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Priced Out or Pulled In? The Interplay Between Housing Prices and the Spatial Mobility of Portuguese Workers

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This dissertation marks the end of an important chapter in my academic journey. Thankfully, throughout this process, as well as over the past five years, I was never alone.

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Abstract

Over the past decade, the Portuguese housing market has experienced strong appreciation, standing out as one of the most severe cases of declining affordability in Europe. While traditional literature emphasises that these costs translate into productivity declines stemming from an inefficient allocation of labour, recent evidence points to alternative adaptation strategies: rather than forgoing access to more expensive urban markets, workers may choose to live in overcrowded housing, reduce other essential expenses or accept extended daily commutes. Positioned at the intersection of urban and labour economics, this dissertation investigates the relationship between rising housing prices and the spatial distribution of Portuguese workers. To this end, municipal statistics from INE are combined with confidential data from the IEFP, employing a PPML estimator with high-dimensional fixed effects to model job placements between 2017 and 2022. The results reveal that, although housing prices largely capture the attractiveness of metropolitan areas, with their increase being associated with a stronger pull of workers from other regions, they also act as a spatial friction at the local level: within metropolitan areas, elevated costs significantly reduce short-distance job matches, pushing workers to the peripheries and prolonging their commutes. The simulation of counterfactual scenarios further confirms the relevance of these findings for the design of public policies. Localised financial subsidies risk exacerbating market distortions and are unlikely to reverse the effects of the housing crisis, regardless of whether they target high- or low-cost regions. Although more challenging to implement, structural reforms aimed at mitigating regional housing disparities appear to hold greater potential for generating aggregate gains.

JEL codes: J24, J64, R21, R23

Keywords: Housing crisis, labour mobility, spatial frictions, PPML with high-dimensional fixed effects

Resumo

Na última década, o mercado imobiliário português registou uma forte valorização, destacando-se como um dos casos europeus mais severos de perda de acessibilidade habitacional. Enquanto a literatura tradicional sublinha que estes custos se refletem em declínios de produtividade decorrentes de alocações ineficientes de mão de obra, evidência recente aponta para estratégias de adaptação alternativas: em vez de abdicarem do acesso aos mercados urbanos mais caros, os trabalhadores podem optar por viver em casas sobrelotadas, reduzir outras despesas essenciais ou aceitar deslocações diárias mais prolongadas. Situada na interseção entre a economia urbana e do trabalho, esta dissertação investiga a relação entre o aumento dos preços da habitação e a distribuição espacial dos trabalhadores portugueses. Para esse fim, combinam-se estatísticas municipais do INE com dados confidenciais do IEFP, recorrendo ao estimador PPML com efeitos fixos de alta dimensão para modelar as colocações profissionais entre 2017 e 2022. Os resultados revelam que, embora os preços da habitação captem em grande parte a atratividade das áreas metropolitanas, com o seu aumento a associar-se a uma maior atração de trabalhadores de outras regiões, estes funcionam também como fricção ao nível local: dentro das áreas metropolitanas, custos elevados reduzem significativamente o número de emparelhamentos a curtas distâncias, empurrando os trabalhadores para as periferias e prolongando as suas deslocações. A simulação de cenários contrafactuais confirma ainda a relevância dos resultados para a estruturação de políticas públicas. Subsídios financeiros localizados correm o risco de agravar distorções do mercado e dificilmente conseguirão reverter os efeitos da crise habitacional, independentemente de visarem regiões de alto ou baixo custo. Embora mais difíceis de implementar, reformas estruturais, focadas na mitigação das assimetrias habitacionais regionais, parecem apresentar maior potencial para gerar ganhos agregados.

Códigos JEL: J24, J64, R21, R23

Palavras-chave: Crise da habitação, mobilidade laboral, fricções espaciais, PPML com efeitos fixos de alta dimensão

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1. Introduction

Since the Great Recession, housing markets across Europe have undergone strong price growth, with Portugal consistently standing out as one of the most affected countries. According to ART (2025), Portuguese housing prices surged by approximately 147% over the past decade, more than double the European Union average. This pattern is equally visible in the rental sector: while rents across the EU rose by 23% between 2010 and 2019, Portugal experienced increases exceeding 40% (Eurofound, 2023). These figures point to a structural affordability problem that goes beyond normal market cycles, positioning the country as a particularly relevant case for examining the causes and consequences of housing pressures within the EU.

Notwithstanding the magnitude of the phenomenon, aggregate national data on housing prices mask a profound regional imbalance. The reported appreciation has been largely driven by concentrated demand in high-productivity urban centres like Lisbon and Porto, alongside tourism-heavy regions such as the Algarve. This persistent pattern has triggered a diffusion effect, whereby price increases spill over into adjacent municipalities, leading to a convergence of high costs along the country's coastal area (European Investment Bank, 2025; Rodrigues & Vilares, 2023). At the same time, less productive regions, particularly in the interior, are experiencing population outflows and sharp declines in housing demand. This spatial divergence creates a difficult paradox, with the areas offering the greatest economic opportunity becoming increasingly inaccessible to the labour force required to sustain them (European Investment Bank, 2025; Glaeser & Gyourko, 2018).

Worker mobility is a key component of an efficient labour market, which explains why its main constraints have already been subject to extensive research. By increasing the cost of relocating to regions with higher economic density, rising housing prices undermine potential gains in productivity and wages. Combined with the reduction in households' disposable income, this dynamic ultimately hinders economic growth (ART, 2025; Eurofound, 2023; Hsieh & Moretti, 2019). In countries like Portugal, where 83% of the wealth produced and nearly 90% of students in higher education are concentrated in coastal areas (European Commission, 2023), the need to understand these effects becomes even more pressing.

It is within this context that this dissertation is developed, aiming to investigate a central research question: how is the recent increase in housing costs associated with changes in labour mobility patterns in mainland Portugal? To address this, the analysis covers the period from 2017 to 2022, combining regional indicators from Statistics Portugal (INE), such as the median municipal price per square metre, with confidential microdata on job placements, vacancies and worker-firm characteristics from the Institute for Employment and Vocational Training (IEFP). Accessed onsite through the *Banco de Portugal* Microdata Research Laboratory (BPLIM), these data are aggregated at the municipal level, capturing both the individuals' area of residence and workplace, which allows for an accurate mapping of inter-municipal mobility and a detailed examination of how these spatial dynamics relate to variations in housing prices.

The need for such granular empirical analysis arises from the recognition of an important gap in the literature, at the intersection of urban and labour economics. While the notion that real estate markets operate in isolation from the broader economy has been largely superseded, with evidence increasingly documenting how housing shocks propagate through the real economy, the field remains heavily focused on integrating price indicators into macroprudential regulation (Adelino et al., 2018; Glaeser & Sinai, 2013; Hartmann, 2015). As a result, the interplay between housing dynamics and other segments of the economy, particularly the labour market, remains comparatively underexplored, with existing studies often emphasising productivity outcomes while overlooking spatial patterns.

By employing an empirical strategy that robustly models bilateral flows and incorporates high-dimensional fixed effects, this dissertation contributes to this relatively scarce literature by offering several key insights. Specifically, the model estimates demonstrate a significant regional asymmetry: for relocations exceeding 30km, higher housing prices in non-metropolitan areas are associated with fewer job placements originating from metropolitan regions, whereas the converse is true for flows in the opposite direction. Although this dynamic reflects the inherent attractiveness of urban centres, widely documented in the literature as agglomeration economies (Glaeser, 2010), the pattern reverses for moves under 10km within metropolitan regions, where a 1% increase in relative housing prices is linked to a 0.93% decrease in placements. These findings suggest that, while these thick labour markets remain highly attractive for workers, prohibitive housing costs may be forcing them to reside further away and accept longer commutes.

A legitimate methodological concern regarding this specification is the presence of endogeneity. While this study does not claim strict causality in its baseline estimates, counterfactual policy scenarios are constructed to illustrate that, even as statistical associations, the findings offer valuable insights into how labour mobility may respond to different interventions. The first scenario simulates the elimination of housing frictions by imposing a unique price across municipalities, resulting in a 0.27% increase in predicted placements. This magnitude offers an approximate estimate of the association between regional housing imbalances and job-matching outcomes. Building on this result, the second simulation further imposes uniform salaries across all regions, mimicking complete spatial cohesion. Under this scenario, predicted placements decline by 3.80%, reflecting a trade-off between geographical equity and market efficiency.

When moving from theoretical exercises to actionable public policy, the simulations suggest that subsidising high-cost areas by 10% could worsen overall matching efficiency, potentially lowering predicted placements by 0.15%. This outcome seems to arise from the depletion of peripheral markets and the concentration of workers' search efforts in metropolitan centres, thereby increasing congestion and reinforcing the housing pressures the policy seeks to alleviate. By contrast, subsidising low-cost municipalities appears to produce negligible national impacts, as such measures are likely to prove insufficient to meaningfully stimulate secondary markets. Given that the only scenario yielding a net positive effect on total placements is the one in which housing price disparities are artificially equalised, these results suggest that resolving spatial frictions of this kind requires broad structural reforms rather than localised financial subsidies. Naturally, such policies demand greater fiscal resources and political commitment, making them considerably more challenging for governments to implement.

The remainder of this dissertation is structured as follows. Section 2 contextualises the Portuguese housing affordability crisis, exploring its structural drivers and distributional impacts. Section 3 reviews the theoretical foundations of labour mobility and examines existing evidence on spatial frictions. Sections 4 and 5 describe the econometric modelling framework and the data sources, respectively. Section 6 presents and discusses the baseline estimates and the simulation results. Finally, Section 7 summarises the main findings, discusses their implications for public policy and highlights avenues for future research.

2. The affordability crisis

With the growing recognition of the economic strain placed on households by rising living costs, the European housing crisis has moved to the forefront of political debate. However, addressing this problem requires a degree of consensus on two highly contested issues. The first concerns its underlying causes and the appropriate policy responses, as recent research highlighting the limitations of a purely supply-side approach (Matias & Graça, 2023; Ribeiro et al., 2025; Rodrigues & Vilares, 2023) contests the traditional focus on construction expansion as the primary driver of affordability (European Investment Bank, 2025). The second relates to the actual magnitude and distributional impact of the crisis - namely, which demographic groups are most affected, the nature of these impacts and the extent to which policy intervention is warranted. Consequently, a careful examination of these debates is necessary before addressing the research question directly.

2.1. Structural drivers

It is well documented that, since the 2008 financial crisis, increases in housing demand have not been matched by a corresponding expansion in construction. Using building permits for new dwellings as a proxy for supply, and indicators such as household formation rates and the obsolescence of the existing housing stock to approximate pressure on the market, the European Investment Bank (2025) estimates that, in 2025, additional housing demand in the European Union reached approximately 2.25 million units, while only 1.32 million new dwellings were delivered to the market.

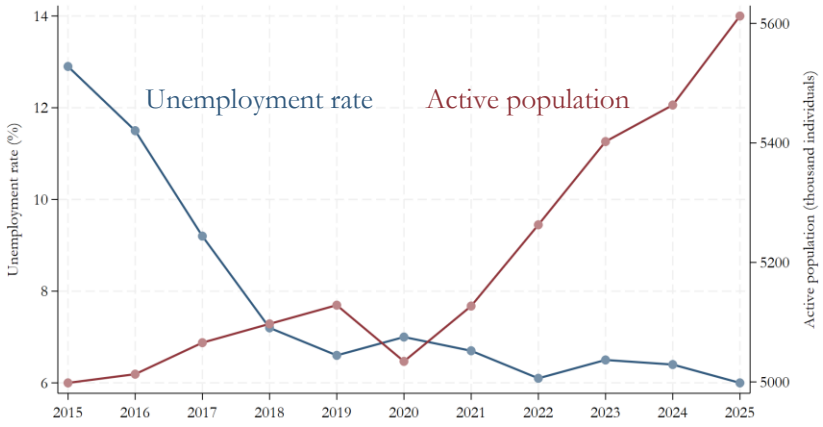
In Portugal, this mismatch is particularly pronounced. According to Banco de Portugal (2026), while the interior remains sparsely built-up, land use intensity in the metropolitan areas of Lisbon and Porto is high and available area is scarce, placing a structural constraint on supply expansion. Therefore, Portugal's housing crisis is not driven by an absolute national shortage of buildable land, but by a severe geographical disconnect between where pressure is greatest and where space for building remains. Compounded by escalating construction costs and stringent urban planning regulations, bridging this gap becomes both financially and operationally prohibitive (Alves, 2019; ART, 2025; Banco de Portugal, 2026).

Such supply-side rigidity renders the evolution of demand dynamics even more consequential. Across Europe, housing markets have been structurally reshaped by the

proliferation of short-term rentals, fuelled by the surge in tourism in already high-demand urban centres (Eurofound, 2023; European Investment Bank, 2025). In Portugal, more than 20% of vacant dwellings remained unoccupied in the past year because of their reallocation to such platforms. This development not only intensifies pressure on housing availability, but also raises investors' willingness to pay, as short-term rentals typically yield higher returns than long-term leases (ART, 2025; European Investment Bank, 2025). Alongside this expansion, the growing presence of institutional investors has accelerated the financialization of housing, whereby residential property is increasingly treated as an investment asset rather than solely as a consumption good. This shift can exacerbate affordability burdens, as these landlords are often associated with lower rates of lease renewal and pricing strategies that displace lower-income tenants, thereby intensifying processes of gentrification (ART, 2025).

On the demand side, labour market conditions have also been notably favourable over the past decade, with the active population expanding rapidly and unemployment falling to historically low levels (Figure 1). These rising living standards have sustained growth in housing demand, particularly for smaller unit typologies. In Lisbon and Porto, T0-T2 apartments have gained prominence in new construction, reflecting the growth of single-person households with a preference for urban locations (Banco de Portugal, 2026; Eurofound, 2023).

Figure 1: Unemployment rate (%) and active population (thousand individuals), 2015-2025



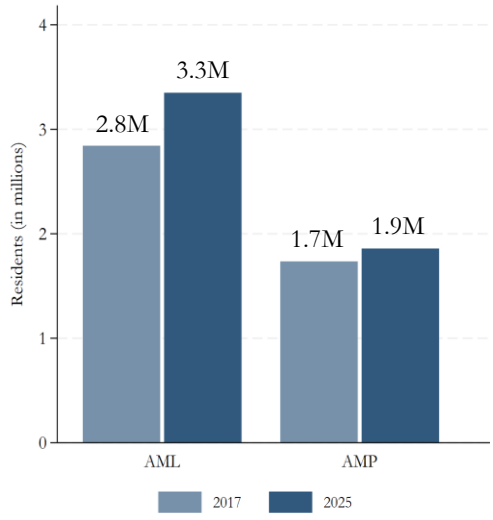
Source: author's calculations based on INE (2026d, 2026i)

At the same time, larger dwellings suffer from structural misallocation: as of 2024, approximately one-third of the European population resided in housing that exceeded their

space requirements. This under-occupation mainly reflects an ageing population remaining in their homes rather than transitioning to residential care. As neither of the aforementioned trends is expected to reverse, supply shortages and allocation inefficiencies are likely to persist simultaneously, suggesting that a strategy focused solely on expanding construction is insufficient to provide a sustainable solution to affordability pressures (ART, 2025).

This chapter would also be incomplete without acknowledging that housing market pressure in Portugal has been driven primarily by population growth. Figure 2 presents the evolution of population in the Lisbon (AML) and Porto (AMP) metropolitan areas from the onset of the crisis, around 2017, to 2025. As expected, population is both larger and has grown more substantially in AML, which gained approximately half a million residents over the period, while AMP recorded a more modest increase of around 0.2 million. Although a portion of this growth likely reflects domestic workers relocating to access thriving centres, consistent with the broader tendency to concentrate higher education and well-paid employment in major urban areas (European Commission, 2023), the most significant share is reportedly driven by the arrival of immigrants (Banco de Portugal, 2026; INE, 2026e).

Figure 2: Resident population (in millions) in the Lisbon and Porto metropolitan areas, 2017 vs. 2025



Source: author's calculations based on INE (2026f)

Evidence from Ribeiro et al. (2025) corroborates the dynamics described in this subsection. Using a counterfactual approach, the authors estimate that, had construction

activity in Portugal maintained the pace observed in the 2000s, housing prices would have been approximately 3% lower; even if construction had doubled, the reduction would have reached only 6%. By contrast, had short-term rentals and international demand remained at 2015 levels, prices would have been between 14% and 22% lower. The authors therefore argue that a policy mix addressing these multiple drivers is significantly more effective than isolated supply-side measures.

However, implementing such policies is not politically straightforward. Housing reforms often face resistance from homeowners, who tend to benefit from the rising prices. As properties represent a major component of household wealth, those who purchased prior to the recent affordability crisis have experienced substantial capital gains. This helps explain why the share of EU households overburdened by housing costs, defined as spending more than 40% of disposable income on housing, has nonetheless declined over the past two decades (European Investment Bank, 2025; Rodrigues & Vilares, 2023). As a result, both the extent to which, and the reasons why, rising property prices should be considered a broadly shared economic problem remain subject to debate, as discussed in the following subsection.

2.2. Distributional and economic impacts

Traditionally, real estate was viewed as fundamentally different from other sectors, with prices expected to remain closely aligned with construction costs and fluctuations driven primarily by interest rate movements. However, recent experience, particularly the substantial losses incurred by millions of homeowners following the 2008 financial crisis, demonstrates that housing functions to a significant extent as a financial asset, subject to the same market volatility as any other (Glaeser & Sinai, 2013). This realisation has since prompted extensive research into how shocks in the real estate sector propagate to the real economy, strengthening the case for incorporating housing price dynamics into macroprudential regulation and financial supervision (Adelino et al., 2018; Glaeser & Sinai, 2013; Hartmann, 2015). Nevertheless, the impacts of these shocks extend significantly to other markets, which remain relatively overlooked.

The clustering of workers in coastal and metropolitan areas has been extensively documented in the urban economics literature, reflecting the presence of strong agglomeration economies. Agglomeration economies arise when the geographic concentration of firms and workers generates productivity gains that would not be

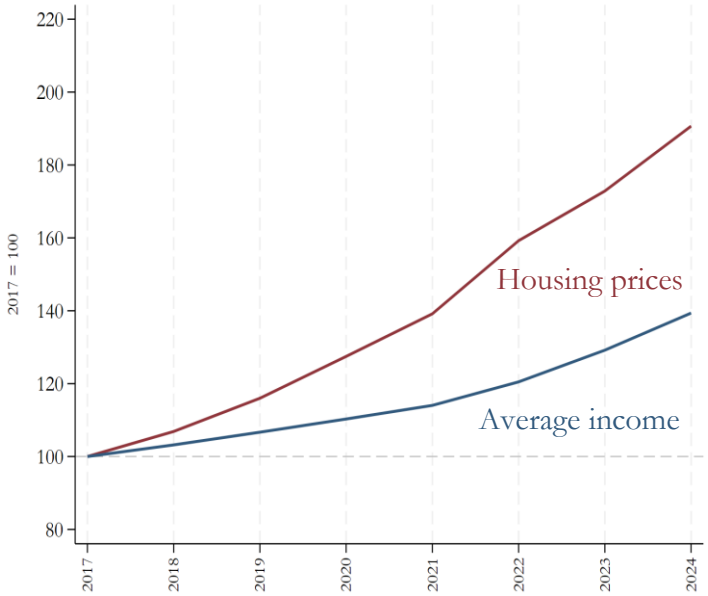
achievable in isolation (Bolter & Robey, 2020; Glaeser, 2010). Although Krugman's classical framework explains these advantages in terms of the reduced cost of moving goods (Krugman, 1992), subsequent research broadens this hypothesis to include the friction of exchanging people and ideas. For instance, Overman and Puga (2010) explain that the structure of dense labour markets allows workers to change employers without changing residence, reducing the risk associated with job transitions and enabling more efficient matching over time. At the same time, agglomeration fosters the accumulation and diffusion of knowledge, as proximity to skilled peers enhances the formation of human capital and increases the rate at which ideas emerge (Figueiredo et al., 2015; Glaeser, 2010).

High-density cities shaped by agglomeration economies also tend to attract a clustering of services characterised by a high incidence of face-to-face interaction. This reinforcing dynamic makes metropolitan areas progressively more attractive, leading some authors to reframe urban attractiveness as a consumption phenomenon as much as a production one (Glaeser & Gottlieb, 2006). These amenities may take the form of public infrastructure, encompassing, for example, access to education and tourist sites (Carlino & Saiz, 2019; Niebuhr et al., 2012), or of cultural environments, including the breadth of entertainment and commercial offerings (Beckers & Boschman, 2017; Diamond, 2016). As a result, despite sustained declines in transportation and communication costs, agglomeration effects have remained remarkably persistent (Alfaro et al., 2019; Glaeser, 2010).

This combination of productive and consumption advantages is closely intertwined with the housing market. If firms are more productive, they are willing to pay higher wages to attract workers. If an area offers both higher wages and a richer amenity environment, workers will, in turn, be willing to pay more to live there. Consequently, wages and housing prices tend to rise together in these areas, and are frequently used in the literature as proxies for urban attractiveness and the intensity of local agglomeration economies (Glaeser, 2010).

Yet, in Portugal, the range of additional factors driving the affordability crisis has caused property prices to grow significantly faster than earnings. As illustrated in Figure 3, real estate valuations in the country have outpaced income growth by approximately 50% since 2017. These escalating living costs have far-reaching consequences, placing greater financial pressure on households entering the market after the crisis, constraining their disposable income and, ultimately, hindering broader economic growth (ART, 2025).

Figure 3: Housing prices and average income, 2017-2025 (nominal)



Source: author's calculations based on INE (2022, 2026c, 2026g)

Households adapt to these pressures through different strategies. The first involves moving to more peripheral areas, away from the most productive and employment-rich urban centres. This option risks driving a spatial misallocation of labour, where skilled workers are discouraged from relocating to high-cost urban centres, while low-income households are effectively priced out of opportunity-rich markets (ART, 2025; Eurofound, 2023; Howard & Liebersohn, 2025).

By contrast, other households may choose to remain close to high-employment, high-amenity areas, accepting a diminished standard of living to offset housing costs. One such response is to delay residential independence, with the average age of leaving the parental home in Portugal reaching 28.9 years in 2024, nearly three years above the EU average (Eurofound, 2023; Eurostat, 2025). Another is to endure worse conditions to remain in place, for instance, residing in overcrowded housing, cutting spending on essentials such as food, education, health and energy, or settling for lower-quality housing in neighbourhoods with higher crime rates or lower-quality schools, provided that commutes remain feasible (Gabriel & Painter, 2020; Nygaard et al., 2021).

An intermediate compromise between these two extremes has emerged with the post-pandemic expansion of telework. However, because most arrangements remain hybrid rather than fully remote, households are still prevented from relocating excessively far from the office (ART, 2025; Reuschke & MacLeavy, 2026). Furthermore, while this flexibility is viable for high-skilled professionals, most low-skilled workers remain bound to physical migration due to the in-person nature of their roles (Schoenberg et al., 2025). Consequently, a meaningful spatial disconnect between where individuals live and where they work is unlikely to materialise in the near future (Reuschke & MacLeavy, 2026).

Taken together, these considerations illustrate how the affordability crisis disproportionately affects any individual seeking geographic mobility for work or education, particularly those belonging to low- and middle-income households. Younger generations also bear a substantial share of this burden: individuals who entered the property market before the recent surge in prices have benefited from substantial capital gains and privileged access to employment-rich areas, whereas those coming after are increasingly excluded from central urban markets (Eurofound, 2023; European Investment Bank, 2025; Matias & Graça, 2023). Similar dynamics have been documented in the United States, where Glaeser and Gyourko (2018) show that housing wealth accumulation has been mainly confined to older cohorts who purchased homes in high-demand areas before stricter land-use constraints intensified price growth.

However, an important debate arises from the fact that housing wealth cannot be directly equated with other financial assets, implying that the extent to which it translates into real inequality may be less straightforward than is often assumed. High property values generate limited welfare gains for homeowners who wish to remain in place, as benefits are largely unrealised unless the asset is traded (Glaeser & Gyourko, 2018). Regarding the measurement of these impacts, Moretti (2013) argues that nominal wage inequality may overstate real inequality, as higher-income individuals also face disproportionately higher living expenses in productive hubs. By contrast, Diamond (2016) contends that those elevated urban costs may reflect compensating advantages, such as superior amenities, implying that they do not necessarily translate into lower welfare. Therefore, the true benefits of residing in urban areas during a housing crisis remain, to a considerable degree, open to question.

3. Understanding labour mobility constraints

In job search models, the reservation wage serves as the optimal stopping rule of the search process, representing the point at which the marginal benefit of continued search equals its marginal cost (Chade et al., 2017). When spatial considerations are incorporated, this cost extends to commuting and relocation expenses. As such, high housing prices reduce the net value of job offers, raising the reservation wage required to accept a job.

This rationale is fully consistent with the classical literature on spatial equilibrium, whereby welfare levels are equalised across space as higher incomes in urban centres are offset by higher housing prices (Glaeser & Gottlieb, 2009). However, recent research suggests that this adjustment mechanism has become increasingly influenced by additional factors, resulting in mixed empirical evidence. Motivated by this, the following section reviews the literature on the role of rising housing costs in shaping worker mobility.

3.1. Definition and determinants

Across the economic literature, labour mobility is conceptualised and measured through a range of approaches. While Long and Ferrie (2006) emphasise the importance of the spatial dimension in measuring labour mobility, comparing an individual's workplace at two or more points in time, other authors adopt alternative metrics based on their specific research objectives. In institutional reports, mobility is often measured through gross bilateral migration flows (Arpaia et al., 2015). Conversely, Davis and Haltiwanger (1998) propose a broader definition based on worker reallocation across firms and sectors, rather than purely geographic movements. More recently, Foschi et al. (2023) quantify it as the elasticity of net migration in response to variations in regional unemployment throughout the business cycle.

Despite these differing perspectives, a common set of determinants shapes the extent of labour mobility. Using gravity equations to model migration flows between EU countries, Arpaia et al. (2015) find that these depend positively on regional unemployment and income differentials, and negatively on relocation costs. Similarly, Anderson and Smith (2010) detail how mobility tends to decrease as current income levels rise, reflecting how higher earnings increase the opportunity cost of job transitions. Both conclusions are consistent with the classical utility-maximisation frameworks proposed by Bodenhöfer (1967) and Gordon and Vickerman (1982), which posit that the decision to relocate occurs when expected income

gains outweigh the various costs of moving, generally categorised into two components: non-monetary expenses relate to the psychological and social impacts of relocation, including a preference for one's current place of residence and the loss of local social networks; monetary costs, in turn, are extensively documented in the literature and include, among others, foregone income from the original job, transport expenses, and costs associated with searching for and acquiring a new home (Bodenhöfer, 1967; Giannone et al., 2020).

In recent years, several authors have sought to quantify the magnitude of these values. Cruz et al. (2024) find that, expressed as a share of a worker's annual income, the median cost of transitioning between sectors is approximately 0.77, compared to 0.49 for regional relocation. When a move involves both, the median cost increases to 0.98. Based on these figures, the authors conclude that the welfare gains from removing sector mobility barriers, regional mobility barriers and both combined would correspond to 3%, 2% and 5% of real wages, respectively. On the other hand, Ransom (2022) estimates that the total costs associated with a long-distance move in the US average approximately $400000, including not only relocation expenses, but also social costs, measured through utility losses.

Contrary to what might be expected, regional mobility decisions are largely unaffected by unemployment status or duration. Abraham et al. (2013) show that, while unemployed individuals compromise on job quality more readily than employed workers, they do not weigh mobility costs differently, meaning interregional unemployment disparities are not driven by a greater reluctance to relocate. Similarly, Guglielminetti et al. (2024) find that, as unemployment spells lengthen, job seekers accept significantly lower wages, but do not expand their geographic search radius.

Given the scope of this dissertation, the focus hereafter will be restricted to the spatial dimension of mobility, neglecting occupational transitions. Accordingly, mobility is defined here, following the European Centre for Social Welfare Policy and Research (n.d.), as "the movement of persons from one place to another for the purpose of employment [...]".

3.2. Empirical evidence on spatial frictions

The close interaction between labour and housing markets underpins the classical spatial equilibrium framework that has long been central to urban economics (Glaeser & Gottlieb, 2009). Within this context, the inelastic response of housing supply in urban centres plays a

major role in shaping how this equilibrium is achieved, as stronger demand, driven by higher wages and employment opportunities, is reflected primarily in higher housing prices rather than in an expansion of the housing stock.

This assumption finds extensive support in the US. Between 1960 and 1990, housing construction in high-growth areas became increasingly constrained by land-use regulations (Glaeser & Gyourko, 2018; Howard & Liebersohn, 2025; Hsieh & Moretti, 2019). According to Glaeser and Gyourko (2018), market prices significantly exceeded construction costs in these areas, by an amount larger than would be optimal even if this gap were interpreted as an implicit regulatory tax. By contrast, in less regulated markets, increases in demand stimulate construction, helping to moderate price pressures (Howard & Liebersohn, 2025).

Following this reasoning, the productivity gains associated with relocating to urban centres should be progressively eroded by rising housing costs, a conclusion supported by a growing body of empirical evidence (ART, 2025; Howard & Liebersohn, 2025). For instance, Card et al. (2025) show that, while around half of the variation in wages across commuting zones reflects genuine place effects rather than worker characteristics, these wage premiums are largely offset once local housing costs are considered. Similarly, Diamond and Moretti (2021) document that high-income locations are also the most expensive, confirming a strong equilibrium relationship between wages and living costs.

As the benefits of relocating to these areas diminish, fewer individuals are expected to move, easing demand pressures in the most expensive markets. However, this adjustment may entail substantial aggregate costs, by preventing workers from accessing the country's most productive locations. Hsieh and Moretti (2019) estimate that, between 1964 and 2009, housing supply constraints reduced US growth by around 36% through the spatial misallocation of labour. Relaxing such restrictions to the level of the median city in just three of these major locations would have increased GDP by approximately 3.7% in 2009.

Supporting these results, Parkhomenko (2023) develops a model in which local landlords play a central role in choosing land-use regulations. In this setting, high-productivity and high-amenity cities tend to adopt more restrictive policies, tightening housing supply precisely in locations where demand is strongest. According to the author, it is this endogenous response that exacerbates the spatial misallocation of labour and the decline in aggregate output identified by Hsieh and Moretti (2019).

However, Glaeser and Gyourko (2018) argue that these conclusions may be overly optimistic. A key concern is that Hsieh and Moretti (2019) rely on the assumption of highly elastic labour demand for their estimates. Furthermore, by attributing spatial wage variations entirely to productivity, the model underplays the role of compensating differentials, whereby workers accept lower wages in exchange for desirable local amenities. Failing to account for these dynamics may lead to an overestimation of the gains from housing supply liberalisation and to implausibly large counterfactual reallocations of labour.

Therefore, the true extent of labour misallocation driven by housing restrictions remains contested, raising doubts as to whether these aggregate productivity gains can fully translate to the European context. On the one hand, supply constraints are often more severe in the EU due to higher population density and land scarcity, suggesting potentially larger benefits from regulatory relaxation. On the other hand, smaller regional productivity differentials and historically lower mobility rates may limit these effects (European Investment Bank, 2025).

To study this phenomenon in a European setting, Eliasson and Westerlund (2024) model how housing prices influence the decision to accept job offers in high-productivity regions. Using representative data for the Swedish population, they find that higher relative housing costs reduce both the probability of taking up employment in the Stockholm metropolitan area and the likelihood of opting for migration over commuting. Specifically, a 10% increase in these relative values reduces the probability of relocation by approximately 0.4 percentage points. Similar spatial frictions are observed in Spain by Nguyen et al. (2026), who estimate that a 10% rise in destination property values reduces inflows by 4.0%.

Just as high destination prices can act as a barrier to entry, housing frictions at the point of origin can act as a barrier to exit. Early work by Henley (1996) provides one of the first analyses of this dynamic: during the UK housing downturn, a large share of homeowners fell into negative equity, resulting in a lock-in effect that severely constrained mobility. More recent evidence confirms this relationship, with negative equity being associated with mobility declines of around 74-79% (Bernstein & Struyven, 2022). Although the underlying mechanism differs, a similar reduction in mobility may arise during periods of housing appreciation, as homeowners who expect prices to keep rising may be reluctant to sell before realising their capital gains, especially if they have taken on substantial debt or face high transaction costs (Case & Shiller, 2003; Eliasson & Westerlund, 2024; Henley, 1996).

This spatial inertia extends beyond homeowners, with Winke (2021) demonstrating that it is particularly severe at the bottom of the income distribution, where residents are primarily renters. Specifically, a 10% increase in local housing prices reduces the probability of moving for low-income households by approximately 28.5 percentage points. This immobility is largely driven by a spatial trade-off: when these groups do relocate, budget constraints typically force them into more peripheral areas, characterised by higher unemployment rates. Such displacement is highly detrimental because commuting serves only as an imperfect substitute for residential proximity to employment, with physical distance remaining one of the primary determinants of job acceptance. Illustrating this, Amior and Manning (2019) find that 50% of workers in the UK commute less than 5km, while 90% travel no more than 30km. Similarly, Manning and Petrongolo (2017) highlight substantial distance-related frictions, estimating that only 19% of workers would prefer a job located 5km away over a comparable local alternative.

Taken together with European survey evidence on residential satisfaction, these results gain further support. While individuals in the lower half of the income distribution report lower satisfaction regarding their accommodation when only quality and type are assessed, the gap narrows considerably when the area where they reside is considered. This divergence suggests that households are willing to compromise on dwelling conditions to preserve access to the amenities and opportunities of desirable urban locations. Portugal provides a particularly clear example: despite experiencing one of the largest declines in housing affordability, respondents report satisfaction with their residential area around 0.5 points higher (on a 0-10 scale) than the EU average (Eurofound, 2023). In line with this evidence, Fonseca (2024) notes that, while there have been signs of revitalisation in some rural areas, the country's settlement pattern continues to be characterised by a strong concentration of population in urban centres.

It appears, then, that escalating property values have not fundamentally altered Portugal's spatial population distribution; yet, this does not mean they are without consequence. Although the exact magnitude of this friction remains contested, housing constraints are widely recognised as a critical determinant of workers' spatial choices. The following sections aim to advance this discussion by providing empirical evidence from Portugal, one of Europe's fastest-appreciating housing markets.

4. The model

Given the variety of competing econometric specifications used to study spatial frictions, evaluating the most common alternatives within the labour economics literature is essential for choosing an appropriate empirical strategy. The following section reviews three distinct approaches, clarifying the methodological trade-offs involved before introducing the selected model.

4.1. Estimation methods

As discussed in Section 3, definitions of labour mobility lie at the core of most methodological divergences within this branch of the literature. Yet, even when the scope is narrowed strictly to geographical mobility, consensus remains elusive. Within this context, three analytical strategies prevail among most studies addressing labour responses to housing shocks.

A first approach relies on binary choice models, such as probit or logit specifications. These strategies are appropriate when the goal is to examine whether the probability of filling a vacancy responds to specific labour market frictions, as is the case in Eliasson and Westerlund (2024) and Manning and Petrongolo (2017). While this remains a suitable framework for addressing such research questions, applying it to the present study would discard information on the intensity of worker mobility by reducing flows to a binary outcome. This restriction is particularly important given that the primary objective of the analysis is to explore the interplay between recent housing price surges and the spatial mobility patterns of Portuguese workers.

To overcome this limitation, the most common approach is to employ gravity equations. Although most widely used to analyse trade flows (Yotov et al., 2016), these models are particularly well suited to labour markets, since the underlying rationale governing the movement of goods and individuals is analytically similar. Accordingly, they have been extensively applied to the study of migration and commuting dynamics (Arpaia et al., 2015; Kirchmaier et al., 2023; Langella & Manning, 2022).

The gravity model, popularised by Tinbergen (1962), relied on log-linearizing the equation to estimate parameters via OLS. While this approach was profoundly influential in both trade and labour economics for decades (Anderson, 2011), Silva and Tenreyro

(2006) prove that this mathematical strategy introduces significant biases, which are particularly relevant in the context of this study. First, because the logarithm of zero is undefined, estimating log-transformed flows via OLS requires either excluding observations with zero placements or applying *ad hoc* transformations. Second, and more importantly, log-linearization in the presence of heteroskedasticity leads to biased and inconsistent estimates. Since gravity equations are inherently multiplicative, with the error variance typically scaling with municipal size and distance, they are intrinsically heteroskedastic, ultimately rendering OLS estimation invalid (Correia et al., 2020; Silva & Tenreyro, 2006).

As a result, a third approach has become the standard in the gravity-model literature: applying the Poisson Pseudo-Maximum Likelihood (PPML) estimator, following the suggestion of Silva and Tenreyro (2006). PPML has proven particularly well suited to modelling commuter flows and has become increasingly common in the labour economics literature (Backes-Gellner & Balestra, 2015; Correia et al., 2020). Given that unobserved heterogeneity across origins, destinations and time periods is likely to confound the coefficients of interest, the present study employs the methodology developed by Correia et al. (2020), allowing for the inclusion of high-dimensional fixed effects (HDFE) in PPML estimation, operationalized through the *ppmlhdfe* command in Stata.

4.2. Model specification

To ensure the structural validity of the empirical framework, we begin by verifying the fundamental premise of gravity equations: the role of physical distance as a primary spatial friction. To this end, a baseline specification is estimated to model the expected number of workers from municipality *i* who accepted a job in municipality *j* in quarter-year period *t*:

$$N_{ij,t} = \exp\left(\beta_1 \ln(Dist_{ij}) + \beta_2 \ln(PR_{ij,t-1}) + \beta_3 \ln(SR_{ij,t-1}) + \alpha_i + \eta_j + \delta_t\right) \epsilon_{ij,t} \qquad (1)$$

where $Dist_{ij}$ denotes the distance between origin *i* and destination *j*, while $PR_{ij,t-1}$ and $SR_{ij,t-1}$ are the lagged relative measures of housing prices and average salaries in the destination versus the origin, respectively. With the aim of capturing all unobserved, time-invariant municipal characteristics, the specification also includes origin (α_i) and destination (η_j) fixed effects. Moreover, temporal heterogeneity is addressed through δ_t, which,

although represented as a single term, denotes two separately estimated fixed effects: a year fixed effect, which absorbs aggregate national shocks such as the COVID-19 pandemic, and a quarter fixed effect, which controls for persistent seasonal patterns in labour dynamics. Finally, to account for heteroskedasticity and intra-pair serial correlation over time, robust standard errors are clustered at the origin-destination level. For further validation of this baseline model, we also subject our estimates to more demanding assumptions: Table A2 of the Appendix reports the results of two alternative specifications, one introducing municipality-by-quarter fixed effects to absorb local seasonal patterns, and another clustering standard errors at the destination municipality level to account for broader unobserved correlations among all workers moving to the same labour market.

Building on this specification, the second model incorporates the relative economic attractiveness of destination labour markets. The vector of bilateral variables in Equation 2, $X_{ij,t-1}$, encompasses both the previously introduced salary ratio and the newly added unemployment ratio between the destination and origin municipalities. In addition, a vector of destination-specific covariates, $Z_{j,t-1}$, is included to capture local economic dynamism and labour market competition. Specifically, this vector includes the destination's active population density, firm density and the total number of job placements registered in the previous period.

$$N_{ij,t} = \exp\left(\beta_1 \ln(\text{Dist}_{ij}) + \beta_2 \ln(PR_{ij,t-1}) + \theta X'_{ij,t-1} + \lambda Z'_{j,t-1} + \alpha_i + \eta_j + \delta_t\right) \epsilon_{ij,t} \qquad (2)$$

Yet, it is important to acknowledge that housing prices do not exert a uniform impact on all placements, as a significant proportion of them occurs within short distances that do not require any consideration of residential mobility. Therefore, estimating a single, uniform effect of the price ratio may understate its true impact. Following Amior and Manning (2019), who report that 95% of commuting flows in the UK occur within a 30km radius, we define a categorical distance variable to serve as a proxy for standard commuting preferences. This variable is partitioned into three intervals (<10km, 10 to <30km, ≥30km) and interacted with $PR_{ij,t-1}$. To confirm that our estimates are robust to the choice of distance thresholds, an additional test (using <25km, 25 to <50km, ≥50km) is presented in Table A3 of the Appendix.

Furthermore, workers' willingness to bear higher housing costs or endure longer commutes is likely to depend on the destination's amenities and labour market thickness. Consequently, the effect of the price ratio is expected to vary according to the metropolitan status of the origin-destination pair. To account for this heterogeneity, we construct a metropolitan area classification (MA) that distinguishes four origin-destination combinations based on whether the origin and destination municipalities belong to a metropolitan area. We then estimate a triple interaction between the distance categories, $PR_{ij,t-1}$ and the MA classification, allowing the effect of housing prices to vary flexibly across different spatial contexts. Similar to the distance thresholds, the robustness of these spatial definitions is tested in Table A3 of the Appendix, where we disaggregate the analysis for the Lisbon Metropolitan Area, the Porto Metropolitan Area and the Grande Lisboa subregion.

The final specification is given by:

$$N_{ij,t} = \exp\left(\beta_1 \ln(Dist_{ij}) + \Theta_{ij,t-1} + \theta X'_{ij,t-1} + \lambda Z'_{j,t-1} + \alpha_i + \eta_j + \delta_t\right) \epsilon_{ij,t} \quad (3.1)$$

where

$$\Theta_{ij,t-1} = \sum_d \sum_m \beta_{d,m} \left[\ln(PR_{ij,t-1}) \times I(Dist_{ij} \in d) \times I(MA_{ij} = m)\right] \quad (3.2)$$

A legitimate methodological concern regarding this empirical strategy is that the relationship between local housing prices and labour mobility is fundamentally susceptible to endogeneity, as several authors have noted so far (Beaudry et al., 2014; Nguyen et al., 2026). This issue primarily stems from two channels. First, reverse causality arises from the simultaneous nature of housing and labour markets: while escalating housing costs may deter job seekers, a high influx of workers into a municipality intrinsically drives up local housing demand, thereby inflating prices. Second, omitted variable bias may stem from unobserved local economic shocks or shifts in regional amenities. Consequently, standard estimators may struggle to untangle whether changes in mobility patterns are a direct consequence of housing prices.

To address these identification challenges, a multi-layered strategy was employed. First, the use of lagged explanatory variables establishes temporal precedence, significantly attenuating the risk of reverse causality. Second, the inclusion of comprehensive spatial and

temporal fixed effects mitigates omitted variable bias by absorbing all time-invariant unobserved municipal characteristics, such as historical and geographical baseline factors, as well as aggregate national shocks and seasonal patterns. Both precautions are further tested in Table A4 of the Appendix, through more restrictive temporal lags and additional time-varying controls for local amenities (INE, 2024, 2026a). These include the university enrolment rate, which captures human capital formation and is associated with greater residential attractiveness (Beckers & Boschman, 2017; Niebuhr et al., 2012), and the number of tourist accommodations, since, following Carlino and Saiz (2019), residents and tourists tend to value similar local amenities.

A more standard econometric approach to addressing this limitation would be the use of instrumental variables (IV). However, their application in this specific spatial context poses severe practical challenges, as estimating such models would be computationally demanding given the size of the sample. Consequently, the PPML specification, combined with lagged covariates and high-dimensional fixed effects, is considered the most appropriate framework for the purposes of this analysis. Nevertheless, the results presented in Section 6 should be interpreted as robust associations rather than strict causal inferences.

5. Data description

The empirical analysis conducted in this dissertation relies on a dyadic panel dataset covering municipalities in mainland Portugal over the period 2017-2022. Information on housing markets and other municipality-level attributes is obtained from INE, Portugal's official statistical authority. Regarding job matches, the analysis uses aggregated data constructed from microdata provided by the Institute for Employment and Vocational Training (IEFP), available at the *Banco de Portugal* Microdata Research Laboratory (BPLIM, 2026). The underlying microdata contain monthly information on individuals registered with IEFP for job-search purposes, capturing their municipality of residence and, for placements resulting from firm vacancies posted with IEFP, their municipality of employment. However, under BPLIM's data-access rules (BPLIM, 2025), these microdata are accessible only to internal researchers. Therefore, for this study, on-site access was granted to a customized dataset comprising aggregated municipality-level information.

This chapter details the data sources, construction procedures and inherent limitations of the dataset assembled for this study. It then describes the main variables and the resulting sample.

5.1. Data sources, coverage and limitations

Housing market data are obtained from INE's Housing Price Statistics at the Local Level, which report the median price per square metre of residential dwellings for each municipality. These statistics are available as a consistent quarterly series from 2019 onwards, while data for 2017 and 2018 were released as standalone datasets, with coverage beginning in the second quarter of 2017 (INE, 2022, 2026g). To capture the multidimensional nature of each municipality's attractiveness, additional variables were also collected from INE, reflecting employment opportunities, wages and other related measures (INE, 2023, 2026b, 2026c, 2026h).

Analysing variations in mobility patterns requires a robust measure of the distance separating a worker's residence from their workplace. Therefore, following standard practice in the spatial analysis literature, inter-municipal distances are computed using population-weighted centroids rather than simple geometric centres (Boyle & Flowerdew, 1997). These centroids were constructed from the 2021 national census (INE, 2021) using geographic information systems software. While commuting time might more accurately

capture the effective spatial frictions faced by workers - and has indeed been widely used (Eliasson & Westerlund, 2024; Kirchmaier et al., 2023; So et al., 2001) - such data were unavailable from open-access sources within the timeframe of this study. Nevertheless, linear distance in kilometres remains a good proxy, used in some of the most influential contributions to this literature (Langella & Manning, 2022; Manning & Petrongolo, 2017), leaving the incorporation of travel time measures as a robustness check for future extensions of this work.

All datasets were merged using the official administrative division codes from INE, which ensure a unique identifier for each municipality. Observations corresponding to the autonomous regions of the Azores and Madeira were excluded, given that mobility constraints in these territories are not directly comparable to those in mainland Portugal. The resulting INE datasets cover 278 municipalities, spanning 23 quarters in the case of housing prices and 6 years for the remaining variables.

Similar to the approach of Manning and Petrongolo (2017), data on prospective workers and job vacancies are drawn from public employment service records. The IEFP is Portugal's national public employment service, whose mission is "to promote job creation and quality, and to combat unemployment, through the implementation of active employment policies, particularly vocational training" (IEFP, n.d.). Registration with the IEFP is required within 90 days to access unemployment benefits (Portal de serviços públicos da República Portuguesa, 2026), which ensures broad coverage of the unemployed population and significantly reduces the risk of selection bias. Moreover, the scope of these data allows worker mobility within the national territory to be isolated from broader migration flows. As a result, estimates of the relationship between housing prices and labour market outcomes are less likely to be confounded by alternative forms of migration.

Despite these methodological advantages, some limitations should be acknowledged. First, not all job seekers are unemployed, meaning that employed individuals searching for new job opportunities are underrepresented in the data, as they face little institutional incentive to register. A similar limitation applies on the firm side, as not all firms posting vacancies rely on the IEFP platform. Consequently, even when a worker is registered with the IEFP, a job match may occur through independent search channels, in which case we do not observe the placement. Notwithstanding this incomplete coverage, the detailed geographic and match-level information captures an important segment of the Portuguese

labour market.

Two aggregated datasets at the municipality level were constructed from the IEFP microdata. The first is a placement matrix detailing the number of workers placed by their municipality of residence and their municipality of employment. The second dataset captures the characteristics of both job offers and workers, aggregated at the municipality-month level. For each location, it includes the share of placements requiring tertiary, secondary or below lower secondary education (fewer than nine years of schooling), as well as the corresponding shares of placed individuals by qualification level and their average age. It further reports the number of vacancies available at the end of each month, along with the average salary associated with filled positions and the number of individuals who secured placements during that period.

To align with housing prices, the monthly number of placements was summed to obtain quarterly totals. The goal was to construct a dyadic panel in which each observation represents a unique combination of year-quarter, municipality of residence and municipality of workplace, capturing the attributes of both locations and the number of IEFP placements for that specific pair and period. However, since placement counts are only recorded when at least one match is observed, the raw dataset excludes the full set of potential origin-destination combinations. Therefore, the final dataset was structured to include all municipality pairs (278 × 278), with missing placement counts set to zero.

A further adjustment was required for housing prices, as 9 of the 278 municipalities exhibit at least one gap in price reporting over the sample period. These municipalities account for a negligible share of the data, with only 0.82% of registered jobseekers residing in them and 0.64% of all placements occurring in them. The affected municipalities were accordingly excluded from the analysis.

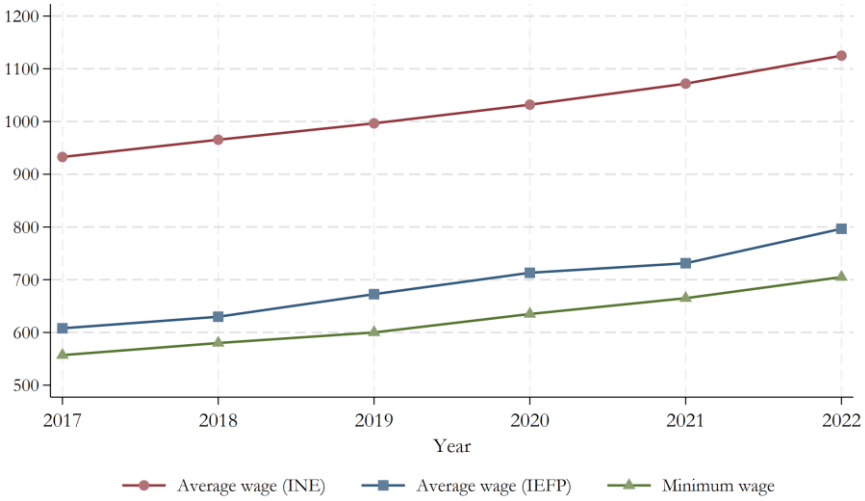
The final estimation sample comprises a 269 × 269 matrix of residence and workplace municipality pairs, observed over 23 quarters and 6 years, yielding a total of 1 664 303 observations.

5.2. Sample description

To ensure that the results of this study are adequately interpreted, it is essential to understand the differences between national labour market patterns and the specific characteristics of the IEFP sample.

One of the areas where this discrepancy is most noticeable concerns the municipal average wage. This is conceptually expected, since the INE metric encompasses all employment relationships, including longer-tenured matches, whereas the IEFP variable exclusively captures the starting salaries offered at the point of hire. Furthermore, because the IEFP wage is contingent upon the specific composition of job seekers and firms registered on the platform at any given time, it is subject to higher volatility than the national average. Figure 4 illustrates the comparative evolution of both wage series alongside the national minimum wage. To avoid outliers, the minimum and maximum observed values of the IEFP wage distribution were excluded, as both were implausibly extreme and likely reflect data entry errors or misclassification.

Figure 4: Evolution of the average municipal wage, IEFP vs. INE, and the national minimum wage (€)



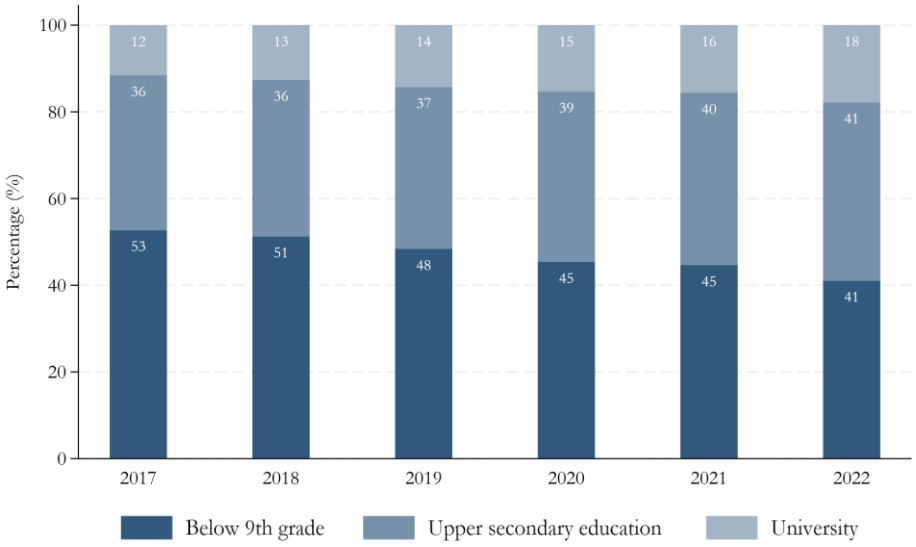
Source: author's calculations based on DGERT (2026), BPLIM (2026) and INE (2026c)

This visual analysis allows us to verify that the average municipal wage reported by INE is substantially higher than that offered through the IEFP. However, the closeness of the former to the minimum wage, together with its gap relative to the INE metric, suggests that the two series diverge more than compositional differences alone would predict. This points to the possibility that pay rates offered through the IEFP are substantially lower not only because they represent starting salaries, but also because of the specific characteristics of the workers and vacancies involved.

To assess this theory, Figure 5 reflects the qualification profile of IEFP placed workers.

Three attainment levels are considered: higher education, upper secondary education and below the 9th grade. To prevent small municipalities from skewing the national distribution, these shares are weighted by the number of registered unemployed individuals who secured placements in each municipality.

Figure 5: Educational composition of individuals placed through the IEFP over the sample period



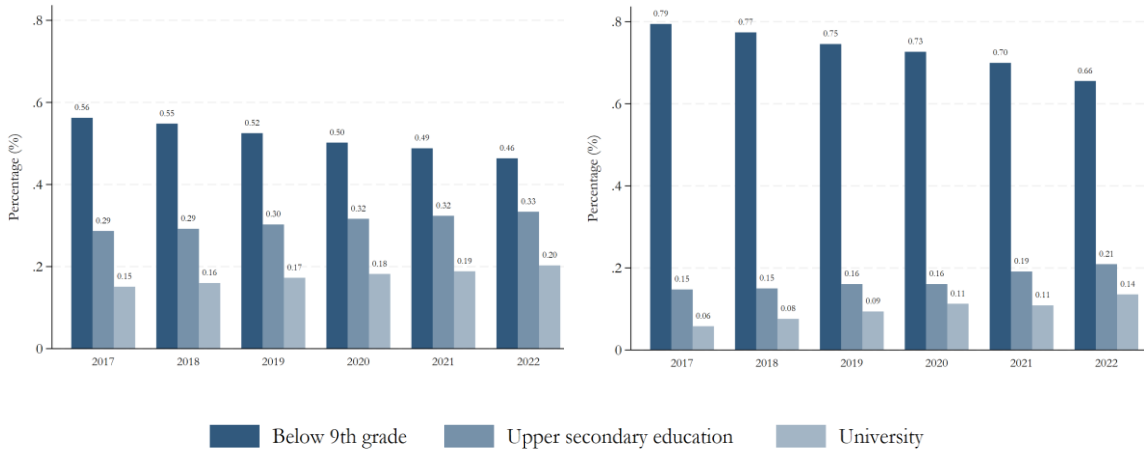
Source: author's calculations based on BPLIM (2026)

As expected, individuals with lower secondary education or less constitute the largest share of the IEFP sample, which aligns with lower aggregate salaries. However, the educational profile of these workers underwent a notable shift over the observed period, with the share of individuals with a 9th-grade education or less declining steadily from 53% to 41%. This was accompanied by sustained increases in both upper secondary (from 36% to 41%) and tertiary attainment (from 12% to 18%). Furthermore, the concentration of the sample among individuals aged 30 to 40 may help explain why, notwithstanding this gradual upskilling, average salaries offered through the IEFP are still substantially lower than the national average, as this demographic aligns with early-to-mid career wage dynamics.

Naturally, a labour supply analysis would be incomplete without considering the structure of labour demand, as a persistent mismatch between the qualifications required by employers and those held by workers may also contribute to the observed educational profile of placements. To explore this, Figures 6 and 7 revisit the weighted qualification shares of

placed individuals, now set against the minimum educational requirements of fulfilled vacancies over the sample period. Following the same principle, vacancy shares are weighted by the total number of placements in each municipality.

Figures 6 and 7: Educational composition (placed individuals vs. fulfilled offers) over the sample period



Source: author's calculations based on BPLIM (2026)

This side-by-side comparison lends support to the hypothesis advanced above: while both distributions are heavily concentrated among individuals with below 9th grade educational attainment, this pattern is markedly more pronounced on the demand side, where vacancies requiring only basic schooling consistently account for over two-thirds of all placements throughout the sample period. This concentration of low-skill requirements among job vacancies posted via the IEFP helps explain why a larger share of low-skilled workers is placed, as well as why average salaries remain lower.

Even so, the underlying trends show a positive structural shift: low-education job offers are declining, while the upper two categories are expanding. This points to a growing diversification of vacancies fulfilled through the IEFP, reflecting concerted policy efforts to incentivize hiring through the platform, with particular attention given to younger and more highly educated cohorts through initiatives such as *Contrato-Geração* and *Estágios ATIVAR+* (Ministério do Trabalho, Solidariedade e Segurança Social, 2019, 2020).

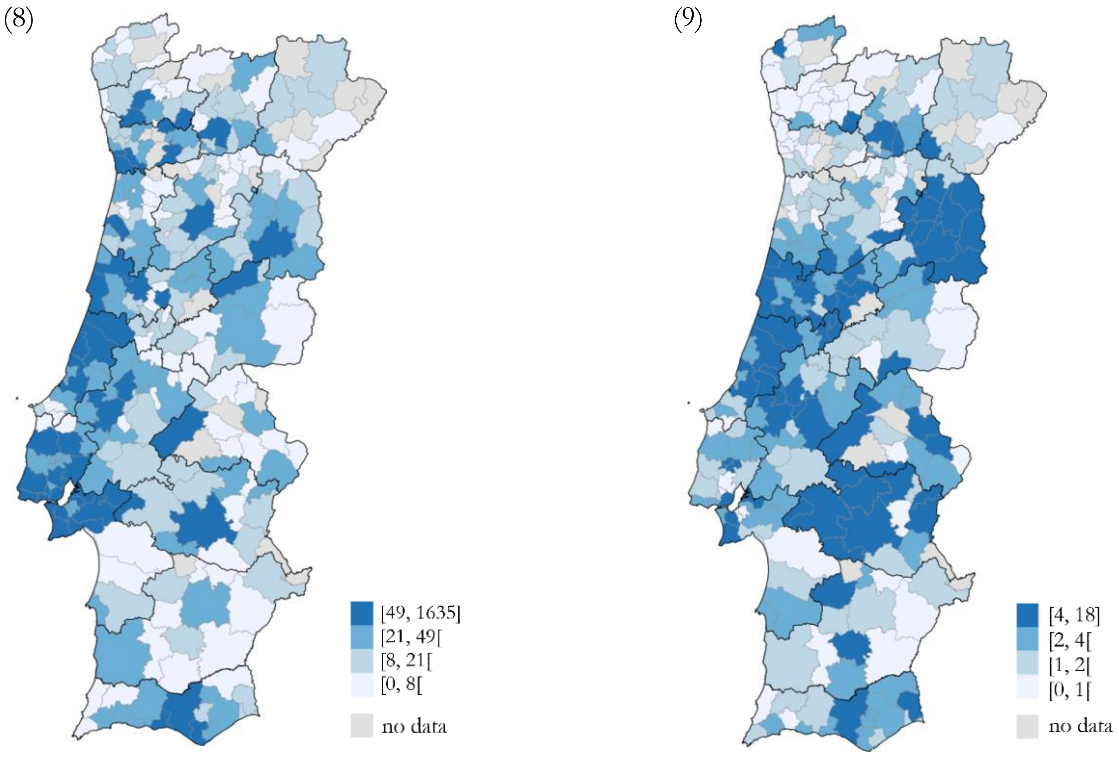
Complementing this analysis, summary statistics for all variables in the empirical models are provided in Table A1 of the Appendix.

5.3. Spatial distribution of workers and offers

As discussed in the previous section, aggregate IEFP metrics often conceal substantial spatial heterogeneity. To explore this, Figures 8 and 9 illustrate the geographic distribution of active job offers alongside a measure of labour market tightness, defined as the number of vacancies per 100 unemployed individuals, at the end of 2022.

As expected, there is a substantial number of job offers along Portugal's coastal strip, particularly within the Lisbon metropolitan area. Nevertheless, these are not the only areas exhibiting high vacancy levels, as IEFP opportunities display a broad spatial distribution across the country, with notable clusters also emerging in inland regions such as Guarda, Covilhã and Évora. A longitudinal analysis further reveals that the most significant increases have occurred in these regions, suggesting a growth that might be linked to the introduction, from 2020 onward, of various incentives to create jobs and hire through the IEFP outside coastal areas (IEFP, 2020). Such geographical dispersion is advantageous for the empirical strategy adopted, as a concentrated distribution of vacancies would reduce the variation available for identification and potentially introduce bias into the estimates.

Figures 8 and 9: Geographic distribution of active job vacancies (8) and ratio of vacancies per 100 unemployed individuals (9) at the end of 2022



Source: author's calculations based on BPLIM (2026) and INE (2026b)

Importantly, the categories in both maps are defined by quartiles, meaning that the highest tier may encompass municipalities with widely varying numbers of vacancies. While inland municipalities in this group typically record around 200 vacancies, Lisbon registers a substantially higher value (1635). Moreover, since the stock of vacancies covers all postings that remain active at the end of each month, high vacancy levels can arise through two distinct mechanisms. In dense coastal areas, persistently large numbers likely reflect thick labour markets, where new postings are continuously generated and rapidly filled. Conversely, in low-placement interior municipalities, elevated vacancy stocks may indicate that positions remain unfilled across successive months, pointing to structural matching difficulties rather than robust demand. A high vacancy stock is, therefore, an inherently ambiguous indicator of local labour market conditions, and should not be interpreted as evidence that these regions are equally dynamic.

Using the number of individuals registered with the IEFP at the end of 2022, a measure of labour market tightness was constructed to serve as a more accurate proxy for municipalities' employment dynamics. As shown in Figure 9, the Porto metropolitan area presents considerably lower values of vacancies per 100 unemployed individuals, indicating that job offers in the region may be predominantly posted outside the IEFP platform, or that they can easily be filled by the large internal pool of unemployed workers. Conversely, the Lisbon metropolitan area exhibits a slightly tighter labour market, with the capital itself registering a ratio in the highest category. This aligns with the substantial volume of vacancies posted through the IEFP in the city, reflecting its role as a primary employment hub for job seekers from different regions, while maintaining low internal unemployment.

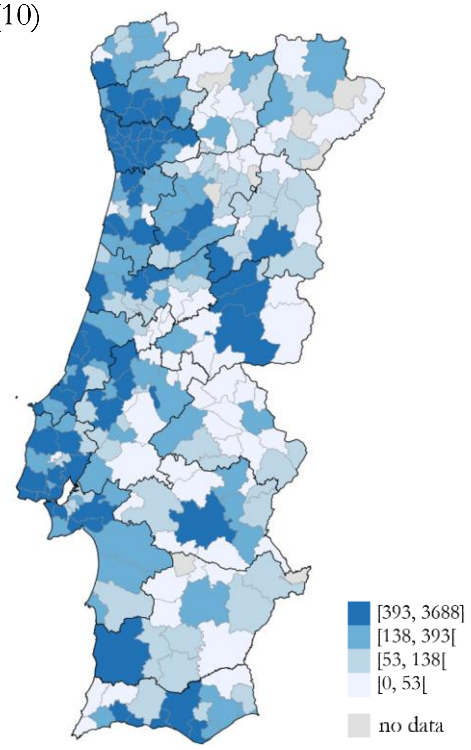
However, the tightest markets are found in regions such as Guarda and Évora, as well as their surrounding municipalities. While this may indicate structural labour shortages, especially if employer demand is stimulated by regional policy incentives rather than pure productivity gains, two additional factors are likely to be at play. First, since this measure relies exclusively on the IEFP sample, businesses in less dynamic labour markets might depend more heavily on the public employment service to post vacancies. Second, as district capitals, these cities naturally operate as regional hubs. Much like Lisbon, their elevated tightness ratios may simply reflect their ability to attract job seekers from

neighbouring municipalities, without necessarily registering high internal unemployment.

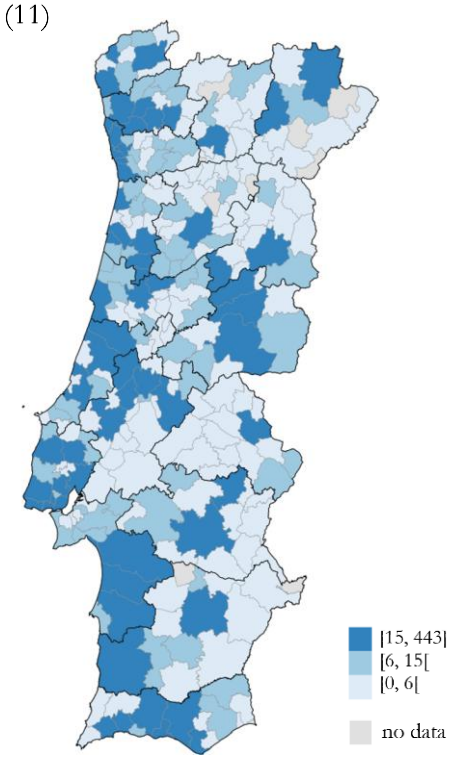
To further test these dynamics, Figure 10 maps the spatial distribution of total placements at the municipal level in 2022. The flow of successful job-worker matches points to a strong concentration of preferred destinations along the coastal areas, particularly in the metropolitan regions. Consistent with the patterns observed for job vacancies, municipalities such as Guarda, Castelo Branco and Évora fall into the highest category, but display the same vast disparity in absolute values when compared to Lisbon and Porto (around 900-1000 placements versus more than 3000). This spatial pattern remains largely consistent in Figure 11, which maps the total number of placements exceeding 30km between residency and job location in 2022, serving as a proxy for placements likely to require relocation or, at least, lengthy commutes. The same regions continue to occupy the highest category, even though the absolute volume of long-distance placements naturally drops (Lisbon and Porto record around 400 placements, compared to fewer than 80 in inland areas).

Figures 10 and 11: Spatial distribution of total placements (10) and placements exceeding 30km (11) in 2022

(10)



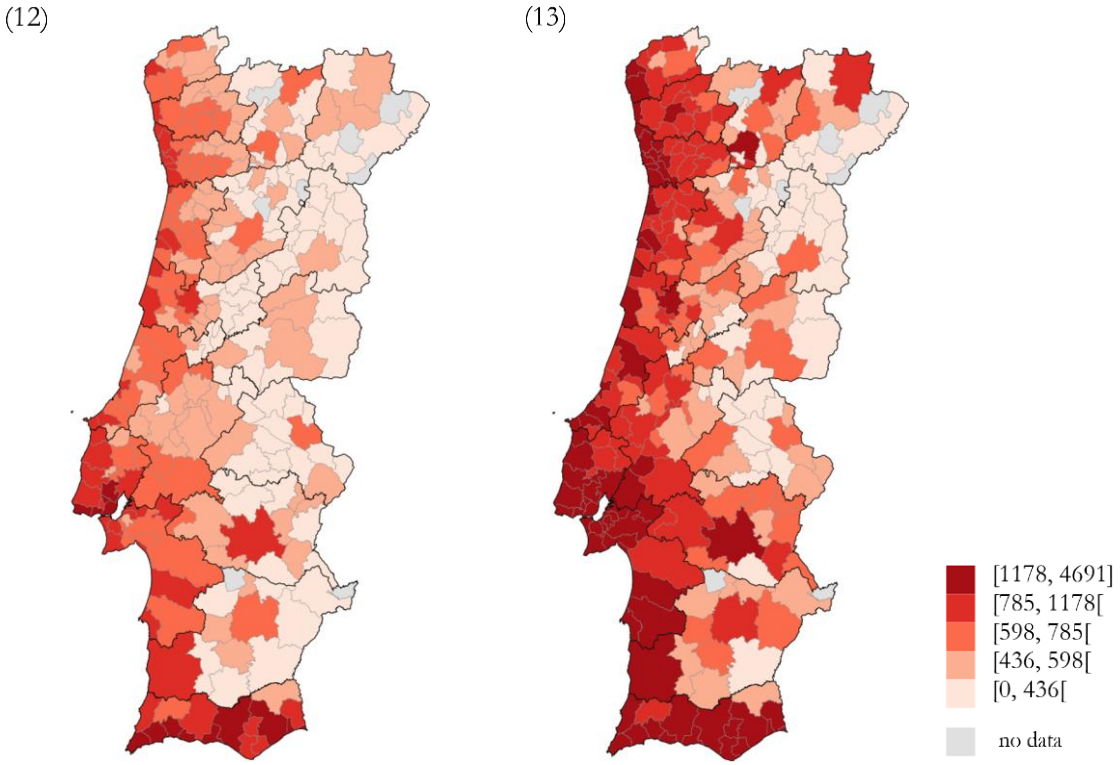
(11)



Source: author's calculations based on BPLIM (2026)

The most dynamic labour markets in the IEFP sample are also those facing the greatest housing pressures, as illustrated by Figures 12 and 13, which depict the evolution of the median price per square metre between 2017 and 2022. As expected, prices rose markedly in coastal regions, particularly in the Algarve and the Lisbon and Porto metropolitan areas. Since this trajectory is fully consistent with both the literature reviewed above and the geographic distribution of placements within our estimation sample, the analysis now proceeds to the discussion of the empirical results.

Figures 12 and 13: Median price per square meter at the municipal level at the beginning (Q2 2017) (12) and end (Q4 2022) (13) of the sample period



Source: author's calculations based on INE (2022, 2026g)

6. Results

In this section, we present the results of the main specifications estimated via Poisson Pseudo-Maximum Likelihood with high-dimensional fixed effects. In addition to examining the heterogeneity in the impact of housing price increases on labour mobility, we conduct a series of simulations to illustrate the spatial implications of rising property costs for Portuguese workers over the sample period.

6.1. Model estimates

Table 1 presents the estimation results for the three main specifications outlined in Section 4. In the baseline model (1), the high pseudo-R^2 indicates a strong overall fit for the gravity framework. Consistent with the spatial literature, the estimates confirm that physical distance is the dominant friction affecting job placements, while the salary ratio also plays a significant role. As theorized, the aggregate coefficient for the housing price ratio is statistically insignificant, supporting the core hypothesis that housing costs exert little impact on overall placements because most labour flows occur within commutable distances, where residential relocation is not required.

To ensure this initial insignificance is not driven by omitted variable bias, specification (2) expands the baseline model by introducing two vectors of extended covariates. These additions aim to capture time-varying unobserved economic dynamism and the evolving attractiveness of the destination labour markets. While the coefficients of these new controls are highly significant and exhibit theoretically consistent signs, the aggregate housing price ratio remains statistically indistinguishable from zero. This persistent result strongly reinforces the theoretical need for a spatially heterogeneous framework.

The final specification (3) introduces a greater degree of complexity, requiring two methodological clarifications. First, in addition to the distance brackets ($d \in \{<10\text{km}, 10\text{-}30\text{km}, \geq 30\text{km}\}$), we retain the continuous logarithmic distance term to capture the standard gravity-model assumption of non-linear spatial friction decay, independent of housing prices. While intra-municipal placements are necessarily excluded from this transformation, we consider it an acceptable trade-off, as our main explanatory variables are aggregated at the municipal level and, therefore, would exhibit no variation. Furthermore, these internal job matches are less likely to require residential relocation.

Table 1: Estimation results

	(1)	(2)	(3)
ln Distance	-2.843***	-2.844***	-3.000***
	(0.026)	(0.026)	(0.028)
ln Salary Ratio$_{(t-1)}$	1.506***	1.012***	1.045***
	(0.410)	(0.341)	(0.347)
ln Price Ratio$_{(t-1)}$	0.096	0.100	
	(0.108)	(0.100)	
ln PR$_{(t-1)}$ x Dist (0) x MA (0)			0.061
			(0.294)
ln PR$_{(t-1)}$ x Dist (0) x MA (1)			1.686
			(1.531)
ln PR$_{(t-1)}$ x Dist (0) x MA (2)			-0.929***
			(0.244)
ln PR$_{(t-1)}$ x Dist (0) x MA (3)			-0.261
			(1.618)
ln PR$_{(t-1)}$ x Dist (1) x MA (0)			0.230*
			(0.118)
ln PR$_{(t-1)}$ x Dist (1) x MA (1)			0.247
			(0.517)
ln PR$_{(t-1)}$ x Dist (1) x MA (2)			-0.127
			(0.213)
ln PR$_{(t-1)}$ x Dist (1) x MA (3)			0.783***
			(0.293)
ln PR$_{(t-1)}$ x Dist (2) x MA (0)			0.094
			(0.110)
ln PR$_{(t-1)}$ x Dist (2) x MA (1)			-1.175***
			(0.165)
ln PR$_{(t-1)}$ x Dist (2) x MA (2)			0.590*
			(0.326)
ln PR$_{(t-1)}$ x Dist (2) x MA (3)			1.031***
			(0.152)
ln Active Population Density$_{(t-1)}$		-4.692***	-4.761***
		(0.728)	(0.736)
ln Firm Density$_{(t-1)}$		1.454***	1.443***
		(0.512)	(0.507)
ln Unemployment Differential$_{(t-1)}$		-0.348***	-0.333***
		(0.104)	(0.105)
Total placements$_{(t-1)}$		0.001***	0.001***
		(0.000)	(0.000)
Year FE	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes
Pseudo R-squared	0.76	0.76	0.77
Observations	1586024	1586024	1586024

Standard errors, clustered at the origin-destination level, are reported in parentheses
* p<0.10, ** p<0.05, *** p<0.01
MA (Metropolitan Area) indicates flow type: 0 = non-metropolitan flows, 1 = metropolitan origin only, 2 = both origin and destination are metropolitan, 3 = metropolitan destination only
Dist (distance) bands: 0 = <10km, 1 = 10 to <30km, 2 = ≥30km

Second, metropolitan status is decomposed into four mutually exclusive regimes ($m \in \{0,1,2,3\}$), distinguishing between non-metropolitan flows, origin-only, both or destination-only metropolitan status, respectively. Given its lack of joint significance in earlier estimations, the aggregate housing-price ratio in levels is dropped from the final specification. This simplifies interpretation of the triple interaction terms, which can now be read directly rather than as deviations from a reference category. Therefore, specification (3) encompasses twelve interaction coefficients, reflecting the intersection of three distance brackets and four metropolitan regimes. To ensure sufficient data availability, Table A5 of the Appendix reports the number of observations per category, distinguishing between zero and positive placements.

Except for the total volume of placements in the destination municipality, which is retained in levels to accommodate zero-count observations, all explanatory variables were logarithmically transformed to facilitate the interpretation of coefficients as elasticities. Consistent with gravity literature, the distance coefficient displays the expected sign and significance, suggesting that a 1% increase in the distance between municipalities reduces placements by approximately 3%.

Labour market attractiveness measures also align with theoretical expectations. The lagged salary ratio exhibits a coefficient of 1.04, indicating a near-proportional relationship between relative wage increases and job placements. This finding is consistent with the literature reviewed in Section 3, which suggests that workers consider both prospective earnings and the wages forgone when making relocation decisions (Anderson & Smith, 2010; Arpaia et al., 2015). By contrast, a 1% increase in the destination-to-origin unemployment ratio is associated with a 0.33% decline in placements. This result also supports previous evidence, suggesting that workers avoid stagnant labour markets, preferring dynamic regions where employment transitions are less constrained (Langella & Manning, 2022; Monte et al., 2018; Niebuhr et al., 2012; Winke, 2021).

Regarding destination-specific covariates, active population density serves as a proxy for labour market competition. Its negative and statistically significant coefficient is consistent with the findings of Manning and Petrongolo (2017), suggesting that greater competition among workers discourages inflows. Furthermore, firm density is used as a proxy for employment opportunities. As expected, its coefficient is positive and statistically

significant. Finally, the lagged total volume of placements in the destination is included to account for the possibility that previous inflows increase a destination's attractiveness to subsequent workers. Since this variable is retained in levels, its coefficient represents a semi-elasticity, indicating that a rise of 10 placements in the previous period is associated with an approximately 0.8% increase in current-period placements.

Substantial heterogeneity is observed among the 12 interaction coefficients, which serve as the primary explanatory variables in this analysis. As anticipated by the commuting threshold previously discussed, most coefficients for distances under 30km lack statistical significance, reflecting the fact that workers moving within shorter ranges typically do not need to enter the housing market. Nevertheless, notable exceptions arise when decomposing these flows, with a distinct pattern emerging between placements that involve a change in metropolitan status (i.e., moving between metropolitan and non-metropolitan areas) versus those where the spatial context remains the same.

For movements that cross metropolitan boundaries, the interaction coefficients exhibit greater statistical significance at longer distances. When transitioning from a metropolitan to a non-metropolitan municipality, a 1% rise in the price ratio is associated with a highly significant 1.17% decrease in placements requiring residential relocation or extended commutes. This strongly aligns with existing literature regarding the negative relationship between housing prices and mobility (Eliasson & Westerlund, 2024; Nguyen et al., 2026). However, this friction is highly asymmetric: for moves from a non-metropolitan to a metropolitan municipality, a 1% increase in the price ratio is linked to a 1.03% increase in placements at distances over 30km (also significant at the 1% level). This positive effect is already observable, albeit slightly weaker, in the 10-30km distance bracket, strongly suggesting that housing prices reflect municipal attractiveness, as workers are willing to bear higher living costs or longer commutes to access high-demand labour markets.

The dynamics differ considerably for movements occurring within the same spatial context. For intra-metropolitan flows under 10km, a 1% increase in the price ratio is associated with a 0.93% decrease in placements, significant at the 1% level. This result follows naturally from the previous finding: while rising housing prices do not deter workers from moving into metropolitan areas, they do constrain where these workers can afford to live and how close to the urban core they can work. Consequently, surging real

estate costs in the employment municipality lower a firm's prospects of hiring in its immediate vicinity, as candidates are priced out of nearby housing and forced to accept longer commutes from more affordable locations. This also helps explain the monotonic pattern observed across distance brackets, with the coefficient increasing steadily and eventually turning positive (0.59%, significant at the 10% level) at longer distances. An alternative explanation could be the rise of telework, allowing workers to tolerate longer, but less frequent, commutes. Nevertheless, considering the skill composition of the IEFP sample, this channel seems unlikely to be the main driver of the results.

Conversely, for flows between two non-metropolitan municipalities, a 1% increase in the price ratio is marginally significant and linked to a 0.23% increase in placements within the 10-30km bracket. This may indicate that, as housing prices in these areas rise more moderately than in metropolitan regions, workers are willing to accept slightly longer commutes while remaining relatively close to their place of employment.

Ultimately, our baseline estimates corroborate the broader consensus that Portugal's two metropolitan areas exert a strong pull on workers from other regions, reflecting the wide range of opportunities they offer (European Commission, 2023; Fonseca, 2024). Elevated housing prices act as a strong deterrent to moving toward less dynamic areas, as workers are reluctant to endure greater living expenses or extended travel times without corresponding benefits. For high-demand destinations, by contrast, housing prices effectively capture the area's inherent premium, with people willing to absorb the costs of residential relocation or longer commutes in exchange for access to these growing urban advantages. However, once settled within the metropolitan area, these same workers face the negative externalities of excessive agglomeration, being pushed toward the periphery and forced to reside farther from the urban core.

6.2. Simulations

Although the 12 interaction coefficients provide a highly granular analysis of housing prices and job placements, their broader implications are most intuitively conveyed through the construction of alternative scenarios. Following standard practice in gravity analysis (Yotov et al., 2016), we adopt a partial equilibrium framework that abstracts from general equilibrium feedback effects, thereby isolating the expected spatial reallocation of labour in response to targeted changes in housing and salary ratios. Accordingly, the counterfactual

number of placements is obtained by replacing the observed housing price and salary ratios with their simulated values in Equation (3.1), while holding the remaining covariates fixed. These comparisons are drawn against the baseline of 2022, as this year marks the end of the sample period, when housing market pressures were most acute.

As extensively discussed throughout this study, housing prices act as a labour market friction not because they are uniformly high, but because they are disproportionately severe in coastal and urban areas. This premise can now be visually illustrated. Using an extreme benchmark of complete spatial homogeneity, we project how the spatial distribution of job placements would shift in the absence of housing frictions, assuming instead that a uniform price prevailed across the entire country. Under this scenario, the model predicts a 0.27% increase in total placements in 2022 relative to the observed baseline. This gain gives an approximate estimate of the labour market inefficiency associated with the existing spatial dispersion of housing prices, highlighting the extent to which they may constrain adequate job matching. Nevertheless, given the modest magnitude of this aggregate effect, the primary value of the simulation lies in identifying which municipalities would benefit and which would be most adversely affected by policies aimed at nationwide equalisation of housing costs. The spatial distribution of these effects is presented in Figure 14.

By disrupting the conventional trade-off between agglomeration economies and spatial frictions, this scenario gives rise to a clear dichotomy between metropolitan and non-metropolitan areas. In cores like Lisbon and Porto, neutralizing housing costs seems to eliminate the pricing-out effect, enabling workers to reside in closer proximity to these high-demand hubs. As a result, firms gain access to a larger pool of potential workers, leading to a substantial increase in predicted local job placements. In contrast, surrounding municipalities experience a relative decline: as equalising housing costs draws workers to the urban centre, peripheral areas lose part of the labour force that previously settled there for affordable housing and accepted local employment to avoid lengthy commutes.

Following a similar dynamic, district capitals outside the main metropolitan regions, such as Coimbra and Castelo Branco, seem to lose their primary comparative advantage of relative affordability. In a scenario where housing costs are uniform nationwide, the jobs offered in these intermediate cities may no longer serve as a cost-effective alternative to the primary metropolitan areas, resulting in a relative decline in their predicted placements. Meanwhile,

non-metropolitan peripheries experience a relative gain, suggesting the possibility of a localised rebalancing: as the district capital loses its appeal as a regional hub, its gravitational pull weakens, enabling peripheral firms to more easily secure local matches.

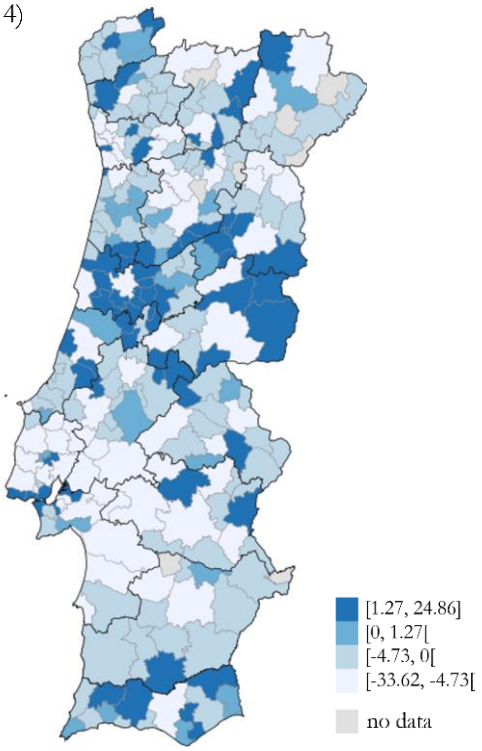
Building on this analysis, a more ambitious scenario can be explored through the neutralization of both housing and salary differentials. By eliminating the primary deterrents and incentives driving spatial mobility, this exercise isolates underlying structural dynamics, projecting job placements based solely on non-pecuniary factors like proximity, amenities and firm concentration. From a policy perspective, it highlights the potential theoretical implications of spatial cohesion measures aimed at erasing economic disparities, suggesting an estimated 3.80% decrease in total placements for 2022 relative to the baseline. This reduction reflects a classic equity-efficiency trade-off: while eliminating financial frictions fosters regional equality, it simultaneously reduces the overall volume of successful job matches.

Figure 15 further maps the distribution of these effects. Imposing absolute spatial parity diminishes the capacity of both metropolitan cores and district capitals to attract placements, shifting the primary relative gains toward interior municipalities. The magnitude of this redistribution is also evident: maximum increases rise from 24.86% in the first scenario to 41.64%, while maximum losses deepen to -48.94%. Such results closely align with the theoretical expectations of absolute spatial cohesion: stripped of the wage premiums that fuel urban agglomeration and the housing costs that typically constrain it, the geographic distribution of job placements becomes more dispersed.

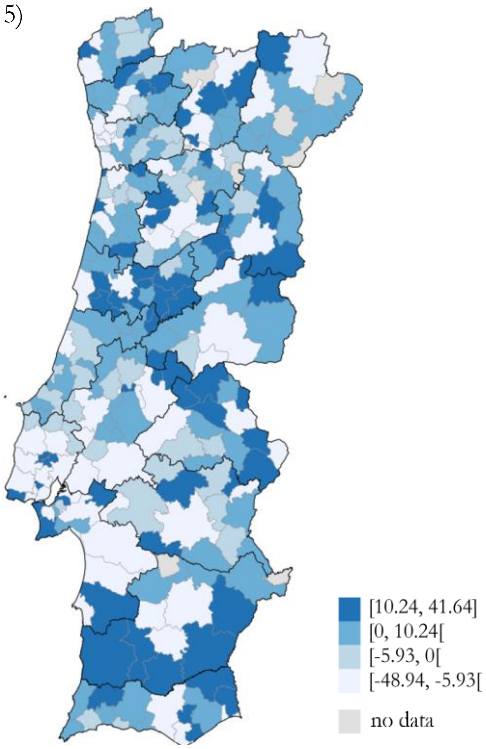
While these findings provide valuable insights into the potential impacts of spatial cohesion policies, such radical scenarios remain largely theoretical. To address this, two additional simulations were developed, focusing on more realistic policy approaches: subsidising high-cost versus low-cost workplace municipalities. These targeted exercises seek to evaluate the actual effectiveness of these interventions - specifically, whether enabling workers to live closer to highly productive hubs successfully mitigates spatial misallocation, and whether incentivizing employment in interior municipalities truly fosters regional development.

Figures 14 and 15: Predicted difference (%) in placements assuming the complete absence of housing frictions (14) and the neutralization of both housing and wage frictions (15)

(14)



(15)



Source: author's calculations based on BPLIM (2026)

Let us assume that, in 2022, the government introduced a support scheme targeting individuals employed in the country's most expensive municipalities. Specifically, workplace municipalities where the median housing price per square metre exceeded the 75th percentile at the end of 2021 became eligible for a 10% state subsidy, provided either through direct transfers or tax reliefs. This threshold encompasses the vast majority of metropolitan municipalities, coastal areas and a few district capitals, which constitute the focus of the analysis - given the partial equilibrium framework adopted in this study, the exercise estimates the direct effects of the policy exclusively within subsidised regions, abstracting from any general equilibrium spillovers on the rest of the country.

At the aggregate level, the exercise results in a modest decline of 0.15% in predicted placements, although its effects display considerable spatial heterogeneity. As illustrated in Figure 16, despite all eligible municipalities receiving the subsidy, the policy does not generate uniformly positive outcomes. Job matches become increasingly concentrated in the Lisbon and Porto metropolitan centres, alongside a few major coastal hubs. In contrast, surrounding municipalities experience relative declines, aligning with the previous discussion: as housing

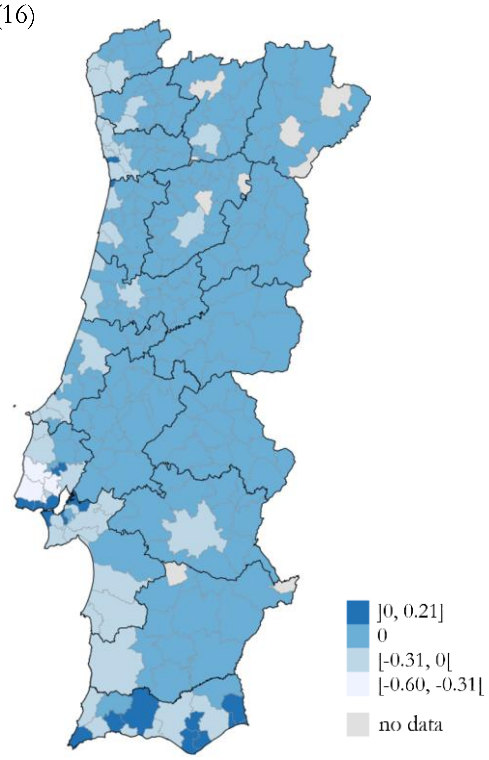
becomes more affordable, workers are more likely to reside closer to urban cores, eliminating the need to accept jobs in less central municipalities. At the same time, district capitals such as Viseu, Coimbra and Évora also experience a reduction in successful matches, suggesting that the subsidy effectively anchors more workers within the metropolitan centres. To test the robustness of these findings, a secondary evaluation considered a higher subsidy rate of 25%. While the aggregate impact steepens, resulting in an overall placement reduction of 0.28%, the spatial patterns remain largely unchanged. This dynamic indicates that public interventions targeting high-cost areas risk triggering a feedback loop that draws further demand to the urban core. Ultimately, this may not only aggravate the housing crisis but also exacerbate spatial mismatch, as peripheral firms struggle to fill vacancies while core markets become congested, potentially driving an overall decline in matching efficiency.

Having identified the inefficiencies associated with subsidising high-cost municipalities, we now test the opposite policy: subsidising low-cost workplace areas to evaluate the partial equilibrium impacts of promoting economic activity in the country's interior. Applying the same framework with a 10% subsidy, the exercise produces a negligible decline of 0.01% in total predicted placements, suggesting limited influence on aggregate labour market outcomes. As illustrated in Figure 17, the spatial effects are strictly confined to the country's interior, with relative gains mainly clustering around regional district centres. Furthermore, testing a steeper 25% subsidy reveals that the spatial distribution remains largely unchanged, still resulting in a contraction in total predicted placements, even if only slightly larger (0.02%). Ultimately, the results indicate that broad financial incentives targeted exclusively at low-cost municipalities may generate negligible aggregate effects, appearing insufficient to overcome the structural inertia of secondary markets. More importantly, if such measures struggle to substantially reallocate labour even within peripheral zones, they are also unlikely to attract workers away from high-demand metropolitan markets, where agglomeration economies continue to provide strong incentives for both workers and firms.

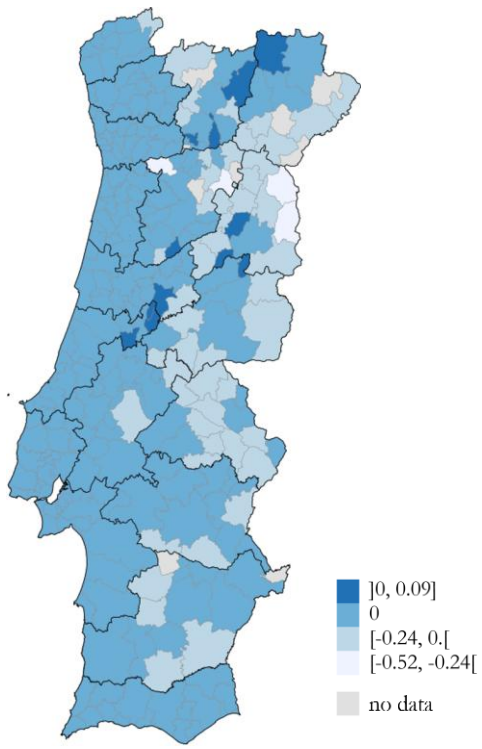
Comparing all exercises, only the theoretical scenario in which the price ratio equals one yields positive outcomes in terms of total predicted placements. Combined with the inefficiencies of the targeted interventions examined above, the findings suggest that localised subsidies, whether directed towards high- or low-cost municipalities, are unlikely to substantially alleviate the spatial frictions associated with the housing crisis.

Figures 16 and 17: Predicted difference (%) in placements resulting from a targeted subsidy of 10% in high-cost workplace municipalities (16) and low-cost workplace municipalities (17)

(16)



(17)



Source: author's calculations based on BPLIM (2026)

Nevertheless, considering the constraints inherent to a partial equilibrium framework, as well as the varying number of observations per municipality available for identification, these results should not be interpreted as definitive policy prescriptions. Rather, they simply underscore the potential limitations of demand-side housing subsidies in addressing spatial labour market distortions. At the same time, although structural interventions aimed at narrowing fundamental disparities in housing prices receive broad support in the literature, they inevitably involve substantial political, fiscal and spatial-environmental challenges, making them considerably more difficult to implement than conventional targeted financial subsidies. Given the scale of investment required to implement such measures, further empirical research is needed to complement the present analysis and assess their broader economic and social benefits.

7. Conclusion

The aim of this dissertation is to explore the interplay between the housing crisis in Portugal and the spatial distribution of labour across the country. While one might look to classical supply-demand theory for a straightforward relationship, whereby increased real estate prices lower demand for a given location, an extensive review of the literature revealed that the underlying dynamics are significantly more complex. In much of the North American evidence, empirical assessments have linked the growth of urban housing prices to a significant misallocation of labour, often focusing on quantifying the output losses caused by suboptimal job matches. However, more recent analyses, especially in the EU, have started to describe different approaches to this problem: rather than simply being deterred from accessing these markets, workers are resorting to living in overcrowded housing, reducing other types of expenditure or relocating further away.

To understand which of these mechanisms prevail in the Portuguese context, the PPML estimator with high-dimensional fixed effects was used to model quarterly job placements between mainland municipalities from 2017 to 2022. The primary explanatory variable, the workplace-to-residence housing price ratio, was interacted with distance and metropolitan indicators to assess how results change when moves involve relocation, impractical commutes or metropolitan advantages. Estimates indicate that, for job offers 30km or more away, a 1% increase in relative housing prices in non-metropolitan areas is associated with a 1.17% decrease in placements coming from metropolitan regions. Conversely, moves in the opposite direction see a 1.03% increase. While this dynamic reflects the enduring pull of urban centres, localised housing costs still appear as a significant barrier: for moves under 10km within metropolitan regions, a 1% price increase is linked to a 0.93% drop in placements. These findings suggest that, despite the attractiveness of thick labour markets, prohibitive housing costs are reflected in the choice to reside further away from the workplace, which correlates with longer commutes.

To explore how labour mobility may evolve in response to different interventions, counterfactual scenarios were simulated. Theoretically, eliminating housing price disparities increases predicted placements by 0.27%, whereas enforcing complete spatial cohesion through uniform prices and salaries reduces them by 3.80%, highlighting a trade-off between spatial equity and market efficiency. Moving to actionable policies, simulations suggest that

subsidising high-cost workplace areas by 10% would likely worsen matching efficiency, potentially lowering placements through the depletion of peripheral markets and the exacerbation of metropolitan congestion. Meanwhile, subsidising low-cost municipalities appears to produce negligible aggregate effects, as financial incentives alone seem insufficient to overcome the structural inertia of these secondary markets.

However, the inefficacy of localised subsidies does not imply that rising housing prices should be dismissed as a policy concern. As indicated by the estimates, while workers may not abstain from entering dynamic labour markets, they appear to internalize this friction through significantly longer commutes or securing employment further from the urban core. Moreover, if subsidising central areas merely attracts additional demand, while subsidising the interior seems insufficient to mobilize labour there, the structural pattern of coastal agglomeration and interior depopulation remains unlikely to be easily disrupted, perpetuating the affordability crisis in urban cores and hindering economic cohesion. Given that, across all simulations, only a complete neutralization of housing price disparities yields a net positive effect on total placements, resolving the current crisis may require broad structural reforms rather than targeted incentives.

Naturally, due to the limitations of the presented model, these conclusions should not be interpreted as definitive policy prescriptions. Future research should seek to validate these findings by incorporating more accurate measures of commuting time, using data from more recent years and addressing endogeneity to establish strict causality. Furthermore, while the current model captures the broad spatial dynamics of the Portuguese labour market quite well, it does so somewhat simplistically by assuming uniform motivations across all workers. A more granular analysis at the individual level should be pursued to understand how family ties, age, qualifications and housing tenure also influence these mobility decisions.

Despite these constraints, this research contributes to the current debate by demonstrating the highly asymmetrical impact of housing costs across local labour markets. With housing pressures and job vacancies unevenly distributed throughout the country, the current affordability crisis threatens to deepen regional disparities. Ultimately, these localised frictions have the potential to constrain aggregate growth as severely as structural labour misallocation, underscoring why the relationship between housing and labour markets must remain a critical priority for future empirical work.

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Annex

Table A1: Summary statistics

	Mean	SD
Main regression variables:		
Median house price (p/m2)	747.41	458.64
Average monthly salary (€)	1,028.72	181.75
Active population density	20,206.51	54,482.73
Firm density	40.53	126.53
Unemployment rate (%)	5.43	6.36
Number of placements	76.98	115.56
Additional variables:		
Age	36.40	4.12
University enrolment rate (%)	12.90	38.84
Number of tourist accommodations	19.82	43.19

Note: SD - standard deviation

Table A2: Comparison of model estimates under alternative fixed effects and standard error clustering

	Baseline (3)	FE	Cluster
ln $PR_{(t-1)}$ x Dist (0) x MA (0)	0.061	0.096	0.061
	(0.294)	(0.292)	(0.304)
ln $PR_{(t-1)}$ x Dist (0) x MA (1)	1.686	1.706	1.686
	(1.531)	(1.524)	(1.722)
ln $PR_{(t-1)}$ x Dist (0) x MA (2)	-0.929***	-0.938***	-0.929**
	(0.244)	(0.242)	(0.390)
ln $PR_{(t-1)}$ x Dist (0) x MA (3)	-0.261	-0.276	-0.261
	(1.618)	(1.627)	(0.999)
ln $PR_{(t-1)}$ x Dist (1) x MA (0)	0.230*	0.249**	0.230
	(0.118)	(0.126)	(0.166)
ln $PR_{(t-1)}$ x Dist (1) x MA (1)	0.247	0.217	0.247
	(0.517)	(0.505)	(0.647)
ln $PR_{(t-1)}$ x Dist (1) x MA (2)	-0.127	-0.121	-0.127
	(0.213)	(0.214)	(0.218)
ln $PR_{(t-1)}$ x Dist (1) x MA (3)	0.783***	0.786***	0.783**
	(0.293)	(0.291)	(0.330)
ln $PR_{(t-1)}$ x Dist (2) x MA (0)	0.094	0.111	0.094
	(0.110)	(0.115)	(0.155)
ln $PR_{(t-1)}$ x Dist (2) x MA (1)	-1.175***	-1.184***	-1.175***
	(0.165)	(0.163)	(0.217)
ln $PR_{(t-1)}$ x Dist (2) x MA (2)	0.590*	0.569*	0.590
	(0.326)	(0.325)	(0.384)
ln $PR_{(t-1)}$ x Dist (2) x MA (3)	1.031***	1.040***	1.031***
	(0.152)	(0.152)	(0.199)
Baseline FE	Yes	No	Yes
Year + Municipality x Quarter FE	No	Yes	No
Cluster level	Pair	Pair	Destination
Observations	1586024	1584684	1586024

Standard errors are reported in parentheses
* p<0.10, ** p<0.05, *** p<0.01
MA (Metropolitan Area) indicates flow type: 0 = non-metropolitan flows, 1 = metropolitan origin only, 2 = both origin and destination are metropolitan, 3 = metropolitan destination only
Dist (distance) bands: 0 = <10km, 1 = 10 to <30km, 2 = ≥30km

Table A3: Comparison of model estimates under alternative area classifications and distance thresholds

	Baseline (3)	AML	GL	AMP	50km
ln $PR_{(t-1)}$ x Dist (0) x Area (0)	0.061	-0.653**	-0.650**	-0.482*	0.198
	(0.294)	(0.279)	(0.278)	(0.249)	(0.128)
ln $PR_{(t-1)}$ x Dist (0) x Area (1)	1.686	7.802***	-0.073	0.432	0.949
	(1.531)	(1.564)	(0.520)	(1.784)	(0.705)
ln $PR_{(t-1)}$ x Dist (0) x Area (2)	-0.929***	-0.912***	-0.943**	-0.852*	-0.564***
	(0.244)	(0.340)	(0.372)	(0.459)	(0.204)
ln $PR_{(t-1)}$ x Dist (0) x Area (3)	-0.261	-5.219***	-5.615***	0.416	0.702
	(1.618)	(1.481)	(1.436)	(1.769)	(0.486)
ln $PR_{(t-1)}$ x Dist (1) x Area (0)	0.230*	0.268**	0.261**	0.166	0.224*
	(0.118)	(0.120)	(0.120)	(0.114)	(0.117)
ln $PR_{(t-1)}$ x Dist (1) x Area (1)	0.247	1.139	0.314	-0.037	-0.558**
	(0.517)	(1.113)	(0.458)	(0.487)	(0.265)
ln $PR_{(t-1)}$ x Dist (1) x Area (2)	-0.127	-0.237	-0.250	0.043	-0.090
	(0.213)	(0.283)	(0.300)	(0.431)	(0.252)
ln $PR_{(t-1)}$ x Dist (1) x Area (3)	0.783***	0.393	0.235	0.995**	0.596***
	(0.293)	(0.457)	(0.471)	(0.402)	(0.208)
ln $PR_{(t-1)}$ x Dist (2) x Area (0)	0.094	0.245**	0.235**	0.186	-0.005
	(0.110)	(0.116)	(0.116)	(0.119)	(0.114)
ln $PR_{(t-1)}$ x Dist (2) x Area (1)	-1.175***	-1.082***	-1.084***	-0.286	-1.335***
	(0.165)	(0.244)	(0.243)	(0.321)	(0.159)
ln $PR_{(t-1)}$ x Dist (2) x Area (2)	0.590*	-0.194	-0.462	0.742	2.941***
	(0.326)	(0.335)	(0.421)	(0.473)	(0.381)
ln $PR_{(t-1)}$ x Dist (2) x Area (3)	1.031***	1.132***	1.067***	0.893***	1.100***
	(0.152)	(0.223)	(0.223)	(0.258)	(0.147)
Area	Both AM	AML	GL	AMP	Both AM
Distance threshold	30km	30km	30km	30km	50km
Year FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes
Observations	1586024	1586024	1586024	1586024	1586024

Standard errors, clustered at the origin-destination level, are reported in parentheses
* p<0.10, ** p<0.05, *** p<0.01
Area indicates flow type: 0 = neither origin nor destination belongs to the area; 1 = only origin belongs to the area; 2 = both origin and destination belong to the area; 3 = only destination belongs to the area
Dist (distance) bands: if threshold is 30km (0 = <10km, 1 = 10 to <30km, 2 = ≥30km); if threshold is 50km (0 = <25km, 1 = 25 to <50km, 2 = ≥50km)

Table A4: Comparison of model estimates under alternative lags and additional variables

	Baseline (3)	L2	L4	Measures
ln PR x Dist (0) x MA (0)	0.061	0.030	-0.028	0.042
	(0.294)	(0.280)	(0.259)	(0.295)
ln PR x Dist (0) x MA (1)	1.686	1.910	2.094	1.677
	(1.531)	(1.535)	(1.475)	(1.526)
ln PR x Dist (0) x MA (2)	-0.929***	-0.939***	-1.010***	-0.941***
	(0.244)	(0.247)	(0.264)	(0.248)
ln PR x Dist (0) x MA (3)	-0.261	-0.553	-0.898	-0.291
	(1.618)	(1.574)	(1.722)	(1.618)
ln PR x Dist (1) x MA (0)	0.230*	0.218**	0.064	0.214*
	(0.118)	(0.098)	(0.158)	(0.119)
ln PR x Dist (1) x MA (1)	0.247	0.228	0.179	0.225
	(0.517)	(0.509)	(0.517)	(0.517)
ln PR x Dist (1) x MA (2)	-0.127	-0.139	-0.175	-0.140
	(0.213)	(0.207)	(0.225)	(0.215)
ln PR x Dist (1) x MA (3)	0.783***	0.748**	0.580*	0.764***
	(0.293)	(0.292)	(0.310)	(0.293)
ln PR x Dist (2) x MA (0)	0.094	0.066	-0.065	0.079
	(0.110)	(0.098)	(0.143)	(0.111)
ln PR x Dist (2) x MA (1)	-1.175***	-1.187***	-1.316***	-1.192***
	(0.165)	(0.160)	(0.186)	(0.166)
ln PR x Dist (2) x MA (2)	0.590*	0.519	0.235	0.572*
	(0.326)	(0.330)	(0.352)	(0.326)
ln PR x Dist (2) x MA (3)	1.031***	1.006***	0.888***	1.013***
	(0.152)	(0.147)	(0.173)	(0.153)
University enrolment rate (%)				0.004***
				(0.001)
Number of tourist accommodations				0.001***
				(0.000)
Lag	L1	L2	L4	L1
Year FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Observations	1586024	1513932	1369748	1586024

Standard errors, clustered at the origin-destination level, are reported in parentheses
* p<0.10, ** p<0.05, *** p<0.01
MA (Metropolitan Area) indicates flow type: 0 = non-metropolitan flows, 1 = metropolitan origin only, 2 = both origin and destination are metropolitan, 3 = metropolitan destination only
Dist (distance) bands: 0 = <10km, 1 = 10 to <30km, 2 = ≥30km

Table A5: Distribution of observations across interaction categories

	N	N=0	N>0
<10km & NMA to NMA	7268	523	6745
<10km & MA to NMA	115	11	104
<10km & MA to MA	2231	85	2146
<10km & NMA to MA	115	19	96
10-30km & NMA to NMA	40158	26453	13705
10-30km & MA to NMA	2921	2145	776
10-30km & MA to MA	7590	3815	3775
10-30km & NMA to MA	2921	2032	889
>30km & NMA to NMA	1211962	1203873	8089
>30km & MA to NMA	185334	182105	3229
>30km & MA to MA	18354	17399	955
>30km & NMA to MA	185334	181828	3506

Notes: MA: metropolitan municipality, NMA: non-metropolitan municipality

FEP FACULDADE DE **ECONOMIA E GESTÃO**