tax certificates for two groups: the total number and individuals in classes 1 to 10. It also reports tax census coverage, defined as the ratio of all tax certificates to the adult population recorded in the local population census. This comparison shows that the level of registration in the personal tax certificate varied substantially over the more than fifty-year period under analysis. Although coverage

increased in the long run –from below 50 percent in the 1880s to more than 90 percent in the 1910s, 1920s and 1930s– this expansion was far from linear. Registration was markedly higher in 1882 than in any subsequent year prior to 1907. Likewise, coverage declined in the 1924 census, before recovering in later rounds.

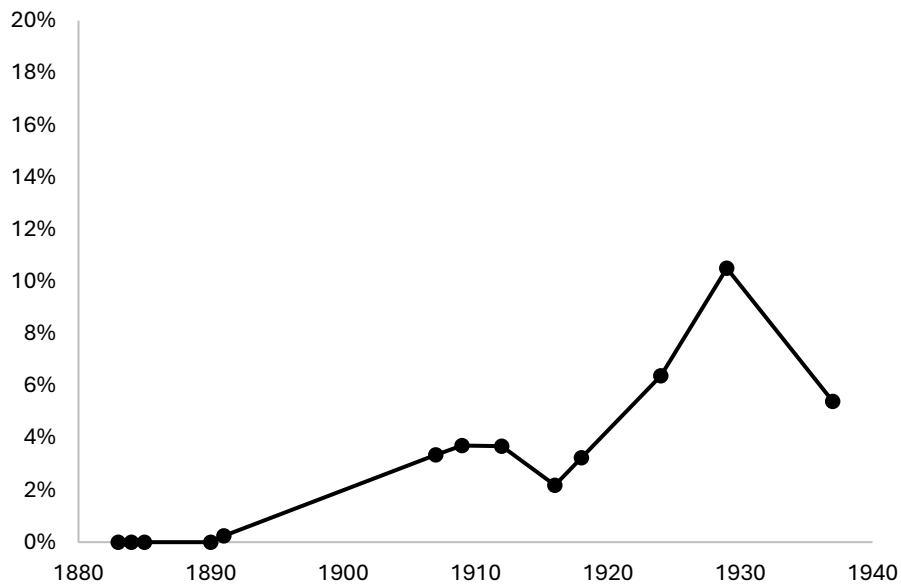
Fluctuations in coverage appear to be driven primarily by changes in the number of individuals recorded in the lowest class, whereas the number of taxpayers in classes 1 to 10 remained comparatively stable over time. This pattern reinforces the robustness of the tax records in capturing the population assessable on any of the three main indicators. It also highlights a persistent challenge: accounting for segments of the population – concentrated in the lowest class– that were more likely to be omitted from the tax registers and thus require careful adjustment. The default procedure we recommend is to impute missing adults to the lowest class using the population census as an external denominator.

The next step in our analysis focuses on the information recorded in the tax censuses: income from property rents, mixed income from business activity, salaries, or, alternatively, the payment of housing rents. Figure 6 presents this information aggregated at the household rather than the individual level and uses the number of households reported in the population census as an external denominator. This makes the data easier to interpret and avoids several of the pitfalls already discussed (housing rents were reported only by the household head; married women declaring no sources of income; etc.).

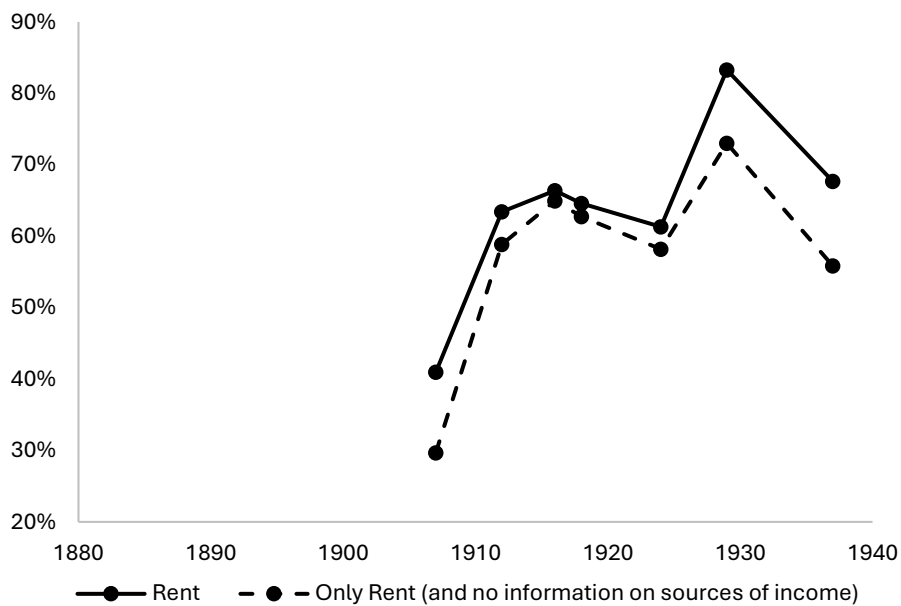
Figure 6. Share of households reporting different income sources or housing rent as an expenditure



Panel B. Annual Salaries



Panel C. Housing rent (expenditure)



In the long term, the most significant transformation was the relative decline in the share of households that owned real estate (farms or urban property) or ran their own business, while the relative size of salaried households tended to increase. It is worth noting that the data shown in panel B typically exclude the wage-earning population. From 1929 onward they do include a significant number of highly paid labourers, following a government regulation establishing that individuals in this group earning above a specified threshold were required to be assessed under the personal tax certificate. As a result, in San Feliu, labourers with annual wages exceeding 2,000 pesetas reported their labour income in that tax census⁷.

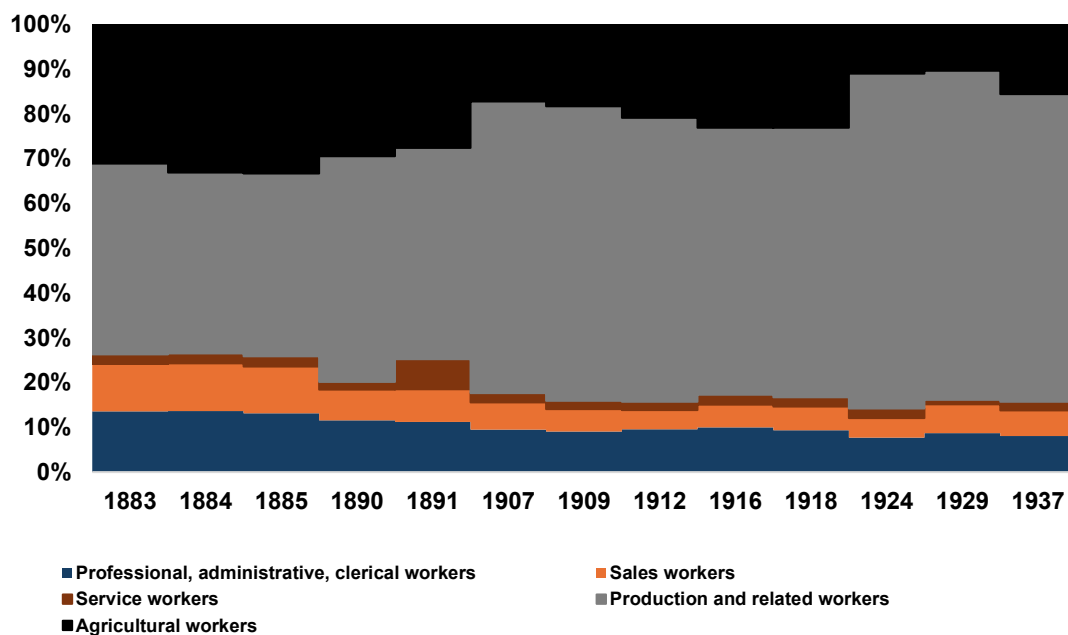
⁷ Resolución nº423, 13/04/1927

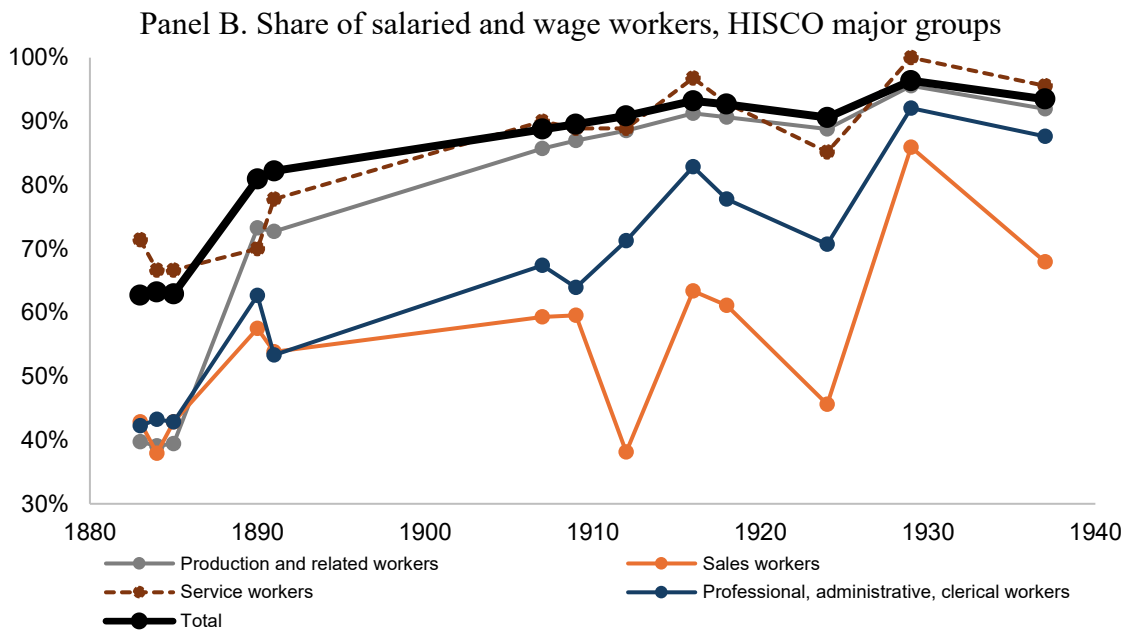
Finally, it is worth noting that rental information in a small town such as San Feliu is less useful than in a large city. There is no information on rents in the tax census prior to 1907, most likely because prevailing rental values placed most households in the lowest certificate class. Thereafter, information on rents becomes more abundant and gradually increases over time, covering around 60 percent of households. Indeed, as shown in panel C, for the large majority of renter households this is the only information available, as these individuals reported neither salaries nor direct taxes.

The approach adopted in this paper combines the occupational classification of workers, as reported in the tax census, with an imputation of employment status to distinguish between salaried and self-employed workers. Figure 7, panel A, presents the standard perspective of employment by major HISCO groups using the self-reported occupation. The structural transformation of the local economy led to a decline in the share of agricultural workers (mostly farmers) from approximately 30 percent in 1883 to 10 percent in 1929. By contrast, the main change is an increase in the share of production workers (HISCO groups 7, 8, and 9), while –perhaps more surprisingly– the most skilled occupations, typically associated with high value-added services (HISCO groups 1, 2, 3, and 4), experienced a relative decline.

Figure 7. Occupational classification and employment status of the employed population in the tax census

Panel A. Occupational classification, HISCO major groups





Note: Agricultural workers (HISCO major group 6) are excluded from this analysis.

A more relevant change emerges when this information is combined with estimates of employment status by major occupational groups. To do so, we assume that individuals reporting mixed income are self-employed, while those for whom no such information is recorded are classified as wage and salary earners. This approach has the virtue of providing a perspective on employment status that is otherwise missing from most Spanish population censuses of the period and has therefore been largely absent from historical analyses.

Results, summarized in Figure 7, panel B, show a continuous increase in the share of salaried and wage employment. The levels estimated for the early 1880s –around 60 percent– are likely biased downward due to undercounting in the tax census, particularly among labourers. The subsequent trends from 1890 onwards, however, can be considered robust. Moreover, the fact that growth in salaried employment occurs both among white-collar workers (professional, managerial, and clerical) and among manual workers suggests that, in San Feliu, the sectoral shift in the economy went hand in hand with an expansion of salaried employment. This was not simply a replacement of self-employed jobs by wage earners, but rather the emergence of a new set of salaried occupations that had previously been non-existent.

Table 11. Median annual earnings by HISCO major groups, and skill ratios

Year	Median annual earnings, in pesetas				Pay ratios	
	A Professional, administrative, clerical workers	B Sales workers	C Service workers	D Production and related workers	A/B	A/D
Salary and wage earners						
1912	1.000	NA	NA	NA		
1918	1.100	NA	NA	NA		
1924	2.000	725	725	750	2,76	2,67
1929	3.000	2.050	800	2.500	1,46	1,20
1937	4.000	2.000	2.230	3.000	2,00	1,33
Self-employed						
1912	685	420	456	288	1,63	2,38
1918	840	480	470	288	1,75	2,92
1924	2.025	1.404	468	617	1,44	3,28
1929	2.227	1.888	NA	600	1,18	3,71
1937	1.440	1.941	1.140	720	0,74	2,00

The final step of this analysis involves computing earnings by major occupational group and employment status. The usual caveats discussed earlier apply here as well. Information is sparser for wage earners—especially prior to 1924—while it is more abundant for the self-employed. In addition, the relatively small size of San Feliu implies that the number of observations by occupational group and year is often limited and potentially subject to bias. For these reasons, we rely on median rather than mean earnings and refrain from reporting estimates when the number of observations for a given year is too small.

Subject to these precautions, the results are presented in Table 11. Three main conclusions emerge from this comparison. First, earnings in white-collar occupations and among sales workers are broadly similar when comparing salaried and self-employed individuals. This finding is important, as it reinforces the potential value of our estimates of mixed income, especially for occupational groups that are typically understudied. With a larger sample it would be possible to trace long-term trends using self-employed workers alone, thereby studying earnings in periods for which information on wages is unavailable.

Second, comparisons between salaried and self-employed workers are less robust when contrasting service occupations with production-related ones. This reflects, in part, differences in skill composition across employment statuses (for example, public security services are salaried, whereas barbers are mostly self-employed), as well as the complete absence of wage data for labourers prior to 1924. Nevertheless, the long-term trends in mixed incomes for the self-employed for production workers are broadly consistent with those reported in the most widely cited sources on industrial and construction workers for this period.

At this stage, we refrain from placing too much weight on the skill ratios reported in the last columns of Table 11. The evidence suggests that the premium earned by white-collar occupations was relatively stable when focusing exclusively on mixed incomes but may have declined when salary and wage earners are included. This difference is non-trivial,

as it could reflect either measurement issues in earnings or, alternatively, a relative improvement in the conditions of the wage-earning population.

Conclusions

This paper has examined the potential of the Spanish *cédulas* as a source for measuring income inequality during the late nineteenth and early twentieth centuries. More broadly, it has proposed a methodological framework for using the classification system of a graduated tax that relies on economic indicators –such as salaries, direct tax payments, and housing rents– to approximate the distribution of income in a period for which conventional sources remain scarce. We show that estimates can be produced either by combining tabulated statistics or by using microdata, and that both approaches yield relatively consistent results. The *cédula* tax therefore provides a useful proxy for the distribution of income, while also offering opportunities for more detailed analysis at the local level.

The results derived from the tax statistics suggest levels and trends in inequality that are broadly consistent with those obtained through alternative methodologies. The distribution implied by the *cédula* tax aligns reasonably well with previous estimates of income concentration in Spain based on wage distributions, land inequality, or the distribution of factor incomes. At the same time, the analysis at the municipal level reveals higher levels of inequality in southern regions, especially when conditioned on the level of economic development.

The two case studies based on tax microdata further illustrate the analytical possibilities offered by this source. The Madrid census demonstrates that the personal tax certificate can be used to explore the structure and composition of incomes at the upper end of the distribution, in a way comparable to the approach adopted in the top incomes literature. The dataset for San Feliu de Llobregat (Barcelona) shows how the same source can be used to analyse structural transformation at the local level, tracing changes in employment structure, the expansion of salaried work, and the evolution of skill premia over time.

The perspective presented here should be read as a first step in a new research agenda that aims to revisit classical questions about inequality through the lens of this graduated poll tax. At present, several directions for future research can be identified. First, the evidence highlights the importance of expanding the collection of tax microdata across a wider range of municipalities. A broader dataset would make it possible to examine labour earnings in greater detail, including the evolution of skill premia and occupational careers over time while leveraging regional differences. Such evidence would significantly enrich our understanding of wage formation and labour market stratification in Spain before the advent of collective bargaining in the 1930s.

Second, additional work is required to refine the assumptions used to convert direct tax payments into estimates of mixed and property incomes. Although the conversion factors employed in this paper rely on contemporary fiscal assessments, they remain approximations and may vary across sectors and regions. Improving these assumptions would enhance the reliability of the income distributions reconstructed from the tax data. This could be done by using business or private accounting sources, some of which have already been explored by agrarian historians.

Finally, future research could expand the use of information on housing rents recorded in the tax census. As demonstrated in the case of Madrid, rent data provide a valuable proxy for household income in urban settings where homeownership was limited. Extending this analysis to other cities and regions would help improve our understanding of housing markets and living standards, while also offering new ways to connect tax records with the growing literature on household budgets and consumption.

Taken together, these research avenues suggest that the personal tax certificate constitutes a promising foundation for a broader research agenda on historical living standards in Spain.

Data Availability Statement

The microdata and replication files used in this paper have been deposited at ICPSR and are publicly available. The deposit includes the three datasets described in the paper, the corresponding Stata do-files, and a full codebook.

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For administrative purposes, the Ministry of Finance summarized the results in statistical reports on the number of individuals per class. For Spain as a whole, we have identified reports for the years 1889, 1904, 1906–1907, and 1926 (Dirección General del Tesoro Público y Ordenación General de Pagos del Estado 1910; Comité Central de Fondos Provinciales 1928; Comisión Extraparlamentaria para la Transformación del Impuesto de Consumos 1910; Intervención General de la Administración del Estado 1891, 1976).

Between 1908 and 1925, the national statistics published with the same title by the Ministry of Finance de facto exclude a significant number of adults. The reason is related to the 1908 tax reform, which granted the right to administer this tax to large municipalities (provincial capitals and municipalities with more than 30,000 inhabitants). As a result, the national statistics only cover approximately 80 percent of the Spanish population, namely those living in smaller municipalities, together with the full population of the Basque Country and Navarre. In 1925 the tax underwent a broad reform of its schedule, and its administration was transferred to the provincial governments (*diputaciones provinciales*). Consequently, the statistical report for the following year includes the full population, with the exception of the Basque Country, Navarre, and the Canary Islands. From that date until the repeal of the *cédula* tax in 1943, we have not located further statistical summaries.

In addition to these summaries, we have been able to locate handwritten tabulations of the distribution of *cédulas* by municipality for the year 1919 in the National Archives¹. This report is not complete, as most capital cities are missing, and information for some provinces is also absent.

Local authorities responsible for administering the tax occasionally published their own statistical summaries. This is the case for the cities of Madrid and Barcelona in several years between 1910 and 1925 (Ayuntamiento de Barcelona 1912; Ayuntamiento de Madrid 1914; Diputación de Madrid 1942).

Altogether, these reports constitute the main input for our macro-level estimates. We typically start with the published tables and carry out two minor amendments. First, we standardize the information to approximate the distribution in terms of the tax census. As explained in the paper, the tax administration could either count the individuals registered in the tax census or, alternatively, only those who paid the *cédula*. Since the number of taxpayers is lower than the number of adults recorded in the tax census due to non-compliance and evasion, we re-estimate the number of observations whenever tax census information is missing. These two data inputs (tax census and taxpayers) appear systematically in the records for 1908–1925 and in the extraordinary report for 1926, but are missing for earlier years. To carry out this estimation process, we rely on the observed ratios for 1908 and, additionally, on the number of *cédulas* distributed by province reported in another source.² This rescaling of observations typically affects the lower part of the distribution (i.e. mostly classes 10 and 11) more than the upper part, given higher tax compliance among more affluent individuals. Consequently, if this adjustment were not made, inequality estimates would be biased upward.

¹ AHN, FC-Hacienda, Caja 10727/2

² Libros de intervención de la Fábrica de la Moneda y Timbre. AHN, FC-Hacienda, Libros 166-167

The second step involves a minor reclassification of the tax data. From 1906 onwards, the spouses of taxpayers classified in the top four classes were granted a special *cédula* irrespective of their income. Since this amounted to a surcharge on married couples, we reclassify these individuals into the lowest class, following the assumption that income (salaries, rents, and direct taxes) accrued to the household head. Additionally, any difference between the number of adults recorded in the population census and the number observed in the tax records is allocated to the lowest class.

Finally, it is worth noting that the imputation of the *cédula* tax (and thereby of our income proxy) is carried out by keeping the tax scale constant for the period 1883–1925. This means that we disregard any surcharges applied by the central government or by local authorities. In this way, observations are consistently weighted using the same factors across time and space.

Microdata

The building of a microdata set has been done by gathering a sample from the Madrid tax census for the year 1902 for the 10 districts of the city. The original records are preserved in the national archives³. These 10000 observations according to the *cédula* class and using a tabulation on the aggregate distribution for Madrid city in 1904 (Comisión Extraparlamentaria para la Transformación del Impuesto de Consumos 1910).

For San Feliu de Llobregat, we have exploited similar records in the local archives. We have transcribed all data records for the different cross-sections and therefore there is no need to apply weights.

The details on both micro datasets are explained in the codebook available at ICPSR.

³ AHN, Fondo Exento de la Delegación de Hacienda de Madrid, Libro 4274, 4240, 4695, 4365, 4830, 4613, 4450, 4150, 4550, 4755

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Appendix to Measuring Income Inequality Using a Graduated Poll Tax: Spain, 1874–1943

This appendix presents the main data sources related to the Spanish *cédulas* tax. It provides references for the statistical summaries and offers several insights into the institutional framework necessary for a correct interpretation of the results. In a second section, it lists the references used to build the micro datasets.

Statistical Summaries

The *impuesto de cédulas personales* was a graduated poll tax that classified the adult population into different classes. The *cédula* was the legal document issued under this tax. Figure 1, panels A and B, present two examples of *cédulas* from this period.

Figure 1. Examples of Cédulas personales

Panel A, Cédula of Francisco Palafox, year 1883



Panel B. Cédula of Manuel Azaña, year 1932



Source: AHN//DIVERSOS-COLECCIONES,21,N.1958 and AHN//DIVERSOS-TITULOS_FAMILIAS,3342,N.4