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Working Papers in Economic History

2023-01

ISSN: 2341-2542

Serie disponible en

<http://hdl.handle.net/10016/19600>

Web:

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Losing height: measuring the regional loss of human capital from the Republican exile to Mexico.¹

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Abstract

Recent studies showed that Spanish republican exiles who travelled to Mexico to escape the effects and aftermath of the Spanish civil war were positively selected. However, the potential existence of regional differences in this positive selection needs to be addressed appropriately. Using a new dataset directly extracted from primary sources, we compare the heights of the republican exiles in Mexico with the estimations of those who stayed behind in their provinces of origin. We also study the existence of potential determinants to explain these differences. In addition to estimating how intense the loss of human capital was at the regional level, we also compare the heights of the republican exiles in Mexico with the heights of the Mexican population. Our results show significant regional differences in the positive selection of republican exiles. This was probably the consequence of the opportunities the local populations had to escape after the war started. We also show that Mexico was a place where Spanish migrants were able to obtain better occupations than their counterparts in Spain, meaning that although Mexico benefited from the arrival of a highly skilled labour force, it also provided republican exiles new opportunities.

Keywords: Heights, Exile, Gender, War.

JEL classification: D6, J24, N0, N33, O15.

¹ We thank the comments received by the participants at the CEI Seminar/ Economic Development Workshop of the IER at Hitotsubashi University and the Instituto Universitario de Investigación Ortega y Gasset in Mexico City. Support from the project “Recuperación de la Memoria Democrática de los represaliados políticos. La pérdida de capital humano derivada del exilio republicano en México” funded by Ministerio de la Presidencia of Spain is acknowledged.

Introduction

The Spanish Civil war (1936-39) is considered a preface to the events that would lead to the beginning of the Second World War. As in the case of WW2, the Spanish Civil war implied the forced movement of the civilian population who fled their places of origin, exiling to other parts of Spain or crossing the frontiers to countries like France and the Americas. Second, only to France, Mexico became one of the largest recipients of republican exiles thanks to the open arms policy developed by its president Cárdenas, who agreed to accept Spanish republican exiles with no limits. Recent research has supported the idea that the republican exile to Mexico was positively selected, being even more skilled than the traditional economic migration to the north American country that was already highly skilled (Sánchez-Alonso and Santiago-Caballero, 2022). However, it is unclear if this positive selection of the republican exile was homogeneous all over the country or if there were any significant regional differences. Understanding potential regional variations would help to understand the selection dynamics in forced migrations and the variables involved in the process. This would be particularly important in the loss of human capital, a well-known phenomenon in the literature of armed conflicts that can have severe long-term effects in those regions affected. The Spanish Civil War provides an extraordinary case study whose analysis is possible thanks to the existence of detailed microeconomic data on the republican exiles to Mexico, from where we can address these critical issues.

The use of heights as a proxy of welfare and human capital has been a common approach in the literature, working under the assumption that the changes in statures reflect changes in living conditions, including aspects that other proxies like income cannot capture.² Several studies have supported the usefulness of heights as a proxy for nutrition levels, environmental conditions, education and even cognitive abilities during adulthood.³ It was in the 1980s when estimations of human heights began to be used systematically by economic historians to measure living standards.⁴ The literature on human heights increased during the last three

² Steckel (2008) and Komlos and Baten (1998)

³ For nutrition see Bodzsar and Susanne (1998), for environmental conditions Steckel (1995), for education Quiroga (2003) and Martínez-Carrión and Puche-Gil (2009), Camara et al. (2019), Huang et al. (2015), Silventoinen et al. (2001), Heineck (2006) or Meyer and Selmer (1999). See also Deaton and Arora (2009), Case and Paxson (2008). There are also studies linking income levels with heights like Maria-Dolores and Martínez-Carrión (2011) or Bozzoli, Deaton and Quintana-Domeque (2009)

⁴ For example Sandberg and Steckel (1980), Steckel (1983) and Komlos (1989)

decades following the examples set by the first wave of publications in the eighties.⁵ Therefore, we count on numerous studies covering various geographical locations and temporal frames.⁶ The sources used in the literature are equally broad, from the analysis of skeletons or heights of slaves to penitentiary documentation or military records.⁷ Spain was not an exception in the development of the field and also experienced a considerable number of investigations at regional and national levels, mainly from the late 19th to the mid-20th century.⁸ However, most primary sources with information concerning heights in the past are based on the study of males. Military recruitment records are one of the most popular sources, but they can only offer information about half of the population. Although some studies include female heights using, for example, the records from prisons, they are still a minority.⁹

In our case, we will use the information contained in the Registro Nacional de Extranjeros (National Registry of Foreigners, Registry from now on) from Mexico, which includes records of tens of thousands of Spanish migrants who entered Mexico. The Registry included information on many variables identifying each individual, including their heights, that we will use as a proxy of human capital and compare with the estimated heights of the average Spaniards and the Mexican population. We will also address the potential drivers of the loss of human capital in Spain and the potential benefits obtained by Mexico. Finally, the paper will take advantage of the detailed information on women to estimate their role in the loss of human capital due to the republican exile to Mexico.

The first part of the paper will briefly introduce the relevance of Mexico as a recipient of the broader republican exile. We will later present the primary source used in the paper, the National Registry of Foreigners and describe the sample of observations, its main characteristics and the methodology to estimate the heights of the exiles. The following section will provide the estimates of the gap between male emigrants and the male population

⁵ Fogel (1995) presents a good summary of the first studies. For a more recent state of the question see Komlos (2009) and Steckel (2009)

⁶ Some examples are for England Floud, Wachter and Gregory (1990), Nicholas and Steckel (1991) or Hatton and Martin (2010) for Italy Federido (2010) and A'Hearn (2003). Floud (1994) and Hatton (2010) present series for Europe. See also Komlos (1995) for a wide range of studies. As examples of very long term studies see Bogin and Keep (1999) and Koepke and Baten (2005).

⁷ Steckel and Rose (2002), Steckel (1979), Martínez-Carrión and Puche-Gil (2010)

⁸ Martínez-Carrión (1986) was one of the first studies in Spain, followed by other studies of the author like Martínez-Carrión (1991, 1994) Martínez-Carrión and Puche-Gil (2011), Quiroga (1998, 2001, 2002, 2003), Gomez Mendoza and Perez Moreda (1995), Camara (2009), Garcia-Montero (2009) and Ramon-Muñoz (2009)

⁹ Baten and Murray (2000), Harris (2009), Guntupalli and Baten (2009) and with more recent data Spijker, Perez and Camara (2008) and Santiago-Caballero (2021)

in Spain at the regional level to analyse if there were significant regional differences in how positively selected the republican exiles in Mexico were, also exploring the potential channels that could explain these differences. The next section of the paper compares the heights of the republican exiles in Mexico with those of the Mexican population and studies the contribution of the Spanish exiles to the Mexican labour force. The last section addresses the relevance of women in this process of brain drainage, estimating the share that female human capital represented in the republican exile in Mexico and comparing it with the available estimations of similar female human capital proxies in Latin America.

Our results conclude that there were significant regional differences in how positively selected the republican exiles in Mexico were and that a critical factor in explaining these differences was the cost the population faced to leave their provinces of origin. We also find that the republican exiles presented higher human capital levels than the average Mexican population and positively contributed to Mexican society. The Mexican economy provided good opportunities for Spanish migrants who could find better occupations than workers with a similar profile in Spain, offering new labour opportunities for the exiles forced to leave. Finally, our paper shows that when correctly for, the share women represented in the total loss of human capital of the republican exile in México was significant.

This paper makes several significant contributions to the existing literature. The first one is using anthropometric measures to estimate the human capital of the republican exiles instead of the classic occupational profile. Using heights is relevant as it makes it possible to account for female human capital that has usually been neglected in similar studies. An exception is Blum and Rei (2018), where the authors assess the selectivity of European Jewish migrants to the US during World War II using average height as a key indicator to evaluate health and human capital and find that both refugee and nonrefugee passengers were positively selected.

As our study shows, using alternative proxies like occupations underestimates women's human capital in similarly forced migrations. We also prove that the loss of human capital consequence of the republican exile to Mexico was regionally asymmetrical and that a reason was local populations' ability and easiness to escape their regions of origin. This finding is significant as it shows the relevance of socio-economic inequality on individuals' power to escape the effects of military conflict and the subsequent repression. Finally, our comparison

with the Mexican population shows that republican exiles positively contributed to Mexico. At the same time, the Mexican economy provided new labour opportunities for them.

Mexico in the republican exile

To what extent Mexico is a good proxy for all the Spanish exiles is a critical question. Mexico represented around 15 per cent of all the exiles that left the country during the war (Pla Brugat, 2001). Most of these exiles moved to France during the first stages of the war, many crossing the Pyrenees from neighbouring Catalonia, Aragon, Navarra and the Basque Country or other distant areas like Valencia. One of the first ideas of this paper was the inclusion of this emigration in our calculations of regional losses of human capital. However, some important obstacles make this inclusion difficult. First, although hundreds of thousands of Spaniards crossed the frontier towards France, it is also true that many of them returned to Spain. One of the reasons was the terrible living conditions that the exiles experienced in France. From the recording of the personal experiences of many exiles, different authors have pointed out that the welcome the republicans received in France was far from hospitable. The exiles were placed in refugee camps that did not comply with basic living standards. The poor sanitary conditions and the hard winter of 1939 produced numerous casualties, while the Spanish doctors and nurses that were part of the exile were not allowed by the French authorities to give any medical care to their countrymen during the first days (Mancebo, 2008:96).

Rubio (1977) estimated that believes that in February 1939, the number of republican exiles in France reached 475,000, although the increasing number of returns later reduced the number in December to 140,000. Apart from their numbers, we count on some estimations of the human capital of the exiles in France. Pla Brugat calculates that around half of the republicans living in France in 1939 belonged to the secondary sector, one-third to the primary and finally, around 18 per cent to services (Pla Brugat, 2000:169). However, this estimation that could work as a crude proxy of human capital changed during the following years since many of these exiles returned to Spain. The problem of identifying the profile of those who returned to Spain makes difficult the direct incorporation of the French exiles into the estimation of human capital.

For geographical proximity, France was the best candidate and, therefore, the first receiver of exiles, although it was not the only destination point for the republican diaspora. During the

civil war, the Mexican government acted like one of the most faithful allies of the republican government, with actions like the supply of armament or the reception of children from the republican side (Llorens, 1976:125). After the end of the civil war, the government of Cardenas encouraged the arrival of exiles from Europe. The Mexican president accepted an unlimited arrival of republicans if they could pay for their passage to the Americas. Following the orders of Cardenas, the Mexican authorities facilitated the arrival of the republican exiles. Soon, Mexico became the world's second-largest receiver of republican exiles, second only to France.

Was the Mexican exile representative of the rest of the Spanish population? The traditional iconography presents a Mexican exile that is not a good mirror of Spanish society. According to this interpretation of the Mexican exile, they were mainly intellectuals, lawyers, and university professors and, therefore, only representative of the most cultivated social spectrum. There is no discussion about the importance of some figures that left the country, like scientists, artists, or politicians. To name one of them, Blas Cabrera Felipe was considered one of the leading physicists of his time, sharing experiences with figures like Einstein, Bohr and Curie and being invited to the Solvay Conference, a meeting of the best scientists of the world. However, the data analysis has discredited this view arguing that the exile in Mexico was indeed a good reflection of the Spanish population. Our data support the results of Pla Brugat (2001) who claims that together with the top social elite, there was also a substantial movement of lower classes. We can therefore conclude that the Mexican exile was more representative of Spanish society than we used to believe.

Source and methodology

Source

The National Registry of Foreigners in Mexico (Registro Nacional de Extranjeros, Registry from now on) was established in Mexico by the national government in 1926. The Registry was controlled by the General Direction of Migratory services and had as its primary purpose the registration of all the foreigners living in Mexico at the time. For that reason, the Mexican authorities started a survey interviewing all the foreigners who entered Mexico before 1926 and were still living in the country. The process was slow, and most records of foreigners already living in Mexico were created in the 1930s. The records of all the immigrants that

entered Mexico after the establishment of the registry were usually issued as they crossed the frontier. The Registry continued working and recording all the incoming immigrants until 1948. Personal information from each of the foreigners was recorded on cards issued as legal proof of their status in the country. Although the design of the cards changed depending on the entry year, the information provided was relatively standard. Figure 1 shows a typical structure of the card and the data it included.

Figure 1. Immigration Card Design

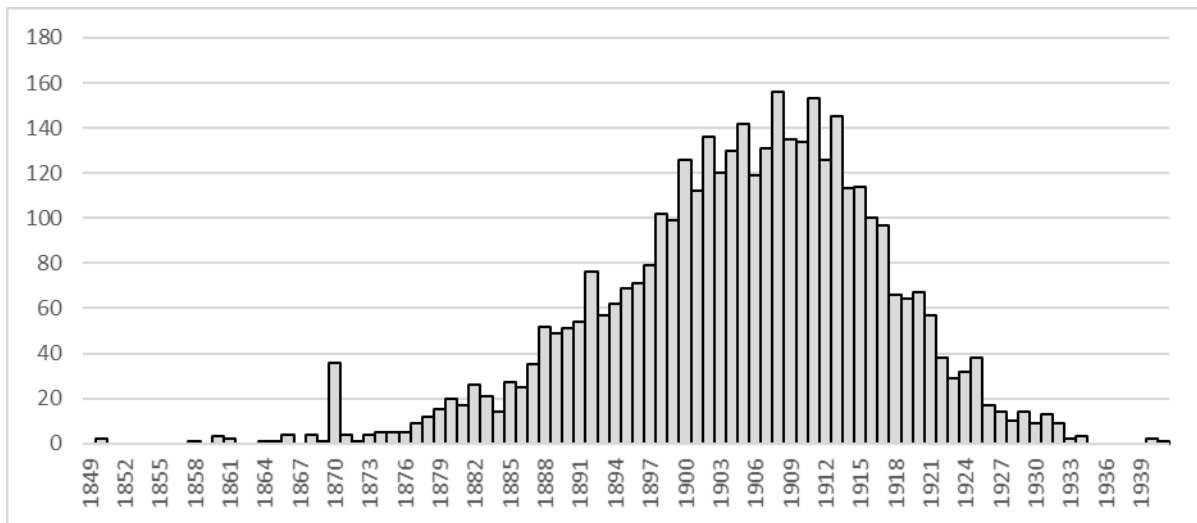
CARD DATE	HEIGHT	COMPLEXION
NAME AND SURNAME	COLOUR	HAIR
PICTURE	EYEBROWS	EYES
	NOSE	MOUTH
	MOUSTACHE	BEARD
	SIGNS	
	BIRTH YEAR	CIVIL STATE
	OCCUPATION	
	NATIVE LANGUAGE	
	OTHER LANGUAGES SPOKEN	
	BIRTH PLACE	
	NATIONALITY	
	RELIGION	RACE
	RESIDENCE	
	NAME AND ADDRESS OF CLOSEST RELATIVE	
SIGNATURE	OTHER INFORMATION	

The cards were especially rich in terms of the physical description of the immigrants. They included front and side pictures, height, as well as its physical complexion and information related to skin colour, hair, eyebrows, eyes, nose, mouth, jaw, moustache, beard, and other visible signs. The cards also had information concerning the profile of the immigrants, like the birth year (sometimes even the day and month), civil state, occupation, native language, other languages spoken, birthplace (often including the municipality), nationality, religion, race and place of last residence. The date when the card was issued is also a key variable in our analysis because this was also the date when the height of the individual was measured. The records in the registry also included more information, like the location in Mexico where they crossed the frontier and the kind of transport they used to reach it. A key element for our research included in the cards was the political status of the migrant, which was introduced to record the republican exiles who escaped the effects and repression that followed the end of the Spanish Civil War. This variable allows us to distinguish between the traditional migrants who entered Mexico for economic reasons and those who did it forced by political repression.

However, although most of the card information is consistent from year to year, we also found significant differences in the quality of the information provided by the field “occupation”. We believe that the occupation reported by those immigrants already living in Mexico when the registry was created, was the one they had in Mexico when they were recorded. When the cards were issued when the immigrant entered the country, the information was related to their careers before leaving Spain. In addition to this critical difference, there is also a qualitative disparity in the records. In the cases of the immigrants already living in Mexico, a significant share of the occupations reported were either “sellers” or “employees”. However, the information provided by the immigrants as they entered Mexico was more detailed and perfectly described the sort of job they carried out in Spain. We can conclude that either the authorities that interviewed the immigrants in Mexico when the registry was created were less diligent than their counterparts in the immigration controls or that the immigrants already living in Mexico were less generous in providing information than the Spaniards crossing the frontier. Therefore, we should consider that the apparent lack of detail of occupation by some migrants living in Mexico imposes a limitation in analysing their professions. In principle, the registry includes more than 50,000 records, although other authors have argued that the number of cards available is considerably lower (Lida and Pacheco Zamudio, 1994).

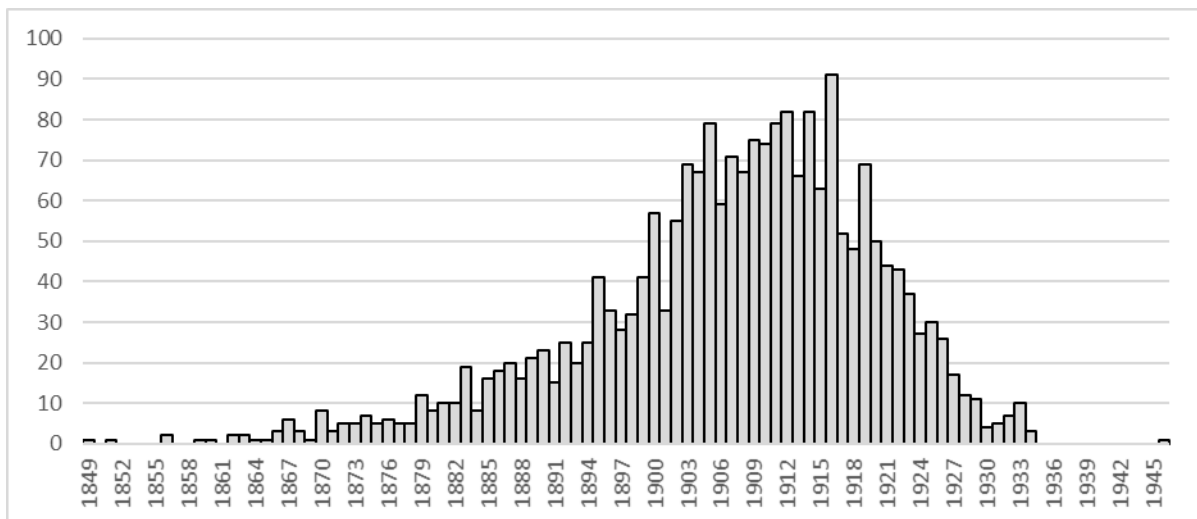
Our final sample includes the records for 27,782 individuals, including 19,943 men and 7,839 women. Within this sample, the records corresponding to the republican exiles include 6,107 individuals, with 3,910 men and 2,197 women. As explained above, the registry was established in Mexico in 1926, and the records were created for all the immigrants that entered the country after that year. Therefore, we can be sure that the Registry includes all the immigrants who entered Mexico between 1926 and 1948. However, for those who entered Mexico before, we only count on the records of those immigrants that remained in the country and did not pass away before the Mexican authorities interviewed them. Figures 2 and 3 show the density histograms of the number of observations in the sample by year of birth. The richest period in terms of availability of records is the early twentieth century, and both in the case of men and women, the histograms follow a normal distribution. However, we can also observe some anomalies like the unexpectedly high number of records in specific years, like 1870 for men or 1919 for women.

Figure 2. Histogram of men by year of birth



Source: National Registry of Foreigners.

Figure 3. Histogram distribution of women by year of birth

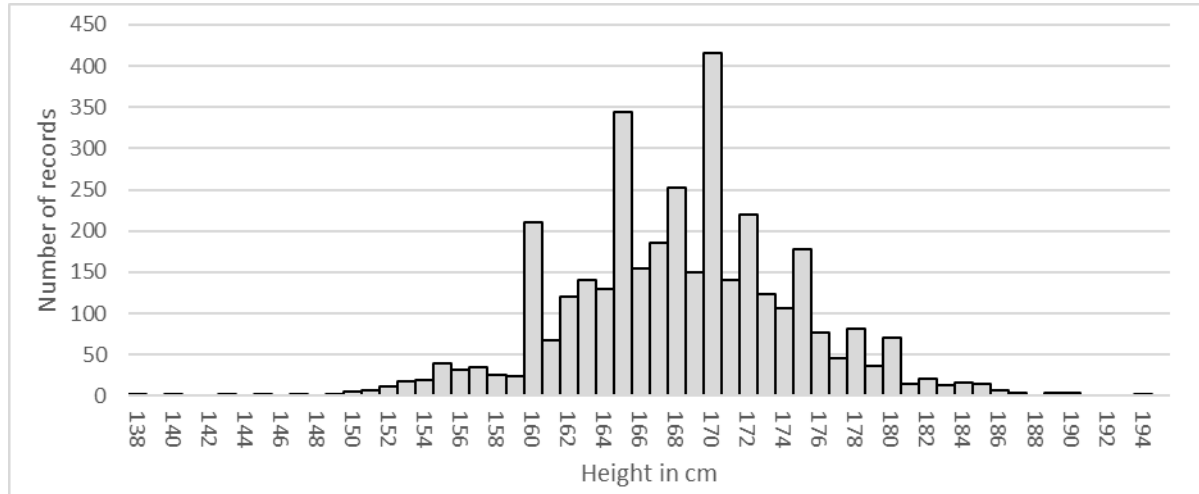


Source: National Registry of Foreigners.

A similar pattern emerges from the study of the histograms of male and female heights presented in Figures 4 and 5 with a normal shape but again with significant peaks at certain heights that coincided with what seems to be rounded-up measurements like 160, 165 or 170. This shows that the officials measuring the migrants usually rounded up heights close to those values. A similar histogram presenting ages would show a similar pattern of age heaping, which would also explain the peaks observed in the case of the years of birth presented above. Although they introduce some noise in the real measurements, the fact that the round-up is relatively small (± 2.5 cm) and that the effects are probably equally distributed around each

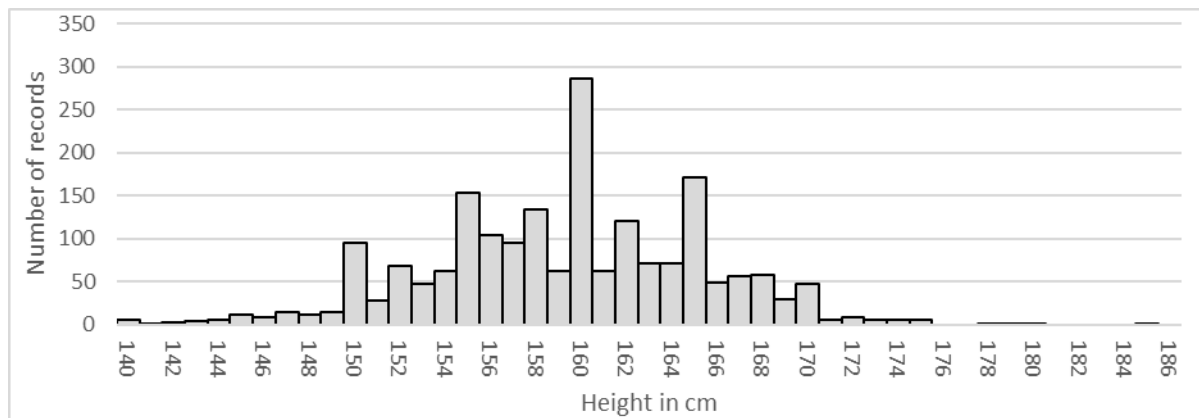
rounded-up measurement, the impact on the final estimates will be small, as in most of the cases they will cancel each other in the averages we will present.

Figure 4. Histogram of male heights



Source: National Registry of Foreigners.

Figure 5. Histogram of female heights



Source: National Registry of Foreigners.

In terms of the year when the exiles arrived in Mexico, Table 1 shows that the largest group of republican exiles arrived right after the end of the Spanish Civil War in 1939, probably after seeing that the defeat of the Republic implied that they could not return to a Spain now controlled by the fascist regime of General Francisco Franco.

Table 1. Number of records by entry year

1936	15	1944	103
1937	41	1945	82
1938	72	1946	159
1939	2,903	1947	391
1940	809	1948	30
1941	562	1949	2
1942	852	1950	14
1943	72		

Source: National Registry of Foreigners.

Figure 6 presents the 17 regions studied, while Figure 7 shows the regional origins of the exiles, revealing clear and defined geographical patterns that both men and women share. Apart from some minor gender differences in regions like Galicia, the shares of male and female exiles in Mexico were relatively similar in all the regions analysed. Catalonia and Madrid represent the highest shares within the republican exile to Mexico, with other regions like Andalusia in the south or some regions in the north.

Figure 6. Autonomous Communities

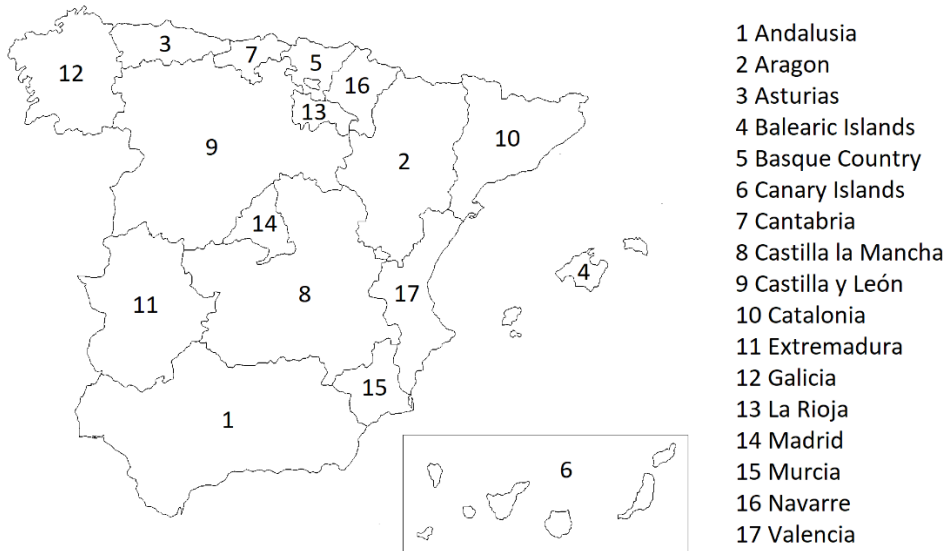
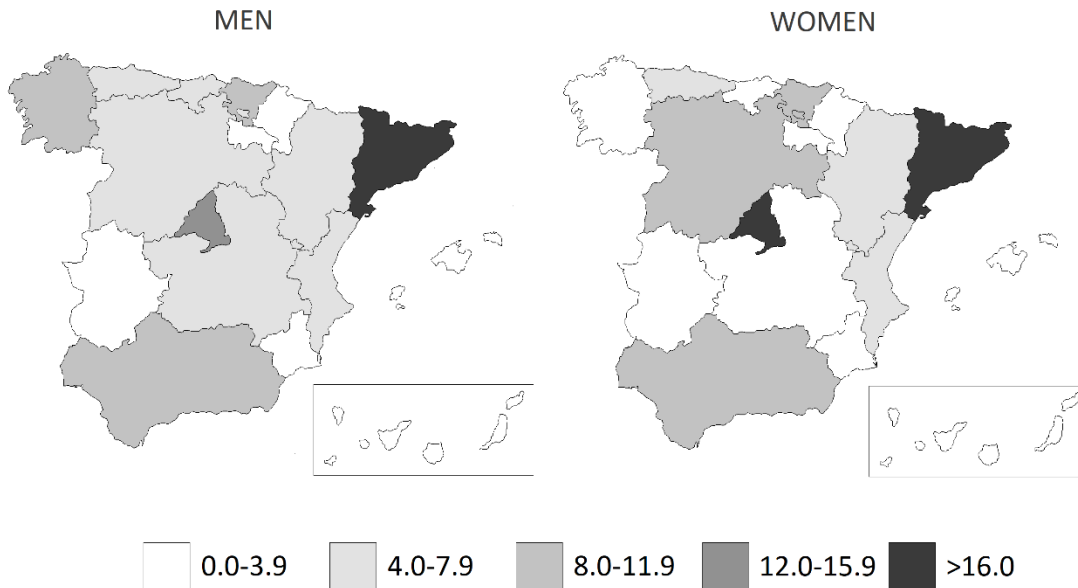


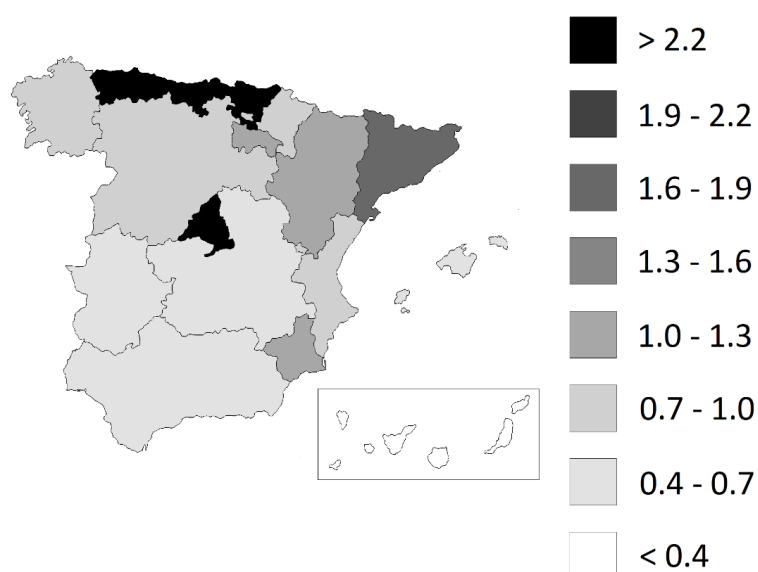
Figure 7. Regional distribution of male and female exiles



Source: National Registry of Foreigners.

However, a slightly different picture emerges when we consider each region's population share and compare it with the share of the same region in the republican exile to Mexico. Figure 8 shows the ratio between the share that each region represented in the republican exile to Mexico and their share in the population of Spain in the closest available population census (1930). If the ratio of a region is higher than one, its contribution to the republican exile was higher than its contribution to the population of Spain and vice-versa. While Catalonia remains among the regions where the relative exit of exiles was higher (1.7 times the share that its population represented in Spain by 1930), it is in Madrid and three regions in the north (Basque Country, Cantabria and Asturias) where the relative share was higher, while the regions in the south presented shares in the exile to Mexico lower than the share of their respective populations in Spain. Therefore, some of the regions of Spain, like Madrid, Catalonia or the north, are overrepresented in the sample, given their real weight in the country's total population.

Figure 8. Regional distribution of male and female exiles



Source: National Registry of Foreigners and 1930 Census (INE, 1930)

Measuring heights from historical records

To estimate the evolution of the heights of the Spanish immigrants to México, we calculated decadal averages for both men and women. The decision to estimate statures using 10-year periods is based on several grounds. The most important was creating a representative sample, a problem especially serious for the first and last decades analysed in this paper. The records are rich for 1880-1920 when we could even risk the creation of annual estimations at a national level. There are also good methodological reasons to consider instead of short periods. An individual who has suffered from malnutrition during the first years of his life could catch up during the rest of his youth, especially during puberty. Therefore, considering a larger period could help us capture in part the existence of this sort of situation. Finally, the use of decadal cohorts has also been widely used in the literature and is generally accepted as a valid method, especially, as we already explained, when the sample is not large enough to afford shorter periods.¹⁰

We carried out several calibrations in our estimations consequence of the nature of the source and the availability of records. Martínez-Carrión (2005) shows that a human's standard growing period lasts from birth to approximately 18 years. The most significant changes

¹⁰ See for instance Batten (2000) Hatton and Bray (2010)

appear during the first five years of life when girls' and boys' stature show the same pattern. The trend changes during puberty when girls grow more than boys, which is reversed during the last teenage years when boys catch up and surpass girls.

The nature of the registry implies that the Spanish immigrants were measured at different stages of their lives. Therefore, our sample contains information on individuals whose ages at the time of the measuring range from their early teens to the case of a woman who was measured at age 100. This is a problem, as, after age 50, heights tend to decrease because the discs between the vertebrae compress and because, as Martínez-Carrión (2005) showed, individuals younger than 18 still have some growth potential. Although the lion's share of our sample comprises people between 18 and 50 years, it also includes records outside this range.

We decided to keep in our sample the records of those older than 50 making the necessary adjustments in their heights so they are comparable with the rest of the sample. Fernihough and McGovern (2015) estimated that the annual reduction in height after age 50 was between 0.08 and 0.1 per cent for males and 0.12 and 0.14 per cent for females, so we used the average of these ranges to adjust heights for migrants older than 50. We decided to keep these records, adjusting their heights because they were the most important source of information for the individuals born during the first decades of the study. We also decided to exclude those immigrants whose ages were below 18 when they were measured. As in the case of older people, we could have tried to calibrate the heights of teenagers given the potential growth, adjusting by the average height of men and women in their birth cohort. However, this procedure implied several methodological assumptions that are, in our opinion, untenable. Assuming that after age 50, all the immigrants will tend to reduce their stature at the same rate is a plausible hypothesis, and the adjustment we carried out is standard and accepted in the literature. However, assuming the same growth potential for all the teenagers would also assume that all of them had the same living conditions during their childhood and teenage years and, therefore, that their growth potential when measured was also similar. As explained before, an individual with particularly low living standards during the first years of his life could be able to catch up in terms of heights during his adolescence. Therefore, the growing potential of the teenagers who entered Mexico could easily be diverse, and there is no honest way to know the particular case of each immigrant. For that reason, all individuals younger than 18 when they were measured were excluded from the sample.

The series at the regional level were created using the same sample and adjustments as in the case of the national one. We aggregated the microeconomic data by region using the current political boundaries of the seventeen modern Autonomous Communities (Comunidades Autonomas) presented in Figure 6, following Quiroga's same structure in her estimation of regional heights (Quiroga, 2001).

Results

The heights of male and female republican exiles in Mexico

Figure 9 shows the average height of the republican exiles in Mexico by the decade of birth between 1850 and 1930. Our estimates show that, on average, male exiles measured 168.5 cm and female exiles 159.6 cm. The long-term trends of republican male exiles are consistent with those obtained in other historical anthropometric studies in Spain that support the idea of a decline in average heights in Spain in the 1860s. Martinez-Carrión and Puche-Gil (2010) showed that average heights in Southeast Spain fell during the 1860s and 1870s and grew again during the 1880s.

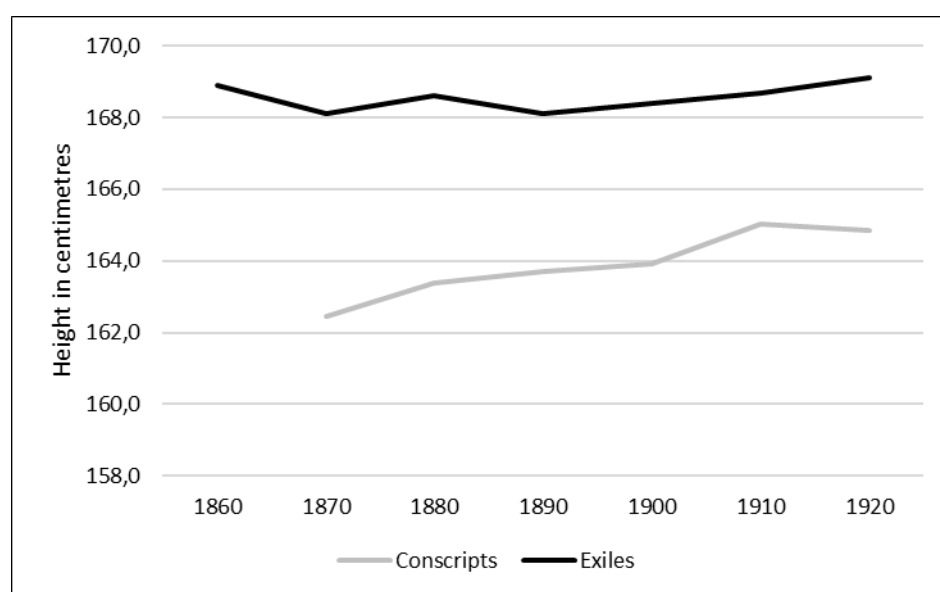
Figure 9. Average height of republican exiles in Mexico by decade of birth and gender, 1860-1920



Source: National Registry of Foreigners

We can compare the heights of the republican male exiles in Mexico with the estimations of male heights in Spain calculated by Quiroga (2001), where the author estimated the evolution of male statures in Spain by birth year between 1873 and 1934 using military records that measured conscripts in all the country. Figure 10 presents the average heights obtained from Quiroga for Spain and our series for Spanish male exiles to Mexico.

Figure 10. Average height of male exiles to Mexico and Spanish conscripts by decade of birth, 1860-1920.



Source: Average data for conscripts estimated from Quiroga (2001) and for exiles estimated from the National Registry of Foreigners.

As this paper's primary purpose is to estimate the loss of human capital consequence of the republican exile to Mexico, we will focus on the differences in levels between the Spanish and exile series. Figure 10 shows that, on average, the republican male exiles were 4.6 cm taller than the average Spanish conscript. Even considering the potential bias in the heights of the conscripts because of the underrepresentation of the higher socio-economic classes, their small number and the large gap imply that the differences between the average Spaniard and the average republican exile in Mexico were striking. This means that the republican exiles who left Spain and arrived in Mexico enjoyed higher living standards than the average population in the country. Therefore, the story of the republican exile to Mexico is genuinely one of loss of human capital, where those who left were in better conditions than those who stayed behind.

However, as we mentioned before, the sample of Spanish exiles was biased towards the provinces in the north of the country and Madrid and Catalonia. Suppose that the inhabitants of those regions were generally taller than the average Spaniard. In that case, the gap may not be a sign of a brain drainage story but of geographical differences in statures. Table 2 presents the average height estimated by Quiroga for the cohorts born in the 1910s and 1920s that compose the largest part of the records in our sample of male exiles. As we can see, the regions that contributed more to the republican exile in Mexico and highlighted in bold were clearly above the Spanish average, meaning that the higher average height of the republican exiles could be a consequence of a regional bias of the sample, and not really because those who left had higher socio-economic status and skills than those who remained in the same regions.

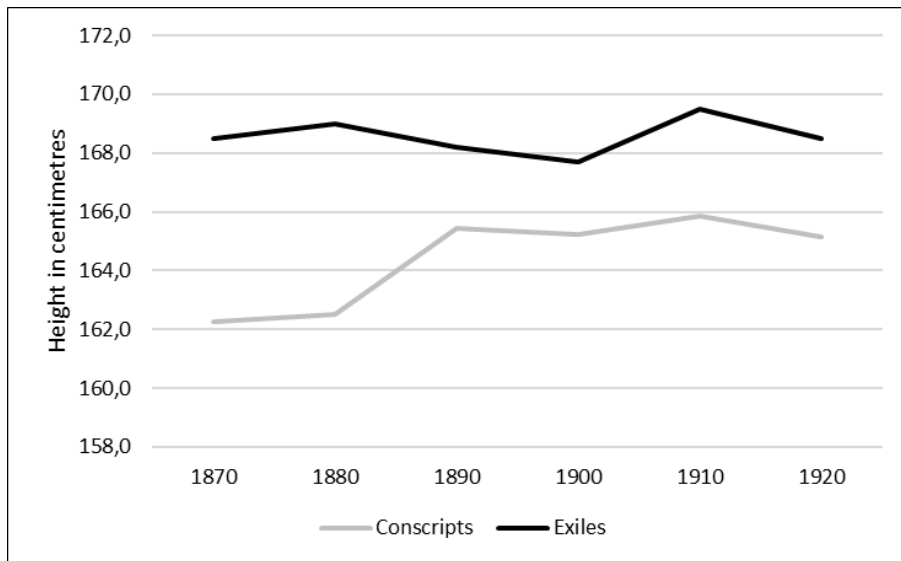
Table 2. Average height by region of conscripts born between 1910-1930

Region	Height	Region	Height
Canary Islands	168.1	Aragón	165.2
Catalonia	167.7	Spanish average	164.9
Basque Country	167.0	Murcia	164.9
Balearic Islands	166.4	Andalusia	164.3
Cantabria	166.2	Castilla la Mancha	164.0
Navarre	166.0	Extremadura	163.8
Valencia	165.5	Rioja	163.5
Madrid	165.5	Galicia	163.5
Asturias	165.3	Castilla Leon	162.9

Source: Quiroga (2001)

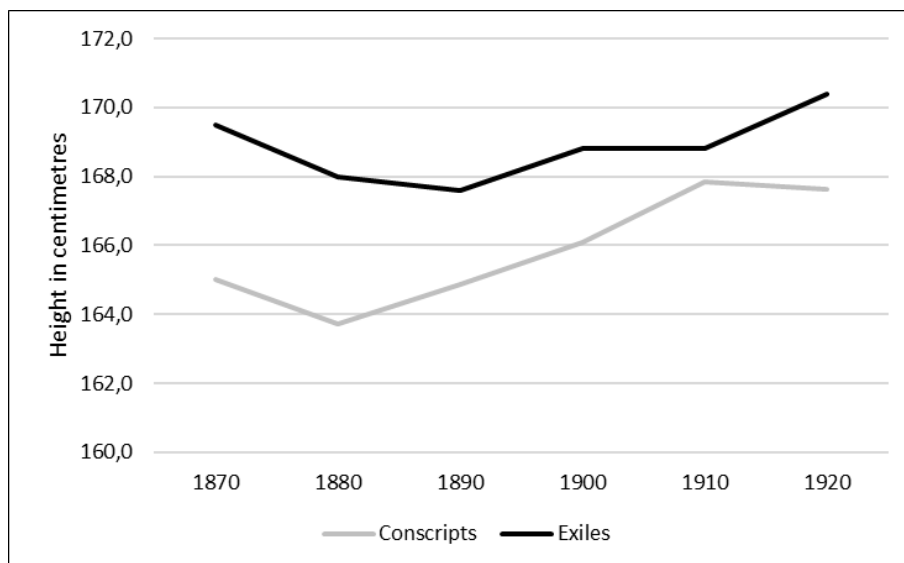
To study if this was the case, we divided our sample of male republican exiles by region and compared them with the regional estimates by Quiroga from military records. Figures 11 and 12 present the average height of the male republican exiles to Mexico compared to the conscripts measured in Madrid and Catalonia as two examples. The results for the remaining regions by decade are shown in the appendix.

Figure 11: Average height of male exiles to Mexico and Spanish conscripts from Madrid



Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 12: Average height of male exiles to Mexico and Spanish conscripts from Catalonia

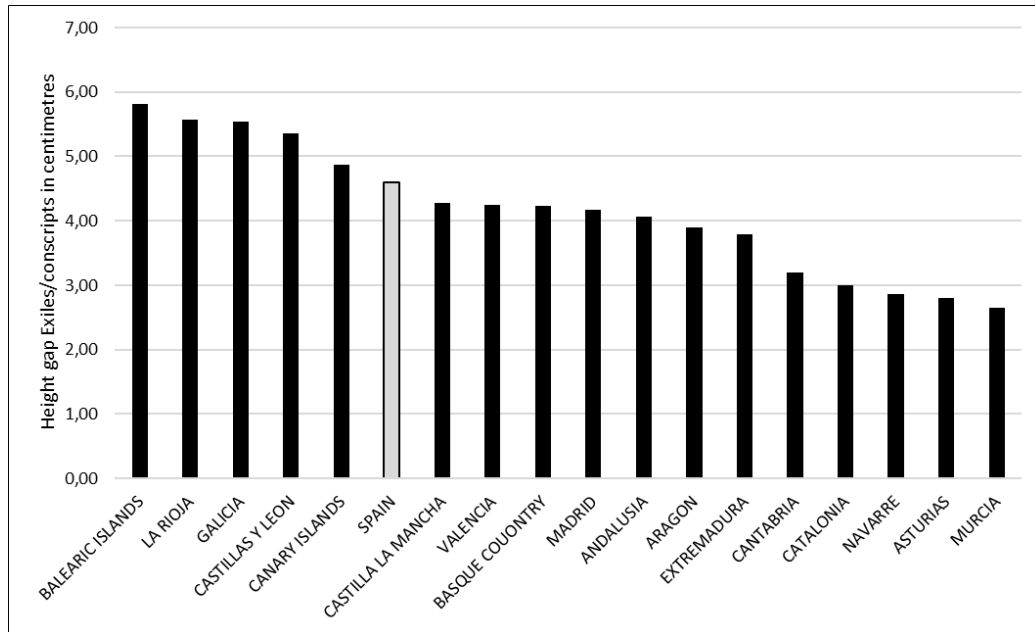


Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

The results for all the regions are summarised in Figure 13, which shows that in all the cases, the average heights of the exiles were substantially higher than those of Spaniards who decided to stay. Therefore, we can conclude that in all the regions, the male exiles who moved from Spain to Mexico enjoyed higher biological living standards than the Spaniards who remained in the country. If we assume that taller statures are associated with better socio-economic status and human capital, we should conclude that the republican exile to Mexico

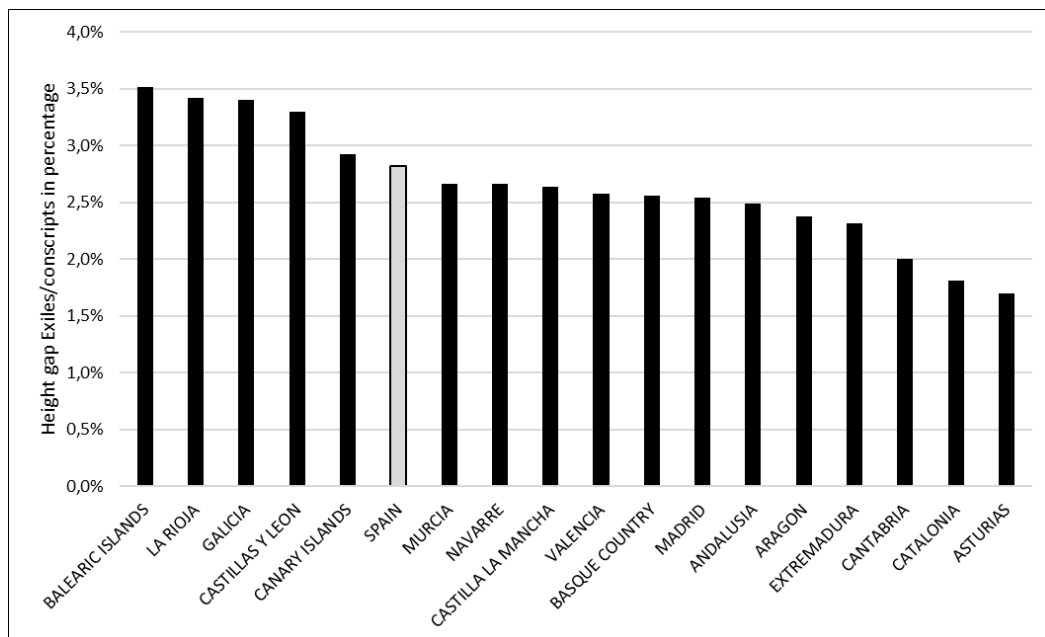
was indeed a case of brain drainage. Considering that the gap in cm could be affected by the levels, we also estimated the gap in heights as a percentage of the conscripts' heights in Figures 14 and 15.

Figure 13. Average gap in height between male republican exiles and conscripts by region in cm.



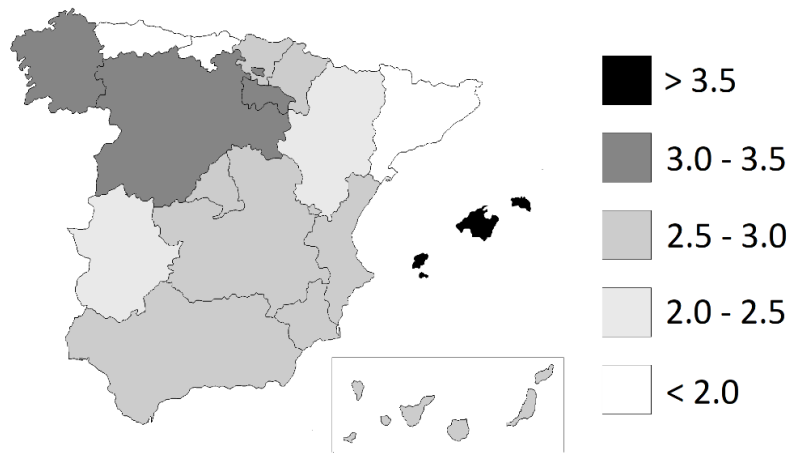
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 14. Average gap in height between male republican exiles and conscripts by region in percentage.



Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 15. Average gap in height between male republican exiles and conscripts by region in percentage.



Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

It is clear that male republican exiles were, on average taller than the average conscript in their respective regions of origin; however, we also observe a significant variation in how large this gap was. The highest gaps in male heights are found in regions like the Balearic Islands, la Rioja, Galicia or Castilla y Leon. In contrast, the lowest gaps were estimated in Asturias, Catalonia or Cantabria. Taking both distribution extremes, the regional gaps ranged between 5.8 cm in the Balearic Islands (3.5%) and 2.5 cm in Asturias (1.7%).

What explains this wide regional variation in the positive selection of male republican exiles to Mexico? In regions like Asturias, although the average male exile was clearly taller than his counterpart who remained in Spain, the sample was less biased towards the elites than in other regions like the Balearic Islands or Galicia. A higher average positive selection means that individuals from higher socio-economic status in a specific location migrated in larger shares than in other regions. Why the republican elites were able to escape better than the rest is easy to understand through their better ability to cover the costs. However, why the same elites escaped in larger shares in some specific regions does not have such a straight and simple answer.

If the cost of leaving is too high, then only those with enough resources will be able to cover it. Therefore, those who flee and become exiles in third countries will be composed mainly of

the higher socio-economic classes, explaining a higher positive selection. If that is the case, then the regional gap in heights that we estimate should be much higher than in those regions where the cost of leaving the country is lower and less affluent social classes can also escape. We estimated several variables to measure the cost of leaving their origin regions. More precisely, instead of the seventeen modern regions of Spain, we divided our sample into the fifty current provinces presented in Figure 16, which also shows the geographical location of their respective capitals.

Figure 16. provinces of Spain and their respective capitals.



Equation (1) presents the OLS model that we use, where the dependent variable is measured as the height of individual i minus the average height in his autonomous community of origin and measures how positively selected he was.¹¹ The first independent variable we estimated was the distance by land from the province's capital, where the exile was born to the closest international frontier. With this variable, we intend to estimate the transportation cost of escaping the country by land. The political refugees could also choose an alternative escape route using the closest port. For that reason, we also estimated the distance between the capital of the province of origin of the exile and the nearest port. Apart from geographical variables, we should also consider that a republican refugee may have fewer chances to escape her province of origin if the National forces fighting the republic quickly occupy it. Therefore, to

¹¹ Although we can split the exiles in our sample by province, the information regarding the heights of the conscripts that we use to estimate the selection bias is only available for the seventeen autonomous communities that we presented earlier in the paper.

account for the time that the refugees had to prepare for their escape, we also estimated the number of days that the capital of their province of origin was under the control of the republican government.

$$Height\ Gap_i = \alpha + \beta_1 Days\ Republican_i + \beta_2 Distance\ to\ frontier_i + \beta_3 Distance\ to\ port_{i4} + \varepsilon_i \quad (1)$$

Table 3 presents the results that show that the number of days that the capital of the province of origin of the exile remained under republican control was statistically significant to explain the height gap. The longer the capital remained under the control of the republican government, the lower the height gap between the exiles from that province and the average conscript. The distance to the closest international frontier using a land route is also significant¹². In this case, the further the distance between the capital of the province of origin to the nearest border, the higher the height gap. These results support the idea that the cost of escaping from their birth provinces was critical in explaining the political refugees' ability to flee. In regions where the cost was higher, the republican exile in Mexico was more biased toward the higher socio-economic classes.

Table 3. Correlates of height gap.

Dep. variable: Height gap	Model I
Days until occupation (x 100)	-0.2 ***
Km by land to frontier (x 100)	0.3***
Km to closest port (x 100)	0.0
Obs.	2,930
R2	0.01

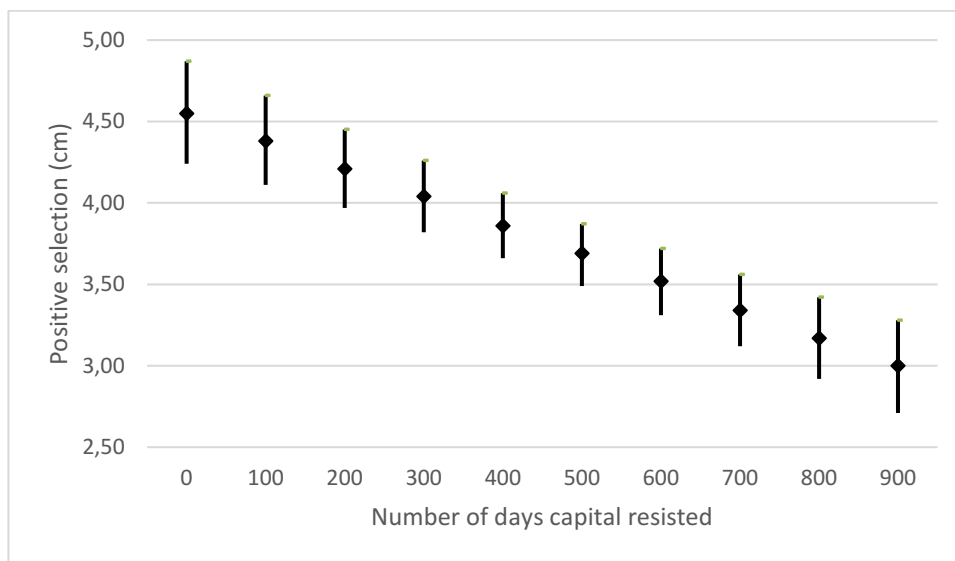
Notes: *, **, and *** denote significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors in parentheses.

Figures 17 and 18 present the marginal effects of the different thresholds in the number of days that the capital of origin of the exile was under republican control and in the distance by land to the closest international frontier in the height gap. Suppose we focus on the time the province's capital was under the control of the Republican government. In that case, we

¹² Something similar is found for internal migration in Spain. Juif and Quiroga (2019) find that if the distance travelled from the province of birth is above a threshold (100 km), it affects the positive selection of migrants more significantly.

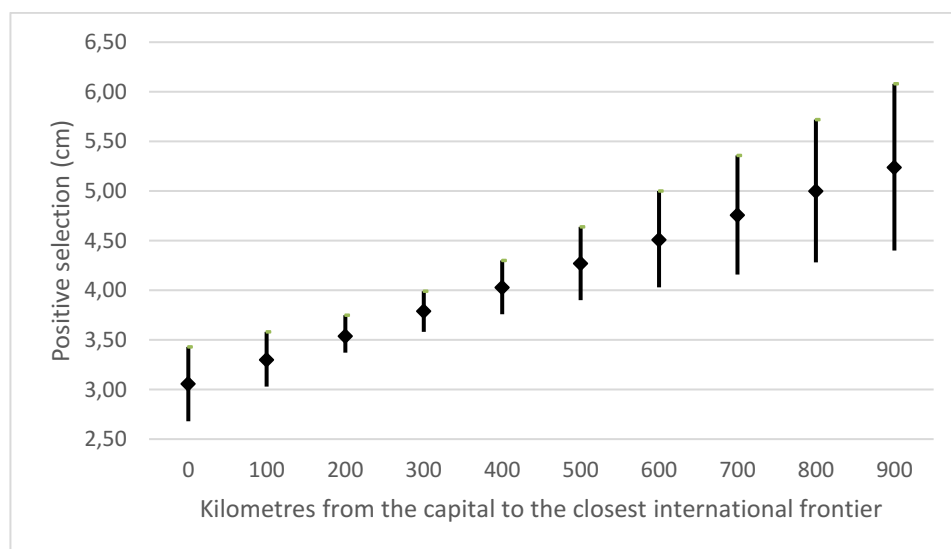
observe that the difference between being immediately occupied by the National army and resisting until the war's end is essential, with the average height gap being fifty per cent higher if the National forces controlled the capital from the beginning of the war. The role of distance by land to the closest international border was also relevant. For example, the marginal effect on the height gap would be around 50 per cent higher in the farthest capital by land to an international border compared to the closest.

Figure 17. Marginal effect of the days the capital of the province was under republican control on height gap in cm (90 per cent confidence levels)



Source: estimates using the National Registry of Foreigners and Quiroga (2001).

Figure 18: Marginal effect of the distance by land from the province's capital to the closest international frontier on height gap in cm. (90 per cent confidence levels)

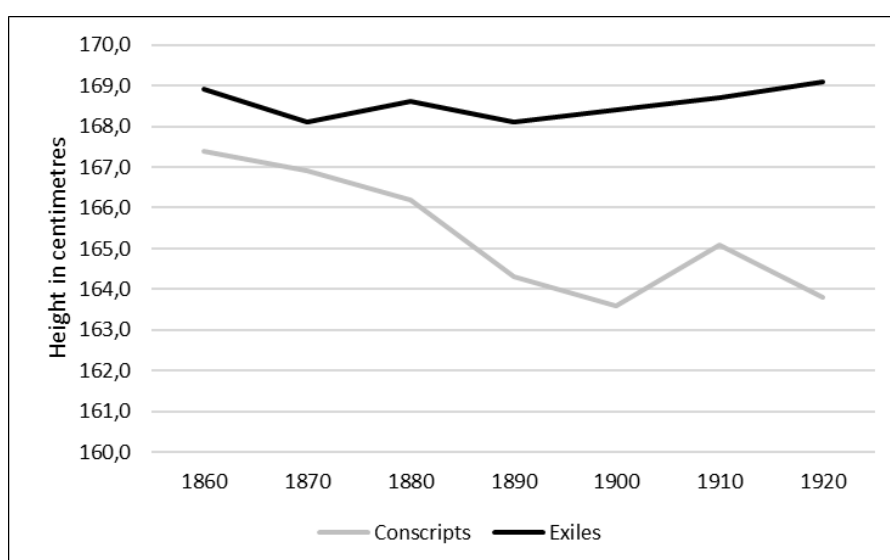


Source: estimates using the National Registry of Foreigners and Quiroga (2001).

The impact on México.

Once we have established that the republican exile to Mexico was a considerable qualitative loss of human capital for Spain, we will address to what extent it was a positive gain for Mexico. Following the same strategy that we used in the case of Spain, we can compare the heights of the republican exiles in Mexico with that of the average Mexican citizen. However, the quality of the information that exists in the case of Mexico to estimate the heights of its male population is not as good as the one that exists for Spain. López-Alonso and Vélez-Grajales (2015) calculated the heights of the Mexican conscripts born between 1850 and 1986 using military records. Their preferred estimations with ours for the male republican exiles are presented in Figure 19.

Figure 19: Average height of male exiles to Mexico and Mexican conscripts



Source: National Registry of Foreigners for exiles and López-Alonso and Vélez-Grajales (2015) for conscripts.

The average difference between both series shows that the republican exiles were 3.2 cm taller than the average Mexican conscript. This gap was 1.1 cm lower than the difference between the exiles and the Spanish conscripts. However, the difference is not consistent over time and is much higher if we focus on the decades of birth that contain most of the republican exiles (1900-1920) when the average difference reaches 4.6 cm in favour of the Spanish exiles.¹³ We

¹³ The authors suggest that the intense decline observed during the late nineteenth century in the Mexican series reflect the effects of the industrialisation of Mexico, where large portions of a middle class of artisans and traders could not face the competition of modern industries and the railroad. (López-Alonso and Vélez-Grajales, 2015: 382).

should also consider that the Mexican series' levels probably overestimate the actual levels of the average population for a couple of reasons. The first one is that the estimate results from a truncation method that excludes short individuals, and the second is that the average Mexican conscript had a higher literacy rate than the average Mexican, suggesting that the sample is biased toward more educated and, therefore, taller individuals (López-Alonso and Vélez-Grajales, 2015). On the other hand, biological differences between the native Mexican population and the Spaniards could explain the difference. For that reason, we also compared the height of the republican exiles with those of the Mexican elites extracted from passport records (López-Alonso and Vélez-Grajales, 2015). The comparison shows that although the Mexican elites were taller than the average Spanish refugee, with an average male height of around 170 cm compared to the 168.6 from the republican exiles, the small difference put the republican exiles much closer to the elites in Mexico than to its average population.

The republican male exiles were also considerably taller than the average citizens in other Latin American countries. Meisel-Roca and Vega-Acevedo (2007) estimated that the average Colombian born in the 1910s did not reach more than 164 cm in any year of the decade, while the republican exiles in Mexico born in the same years were 168.7 cm tall. They were also slightly taller than the male elites in Colombia born between 1870 and 1820, who measured on average 168.4 cm compared to the 168.5 cm of the republican exiles, as were the male elites in Brazil with average heights around 168 cm (Franken, 2019).

However, if Mexico benefited from receiving thousands of highly skilled exiles, it is also true that the political refugees also benefited from the open arms policy of the Mexican government of President Cardenas. An alternative way of studying the integration of the republican exiles in the Mexican labour markets can be obtained from the comparison of the occupations they had in Spain with those that they had in Mexico. If the republican exiles occupied similar positions to the ones they had in Spain or even better ones, we could conclude that they also clearly benefited from the change at least in occupational terms. However, if they worked in professions below those they could obtain in Spain, then we could conclude that the Mexican labour market did not provide good opportunities for the republican exiles.

The main problem with this sort of counterfactual is that we do not have information about the occupations the exiles had when they started working in Mexico, as the ones recorded in the cards issued when they entered Mexico seem to be the ones they had in Spain. However,

as explained earlier, we also have information about the traditional economic Spanish migrants who entered Mexico before 1929 and were registered by the Mexican government while they already lived there. In this case, the occupations they reported were the ones they had in Mexico. We can therefore try to match the Spanish exiles with a similar Spanish traditional migrant as close as possible in terms of human capital and any other variable that could explain the quality of his occupation. Equation (2) shows our identification strategy, where the dependent variable is the HISCAM score of the individual's occupation. Proposed by Lambert et al. (2013), HISCAM is a social stratification index widely used in the literature where higher values represent more advantaged occupational positions. The index ranges from 40.24 to 99, with a university professor assigned a value of 96.15, a cook of 59.91 and a house servant of 40.24. In other words, HISCAM allows the operationalisation of qualitative information, like occupations, into a quantitative index that can be used in econometric models.

As independent variables, we will include all the information we believe could explain an individual's HISCAM (occupation). As explained earlier, the height of an individual is a good proxy of his socioeconomic status and educational levels. For that reason, we include it as one of our explanatory variables. We also include the number of foreign languages spoken as a more direct and advanced proxy of human capital, as well as the age of the individual to account for better occupations achieved through the life cycle and gender using a male dummy.¹⁴ Finally, we include fixed effects by the province of origin and decade of birth. The reason for including these is the existence of regional differences in Spain in proxies of human capital, such as literacy rates and heights that were not the result of a better socio-economic status. The use of time dummies intends to control for the changes in improving education and heights over time. After controlling for all these factors that we believe can explain the HISCAM achieved by an individual, we included our main variable of interest that consists of a dummy that takes a value of 1 if the individual was a traditional migrant who entered Mexico before 1929 and 0 if it was a republican exile who entered Mexico after 1936. Therefore, taking a traditional migrant and a republican exile of the same height, who speak the same number of foreign languages, have the same age, same gender, and were born in the same province and in the same cohort, this dummy will estimate if there is any difference between the HISCAM achieved by both of them. If the dummy is not significant, then the

¹⁴ See Sánchez-Alonso and Santiago-Caballero (2022).

occupation that the traditional migrant obtained in Mexico compared to the one that a republican exile with very similar characteristics had in Spain would be similar too.

$$HISCAM_i = \alpha + \beta_1 Exile_i + \beta_2 Height_i + \beta_3 Languages_i + \beta_4 Age_i + \beta_5 Male + P_i + D_i + \varepsilon_i \quad (2)$$

The results presented in Table 4 show that, as expected, the control variables were very relevant in explaining the quality of the occupation (HISCAM) obtained by an individual. Higher heights and languages spoken increased HISCAM scores, as did age. The male dummy was also positive and significant, meaning that women with similar characteristics obtained worse occupations than their male counterparts. Finally, our main variable of interest shows that a traditional migrant with the same characteristics as a republican exile was able to obtain in Mexico a HISCAM which was 3.1 points higher than the one his exile counterpart was able to obtain in Spain, meaning that Mexico was indeed a place where the republican exiles could also find the possibility to improve the occupations that they had in Spain. Considering that the average HISCAM of an exile was 64.7, a traditional migrant with a similar profile would get in Mexico a HISCAM that was around 5 per cent higher than the average HISCAM the exiles had in Spain. Although the number is not extremely high, it shows that Mexico could provide the republican exiles with new labour opportunities compared to the ones they had in Spain.

Table 4. Correlates of HISCAM

Dep. variable: HISCAM	Model I
Mexican vs Exile occupation	3.1 ***
Height	0.09***
Languages	5.7 ***
Age	0.23 ***
Male	2.5 ***
Decade of birth controls	YES
Province of birth controls	YES
Obs.	12,276
R2	0.16

Notes: *, **, and *** denote significance at 10, 5, and 1 per cent levels, respectively. Robust standard errors in parentheses.

The role of women

Although our source includes very detailed information about women on heights and other human capital proxies, the lack of similar information in Spain or Mexico makes difficult a comparison like the one we carried out in the case of males using heights or any other proxy of human capital contained in our records. However, we count on some estimates of female heights in Latin America that we can compare with our estimates from the female republican exiles. Meisel-Roca and Vega-Acevedo (2007) estimated that the average heights of women in Colombia in the 1910s were around 151 cm compared to the 159.4 cm of the average female republican exile born in the same decade. Female exiles were even slightly taller than the Colombian female elites born between 1870 and 1920, who measured 158.3 cm compared to the 159.4 cm of the female exiles born in the same years.

We can conclude that the male and female republican exiles in Mexico were very positively selected compared to their Spanish counterparts and the societies where they arrived. But how significant was the role of women in this loss of human capital? The main problem in accounting correctly for the role of women in processes like the one described in this paper is the lack of information to measure their relevance accurately. Regarding human capital, the sources available to study migratory movements (voluntary or forced) usually include information on occupations to check the profile and quality of the migrants. However, a large proportion of women cannot be adequately accounted for by doing so. Our case is a good example: 88 per cent of the Spanish women included in the Mexican Registry were recorded as Housewives, and only 12 per cent had a different occupation mainly related to administrative work or healthcare, including a broader range of professions like liberal professionals. Therefore, the use of occupations would only allow us to account for 12 per cent of women as the heterogeneity within the large group of housewives is too high.

To measure the share of human capital loss in the Mexican republican exile from women, we could use the recorded occupations, making use again of HISCAM, adding up the HISCAM scores of all the occupations recorded for both men and women and calculating the share that female HISCAM points represented. However, the main problem with this method is that there is not even a HISCAM score recorded for housewives, meaning that only 12 per cent of women with a different occupation would be considered. That explains why following this method, only 14.8 per cent of all the HISCAM points 'lost' in the republican exile to Mexico

can be directly attributed to women when they represented 36 per cent of all the exiles. This underreporting of female participation is a good example of women's invisibility in economic history due to the lack of quality in recording their contributions.

The biological differences and lack of female heights for the women who remained in Spain mean that the use of heights to compare them with men is also problematic to account for the share that women represented in the loss of human capital during the republican exile to Mexico. However, we can use another human capital proxy to account for female participation comparable to male exiles and available for the whole sample of women. As explained earlier, the cards of the Registry also included the foreign languages spoken by the individual, that in this case, would also account for the heterogeneity among the 88 per cent of housewives. While we cannot distinguish the human capital of a well-educated housewife from one without education using their occupation, the one with a high level of human capital will probably be able to speak a different language. Table 5 shows the distribution of male and female exiles depending on the number of foreign languages they could speak. In this case, we excluded all those languages that did not require a formal investment in education, such as Basque, Catalan or other languages naturally spoken in Spain other than Spanish.

Table 5. Distribution of men and women by number of foreign languages spoken.

Foreign languages spoken	Women	Men
None	64,2%	53,3%
One	30,1%	34,6%
Two	5,0%	9,2%
Three	0,7%	2,4%
Four	0,0%	0,5%
Five	0,0%	0,0%

Source: estimates using the National Registry of Foreigners.

Our results show that measured as the number of foreign languages spoken, the heterogeneity of women in terms of human capital once housewives are considered is as high as in the case of men. This highlights the importance of accounting correctly for the human capital of women and the mistake of considering housewives as a monolithic, homogenous group that is indeed as diverse as men. As we did earlier with HISCAM scores, we can sum up all the spoken foreign languages 'lost' in the republican exile to Mexico and estimate the share of

them that could be directly attributed to women. The result shows that women mastered 27.7 per cent of all the languages spoken by the republican exiles. This share almost doubles the percentage of HISCAM points those women represented. The number is not negligible, considering that women just represented 36 per cent of all the exiles and the traditional discrimination faced in terms of becoming the recipients of family investments in human capital. Even when many of these were spoken by housewives who did not have an occupation outside of their household, their effect went beyond the direct consequences on its administration with well-known spillovers on other factors like the education of their children and, therefore, the human capital of the next generations¹⁵.

Conclusions

The economic and social effects of forced mass migrations have been critical issues in political conflicts where economic historians have paid particular attention, but it has also gained international interest in recent years due to the military conflicts in countries like Syria or Ukraine. The republican exile to Mexico that fled Spain after the beginning of the Spanish Civil War, and especially after its conclusion, presents a unique case study where the existence of an extraordinary source allows us to address some of the most relevant issues related to the effects of the mass movements of political refugees.

This was possible thanks to the creation of the National Registry of Foreigners in Mexico, which includes information about all the emigrants who lived in Mexico in the 1920s and those who entered the country afterwards and identified those who were political refugees fleeing the Spanish Civil war after 1936. One characteristic that makes the Registry special is the inclusion of the heights of the emigrants in the records and the critical fact that they also included women. From the study of over 27,000 individual records, we could estimate the evolution of heights of the Spanish republican exiles in Mexico and compare them with those who remained in Spain and those who received them in the Americas.

¹⁵ In a similar exercise Blum and Rei (2018) found that European female Jewish refugees in the United States during the Second World War spoke an average of 1.6 languages compared to 1.3 for non-refugees.

Our results show a very strong positive selection in the profile of the republican exiles to Mexico, being on average 4.3 cm taller than the average Spaniard. This positive selection was not the consequence of a regional bias in the sample towards areas where individuals were taller, but a common situation in all the regions analysed where exiles were systematically taller than the average individuals born in their regions of origin.

We also observe that the level of this positive selection presented a very high heterogeneity being much higher in some specific regions. Taking advantage of this variance, we analysed the regional positive selection's potential determinants, showing that the cost of leaving the country was probably one of its leading causes. We find that the longer the capital of the province of origin of the exile remained under the control of the Republican government and the shortest its distance to the closest international frontier, the lower the positive selection. As both variables would decrease the cost of fleeing the country, this means that in those provinces where the costs of escaping were higher, those with enough resources were able to do it in larger numbers, explaining that the individuals who composed the republican exile in Mexico from those regions were more biased towards the higher socio-economic classes and therefore the higher positive selection.

We also compare the heights of the republican exiles to those of the Mexican population and other Latin American countries, showing a similar pattern where male republican exiles were considerably taller than the local populations and practically as tall when not taller than their elites. Therefore, we can conclude that the arrival of the republican exiles to Mexico was indeed a positive contribution to Mexican society, despite their small number compared to the Mexican population. Our research also shows that Mexico provided opportunities to the migrants who arrived in the country and obtained better occupations than a similar counterpart would get in Spain.

Finally, we also explored women's role in this process and their relevance in the loss of human capital due to the republican exile in Mexico. Our estimates are relevant as they present evidence of the underestimation of female contributions in economic history that can derive from the under-recording of women in historical sources. When women's human capital is correctly accounted for, we show that women represented a significant share of the human capital lost in the republican exile to Mexico, much higher than the estimates derived from more traditional proxies where the qualification of women was not correctly recorded.

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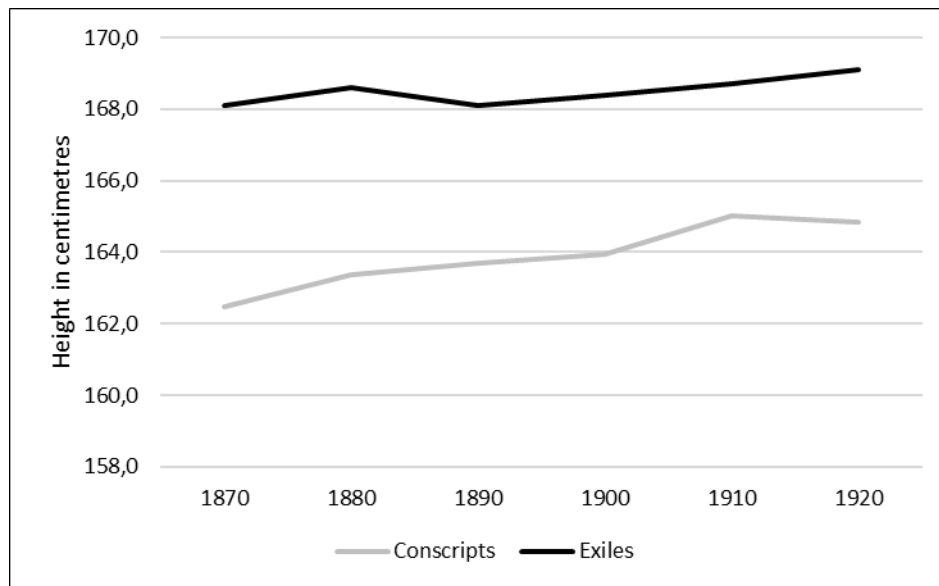
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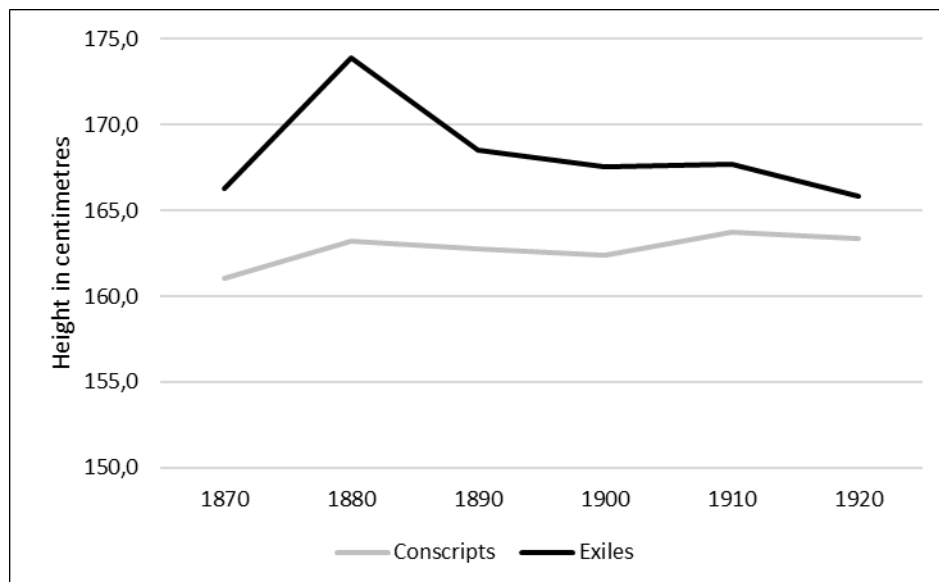
Appendix

Figure 20: Average height of male exiles to Mexico and Spanish conscripts from Andalusia



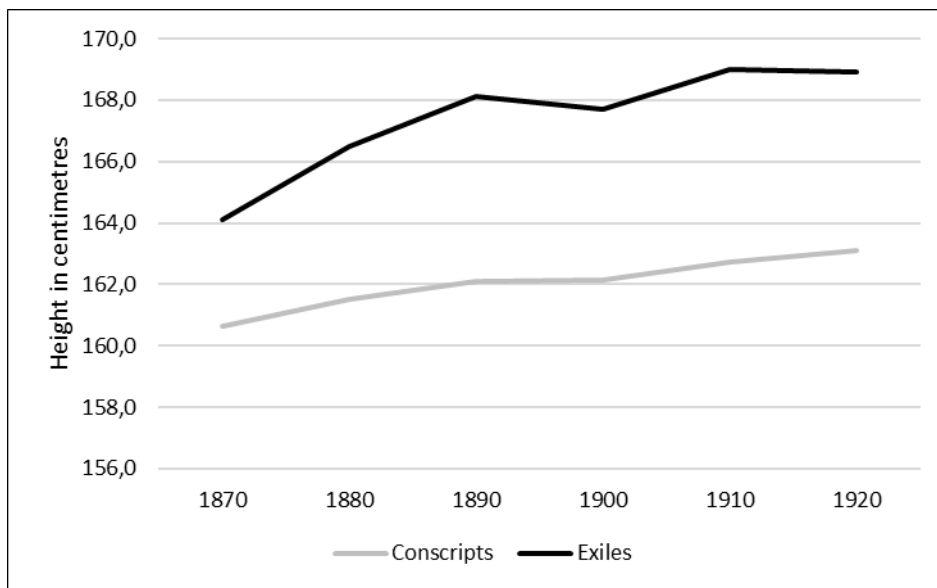
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 21: Average height of male exiles to Mexico and Spanish conscripts from Galicia



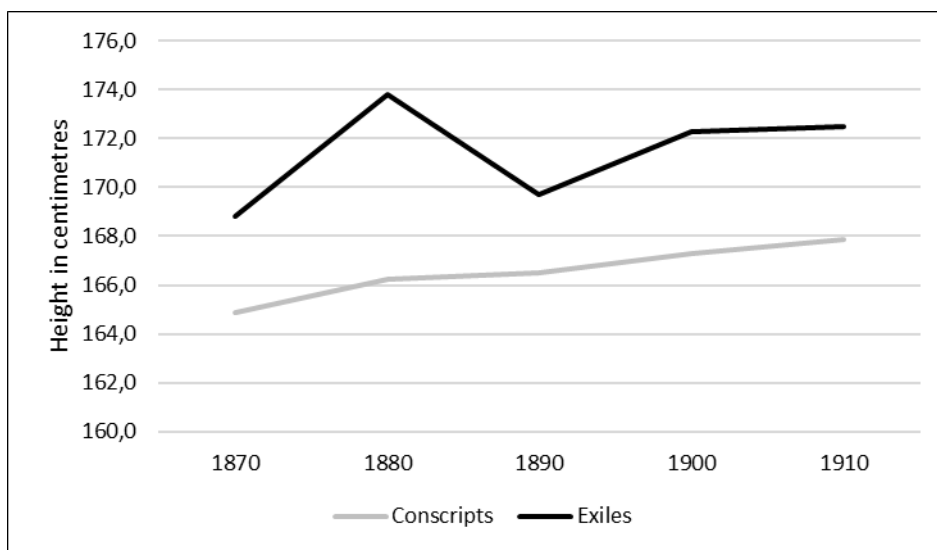
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 22: Average height of male exiles to Mexico and Spanish conscripts from Castilla y Leon



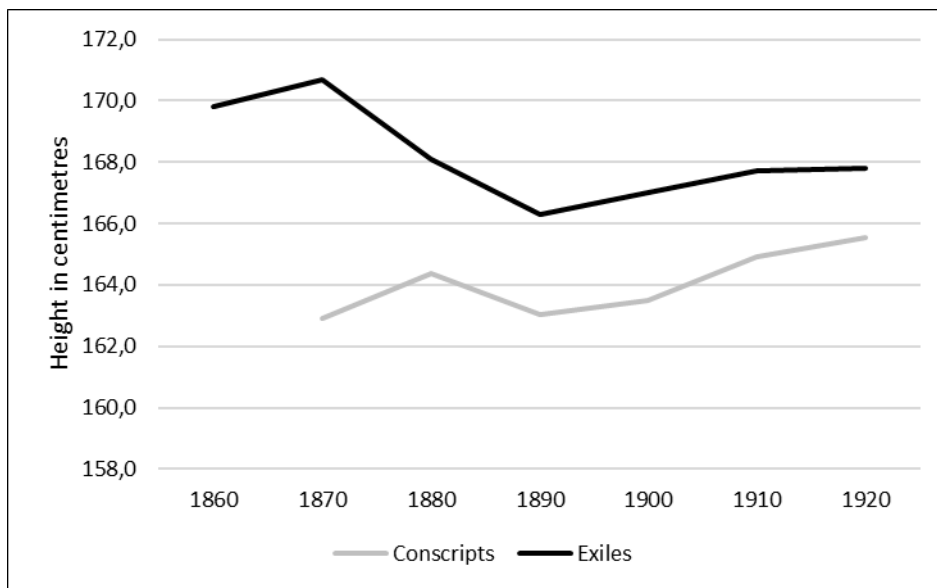
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Figure 23: Average height of male exiles to Mexico and Spanish conscripts from the Canary Islands



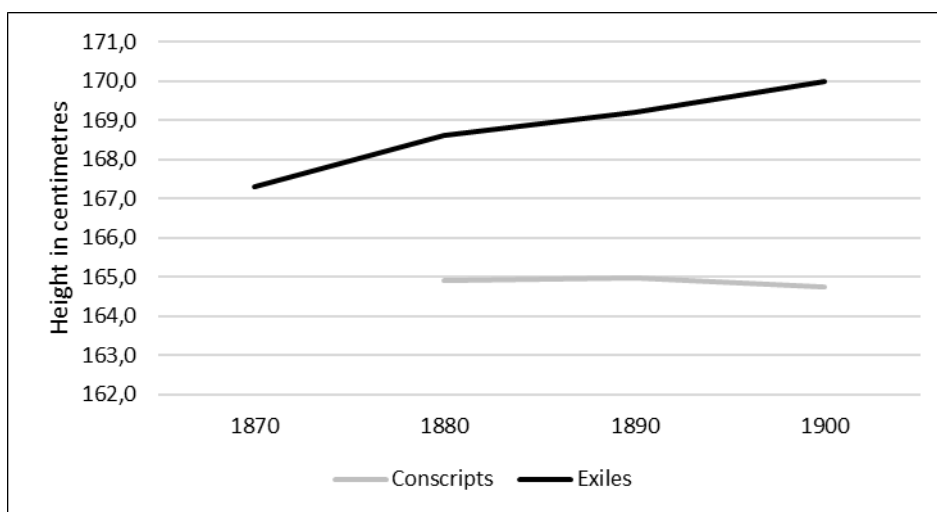
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 24: Average height of male exiles to Mexico and Spanish conscripts from Aragon



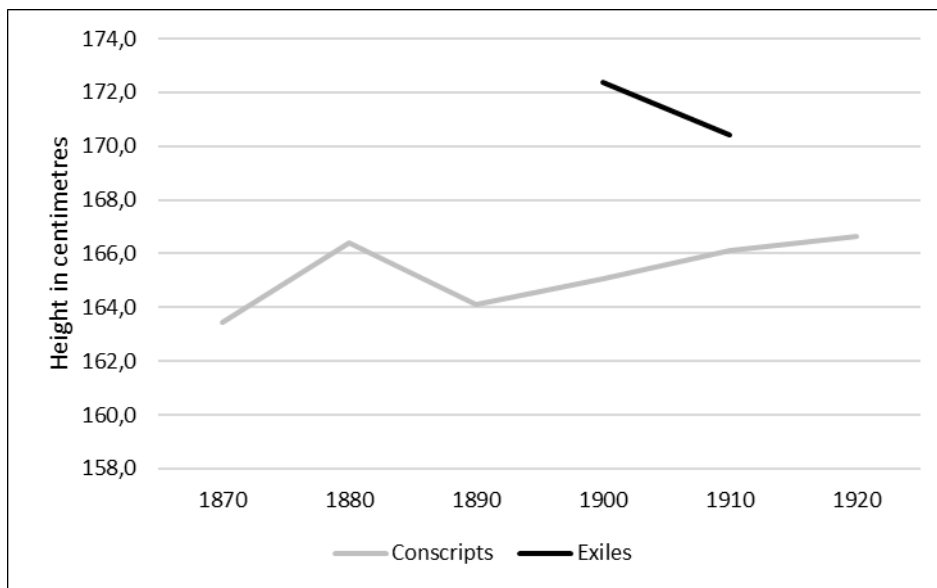
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 25: Average height of male exiles to Mexico and Spanish conscripts from Murcia



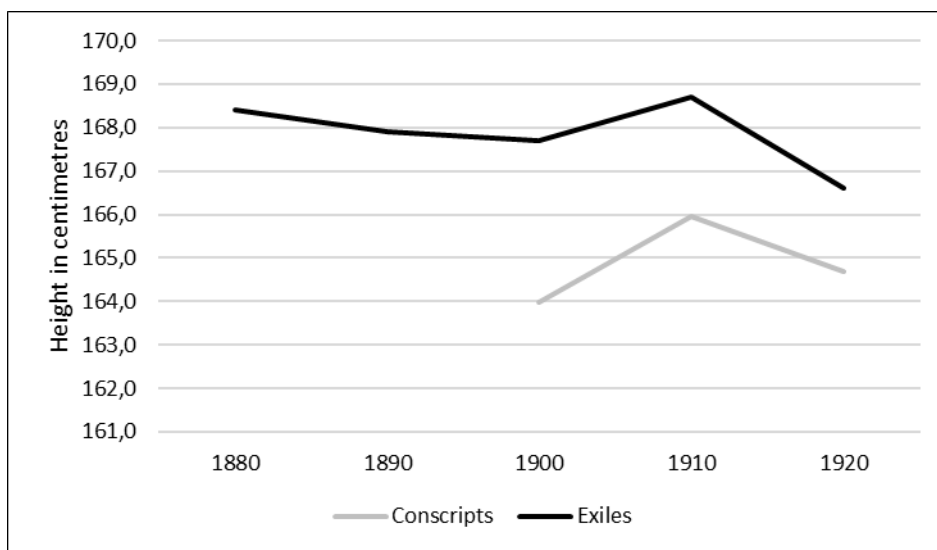
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Figure 26: Average height of male exiles to Mexico and Spanish conscripts from the Balearic Islands



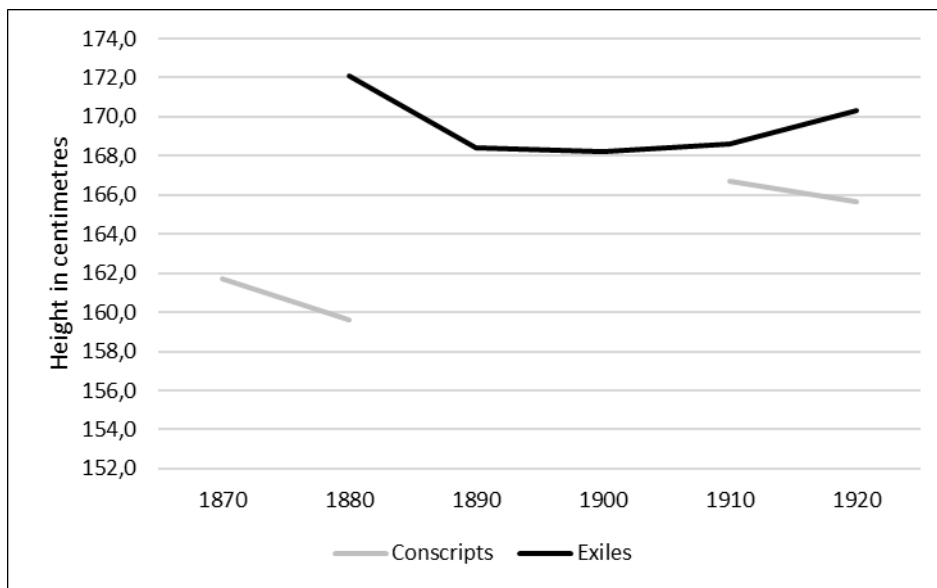
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Figure 27: Average height of male exiles to Mexico and Spanish conscripts from Asturias



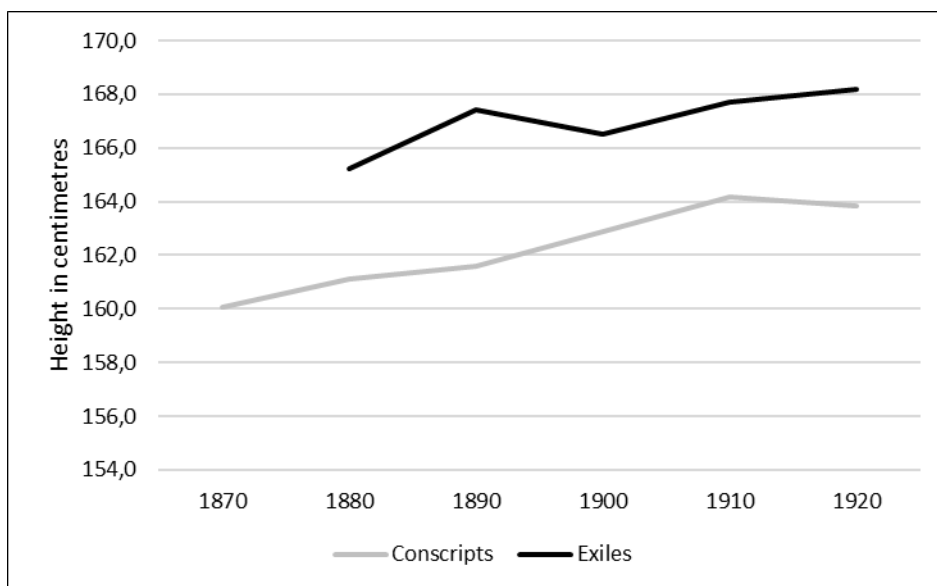
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 28: Average height of male exiles to Mexico and Spanish conscripts from Cantabria



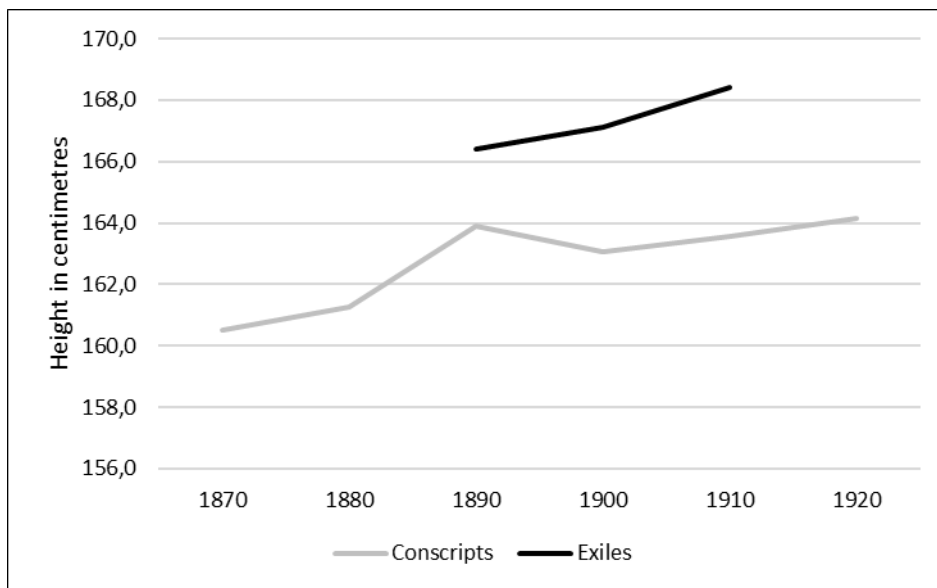
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 29: Average height of male exiles to Mexico and Spanish conscripts from Castilla la Mancha



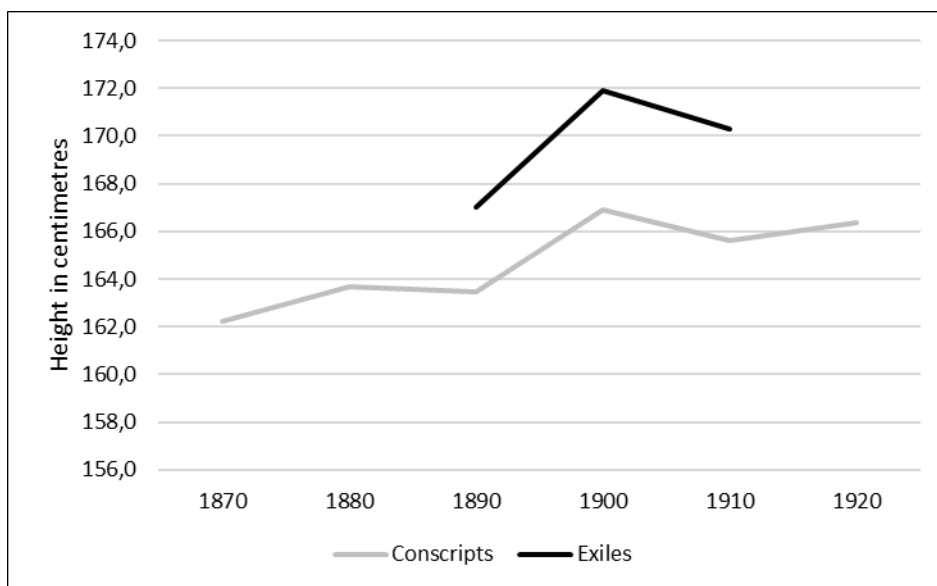
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 30: Average height of male exiles to Mexico and Spanish conscripts from Extremadura



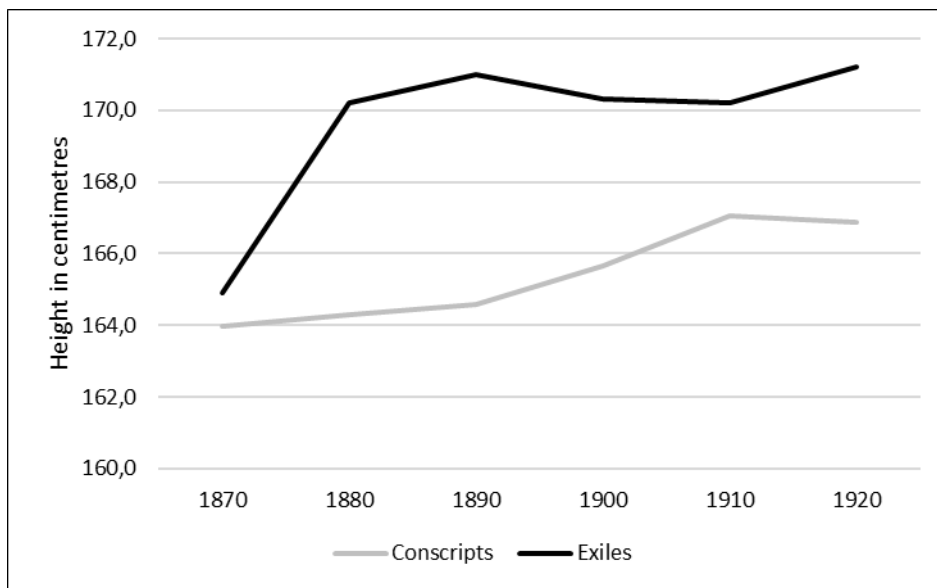
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 31: Average height of male exiles to Mexico and Spanish conscripts from Navarre



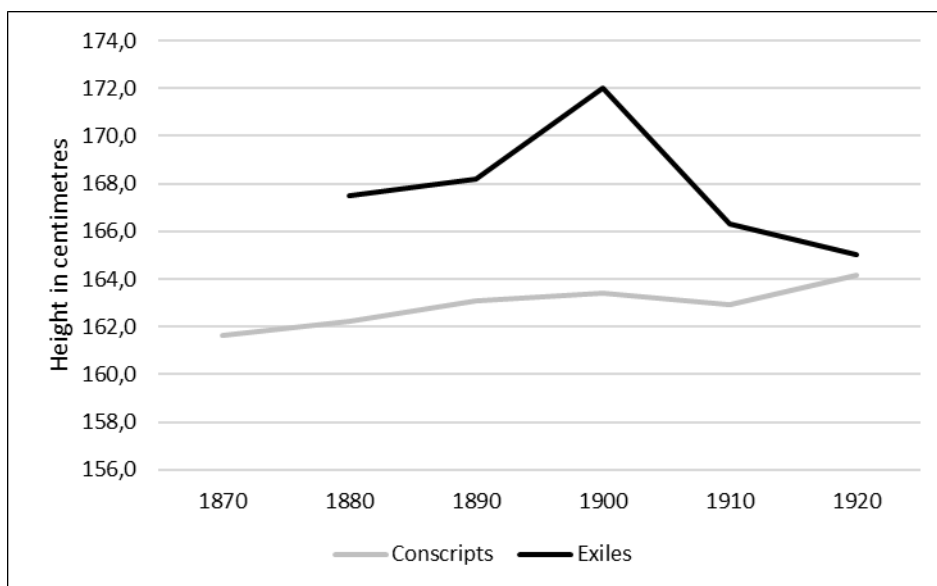
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 32: Average height of male exiles to Mexico and Spanish conscripts from the Basque Country



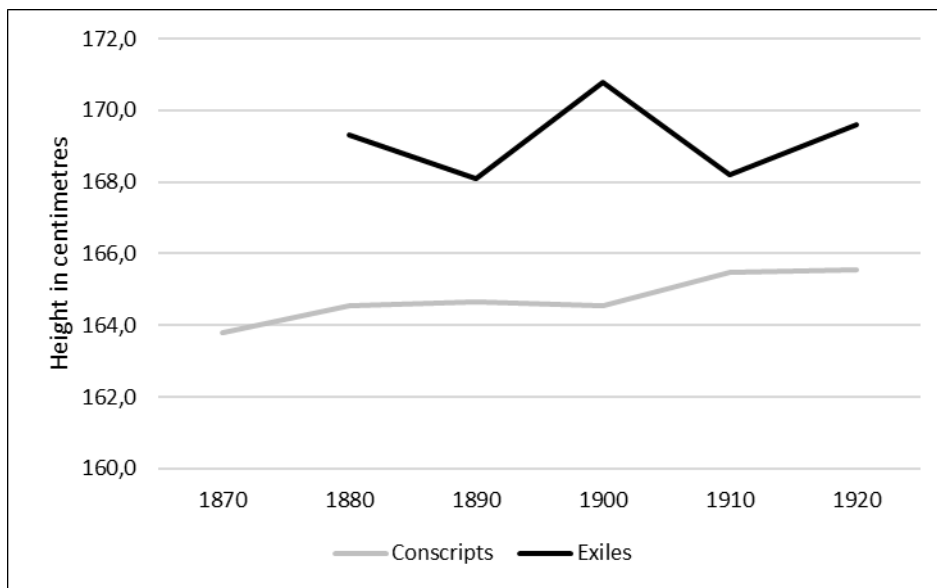
Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 33: Average height of male exiles to Mexico and Spanish conscripts from la Rioja



Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.

Figure 34: Average height of male exiles to Mexico and Spanish conscripts from Valencia



Source: Average data estimated from Quiroga (2001) and Source: National Registry of Foreigners.