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Can Migration Mitigate Labour Force Shrinking?

Local and Gender Divides in Italian contexts

Abstract

Although the accelerated ageing of labour force is commonly depicted across European countries, differences in local population dynamics remain often undetectable, mainly due to data limitations at fine geographical scales. The analysis investigates at what extent cohort turnover and migration flows influence the labour force dynamics at sub-national level. Italy has been selected as an ideal case study for two main reasons. First, Italy is recognized as an extreme example of lowest-low fertility country; second, structural internal divides characterize Italian territories.

At provincial level, the annual active population change is decomposed into cohort turnover and both internal and international migration effects, over the period 2011-2020, applying the Degree of Urbanization (DEGURBA) classification to assess territorial heterogeneities.

Although cohort turnover effects are the main structural component of labour renewal at provincial levels, results reveal an important role of internal mobility in driving the changes of local labour forces. International migration plays a smaller but persistently gendered role: female migrants consistently exhibit higher turnover shares.

The analysis represents a first attempt to assess the distinctive role played by internal (and international migration) in mitigating the impact of population ageing on the local labour force. By mapping the complexity and heterogeneity of labour force dynamics, the analysis contributes to assess diversities in labour market participation by gender and underscore how the increase of female labour force participation is becoming crucial to alleviate the effects of ageing.

Long Abstract

1. Introduction

Developed societies are experiencing relevant population ageing dynamics (Bistock and George 2011). Cohort turnover effect on population change is becoming dramatic both in terms of labour supply shortage (Börsch-Supan 2003; Piggot and Woodland 2016) and welfare state sustainability (Lutz et al. 2019; European Commission 2024). These impacts are widespread across the European Union (EU) member states (Carone et al. 2005), becoming more significant for the lowest-low fertility countries (Kohler et al. 2002, Billari and Kohler, 2004). The public debate on the challenges related to ageing is lively both in the scientific and political arenas. The most (and fastest) viable option to counterbalance (or slow down) ageing effects is represented by international migration (Billari 2022), considering that migrant populations, compared to native ones, are usually younger and have higher fertility rates (Kulu and González-Ferrer 2014). However, national aggregates do not always reflect local population and labour market dynamics, and related possible consequences of migration. Previous studies at local levels (Goujon et al. 2022, Ghio et al. 2022) have shown that migration can partially mitigate the effects of ageing; yet they lack distinguishing effects between international and internal movements (Impicciatore and Strozza 2016). Since the growing interest for causes and effects of the geographical dimension of inequality (Rodríguez-Pose, 2018; Storper, 2018), the distinction between international migration and internal mobility is essential to capture within-country heterogeneity.

Against this context, the study aims to assess what extent cohort turnover and migration flows influence the labour force dynamics at sub-national level. In this perspective, Italy is a valid case study for at least two reasons. First, Italy is recognized as an extreme example of lowest-low fertility country (Kohler et al. 2002); second, structural internal divides, among the deepest in the developed world (Rosés and Wolf 2018; Avola et al. 2024), characterize Italian territories. Using ad-hoc datasets on mobility granted by the National Institute of Statistics (ISTAT), the analysis decomposes the active population change into cohort turnover and both internal and international migration effects, by province (NUTS-3 level). The approach proposed by Ghio at al. (2022) is here innovatively elaborated introducing the following specifications: i) international migration effects are separately measured from internal mobility ones; ii) rather than the working-age population, the labour force is estimated.

The analysis is expected to extend migration literature. Firstly, the descriptive findings offer a preliminary assessment of the role played by internal and international migration in mitigating the impact of population ageing on the local labour force. Second, we map the heterogeneity of labour force dynamics, accounting for territorial variations in labour market participation for men and women, across Italian territories.

2. Data and Methods

The analysis is based on data collected at the provincial level by ISTAT on population and demographic behaviours. Specifically, publicly available information from administrative sources, population censuses and population intercensal reconstructions were harmonized to monitor changes in the labour force, between 2011 and 2020: i) populations residing in Italian provinces as of January 1st; ii) deaths. These datasets were complemented by ad hoc data provisions on mobility and active population rates by age-group. Overall, we compile and harmonize data on 106 provinces, disaggregate by sex and 15-year age groups.

To examine the effects of ageing population on labour force dynamics at the local level, we account for the population aged 25 to 64 years living in Italian provinces. Entry cohorts are defined as the 25-age group becoming part of the working-age population during the reference period, while exit cohorts are defined as the 64-age group leaving the working-age population during the reference period. The labour force was estimated by applying sex and age-specific activity rates to the working-age population.

Table 1 details data sources, definitions, breakdowns and activity rates adopted by the analysis to compute the labour force by province.

Table 1 – Data sources, definitions, breakdowns and applied activity rates

Data source	Definition/type of information	Breakdown / sex and age group	Activity Rates
Istat intercensal population reconstruction by province, sex and age class 2011-2020	Entry cohort	Age 25 on January 1st	Activity rate of 24 age class
	Exit cohort	Age 65 on January 1st	Activity rate of 64 age class
Deaths by municipality, sex and age class (5-year groups) 2011-2020	Deaths	Aged 25-49	Activity rate of 25-49 age groups
		Aged 50-64	Activity rate of 50-64 age groups
Ad hoc data provisions, international and internal movements by municipality, sex and age class (5-year groups) 2011-2020	International and internal movements	Aged 25-49	Activity rate of 25-49 age groups
		Aged 50-64	Activity rate of 50-64 age groups

To assess the contribution of each demographic component to the local labour force changes during each year, we formulate the following equation:

$$Pop\_lf_{i,t+1}^{25-64} = Pop\_lf_{i,t}^{25-64} + \left(im\_lf_{i,t-t+1}^{25-64} - em\_lf_{i,t-t+1}^{25-64}\right) + \left(imm\_lf_{i,t-t+1}^{25-64} - emm\_lf_{i,t-t+1}^{25-64}\right) - deaths\_lf_{i,t-t+1}^{25-64} + \left(entry\_lf_{i,t-t+1}^{25} - exit\_lf_{\_i,t-t+1}^{64}\right)$$

where:

i = provincial territorial unit; *t* = beginning of the reference temporal period; *t+1* = end of the reference temporal period

$Pop\_lf_{i,t+1}^{25-64} Pop\_lf_{i,t}^{25-64}$ represent the active population at the beginning and end of reference period, respectively

$\left(im\_lf_{i,t-t+1}^{25-64} - em\_lf_{i,t-t+1}^{25-64}\right)$ is the net international migration, computed as difference between in-out international flows of active migrants, *arrived in* and *emigrated from* the province *i* during the reference period *t-t+1*

$\left(imm\_lf_{i,t-t+1}^{25-64} - emm\_lf_{i,t-t+1}^{25-64}\right)$ is the net internal mobility, computed as difference between in-out intra-provincial flows of active internal migrants, arrived in and emigrated from the province *i* during the reference period *t-t+1*

$deaths\_lf_{i,t-t+1}^{25-64}$ correspond to labour-force deaths aged 25-64 years, recorded in the province *i* during the reference period *t-t+1*

$\left(entry\_lf_{i,t-t+1}^{25} - exit\_lf_{\_i,t-t+1}^{64}\right)$ is the net labour-force cohort turnover (*Cohort turnover_lf*), computed as difference between in-out active cohorts, recorded in the province *i* during the reference period *t-t+1*

Following the definition of the Population Turnover Rate and Migration Share of Turnover (Billari, 2022), we propose the Population Turnover Rate of the labour force (PTR_lf) referred to the active population, where each component of changes is gauged by the rate or proportion between the estimated active migrants (international or internal immigrants or emigrants) or labour-force deaths, and the average active population living in the province during the reference period. For instance, the crude immigration rate is computed as follows:

$$r\_im\_lf_{i,t-t+1}^{25-64} = \frac{im\_lf_{i,t-t+1}^{25-64}}{\left(Pop\_lf_{i,t+1}^{25-64} + Pop\_lf_{i,t}^{25-64}\right)/2}$$

Then, we derive the International Migration Share of Turnover (iMST_lf) and Internal Mobility Share of Turnover (mMST_lf) to decompose the incidence of international migration and internal mobility. Formally, they are:

$$iMST\_lf_{i,t+1}^{25-64} = \frac{r\_im\_lf_{i,t-t+1}^{25-64} + r\_em\_lf_{i,t-t+1}^{25-64}}{\left(PTR\_lf_{i,t+1}^{25-64}\right)}$$

$$mMST\_lf_{i,t+1}^{25-64} = \frac{r\_imm\_lf_{i,t-t+1}^{25-64} + r\_emm\_lf_{i,t-t+1}^{25-64}}{\left(PTR\_lf_{i,t+1}^{25-64}\right)}$$

For the reference period, the $PTR\_lf_{i,t+1}^{25-64}$ captures changes accounting for the labour-force and population dynamics experienced by each province, while $iMST\_lf_{i,t+1}^{25-64}$ and $mMST\_lf_{i,t+1}^{25-64}{}_{i,t-t+1}$ quantify the role played by migration components.

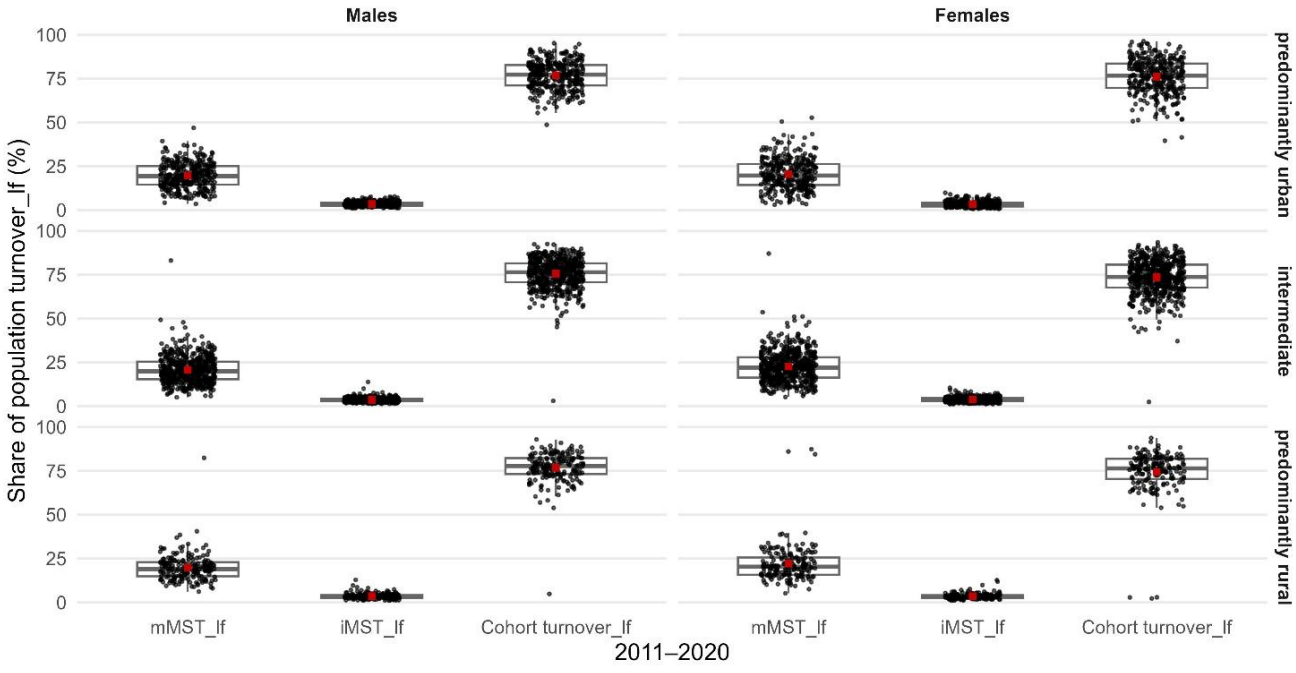
To illustrate results, we cluster Italian provinces using the "DEGURBA" European territorial classification of degrees of urbanization (Eurostat 2020), based on population size and density, which distinguishes three predominant categories: (a) predominantly urban areas, accounting for more than 50% of the population; (b) predominantly intermediate areas, where more than 40% of the population lives; and (c) predominantly rural areas, where the 8-9% of the population lives in 2011-2020.

3. Preliminary results

The joint analysis of the *PTR_lf*, the *Cohort turnover_lf*, and the *MST_lf* – distinguishing its *iMST_lf* and *mMST_lf* components – provides a comprehensive picture of the demographic renewal mechanisms operating in the local labour market across Italian provinces during 2011–2020 interval. Together, these indicators quantify the ageing and mobility-driven renewal at sub-national level.

Figure 1 illustrates the distribution of the main components of labour force population turnover across Italian provinces from 2011 to 2020, disaggregated by sex and degree of urbanisation. Overall, the patterns appear broadly consistent between males and females, with only minor gender-related differences in the magnitude and dispersion of values. Internal migration represents a relatively modest share of total population turnover, while international migration remains even lower across all territorial typologies. By contrast, cohort turnover, reflecting demographic ageing and replacement, accounts for the largest component of population turnover everywhere. Urban provinces show slightly higher levels of internal mobility, consistent with greater demographic dynamism and population renewal. These findings highlight that structural demographic processes, rather than migration flows, are the primary drivers of population turnover in most Italian territories, with gender differences playing a minor role.

Figure 1 – Labour force components (*iMST_lf, mMST_lf and Cohort turnover_lf*) by sex and DEGURBA, 2011 and 2020

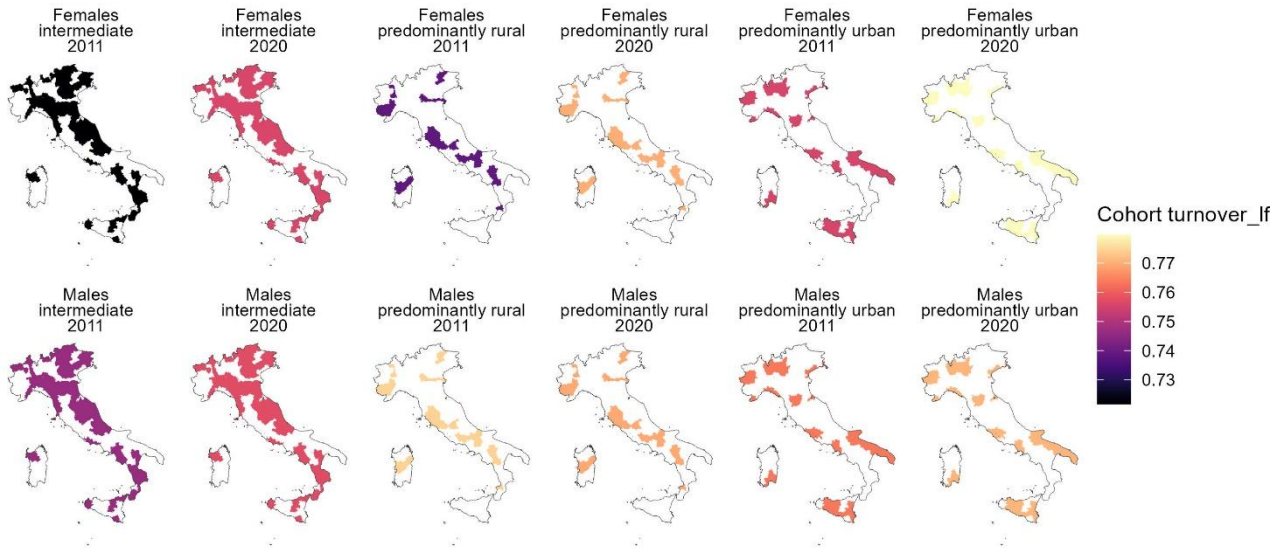


When the increase across all DEGURBA classes indicates a mild reinforcement of generational replacement within the working-age population, particularly among women, gender differences diminished over time, and female *Cohort turnover_lf* now equals or slightly exceeds that of men in all spatial categories. Nonetheless, intermediate provinces remain systematically below urban and rural ones (≈72%–75%), reflecting a demographic slowdown typical of transitional territories in terms of urbanization.

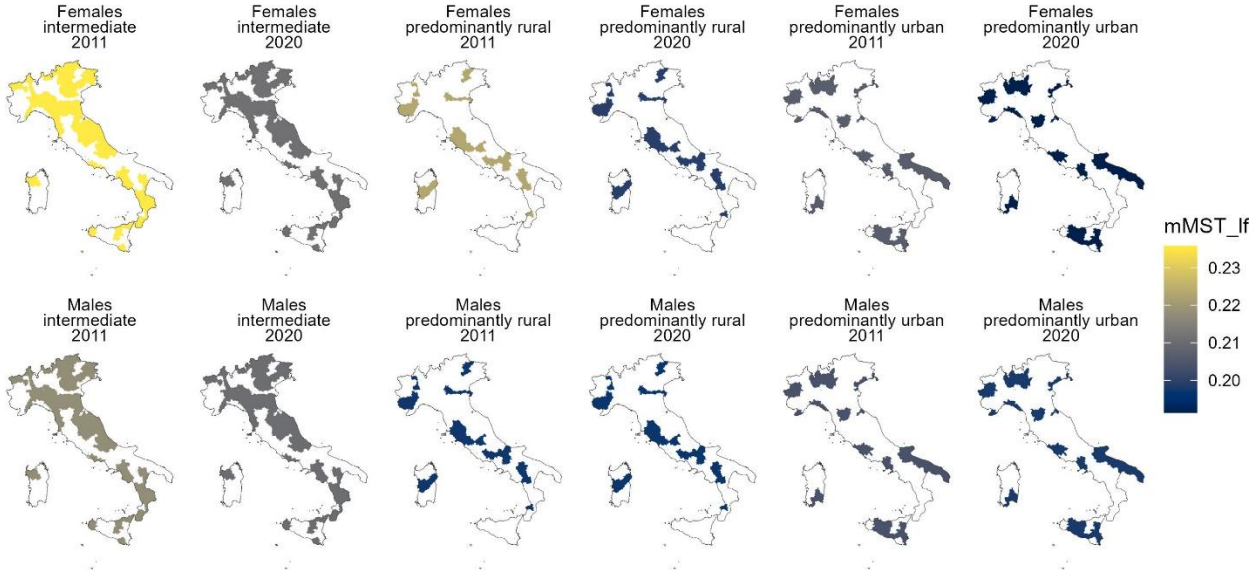
The mMST_lf, which captures the share of turnover attributable to internal migration, exhibits higher variability and clearer spatial gradients. In 2011, female mMST_lf reached 21% in urban provinces, 24% in intermediate, and 22% in rural contexts; male values were 20%, 22%, and 20%, respectively. By 2020, a general decline emerged, particularly among women—dropping to 19% (urban), 21% (intermediate), and 20% (rural)—while male levels decreased slightly to 19.8, 21%, and 19.7%. Thus, internal migration contributed between 19% and 24% of total labour-force turnover in 2011 but fell to roughly 20% by 2020, indicating a reduction in interprovincial mobility. Although the magnitude of internal mobility remains similar for both sexes by 2020, women displayed higher values in 2011, suggesting a progressive attenuation of female-led internal migration dynamics over the decade. The iMST_lf remains comparatively modest but displays distinctive gender and spatial asymmetries. In 2011, female averages were 3.7% (urban), 4.3% (intermediate), and 3.8% (rural), while men recorded 3.5%, 3.1%, and 2.8%. By 2020, both sexes experienced slight decreases, with female means at 2.9%, 3.3%, and 3.3%, and male ones at 3.1%, 3.2%, and 3.1%. Despite their small absolute magnitude, these figures show that international migration continues to play a steady, gendered role in labour-force renewal. Women maintain higher iMST_lf values in all DEGURBA classes likely due to the growing importance of female-dominated migration streams—especially in care and service sectors concentrated in urban and intermediate territories.

Figure 2 - Spatial patterns of labour force components (*iMST_lf, mMST_lf and Cohort turnover_lf*) by sex and DEGURBA, 2011 and 2020

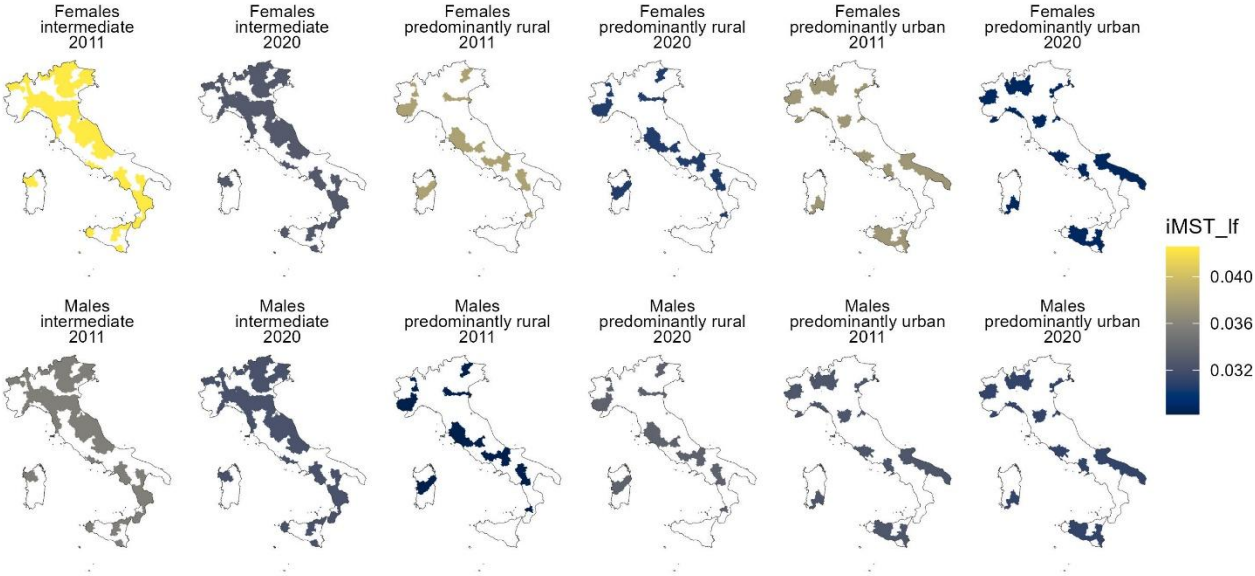
a)



b)



c)



The spatial evidence from Figure 2 complements the results in Figure 1, confirming consistent gendered and territorial patterns in labour-force renewal across Italian provinces. Light tones in *predominantly urban* and *intermediate* areas correspond to higher PTR_lf and Cohort Turnover_lf levels, indicating stronger renewal capacity than in *predominantly rural* provinces, which display darker shades and lower scores. The geographical distribution of the indicators shows a persistent North-South gradient over time: PTR_lf and MST_lf (both *iMST_lf and mMST_lf*) are higher in the northern areas of the country, conversely the Cohort Turnover_lf attains larger magnitude in the southern ones.

Female distributions are generally lighter than male ones, aligning with the higher female averages reported in Figure 1 and pointing to women's increasing contribution to workforce renewal over time. For *mMST_lf*, lighter shades in intermediate territories and the gradual darkening from 2011 to 2020 illustrate the decline in internal mobility and confirm that the relative hierarchal distribution among DEGURBA classes remained stable. Gender differences also follow the numerical patterns: women showed higher mobility in 2011, but this

advantage narrowed by 2020. The i*MST_lf* maps similarly reproduce the quantitative hierarchy, with lighter areas concentrated in more urbanised contexts and darker tones prevailing in rural ones. The persistence of lighter female patterns across all categories reflects the structural feminisation of international migration and its role in sustaining renewal processes.

4. Expected findings

Labour-force renewal is not simply a matter of generational turnover, but rather a complex interplay of spatial structuring, gendered mobility and local and sectorial segmentation of labour markets. At this stage of analysis, what emerges is a graduated renewal system, rather than a binary centre-periphery divide.

In interpreting these results, three core interpretative themes stand out. First, mobility as compensation: the fact that internal and international migration shares have measurable positive associations with turnover rates indicates that spatial movement is acting as a buffer against demographic labour force shrinkage. Yet, the observed slight decline in internal mobility over time suggests that this compensatory mechanism may be weakening, placing renewed emphasis on the need for structural changes in local mechanisms. This insight aligns with broader European research on the limits of migration to counteract ageing populations (Ghio et al, 2022, Mentzelopoulou, 2025). Second, the results highlight a gendered dynamic of renewal. The narrowing of the PTR_lf and Cohort Turnover_lf gender gap, combined with women's persistently higher MST_lf levels across spatial categories, suggests that women are increasingly engaging in sustaining labour-force renewal. This is more than a numerical shift: it signals a structural transition in which female labour-force engagement and mobility become integral to demographic processes, echoing recent labour-market reform literature stressing female participation and mobility (Marino, 2025). Third, the spatial evidence reveals an embeddedness of renewal regimes. The clearer hierarchies and the relative weakening of mobility in intermediate and rural territories imply that renewal capacity is increasingly tied to connectivity, either functional (mobility flows) or structural (labour-market opportunities). This suggests that demographic sustainability is spatially contingent: territories that successfully integrate mobility and participation dynamics maintain renewal; those that do not, face stagnation (Morin, 2015).

Finally, expected findings also reinforce and nuance previous evidence from Ghio et al. (2024), showing that internal mobility continues to play a prominent role in sustaining labour-force renewal, particularly in *intermediate* territories that attract both in-migrants from peripheral areas and out-migrants from urban cores. This centripetal pattern enhances demographic vitality in territories with higher participation rates while accelerating population decline in less connected areas. The relationship between migration and labour force activity rates thus becomes circular: movements are both shaped by and reinforce existing disparities in labour-market inclusion. Territories with more open and diversified labour markets, typically urban and intermediate ones, accumulate demographic advantage through the inflow of active individuals, whereas peripheral areas experience compounded losses due to out-migration and persistently low participation.

The gender dimension further amplifies these territorial asymmetries. Despite persistent inactivity among a substantial share of working-age women, the evidence of rising *PTR_lf* and *Cohort Turnover_lf* among females indicates that women have become pivotal in sustaining demographic renewal. This trend reflects social processes, rooted in the intersection between labour-market openness, gender equality, and spatial opportunity. At the same time, the analysis highlights the territorial contingencies of renewal regimes. Intermediate provinces display mobility-driven renewal systems, where circulation offsets cohort balances. This reveals the peculiar configuration of Italian urbanisation, where intermediate areas serve as the key engines of demographic renewal, challenging the binary urban–rural model often observed elsewhere in Europe (Ghio et al. 2024). From a policy perspective, these findings call for an integrated strategy linking participation, mobility, and territorial cohesion. Strengthening women's labour-market inclusion, facilitating interregional mobility, and supporting the stable integration of international migrants should be regarded as complementary levers of demographic adaptation. The use of the DEGURBA classification can guide place-based interventions that acknowledge the differentiated renewal capacities of urban, intermediate, and peripheral areas.

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