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Turnover in changing urban landscapes: a demographic perspective of diversity at the submunicipal level

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Abstract

In recent decades, migration has played an increasingly central role in population change amid very low fertility and mortality, accelerating population turnover resulting in an unequal increase of diversity across territories and generations, accelerating demographic metabolism, the generational succession driving social change. Residents' perceptions of these fast changes have been instrumentalized by longstanding conspiracy theories, crystallizing in what is known as the “Great Replacement”. This paper counters such narratives by analysing these demographic processes through the case study of three Spanish Mediterranean cities. We measure these demographic dynamics at sub-municipal levels and across cohorts, assessing diversity not merely as the accumulation of origins but as the relative balance between groups. Results show that in a context of rising inequality and job insecurity for both natives and migrants, fast demographic changes, rather than ethnic replacement, reflect complex population dynamics shaped by cohort structures, local socioeconomic conditions, and urban migration histories. Replacement theories capitalize on negative perceptions of demographic change, attributing it as the cause of public discontent over rising inequality. Exposure to diversity is highest in younger “empty” cohorts and economically vulnerable areas: neighbourhoods shaped by twentieth-century internal migration and central areas undergoing gentrification.

1. Introduction

1.1 Migrations, demographic change and social perceptions

During the 21st century, most developed countries have experienced a shift in which net migration has become the primary driver of population change. This occurs within a context of low fertility and increasing life expectancy, which together have led to a growing proportion of elderly individuals, a phenomenon commonly referred to as population aging. This represents a transition to a Complex System of Demographic Reproduction (Cabr  et al, 2002), in which migration plays a decisive role alongside fertility and mortality, rather than population change being driven solely by the latter two factors. Historically, large metropolitan areas anticipated this transition, as migration has long been a fundamental factor shaping the evolution of their populations (Massey et al, 1993).

The first consequence of this shift toward migration within the Demographic Reproduction System, particularly in the context of aging populations, is that migration has assumed a central role in population renewal. Its increase in the 21st century sometimes reaching massive scales due to economic globalization has accelerated the process of population renewal itself. This phenomenon has been described by some authors as “fast demography” (Billari, 2022), fast relative to the slower, more inertial progression driven by fertility and mortality.

The international character of these migrations and, consequently, their ethno-cultural and religious diversity relative to the native population has had a significant impact. One of the first effects is the uneven diversification of generations, largely due to the young age at which most immigrants arrive. The relative weight of migrants in younger generations is further accentuated in Spain because these generations are empty, that is, cohorts with fewer initial members due to declining fertility and lower birth rates. As a result, the proportion of foreign-born individuals will be key in the future cohort replacement process or succession of generations. This phenomenon is what is known as demographic metabolism, which links generational replacement with social change (Ryder, 1965), and has recently been revisited to assess the potential impact of large-scale migration on future societal change (Lutz, 2012). Through this perspective, the literature has focused mainly in the analysis of human capital (Lutz, Butz, & KC, 2014; Striessnig, 2019), as well as the influence of migration on the evolution of religious beliefs (Goujon

et al., 2006) and on European identity (Lutz, Kritzinger, & Skirbekk, 2006; Striessnig & Lutz, 2016).

The fast pace, magnitude, and complexity of these changes, especially in a context of rising economic inequality after the Great Recession, has generated widespread fear, fuelling the spread of longstanding conspiratorial theories. These theories revive earlier conspiracy narratives that emerged at the end of the demographic transition in various countries during the late nineteenth and early twentieth centuries. They were particularly concerned with declining fertility and the changing ethnic composition of the population (Davis, 2024). Today, these ideas have crystallized in what is known as the “Great Replacement.”

According to this theory, there is a conspiracy to replace the native working population in Europe with racialized African and Muslim populations (Camus, 2017). In other words, these conspiracies succeed because they offer a simple explanation for the anxiety caused by the inability to grasp the systemic nature of profound and rapid changes affecting people’s lives.

Such theories have indirectly instrumentalized demographic analyses based on the concept of “replacement migration” (United Nations, 2000). This framework assumes that migrant inflows result from a structural shortage of young people entering the labour market due to previously low fertility. They also drew on the idea of the “Third Demographic Transition” proposed by David Coleman (2006), which refers to changes in the ethnoracial composition of the population driven by migration and fertility differentials between immigrant and native-born populations.

So far, two main strategies have been adopted to counter this conspiratorial theory. The first is based on a genealogical analysis of the discourse, highlighting its connection to racist and xenophobic theories already present in mid-19th century French nationalism and the nativist movements of early 20th century United States, which were closely tied to eugenic thought and its’ peak under the National Socialist regime (Domingo, 2020; Goetz, 2021; Ekman, 2022; Bracke & Hernández Aguilar, 2024). The second strategy has focused on quantitative analysis, either of the characteristics of its followers (Dennison & Kustov, 2025) or to demonstrate the absurdity of its empirical basis from a demographic perspective (Le Bras, 2022), both in its initial formulation and in the execution of the population projections on which it supposedly relies. Both approaches have thus aimed to expose the falsehood of the theory and its connection to post-truth politics, as well as right-wing and far-right populist movements. Our approach is

complementary but fundamentally different: we aim to analyse the demographic processes which may have impacted the population's perception of demographic changes, and which have been instrumentalized by conspiracy theories in particular, and by involutionist discourses in general, in order to better understand them and inform strategies to counter the hate speech they propagate.

In this paper, we pursue three main objectives. First, we aim to measure and analyse these demographic changes from the beginning of the twenty-first century by focusing on: (1) Population turnover and the role of migration in this process; (2) The relationship between migration and the increase in diversity with Demographic Metabolism, that is, the interplay with generations and age structures, particularly among young cohorts; and, finally, (3) The measurement of diversity, understood not simply as the multiplication of different origins but as the distribution and relative weight of origins within a given territory or generation.

To address these objectives, we focus on three Mediterranean Spanish cities: Barcelona, Valencia, and Palma, the capitals of three regions of the most economically and demographically dynamic regions in Spain (Catalonia, the Valencian Community, and the Balearic Islands). Despite these differences, the three cities share several key characteristics: they were major destinations for internal migration during the twentieth century; they have experienced substantial international immigration throughout the twenty-first century constituted by a considerable diversity of origins; and they have undergone intensified gentrification processes, shaped by the combination of strong tourist appeal and the cultural heritage of their historic urban centres. We first adopt a city-level approach and then turn to the district level in order to capture intra-urban heterogeneity, as cities exhibit substantial internal contrasts in socioeconomic characteristics and diversity.

1.2 Economic globalization, migrations and urban transformations

With economic globalization at the beginning of the new millennium, international migration increased substantially in many countries that had traditionally been sources of emigration. Migration flows accelerated and became more diverse in terms of origin, motivations, and the sociodemographic characteristics of migrants. More precisely, the arrival of international migrants coincided with accession to the European Union and a relatively weak welfare state, which facilitated entry into sectors such as care work,

alongside strong demand in sectors such as intensive agriculture, construction, and tourism.

These movements primarily affected major urban centres, which became major migration hubs. International migration supplies mostly low-wage workers in an increasingly polarized urban labour market, creating a dual city under globalization (Sassen, 2001) leading to spatial segregation alongside gentrified urban cores. Migration is therefore part of global circuits of capital, labour, and information, turning Global cities both in a melting pot for diversity, a space where super-diversity could manifest (Vertovec, 2012), and places where the ethno-stratification of the working class was reinforced or reproduced. At the same time, they emerged as centres for the formation of new transnational elites.

The case of Spain is exceptional due to the remarkable intensity and rapidity of its transformation from a traditionally emigrant country into an immigrant-receiving one since the last quarter of the twentieth century (Izquierdo-Escribano and Muñoz-Pérez, 1989). Two migration waves following the economic cycle have driven this shift, raising the share of the foreign-born population from 3.6% in 2000 to 19.26% in 2025.

This growth has displayed strong regional asymmetries, which have in turn been reflected and magnified in the country's major cities. Among them are Barcelona, with 512.000 foreign-born citizens in 2025 (30.9% of its total population), Palma de Mallorca with 119.000 (27.6%), and Valencia with 177.000 (22%).

Similarly, to the rest of Mediterranean metropolises, in the last decades of the twentieth century, migration flows corresponded mainly to suburbanization processes towards the peripheries (Pujadas-Rúbies et al, 2012; Susino and Duque-Calvache, 2013). However, from the start of the century, international immigration has been decisive in the integration of these urban cores within the global economy, reshaping population dynamics both in metropolitan centres and their peripheries (Bayona-i-Carrasco et al., 2014). In the case of the cities under study, they are capital cities of regions that have been three of the main poles of attraction of previous internal migrations that have contributed heavily to their growth: Barcelona from the beginning of the XX century until the 1980s, Valencia from the half of the same century until the 1980s, and Palma from the 1960 onwards. Subsequently, and more recently, they have become some of the cities with the greatest attraction for international migrants in the country (Recaño, 2020; Montfort et al, 2025).

First, Barcelona can be described as a European global city characterized by a polarized migrant labour market. On one hand, it attracts highly qualified professionals (Cocola-Gant and López-Gay, 2020), while on the other, it maintains a strong demand for low-skilled immigrant labour in the service and care sectors. However, these sectors do not necessarily employ a low-qualified workforce, as overqualification is an increasingly prevalent phenomenon, particularly among migrants (Aguilar-Ramos and García-Crespo, 2008). Similar dynamics are observed in Valencia and Palma, each with its own specific characteristics. In the case of Valencia, although it occupies a less central position within Spain's international networks, the city is nonetheless integrated into global migration circuits through labour migration, lifestyle migration, and the increasing internationalization of its housing market. Palma and the Balearic Islands, on the other hand, exemplifies the globalization of lifestyle and the tourism economy. In addition, Palma continues to receive internal migration from the rest of Spain even during the present century, whereas the other two cities ceased to receive substantial internal inflows.

In summary, the common migration model across the three cities is characterized by a low value-added production model and a demand generated by the outsourcing of reproductive work to the market. This results in a segmented labour market: one segment attracts relatively skilled or highly educated migrants for the “urban global city” functions (Sassen, 1996), while much larger flows occupy precarious, informal, or low-wage jobs in domestic work, care, and cleaning, often filled by migrant women. These dynamics will inevitably translate into spatial and socioeconomic segregation within cities, consolidating or creating new forms and spaces of inequalities across district and neighbourhoods.

2. Data and Methods

There are three phenomena we seek to measure: population turnover, diversity, and their relationship with both territory and generations, as well as with income level as a proxy of socioeconomic inequalities within cities. To calculate population turnover, we use the *Population Turnover Rate (PTR)*, measured as follows adding crude rates:

$$PTR_j(0, t) = b_j(0, t) + d_j(0, t) + i_j(0, t) + e_j(0, t)$$

Where, $b_j(0, t)$ is the birth rate, $d_j(0, t)$, the death rate, $i_j(0, t)$ the immigration rate, and $e_j(0, t)$ is the emigration rate, for unit j and time $(0, t)$. All data is drawn from the Spanish National Statistics Institute (INE). Birth and death data are sourced from the Vital Statistics, an annual register that provides information on births and deaths at the municipal level. For the analysis of migration, we rely on the Residential Variation Statistics, which records migratory movements between Spanish municipalities as well as with foreign countries, based on reported changes in the *Padrón Continuo de Población*, the continuous population register that records the population of each Spanish municipality on a yearly basis.

Secondly, to estimate the contribution of migration to population turnover, we employ the Migration Share of Turnover (MST):

$$MST_j(0, t) = \frac{i_j(0, t) + e_j(0, t)}{PTR_j(0, t)}$$

To calculate diversity, we use the Simpson Diversity Index (Simpson, 1949), measured as follows:

$$IDS = \frac{1}{\sum_{i=1}^S P(i)^2}$$

Far from the common assumption that diversity simply reflects the accumulation of an increasing number of origins within a territory, the Simpson Diversity Index measures the relative balance between groups in that territory. Thus, if one group dominates over the others, diversity will remain low, even if many different origins are present.

Where S refers to the total number of possible cases or groups, and $P(i)$ is the size of the group, expressed as the proportion of each population group relative to the total in the study area. The results are shown on a numerical scale ranging from a minimum of 1 to a maximum corresponding to the number of groups considered, the latter being the indicator of maximum diversity. Up to eight groups are used, six of which correspond to significant foreign-born populations (former EU-15 and developed countries, Rest of Europe, Maghreb, Sub-Saharan Africa, Latin America, Asia and the rest of the world). These foreign groups were selected based on both their numerical representativeness and

their residential segregation patterns. The native population is divided between those born in the same province or in the rest of Spain. This aims to identify past internal migratory movements as a tool for making visible the diversity resulting from internal migration. Thus, the index values can range from 1 to 8 (the total number of groups). A value below 8 indicates that uneven group weights reduce effective diversity: for example, an Index of 4 means that the observed uneven distribution among the eight groups is equivalent, in terms of diversity, to having only four equally represented groups.

This calculation is carried out for the last two decades in five time points (2002, 2007, 2012, 2017 and 2022), for the three cities considered, using data from the Continuous Population Register. This source annually records the resident population in a municipality, and where the immigrant population is usually quite well represented, as they can be registered without a valid residence permit and this allows them to prove their presence in Spain in subsequent administrative regularisation processes.

Moreover, we calculate diversity at the district level, which highlights the spatial distribution of migration across the cities. We also compute it by five-year age groups, showing how diversity evolves across different ages. Combining territory and age provides a more detailed understanding of migration's impact on population trends. Finally, we incorporate household income at the census-tract level as an economic indicator, grouping its values into quintiles to examine its association with diversity in 2022. This categorization allows for a more detailed analysis of how diversity patterns vary across the income distribution.

3. Results

3.1 Population turnover and migration in Barcelona, Valencia and Palma

Population turnover, especially its peaks, during periods of migratory expansion require careful measurement and contextualization. Doing so is essential not only for understanding the nature of demographic change itself but, more importantly, for capturing how the periods of acceleration of such change are perceived by residents within cities and across their neighbourhoods and districts.

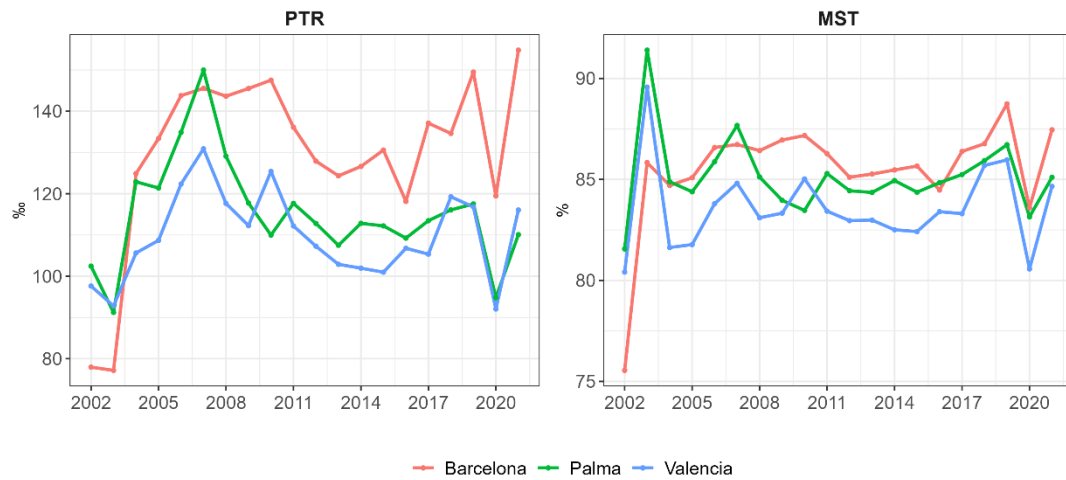
First, we must highlight as Billari (2022) pointed out, the territorial scale is crucial. Moving from the national total to the regional level, and subsequently from the region to the city, increases the number of both inflows and outflows. This, in turn, inflates the population turnover values. Furthermore, the role of migration and demographic

dynamics in shaping large urban areas is by no means a new phenomenon; however, the recent acceleration of these processes, particularly within a context of globalization and the diversification of migrant origins, must be explicitly considered when analysing patterns of urban diversity today.

Figure 1 illustrates the Population Turnover Rate and the Migration Share of Turnover. In the first case, the two migration waves and the impacts of the Great Recession and COVID-19 pandemic are clearly perceptible. Following the first wave, Barcelona shows the highest turnover values. During the peak of international inflows in 2007, Palma temporarily reached the highest turnover rate, surpassed only by Barcelona's value in 2021. Values exceeding 140 per thousand were unprecedented, with Barcelona surpassing this threshold in 2021, reaching approximately 150 per thousand. Overall, the turnover rate starts at around 100 per thousand (i.e., about 10% of the population changing annually) in 2002, and rarely falls below this level, particularly in Barcelona. The only notable exception occurs in 2020, reflecting the impact of the COVID-19 lockdown. Taken together, these patterns indicate that turnover rates have remained persistently higher than in earlier periods.

The trend of the Migration Share of Turnover (MST) is very similar and remains fairly stable across the three cities, except for the peak year 2007 where values exceeded 90% in Palma, and later never falling below 80% overall. Migration data for 2002 are underrepresented, which explains the substantial jump from 2002 to 2003. Barcelona's values, which follow this general trend, remain comparatively high and make it the only city where the second migratory wave has a greater impact on population renewal than the first. These patterns will be reflected in increasing diversity throughout the second migration wave. With respect to Valencia, although it reaches higher values than Palma or Barcelona in certain specific years, both in PTR and MST, it generally maintains lower levels than the other two cities. Nevertheless, the contribution of migration remains very high and differs little from that observed in the other cities, never falling below 80%.

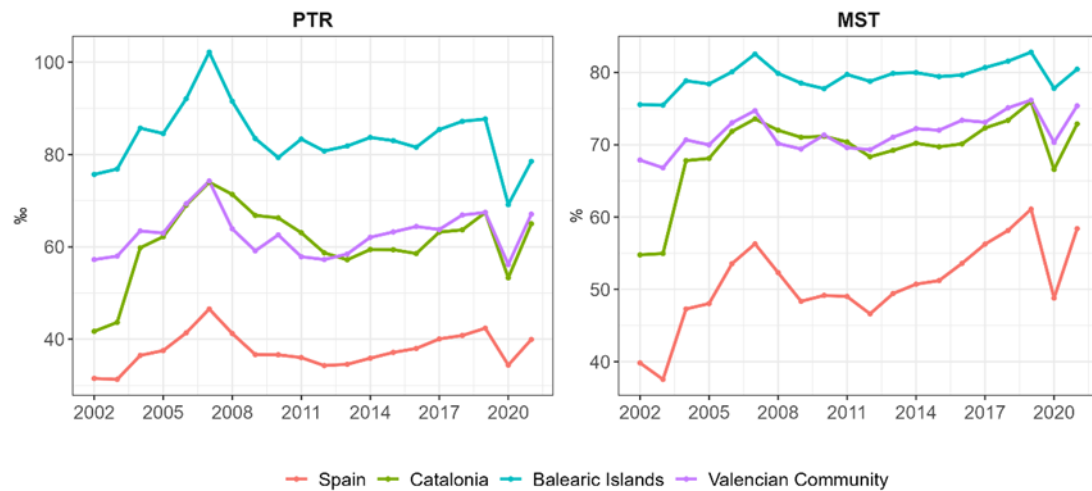
Figure 1. Population Turnover Rate and Migration Share Turnover, Barcelona, Valencia and Palma, 2002-2021



To illustrate the scale effect, in Figure 2 we present the turnover values and the weight of migrations for the regions or Autonomous Communities (*Comunidades Autónomas*) of which the cities under study are the capitals. These correspond to NUTS-2 regions, although the Balearic Islands are simultaneously equivalent to a NUTS-3 region (province). The shape of the curve follows the same general pattern, but both indicators are evidently lower at the national level, since we are accounting for fewer migration movements. The regional values fall between the national figures and those observed for the cities.

Two main aspects should be highlighted at the regional scale. First, the notably high values observed for the Balearic Islands, also reflecting a scale effect, as the Balearic Islands constitute a geographically smaller region with a smaller population (1.17 million in 2021, compared with Catalonia's 7.8 million and Valencia's 5.1 million in the same year). Second, the MST attains a higher weight in the second wave, reaching a more pronounced peak both for Spain as a whole and for the regions. This is attributable to declining birth rates, which increase the relative contribution of migration even when migration flows are lower. This is not the case for the cities, where the MST remains at very high levels (with two peaks), but never surpasses that of 2007, since migration consistently accounts for the overwhelming share of population change.

Figure 2. Population Turnover Rate and Migration Share Turnover, Spain and regions, 2002-2021



3.2 Demographic Metabolism: age and cohorts

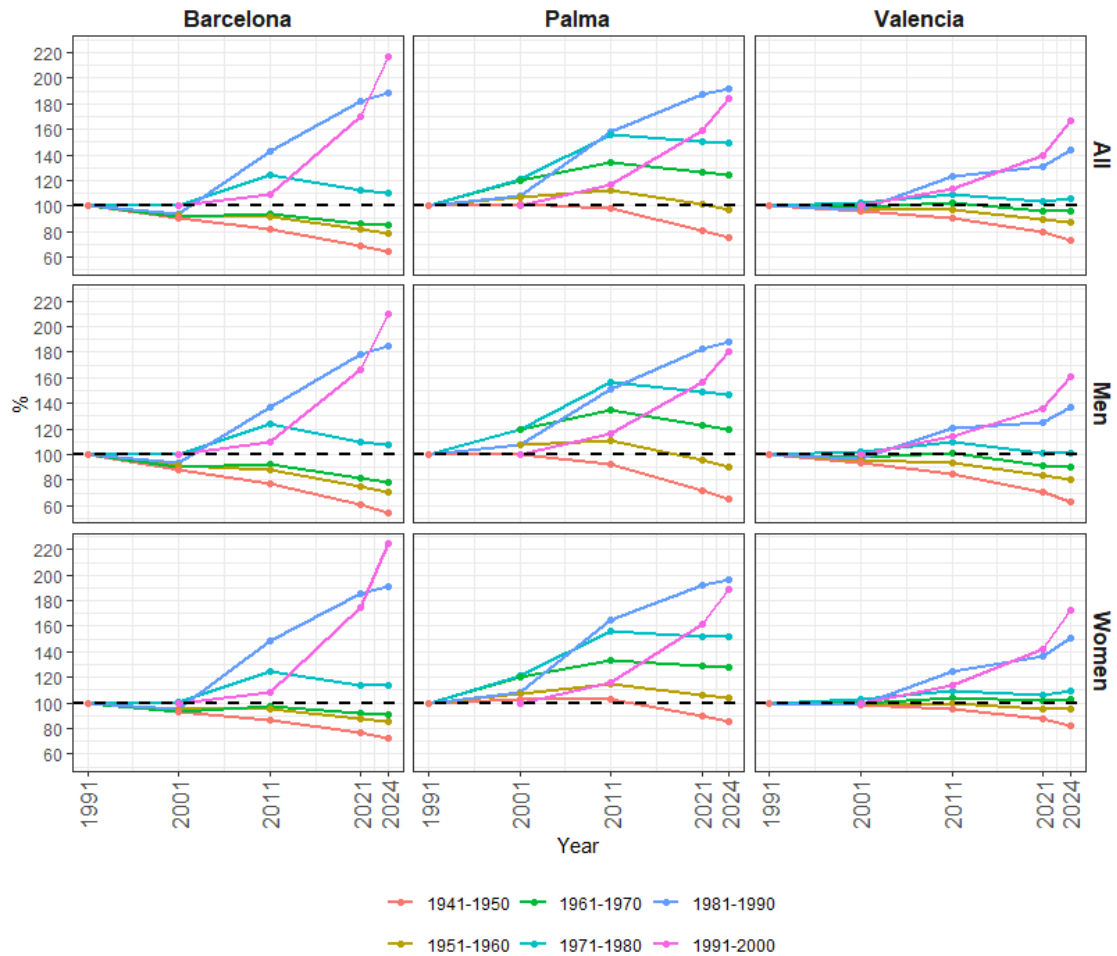
In this section we proceed to examine the results by cohort and age within the framework of demographic metabolism, enabling for a more detailed analysis of the demographic impact of migration. The evolution of cohort size (Figure 3), typically declining due to mortality, allows us to assess the impact of both internal and international migrations, as well as their timing across the three cities. Standardizing the initial cohort size to 100, we observe that migration doubles the numbers of the most recent generations for the 1981–1990 and 1991–2000 cohorts in all three cities, and for earlier cohorts in the case of Palma.

The first three cohorts (1941–1950, 1951–1960, and 1961–1970) are affected by internal suburbanization movements, i.e. outflows from central cities to suburban peripheries (Nel·lo, 2004, Gil-Alonso et al, 2011). These flows initially affected large cities such as Madrid and Barcelona, and a few years later Valencia, with a lesser impact in Palma. The oldest generation also reflects the effect of mortality in the last observed years. The first major migration wave in the early 2000s primarily affects the 1981–1990 generation as observed in 2011 since most international migrants arrive at a young age. However, it is interesting to note that this also affects the Baby Boomer generations (1960s to late 1970s in Spain), providing evidence that the arrival of migrants is driven by the economic cycle and not by the need to compensate for deficits in the population's age structure, as asserted by the Replacement migration theory. Migration plays a crucial

role in certain cohorts, because preceding fertility declines created smaller native-born cohorts, thereby increasing the relative share of migrants. A second period of intense migration has a particularly strong impact on the most recent generation, 1991-2000. This empty cohort at birth, reflects historically low fertility in Spain during the late 1990s (Adserà, 2006; Devolder and Cabré, 2009). By 2021, the cohort had experienced a substantial increase in size. This growth was most intense in Barcelona and Valencia, where the second wave of migration particularly affected this younger cohort.

Differentiating by sex, the effect on female cohorts is higher. This reflects the predominance of women in migration to large cities, both through internal movements associated with higher educational attainment among women, and international migrations, particularly from Latin America, where labour demand in care-related occupations amplifies their relative weight, in what is known as global care chains (Hochschild, 2000).

Figure 3. Evolution of Generations (1941-2020) of Barcelona, Palma and Valencia, from 1991-2024

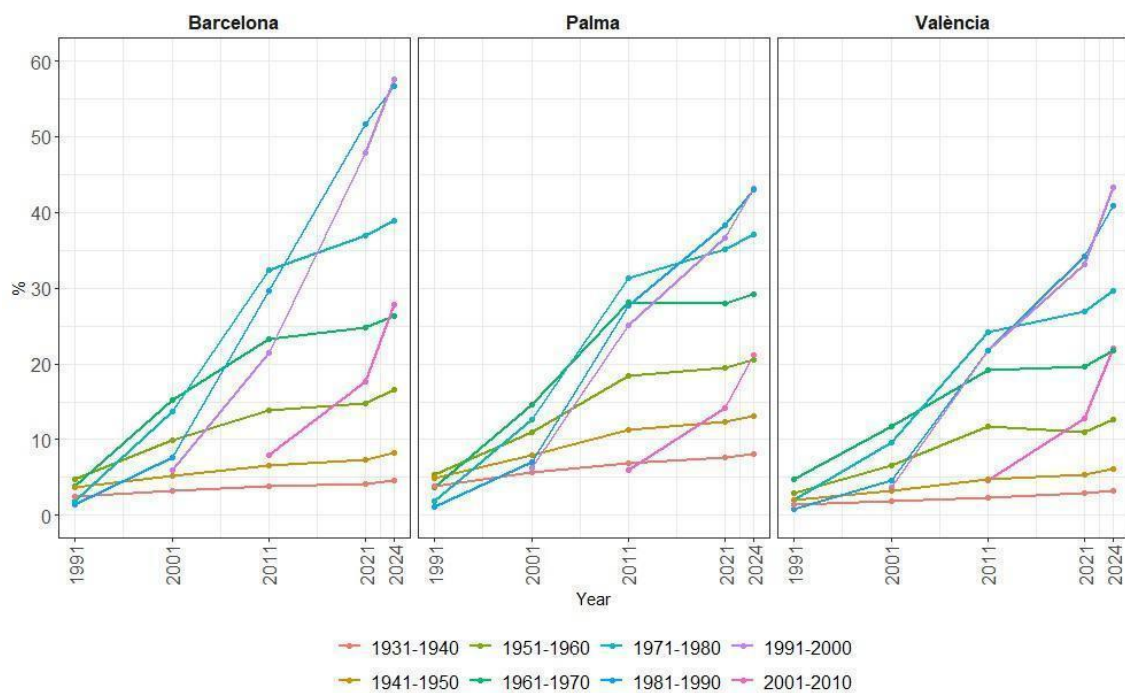


Consequently, the share of international migrants within the different cohorts varies, reaching values exceeding 50% among the youngest cohorts in the case of Barcelona (Figure 4). In all three cities, the cohort born between 1991–2000 records the highest percentages, as it was affected by both migration booms, surpassing the 1981–1990 cohort, less impacted by the second.

The observation that the two most recent cohorts, those with the highest percentages of foreign-born individuals, are “empty cohorts” does not imply that larger cohorts at birth did not also experience substantial levels of migration. That is the case for the 1961–1970 and especially the 1971–1980 cohorts. This cohort perspective highlights not only changes in the human landscape of the territory, and thereby neighbourhood identity and cohesion, it also reveals the extent to which intergenerational relationships take on an intercultural dimension, given the stronger diversification of the most recent cohorts and their residential segregation.

This asymmetric impact of immigration across different cohorts or generations will undoubtedly create new dynamics in the sharing of urban spaces and the interactions between more diverse younger generations and older, more homogeneous ones. Such intergenerational relationships may shape patterns of social cohesion, segregation, and everyday coexistence within the city.

Figure 4. Percentage of foreign born in Generations (1931-2010) of Barcelona, Valencia and Palma, 1991-2024



3.3 Measuring Diversity

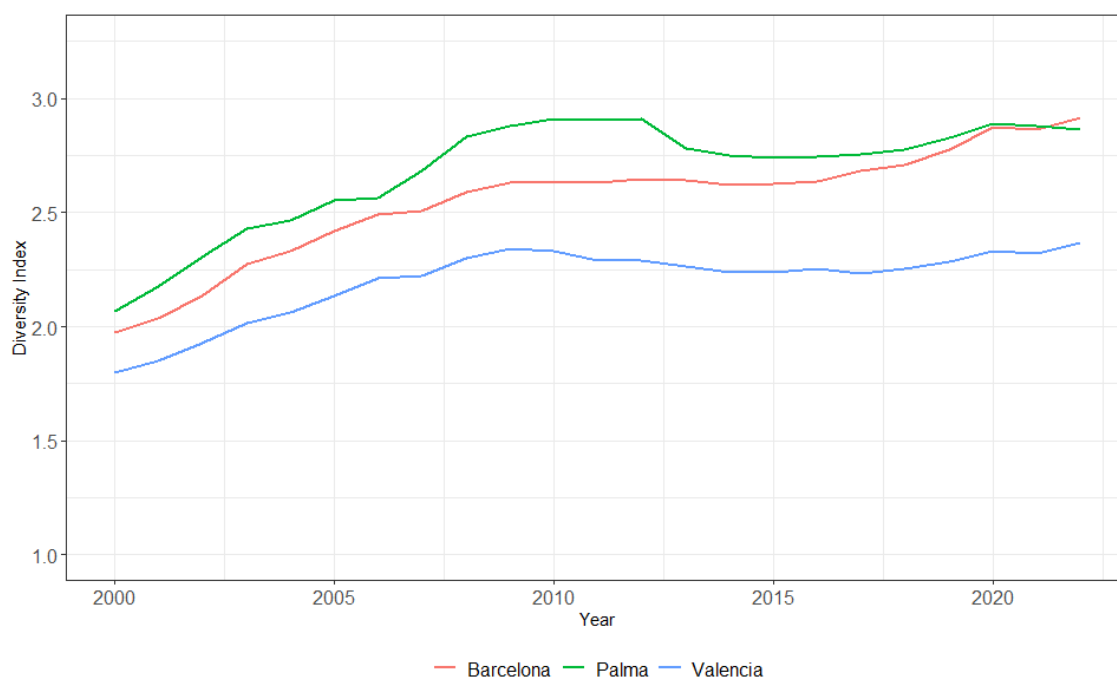
Diversity, as we measure it, does not only capture the increase in different population origins, but also the weighting of the presence of different groups within the same territory or generation. It should therefore not be confused with the number of immigrants or the proportion they may represent within a given territory. In this regard it is important to recall that we distinguish eight origin groups by place of birth (Same province, rest of Spain, former EU-15 and other developed countries, Rest of Europe, Maghreb, Sub-Saharan Africa, Latin America, Asia, and a residual category). These groups are analytically relevant for the cities studied, either due to their demographic weight or their distinct residential patterns within the urban fabric (Galeano and Bayona-i-Carrasco,

2018). The evolution of diversity (Figure 5) broadly reflects the phases of migratory growth in Spain, although it manifests differently in each city. As we have explained, although the number of different countries of birth increases exponentially, their uneven distribution, with a large concentration of Latin American and European populations, means that the Simpson Index, which captures the balance among groups, remains at relatively low levels in all three cities, even though it increases over time. The initial increase during the first decade of the twenty-first century stabilises with the onset of the economic crisis, which had a particularly marked effect in Valencia. There, the construction sector, which played a central role both in the city and region, was the first and most impacted by the crisis (Salom-Carrasco et al., 2015) leading to migrant workers leaving and a decline in the indicator. In Palma, a decrease occurred between 2012 and 2013, which should be linked to administrative changes in the management of the municipal population register. This reflects the first-time removal from the register of individuals from other EU countries whose continued residence in Spain could not be verified. This measure was especially consequential in Mediterranean regions with a substantial presence of EU residents for lifestyle or residential reasons, of which Palma is a notable example.

From 2015 onwards, diversity begins to rise again, particularly in Barcelona, where migratory inflows have been especially intense (Domingo et al., 2023). Consequently, Palma and Barcelona display higher levels of diversity than Valencia, although Barcelona surpasses Palma for the first time in the final year analysed (2022) approaching an indicator of 3.

The higher values of Palma can also be explained by the contribution of internal migrants from the rest of Spain, which is one of the origins considered. Internal migrants played an important role in all three cities during the twentieth century; however, only Mallorca and its capital, Palma, continue to receive substantial inflows throughout the twenty-first century, driven largely by the tourism sector, which primarily attracts young, low-educated migrants.

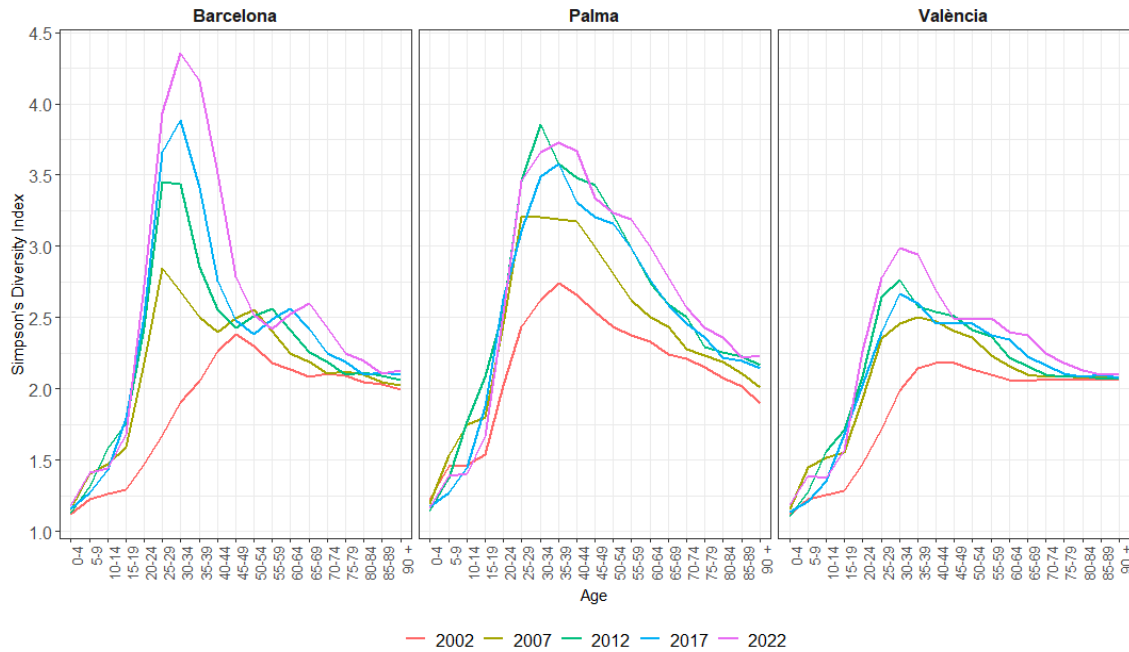
Figure 5. Evolution of Simpson index of Diversity in the three cities, 2000-2022



The evolution of diversity takes on a new perspective when examined by age group, a particularly important aspect, given that these are cities with recent international migratory flows (Figure 6). In 2002, at the onset of the first migration boom, maximum diversity was observed in Palma among individuals aged 35–39, in Barcelona at 45–49, and in Valencia at 40–44.

At the same time, relatively high diversity persisted above these ages, largely as a result of earlier internal migration processes. Since then, new peaks have emerged among younger age groups (30–34), reaching values close to 4.5 in Barcelona by 2022, above 3.5 in Palma by 2012, and approximately 3.0 in Valencia by 2022. Barcelona's surpassing of the other cities in the most recent year reflects the progressively more intense arrivals among younger cohorts in recent periods. In the same city, diversity declines among intermediate ages, a pattern not observed in the other two cities, particularly Palma. Although Barcelona has exceeded the others in peak diversity in the last two periods, Palma maintains higher values among middle-aged groups up to 65–69. This results in a more evenly distributed diversity across age groups in Palma, and to a lesser extent, in Valencia.

Figure 6. Diversity by age groups in Barcelona, Palma and Valencia, 2002-2022



3.4 Sub-municipal diversity trends

To understand the impact on the population and on residents' perceptions of diversification, we need to examine how this diversity is distributed at the district level. When analysing diversity across districts (Figure 7), it is necessary to consider the specific characteristics of each district (Tables in appendix) such as their socioeconomic conditions. The comparison is complex, since we are studying cities and districts that vary considerably spatial and demographic characteristics. Barcelona is divided into 10 districts, Valencia into 19 and Palma into 5 (see maps in appendix).

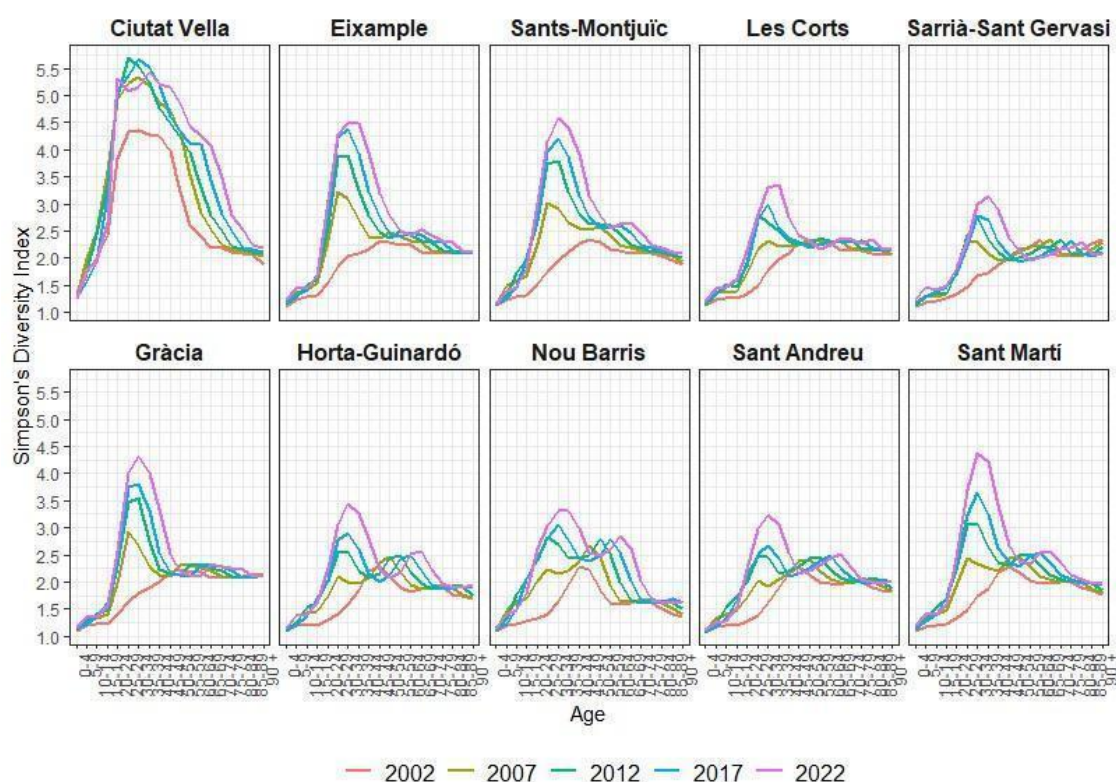
A common pattern across the three cities is that the central districts (the historic city centres) tend to reach the highest diversity scores (5.5 in Barcelona, 4.3 in Palma, and 4.0 in Valencia). The key difference lies in the economic profile of these areas: while the central district of Barcelona ranks relatively low in economic indicators, in Valencia and Palma it is among the wealthiest. Nevertheless, all three have undergone or are currently undergoing processes of gentrification and turistification.

In Barcelona, the diversity indicators reveal the most notable contrasts between younger and older age groups among the three cities. The lowest levels of diversity are found in the city's wealthiest districts, particularly Sarrià–Sant Gervasi and Les Corts. In contrast, the lowest-income district (Nou Barris) stands out as a clear example of an area

strongly shaped by past internal migration processes, where older internal migrants coexist with newer international migrants.

Overall, four districts in Barcelona recorded diversity scores above 4 in 2022, with Ciutat Vella already exceeding this threshold as early as 2002. This historical district is where the gentrification process is most advanced (Sánchez-Aguilera and González-Pérez, 2021). Districts such as Sant Andreu, Horta-Guinardó, and Sant Martí also reflect the lasting impact of earlier migration waves, particularly among older residents. Meanwhile, more central areas like Eixample, Sants-Montjuïc, and Gràcia display a different pattern, characterized by significant increases in diversity over time among younger age groups, while older cohorts remain less affected. These districts are also described as experiencing advanced gentrification (Sanz-Pérez et al, 2025)

Figure 7. Diversity by age groups in Barcelona districts, 2002-2022

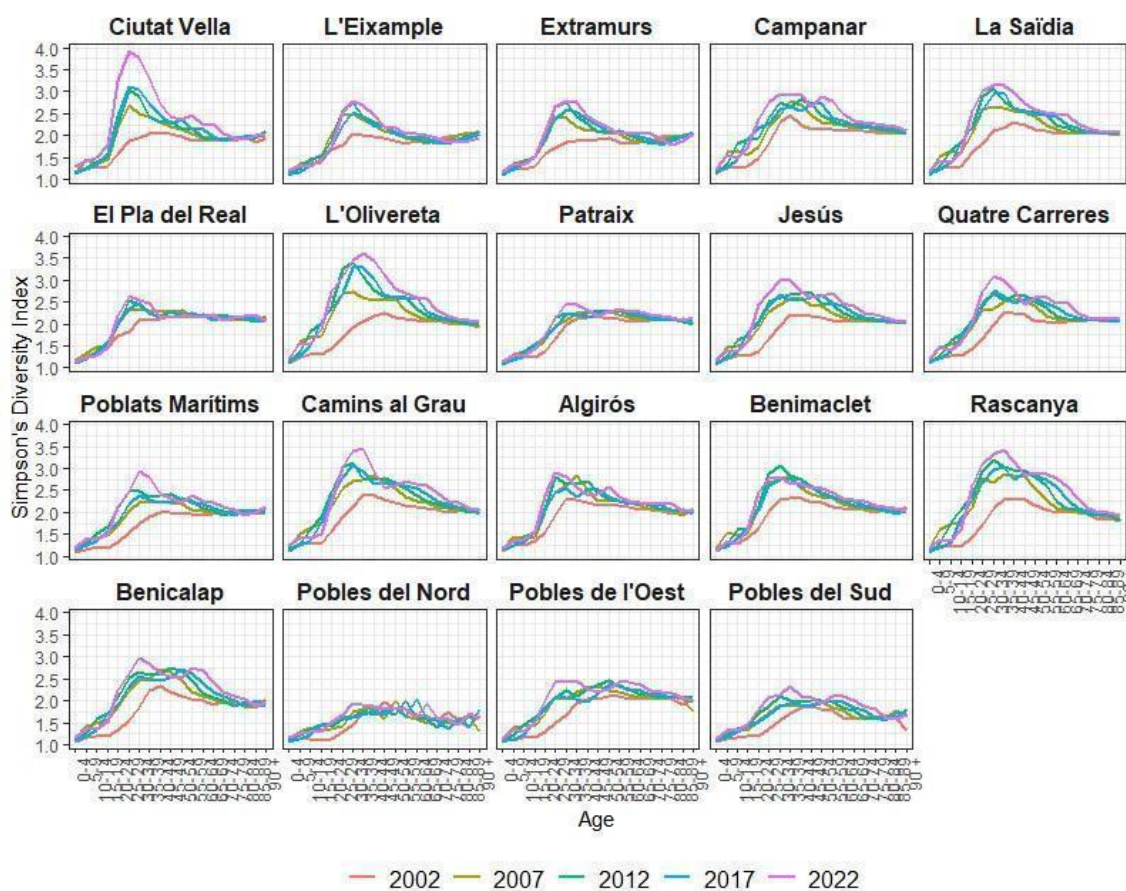


València

The wealthiest districts in Valencia which are also the most geographically central ones (Eixample, Extramurs, and Pla del Real), exhibit generally low levels of diversity (Figure 8). The exception is Ciutat Vella, which, despite its high-income levels, is a district characterised by considerable diversity. In contrast, lower-income districts (most

notably Rascanya and Olivereta) display comparatively high diversity. Following the same trend as Barcelona, other central districts with medium income (such as Camins al Grau), show diversity levels approaching those of these lower-income districts. Other districts begin with relatively low diversity but experience a marked increase over time, reaching high levels by 2022 (La Saïdia). Nonetheless, some districts similar in terms of income (Poblats Marítims), maintain consistently low diversity values. Finally, the influence of previous internal migration is evident across many districts, more prominently so than in the other two cities.

Figure 8. Diversity by age groups in Valencia districts, 2002-2022

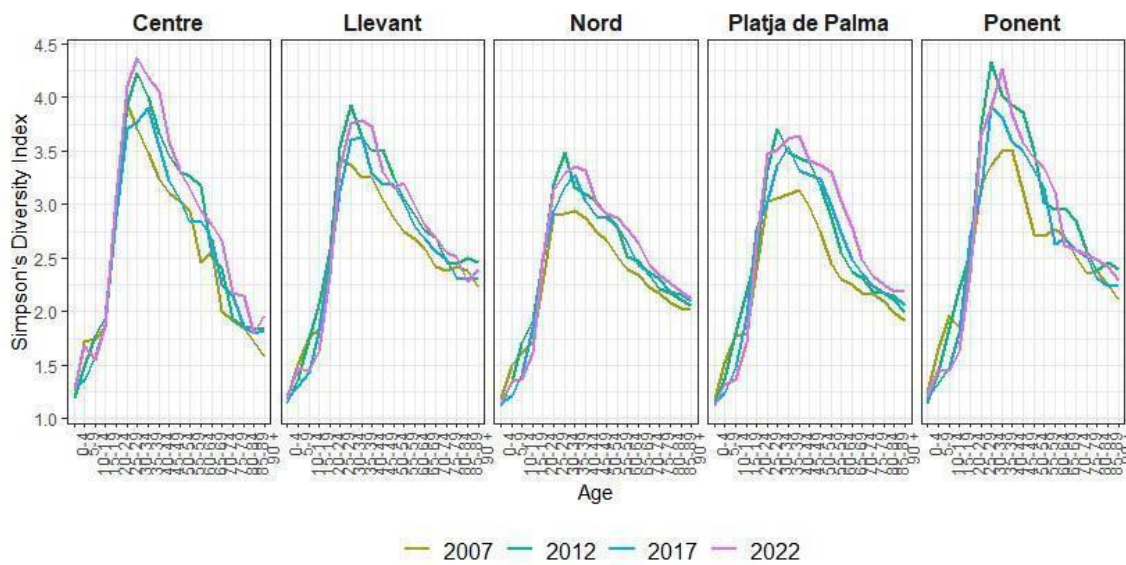


Palma

Two districts of Palma (Figure 9) combine relatively high-income levels with elevated levels of diversity (Centre and Ponent). The most socioeconomically disadvantaged district (Llevant) exhibits the third-highest diversity values in the city. By contrast, the Nord district, middle to upper in terms of income, shows notably lower levels of diversity.

Regarding temporal trends, most districts reached their highest diversity levels around 2012, except for Centre, where diversity continued to increase and peaked later, in 2022. The age profile of diversity in most districts mirrors the overall municipal pattern, with a pronounced peak at younger ages and sustained high levels throughout mid-adulthood compared to the other two cities. The Llevant district, despite having the lowest income levels, shows remarkably high diversity at older ages (contrary to the other two cities), ranking second only to Ponent (the richest district).

Figure 9. Diversity by age groups in Palma districts, 2002-2022



3.5 Diversity and Income

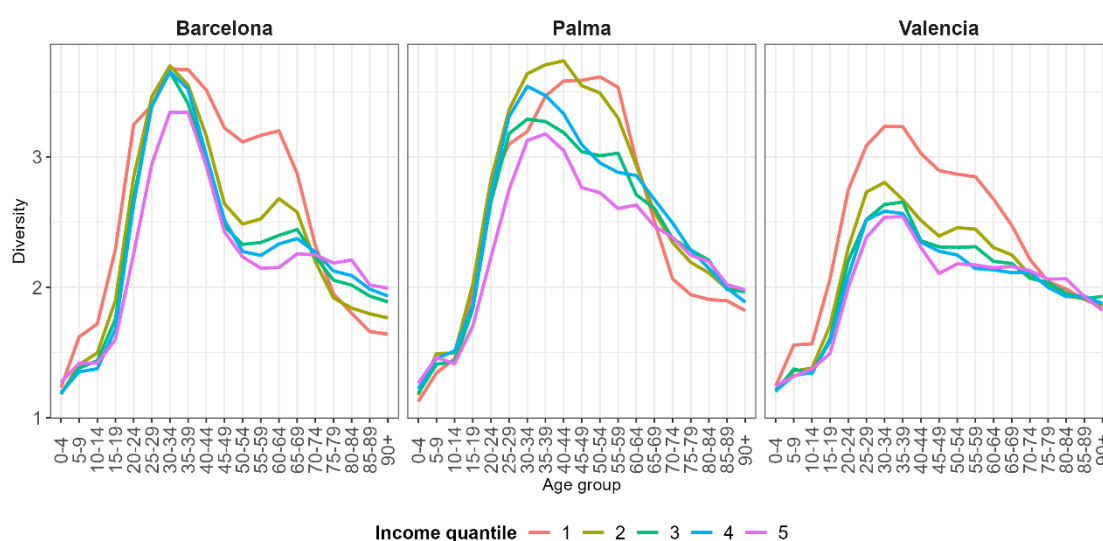
Significant socioeconomic heterogeneity persists within districts. The clearest case is Palma, where only five districts exist, which limits the depth of analysis of sub-municipal trends. Using household income available at the census tract level, we can link this socioeconomic indicator to the diversity index to assess this relationship in greater detail. Thus, we group household income in quantiles (from lowest 1, to highest 5) by census tracts, observing a different age and average diversity patterns across the three cities (Figure 10).

Starting with Barcelona, we distinguish a similar shape to figure 6, with younger ages ranging from 25 to 39 displaying the highest across all ages. More important differences are found from 45 to 70 years old between, where the lowest income quantile maintains substantial higher levels of diversity. That is mainly due to the effect of the first international migrants concentrated in low-income areas.

The gap in diversity between the wealthiest areas and the rest is smallest in Barcelona at the younger peak ages. At ages 80 and above, the diversity pattern is reversed: the lowest values occur in low-income areas, where the population is overwhelmingly composed of internal migrants from the rest of Spain (72%) and locally born individuals (25%). This reflects the historical development of low-income neighbourhoods as settlements for internal migrants. International migrants remain underrepresented among the oldest age groups in these areas.

Palma's results are more complex, in younger ages the second and forth quintile show the highest levels mainly because of residential migration, attracting not only old age migrants, but also young and middle-aged professionals (Salvà-Tomàs, 2002). Whilst the lowest income quantile shifts its higher values to the 50-54 age group. Again, middle ages show higher diversity values compared to Barcelona and Valencia, highlighting a different migration model with a predominant role of lifestyle migration in middle and old ages. As in Barcelona, the lowest-income areas display the lowest levels of diversity in the oldest ages, while diversity is more pronounced in higher-income neighbourhoods. Valencia is the city where the lowest quartile shows more distance with the rest and consistently having the highest diversity. The pattern is similar to that of Barcelona, showing the highest values in younger ages, and a new bump around ages 50 to 60 revealing the effect of the first international migration wave before the Great Recession. At the oldest ages, all quantiles converge to very similar values.

Figure 9. Diversity by age and income quartile, census tract level, 2022



Across all of them, we can identify three recurring spatial configurations of high diversity at the district level: (1) central areas, defined as the historic urban cores; (2) working-class peripheral areas; and (3) central middle-class districts.

Diversity is the highest in the central areas with the historic city centres acting as early pioneers. Over time, other districts, mostly middle-class, have also experienced growing diversity in younger ages, especially after the crisis prompted mainly by push factors and being more educated. In both first two categories, gentrification processes have been central and have transformed, or are in the process of transforming, the demographic landscape of these cities (Sanz-Perez et al, 2025). Moreover, they have gone hand in hand with an increase in diversity.

In contrast, peripheral low-income districts concentrate old age internal migrants from the last century, as well as aging international migrants who arrived before the Great Recession as well as younger age groups from the latest migration wave.

These contrasting patterns reflect the spatialization of a dual form of diversity, embodying the notion of a dual city: diversity increases in both cases, but in very different kinds of urban settings: working-class, formerly internal migrant neighbourhoods on the periphery versus central, middle-class and areas undergoing gentrification. The implications for coexistence in these spaces will differ depending on the socioeconomic conditions of both migrants and native residents. In more disadvantaged areas, challenges are likely to be greater, particularly where newly arrived international migrants share space with earlier waves of internal migrants.

Nevertheless, several fundamental differences between the cities can be identified that shape their migratory dynamics, including their economic specialization, the timing of their migration histories, and their respective positions within the globalized economy. In terms of diversity, in Barcelona, diversity among younger age groups cuts across income levels, whereas in Valencia it is more strongly concentrated in low-income neighbourhoods. These two cities are closer to the three urban models outlined above. In Palma, both low and high-income areas exhibit high levels of diversity. Age related patterns are broadly similar in Barcelona and Valencia, with a clear contrast between younger and older populations. Palma, however, displays a distinct age profile, reflecting the influence of lifestyle migration, which spans a wide range of age groups, a pattern reminiscent of a “Californian migration model” combining substantial lifestyle migration among middle and older-age groups, which in turn attracts younger migration driven by

the service sector. This results in relatively high levels of diversity across most age groups.

4. Discussion and conclusion

The “Great Replacement Theory” constitutes a narrative fallacy that compensates for an inability to comprehend the systemic changes of the Complex System of Demographic Reproduction. These changes begin with immigration in accelerating population renewal and its impact on demographic metabolism, that is, the unequal diversification of generations produced by immigration. When viewed through the lens of social and spatial interactions, these changes reshape intergenerational, gender, and class relations, highlighting the perceived importance of origin social weight assigned to a person's origin.

These demographic changes, in and of themselves, do not explain the acceptance and rapid diffusion of conspiracy theories such as the “Great Replacement”. Such theories require a national-populist narrative capable of capitalising on the unease generated by the fear of becoming redundant among populations that have directly experienced the increase in inequality accompanying economic globalisation and the rise in migratory movements. Such narratives require communicative networks for their dissemination creating a community bound together by the negativity of the conspiratorial theory. Yet the underlying realities and the exceptional magnitude of recent demographic changes, which are essential for understanding the rise of regressive discourses on migration, have frequently been neglected.

In this study we have explored, first, the remarkable speed of population turnover linked to the increase in migration has not only resulted in greater diversity within the city and its districts, but also in a profound transformation of the human landscape and uses of urban space. This acceleration helps explain why negative perceptions of rising inequality and the job insecurity associated with globalization are frequently associated with the fast change in the origin composition of residents within the same neighbourhood, a form of ecological fallacy that reinforces the “Great Replacement” theory. Ultimately, this conspiracy theory provides an oversimplified interpretation of complex systemic changes, which unfold in parallel with rapid transformations in the neighbourhood's population.

Second, the diversification of generations does not constitute a process of ethnic replacement, as the conspiratorial theory claims, but rather reflects the complex transformation of the population across multiple cohorts and territorial scales, shaped by already existing cohort sizes, local spatial socioeconomic characteristics and by the specific migration histories of urban areas. Demographically speaking, the relative weight of migrants varies substantially across generations. Existing demographic conditions, most notably the presence of “empty” and “full” cohorts resulting from earlier periods of fertility decline or increase, are crucial for understanding the relative importance of immigrants within specific generations. While heterogeneity by origin is minimal among the oldest cohorts, it reaches its highest levels among the most recent cohorts, particularly among young adults of working age. Consequently, intergenerational relations increasingly intersect with intercultural relations. In terms of socioeconomic characteristics, the diversity of origins reflects differentiated mobility profiles within the same city in a context of globalization, ranging from a new class of highly mobile professionals settling in central or revalorised neighbourhoods to a larger group employed in low-paid occupations. Migration flows closely follow economic cycles rather than processes of replacement. The first wave was largely driven by pull factors linked to economic expansion in sectors such as construction and services, whereas the second wave and subsequent recovery were more strongly shaped by push factors and involved migrants with higher educational profiles.

Third, by examining diversity by the neighbourhood and income, we find that exposure to diversity is higher among residents of the most economically vulnerable districts and census tracts. These areas still contain a significant share of residents from the twentieth-century internal Spanish migrations, as well as central neighbourhoods undergoing processes of gentrification, where the native population is displaced by a globalized real estate market. This population is the most adversely affected by the growing process of inequality, together with the immigrants with whom they share the territory.

We should therefore consider that the theory of demographic metabolism is not only highly useful in this applied context, where migration constitutes a key element for understanding generational replacement at the sub-municipal level. Its territorial-level analysis also makes it possible to measure the magnitude of the impact of demographic change driven by immigration on generations and neighbourhoods. These are precisely the dynamics that discourses of “involution” seek to instrumentalize in order to lend an appearance of credibility to their conspiracy theories.

As a next step to be addressed in future research, the relationship between the indicators and results proposed here and the electoral behaviour of the population remains to be explored. Bringing together a demographic analysis that measures systemic changes in the demography of cities and neighbourhoods with electoral behaviour would be of great interest for advancing our understanding of the relationship between the two, going beyond and contributing additional insight to the more recurrent analyses in electoral sociology.

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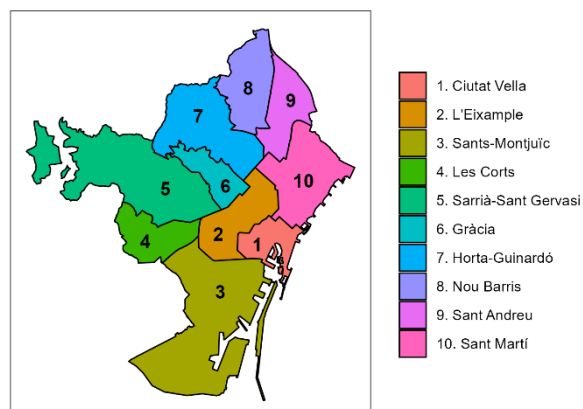
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APPENDIX

Barcelona

Districts	Population	Household income (euros)	Share foreign-born (%)
Ciutat Vella	101.160	30.572	62,22
Eixample	262.015	47.663	33,34
Sants-Montjuïc	178.073	37.937	32,91
Les Corts	80.229	58.364	20,64
Sarrià-Sant Gervasi	146.005	74.733	20,36
Gràcia	119.824	44.713	27,04
Horta-Guinardó	170.435	38.592	24,45
Nou Barris	169.313	32.739	29,14
Sant Andreu	151.671	39.274	22,08
Sant Martí	236.399	41.317	27,77
Total	1.615.124	43.991	29,58

Barcelona

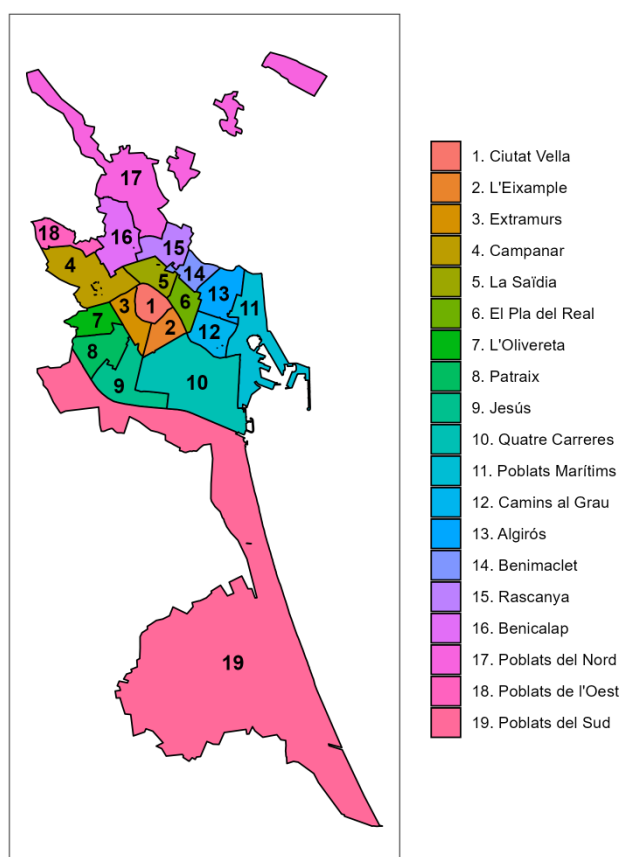


València

Districts	Population	Household income (euros)	Share foreign-born (%)
Ciutat Vella	26.986	46.088	24,11

L'Eixample	43.038	52.010	15,88
Extramurs	48.453	43.201	17,44
Campanar	39.166	42.527	20,58
La Saïdia	46.140	34.130	22,19
El Pla del Real	30.278	58.092	13,61
L'Olivereta	48.586	30.394	27,06
Patraix	57.850	36.536	15,69
Jesús	51.747	32.005	22,15
Quatre Carreres	75.730	34.390	21,46
Poblats Marítims	54.750	31.660	19,67
Camins al Grau	65.170	38.406	21,97
Algirós	35.337	38.781	17,41
Benimaclet	27.933	38.379	16,83
Rascanya	53.565	33.209	25,40
Benicalap	48.148	32.894	21,23
Pobles del Nord	6.778	42.038	11,25
Pobles de l'Oest	14.592	30.219	19,11
Pobles del Sud	21.370	32.240	16,15
Total	795.617	37.596	20,2

Valencia



Palma

Districts	Population	Household income (euros)	Share foreign- born (%)
Centre	23.321	51.858	29,94
Ponent	116.557	45.521	25,18
Nord	91.059	42.551	23,16
Llevant	150.627	37.008	27,29
Platja de Palma	37.396	40.215	26,44
Total	418.960	41.852	25,88

Palma

