TOURISTS, IMMIGRANTS AND HOUSING IN LISBON AND PORTO

Prices, supply and policy, 2000–2025

LISBON ECONOMICS



Tourists, Immigrants and Housing in Lisbon and Porto: Prices, Supply and Policy, 2000–2025

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Abstract

In a growing metropolitan area, most new housing is built in the suburbs. This paper divides the metropolitan areas of Lisbon and Porto into zones and studies construction, prices and policies. Building followed a credit cycle. A boom in 1998–2007 ended in 2008–2012. From 2013 the suburban supply curve shifted inward, and at a given ratio of price to construction cost the rate of new construction fell by about three quarters. The shortfall widened over time. Credit restriction was an important cause of this fall. Between 2008 and 2012 banks lowered the maximum loan-to-value ratio on housing loans every year and tightened credit to firms. The restriction of housing credit accounts for 52% to 72% of the fall in suburban supply around Lisbon. Land scarcity does not explain the fall. If it did, construction would have fallen more in the municipalities with less land available, and it fell less.

Real house prices in Lisbon rose 126% between 2013 and 2025. Demand from tourism, students and non-resident buyers is concentrated in the city. Most new immigrants settled in the suburbs. In a three-zone model with location choice and construction by zone, immigration accounts for about two fifths of the 2011–2025 increase in real prices in the Lisbon zones, and the growth of tourist beds for 14% of the increase in Lisbon city.

The credit limits keep lending at prudent levels, so policy has to act on licensing, building rights and land. In a welfare model, a higher permitted building density near rail and metro stations and faster licensing raise net welfare at no public cost. Credit to developers through a guarantee fund delivers the most dwellings within ten years. Demand subsidies and rent control reduce net welfare.

Keywords: house prices; tourism; short-term rentals; immigration; housing supply; vacant dwellings; suburbs; metropolitan area; stock-flow model; Lisbon.
JEL codes: R21, R31, R52, Z30, J61.

Non-technical summary

Lisbon is one of the 18 municipalities of its metropolitan area. In a growing metropolitan area, most new residents are housed in the suburbs. This study asks why suburban supply around Lisbon did not respond to demand after 2013, and what this meant for prices.

Demand by zone. Demand from tourism, students and buyers with tax residence abroad is concentrated in the city. In 2011–2025 the city received 65% of the new tourist beds of the metropolitan area. Most new immigrants settled in the suburbs, which received 74% of the increase in the immigrant population since 2011. Relative to its population, the city received more immigrants. Between the 2011 and 2021 censuses, the net departure of Portuguese residents from the city, after births and deaths, was 14,943.

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Housing stock and construction. About 2,043 new dwellings were completed in the city in 2012–2021. The 2021 census nevertheless counted 6,036 fewer dwellings than the 2011 census, within the same boundaries. Conversions to hotels and offices, mergers of dwellings and differences in census coverage are consistent with this gap; the data do not separate them. In the suburbs, the number of people to be housed rose by 455,130. Suburban completions averaged 15,909 dwellings a year in 2002–2007. They averaged 3,202 a year in 2016–2025. New construction is low-density, with about two dwellings per building. Holding each zone's 2011 occupancy (persons per dwelling) constant and counting tourist beds, the metropolitan area lacks about 306,850 dwellings. Two thirds of this shortfall is in the suburbs.

Why suburban construction fell. From 2013 the suburban supply curve shifted inward. At a given ratio of price to construction cost, the rate of new construction fell by about three quarters. Land scarcity constrains supply in the city, but it does not explain this fall. If it did, construction would have fallen more in the municipalities with less land available, and it fell less. Credit restriction was an important cause of this fall. Between 2008 and 2012, banks lowered the maximum loan-to-value (LTV) ratio on housing loans every year and did not raise it afterwards, and they also tightened credit to firms. Buyers of new dwellings depend on mortgages, and developers depend on those buyers and on bank credit. The restriction of housing credit accounts for 52% to 72% of the estimated fall in suburban supply after 2013. Suburban permits recovered from 2017 and are converted into completed dwellings at about the pre-crisis rate. Licensing per dwelling in 2016–2025 was, however, about a third of its 2002–2007 level. In Lisbon city, completions per dwelling licensed two years earlier fell by more than half.

A construction cycle, then a persistent fall. Construction followed a credit cycle. Nationally, completions averaged 14.1 a year per 1,000 dwellings in 1992–1997, 18.4 in the boom of 1998–2007 and 7.7 in 2008–2012. At a given ratio of price to construction cost, building in the boom years was higher than in 2008–2012, and this excess disappears once the LTV term enters the supply equation. Part of the fall after 2007 was therefore the end of a credit-fed boom. The fall after 2013 is of a different kind. In 2017–2025 completions averaged 3.6 a year per 1,000 dwellings, about a third of the 1992–2025 average (10.2). Measured against a baseline that excludes the boom years, the 2013 break is still 64%. A catch-up after the boom would have narrowed the shortfall over time. It widened instead, nationally from 60% in 2013–2016 to 75% in 2017–2025, and in the inner ring from 68% to 82%. The small excess of dwellings that the Lisbon suburbs had in 2011 was used up by 2020 in the inner ring and by 2022 on the south bank. The restriction of housing credit accounts for about half of the break in both periods. The building rates of the boom were fed by credit, and the 2018 limits of Banco de Portugal keep housing credit at prudent levels. The other causes of the fall, licensing, building rights and land, therefore carry most of the weight for policy.

Links between the zones. Employment remained concentrated in the city, whose share of the metropolitan area's jobs rose to 40.1% in 2024. Traffic on the bridges and access roads into the city reached record levels in 2025. Suburban prices move with prices in the city.

Results of the three-zone model. A model of the three zones of Lisbon reproduces the increase in real prices within the sample. In its counterfactual without the 2013 supply break, real prices in 2025 would be about 13% lower in the suburbs and 6% lower in the city. Immigration accounts for about two fifths of the 2011–2025 increase in real prices in the

three Lisbon zones. The growth of tourist beds accounts for 14% of the increase in Lisbon city. Both are computed by holding the variable at its 2011 level, and both depend on the elasticity of the real price with respect to occupancy, the number of persons per dwelling. The main results use elasticities estimated zone by zone. The elasticity estimated on the national panel of municipalities is smaller and gives a lower bound, at which the effect of the supply break is about half as large. Holding purchases by buyers with tax residence abroad at zero removes at most 2% of the increase. Relocating jobs or reducing commuting times changes prices by a few percent.

Affordability. In Lisbon city, 12% of renter households could buy a 75 m^2 dwelling at the median price. In the cheapest municipality of the south bank, the share rises to 46%. Including the cost of commuting by car, it falls to 28%.

Policy implications. In the suburbs, the measures are credit to developers through a guarantee fund, faster licensing and upzoning near rail and metro stations. In the city, they are higher height limits outside the historic center, limits on the conversion of dwellings to other uses and to local accommodation, and the return of vacant dwellings to use. Housing, transport and land for employment require planning at the scale of the metropolitan area. A welfare model that values the benefits and costs of each measure in euros finds that upzoning and faster licensing raise net welfare at no public cost. Demand subsidies and rent control reduce net welfare in every draw of the model's parameter bands.

What the study does not establish

The study does not establish that tourists or immigrants caused the housing shortage. They raised demand; the shortage arises from the contraction of supply after 2013, above all in the suburbs. The analysis works with three zones and does not model the location of each dwelling and each job.

Technical summary

The question and the zones

The paper divides the metropolitan areas of Lisbon and Porto into five zones: Lisbon city, its inner ring (Grande Lisboa without Lisbon) and the south bank (Península de Setúbal); Porto city and its ring (Section 3). The question is why suburban supply, which provides most of the new housing of a growing metropolitan area, did not respond to demand after 2013.

Demand by zone

The number of people to be housed, residents plus tourist beds, rose by 33% in Lisbon city and by 455,130 in its suburbs between 2011 and 2025 (Section 4). Of the suburban increase, 79% falls after 2019; this timing depends on how INE's population revision is distributed over the years. Totals are INE's revised estimates. Nationals are the 2021 census count, the revised total times the 2011 census share of nationals, and each zone's 2011–2021 trend after 2021; immigrants are the remainder. The city received 65% of the new tourist beds of its

metropolitan area. The suburbs received 74% of the increase in the number of immigrants, and the city received more relative to its population (Section 6).

Supply by zone

The census stock of Lisbon city fell by 6,036 dwellings in 2011–2021, although 2,043 dwellings were completed. The census counted 7,646 fewer dwellings than the recorded flows imply; the residual includes conversions, mergers and differences in census coverage. In the suburbs, the elasticity of the construction rate (completions per existing dwelling) with respect to the lagged real price is 1.73 in the inner ring and 1.39 on the south bank. At a given national ratio of price to construction cost, the construction rate fell after 2013 by 79% in the inner ring and 70% on the south bank. The ECB Bank Lending Survey for Portugal records net tightening of LTV limits on housing loans in every year from 2008 to 2012, with net percentages of 45 to 80; from 2013 the net balance was zero or small, and the cumulative tightening persisted. The cumulative tightening accounts for 52% of the estimated 2013 break in the inner ring and 72% on the south bank. In Lisbon city, it accounts for none of the break (Section 9). Completions per dwelling licensed two years earlier were 0.77 and 0.84 in the suburbs in 2020–2025, against 0.84 and 0.83 in 2004–2010. Licensing per dwelling in 2016–2025 was about a third of its 2002–2007 level. New suburban buildings held about 2 dwellings each in 2021–2025. Land scarcity constrains supply in the city and the inner suburbs. Across the mainland municipalities, however, the fall in construction between 2002–2007 and 2016–2025 was smaller where a larger share of the land is already built up (Section 9). On the south bank and in the Porto ring, prices were at or below construction cost in 2013–2016. When the ratio of price to cost of each zone replaces the national ratio, the 2013 break is small and not significant on the south bank, smaller in the Porto ring and still large in the inner ring. Section 10 examines licensing, labor and costs.

Links between the zones

The city's share of the metropolitan area's jobs rose from 37.1% in 2010 to 40.1% in 2024. Traffic on the accesses to the city falls in recessions, reaches record levels in expansions and grows with economic activity. Suburban prices co-move with the city's price. Suburban construction follows the price in the suburb more closely than the price in the city (Section 11).

The three-zone model

Households choose a zone according to price and job access; in each zone the price clears the market given the number of persons per dwelling; construction responds to prices (Section 12). It is a location-choice and stock-flow model in which the population of each metropolitan area follows the data; it does not measure welfare. The parameters of the price, construction, credit and interest-rate terms are estimated on the municipal panels and on the zone panel. The weight of job access is not identified, and the elasticity of location with respect to price is construed. The free simulation reproduces the increase in real prices in the Lisbon zones within the sample. The effects of immigration and tourism depend on the elasticity of the real price with respect to occupancy (persons per dwelling). The main results use the zone elasticities (2.21 in the inner ring and 2.14 on the south bank). The lower bound uses the elasticity of 0.98 estimated by instrumental variables on the national municipal panel. In the counterfactual without the 2013 break in suburban construction,

real prices in 2025 would be 13.1% lower in the inner ring, 12.7% lower on the south bank and 6.3% lower in the city, with about 95,070 more suburban dwellings and 36,783 residents moving from the city to the suburbs. With the national elasticity, these effects are about half as large. Around Porto, the city's real price would be 7.2% lower. A separate scenario adds 210,066 suburban dwellings, the number implied by the 2002–2007 completion rates. It lowers real prices by 25.0% and 26.3% in the suburbs and by 12.8% in the city, but it requires more construction than the estimated supply curve delivers. Relocating jobs or reducing commuting times changes prices by at most 3.1% at the central values, and by up to 11% on the south bank at the upper end of the band for the weight of job access. Holding immigration at its 2011 level removes 41% to 46% of the 2011–2025 increase in the logarithm of the real price in the three Lisbon zones (22% to 25% with the national elasticity) and 27% to 29% in the two Porto zones. Holding tourist beds at their 2011 level removes 14% of the increase in Lisbon city and 7% in its suburbs. A third calibration estimates all coefficients of the price equation jointly; its interest-rate lag lies at the edge of its grid, and the paper reports it only as a robustness test.

Lisbon city in detail

In the structural model of Lisbon city for 2000–2025 (Section 8), the contributions to the 2011–2025 increase in the logarithm of the real price are 26% for residents, 17% for tourist beds, 24% for income and 21% for the real mortgage rate; the income and rate contributions are imprecisely estimated. The model holds the suburbs fixed and uses a smaller elasticity of the price with respect to occupancy than the zone model; these are two of the reasons its shares differ (Section 12).

Affordability and policy

In Lisbon city, 12% of renter households could buy a 75 m^2 dwelling at the median price. In the cheapest municipality of the south bank, 46% could, and 28% after paying for a car commute (Section 15.1). Section 16 sets out the measures by zone. In the suburbs, they are credit to developers through a guarantee fund, faster licensing and upzoning near rail and metro stations. In the city, they are higher height limits outside the historic center and limits on the conversion of dwellings to other uses and to local accommodation. Transport and employment measures widen the choice of residential location and have small effects on prices. A welfare model ranks the measures by benefits less costs, in euros (Section 16.1). Upzoning near rail and metro stations and faster licensing raise net welfare at no public cost, public rental housing on public land in Lisbon city covers its cost, and demand subsidies and rent control reduce net welfare in every draw of the parameter bands. Vacant dwellings, rents, the new Lisbon airport (Annex D) and student and immigrant housing are treated in separate sections.

1 Introduction

Real house prices in Lisbon fell 32% from 2000 to 2013 and then rose 126% to 2025, one of the largest increases among European capitals. In the appraisal series used in this paper, real prices rose by 112% in Porto city and by 96% in Lisbon city between 2011 and 2025. Public debate attributes the increase to tourism, foreign buyers or immigration. The answer depends on the geographical unit of analysis. Lisbon city is one of 18 municipalities of its metropolitan area and has 20% of its residents. A growing metropolitan area builds most of

its new housing in the suburbs. This paper asks why suburban supply around Lisbon did not respond to the demand for housing after 2013.

Demand and supply both differ across zones. Tourism, students and buyers from abroad concentrate their demand in the city; immigrants, and residents who leave the city, seek housing in the suburbs. The city has little free land, and its stock of dwellings fell despite new construction. In the suburbs, construction at a given price fell sharply after 2013. The concentration of employment in the city and congestion on its accesses limit the shift of demand to the suburbs. We measure each of these elements by zone and combine them in a three-zone model that compares policy measures. The paper builds on six strands of work.

Tourism, short-term rentals and housing. Short-term rentals move dwellings from long leases to tourist lets. In the United States, an increase in Airbnb listings raised rents and prices in the median zip code (Barron et al., 2021). In Barcelona the effects were larger in the most exposed neighborhoods (Garcia-López et al., 2020). In Portugal, a larger Airbnb share raised municipal prices, most in historic centers (Franco and Santos, 2021). Local accommodation and purchases by non-residents both raised municipal prices (Banco de Portugal, 2021). When tourism was interrupted during the pandemic, rents fell in Lisbon's exposed parishes (Batalha et al., 2022). Fieldwork in Alfama documents the displacement of residents (Cocola-Gant and Gago, 2021). The rehabilitation of the historic center did not stop the loss of long-term residents (Lestegás, 2019). In cross-country studies, tourism lowers housing affordability, more in economies that depend on it (Anastasiou et al., 2025; Cró and Martins, 2024). These studies consider tourism in isolation.

Immigration and housing. In U.S. cities, an immigrant inflow equal to a given share of the population raises rents and house values by about the same percentage (Saiz, 2007). Immigration accounts for about a quarter of the increase in house prices in Spain (Gonzalez and Ortega, 2013). In the United Kingdom the effect has the opposite sign, because higher-wage natives leave the areas that receive immigrants (Sá, 2015). Another strand studies where immigrants live. Southern European cities combine low segregation with peripheralization and exclusion (Arbaci and Malheiros, 2010; Malheiros and Vala, 2004). In Portugal, the main housing problem of immigrants from the former colonies was the quality of their dwellings (Malheiros and Fonseca, 2011). In Sweden and Denmark, the dispersal of refugees provided natural experiments. Living among compatriots raised immigrants' earnings (Edin et al., 2003; Damm, 2009). The local labor market on arrival and the distance from jobs shaped their integration (Åslund and Rooth, 2007; Åslund et al., 2010; Aksoy et al., 2023). In Germany, an obligation to live in one place lowered the employment of refugees (Brücker et al., 2020). These studies consider residents in isolation.

Supply elasticity and regulation. Supply is inelastic where geography and regulation limit building (Saiz, 2010). The gap between price and construction cost then acts as a regulatory tax (Glaeser et al., 2005; Glaeser and Gyourko, 2018). Planning constraints raise the elasticity of prices with respect to local earnings (Hilber and Vermeulen, 2016), and regulation raises prices and reduces construction (Gyourko and Molloy, 2015; Mayer and Somerville, 2000a). Places with elastic supply had fewer and shorter bubbles (Glaeser et al., 2008). Supply is more rigid in continental Europe than in North America (Caldera and Johansson, 2013), and elasticities change over time (Aastveit et al., 2023). Regulation slows the response of supply, and geography lowers its level (Paciorek, 2013). Credit is a further determinant of supply. Bank capital constrains lending for real estate (Peek and Rosengren, 1994), and credit supply affects construction at the regional level (Mayer and

Somerville, 1996; Favara and Imbs, 2015). In the United States, immigration enforcement that cut construction employment lowered residential building (Howard et al., 2024), and productivity in construction has stagnated for decades (Goolsbee and Syverson, 2023). New housing also has effects beyond the place where it is built. It generates chains of residential moves (Bratu et al., 2023; Mast, 2023) and lowers nearby rents (Asquith et al., 2023). The transport network determines where new housing can be located (Duranton and Puga, 2015; Baum-Snow, 2007; Gonzalez-Navarro and Turner, 2018). A functioning market always has some vacant dwellings (Wheaton, 1990; Gabriel and Nothaft, 2001). Long-term vacancy is a better measure of excess supply (Molloy, 2016), and a tax on vacant housing in France returned part of it to use (Segú, 2020). For Portugal, demand shocks raise prices most where supply is inelastic (Amador, 2026), and developers describe licensing as slow and unpredictable (Rodrigues et al., 2023).

Student housing. Students are a large and growing part of housing demand in Lisbon and Porto. Studies of Lisbon describe international students as a new group of urban consumers who compete with tourists for central dwellings (Malet Calvo, 2018; França et al., 2023). Platforms let rooms by the semester, between the tourist let and the long lease (Cocola-Gant and Malet Calvo, 2023). Students in Lisbon and Porto report worse housing conditions than students elsewhere in the country, and the gap follows family income (Aguiar et al., 2026). The national plan for student housing has completed new public residences (Brito and Serpa, 2026). A housing benefit indexed to the rent can be passed through to rents, as it largely was in France (Fack, 2006). The Finnish estimates of this pass-through vary widely (Kangasharju, 2010; Viren, 2013; Eerola et al., 2026).

Housing policy. When supply is inelastic, demand subsidies are passed through to prices. In Greater London, a public equity loan for buyers of new homes raised prices with no detectable effect on construction (Carozzi et al., 2024). Subsidized building displaces part of private building (Sinai and Waldfogel, 2005; Eriksen and Rosenthal, 2010; Chapelle, 2015), and its effect on nearby prices depends on the neighborhood (Diamond and McQuade, 2019). Rent control reduced the supply of rental housing in San Francisco (Diamond et al., 2019). Its end raised the value of nearby housing in Cambridge, Massachusetts (Autor et al., 2014). The second generation of controls regulates increases within a tenancy and leaves initial rents free (Arnott, 1995). In Sweden, large housing estates on the urban periphery declined after a crisis (Hall and Vidén, 2005; Andersson and Bråmå, 2018). The evidence on the benefits of imposed social mixing is weak (van Gent et al., 2018; Seemann, 2021). Children who moved to lower-poverty areas earned more as adults (Chetty et al., 2016), and the European evidence favors mixing that is voluntary and gradual (Galster and Friedrichs, 2015). Portugal's social rental stock is small by European standards (OECD, 2025), and the government set a target to raise it (Presidência do Conselho de Ministros, 2018).

Supply within metropolitan areas. Housing supply is less elastic where land is scarce and regulation is tight (Saiz, 2010; Glaeser et al., 2005; Glaeser and Gyourko, 2018; Paciorek, 2013). Within a metropolitan area, supply is more elastic far from the center, where land is undeveloped and regulation is lighter (Baum-Snow and Han, 2024). Quantitative models of cities link where people live to where they work through commuting costs (Ahlfeldt et al., 2015; Monte et al., 2018), and Favilukis et al. (2023) build a two-zone model of New York with zoning, transit and rent policy that measures welfare. Transport changes the shape of cities (Baum-Snow, 2007; Duranton and Puga, 2015). This paper contributes the post-crisis break in suburban construction in a European metropolitan area, the location of each source

of demand by zone, and a three-zone location-choice and stock-flow model with an annual path. The three-zone model does not measure welfare; a separate model values the policy measures (Annex C).

The paper makes six contributions. First, it divides into zones a housing market that is usually studied as a single city, and it measures demand, supply and prices in each zone. Second, it locates each source of demand. Tourism and buyers from abroad concentrate in the city, most immigrants in the suburbs, and students near the universities. Third, it reconciles the census stock of the city with the recorded flows; the census counted 7,646 fewer dwellings than the flows imply, a residual that includes conversions, mergers and differences in census coverage. Fourth, it identifies why suburban supply did not respond. Construction remains elastic with respect to price, but the suburban supply curve shifted inward from 2013. The cumulative tightening of LTV limits in 2008–2012 accounts for about half of the estimated break in the inner ring and about three quarters on the south bank. This fall is distinct from the end of the credit-fed boom of 1998–2007. Building fell to about a third of its 1992–2025 average, and the shortfall widened over time. Licensing remains far below its pre-crisis level, and new construction is low-density. Fifth, it estimates a three-zone model that reproduces the increase in prices within the sample and compares policy measures. In the counterfactual without the 2013 break in suburban construction, real prices in 2025 would be about 13% lower in the suburbs and 6% lower in the city; relocating jobs or reducing commuting times changes them by a few percent. Immigration accounts for about two fifths of the increase in real prices in the three Lisbon zones, and the growth of tourist beds for 14% of the increase in Lisbon city. Sixth, it measures affordability by zone, for renters who stay and for those who move. The paper also converts tourist beds and immigrants into demand for dwellings, and it treats vacant dwellings, licensing, rents, student and immigrant housing, and the new airport.

Section 2 presents the data and methods. Section 3 defines the zones and Section 4 describes what happened in each. Section 5 compares tourism pressure and prices in Lisbon and Porto with other European cities. Section 6 locates the sources of demand, and Section 7 converts tourist beds into resident equivalents. Section 8 decomposes the increase in prices in the city. Section 9 analyzes supply by zone, and Section 10 examines credit, labor and licensing. Section 11 covers the links between the zones and Section 12 the three-zone model. Section 13 measures vacant dwellings, Section 14 the distribution of gains and losses, and Section 15 affordability. Section 16 sets out the measures by zone, Section 17 the policies for affordability and Section 18 rent policies. Section 19 states the policy implications of the results, Section 20 concludes on policy and Section 21 states the limits of the analysis. Annex A contains the data, model and estimation, Annex B specific groups and places, Annex C the welfare model of housing policies, and Annex D the new Lisbon airport.

2 Literature, data and methods

The paper builds on the stock-flow model of the housing market (DiPasquale and Wheaton, 1992) and on studies of supply, immigration, tourism and vacancy, reviewed in Section A.1. It uses public data from INE, Banco de Portugal, Eurostat, the BIS and the national register of short-term rentals (Section A.2). The central demand parameter is the elasticity of the real price with respect to occupancy, measured as people to house per dwelling. It is estimated by two-stage least squares on a panel of municipalities with municipality and year effects and two instruments (Sections A.3 and A.4). Section 8 applies this national elasticity to the series for Portugal and Lisbon and decomposes the change in the log real price into the contributions of its determinants. Annex A reports the details.

A maintained assumption. The paper assumes that households priced out of central Lisbon relocate gradually to the suburbs of the metropolitan area, because the center is congested and densely built and the suburbs have more land available (Section 10.1). Demand that the city's stock cannot accommodate is therefore transferred to the suburbs, and the metropolitan area is the relevant housing market. The assumption conditions the interpretation of the results. In the decomposition, residents priced out of Lisbon are subtracted from the city's demand and added to that of the suburbs, so the rise in Lisbon's price understates the pressure on the metropolitan market; in the results for the suburbs, suburban prices and construction respond to demand originating in the center. The data of the paper are consistent with the assumption. Lisbon's share of the metropolitan area's jobs rose from 37.1% in 2010 to 40.1% in 2024, traffic on the Tagus bridges reached its highest level in 2025, and the appraisal value of the suburbs south of the river, which had fallen to 36% of Lisbon's in 2018, returned to 52% in 2025 (Section B.1). Fieldwork in Lisbon documents the displacement of residents from the historic center (Cocola-Gant and Gago, 2021; Lestegás, 2019). The available data do not record residential moves within the metropolitan area, so the assumption cannot be tested directly (Section 21).

3 The metropolitan market and its zones

Lisbon city is one of the 18 municipalities of the Lisbon Metropolitan Area. In 2025 it held 20% of the area's residents and 21% of its dwellings. Its share of the area's jobs was higher, 40% in 2024, against 37% in 2010. Land scarcity constrains housing supply in the city. Most of the additional dwellings of a growing metropolitan area are therefore built in the suburbs.

The paper accordingly divides the metropolitan market into zones. Around Lisbon there are three: the city; the inner ring, the other 8 municipalities north of the Tagus; and the south bank, the 9 municipalities of the Setúbal peninsula. Porto has two: the city and a ring of 11 municipalities. The rest of the country is the comparison group. Table 1 describes the zones. A spatial model that locates each dwelling and each job is outside the scope of this paper (Section 21).

The composition of demand differs by zone. Tourist accommodation, higher-education students and the purchases of buyers resident abroad and of investment funds are concentrated in the city. Immigrants, and residents who leave the city, settle mainly in the suburbs, where the number of people to house rose by 455,130 between 2011 and 2025. Employment remains concentrated in the city, so most residents who move to the suburbs continue to commute to it. Section 4 reports the data by zone. The structural model of Section 8 covers the city; the municipal panel estimates, the supply equations by zone and the three-zone model cover all zones.

Table 1: The zones of the two metropolitan areas, 2025.

Zone	Municipalities	Residents	Dwellings	Jobs (share, 2024)	Tourist beds	Real price (€/m^2)
Lisbon city	1	658,236	320,935	40%	105,319	3,474
Inner ring	8	1,757,025	760,180	43%	36,241	2,244
South bank	9	937,678	437,961	17%	22,962	1,886
Porto city	1	273,476	138,867	27%	48,536	2,374
Porto ring	11	1,308,032	591,504	73%	26,661	1,576

Sources: residents, INE revised estimates; dwellings, INE (0008329) and completions; jobs, persons employed in establishments of all sectors at the place of work (INE, SCIE), share of the metropolitan area; tourist beds, hotels and local accommodation; real price, bank appraisal value per m^2 deflated by the harmonized index of consumer prices, municipalities weighted by their 2011 dwelling stock. Inner ring: Cascais, Loures, Mafra, Oeiras, Sintra, Vila Franca de Xira, Amadora, Odivelas. South bank: Alcochete, Almada, Barreiro, Moita, Montijo, Palmela, Seixal, Sesimbra, Setúbal. Porto ring: Matosinhos, Vila Nova de Gaia, Maia, Gondomar, Valongo, Póvoa de Varzim, Vila do Conde, Paredes, Espinho, Santo Tirso, Trofa. Lisbon city's tourist beds in 2025 use the extract of the local-accommodation register of the zone panel (105,319); the city model of Section 8 uses an earlier extract (105,314).

4 What happened, by zone, 2011–2025

Table 2 reports demand, supply and prices for each zone. Demand is measured as the number of people to house, residents plus tourist beds, since a bed let to tourists is not available to a resident.

Lisbon city. The number of people to house rose by 33%, first through tourist beds and later through immigration. Tourist beds increased by 75,646 and immigrants by 140,713, while Portuguese nationals decreased by 25,066. The stock of dwellings did not grow. The census counted 325,676 dwellings in 2011 and 319,640 in 2021 (on the 2021 boundaries), although 2,043 were completed in new construction between the two censuses. The census change is smaller than the change implied by the recorded flows (Table 3). People per dwelling rose from 1.77 to 2.38, and the real price rose by 96%.

The suburbs of Lisbon. In the inner ring and on the south bank the number of people to house rose by 455,130 between 2011 and 2025; 79% of the increase occurred after 2019. Immigrants account for 393,643 of the increase. The stock of the suburbs rose by 33,961 dwellings, while 39,066 were completed in new construction. Completions in new construction averaged 15,909 dwellings a year in 2002–2007 and 3,202 a year in 2016–2025. The real price rose by about as much as in the city. The paper's shortfall measure is the number of dwellings that would return each zone to its 2011 ratio of people to house per dwelling, with tourist beds counted as people to house. By this measure the suburbs lack 196,889 dwellings, two thirds of the metropolitan shortfall of 306,850. The measure is a benchmark, since 2011 was a crisis year. (Applied to the metropolitan area as a single market, with one average ratio of people per dwelling, the measure gives 302,878.)

Porto. Porto city followed the same pattern as Lisbon city. The number of people to house rose by 31%, the number of nationals fell, and the stock of dwellings barely changed. The Porto ring differs. Demand there rose by 6% and new construction nearly kept pace, so the shortfall of the ring is only 10,597 dwellings.

The population rule. After the 2021 census INE revised its population estimates to include immigrants whom the census had not counted. The population totals of this paper are the revised estimates, spread back to 2011. Nationals are the census count of Portuguese nationals in 2021. For 2011 they are the revised total multiplied by the census share of nationals. After 2021 they follow each zone's 2011–2021 rate of change, because no annual count by nationality exists. Immigrants are the revised total less nationals. In Lisbon city this gives 174,806 immigrants in 2025 and 114,984 in 2021, close to the 108,653 foreign residents with a residence permit in 2021; the census counted 55,324. In the inner ring and on the south bank the rule gives 17% and 32% more immigrants than the stock of permit holders in 2021, which excludes immigrants awaiting a permit. The timing of the increase depends on how INE's revision is distributed over 2012–2021 and on the assumed trend of nationals after 2021.

Table 2: Demand, supply and prices by zone, 2011–2025.

Zone	People to house	immigrants	Change in nationals	tourist beds	Dwellings	Dwellings built	People per dwelling	Real price	Shortfall (dwellings)
Lisbon city	+33%	140,713	−25,066	75,646	−0.6%	3,337	1.77–2.38	+96%	109,961
Inner ring	+19%	250,074	13,540	24,655	+2.3%	21,736	2.03–2.36	+104%	125,268
South bank	+21%	143,569	6,780	16,512	+4.0%	17,330	1.89–2.19	+97%	71,621
Porto city	+31%	53,720	−16,126	38,703	+1.0%	8,574	1.79–2.32	+112%	41,321
Porto ring	+6%	96,740	−38,724	19,451	+4.3%	25,855	2.22–2.26	+91%	10,597

People to house: residents plus tourist beds (one bed counts as one resident). Immigrants and nationals: the population rule of this section. Dwellings built: completions in new construction, 2012–2025 (INE). Shortfall: the dwellings that would return the zone to its 2011 ratio of people to house per dwelling.

The census stock and the recorded flows. Table 3 compares the census change in the stock of dwellings with the flows that INE records. Lisbon city completed 2,043 new dwellings in 2012–2021, and rehabilitation less demolitions reduced the stock by 433 in net terms. The census nonetheless counted 6,036 fewer dwellings in 2021 than in 2011 (on the 2021 boundaries, which include Parque das Nações). The census count is therefore 7,646 dwellings below the count implied by the recorded flows. This residual is consistent with the conversion of whole buildings into hotels, hostels or offices, the merging of flats, unrecorded demolitions and differences in census coverage; the data do not separate these sources. Porto city shows a residual of the same sign, 7,203 dwellings. In the suburbs the census change is close to the recorded flows. In the city the number of dwellings of usual residence rose by 2,804, while second homes fell by 5,837 and dwellings vacant for other reasons by 5,897; dwellings vacant for sale or rent rose by 2,894. The additional resident households of the city were thus housed mainly in former second homes and vacant dwellings.

Table 3: Census change in the dwelling stock and recorded flows, 2012–2021.

Zone	Built new	Rehabilitation less demolitions	Census change	Residual
Lisbon city	2,043	−433	−6,036	−7,646
Inner ring	10,912	410	10,031	−1,291
South bank	9,628	242	9,190	−680
Porto city	3,740	−421	−3,884	−7,203
Porto ring	11,980	−82	10,774	−1,124

Dwellings. Built new: completions in new construction (INE 0013249). Rehabilitation less demolitions: the change in INE's stock estimate (0000084) less the new dwellings; INE counts rehabilitation and demolition works only in buildings. Census change: classic family dwellings, censuses 2011 and 2021 on the 2021 map (0011495). Residual: the census change less both flows.

The count of new dwellings against investment. Investment in dwellings in the national accounts was 11,179 to 14,838 million euros a year in 2023–2025, and INE counts 22,280 to 27,301 new dwellings a year. At the construction cost of a dwelling of the size completed, about 126,784 to 134,072 euros excluding land, in current euros of each year, the new dwellings account for 25% to 26% of that investment, and for 19% to 38% between the low and the high cost. The remainder corresponds to work on existing dwellings and to transaction costs. If all new floor area of every use were attributed to dwellings, their share would be at most 77%. Investment is consistent with the count of new dwellings, but it cannot detect an undercount. The 2025 figures are provisional.

5 What happened in Lisbon and Porto, 2011–2025

Table 4: Tourism, prices and passengers, Lisbon and Porto, 2011–2025.

	Nights per resident		Bank appraisal (euros/m^2)		Relative to Coimbra		Lisbon airport
Year	Lisbon	Porto	Lisbon	Porto	Lisbon	Porto	(millions)
2011	11.8	7.6	1,707	1,079	1.72	1.09	14.8
2014	16.3	10.9	1,474	1,000	1.68	1.14	18.1
2017	21.8	15.9	2,217	1,306	2.20	1.29	26.7
2019	23.3	18.7	2,963	1,875	2.59	1.64	31.2
2022	20.9	18.8	3,495	2,405	2.53	1.74	28.2
2025	24.3	24.2	4,337	2,963	2.35	1.60	36.1

Sources: INE (nights in tourist accommodation; resident population, with the revised 2021–2025 estimate spread back as explained in Section A.3.2; median bank appraisal value; passengers landed and departed). Lisbon/Coimbra: ratio of the bank appraisal values of the two municipalities.

Tourism grew mainly between 2013 and 2019 and returned to its 2019 level after the pandemic. Prices in Lisbon and Porto were higher in 2025 than in 2011, and their rise relative to Coimbra was concentrated in the years of tourism growth. Since 2019, with tourism broadly stable, the ratio of the Lisbon price to that of Coimbra has declined, to 2.35 in 2025. The ratio to Beja, a municipality with even less tourism, rose mainly in the same years, from 2.05 in 2014 to 3.33 in 2019, and reached 3.43 in 2025. The municipal panel includes every municipality with data, including those with little tourism (Table 4; Figure 1).

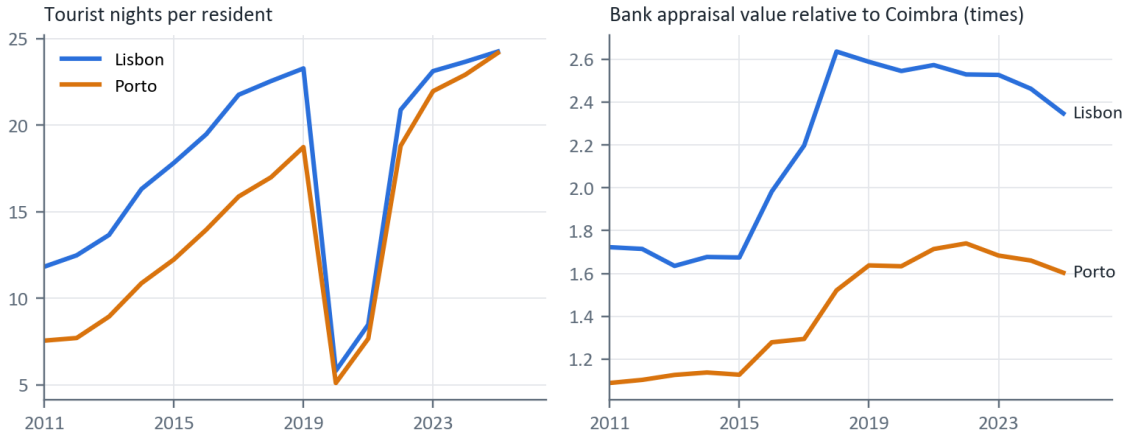

Figure 1: Tourism pressure and the house price relative to Coimbra, Lisbon and Porto, 2011–2025. Source: INE.

Lisbon has one of the highest ratios of tourist nights to residents among European cities. The comparison is restricted to cities, because coastal and mountain resorts, with few residents and many tourists, have high ratios that are not informative about cities. In 2019, the last year before the pandemic with data for almost every city, the municipality of Lisbon had 23.3 nights per resident and Porto 18.7; in 2025, 24.3 and 24.2. Among the capitals and large tourist cities of the table with data for 2017–2019, only Venice (49.8) and Florence (29.6) have more than Lisbon; small resorts, such as Benidorm, Rimini or Funchal, have higher values. Palma de Mallorca (22.3) and Bruges (18.9) are close to Porto. Munich (12.4), Rome (11.0) and Berlin (9.4) have about half the Lisbon value or less. On the Eurostat definition of the "greater city", which adds the adjacent municipalities, Lisbon has 8.9 nights per resident, more than Paris (7.3), Budapest (6.1) and Madrid (4.5). The size of the greater city differs widely, from 10.3 million residents in Paris to 1.9 million in Lisbon. Within Lisbon, tourist accommodation is concentrated in the historic center. The parishes of Santa Maria Maior and Misericórdia have 10,819 and 8,056 short-term rental beds (Table 5).

Table 5: Nights spent in tourist accommodation per resident, 2019: capitals and large tourist cities.

City	Nights	City	Nights
Venice	49.8	Stockholm (greater city)	7.5[2018]
Florence	29.6	Paris (greater city)	7.3
Lisbon, municipality (INE)	**23.3**	Helsinki	6.9
Palma de Mallorca	22.3	Bratislava (greater city)	6.6
Bruges	18.9	**Porto (greater city)**	**6.1**
Porto, municipality (INE)	**18.7**	Budapest (greater city)	6.1
Valletta (greater city)	18.5	Málaga	6.0
Split (greater city)	16.1	Brussels (greater city)	5.8[2018]
Munich	12.4	Riga	5.3
Nice (greater city)	11.5	Madrid (greater city)	4.5
Rome	11.0	Milan (greater city)	4.5
Berlin	9.4	Vilnius	4.5
Lisbon (greater city)	**8.9**	Warsaw	3.7
Hamburg	8.3	Zagreb	3.3
Kraków	7.8	Naples (greater city)	1.7
Ljubljana	7.6	Bucharest	1.6[2018]
Tallinn	7.5	Sofia	1.5

Sources: Eurostat urban statistics (urb_ctour, nights spent in tourist accommodation establishments; urb_cpop1, population on 1 January); INE for the municipalities of Lisbon and Porto. Superscripts give the year when 2019 is not available. Greater city: the Eurostat area that adds the adjacent municipalities. Barcelona, Amsterdam, Vienna, Prague, Athens, Dublin, Copenhagen, Oslo, Seville, Valencia, Salzburg and Edinburgh have no data for 2017–2019. The municipal ratios of Lisbon and Porto divide INE nights by the population series of this paper, revised after the 2021 census; the other rows use Eurostat populations. INE counts nights in tourist accommodation establishments, so small short-term rentals may be missing.

House prices are more comparable across capitals than across regions. Among the 20 European capitals with a price series, the real house price in Lisbon rose 133% between 2013 and 2025, more than in any other except Budapest (216%). In Dublin, Copenhagen and Amsterdam it rose between 81% and 88%, in Madrid and Berlin about 71%, and in Paris and Helsinki it fell. The annual changes of the real price in Lisbon are most closely correlated with those of Madrid, Budapest, Amsterdam and Ljubljana, with coefficients between 0.74 and 0.84 in 2012–2025 (Figure 2).

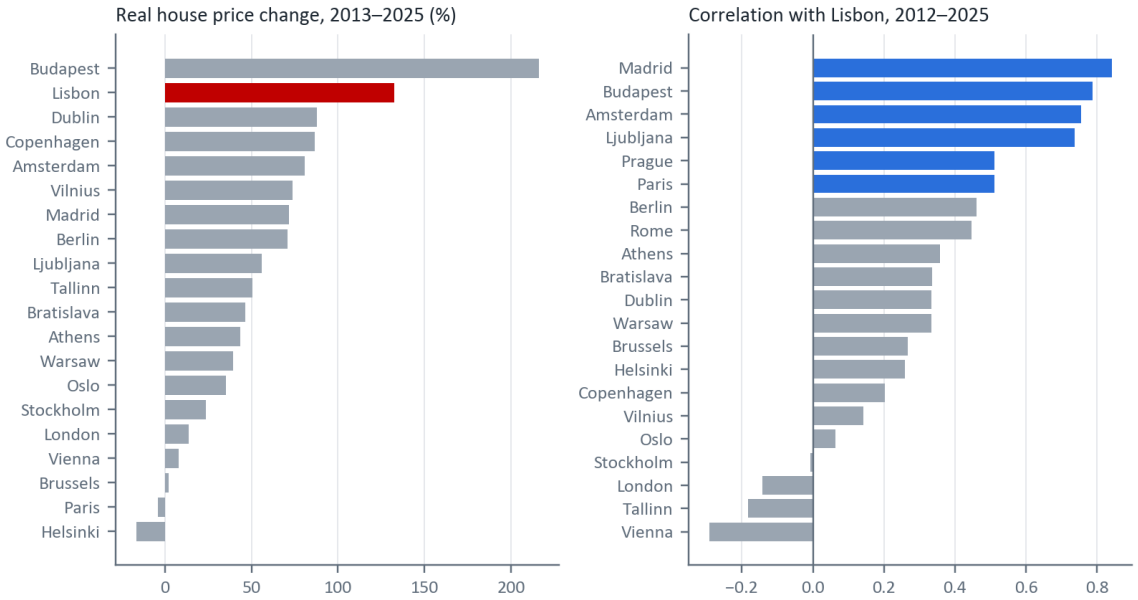

Figure 2: Left: real change in house prices, 2013–2025. Right: correlation of annual real price growth with Lisbon, 2012–2025. Sources: BIS detailed residential property prices, deflated by each country's consumer prices (BIS); Lisbon from the series of Section A.2, deflated by the harmonized index of consumer prices, like the other capitals.

Price levels complete the comparison. In 2025 the average asking price of a new dwelling in Lisbon was 6,320 euros per m^2. In euros, Lisbon ranks 10th among 22 capitals, close to the median of the others (6,135 euros). Adjusted for the price level of each country, the Lisbon price is 7,409 euros in purchasing power standards (PPS). Lisbon then ranks 4th, after Paris, Prague and Stockholm, and stands 32% above the median of the other capitals. In Paris and Stockholm the prices are transaction prices of existing dwellings. Among the 15 capitals measured by the Deloitte asking price of new dwellings, Lisbon ranks 2nd in PPS, after Prague. A square meter of a new dwelling in Lisbon costs 27.8% of the yearly adjusted disposable income per head in Portugal, the second-highest value of the 20 capitals with data, after Prague. With the INE median sales value of new dwellings (5,890 euros per m^2), Lisbon ranks 13th in euros and 5th in PPS. The median value of all dwellings (4,875 euros) gives a lower bound. With it, Lisbon ranks 14th in euros, below the median, and 10th in PPS, at the median of the other capitals (Figure 3).

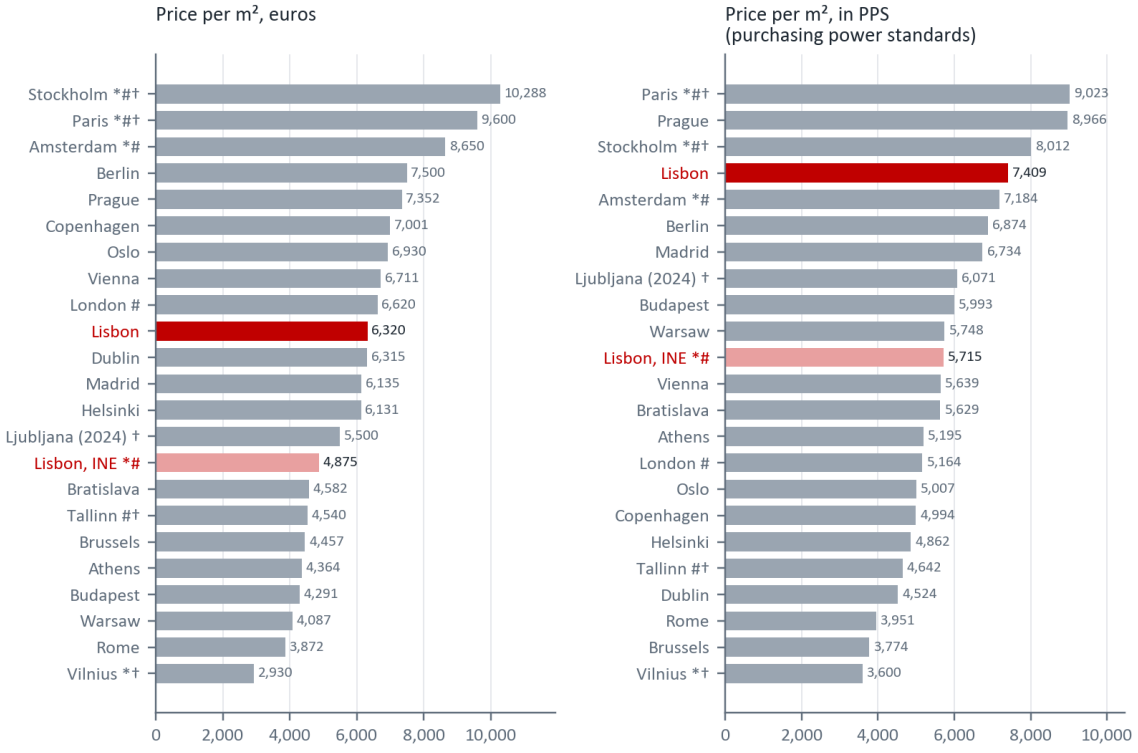

Figure 3: House price per square meter in European capitals, 2025, in euros (left) and in purchasing power standards (right). Sources: Deloitte Property Index 2026, except where marked; INE; Eurostat price level indices of actual individual consumption (prc_ppp_ind_1).

6 Who demands housing, and where

The groups that added to housing demand located in different zones (Table 6).

Tourist accommodation is concentrated in the center. Lisbon city accounted for 65% of the increase in tourist beds in its metropolitan area. In 2025 the historic center held 79% of the city's local-accommodation beds. Across the parishes of Lisbon and Porto, those that added more local-accommodation beds per resident in 2011–2021 lost more residents. The estimate depends on three parishes, Misericórdia, Santa Maria Maior and Santo António; without them the coefficient is not significant ($t = -0.6$).

Buyers resident abroad and non-household buyers account for a small share of purchases. Buyers with a tax domicile abroad made 6.3% of the purchases of dwellings in Grande Lisboa in 2023 and paid on average 641,234 euros, against 330,961 euros paid by buyers resident in Portugal. Firms, funds and other non-household buyers made 18% of the purchases.

Most immigrants settle in the suburbs. Of the increase of 534,356 immigrants in the Lisbon area in 2011–2025, 74% occurred in the inner ring and on the south bank. In the

Porto area the ring accounted for 64%. Relative to its population, the city received more immigrants. It added 26 immigrants for every 100 residents of 2011, against 17 in the inner ring and 18 on the south bank.

Higher-education students are concentrated in the cities. Lisbon city accounts for 79% of the higher-education students enrolled in its metropolitan area, and Porto city for 79% of those enrolled in its area.

Portuguese residents left the center. Between the censuses of 2011 and 2021 Lisbon city lost 27,509 Portuguese residents, 16,037 of them in the historic center. Net of the natural balance, departures exceeded arrivals by 14,943; the Portuguese population of the suburbs rose by 25,305. INE does not publish movers by municipality of origin, so the flows from the city to each suburb cannot be measured directly. Across suburban municipalities, a larger inflow of Portuguese-born movers from other municipalities is associated with more completions per 100 dwellings in 2012–2021 ($t = 2.8$) and is not associated with faster price growth in 2016–2025 ($t = -1.2$).

Table 6: Location of the demand of each group, as shares of the metropolitan area.

Zone	Growth of tourist beds, 2011–2025	Growth of immigrants, 2011–2025	Students enrolled, 2025/26
Lisbon city	65%	26%	79%
Inner ring	21%	47%	10%
South bank	14%	27%	11%
Porto city	67%	36%	79%
Porto ring	33%	64%	21%

Tourist beds: hotels and local accommodation (INE; Registo Nacional de Alojamento Local). Immigrants: the population rule of Section 4. Students: higher education, by the municipality of the institution (DGEEC); the Porto ring here is the metropolitan area less Porto.

7 Tourism and immigration, two demands for housing

A tourist occupies a bed for fewer nights a year than a resident. A dwelling let as a short-term rental, however, is withdrawn from the residential stock for the whole year, whatever its occupancy, and hotels compete with housing for central land and buildings. The paper therefore counts each tourist bed as one resident. This is assumption A1 of Section 8, which the paper does not test directly; the demand equation of that model relates the log real price to the log of people to house per dwelling, real disposable income and the real mortgage rate (equation 5), and the sections before it use only that equation and assumption A1. Under this assumption, immigration and tourism are components of a single demand, and the paper analyzes them together.

With each tourist bed, in a hotel or a short-term rental, counted as one resident, tourism was equivalent to 29,673 residents in Lisbon in 2011 and 105,314 in 2025. The resident population rose from 542,589 to 658,236. Total demand rose by 28.8 log points, of which 10.4 log points are attributed to tourism when it is added after residents (Figure 4). In Porto, tourism was equivalent to 9,833 residents in 2011 and 48,536 in 2025, for a resident population of 273,476.

In the panel of municipalities, with municipality and year effects and tourist beds lagged three years, the elasticity of the real price with respect to population is 1.17 (standard error 0.17); the structural decomposition uses the 2SLS estimate of Section A.4. Rents are assumed

to follow prices with a pass-through of 80%. Applied to tourist beds counted as residents, this elasticity implies that tourism raised prices in Lisbon by 13.0% and rents by 10.3%. In Porto it raised prices by 16.2% and rents by 12.7%. The pass-through of 80% is taken from New Economics Foundation (2026). The elasticity of rents with respect to population estimated on the panel is 0.79 (standard error 0.17), 0.67 times the price elasticity. With this ratio, the estimated effect of tourism on rents is 8.5% in Lisbon and 10.6% in Porto. The paper's rent estimates use the pass-through of 80%; the panel ratio gives their lower bound. With the pass-through of 80%, the estimates are close to the central value of the literature for Lisbon and below it for Porto.

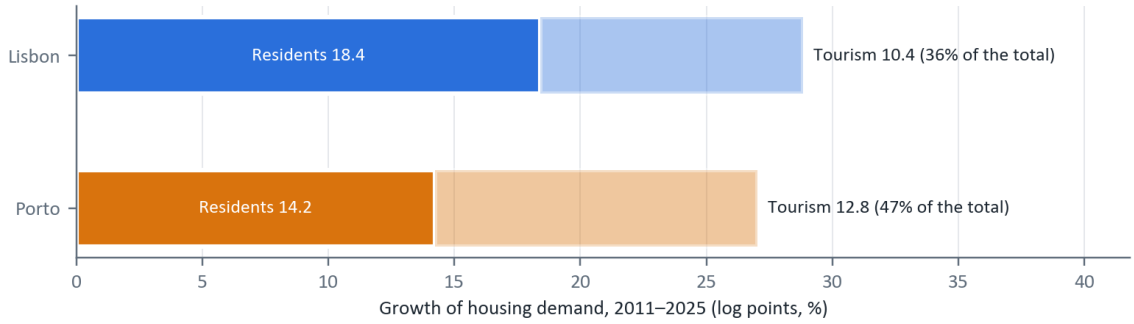

Figure 4: Growth of housing demand between 2011 and 2025: residents and tourist beds (each bed counts as one resident). Sources: INE; national register of short-term rentals.

8 A structural model of the housing market, 2000–2025

The previous sections measure the effect of tourism and immigration on prices. This section combines housing demand and supply in a single model, estimated on data from 2000. The model has three equations. The demand equation relates the real house price to the number of people to house per dwelling, household disposable income and the real mortgage rate. The supply equation relates completions to the house price relative to construction cost. The third equation is the stock-flow identity, which adds each year's completions to the stock of dwellings.

People to house are residents plus tourist beds, as in Section A.3. Short-term rental beds are taken from the national register, for every municipality. The price for Portugal is the Banco de Portugal index, compiled from Confidencial Imobiliário data until 2008 and from INE data afterwards. The Lisbon price series links the growth rates of four series: Confidencial Imobiliário for the city, from 2000 to 2004; the national index, from 2005 to 2008; the INE bank appraisal value for the Lisbon Metropolitan Area, from 2009 to 2010; and the municipal bank appraisal value from 2011.

The decomposition

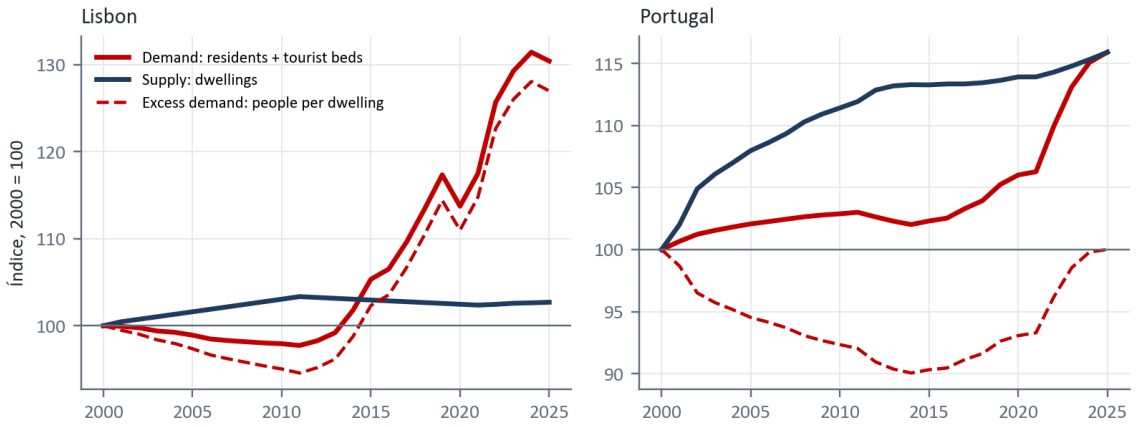

Figure 5: Housing demand (residents plus tourist beds), supply (dwellings) and excess demand (people to house per dwelling), Lisbon and Portugal, 2000 = 100. In Lisbon, between 2000 and 2025, demand rose 30% and the stock 3%. Sources: INE, Eurostat, national register of short-term rentals; calculation by Lisbon Economics.

In Lisbon, excess demand (people to house per dwelling) and the real price moved together. Both fell until 2013 and rose afterwards; the price rose faster, because real income also grew. Nationally, the stock grew faster than demand until 2014, so excess demand fell. It rose afterwards, and faster from 2021, as immigration increased (Figure 5; Figure 6).

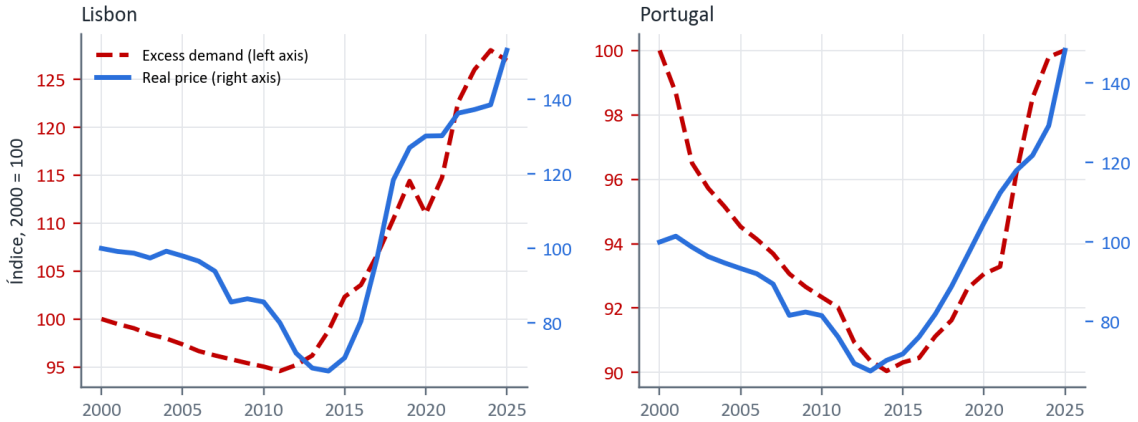

Figure 6: Excess demand (people to house per dwelling) and the real house price, Lisbon and Portugal, 2000 = 100. Sources: Confidencial Imobiliário, Banco de Portugal, INE; calculation by Lisbon Economics.

The elasticity of the real price with respect to people to house per dwelling (β in equation 5) is 0.98. It is estimated by two-stage least squares on the panel of municipalities for 2014–2025, with year effects; the instruments are tourist beds three years earlier and cumulative immigration. Estimated on the national series of 26 years, the elasticity is much larger. Over those years people per dwelling also moved with the credit cycle, and a series of that length cannot separate the effect of credit from that of demand. The elasticity of

completions with respect to the price relative to construction cost is 2.6. Since 2013, at given prices and costs, completions relative to the stock are about 27% of their 2001–2012 level. In the decomposition that follows, the semi-elasticity of the real price with respect to the real mortgage rate is fixed at the national estimate (−0.082 per percentage point), and the income elasticity is estimated on each series (Table 7).

Table 7: Contribution of each factor to the change in the log real price, as a share of the change.

	Lisbon 2000–2025	Lisbon 2011–2025	Portugal 2000–2025	Portugal 2011–2025
Change in real price	+53%	+91%	+48%	+95%
Residents	+32%	+26%	+24%	+11%
of which arrivals less departures	+44%	+30%	+33%	+16%
of which natural balance	−12%	−4%	−9%	−5%
Tourist beds	+28%	+17%	+13%	+6%
Dwellings	−6%	+1%	−37%	−5%
Income	+37%	+24%	+66%	+38%
Mortgage rate	+59%	+21%	+64%	+20%
Residual	−51%	+11%	−30%	+30%

Additive decomposition in logs, with the demand coefficient of the municipal panel, the rate coefficient fixed at the national estimate and the income coefficient estimated on each series. The contribution of demand is split between residents and tourism by the Shapley rule. A negative share is a contribution that lowered the price. Arrivals less departures is the change in the resident population minus the natural balance (births minus deaths, INE). It counts immigrants, moves between municipalities and the emigration of Portuguese citizens. The residents' share is split between the two balances, in proportion to each. The share of arrivals less departures is the residents' share minus the natural-balance share, after rounding. Natural balance: INE, series 0006201 (2000–2010), 0008270 (2011–2023) and 0012432 (2024–2025). Arrivals less departures also include the 2021 revision spread over 2012–2021 and, before 2011, the adjustment of the older INE population series.

In Lisbon, the real price rose 53% between 2000 and 2025. Until 2013 it fell 32%, mainly as a result of the credit crisis, which the model does not include. Between 2011 and 2025, the contribution of residents is 26% of the rise, that of tourism 17% and that of income 24%. Within the residents' share, arrivals less departures contribute 30%, and the natural balance, which was negative, −4%. By the population rule of Section 4, Lisbon city gained 140,713 immigrants in 2011–2025 and lost 25,066 nationals; the growth of its resident population is therefore due to immigration. With the natural balance alone, Lisbon's population would have fallen. For the country, the contribution of tourism is smaller, because tourist beds are a smaller share of demand.

These shares depend on the demand elasticity. With the elasticity two standard errors above or below its estimate, the contribution of residents ranges from 20% to 33% of the rise in Lisbon and that of tourism from 13% to 21%. Hotels occupy buildings built or adapted for hotel use, while short-term rentals withdraw dwellings from the residential stock. Counting only short-term rental beds, the contribution of tourism is 11% of the rise.

Table 34 compares these estimates with the literature. The elasticity of the price with respect to people per dwelling, 0.98, is close to the elasticity of about 1 that Saiz (2007) estimates for U.S. cities and to the 1.3 implied by Gonzalez and Ortega (2013) for Spanish provinces, and above the 0.69 that Amador (2026) estimates for new households in Portuguese municipalities. The rate semi-elasticity, −7.9% for one point of the real mortgage rate, is at the top of the range in the literature, 0 to −8% (Dieckelmann et al., 2023, p. 3), and close to the ECB's estimate for the euro area at low rates, about −9% after two years

(Battistini et al., 2022). House prices respond more to the rate when rates are low (Dieckelmann et al., 2023), and the real mortgage rate in Portugal was below zero in 6 of the 26 years. The price elasticity of new construction in Portugal is similar to that in the United States (Caldera Sánchez and Johansson, 2011), but the level of construction fell after 2013 to about 27% of its earlier rate. The implied elasticity of the stock with respect to price over ten years is about 0.08, against 1.75 in the average U.S. metropolitan area (Saiz, 2010).

The model also computes counterfactual paths for 2011–2025 with each factor removed. With tourist beds held at their 2011 level, the real price in Lisbon in 2025 would be 10% lower; without immigration after 2011, it would be 17% lower. The corresponding figures for Porto are 11% and 15%. Had Lisbon built at the national rate, its real price would be only 3% lower, because the national rate of construction is also low.

Figure 7 shows, year by year, the cumulative contribution of each factor to the change in the real price since 2000. The line is the observed change. Until 2013 the credit crisis, which the model does not include, lowered prices. After 2015 the contributions of residents, tourism and income were positive; in Lisbon, the contributions of residents and tourism are larger than in the rest of the country.

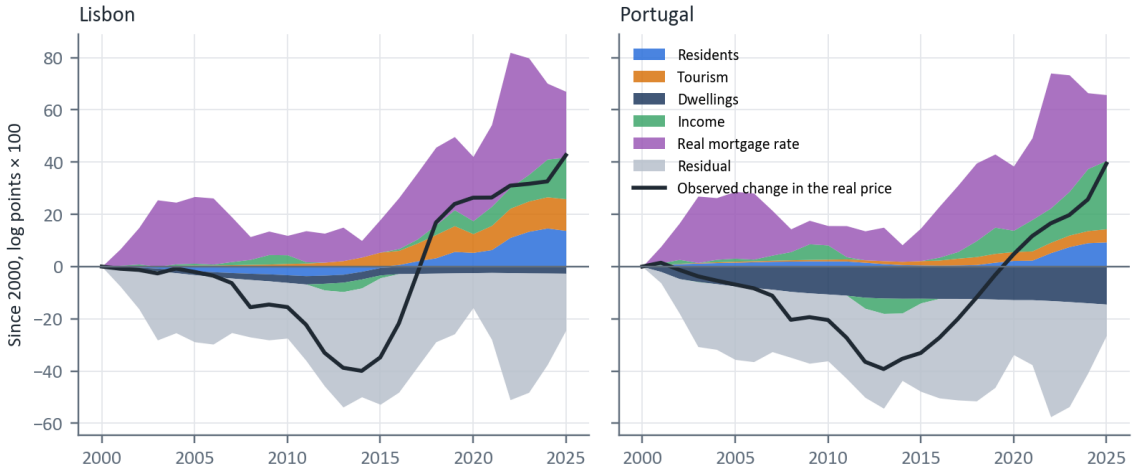

Figure 7: Cumulative contribution of each factor to the change in the real price since 2000, in log points × 100, Lisbon and Portugal. Areas above zero are positive contributions and areas below zero negative contributions; the line is the observed change. Calculation by Lisbon Economics.

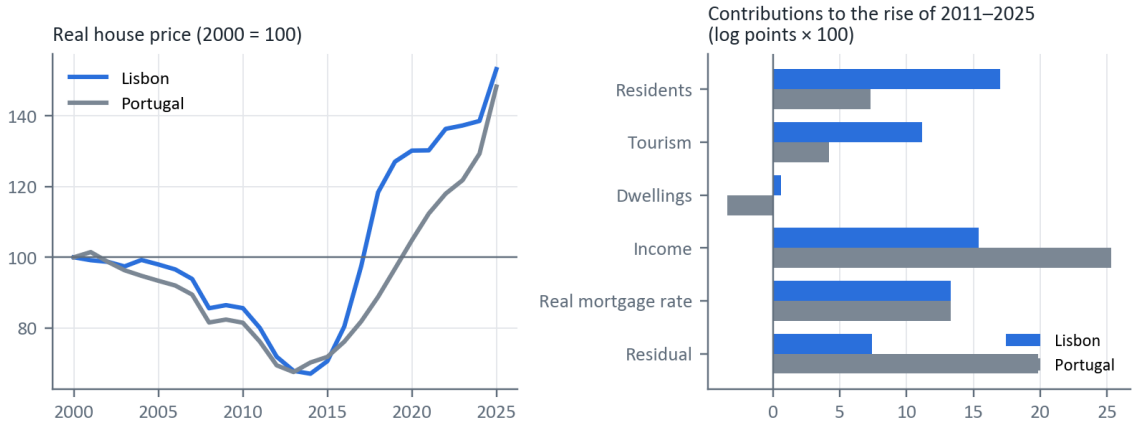

Figure 8: Left: the real house price in Lisbon and Portugal (2000 = 100). Right: the contribution of each factor to the rise in the real price between 2011 and 2025, in log points. Sources: Confidencial Imobiliário, Banco de Portugal, INE, Eurostat, ECB; calculation by Lisbon Economics.

Figure 8 shows the real price (left) and the contribution of each factor to its 2011–2025 rise (right).

The decomposition method

The change in $\ln N_t$, where $N_t = R_t + B_t$ is the number of people to house (residents R_t plus tourist beds B_t), is split between residents and tourist beds by the two-factor Shapley rule. The residents' share is then split between arrivals less departures and the natural balance, in proportion to each in the change in residents. This second split is a linear approximation. An exact three-factor Shapley split gives the same shares, to within one percentage point. In Lisbon, between 2000 and 2025, deaths exceeded births by 35,418, and arrivals less departures added 130,179 residents. The panel estimate of β is a local elasticity. If the aggregate elasticity is larger than the local one, the shares of residents and tourism understate their effect; the paper does not estimate the aggregate elasticity. The decomposition also assigns the same effect to every person, and the effect per person of immigrants may be larger or smaller. Since 2013 the contributions of residents, tourism and income have been positive. The contribution of the residual has also been positive, at 28% of the 2013–2025 rise in Lisbon and 31% in the country. The residual captures what the model omits, such as the recovery of credit after the crisis. The shortfall of dwellings computed in Section 4 counts hotel beds as housing demand; without them it would be about 97,000. In the counterfactual simulations, completions in Lisbon and Porto respond to the price with the panel elasticity plus the additional term for the two cities, 1.79 in total, although that additional term is not significant. The 2011 occupancy used by the shortfall measure is only a benchmark, because 2011 was a crisis year.

Prices and fundamentals. The model also compares observed prices with the fundamental values implied by its estimates. The deviation of the Lisbon price from its fundamental value lies within the range of its past deviations; the national price lies further above its fundamental value, which carries the imprecision of the estimated income effect (Section A.5).

9 Supply by zone: why the suburbs did not respond

Supply conditions differ between the city and its suburbs (Table 8). Land scarcity constrains supply in the city. In 2016–2025 the city completed 0.8 new dwellings a year per 1,000 dwellings of its stock, and in 2012–2021 its census stock fell despite new construction (Section 4). Most of the additional dwellings of the metropolitan area must therefore be built in the suburbs.

In the suburbs, new construction responds to prices. In the municipal panel, the elasticity of completions with respect to the real price of the previous year is about 1.7 in the inner ring and 1.4 on the south bank. The level of construction nonetheless fell after 2013. Each zone's aggregate supply equation for 2004–2025 relates completions, relative to the stock of the previous year, to the lagged ratio of the national real price to the real construction cost. In this equation the coefficient of a dummy for 2013 onward is −1.54 log points in the inner ring and −1.20 on the south bank. At given prices and costs, completions relative to the stock were thus 79% lower from 2013 onward in the inner ring and 70% lower on the south bank. Banks reported a net tightening of loan-to-value (LTV) terms on housing loans in every year of 2008–2012, before the break; the cumulative tightening was not reversed afterwards (ECB Bank Lending Survey, Portugal). Controlling for the cumulative tightening of LTV terms, the estimated post-2013 supply break falls by 52% in the inner ring and 72% on the south bank (bootstrap 90% bands 29%–77% and 43%–90%). In Porto city the LTV term does not reduce the break. In Lisbon city it does not reduce the break either, and its coefficient has the sign opposite to the one expected ($t = 2.2$); the national index of credit terms therefore also captures other changes of those years.

Licensing has recovered in recent years. In 2020–2025 the inner ring licensed 3,755 dwellings a year, against 1,376 in 2014–2019, and the south bank 2,314. Completion follows licensing with a lag of about two years. Completions per dwelling licensed two years earlier were 0.77 in the inner ring and 0.84 on the south bank in 2020–2025, against 0.84 and 0.83 in 2004–2010. The rate at which the suburbs complete licensed dwellings is therefore close to its pre-crisis level, and the fall in completions originates in the number of dwellings licensed. Per 1,000 dwellings of the stock, the inner ring licensed 4.0 dwellings a year in 2016–2025, less than a third of its 2002–2007 level (13.3); the south bank licensed 4.9, little more than a third of its 2002–2007 level (13.8). Lisbon city is the exception. Its completion rate fell to 0.48 dwellings per dwelling licensed two years earlier in 2020–2025, against 1.12 in 2004–2010. The remainder of this section examines building density and land in the suburbs; Section 10 examines credit, labor, construction costs and licensing.

Table 8: New construction by zone: completions, licensing and supply estimates.

Zone	Completed per 1,000 dwellings 2002–2007	2016–2025	Per year, 2020–2025 Licensed	Completed	Completed per licensed dwelling 2004–2010	2020–2025	Price elasticity	Break of 2013	Reduction with LTV
Lisbon city	3.2	0.8	800	348	1.12	0.48	0.77 (0.51) n.s.	−35% n.s.	n.d.
Inner ring	12.7	2.3	3,755	2,364	0.84	0.77	1.73 (0.30)	−79%	52%
South bank	15.4	3.5	2,314	1,875	0.83	0.84	1.39 (0.18)	−70%	72%
Porto city	7.9	5.6	1,840	1,142	0.72	0.78	2.62 (0.20)	−50%	n.d.
Porto ring	19.6	3.8	5,411	3,058	0.92	0.73	1.35 (0.23)	−71%	57%

Completed: dwellings completed in new construction per 1,000 dwellings of the stock, annual average. Licensed: dwellings licensed in new construction (INE 0013236). Completed per licensed dwelling: dwellings completed in the years shown per dwelling licensed two years earlier. Price elasticity: elasticity of completions relative to the lagged stock with respect to the real price of the previous year, municipal panel 2012–2025 with municipality and year effects; Driscoll-Kraay standard error in parentheses. Break of 2013: $e^{\theta} - 1$*, where* θ *is the coefficient of a dummy for 2013 onward in the zone's annual equation of* $\ln(C_t/H_{t-1})$ *on* $\ln q_{t-1}$ *(the national real price over the real construction cost), 2004–2025, without the LTV term. Reduction with LTV:* $1 - \theta_{\text{LTV}}/\theta$*, where* θ_{LTV} *is the same coefficient once the cumulative net tightening of loan-to-value terms since 2003 (ECB Bank Lending Survey, Portugal, lagged one year) enters the equation. n.s.: not significant; n.d.: not defined, because the LTV term does not reduce the break.*

9.1 A construction cycle and a persistent fall

Building followed a credit cycle (Table 9). Nationally, completions per 1,000 dwellings peaked in 2002 at 24.3 and reached their trough in 2015 at 1.6. They averaged 14.1 a year in 1992–1997, 18.4 in 1998–2007, 7.7 in 2008–2012 and 3.6 in 2017–2025, against a 1992–2025 average of 10.2. In each zone's supply equation, building at a given price-cost ratio was higher in 2001–2007 than in 2008–2012, by 24% in the inner ring ($t = 1.3$), 70% on the south bank ($t = 1.9$), 61% in the Porto ring ($t = 2.1$) and 55% nationally ($t = 2.3$). With the cumulative LTV term in the 2004–2025 equation, the coefficient of a dummy for 2004–2007 is no longer significantly positive in any zone. The boom was fed by credit, and the fall of 2008–2012 ended it.

The fall after 2013 is a different phenomenon. If it were a catch-up after the boom, with the excess stock being absorbed, the shortfall would narrow over time. Table 9 splits the 2013 dummy into 2013–2016 and 2017–2025. The shortfall widened in the inner ring, from 68% to 82%, in the Porto ring, from 48% to 77%, and nationally, and it was stable on the south bank. On the national series for 1992–2025 without the boom years 1998–2007, the 2013 break is −64% ($t = -6.1$). The dwellings added in 2001–2011 exceeded those needed to house the increase in population at each zone's 2001 occupancy by 3.1% of the 2011 stock in the inner ring and 4.8% on the south bank; this excess was used up by 2020 and 2022. The measure ignores the long-run fall in household size and therefore overstates the excess. The cumulative LTV term accounts for 42% and 43% of the two sub-period breaks in the inner ring, and for 63% and 93% on the south bank. With 18 to 22 annual observations and the national price-cost ratio in every zone, these estimates are indicative.

The interpretation matters for policy. The building rates of the boom were fed by credit and are not the benchmark for supply today. The borrower-based limits that Banco de Portugal introduced in 2018 keep housing credit at prudent levels, so the part of the break that the LTV term accounts for is not a margin for policy. The other half of the break, which credit does not account for, depends on licensing, building rights and land, and these factors now carry most of the weight (Sections 10 and 16.1).

Table 9: The construction cycle and the break after 2013.

Zone	Completions per 1,000 dwellings a year				Break at a given price-cost ratio		Share accounted for by LTV	
	1998–2007	2008–2012	2013–2016	2017–2025	2013–2016	2017–2025	2013–2016	2017–2025
Inner ring	14.3	6.2	1.0	2.5	−68% (−3.1)	−82% (−19.6)	42%	43%
South bank	18.1	6.8	1.2	3.7	−69% (−4.1)	−70% (−8.3)	63%	93%
Porto ring	24.9	6.3	1.4	4.0	−48% (−2.9)	−77% (−23.2)	47%	31%
Mainland	16.6	6.5	1.5	3.0	−60% (−3.5)	−75% (−15.3)	54%	54%

Completions: INE; the zone series start in 2001 (the first column is 2001–2007 for the zones). Break: the change in completions relative to the stock at a given lagged ratio of the national real price to the real construction cost, from each zone's supply equation for 2004–2025 with separate dummies for 2013–2016 and 2017–2025; t statistics in parentheses. Share accounted for by LTV: the reduction of each dummy's coefficient once the cumulative net tightening of LTV terms (ECB Bank Lending Survey) enters the equation.

Building density in the suburbs. A metropolitan area can add dwellings by extending the built-up area or by raising building density on land already in use. The suburbs of Lisbon have grown mainly by extension. New construction there is low-density, with about two dwellings per new family-housing building in the inner ring and on the south bank, and this ratio has not changed since 2011 (Table 10). In the Porto ring density has risen, from 1.9 dwellings per building in 2011–2015 to 3.4 in 2021–2025. In the two cities new construction consists of multi-dwelling buildings. Higher building density in the suburbs, near rail and metro stations, would add more dwellings on the same land.

Table 10: Building density: new dwellings per new family-housing building.

Zone	2011–2015	2016–2020	2021–2025
Lisbon city	9.6	7.6	24.7
Inner ring	2.2	2.0	2.2
South bank	2.1	1.8	1.9
Porto city	6.0	7.5	11.1
Porto ring	1.9	2.1	3.4

Dwellings completed in new construction for family housing (INE 0013249) divided by the new buildings for family housing completed (INE 0013247).

Land availability and the fall in building. Land is scarce in Lisbon city. Built-up land covers 80% of its area, and only 19% of the urban land of its master plan is free, much of it parks; Lisbon is among the 2% of municipalities with the least free urban land. Land is also scarce in the suburbs nearest the city. Cascais, Odivelas, Sintra, Oeiras, Amadora and Almada are among the 10% of municipalities with the least free urban land, with 20% to 31% of the urban land of their plans free. The rest of the south bank and the outer north have more. In Palmela, Alcochete, Montijo, Barreiro, Setúbal, Moita, Sesimbra, Vila Franca de Xira, Seixal and Mafra, between 35% and 61% of the urban land of the plans was free in 2010, yet completions there fell to a median 19% of their 2002–2007 level, from 7% in Vila Franca de Xira to 48% in Seixal. Across the 278 municipalities of the mainland, completions in 2016–2025 were a median 17% of their 2002–2007 level, and the fall was smaller where a larger share of the land is already built up ($p < 0.001$). Land scarcity constrains supply in the city and in the suburbs nearest to it, but it does not explain the fall in construction. If it did, construction would have fallen more in the municipalities with less land available, and it fell less. Where land is scarcer by this measure, the elasticity of completions with respect to the price is higher, the opposite of the sign in Saiz (2010); the difference is no longer significant once the size of the municipality and its price level are controlled for ($p = 0.11$).

This suggests that the measure, taken from the plans, does not capture buildable land.

Price against the construction cost. Construction is profitable when the price of a dwelling covers its construction cost (Glaeser and Gyourko, 2005, 2018). Table 11 reports q, the median appraisal value per m^2 of each zone divided by the construction cost of one m^2 excluding land. On the south bank and in the Porto ring, prices were at or below the construction cost in 2013–2016: q was 0.95 and 0.82 in 2013 (0.73 to 1.23 and 0.63 to 1.07 over the band of the cost). In the inner ring q was 1.08 in 2013, and in Lisbon city 1.74. Since 2019 q has risen, to 1.56 to 2.22 in the suburbs in 2025. When the supply equation of each zone uses the zone's q, the elasticity of completions with respect to q is 2.8 to 3.9 outside Lisbon city, and the estimated 2013 break is smaller: −0.14 (0.10, not significant) on the south bank, −0.48 (0.07) in the Porto ring and −0.82 (0.10) in the inner ring. Only 2012 precedes the break in these series, so the break is weakly identified. On the south bank and in the Porto ring, the fall in building is attributable mainly to low profitability. In the inner ring a large break remains after price and cost are controlled for; it is consistent with credit conditions and licensing, which the data do not separate.

Table 11: Price against the construction cost, by zone.

	Price over the construction cost, q					Supply equation on the zone's q	
Zone	2011	2013	2016	2019	2025	Elasticity	2013 break
Lisbon city	2.04	1.74	2.04	3.16	3.39	1.79	−1.35 (0.21)
Inner ring	1.28	1.08	1.14	1.63	2.22	2.78	−0.82 (0.10)
South bank	1.11	0.95	0.96	1.21	1.85	2.93	−0.14 (0.10) n.s.
Porto city	1.29	1.20	1.32	2.00	2.32	3.90	−0.63 (0.17)
Porto ring	0.96	0.82	0.87	1.11	1.56	3.70	−0.48 (0.07)
Rest of the country	0.97	0.82	0.83	0.97	1.27	3.04	−0.31 (0.02)

q: median bank appraisal value per m^2 of the zone over the construction cost of one m^2 of a dwelling excluding land; the cost is the controlled-cost reference (Portaria 69-B/2024, indexed to INE's construction cost index) raised by 30% for other costs; central value. The band runs from the reference alone to a further 30%. Supply equation on the zone's q: the supply equation of the zone with the zone's q of the previous year as its price term, 2012–2025; elasticity of completions with respect to q and 2013 break in log points, Newey-West standard error in parentheses; n.s.: not significant. Only 2012 precedes the break.

10 What held up supply

Frictions in the literature. The literature models building as a gradual adjustment of the stock toward the level that the price implies. Building fast has a rising marginal cost, so supply responds less in the short run than in the long run (Topel and Rosen, 1988). In the stock-adjustment model, a friction is a slow speed of adjustment, separate from the long-run stock (DiPasquale and Wheaton, 1994). Construction responds to changes in prices more than to their levels (Mayer and Somerville, 2000b). Uncertainty makes waiting valuable and delays building (Titman, 1985), and builders who time the market lower the measured elasticity (Murphy, 2018). Paciorek (2013) separates the two effects that matter here: regulation lowers the response of supply by lengthening lags, while geography lowers the level of investment. Supply elasticities are estimated with stock-adjustment and error-correction equations (Malpezzi and Maclennan, 2001; Caldera and Johansson, 2013). Supply is more rigid in continental Europe than in North America (Caldera and Johansson, 2013), and elasticities change over time (Aastveit et al., 2023). On credit, bank capital constrains lending for real estate (Peek and Rosengren, 1994), and in Spain weak banks cut lending to

their firms well before they were rescued (Bentolila et al., 2018). Credit has been linked to building before: a credit crunch cut construction in the American Northeast in the early 1990s (Mayer and Somerville, 1996), credit supply expanded the housing stock where supply is elastic (Favara and Imbs, 2015), and a capital charge on construction loans cut the renovation of rental housing in the United States (Reher, 2021). The comparison of developers with individual builders below adds evidence from a European deleveraging, within the same municipality and year. On labor, immigration enforcement that cut construction employment lowered residential building and raised prices in the United States (Howard et al., 2024), and productivity in construction has stagnated for decades (Goolsbee and Syverson, 2023). For Portugal, Amador (2026) finds that demand shocks raise prices most where supply is inelastic, and lists labor shortages, low productivity, licensing delays and scarce urban land among the frictions.

The 2013 break in the supply equation is a dummy variable. Its coefficient measures the fall in completions after 2013 at given price and cost; it does not identify the cause. We add to the equation, one at a time and lagged one year, the variables that can restrict building, and report by how much each reduces the estimated break. On the national series for 2004–2025, controlling for the cumulative net tightening of loan-to-value (LTV) terms on housing loans in the Bank Lending Survey reduces the estimated break by 59% ($t = -10.7$), and controlling for the tightening of credit standards on loans to firms reduces it by 39% ($t = -6.1$). The interest rate on loans to firms ($t = 1.3$) and the profit margin of construction ($t = -0.2$) are not significant. Controlling for employment in construction removes the whole break, but employment measures the same activity as completions and cannot be read as a cause. The tightening of LTV terms preceded the break: the net percentage of banks reporting a tightening was between 45 and 80 in every year of 2008–2012 and zero in 2013 and 2014, and it stayed between -10 and 25 in 2015–2025, so the cumulative tightening was not reversed. With 22 annual observations and credit indices that change almost as a single step around the crisis, this evidence is only indicative. Letting the pandemic years 2020–2021 shift the level of the equation, or its level and its response to price, leaves the credit coefficients unchanged. With only two such years, the national series cannot distinguish a change in the response to price from a shift in level.

The municipal panel separates credit from local conditions. Private developers depend on construction loans and on their buyers' mortgages; individuals who build their homes depend less on both. We compare completions by private firms with completions by individuals in the same municipality and year, so municipality-by-year effects control for local demand, prices and licensing. From 2004 to 2010 the two moved together; in 2003 firms built relatively less than in 2007. From 2011 building by firms fell relative to building by individuals: by -0.39 log points in 2011 and -0.71 in 2013, about half of what the individuals' building would predict (Figure 9). The gap then closed gradually and was no longer significant from 2020; by 2025 firms built relatively more. The level of the loan-to-value ratio at origination, which fell between 2008 and 2012 and recovered after, is statistically associated with the gap: each reduction of 10 percentage points in the ratio widened it by 0.27 to 0.51 log points (t of 8.2 and 9.1, on the Banco de Portugal's two series). The loan-to-value series varies only by year, so errors clustered by municipality overstate the precision of these t-statistics. Municipalities whose building came more from developers before the crisis lost more after it: moving from the 25th to the 75th percentile of that share lowered completions by 0.65 log points in 2014, and the difference faded by 2023.

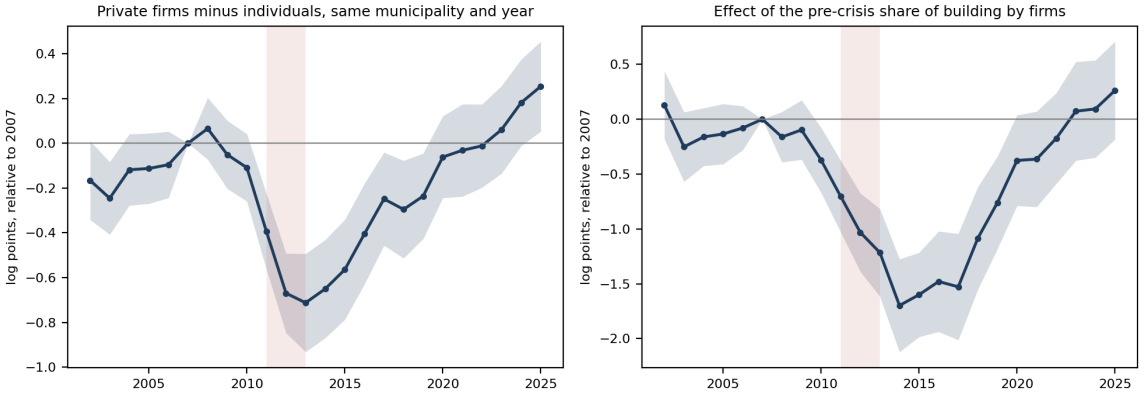

Figure 9: Building by private developers and the credit tightening, municipal panel. Left: completions by private firms minus completions by individuals, same municipality and year. Right: effect of the share of pre-crisis (2002–2007) completions built by firms. Log points relative to 2007, with 95% confidence bands (standard errors clustered by municipality); shaded, 2011–2013. The right panel is per unit of the share; the text reports the difference between the 25th and the 75th percentile. Source: INE, completions by type of builder.

The credit tightening of the adjustment program, through the loan-to-value of buyers and credit to firms, is statistically associated with the deeper fall in building by developers from 2011 until about 2019. The design compares firms with individuals in a year, so it cannot rule out another national shock of those years that hit developers harder, such as the exit of construction firms. From 2020 the gap is no longer negative, yet total building remains far below its earlier rate at the same price and cost, so the shortfall that persists falls on all builders alike. Completions kept pace with licenses: they ran at 0.94 per dwelling licensed two years earlier in 2004–2010 and at 1.09 in 2014–2025, so the break is not in turning licenses into dwellings. Licenses fell with completions, and these data cannot tell whether fewer projects were submitted or fewer were approved; only Lisbon's records, described below, measure the time to license. Two changes that affected all builders are consistent with this persistence. The loan-to-value at origination never returned to its boom level: on the Banco de Portugal series of 2018 it was 75 to 80% in 2003–2006 and 73% in 2017, and the macroprudential limits of 2018 kept it below that level. And employment in construction fell from 561 thousand in 2003 to 286 thousand in 2013, and by 2025 had recovered only to 412 thousand. Individuals also borrow, so the comparison between developers and individuals understates the credit effect. The loan-to-value ratio stands here for the credit conditions of those years as a whole.

Building capacity. The panel also tests capacity. With municipality and year effects, completions rose by 0.25% for each 1% more construction workers in the municipality the year before in 2011–2019, and by 0.40% from 2020, when the developer gap had closed. Employment also follows building, so this is an association. Municipalities that lost more construction workers in 2010–2013 built less until 2019, and the difference faded after 2020. Workers move between municipalities, so a shortage of workers is national and is captured by the year effects. Nationally, the country completed 81 new dwellings per thousand people employed in construction in 2010 and 63 in 2024. Since 2012, housing has not lost share in construction investment. In the AMECO national accounts, investment in dwellings, which includes renovation, rose 28% in volume from 2019 to 2025, against 19% for non-residential construction, and has been 33% to 39% of construction investment every year since 2012. It

had been 50% in 2000, and investment in dwellings in 2025 was still 44% below its 2000 level. Pay per employee in construction rose from 82% of the economy's average in 2019 to 85% in 2025 while construction employment grew, and the labor cost of new housing rose 45% from 2019 to 2025, against 29% for materials. Eurostat's index of hourly wages, which holds the composition of the workforce fixed, rose 38% in construction and 38% in the business economy, so at fixed composition construction pay did not rise relative to the rest. The sector still employs fewer people than in 2008. The evidence is consistent with a shortage of construction workers in a labor market that is tight across the economy, but it does not establish one.

Speed and level. Following that literature, we estimate supply as a partial adjustment. Nationally, the log of completions over the stock depends on its lagged value and on the lagged price relative to cost. With the 2013 break, the lag has a coefficient of 0.68, so about a third of the gap between building and its price-implied level closes each year, and the long-run elasticity is 4.0. The loan-to-value tightening enters as a shift in the level (-0.18, $t = -5.3$) and does not change the response to price ($t = 0.4$). Construction capacity changes the response. Building responds more to price when more people work in construction (1.45, $t = 2.0$). With capacity in the equation, the 2013 break is no longer significant ($t = -0.9$). Credit lowered building at every price; capacity affects the elasticity of building with respect to price. Capacity also follows building, so the second result is suggestive. On the municipal panel, with municipality and year effects, completions respond to the lagged real appraisal value with an elasticity of 0.96, and of 1.24 in the long run. The response was 0.41 until 2019 and 0.81 from 2020 (the difference has a standard error of 0.11), when the developer gap had closed. We cannot reject that local capacity leaves the response unchanged (0.25, standard error 0.20); this is consistent with a national shortage of workers, and also with capacity that has no effect on the response. With 14 years, the lagged term is biased downward by about 0.09, so the panel overstates the speed of adjustment somewhat. The evidence rests on the signs and the interactions.

Building licenses in Lisbon. In Lisbon, licenses rose and completions did not follow. The city licensed 4,025 new dwellings in 2019–2023, 6.8 times as many as in 2011–2015. In 2021–2025 it completed 1,954, 0.49 for each dwelling licensed two years earlier, against 1.10 in 2011–2018. In Porto the ratio was 0.81 in 2021–2025, and in the country 0.95. A license does not guarantee a dwelling. In Lisbon, projects licensed since 2019 either take longer to build or have not started. This is consistent with the shortage of construction capacity and the cost increases of 2022; part of the licensed supply has not been built. The municipal series are small and irregular, so the ratio for a single year means little. The text therefore relies on five-year sums.

Licensing times. No official statistic measures how long a building license takes in every municipality. In December 2025 the governor of the Banco de Portugal asked that every municipality publish the number and the average duration of its licensing processes (*Jornal de Negócios*, 19 December 2025). Lisbon's open data allow a measure. They list every permit the council issued since 2009, 14,808 in all, with the date of the application and the date of the permit (Câmara Municipal de Lisboa, 2026). The median time from application to permit, over all permits, rose from 316 days in 2012 to 723 days in 2021 and was 591 days in 2025. Long delays are a structural feature of licensing in Portugal, and they lengthened during the boom. Over the last ten years the median rose 45%, from 408 days in 2015; over the last five it fell 17%, from 709 days in 2020. The wait is worse than a decade ago, though below the

2021 peak. For new construction it rose from 390 days in 2013 to 1,088 days in 2025, nearly three times as long (Figure 10). These times include the steps that fall to the applicant, such as submitting engineering projects and paying fees. In the same years the World Bank's Doing Business time for a standard warehouse in Lisbon stayed at 160 days, from the 2014 edition to the 2020 edition, the last; it follows the legal deadlines of a standard case. In its 2018 report on the regions of the EU, the World Bank found Porto as fast as Lisbon (159 against 160 days; 100 against 105 for the two municipal approvals) (World Bank, 2018). In its Subnational B-READY report for 2024, with data for December 2023, it found Porto faster (453 against 545 days, for a new office building and with more steps counted) (World Bank, 2024). The council's records give 4,056 pending urban-planning processes at the end of 2017 and 3,923 in March 2019, when it decided about 3,850 such processes a year (*Público*, 18 June 2019), a wait of about 12 months. For building processes, a narrower set, in February 2022 about 3,100 were pending, against 1,841 decisions in 2021 (*ECO*, 10 February 2022), a wait of about 20 months. Councillors reported an average licensing time of 16 months in 2022 and 13 months in 2023 (APPII, 16 October 2024), and an appraisal of architecture projects that fell from 8 months in 2021 to 4 months in 2025 (*Jornal Económico*, 23 June 2026). Each of these figures uses a different measure. Developers and market experts consulted by Rodrigues et al. (2023) describe licensing as slow and unpredictable: each process is followed by particular officials, and the same process in the same municipality can take widely different times depending on who reviews it. Licensing in Lisbon is slow: since 2015 the median permit has taken more than a year. We do not estimate the effect of licensing times on building. In 120 regressions of Lisbon's completions on the wait one to three years earlier, no coefficient is negative, and next year's wait, which cannot cause this year's completions, is significant in 7 of 8 specifications: the wait moves with the building cycle. The data therefore support no estimate of the effect of licensing on building. Municipalities whose master plan was older in 2012 built less in response to price (by 0.22 per standard deviation of the plan's age, standard error 0.10); the association is not robust to every check.

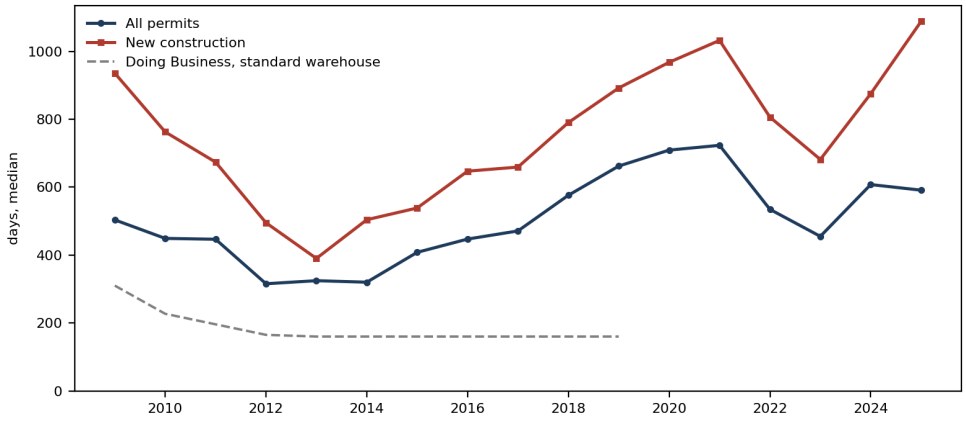

Figure 10: Time from application to building permit in Lisbon, 2009–2025. Median days, by year of permit, for all permits and for new construction. The times include the steps that fall to the applicant. The open data run to October 2026; the partial year is left out. Dashed: World Bank Doing Business, total time for a standard warehouse, by year of data, to the last edition. Sources: Câmara Municipal de Lisboa, open data on building permits (Câmara Municipal de Lisboa, 2026); World Bank.

Applications for new building. Nine municipalities publish their registers of building processes on their GIS services, and flatin.pt counts the applications that enter each town hall every year, by type of works (flatin.pt, 2026). Table 12 gives the new-build applications entered per year for every 1,000 dwellings. In 2021–2025 Lisbon received 0.34 a year, and Matosinhos, north of Porto, 2.63, about 8 times as many. Porto rose from 0.03 in 2021 to 0.48 in 2025, but its register leaves many applications undated (1,723 at the November 2026 reading), so its early years are lower bounds. The counts are applications. They are not permits issued and not dwellings, and one application can be a house or a block of flats. The period is short, and only three of the nine municipalities in the source classify their applications by type.

The same source gives the age of the applications pending in Porto on 8 November 2026: 936 in all, with a median age of 409 days; 75% were older than 180 days and 55% older than a year. Of these, 283 were for new building, with a median age of 416 days. The age of pending applications gives more weight to long cases, because the short ones have already left the list. For Lisbon it gives the time from application to title for the 701 titles issued in the 12 months to 29 October 2026: a median of 520 days, and 940 days for the 35 new-build titles. Our medians from the council's open data are 591 and 1,088 days for the permits of 2025, and 475 and 1,035 for those of 2026 to October. The two sources are close.

Table 12: New-build applications entered per year, per 1,000 dwellings, 2021–2025.

Municipality	2021	2022	2023	2024	2025	Mean
Lisbon	0.35	0.32	0.27	0.42	0.35	0.34
Porto	0.03	0.12	0.15	0.30	0.48	0.21
Matosinhos	2.93	3.20	2.78	1.96	2.28	2.63

Applications (processes) that entered the town hall, by year of entry; not permits issued and not dwellings. Dwellings of 2021 (INE). Lisbon's register is its list of permits. Source: municipal GIS services (building-permit registers), as compiled by flatin.pt, accessed 8 November 2026 (flatin.pt, 2026).

Supply by area. Building fell in the whole country; in numbers of dwellings, the fall was concentrated in the suburbs. In the Lisbon Metropolitan Area, new dwellings completed fell from 16,936 a year in 2002–2007 to 3,448 in 2016–2025, by 80%. They fell by 76% in Lisbon, by 80% in the other 17 municipalities of the area, by 81% in the Porto area outside Porto and by 80% in the rest of the country (Table 13). The suburbs of Lisbon account for 12,707 of the 13,488 dwellings a year that the area stopped building. Lisbon had built little before the crisis, and in 2016–2025 it built 7% of the area's new dwellings, with 22% of its 2011 stock. Porto is the exception: its building fell by 29%, and in 2021–2025 it completed 8.8 dwellings a year for every 1,000 of its 2011 stock, against 7.9 in 2002–2007.

The supply equation of this section, estimated for each area with the national price and the same break from 2013, leads to the same conclusion. At a given price, the break lowered building by 73% in the suburbs of the two cities, by 72% in the rest of the country and by 51% in the two central cities. In Lisbon alone the break is not significant, because the city builds too few dwellings for a precise estimate. Controlling for the cumulative tightening of LTV terms, the estimated break falls by 59% in the suburbs and by 65% in the rest of the country. In the two central cities the LTV term is not significant; in Lisbon city its coefficient is positive ($t = 2.2$), so it does not reduce the break. The national index of credit terms may also capture other changes of those years. In the panel of 261 municipalities for 2012–2025, with municipality and year effects, the elasticity of building with respect to price is higher in the suburbs of Lisbon than in the rest of the country: 1.73 (standard error 0.22), against

0.76 (0.21). In the two central cities it is 1.64 (0.67), and the difference from the rest of the country is not significant. Building in the suburbs of Lisbon is elastic with respect to price, but since 2013 it has been far lower at any given price.

Table 13: New dwellings completed and the break in supply, by area

	Completed per year		Change	Break from 2013	LTV, t	Break reduction
	2002–2007	2016–2025		θ (s.e.)		with LTV
Lisbon (municipality)	1,027	246	−76%	−0.43 (0.55)†	2.2	–
Rest of the Lisbon area (17)	15,909	3,202	−80%	−1.38 (0.16)	−8.2	60%
Porto (municipality)	1,086	773	−29%	−0.69 (0.25)	0.1	–
Rest of the Porto area (11)	11,098	2,157	−81%	−1.23 (0.17)	−5.0	57%
Rest of the country	55,018	10,819	−80%	−1.28 (0.16)	−12.4	65%
Portugal	84,138	17,197	−80%	−1.26 (0.15)	−10.0	62%

Completions of new dwellings, all promoters (INE). The break is θ in $\ln(C_t/H_{t-1}) = c + \eta \ln q_{t-1} + \theta\, 1[t \geq 2013] + u_t$, 2004–2025, with the national q in every area; Newey-West standard errors. LTV: the cumulative net tightening of loan-to-value terms (Bank Lending Survey), lagged one year, added to the equation. Break reduction: $1 - \theta_{\text{LTV}}/\theta$, with θ_{LTV} the break estimated with the LTV term; shown where the LTV coefficient is significant and negative. †Not significant at 5%.

What builders say constrains them. Builders name the same constraints in surveys and in the press, and labor comes first. In the twelve months to October 2026, 25% of construction firms named the shortage of labor as a factor limiting their activity, against 9% in 2008–2019 (European Commission, 2026). The share is higher in civil engineering (33%) than in building (25%). In the second quarter of 2026, 90% of the private-works firms of the builders' association AICCOPN named the shortage of skilled labor (AICCOPN, 2026). Its president said that «a escassez de mão-de-obra é o principal constrangimento» (the shortage of labor is the main constraint) (Observador, 2024).

Licensing comes second. Firms in construction and real estate rate municipal licenses 3.70 on INE's obstacle scale of 1 to 5, above the 3.57 of all firms (INE, 2025). In Lisbon the median time from application to permit, by year of permit, was 591 days in 2025 for all permits and 1,088 days for new construction (Figure 10). The developers' association APPII says that «Um projeto de licenciamento nas áreas metropolitanas de Lisboa e Porto pode demorar facilmente entre três a cinco anos» (a licensing project in the Lisbon and Porto metropolitan areas can easily take three to five years) (ECO, 2024).

Input prices come third. Material shortages reached 26% of firms in 2022 and are now at 6%, while labor costs in new housing rose 64% in 2015–2025, against 35% for materials. Taxes come fourth. They are a frequent complaint, and the 6% VAT rate on the construction of housing for sale or rent, set by Decreto-Lei 97/2026, answers the main one (Presidência do Conselho de Ministros, 2026b). The production chain comes last. The associations name subcontracting and the small size of firms, with no survey measure. Most firms (67%) report no limiting factor at all, and insufficient demand, the main limit in 2008–2019 (38%), is now cited by 4%. The constraints that builders report are on the supply side.

10.1 Centers without land, suburbs far from jobs

The centers are almost fully built up. Central Lisbon and Porto have little land left, and height limits in the building rules stop the centers from growing upward in many areas; such limits raise the cost of housing and move construction to the periphery (Bertaud and Brueckner, 2005). Bringing Lisbon's vacant dwellings back into use would cover only 8% to 20% of its shortfall of dwellings in use (Section 13).

The suburbs have land. Their homes are worth less to buyers who work in the city, because jobs stayed in the center and the commute is long; what held back building there is the subject of Section 9. Lisbon's share of the jobs of its metropolitan area rose from 37.1% in 2010 to 40.1% in 2024. Traffic on the two Tagus bridges reached a maximum of 225,576 vehicles a day in 2025, and prices in the municipalities south of the river fell relative to Lisbon's until 2018. Licensing adds a structural delay that worsened during the boom: the median wait for a permit in Lisbon was 591 days in 2025, and Porto's pending new-build applications had a median age of 416 days in November 2026.

New supply therefore has to come mostly from the suburbs. Transport and jobs decide how much of the city's demand moves there. This is why the policy conclusions propose to plan the suburbs at the scale of the metropolitan area (Section 20). Section B.1 gives the estimates.

11 What links the zones

The suburbs are linked to the city through employment, through the road and bridge accesses to the city, and through prices.

Employment remains concentrated in the city. Lisbon city's share of the metropolitan area's jobs, all sectors at the place of work, rose from 37.1% in 2010 to 40.1% in 2024. Most residents who move to the suburbs keep their job in the city and commute. The location of employment therefore acts on demand: it limits how much of the city's demand can relocate to the suburbs. The low level of suburban construction is a supply outcome (Section 9).

Traffic on the accesses to Lisbon follows economic activity. The census commuting times of 2011 and 2021 were measured during a recession and during the pandemic, so the paper does not use them as a time series. It uses the annual traffic counts. Traffic fell in 2012–2013 and in 2020–2021 and then reached the highest levels of the series. In 2025 the two Tagus bridges carried 225,576 vehicles a day, the Vasco da Gama bridge 76,817 and the A1 entrance 103,414, all the highest values of their series. Traffic on the Vasco da Gama bridge has grown at a trend rate of 1.3% a year since 2008. The 25 de Abril bridge carries about 148,759 vehicles a day, close to its 2008 level. Traffic grows with GDP. Net of GDP, the trend of traffic on the bridges is a decline of 0.5% to 0.8% a year, and on the road entrances the trend is not significant. The recent peaks therefore reflect the growth of economic activity. In the three-zone model, higher traffic raises the commuting time to the city through a construed elasticity, an assumed value with a declared band (Section 12).

The value residents attach to job access. Across 28 suburban municipalities of Lisbon and Porto, and controlling for the change in the local price, the resident population grew more between the 2011 and 2021 censuses where access to jobs increased more. The OLS coefficient of job access in the choice of residence is 0.29 (standard error 0.23), positive and not significant. An instrument based on suburban job growth before 2011 gives 1.41, with a first-stage F of 3.4; a shift-share instrument has a first-stage F of 0.01. Both instruments are weak. The estimate also rests on census counts of residents and foreigners, which the population rule corrects. Since the data do not identify the coefficient, its band is construed. The three-zone model of Section 12 uses the OLS estimate as its central value, with that band.

Suburban prices move with the city's. In the municipal panel, the elasticity of the suburbs' real price with respect to the city's real price of the previous year is 0.32 ($t = 12.6$). An increase in the city's tourist beds is associated with an increase in suburban residents ($t = 12.3$). Both estimates compare the suburbs with the rest of the country. Within the suburbs, the municipalities more exposed to the city did not gain more residents when the city's tourist beds grew ($t = -0.02$). Suburban completions respond to the suburb's price; the coefficient of the city's price is imprecisely estimated ($t = 1.2$ with errors clustered by municipality, 2.6 with Driscoll-Kraay errors).

12 The three-zone model

The zones of Section 3 are linked by the relocation of residents and by prices. This section joins them in one model, which measures the effect of each driver on the real price of every zone when residents can change zone and building depends on prices. It is a three-zone model of location choice with a stock-flow block for the housing stock, solved annually for 2011–2025. It takes the link between residence and employment from the quantitative models of cities (Ahlfeldt et al., 2015; Monte et al., 2018); the closest model of housing policy is the two-zone model of New York of Favilukis et al. (2023). The model has no wages or productivity, and it does not measure welfare. The population of each metropolitan area is set to the data; job access only reallocates residents between zones.

The model. Nationals and immigrants choose a zone according to its price and its access to jobs (equation 1). Job access sums the jobs of all zones, discounted by the commuting time to them; the commuting time into the city increases with the traffic on its access roads (equation 2). The price of each zone depends on its occupancy, residents plus tourist beds per dwelling available to residents (equation 3). Completions depend on the price of the previous year (equation 4). Students are held fixed near the universities, and tourist beds are set to the data.

$$s_{gzt} = \frac{\exp(V_{gzt})}{\sum_k \exp(V_{gkt})}, \qquad V_{gzt} = a_{gz} - b_g \ln P_{zt} + c_g \ln A_{zt} + \xi_{gzt}, \tag{1}$$

$$A_{zt} = \sum_k J_{kt}\, e^{-\omega \tau_{zkt}}, \qquad \tau_{zCt} = \tau_{zC,2011}\left(T_{zt}/T_{z,2011}\right)^{\varepsilon}, \tag{2}$$

$$\ln P_{zt} = \kappa_z + \beta_z \ln \frac{R_{zt} + B_{zt}}{H_{zt} - W_{zt}} + \gamma_z \ln Y_t + \delta \bar{r}_t + \mu\, LTV_{t-1} + u_{zt}, \tag{3}$$

$$H_{zt} = H_{z,t-1} + C_{zt} - L_{zt}, \qquad \ln C_{zt} = \ln C_{zt}^{\text{data}} + \eta_z \left(\ln P_{z,t-1} - \ln P_{z,t-1}^{\text{data}}\right). \tag{4}$$

Here g indexes the two groups, nationals and immigrants, z and k the zones and t the year. s_{gzt} is the share of group g resident in zone z, V_{gzt} the utility of that location and a_{gz} a constant; b_g is the response of location to the price and c_g the weight of job access. J_{kt} is the number of jobs in zone k, τ_{zkt} the commuting time from z to k, ω the decay of access with commuting time, T_{zt} the traffic on the access roads from z and ε the elasticity of commuting time with respect to traffic. P_{zt} is the real price of zone z. R are residents, B tourist beds, H dwellings, W the dwellings withdrawn by non-resident buyers, C completions and L the dwellings that leave the stock; the ratio in equation 3 is occupancy. κ_z is a constant, β_z the elasticity of the price with respect to occupancy and γ_z its elasticity with respect to income per capita Y_t. $\bar{r}$ is the geometric lag of the real mortgage rate r, $\bar{r}_t = (1-\lambda) r_t + \lambda \bar{r}_{t-1}$, and LTV the cumulative net tightening of loan-to-value (LTV) terms in the ECB Bank Lending Survey for Portugal; δ and μ are the semi-elasticities of the price with respect to them. η_z

is the elasticity of completions with respect to the lagged price, and the superscript data marks observed values. The annual residuals ξ and u are kept in every counterfactual, so the baseline reproduces the data and each counterfactual is measured as a deviation from it.

The elasticity of the price with respect to occupancy. β_z is the percentage change in the real price for a 1% increase in occupancy, the persons to be housed per dwelling. In the model it carries the whole effect of immigration and tourism on prices. It is estimated in two ways. The zone elasticity is estimated separately for each zone, from the annual changes of its municipalities relative to all municipalities in the same year: 2.21 in the inner ring, 2.14 on the south bank and 2.59 in the Porto ring. Each city is a single municipality, and its elasticity is the 2SLS estimate on the two cities pooled, 1.32. In the Lisbon suburbs, an increase of 1% in occupancy therefore raises the real price by about 2.2%. The national elasticity is a single β estimated by 2SLS on the municipal panel of the whole country, 0.98, with an instrument against reverse causality (first-stage F of 899). The two estimates differ for two reasons. The zone estimates use only the municipalities of each zone and no instrument; they may reflect the tighter suburban market, or be biased upward by other shocks that raised prices in the same municipalities and years. The national estimate is better protected against that bias, but it averages over municipalities with vacant housing. The main run therefore uses the zone elasticities, and the lower bound uses the national elasticity.

Parameters. Table 14 reports the parameters and their sources. The coefficients of price, income, building, credit, the real rate and LTV terms are estimated. The central elasticities β_z of the suburbs are the zone estimates, 2.21 in the inner ring and 2.14 on the south bank; the lower end of their band is the national elasticity, 0.98. The weight of access c_g is estimated on census counts but is not identified, so its band is construed (Section 11). ω is calibrated on the commuting flows of 2011. The response of location to the price b_g is construed at 1.02, the inverse of 0.98, with a band from 0 to 1.36. ε and the shares used for students and for the dwellings withdrawn by non-resident buyers are construed, with declared bands. The national time series does not separate credit terms from occupancy: adding the LTV term to the national demand equation makes the coefficient of occupancy negative (-2.03, $t = -2.88$). The shares attributed to credit terms below carry this imprecision.

Fit. With its annual residuals the model reproduces 2011–2025 exactly. The free simulation sets the residuals to zero; it is an in-sample check, because the price coefficients are estimated on the same years (Table 15). In the three Lisbon zones it reproduces the price rise since 2014 within 9 to 17 percentage points, with a root mean square error of 0.09 to 0.12 in the log price. In Lisbon city it underpredicts the price in 2017–2021, by up to 0.24 log points, the years in which local accommodation and purchases by buyers domiciled abroad reached their maximum. In Porto it reproduces 74% to 85% of the log rise.

Suburban building without the 2013 break. The main counterfactual removes the 2013 break in suburban building; completions keep their pre-2013 response to the price (scenario 1c in Table 16). The real price in 2025 would be 13.1% lower in the inner ring, 12.7% lower on the south bank and 6.3% lower in the city. With the national elasticity, the lower bound, the reductions are 7.1%, 6.8% and 2.8%. The suburbs would have about 95,070 more dwellings, and about 36,783 residents would move from the city to the suburbs. These arrivals offset part of the suburban price reduction: between 83% and 88% of it remains. The reduction of the city's price operates only through these departures: with residents held fixed it is zero, and with no response of location to the price ($b = 0$) it is 2.8%. Around

Porto the ring would have about 49,822 more dwellings, and the real price would be 7.2% lower in the city and 15.8% lower in the ring.

The price effect of more dwellings. Scenario 1 measures the price effect of about 210,000 more suburban dwellings by 2025. It applies the 2002–2007 completions per dwelling to the stock of each year, which adds 210,066 dwellings, more than the suburban shortfall of 196,889. The real price would be 25.0% lower in the inner ring, 26.3% on the south bank and 12.8% in the city. The scenario imposes more building than the estimated supply equation implies at those lower prices. It measures the effect of a quantity of dwellings; no policy in the model produces it.

Comparison of the scenarios. Removing only the part of the suburban break attributed to credit (scenario 2) lowers the real price by 5.7% in the inner ring, 6.8% on the south bank and 2.9% in the city. Easing credit to buyers as well (scenario 2b) raises demand and offsets part of that reduction: suburban prices fall by 2.4% and 3.6%, and the city's price rises by 0.7%. Per 10,000 dwellings added in the suburbs, scenarios 1, 1c and 2 lower the city's real price by 0.6 to 0.7% and the inner ring's by 1.2 to 1.4%. The scenarios differ mainly in the number of dwellings they add. Upzoning near rail and metro and faster licensing are not represented in the model.

Jobs and commuting. Holding the city's share of jobs at its 2010 level, or reducing commuting times by 10–20%, changes the central real price by at most 3.1% in any zone. At the upper end of the band of the weight of access, faster commuting raises the price on the south bank by up to 11%, as residents relocate there, and lowers the inner ring's by up to 4%. Because the population of each metropolitan area is set to the data, jobs and commuting only reallocate residents between zones. At the estimated weight of access their effect on prices is small; the effect of suburban building is large.

Tourism and immigration. Holding the city's tourist beds at their 2011 level (scenario 5) lowers its real price by 7.7% and keeps 30,155 more residents in the city. Table 17 holds each driver at its 2011 level in turn and reports the share of the 2011–2025 log rise of the real price attributed to it. In the main run, the share attributed to immigrants is 41% in Lisbon city (33% to 49% over the bands), 45% in the inner ring and 46% on the south bank (25% to 49% and 29% to 48%). In the suburbs, the lower ends are obtained with the national elasticity, 0.98. The suburbs received 74% of the new immigrants, but the city received more per resident: 26 per 100 residents of 2011, against 17 and 18 in the suburbs. The share attributed to tourist beds in all zones is 14% in the city and 7% in the inner ring. Held at 2011 together, immigrants and tourist beds account for more than half of the rise in each Lisbon zone. The share attributed to buyers domiciled abroad is at most 2% at central values and 4% at the upper end of the band. Income and the real rate contributed to the rise, and the tightening of credit terms reduced it by 9% to 11% of the rise.

Two models, two decompositions. The city model of Section 8 attributes 26% of Lisbon city's 2011–2025 rise to residents and 17% to tourist beds. The zone model attributes 41% to immigrants and 14% to tourist beds. The difference has three sources. The elasticity of the price with respect to occupancy in the city is 1.32 in the zone model, against 0.98 in the city model, and a higher elasticity raises every demand share. The zone model counts immigrants by the population rule, while the city model counts the net change in residents,

in which the departures of Portuguese residents offset part of the immigrants. In the zone model, finally, residents change zone and completions depend on prices, while the city model takes both as data.

Three calibrations of the price equation. The elasticity β_z determines most of the shares, so the model is solved under three calibrations (Table 18). The main run uses the zone elasticities. The lower bound uses the national elasticity, 0.98, in every zone. With it, the share of the rise around Lisbon attributed to immigrants is 22% to 25%, against 41% to 46% in the main run, and the share of the city's rise attributed to tourist beds is 10%, against 14%. Without the 2013 break, suburban real prices would be 6.8% to 7.1% lower, against 12.7% to 13.1%, and the city's 2.8% lower, against 6.3%. The ranking of the scenarios is the same in both runs. In the suburbs, building without the break has the largest effect on prices. In each city, holding the city's tourist beds at their 2011 level has a larger effect on its price than suburban building, and jobs and commuting have the smallest. A third run estimates all coefficients of the price equation jointly on the municipal panel of the five zones, with municipality effects and a wild cluster bootstrap by year. Its elasticities range from 0.42 to 0.58, but its estimate of λ is 0.90, at the edge of the grid, and the share of the rise attributed to the lagged rate is then 91% to 96%. Its scenario without credit tightening for builders and buyers raises prices by 11% to 13%, a result not verified. The paper reports this run only as a robustness test. The five zone series alone do not identify the elasticities: the estimates range from −0.77 to 0.29, and none is significant.

Table 14: Parameters of the three-zone model, main run (central values of the bands).

Parameter	Lisbon city	Inner ring	South bank	Porto city	Porto ring	Source
Elasticity of the price with respect to occupancy, β	1.32	2.21	2.14	1.32	2.59	zone OLS estimates (city: 2SLS); lower bound 0.98
Elasticity of completions with respect to the lagged price, η	0.77	1.73	1.39	2.62	1.35	municipal panel by area
2013 break in completions (log points)	–	−1.54	−1.20	–	−1.23	supply equation of the zone
Part of the 2013 break attributed to LTV terms (log points)	–	−0.80	−0.87	–	−0.70	supply equation with LTV
Weight of job access, nationals, c_g	0.29	0.29	0.29	0.29	0.29	censuses 2011 and 2021; band construed
Weight of job access, immigrants, c_g	0.55	0.55	0.55	0.55	0.55	censuses 2011 and 2021; band construed
Income elasticity of the price, γ	1.13	1.49	1.49	1.49	1.49	demand equations, city and country
Decay of job access with commuting time, ω	0.053	0.053	0.053	0.024	0.024	commuting flows, census 2011
Response of location to the price, b_g (construed)	1.02	1.02	1.02	1.02	1.02	1/0.98, band 0 to 1.36
Semi-elasticity of the price, lagged real rate, δ	−0.060	−0.060	−0.060	−0.060	−0.060	zone panel
Weight of the past in the lagged rate, λ	0.45	0.45	0.45	0.45	0.45	zone panel
Semi-elasticity of the price, LTV terms, μ	−0.052	−0.052	−0.052	−0.052	−0.052	zone panel

Each parameter has a band (statistical annex workbook, sheet G6); the counterfactuals are computed at the lower and the upper end of each band, one parameter at a time. ω, c_g and b_g are set for each metropolitan area.

Table 15: Fit of the model to the real price, 2011–2025.

	Rise 2011–2025		Rise 2014–2025		Error
Zone	Data	Model	Data	Model	(log)
Lisbon city	+96%	+99%	+135%	+126%	0.12
Inner ring	+104%	+107%	+148%	+140%	0.09
South bank	+97%	+95%	+143%	+126%	0.11
Porto city	+112%	+89%	+136%	+123%	0.15
Porto ring	+91%	+62%	+122%	+95%	0.08

Model: the free simulation, with the annual residuals set to zero. Its only inputs are population, tourist beds, dwellings, income, the real rate and credit terms; residents choose their zone within the model. It is an in-sample check. Error: root mean square error of the log real price, 2012–2025.

Table 16: Counterfactuals from 2013, main run (zone elasticities): real price in 2025 relative to the baseline (%).

Scenario	Lisbon city	Inner ring	South bank	Porto city	Porto ring
(1c) No 2013 break in suburban building	−6.3 (−7.4; −2.8)	−13.1 (−15.2; −7.8)	−12.7 (−14.1; −8.4)	−7.2 (−8.9; −2.5)	−15.8 (−18.9; −7.6)
(1) About 210,000 more suburban dwellings (2002–2007 rate)	−12.8 (−15.0; −5.8)	−25.0 (−26.9; −14.6)	−26.3 (−29.5; −17.3)	−19.7 (−24.0; −6.9)	−40.2 (−47.2; −19.4)
(2) No part of the suburban break attributed to credit	−2.9 (−4.1; −1.3)	−5.7 (−8.6; −3.3)	−6.8 (−8.5; −4.4)	−3.3 (−5.3; −1.2)	−7.5 (−11.8; −2.7)
(2b) No credit tightening for builders or buyers	0.7 (−1.1; 2.5)	−2.4 (−5.6; 0.3)	−3.6 (−5.5; −1.0)	−0.2 (−2.2; 2.1)	−4.5 (−9.1; 0.6)
(3) City share of jobs held at 2010	−0.5 (−1.7; −0.3)	0.1 (0.0; 0.2)	0.5 (0.3; 1.7)	−0.2 (−0.6; −0.1)	0.1 (0.0; 0.3)
(4) Commuting 10–20% faster	−0.8 (−2.8; −0.2)	−1.2 (−4.3; −0.4)	3.1 (0.9; 11.2)	0.4 (0.3; 1.5)	−0.2 (−0.8; −0.1)
(5) City tourist beds held at 2011	−7.7 (−10.4; −7.2)	−2.2 (−2.6; −1.1)	−2.2 (−2.6; −1.0)	−8.8 (−12.1; −8.2)	−2.5 (−3.1; −0.9)
(6) All of (1c), (3), (4) and (5)	−14.7 (−17.3; −12.3)	−15.7 (−18.2; −9.5)	−11.6 (−13.2; −4.6)	−15.5 (−18.8; −11.2)	−17.8 (−20.8; −8.7)

Central value and, in parentheses, the lowest and the highest value over the parameter bands. (1c) removes the 2013 break; completions keep their pre-2013 elasticity with respect to the price. (1) applies the 2002–2007 completions per dwelling to the stock of each year, independently of the price. Faster commuting: times to the city 20% shorter from the south bank and 10% shorter from the inner ring and the Porto ring.

Table 17: Share of the 2011–2025 log rise of the real price attributed to each driver, main run (zone elasticities) (%).

Driver held at 2011	Lisbon city	Inner ring	South bank	Porto city	Porto ring
Immigrants	41 (33; 49)	45 (25; 49)	46 (29; 48)	27 (21; 34)	29 (13; 36)
Tourist beds, all zones	14 (13; 17)	7 (4; 7)	7 (5; 8)	14 (12; 18)	8 (4; 10)
Immigrants and tourist beds	58 (48; 68)	53 (30; 58)	55 (35; 58)	44 (35; 55)	39 (17; 48)
Buyers domiciled abroad	2 (0; 3)	1 (0; 2)	1 (0; 2)	2 (0; 4)	1 (0; 2)
Nationals	−1 (−1; −1)	−1 (−1; −1)	−1 (−1; −1)	−7 (−8; −4)	−12 (−15; −5)
Students	1 (1; 2)	0 (0; 1)	0 (0; 1)	2 (1; 2)	1 (0; 1)
Income	39 (27; 51)	41 (35; 47)	43 (38; 48)	39 (34; 45)	46 (38; 54)
Real interest rate	20 (15; 23)	18 (14; 21)	19 (14; 22)	16 (11; 18)	19 (14; 23)
Credit terms (LTV)	−11 (−17; −6)	−10 (−16; −5)	−11 (−16; −6)	−9 (−13; −5)	−11 (−16; −5)
Rise of the real price	+96%	+104%	+97%	+112%	+91%

Each driver is held at its 2011 level from 2012 onward, and the other drivers are set to the data; residents relocate between zones and completions depend on the lagged price. Share: the reduction of the log real price of 2025 relative to the baseline, as a share of the 2011–2025 log rise. The shares do not sum to 100, because the drivers interact, and completions and the annual residuals are not held at their 2011 levels. A negative share means that the driver lowered the price. In parentheses, the range over the parameter bands.

Table 18: Three calibrations of the price equation.

	Calibration	Lisbon city	Inner ring	South bank	Porto city	Porto ring
Elasticity β (occupancy)	Main (zone elasticities)	1.32	2.21	2.14	1.32	2.59
	Lower bound (national elasticity)	0.98	0.98	0.98	0.98	0.98
	Robustness (joint)	0.49	0.57	0.42	0.58	0.48
Immigrants (% of the log rise)	Main (zone elasticities)	41	45	46	27	29
	Lower bound (national elasticity)	25	22	22	17	12
	Robustness (joint)	13	12	11	10	6
Tourist beds (% of the log rise)	Main (zone elasticities)	14	7	7	14	8
	Lower bound (national elasticity)	10	3	4	10	3
	Robustness (joint)	5	2	2	6	2
Real rate (% of the log rise)	Main (zone elasticities)	20	18	19	16	19
	Lower bound (national elasticity)	20	19	20	17	20
	Robustness (joint)	96	91	96	84	99
Credit terms (% of the log rise)	Main (zone elasticities)	−11	−10	−11	−9	−11
	Lower bound (national elasticity)	−12	−11	−11	−9	−12
	Robustness (joint)	−39	−36	−38	−32	−40
No 2013 break (1c), price in 2025 (%)	Main (zone elasticities)	−6.3	−13.1	−12.7	−7.2	−15.8
	Lower bound (national elasticity)	−2.8	−7.1	−6.8	−2.9	−7.6
	Robustness (joint)	−1.5	−4.1	−3.4	−1.6	−4.0
City tourist beds at 2011 (5), price in 2025 (%)	Main (zone elasticities)	−7.7	−2.2	−2.2	−8.8	−2.5
	Lower bound (national elasticity)	−6.1	−1.0	−0.9	−7.0	−0.9
	Robustness (joint)	−3.2	−0.5	−0.5	−4.2	−0.5
All combined (6), price in 2025 (%)	Main (zone elasticities)	−14.7	−15.7	−11.6	−15.5	−17.8
	Lower bound (national elasticity)	−9.9	−8.7	−5.5	−9.6	−8.5
	Robustness (joint)	−5.3	−5.1	−2.8	−5.6	−4.5
RMSE of the free simulation (log)	Main (zone elasticities)	0.12	0.09	0.11	0.15	0.08
	Lower bound (national elasticity)	0.15	0.09	0.08	0.16	0.09
	Robustness (joint)	0.15	0.06	0.06	0.16	0.05

Zone elasticities: the elasticity of the price with respect to occupancy of each zone, estimated on its municipalities with year effects. National elasticity: the elasticity estimated by 2SLS on the national municipal panel with year effects, applied to every zone. Joint estimate: all coefficients of the price equation estimated jointly on the municipal panel of the five zones, with municipality effects and a wild cluster bootstrap by year; its estimate of λ lies at the edge of the grid. In the first two calibrations, the income, rate and credit coefficients come from the demand equations and the zone panel. Shares: as in Table 17. Scenarios: as in Table 16.

13 Vacant dwellings and rehabilitation

In 2021 Lisbon had 319,640 dwellings. Of these, 47,748, or 14.9% of the stock, were vacant: 21,749 for sale or rent and 25,999 vacant for other reasons, such as undivided inheritances, dwellings awaiting works or buildings in ruin. In the historic center (Santa Maria Maior, Misericórdia, São Vicente, Santo António, Estrela, Arroios and Penha de França) 19,129 dwellings were vacant, 22.3% of the stock. In 2011 the city had 50,209 vacant dwellings (15.6%), so in ten years the number barely changed. Most dwellings vacant for other reasons are in buildings in good condition: 14,522 in buildings with no repair needs and 1,449 in buildings with deep repair needs.

The composition of vacancy has changed since 2011. Dwellings vacant for sale or rent went from 18,416 to 21,749, and those vacant for other reasons fell 16%. The census of April 2021 was taken during the pandemic, when many short-term rentals were empty or looking for a tenant (Batalha et al., 2022), so dwellings vacant for sale or rent were probably above normal. For most dwellings vacant for other reasons, the main obstacles to their return to use are ownership, undivided inheritances, taxation and the legal security of letting; the cost of works is a lesser obstacle. Their number fell between 2011 and 2021, a decade of rising prices, which suggests that the low recovery case is not pessimistic. The census may also have recorded as vacant some dwellings of residents it did not count (Section A.2); the pool would then be smaller.

The historic center is fully built up. In the rest of the city, the 2012 municipal master plan still provides for areas to be consolidated, mainly in the east and north, but there is no official figure for the buildable land that remains. In the center, the supply of housing grows mainly by recovering vacant dwellings and degraded buildings and by returning short-term rental units to permanent housing.

Dwellings vacant for sale or rent belong to the normal turnover of the market and are not additional supply. The recoverable pool is the dwellings vacant for other reasons. The central calculation adds to them the dwellings for sale in buildings with deep repair needs, a total of 26,730 dwellings in the city and 9,727 in the center. INE does not report how many of these can return to use; the paper considers three cases: 30%, 50% and 70%. Recovery would add about 7,800, 13,400 or 18,700 dwellings to the city, of which 2,800, 4,900 or 6,800 in the center. In the central case, recovery would house about 29,670 people, 4.5% of the residents of 2025 (Table 19).

Table 19: Vacant dwellings and the stock that can return to use, Lisbon.

	Dwellings	Vacant	Vacancy rate	Vacant for other reasons	Recoverable low / central / high
Lisbon, 2021	319,640	47,748	14.9%	25,999	7,800 / 13,400 / 18,700
Historic center, 2021	85,967	19,129	22.3%	9,403	2,800 / 4,900 / 6,800
Lisbon, 2011	322,865	50,209	15.6%	31,003	
Historic center, 2011	92,337	20,472	22.2%	12,473	

Source: INE, censuses of 2021 (0013315, 0011553) and 2011 (0006304). Historic center: the parishes of Santa Maria Maior, Misericórdia, São Vicente, Santo António, Estrela, Arroios and Penha de França; for 2011, the parishes before the 2012 reform. Census counts; Section A.4 uses the INE annual estimate of the stock. Recoverable: 30%, 50% and 70% of the pool, rounded to hundreds (dwellings vacant for other reasons; in the central and high cases, also those offered for sale or rent in buildings with deep repair needs). In 2011 INE listed dwellings vacant for demolition separately; the 2011 column for other reasons excludes them.

Recovery reduces the shortfall but does not close it. The shortfall is measured in occupied

dwellings. The 110,000 missing dwellings of Section 4 count vacant dwellings as part of the stock, and returning a vacant dwelling to use does not change that count. In 2011 Lisbon had 2.10 persons to house per occupied dwelling. Housing the persons of 2025 at that ratio would require about 91,900 more occupied dwellings than the 2021 census counted. The paper uses the 2021 count as the 2025 level, because the stock barely changed. Between 2011 and 2025 demand grew by 191,288 people, counting residents and tourist beds, which corresponds to 91,140 dwellings at the same ratio. Recovery covers between 8% and 20% of the shortfall. Recovery in the historic center alone covers between 3% and 7%.

Even in the extreme cases, recovery does not close the gap. If all 25,999 dwellings vacant for other reasons returned to use, they would cover 28% of the shortfall. Adding the 731 vacant dwellings on the market in buildings with deep repair needs and about 8,200 vacant on the market above the normal turnover between contracts (estimated at 4% of the stock, in a band of 3% to 5%), they would cover 38%. All 47,748 vacant dwellings in the city would give 52%, an impossible bound, because the market always needs vacant dwellings between contracts. In the historic center the high case covers about 7% of the shortfall, and all its dwellings vacant for other reasons 10%. Recovering vacant dwellings and limiting short-term rentals reduce the shortfall but cannot close it. Closing it requires new construction outside the center, in the areas that the municipal master plan still leaves to be consolidated, in the east and north, and in the municipalities of the metropolitan area, served by public transport that links them to the center. In the counterfactual of the three-zone model without the 2013 break in suburban building, the city's real price in 2025 is about 6% lower (Section 12).

The country had 723,215 vacant dwellings in 2021. The vacant dwellings of the rest of the country are not part of Lisbon's supply; those of the metropolitan area are part of it where their residents can commute to work in Lisbon. Lisbon has 6.6% of the total. The Lisbon Metropolitan Area has 22.1% and the Porto area 11.6%. Parishes with fewer than 100 inhabitants per km^2 have 29.6% of the country's vacant dwellings, with a vacancy rate of 15.2%; those with more than 500 inhabitants per km^2 have 44.8%, with a rate of 10.7%. Low-density areas have higher vacancy rates, but 70% of the country's vacant dwellings are in parishes with more than 100 inhabitants per km^2 (Table 20).

Table 20: Where Portugal's vacant dwellings are, 2021.

Municipalities	Vacant	Share of total	Vacancy rate
Lisbon (municipality)	47,748	6.6%	14.9%
Rest of Lisbon Metropolitan Area	112,028	15.5%	9.5%
Porto (municipality)	20,270	2.8%	15.2%
Rest of Porto Metropolitan Area	63,562	8.8%	9.0%
Rest of country, predominantly urban	309,057	42.7%	12.9%
Rest of country, medium urban	76,669	10.6%	13.0%
Rest of country, predominantly rural	93,881	13.0%	14.5%
Portugal	723,215	100.0%	12.1%

Source: INE, 2021 census (0013315). Outside the two metropolitan areas, each municipality takes the class of the 2014 typology of urban areas where most of its residents lived in 2011 (INE, 0009091).

At the end of 2023 the city council counted 2,854 derelict private buildings, 1,158 wholly and 1,696 partly vacant, according to data cited by the *Diário de Notícias*. These are buildings declared derelict for the surcharge on the municipal property tax, and the number cannot be compared with the INE count of dwellings.

14 Who gains and who loses

The rise in prices and rents transfers wealth from those who rent to those who own. In Portugal, 70% of main residences are occupied by their owner (INE, 2021 census); in Lisbon, 42% of households rent their home (Section 15).

- *Owners* gain from the rise in value. At the central estimate of the literature, the growth of tourism in 2011–2025 raised the value of an 80 m^2 two-bedroom dwelling by about 53 thousand euros in Lisbon and 51 thousand euros in Porto.
- *Landlords and operators of short-term rentals* receive higher rents or the income from tourism.
- *Tenants and those looking for a home*, mostly the young and immigrants, pay more: at the central estimate of the literature, about 149 euros a month for an 80 m^2 two-bedroom dwelling in Lisbon and 175 euros in Porto, on new leases.
- *Workers in tourism and restaurants* gain from higher employment in the sector. New Economics Foundation (2026) finds that in the countries most dependent on tourism, the growth of tourism did not raise real wages.
- *The State and the municipalities* collect taxes and fees on tourism, transactions and real estate.

Immigrants and students. Immigrants and students bear a large part of the cost of the housing shortage. Immigrants from outside the EU have lower incomes than Portuguese citizens, a low homeownership rate and a high incidence of overcrowding. Official crime rates put Amadora, Sintra, Loures and Seixal below the national rate. Of six European countries compared, Portugal has the fewest public residence beds per student. Annex B presents the evidence and the lessons from other European countries (Sections B.2, B.3 and B.4).

15 Housing affordability

A household can afford a dwelling when the mortgage payment for its purchase is at most 30% of its income. We set the line for a 75 m^2 dwelling at the median sales value per square meter of each municipality (INE), bought with an 80% loan over 30 years at the year's average rate on new loans for house purchase. The loan terms are close to the market's: the average loan-to-value ratio of new loans was 69% in 2024 and their average maturity 31 years, and the Banco de Portugal caps the debt service of new borrowers at 45% of income from August 2026. Income is the income net of personal income tax of each fiscal household, from the municipal tax statistics (INE). We fit a log-normal distribution to its median and to the ratio of its 90th to its 10th percentile in each municipality and read the share of households below the line. Social contributions are not deducted from that income, so 30% of it is close to a third of disposable income.

We distinguish two questions. The first is access to ownership: can a household that does not own a dwelling buy one? The second is the burden of housing costs: is a household overburdened by them, paying more for housing than it can afford, or does it live in an overcrowded dwelling? A tenant who could not buy may be well housed, in a rented apartment at a moderate rent. The first measure is therefore a barrier to buying; it does not count the households overburdened by their housing.

Access to ownership. Most Portuguese households own their dwelling and do not need to buy. In the 2021 census, 70% of households in Portugal owned their dwelling, 22% rented and 8% lived in it on other terms, mostly rent-free or lent by family or an employer. The two city centers are different: in the municipality of Lisbon 50% owned and 42% rented, and in Porto 49% and 44%. In the metropolitan areas, ownership is closer to the national pattern: 64% in Lisbon's and 65% in Porto's (Table 21).

Table 21: Households by tenure of their dwelling, 2021 (%).

	Households	Own	Rent	Other
Portugal	4,142,581	70.0	22.3	7.7
Lisbon metropolitan area	1,191,363	63.7	29.2	7.1
Lisbon (municipality)	242,044	50.3	42.3	7.4
Porto metropolitan area	681,349	65.1	27.3	7.6
Porto (municipality)	102,093	49.1	44.2	6.7

Private households in main-residence dwellings. Own: owner or co-owner; rent: tenant or subtenant; other: rent-free, lent or other terms. Source: INE, 2021 census (indicator 0011524). All municipalities: statistical annex, sheet D11.

We take the share of tenants and other non-owners in each municipality from the same census (30% nationally, weighted by population, and 50% in Lisbon) and assume that they have the incomes of the municipality's households. Tenants have lower incomes than owners, which biases the shares below downward. Fiscal households split some families, and young adults who live with their parents but file separate tax returns appear as low-income households, which biases the shares up. The two biases run in opposite directions, so the level is approximate. Between 2019 and 2023, the share of tenant households in Portugal that could not buy a dwelling at the local median price rose from 37% to 64% (Table 22). Most of the rise reflects the increase in the average mortgage rate, from 1.26% to 4.01%. The barrier is concentrated in the two metropolitan areas. In Lisbon, about 88% of the households that rent could not buy at the local median price in 2023, and in Porto about 83%; in the 25% of municipalities with the lowest prices, weighted by population, 9.3% of households were below the line. The measure is a better guide to the geography of the barrier and its change over time than to its level. The cash required of a buyer at purchase also rose. For the median home, the down payment rose from about 30,000 to 56,000 euros in the municipality of Lisbon and from about 16,000 to 37,000 euros in Porto between 2017 and 2022, on loan terms available only to buyers under 30 (Rodrigues et al., 2023).

Other indicators point in the same direction. The Banco de Portugal computes the payment on a median-size dwelling as a share of the median household income: it was below 30% in 2009–2021, reached 53% at the end of 2023 and was 48% in 2025, with 102% in Lisbon and 84% in Porto. Homeownership is falling. The share of the population living in a dwelling it owns fell from 78.3% in 2021 to 71.2% in 2025, and the share renting at market rents rose from 10.9% to 16.3% (EU-SILC).

Housing cost overburden. The share of households overburdened by housing costs is much smaller. In 2025, 6.3% of the population lived in households whose housing costs took more than 40% of disposable income, and among tenants at market rents the share was 27.2%; 12.7% lived in overcrowded dwellings, and 1.9% were in arrears on their mortgage or rent (EU-SILC). In a consumer association's survey of 2025, 46% of households reported difficulty in paying for their housing, a broader measure that includes any difficulty. Housing need is concentrated among tenants on recent contracts at current market rents and among

those who share a dwelling for lack of one.

Table 22: Access to ownership: households below the affordability line, Portugal, 2019–2023 (%).

	2019	2020	2021	2022	2023
All households below the line	32	35	35	45	60
Tenant households that could not buy	37	40	40	50	64
Lisbon	74	74	73	80	88
Porto	56	61	61	70	83
Average mortgage rate (%)	1.26	1.07	0.83	1.77	4.01

A 75 m^2 dwelling at the municipal median sales value per m^2 (INE 0012255), 80% loan over 30 years at the year's average rate on new loans for house purchase (ECB), payment at most 30% of income net of personal income tax per fiscal household (INE 0012741 and 0012746, log-normal by municipality); municipalities weighted by population. Tenant households: tenants and other non-owners, 2021 census (INE 0011524), with the municipality's incomes. Tenants are poorer than owners, and fiscal households split some families; the two biases run in opposite directions. A tenant who could not buy may be well housed; the table measures the barrier to buying. With a 60 or a 90 m^2 dwelling, all households below the line in 2023: 50% and 67%.

Across countries the comparison uses the ratio of the national line to the median equivalized income, for a couple with one child buying a 90 m^2 dwelling (EU-SILC; prices from national statistics where they publish a level, carried back with Eurostat's house price index). Its change, the index with 2015 = 100, does not depend on the level of prices, which Italy and Germany do not publish. The levels of the ratio for Portugal and Spain do depend on it: they use the INE median sales value for Portugal and the appraisal value of free housing of the Spanish housing ministry for Spain, which are not fully comparable. Between 2019 and 2025 the ratio rose by 63% in Portugal, against 27% in Germany, 20% in Spain and 10% in Italy (Table 23).

Table 23: The affordability line relative to median income, four countries (2015 = 100).

	2011	2015	2019	2022	2025
Portugal	101	100	88	96	143
Spain	126	100	96	89	114
Italy	105	100	73	66	81
Germany	111	100	103	113	131

Income needed to pay the mortgage on a 90 m^2 dwelling with 30% of income (80% loan, 30 years, average rate on new loans, ECB), for a couple with one child (modified OECD scale 1.8), divided by the median equivalized disposable income (EU-SILC ilc_di01; survey year, income of the year before). Prices: national level per m^2 carried back with Eurostat's house price index for all dwellings; the index does not depend on the level.

Portugal and Spain. On these national price levels, the two countries started from similar positions. In 2019 the line was 0.56 of the median income in Portugal and 0.58 in Spain; in 2025 it was 0.90 and 0.69. These levels depend on the prices of each country, measured in different ways: in Portugal the median sales value (INE), in Spain the appraisal value of free-market housing published by the Spanish housing ministry. Only the index (2015 = 100) does not depend on the price level. Since 2015, house prices have risen by 164% in Portugal and by 81% in Spain (Table 24). For households entering the market, affordability is worse in Portugal, and the income required to buy has grown faster. Overcrowding is also higher: 12.7% of the Portuguese live in an overcrowded dwelling, against 9.5% of the

Spanish. For households who already have a home, the burden of housing costs and arrears are lower in Portugal. The share of the population whose housing costs take more than 40% of disposable income is 6.3% in Portugal and 7.2% in Spain; among tenants at market rents, 27.2% and 26.8%. Arrears on mortgage or rent affect 1.9% of the Portuguese and 5.2% of the Spanish. Most Portuguese households own outright or hold old rental contracts at low rents, and the rise in prices falls on those who enter the market: the young, immigrants and those who move, mostly in Lisbon and Porto.

Table 24: Housing in Portugal and Spain, 2019 and 2025.

	Portugal		Spain	
	2019	2025	2019	2025
Line to median income (ratio)	0.56	0.90	0.58	0.69
House price index (2015 = 100)	142	264	125	181
Overcrowding (% of population)	9.5	12.7	5.9	9.5
Housing costs above 40% of income (%)	5.7	6.3	8.5	7.2
tenants at market rents (%)	26.3	27.2	37.4	26.8
Arrears on mortgage or rent (%)	2.4	1.9	3.8	5.2

Line to median income: Table 23, as a ratio. Other rows: Eurostat, EU-SILC (ilc_lvho05a, ilc_lvho07a, ilc_lvho07c, ilc_mdes06; survey year, incomes of the year before) and house price index (prc_hpi_a, all dwellings).

15.1 Affordability by zone

The share of renters who could buy differs by zone (Table 25). In Lisbon city 12% of renters could buy a 75 m^2 dwelling at the city's median price. In the inner ring 21% could buy in their zone, and on the south bank 29%. For a renter in the city, buying at an affordable price requires moving to another zone. At the median price of the south bank 35% of the city's renters could buy, and in its cheapest municipality, Moita, 46%. The cost of commuting lowers these shares. With two transport passes the share in Moita falls to 39%, and with a car to 28%. In Porto, 17% of the city's renters could buy in the city and 55% in the cheapest municipality of the ring. Even in the cheapest suburban municipality, fewer than half of Lisbon city's renters could buy, and fewer than a third once they pay for a car commute.

Table 25: Renters who could buy a 75 m^2 dwelling at the median price, by zone, 2023.

Zone	Can buy in the zone	Price (€/m^2)
Lisbon city	12%	4,167
Inner ring	21%	2,560
South bank	29%	1,960
Porto city	17%	2,866
Porto ring	33%	1,759

City renters who move to	Price (€/m^2)	Can buy	Can buy, paying the commute		
			one pass	two passes	a car
Inner ring, median price	2,560	25%	23%	22%	16%
Inner ring, cheapest municipality	1,897	36%	33%	31%	23%
South bank, median price	1,960	35%	32%	30%	22%
South bank, cheapest municipality	1,498	46%	42%	39%	28%
Porto ring, median price	1,759	34%	31%	28%	20%
Porto ring, cheapest municipality	1,081	55%	50%	45%	30%

Affordability line of Section 15: the income at which the mortgage payment on a 75 m^2 dwelling at the median price equals 30% of income net of personal income tax; incomes of each municipality. Moving: renters of Lisbon city (Porto city), with their incomes, at the median price of the destination. Commuting cost: one public transport pass (480 euros a year), two passes (960) or one car (3,000), paid out of the same 30% of income (assumed band).

16 Policy by zone

The three-zone model ranks the policy measures by their effect on the real price of 2025 in each zone (Section 12). The contribution of a demand driver is the part of the 2011–2025 log rise of the real appraisal price per square meter that disappears in the model's counterfactual with that driver held at its 2011 level. Immigration accounts for about two fifths of the rise in the three Lisbon zones. The tourist beds of Lisbon city account for 14% of the city's rise. The ranking of the measures below is the same with the zone elasticities and with the national elasticity, which gives smaller effects.

With the zone elasticities of the real price with respect to occupancy (persons per dwelling), the immigration share ranges from 41% to 46% across the three Lisbon zones. With the national elasticity, the lower bound, it ranges from 22% to 25%. The share of the city's tourist beds is 10% with the national elasticity. In the suburbs the tourism share is 7% (3% to 4% with the national elasticity). The city's structural model (Section 8) attributes 17% of the city's rise to tourism.

The suburbs: licensing, developer credit and density near stations. In the counterfactual without the 2013 break in suburban building, in which building keeps its pre-2013 response to prices, the real price in 2025 is 13% lower in the inner ring, 13% lower on the south bank and 6% lower in the city. Removing only the part of the break attributed to the cumulative tightening of loan-to-value terms lowers the 2025 real price by 6%, 7% and 3%. With the national elasticity, the lower bound, the two counterfactuals give 7%, 7% and 3%, and 3%, 4% and 1%. Per dwelling added, the measures in the model have similar effects on prices; they differ in the number of dwellings they add. In the suburbs, completions per dwelling licensed two years earlier were about the same in 2020–2025 as in 2004–2010, but licensing per 1,000 dwellings in 2016–2025 was under 40% of its 2002–2007 level (Section 9).

The binding constraint is the number of licensed projects. The measures that address it are developer credit through a guarantee fund, faster licensing, and upzoning near rail and metro stations. The three-zone model does not measure the last two; the welfare model of Section 16.1 finds that both raise welfare at no public cost, with the zone elasticities and with the national elasticity.

Lisbon city: height limits, conversion limits and vacant dwellings. Land scarcity constrains supply in the city. Raising height limits outside the historic center, and allowing extra floors on existing buildings near transport, adds dwellings without new land (Bertaud and Brueckner, 2005). New construction in the city is already dense where the rules allow it; its new residential buildings held 25 dwellings each in 2021–2025 (Table 10). In 2012–2021 the change in the city's census stock fell short of the recorded flows by 7,646 dwellings. In the counterfactual with the city's tourist beds held at their 2011 level, its real price in 2025 is 8% lower. Limits on the conversion of dwellings and on local accommodation, and the return of vacant dwellings to use (Section 13), preserve the existing residential stock.

Additional floors on existing buildings. The city can also add dwellings by adding floors to low buildings (Table 26). The estimate covers the residential buildings of the 2021 census outside the historic centers that are lower than the 75th percentile of building height in their parish, excluding those built before 1919. If 5%, 10% or 20% of them added one floor within 10 to 15 years, Lisbon city would gain about 470, 2,940 or 9,320 dwellings. With two floors it would gain about 5,880 at the central uptake, and up to 18,650. This is 3% to 5% of its shortfall in the central cases, and up to 17%. Spread over 12.5 years, the central cases add 235 to 470 dwellings a year, against 391 new dwellings completed a year in 2021–2025, so they could about double the city's new supply. In the inner ring two floors add about 28,460 dwellings at the central uptake, 11% to 23% of its shortfall in the central cases and up to about two thirds; in Porto city about 3,640. The uptake is an assumed band, since no Portuguese estimate exists. The estimate leaves out heritage protection outside the centers, plot coverage, parking, lifts and the limits set by the municipal plans. It gives an order of magnitude only.

Table 26: Dwellings from building higher, 2021 census, in 10 to 15 years.

	Eligible	One more floor			Two more floors			Share of	Completed
Zone	buildings	low	central	high	low	central	high	shortfall	a year
Lisbon city	18,079	470	2,940	9,320	940	5,880	18,650	5%	391
Inner ring	128,161	3,090	14,230	41,040	6,180	28,460	82,070	23%	2,547
Porto city	17,507	220	1,820	5,850	440	3,640	11,690	9%	1,213

Eligible: residential buildings outside the historic centers, lower than the 75th percentile of the floors of the parish (band: the median to the 90th percentile), less those built before 1919 (band: before 1946). Uptake: 5%, 10% and 20% of the eligible buildings, an assumed band. Share of shortfall: two floors, central case, against the zone's shortfall of Section 4. Completed a year: new dwellings, 2021–2025. Dwellings rounded to tens.

Transport and the location of employment. In the counterfactuals with faster commuting, or with the city's share of jobs held at its 2010 level, the city's real price in 2025 changes by less than 1% at the central parameter values. Transport investment and employment in the suburbs raise the attractiveness of the suburbs and widen households' choice of location; these benefits, which the model does not measure, may justify them. Their effect on prices is small. Removing the credit tightening for both developers and buyers lowers

suburban real prices by 2.4% to 3.6%, less than removing it for developers alone, because credit to buyers raises demand.

The following sections examine each measure.

16.1 Which policies raise welfare

The model. A two-zone welfare model compares the housing policies of the Lisbon and Porto metropolitan areas. Each area has two zones, the city and the suburbs. Households choose their zone of residence according to the price and to access to jobs. The supply of new dwellings in each zone depends on the price through the zone's price elasticity of supply. The parameters are the zone estimates of this paper (Section 12): the elasticity of the real price with respect to occupancy (persons per dwelling), the price elasticity of supply, and the post-2013 break in suburban construction associated with the tightening of LTV terms. The lower bound replaces the zone elasticities of the price with respect to occupancy by the national elasticity, estimated by 2SLS on the municipal panel, in every zone. The model is linearized around the market equilibrium of 2025.

How welfare is measured. The benefits are the gains of renters and buyers from lower prices or a larger stock, the gains and losses of owners and landowners, the gain in access to jobs from transport policies and, for transfers, the value to low-income households under declared distributional weights. The social value of an additional dwelling is the share of its price in excess of the construction cost and the opportunity cost of land: 0.44 of the price in Lisbon city, 0.25 in its suburbs, 0.32 in Porto city and 0.11 in its suburbs. The costs are public spending and forgone revenue. The marginal cost of public funds is 1.2 euros per euro (band 1.1 to 1.3). Net welfare is benefits less costs, in present value over 10 years. Welfare per euro is the ratio of net welfare to the public cost. Each program has 10,000 dwellings, or 1,000 where stated, so that the ratios per euro are comparable.

Why policies differ. In the model, the share of a transfer to buyers or tenants that passes into prices is 88% in the Lisbon suburbs and 99% in the city. An increase in supply lowers the market price for all buyers and renters in the zone. Regulatory measures, such as upzoning near rail and metro stations and faster licensing, increase supply at almost no public cost. Transfers redistribute income between groups; their net welfare gain arises only from the distributional weights.

How the other columns are built. Every column of Tables 27 and 28 is computed by the model; the tables give no overall ranking. The dwellings of a policy are delivered at a constant rate over ten years, after the delivery lag of its instrument. The share of the shortfall closed by year 10 is the ratio of the dwellings delivered by year 10 to the shortfall by the zone rule. The time to effect is the delivery lag, in years. Its components are estimated from data. The lag from permit to completion is 2 years (band 1 to 3), the lag of licenses that best fits completions in the zone panel. The median new-construction permit took 2.98 years in Lisbon in 2025, according to the city's open data; Porto's licensing time is set at 83% of Lisbon's, the ratio in the World Bank's data. Rehabilitation works take 1.75 to 2.33 years, the 21 to 28 months of Lisbon's sales of vacant municipal buildings (Section 17). A public tender takes 0.33 to 0.99 years: the statutory bidding period of 120 days, plus up to two further periods of equal length for the award. For each instrument, the lags are additive. The simulation draws 4,000 random combinations of the band ends of all parameters, the

lags included. P(loss) is the share of draws with a net welfare loss; the fiscal exposure is the 95th percentile of the public cost across draws. The model does not assess legal or political feasibility.

Table 27: Housing policies and social welfare, Lisbon (shortfall 306,850 dwellings).

Policy	Dwellings (main; lower)	Net welfare, M€ [band]	Per euro	Shortfall closed by year 10, %	Time to effect, years	P(loss)	Fiscal exposure, M€
Upzoning near rail and metro	18,892; 19,879	847 [363 to 1,611]	no public cost	3.1 (1.2–7.9)	5.0 (2.6–6.0)	6%	none
Faster licensing	2,603; 2,742	449 [133 to 930]	no public cost	0.7 (0.1–1.5)	2.0 (1.0–3.0)	0%	none
Public rental on public land, city (large derelict sites)	9,468; 9,741	1,106 [645 to 1,567]	covers its cost	1.3 (0.7–3.2)	5.6 (3.3–7.0)	0%	537
Public rental on public land, suburbs	8,996; 9,485	304 [37 to 571]	1.19	1.3 (0.7–3.2)	5.6 (3.3–7.0)	15%	706
Land lease by tender with a land fund (surface rights)	8,996; 9,485	336 [80 to 554]	3.63	1.3 (0.7–3.2)	5.6 (3.3–7.0)	11%	393
Developer credit through a guarantee fund	25,947; 27,358	965 [−2 to 1,768]	49.82	6.8 (2.2–23.0)	2.0 (1.0–3.0)	40%	129
Limited-profit housing associations with a guarantee fund	8,996; 9,485	354 [135 to 572]	83.26	1.3 (0.7–3.2)	5.6 (3.3–7.0)	9%	21
Housing cooperatives on public land in surface rights	8,996; 9,485	306 [39 to 573]	1.26	1.3 (0.7–3.2)	5.6 (3.3–7.0)	12%	534
Social housing for low incomes (rents geared to income)	8,996; 9,485	208 [−59 to 475]	0.28	1.3 (0.7–3.2)	5.6 (3.3–7.0)	22%	1,246
Rehabilitation of vacant homes, owners with means (deadlines, forced sale or letting)	4,554; 4,685	1,025 [473 to 1,573]	no public cost	1.2 (0.2–2.8)	2.0 (1.8–2.3)	0%	none
Rehabilitation of vacant homes, poor or elderly owners and blocked inheritances (public works loan)	6,154; 6,332	1,366 [823 to 1,906]	18.03	1.6 (0.6–3.2)	2.0 (1.8–2.3)	0%	290
Tax on vacant homes (IMI surcharge)	1,600; 1,646	393 [215 to 571]	covers its cost	0.4 (0.1–0.9)	2.0 (1.8–2.3)	0%	raises revenue
Conversion of public buildings to housing (per 1,000 dwellings)	947; 974	147 [100 to 193]	covers its cost	0.2 (0.1–0.3)	2.7 (2.1–3.3)	0%	16
Student residences (per 1,000 beds)	379; 390	84 [59 to 110]	covers its cost	0.1 (0.0–0.2)	5.6 (3.3–7.0)	0%	20
Permanent affordability of subsidized homes	–	−27 [−108 to 27]	−0.20	–	–	68%	595
New suburban centers (township: dwellings + land fund + transport link)	8,996; 9,485	101 [−197 to 1,637]	0.16	1.3 (0.7–3.2)	5.6 (3.3–7.0)	39%	1,008
Transport link between suburbs (Linha Violeta, Loures-Odivelas)	–	−236 [−533 to 1,301]	−0.45	–	–	62%	685
Moving public services to the suburbs (per 1,000 jobs)	–	2 [0 to 10]	cost not known	–	–	0%	not known
Housing First	–	–	−0.20; 1.80 weighted	–	–	–	–
Rent control, second generation (limits on increases within a tenancy)	–	−198 [−475 to −79]	no public cost	–	–	100%	none

Policy	Dwellings	Net welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure
Demand subsidies (buyer support, rent supplements, IRS Jovem)	207; 218	−234 [−356 to −112]	−0.19	–	–	100%	1,698
Student rent supplement	–	−4 [−8 to −2]	−0.20	–	–	100%	46
Rent control, first generation (ceiling on all rents)	–	−4,243 [−8,487 to −2,122]	no public cost	–	–	100%	none
Faster commuting, network-wide (zone model scenario)	296; 188	13,437 [3,366 to 65,409]	cost not known	–	–	0%	not known
City jobs held at the 2010 share (zone model scenario)	87; 49	61 [15 to 435]	cost not known	–	–	0%	not known

Table 28: Housing policies and social welfare, Porto (shortfall 51,918 dwellings).

Policy	Dwellings (main; lower)	Net welfare, M€ [band]	Per euro	Shortfall closed by year 10, %	Time to effect, years	P(loss)	Fiscal exposure, M€
Upzoning near rail and metro	15,776; 17,511	328 [−40 to 649]	no public cost	16.8 (6.2–41.6)	4.5 (2.3–5.5)	20%	none
Faster licensing	1,991; 2,196	269 [80 to 555]	no public cost	3.1 (0.4–6.4)	2.0 (1.0–3.0)	0%	none
Public rental on public land, city (large derelict sites)	7,984; 8,596	412 [137 to 687]	2.13	7.5 (3.6–17.5)	5.1 (3.0–6.5)	9%	693
Public rental on public land, suburbs	8,189; 9,189	−3 [−241 to 179]	−0.01	7.7 (4.0–18.3)	5.1 (3.0–6.5)	46%	786
Land lease by tender with a land fund (surface rights)	8,189; 9,189	21 [−217 to 204]	0.08	7.7 (4.0–18.3)	5.1 (3.0–6.5)	42%	548
Developer credit through a guarantee fund	13,762; 15,443	100 [−222 to 348]	7.73	21.2 (4.9–70.1)	2.0 (1.0–3.0)	58%	83
Limited-profit housing associations with a guarantee fund	8,189; 9,189	71 [−120 to 218]	18.76	7.7 (4.0–18.3)	5.1 (3.0–6.5)	32%	19
Housing cooperatives on public land in surface rights	8,189; 9,189	35 [−156 to 216]	0.19	7.7 (4.0–18.3)	5.1 (3.0–6.5)	36%	398
Social housing for low incomes (rents geared to income)	8,189; 9,189	−74 [−311 to 109]	−0.10	7.7 (4.0–18.3)	5.1 (3.0–6.5)	58%	1,163
Rehabilitation of vacant homes, owners with means (deadlines, forced sale or letting)	1,575; 1,695	244 [112 to 375]	no public cost	2.4 (0.5–5.8)	2.0 (1.8–2.3)	0%	none
Rehabilitation of vacant homes, poor or elderly owners and blocked inheritances (public works loan)	2,128; 2,291	323 [194 to 451]	10.39	3.3 (1.1–6.6)	2.0 (1.8–2.3)	0%	119
Tax on vacant homes (IMI surcharge)	553; 596	95 [53 to 137]	covers its cost	0.8 (0.2–1.8)	2.0 (1.8–2.3)	0%	raises revenue
Conversion of public buildings to housing (per 1,000 dwellings)	798; 860	78 [50 to 105]	covers its cost	1.1 (0.6–1.8)	2.7 (2.1–3.3)	0%	30
Student residences (per 1,000 beds)	319; 344	48 [23 to 65]	covers its cost	0.3 (0.1–0.8)	5.1 (3.0–6.5)	0%	20
Permanent affordability of subsidized homes	–	−20 [−81 to 20]	−0.20	–	–	66%	444
Moving public services to the suburbs (per 1,000 jobs)	–	8 [2 to 37]	cost not known	–	–	0%	not known
Housing First	–	–	−0.20; 1.80 weighted	–	–	–	–

Policy	Dwellings	Net welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure
Rent control, second generation (limits on increases within a tenancy)	–	−68 [−162 to −27]	no public cost	–	–	100%	none
Demand subsidies (buyer support, rent supplements, IRS Jovem)	621; 682	−193 [−302 to −85]	−0.18	–	–	100%	1,530
Student rent supplement	18; 19	−3 [−6 to −1]	−0.15	–	–	99%	46
Rent control, first generation (ceiling on all rents)	–	−1,449 [−2,898 to −724]	no public cost	–	–	100%	none
Faster commuting, network-wide (zone model scenario)	33; 60	875 [219 to 4,259]	cost not known	–	–	0%	not known
City jobs held at the 2010 share (zone model scenario)	–	104 [26 to 504]	cost not known	–	–	0%	not known

Dwellings added or returned to use in ten years, main run and lower bound. Net welfare: millions of euros of present value, main run; in brackets, the range when each parameter is set, one at a time, at either end of its band. Per euro: net welfare per euro of public cost. Shortfall closed by year 10: dwellings delivered by year 10 as a percentage of the shortfall by the zone rule, main run, with the 5th and 95th percentiles of 4,000 random combinations of the assumptions. Time to effect: the delivery lag, with the same percentiles. P(loss): the share of combinations with a net welfare loss. Fiscal exposure: the 95th percentile of the public cost. Programs of 10,000 dwellings; conversion and student residences per 1,000 dwellings or beds, public services per 1,000 jobs. –: the policy adds no dwellings or the item does not apply.

Main results. No single policy closes the shortfall. By year 10, developer credit through a guarantee fund closes 6.8% of the Lisbon shortfall and upzoning near rail and metro 3.1%; in the Porto metropolitan area, the shares are 21.2% and 16.8%. Four policies add dwellings with no fiscal exposure in both metropolitan areas: upzoning near rail and metro; faster licensing; rehabilitation of vacant homes, owners with means; and tax on vacant homes. Three policies reduce welfare in every draw in both areas: rent control, second generation; demand subsidies; and rent control, first generation. The student rent supplement reduces welfare in 100% of the draws in Lisbon and 99% in Porto. In Lisbon, the groups of policies with the highest and the lowest welfare per euro are the same in the main run and with the national elasticity. Closing the shortfall requires a combination of these policies.

17 Policies for housing affordability

Housing policy can reduce housing costs through three instruments: the public supply of dwellings at below-market rents, subsidies to households that rent or buy, and measures that raise the price elasticity of private supply. When supply is inelastic, the first and the third increase the stock and the second passes mostly into prices.

Social housing. Social housing consists of dwellings that the State, municipalities or non-profit bodies own and let at low rents. Portugal's social rental housing stock, about 2% of dwellings, is among the smaller in the European Union (OECD, 2025). INE's survey of social housing counted 118,334 dwellings in 2012 and 119,691 in 2015, about 2% of the housing stock and 11.5 per 1,000 inhabitants (Table 29). The stock was almost unchanged between 2012 and 2015, and so met little of the increase in demand. Relative to the population at risk of poverty, Portugal had 59 social dwellings per 1,000 persons at risk; Austria had 802,

Denmark 889 and France 599. Public spending on social rental housing was 0.02% of GDP in Portugal, against 0.21% in Austria and 0.20% in France (OECD, 2024). For Portugal, the database's latest value, 63,217 dwellings in 2021, is the census count of rented dwellings with any public rental aid, 1.1% of dwellings on this census-based measure, which also counts private dwellings with rent aid. This measure differs from the survey, so the fall it shows from 2011 reflects a change of source.

Table 29: Social rental housing in Portugal and in selected European countries.

	Year	Dwellings	% of stock	Per 1,000 inhabitants	Per 1,000 at risk of poverty
Netherlands	2021	2,714,000	34.1	155.3	1093
Denmark	2022	640,000	21.3	109.0	889
Austria	2019	930,866	23.6	105.1	802
France	2018	5,089,000	14.0	75.9	599
Finland	2021	348,642	10.9	63.0	593
Ireland	2016	254,380	12.7	53.8	318
Germany	2021	1,101,506	2.6	13.2	84
Italy	2022	850,000	2.4	14.4	72
Spain	2019	290,000	1.1	6.2	30
Portugal (survey)	2012	118,334	2.0	11.2	63
Portugal (survey)	2015	119,691	–	11.5	59

Source: OECD Affordable Housing Database, PH4.2 (latest year available); for Portugal, INE's social housing survey (the 2012 value is the OECD's Portuguese observation for 2011). Population: Eurostat demo_pjan; at risk of poverty: persons below 60% of median equivalized income, Eurostat ilc_li02, same year.

In 2018 the government set the target of raising housing with public support from 2% to 5% of the stock, about 170,000 dwellings in eight years (Presidência do Conselho de Ministros, 2018, Resolution 50-A/2018). The Recovery and Resilience Plan finances 26,000 dwellings under the 1.º Direito program. Whether public construction adds to the stock depends on how much private construction it displaces. In the United States, three subsidized units displaced two private ones on average, with less crowd-out in more populous markets (Sinai and Waldfogel, 2005); for tax-credit rental housing, nearly all of the subsidized construction was offset by fewer new unsubsidized rental units (Eriksen and Rosenthal, 2010); in France, one subsidized unit may have prevented about one private unit (Chapelle, 2015). These estimates come from markets where private builders respond to demand. Where private building has run far below its earlier rate at the same price and cost, as in Portugal since 2013 (Section A.4), public building on public land adds dwellings that would not otherwise exist. We expect crowd-out to be smaller there, although no estimate exists for Portugal. Location matters too: subsidized housing raised nearby house prices in low-income neighborhoods and lowered them in high-income ones (Diamond and McQuade, 2019).

Rent subsidies. Rent subsidies are paid to households that rent on the private market. Portugal spends little on them: 0.09% of GDP on housing allowances, against 0.69% in France, 0.54% in the Netherlands, 0.41% in Germany and 1.38% in the United Kingdom, and 2.7% of households in the bottom income quintile receive one, against 27% in the EU (OECD, 2024). The extraordinary rent support of 2023 reached more than 134,100 tenants a month in 2025, and Porta 65 Jovem 45,686 young people. When supply is inelastic, a large part of a rent subsidy passes into rents: in France, "one additional euro of housing benefit leads to an increase of 78 cents in the rent paid by new benefit claimants" (Fack, 2006).

Subsidies help the households that receive them and raise the rents of those that do not. They should therefore be combined with measures that increase supply.

Support for young households. Since 2024 the State guarantees up to 15% of the value of a home bought by a buyer aged up to 35, and such buyers are exempt from the property transfer tax and stamp duty. In 2025 about 25,500 loans used the guarantee, 49.1% of the home loans to buyers under 35. Since 2025 young workers also pay substantially less personal income tax in their first ten years of work (IRS Jovem), at a cost estimated between 525 and 775 million euros a year. With the income coefficient of the price equation (Section A.4), the income tax relief alone raises the average house price by 0.4–0.6% nationally and 0.3–0.5% in Lisbon. Young households are the marginal buyers, so the effect on the price of the dwellings they buy can be larger. The income coefficient also captures the credit that varies with income, and it is imprecisely estimated, so these figures are indicative. In Greater London, the British equity-loan scheme for buyers of new homes "significantly increased house prices and had no detectable effect on construction volumes", while near the English-Welsh border, where supply responds, it raised construction (Carozzi et al., 2024). Where supply is inelastic, as in Greater London, demand support for buyers is largely a transfer to sellers.

Supply: land, licensing and the urban plan. The central districts have little land left to build on, and height limits protect the historic city. A height restriction makes a city expand outward, at a welfare cost estimated at about 2% of household income (Bertaud and Brueckner, 2005). Most new dwellings have to be built in the suburbs, and the literature finds that licensing procedures and land-use regulation reduce the rate of construction. The paper has no measure of licensing times in the suburbs; the case for reform there rests on the literature and on Lisbon's records. In February 2022 about 3,100 building processes were pending in Lisbon, and revisions of municipal master plans take more than 5 years on average. Delays matter more than fees: metropolitan areas with more extensive regulation have "up to 45 percent fewer starts" and lower supply elasticities (Mayer and Somerville, 2000a), and regulatory constraints raise the response of house prices to earnings (Hilber and Vermeulen, 2016).

Three reforms follow. First, re-plan the peri-urban areas at the scale of the metropolitan area. The plan should set land for housing at higher density where public transport has spare capacity, the access roads and lines that open new land, the natural reserves (REN and RAN) to keep, and building codes that add no cost without benefit. The 2024 decree that lets municipalities reclassify rural land for housing, amended in 2025 to require contiguity with urban land, is a step in that direction. Second, enforce deadlines. Deemed approval has existed since 2024, and Decreto-Lei 108/2026, of 29 May 2026, shortened the decision deadlines to 20 days for building works, 45 for subdivisions and 30 for urbanization works, under penalty of deemed approval (Presidência do Conselho de Ministros, 2026a, art. 23). In practice, developers do not always use deemed approval, and missed deadlines still have no real consequence for the administration (Caetano, 2026). The remaining task is to make the rule effective, with deadlines whose breach has consequences for the administration, deemed-approval titles that are accepted as valid and published decision times. Third, give the applicant recourse to an independent body. In England a council has 8 weeks to decide (13 for major development), after which the applicant may appeal for non-determination to the Planning Inspectorate, which takes over the decision.

Tourism and short-term rentals. Short-term rentals withdraw dwellings from the residential stock, and hotels compete with housing for central buildings (Section 8); most tourist accommodation is in the centers. In 2025 the seven parishes of Lisbon's historic center had 35,693 short-term rental beds, 79% of the city's, or 28 per 100 residents against 2.3 in the rest of the city; the 8,548 registered apartments and houses equal 13% of the center's dwellings in use. Porto's historic center had 16,843 beds, 71% of the city's, or 45 per 100 residents against 3.6. Hotel beds are published by municipality only (59,875 in Lisbon and 24,739 in Porto). Short-term rental rules have changed often: the national suspension of new registrations of 2023 was revoked in 2024, and municipalities set the rules; Lisbon bars new registrations in its areas of absolute containment, except for the rehabilitation of ruined or vacant buildings. Lisbon raised its tourist tax to 4 euros a night in 2024, and it raised 83 million euros in 2025, about half of all municipal tourist taxes. The revenue is not earmarked and funds culture, cleaning and green spaces. Part of it should go to housing in the parishes where tourist pressure is highest, and to the transport and services that make the suburbs a viable alternative.

Older residents of the center. The centers of Lisbon and Porto are poorer than the rest of each city, and Porto's is also older (Table 30). In the seven parishes of Lisbon's historic center, 33% of fiscal households had an income below 60% of the national median in 2023, against 21% in the rest of the city; in Porto's historic center, 33% against 26%. Residents aged 65 or over are 22% of the population in Lisbon's center and 24% in the rest of the city, and 27% and 26% in Porto; the center holds 21% of Lisbon's residents aged 65 or over and 17% of Porto's. About one household in six is a person aged 65 or over living alone, in the centers as in the rest of each city. Most central households rent: 54% in Lisbon and 53% in Porto. Many older tenants hold contracts signed before 1990 (151,620 nationally in the 2021 census), with low rents in buildings that often need repair. The census does not cross-tabulate age and income, so the number of households that are both old and poor cannot be measured.

Table 30: Older and poorer residents in the centers of Lisbon and Porto (%).

	Population 2021	Aged 65+	One person aged 65+	Tenant households	Poor households 2021	2023
Lisbon, historic center	126,769	21.6	15.9	53.8	31.0	32.6
Lisbon, rest of the city	419,027	24.0	16.1	38.6	18.9	20.5
Porto, historic center	37,430	27.3	16.6	52.9	30.5	32.6
Porto, rest of the city	194,370	25.7	15.2	42.3	24.4	26.2

Lisbon's historic center: Santa Maria Maior, Misericórdia, São Vicente, Santo António, Estrela, Arroios and Penha de França; Porto's: the union parish of Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau e Vitória. Population, age, one-person households and tenure: 2021 census (INE 0011609, 0011555, 0011524). Poor households: fiscal households with income net of personal income tax below 60% of the national median of the same measure (INE 0012741, 0012746; log-normal by parish, weighted by households); the income is not adjusted for household size, so this is a guide and differs from the official at-risk-of-poverty rate.

We propose to offer older tenants and owners, on a voluntary basis, a modern dwelling in the suburbs with public support, close to transport and services, and compensation for the move. The offer would improve their housing and free central dwellings for rehabilitation. The offer must be voluntary and the tenant's right to stay protected.

The relocation yields a social gain. In Lisbon's center the market rent is 18.4 euros per m^2 a month, against about 9.6 for a dwelling of equal size in the suburbs (15.0 and 9.4 in

Porto). For a 60 m^2 dwelling, the rental value of the freed central dwelling exceeds that of the suburban one by 6,300 euros a year. Over the remaining tenancy, net of the move, the social gain is 29 to 98 thousand euros in Lisbon and 17 to 62 thousand in Porto, for dwellings of 50 to 75 m^2. The social gain is the same for a tenant and for an owner, since it depends only on the use of the freed dwelling. The old rent is a transfer between tenant and landlord and does not enter the social account. No estimate exists of the tenant's loss of neighbors, habits and services. A voluntary offer reveals it, since the tenant moves only if the compensation covers it. The move is worth making whenever that loss is below the social gain. The landlord gains most, because the dwelling passes from the old rent to the market rent: 96 thousand euros in Lisbon in the central case, against a cost of 40 thousand euros for housing the tenant in the suburbs at the old rent and paying the move. The landlord's gain exceeds the full cost of the offer. An older owner who sells a 60 m^2 dwelling in Lisbon's center, at about 5,230 euros per m^2, and buys one of equal size in the suburbs, at about 2,733, is left with about 150 thousand euros before taxes and transaction costs (86 thousand in Porto, at 3,801 and 2,370 euros per m^2). The owner could also let the central dwelling at the market rent. For an owner, the sale or letting of the central dwelling finances the move, and the public role is to organize the move and secure the suburban dwelling. The municipality's role is to supply the suburban dwellings, set the standard of the offer and protect the tenant.

Rehabilitation. The whole of Lisbon has been an urban rehabilitation area since 2012, extended to 2027: works there pay 6% VAT and rehabilitated buildings are exempt from the municipal property tax for some years and from the transfer tax on purchase. Vacant buildings pay 6 times the property tax rate across the municipality. Under *Reabilita Primeiro, Paga Depois*, the council sells vacant municipal buildings at auction to buyers who must rehabilitate them and pay at the end of the works, 21 to 28 months later. The council's housing company had rehabilitated about 7,200 of the 14,000 municipal dwellings planned to 2028, and in 2026 it received 8 million euros for 315 vacant municipal dwellings. Returning vacant dwellings to use increases the effective supply immediately and in the center, without new land (Section 13). The property tax surcharge is effective only where the owner can obtain a works license in time, so its effect depends on licensing.

Benefits and costs of the policies. Table 31 compares the policies per euro of cost. The social ratio divides the value of the housing services a policy adds, in extra dwellings or a better use of existing ones, at market rents and net of resource costs, by its public or resource cost; a pure transfer adds nothing and its social ratio is zero. The private ratio divides the gain to the households a policy aims to help by its public cost. Values read from the data are fixed. The parameters that no source gives (construction cost, land, crowd-out, elasticities, pass-through, remaining tenancy, discount rate) take declared bands, and the range sets all of them at the values that lower the ratios and then at those that raise them. The statistical annex (sheet D8) holds every parameter and computes each ratio with the same formula.

Table 31: Social and private benefit-cost ratios of housing policies (per euro of cost).

	Social ratio		Private ratio	
	Central	Range	Central	Range
Voluntary relocation of older central tenants, Lisbon	1.82	1.72–1.87	2.38	2.18–2.51
Voluntary relocation of older central tenants, Porto	1.52	1.44–1.57	1.90	1.73–2.00
Public building on public land, affordable rent, Lisbon	1.09	0.35–3.35	3.80	0.63–covers its cost
Rent subsidies	0.00	0.00–0.00	0.22	0.15–0.50
10% tax on moderate rents	0.20	0.03–0.53	0.05	0.00–0.10
Income tax relief for the young (IRS Jovem)	0.00	0.00–0.00	0.83	0.83–0.83

Social ratio: value of the housing services added, at market rents and net of resource costs, over the public or resource cost; a pure transfer is 0. Private ratio: gain to the households the policy aims to help over its public cost; for the relocation, the landlord's gain over the cost of housing the tenant in the suburbs at the old rent and of the move, before the tenant's non-monetary loss. The move of an older owner has the same social gain and is paid by the sale or letting of the central dwelling, with no public cost beyond organizing it. Public building: per m^2, rents over the life of the building; "covers its cost" when the affordable rents collected exceed the cost. IRS Jovem: the share of the relief young buyers keep after one year of higher prices. Ranges: all construed parameters at the values that lower or raise the ratios. Parameters and formulas: statistical annex, sheet D8.

The voluntary relocation of older central tenants adds housing services worth 1.7 to 1.9 times its cost in Lisbon, across the construed bands and before the tenant's loss of neighbors and habits, which the voluntary offer must cover. Public building on public land yields benefits about equal to its cost in the central case, with a wide range that depends on the construction cost, the land and the crowd-out. At Lisbon rents, the affordable rents collected repay most of the construction, so its net public cost is small. Rent subsidies and the income tax relief for the young are transfers: when supply is inelastic they add no dwellings, and most of a rent subsidy passes into rents. The 10% tax rate on moderate rents generates few new lettings per euro of revenue forgone, because most of the relief accrues to existing lettings. Licensing reform has almost no fiscal cost; each year of delay it saves is worth about 8,200 euros per suburban dwelling.

Public buildings and land for vulnerable groups. Unoccupied public buildings, like public land, should be released for housing. They can house first the groups the market serves worst, students, the elderly, the sick and people with disabilities, or return to the market as homes, sold or let on condition that they become dwellings. Bringing Lisbon's vacant dwellings back into use would cover only 8% to 20% of its shortfall (Section 13), so these buildings complement new construction and cannot substitute for it; they can, however, house the most vulnerable sooner, because the buildings exist. The paper holds no inventory of unoccupied public buildings, and the State should publish one.

17.1 Institutional reform for planning

The results of this paper point to an institutional gap. Land use is decided by each municipality, transport by separate operators and agencies, and housing by the State and the municipalities, and no one plans them together for the metropolitan area. The Área Metropolitana de Lisboa, whose council is formed by the mayors of its municipalities, has no such powers: the law gives it the task to participate in plans and investments and to ensure the articulation

between the municipalities and the central government in land-use planning and in transport (Assembleia da República, 2013, art. 67). London has a different institutional arrangement. The Mayor of London prepares the spatial development strategy, with the general policies for the use of land in the whole city, and directs Transport for London (UK Parliament, 1999, ss. 154 and 334); the London Plan is that strategy (Greater London Authority, 2021). Copenhagen's Finger Plan has guided its region for more than 70 years (Sørensen and Torfing, 2019). We propose a metropolitan planning authority for Lisbon, and one for Porto, with powers over land use, transport and housing across the metropolitan area. Licensing reform is part of the same institutional reform. Deemed approval already exists, with the shorter deadlines of Decreto-Lei 108/2026 (Presidência do Conselho de Ministros, 2026a), and the task is to make it effective, with binding deadlines that have consequences and an appeal to an independent body when a deadline is missed. Long licensing delays are a structural feature in Portugal, and since 2015 the median permit in Lisbon has taken more than a year.

17.2 Spatial planning for the suburbs

The suburbs have land. Jobs concentrated in Lisbon, whose share of the metropolitan area's jobs rose from 37.1% in 2010 to 40.1% in 2024, and congestion on the routes into the city limit the share of the city's demand that moves to the suburbs (Section 11). Other capitals have planned their suburbs as centers of jobs and homes, and some have moved public jobs out of the center (Table 32). The objective is to turn dormitory suburbs, from which residents commute daily to Lisbon, into complete urban centers with jobs, services, culture and green space. The center keeps its role in leisure, culture and tourism, as a destination of choice. The relocation of public services and orbital links between the suburbs serve this objective.

Table 32: Experiences abroad: spatial planning, public jobs, large sites and housing policy after a crisis.

Where	What was done	What the evidence shows
London	The London Plan makes town centers hubs with housing, commerce, civic, cultural and community uses, and the places for housing-led intensification (Greater London Authority, 2021, Policy SD6).	A planning policy; the paper found no evaluation.
Paris	New towns around Paris from the 1960s, with policies to slow the moves to the capital (Wilson, 1986); now the Grand Paris Express, a metro that links the suburbs without passing through Paris (Société des grands projets, 2026).	The metro is under construction; the paper found no evaluation.
Large disused sites	Port, industrial and power-station land redeveloped for homes and jobs: HafenCity in Hamburg and the harbor districts of Copenhagen, through public development companies (Bruns-Berentelg et al., 2022); Battersea Power Station in London (Vijay, 2018); in Lisbon, the Expo 98 site on the eastern riverfront (Ochoa, 2022).	HafenCity is planned for about 15,000 residents and 45,000 jobs (Landis, 2022); Copenhagen used the revenues to fund its metro (Bruns-Berentelg et al., 2022).
Copenhagen	The Finger Plan, a regional plan for Greater Copenhagen since 1947.	It has guided the region's growth for more than 70 years and survived revisions in 2017 and 2019 (Olesen, 2021; Sørensen and Torfing, 2019).

(continued)

Where	What was done	What the evidence shows
Stockholm	Vällingby, a post-war new town of neighborhoods around a main center with cultural, social and commercial activities.	A model widely studied in Europe (Hall, 2005).
United Kingdom	Civil service jobs moved out of London: the Lyons review (Lyons, 2004) and the Places for Growth program (Cabinet Office, 2026).	In England, each public job added about 0.5 private jobs in nontradables and removed about 0.4 in tradables, with no net effect in the short run (Faggio and Overman, 2014).
Germany	The government moved to Bonn in 1949 and back to Berlin in 1999.	In Bonn, each public job created just over one private job outside industry and removed about 0.2 in industry (Becker et al., 2021); in Berlin, a local multiplier of about 1.3, mainly in services and within 300 m of the new offices (Faggio et al., 2025).
Housing policy after a crisis		
Vienna	Municipal housing after the First World War; today, subsidies financed by a 1% housing tax shared by employers and employees (Litschauer, 2025).	About 45% of residents live in municipal or limited-profit housing (Litschauer, 2025); access remains broad, although reforms since about 1990 fragmented it (Friesenecker and Kazepov, 2021).
United Kingdom after 1945	A target of 300,000 homes a year, accepted in 1951 (House of Commons, 1951), met largely by local authorities.	Completions reached 326,820 in 1953 and 354,130 in 1954 (MHCLG, n.d.). Right to Buy later sold 2,038,589 social dwellings in 1980–2025 (MHCLG, 2026).
Netherlands	Non-profit housing associations.	Social housing peaked at 41% of the stock in the early 1990s (Boelhouwer, 2002) and was 28.6% in 2024, 2,246,108 dwellings (Turnbull, 2025).
Singapore, from 1960	The Housing and Development Board; flats sold on 99-year leases.	1,277,918 dwellings built by March 2025; 76.0% of residents lived in its flats in 2024 (Housing & Development Board, 2025).
Auckland, 2016	Upzoning of about three quarters of the inner suburban land.	About 21,808 additional dwellings permitted in five years, about 4.11% of the stock (Greenaway-McGrevy and Phillips, 2023).
Finland, from 2008	Housing First: permanent housing without conditions, with support (PAAVO I and II) (Pleace et al., 2015).	Long-term homelessness fell from 2,628 in 2012 to 1,010 in 2024 and rose again in 2025 (Pleace, 2017; Varke, 2025, 2026).
Counter-example: buyer subsidies	Help to Buy in Ireland and in England.	Almost half of the Irish spending was deadweight (Mazars, 2022); in Greater London, Help to Buy raised prices with no detectable effect on construction (Carozzi et al., 2024).

The experiences point to five proposals for Lisbon and Porto. First, plan the suburbs as mixed centers, with housing, business, culture and green space, at the scale of the metropolitan area, as London does with its town centers and Stockholm did in Vällingby. Second, move public administration services to those centers, as the United Kingdom does with its civil service. The evidence from England and Germany is that private service jobs follow public jobs close to where they arrive, so the services should go to the planned centers, near transport. Households can then live near those jobs, and fewer trips cross the bridges, where traffic reached its highest level in 2025. Third, keep the growth along the rail lines with spare capacity, as the Finger Plan has done in Copenhagen. Fourth, link the suburban centers to each other. Most rail and road links run radially into Lisbon, so a trip between two suburbs often passes through the center or over the same bridges, and prices in the southern suburbs fell relative to Lisbon's until 2018 (Section B.1). Orbital links between suburban centers connect suburban jobs and residences without passing through the center. Paris is

building such a network: the Grand Paris Express will link the main places of living and work in its suburbs without passing through Paris (Société des grands projets, 2026). Fifth, release large public and disused sites, such as former industrial, port and rail land, barracks and hospitals, for mixed developments with housing, including affordable housing, under a master plan, as Hamburg, Copenhagen and London did and as Lisbon did with the Expo 98 site. The eastern areas of Lisbon that the paper proposes for housing are of this kind. The relocation of public services is an instrument the State controls; its effect on private jobs varies across the studies, and there is no evaluation for Portugal.

17.3 A long-term program

Housing policy takes effect over many years. Land has to be planned, licensed and built on, and the results come after several electoral cycles, so housing needs a stable program that outlasts them. It also competes with the large public investment programs, such as a new Lisbon airport (Annex D), for national savings, construction inputs and construction workers, all of them scarce. Employment in construction fell from 501 thousand in 2008 to 286 thousand in 2013 and was 412 thousand in 2025, still below its 2008 level, which is consistent with a shortage of workers but does not establish it (Section 10). In the United States, immigration enforcement that cut construction employment lowered residential building (Howard et al., 2024). Housing therefore needs priority and sequencing within total public investment, and measures that expand construction capacity, such as training, the immigration of construction workers and industrialized building. Countries that faced housing crises acted through long programs. Vienna, the United Kingdom after 1945 and the Netherlands built social housing over decades, Singapore built public housing on a national scale, Auckland raised construction through upzoning, and Finland housed the most vulnerable first; subsidies to buyers, as in Ireland and England, raised prices (Table 32). The measures proposed here follow the same lines: a long-term program, institutional reform, complete suburbs, faster licensing and priority to the vulnerable.

Housing competes with the large public investment programs for the same firms and workers. In 2025 Portugal invested 35.9 billion euros in construction, 11.6% of GDP, with 412 thousand workers. Rail, the new Lisbon airport and its access would add 14% to that demand at their joint peak in 2033. A program that closes the shortfall of the two cities, Lisbon and Porto, by the paper's rule, in 15 years requires about 10,100 dwellings a year, about 1.4 billion euros, which raises construction demand by 3.8%; for Lisbon alone, on dwellings in use, about 0.7 billion euros. With the catch-up of public investment, the additional demand peaks at about 19% in 2036 and requires about 65 thousand additional workers. The shortfall of the two metropolitan areas, by the zone rule of Section 4, is larger: 306,850 dwellings around Lisbon and 51,918 around Porto. The paper does not size a program for it.

Labor is the scarce input. In 2026, 25% of construction firms named the shortage of labor as the factor limiting their activity, against 6% for materials, and labor costs in new housing rose 64% in 2015–2025, against 35% for materials. The sector has not recovered the capacity it lost in the crisis. From 2008 to 2014 real construction investment fell 46% and employment 45%, and in 2025 both were still below their 2008 levels. Firms with 250 or more people lost 62% of their turnover, at current prices, from 2009 to 2017. Large groups such as Soares da Costa, Opway and Edifer went into revitalization or insolvency proceedings or were taken over by a rescue fund, and others, such as Teixeira Duarte, shrank at home and turned to Africa and Latin America (Público, 9 August 2016, Soares da Costa; Público, 25 February 2015, Opway; Jornal de Negócios, March 2012, Edifer; Público, 16 April 2015, Teixeira Duarte). The new public works will also draw workers and site managers from

the firms that build dwellings, most of them small and medium-sized, and raise their costs. In building, 79% of the jobs are in firms with fewer than 50 people, and civil engineering pays 45% more per employee. The pressure is highest in the Lisbon metropolitan area, which receives about 67% of the large-project spending in 2033 and has 23% of the country's construction workers; there the labor requirement of the large projects reaches about 45% of the construction workforce, against 15% nationally. Each additional worker also needs housing. At Lisbon's 2011 ratio of 2.10 people per dwelling in use, 65 thousand workers need about 31,000 dwellings.

In Ireland, a ramp-up of public investment met the same labor limits, raising costs and displacing private building (Conroy et al., 2021; Conroy and Timoney, 2024; Barrett and Curtis, 2024), and a rapid scaling up of public investment wastes resources (International Monetary Fund, 2015). Four recommendations follow. The housing program should start in 2027–2028, before the large projects peak, and keep a steady pace. The large works should be staggered, in Lisbon above all. Within public investment, projects with low social returns should give way to housing. Capacity has to grow, through the training of site managers and trades, the immigration of construction workers with housing for them, and industrialized building, which a long and stable program makes viable. Foreign workers were already 32% of construction employees in 2025 (Banco de Portugal, 2026).

18 Rent policies

Theory. A rent ceiling below the market rent transfers income from landlords to sitting tenants, lowers the return on letting, and leads owners to sell, convert or neglect their dwellings. The rental stock shrinks, and rents for new tenants rise. Arnott (1995) distinguishes the first-generation freezes from the second generation of controls, which regulate increases within a tenancy and leave initial rents free. In San Francisco, landlords subject to rent control "reduced rental housing supply by 15%" (Diamond et al., 2019); in Cambridge, Massachusetts, the end of rent control raised the value of nearby housing (Autor et al., 2014).

The law in Portugal. The urban rental regime of 2006 (NRAU) and its reform of 2012 opened the old contracts to renegotiation within limits. In 2019 the government exempted from income tax the rents set at least 20% below the market under its affordable rental program. The 2023 package (Mais Habitação) cut the tax rate on housing rents from 28% to 25%, with lower rates for longer contracts. It capped the initial rent of new contracts on dwellings let in the previous five years at the last rent times 1.02, and it kept the contracts signed before 1990 frozen, with compensation to landlords. Annual updates for 2023 had been capped at 2%. The 2026 budget taxes rents up to 2,300 euros a month at 10%, and exempts rents below 80% of the municipal median. A bill revising the rental regime, now in committee, would end the cap on initial rents, allow the pre-1990 rents to rise except for tenants aged 65 or over with incomes below 64,400 euros, and ease evictions. Tenants' and landlords' associations alike rejected calling a rent of 2,300 euros moderate. The government replied that the ceiling lets the benefit reach Lisbon and Porto.

Effects of the lower tax rate. A rent below 2,300 euros covers 81% of listings nationally and 73% in Lisbon, so the lower rate applies to most existing lettings. Contracts of ten years or more already paid less. For a landlord on a contract of under five years, it raises the rent after tax by 20%. In Lisbon, at the median rent of new contracts and the median sales value, the gross yield is 4.38% on all dwellings and 3.62% on new ones (Table 33). After running

costs and the tax, the cut raises the net yield by 0.5 points on all dwellings and 0.4 on new ones, to 3.2% and 2.6%. The ten-year government bond paid 3.08%, and new mortgages cost 3.06%. A new dwelling bought with a mortgage still yields less in rent than the loan costs. For a 90 m^2 new dwelling, the tax saving is about 2,306 euros a year, 8% of the capital gain at the 2019–2025 trend in Lisbon prices. The return on buying to let comes mainly from capital gains, and the tax cut changes it little. Most of the tax expenditure benefits landlords who would let in any case. A tax relief designed to increase rental supply would apply only to rents below the municipal median and to dwellings added to the stock.

Table 33: Buying to let in Lisbon: yields before and after the lower tax on moderate rents (%).

	Price (€/m^2)	Gross yield	After costs	After tax at 25%	After tax at 10%	Price growth 2019–2025
All dwellings	4,875	4.38	3.50	2.63	3.15	6.8
New dwellings	5,890	3.62	2.90	2.17	2.61	5.6

Municipality of Lisbon. Price: INE median sales value, 2025; rent: INE median rent of new lease contracts, 17.79 €/m^2 a month, second quarter of 2026. Running costs and vacancy: 20% of rent (band 15–25%: the gain from the tax cut is 0.4–0.6 points). Price growth: average annual change of the INE median sales value.

19 What the results mean for housing policy

Since 2013 the real price of housing in Lisbon has risen because demand grew, with more residents, more tourist beds and higher incomes, while the housing stock did not grow. New supply did not respond to the rise in prices. Three changes and one permanent constraint are consistent with this, and the data do not separate their effects. Banks tightened loan-to-value terms in 2008–2012, before the 2013 break in building, and did not reverse the tightening afterwards. The cumulative tightening accounts for about half of the estimated post-2013 break in suburban supply in the inner ring and almost three quarters on the south bank. Employment in construction has not returned to its 2008 level, which is consistent with a shortage of workers but does not establish it. Licensing times are long throughout Portugal, and in Lisbon they more than doubled during the price rise, although nationally completions kept pace with licenses. Land scarcity constrains supply in the city, but it does not explain the fall in construction. If it did, construction would have fallen more in the municipalities with less land available, and it fell less. The suburbs, where most new dwellings would have to be built, lost value relative to Lisbon until the late 2010s, while employment concentrated in the center. The city can build higher only where height limits allow, so most new supply has to come from the suburbs, where completions relative to the stock fell after 2013 at given real prices and costs (Section 9). Students and immigrants bear the largest part of the cost of the shortage. The next section sets out the policy conclusions.

The contribution of each factor. Between 2011 and 2025 the real house price in Lisbon rose 91%. In the structural model of Section 8, the growth of income accounts for 24% of this rise. The fall in the real mortgage rate accounts for 21%. Both shares are imprecisely estimated. On the demand side, the growth of the resident population, which came from immigration, accounts for 26%. Tourism accounts for 17%. The housing stock of Lisbon fell 0.6% in fourteen years. In the three-zone model, in which residents move between zones and construction responds to prices, immigration accounts for 41% of the city's rise (Section 12). The city's tourist beds account for 14%.

Tourism: benefits and costs. Tourism creates employment, exports and tax revenue, and it contributed to the rehabilitation of the historic centers of Lisbon and Porto. Its cost falls on housing. Lisbon's tourist beds rose from 29,673 in 2011 to 105,314 in 2025. Short-term rental beds rose from 1,173 to 45,439. Short-term rentals withdraw dwellings from the residential stock, and hotels compete with housing for the same land and buildings in the center. In the structural model, tourism accounts for 17% of the rise in Lisbon's real price, counting each tourist bed as a resident. Counting only short-term rentals, which withdraw dwellings from the stock, the share is 11%. Its effect is largest in the central parishes. The gains accrue to owners, firms in the sector and the State; the costs fall on tenants and young households looking for a home (Section 14).

The response of supply. The weak response of supply is the central problem. Since 2013, at given real prices and construction costs, completions relative to the stock have been about 27% of their 2001–2012 level. Between 2016 and 2025 Lisbon completed on average 246 new dwellings a year. This is about 0.08% of the stock. To keep in 2025 the 2011 number of persons to house per dwelling, Lisbon would need about 110,000 additional dwellings. The tightening of credit, the exit of firms and workers from construction and longer licensing times in Lisbon are consistent with this fall; the data do not separate their effects. With an inelastic supply, almost all of the increase in demand is reflected in prices.

An integrated approach. The results identify several constraints that act together: scarce land in the centers, a weaker response of suburban building to prices since 2013, slow licensing, and demand subsidies that are capitalized into prices when supply is inelastic. No single measure removes them, so housing policy requires an integrated approach. Institutional reform for planning comes first, with a metropolitan authority that plans land use, transport and housing together and licensing with binding deadlines (Section 17.1). It includes the spatial planning of the suburbs as complete urban centers with employment and services, with the center keeping its role in leisure and culture, orbital transport links between the suburbs, and the relocation of public services to them (Section 17.2). Housing policy is a long-term program, and it competes with the large public investment programs for savings, construction inputs and workers (Section 17.3). Social housing policy is of particular relevance. Portugal's social rental stock is about 2% of dwellings, among the smallest in the European Union. In the cost-benefit analysis of Section 17, public rental housing built on public land in Lisbon has a social benefit-cost ratio of 1.09.

20 Policy conclusions

The results lead to one general principle and nine policy measures. When the housing stock is inelastic, a policy that raises demand raises prices and rents, and a policy that adds dwellings lowers them. Each measure below should therefore be assessed by the number of dwellings it adds and by the households that occupy them.

First, institutional reform of planning. A metropolitan planning authority for Lisbon, and one for Porto, with powers over land use, transport and housing, and licensing with binding deadlines and an independent appeal, are a precondition for the measures below, all of which require land use, transport and housing to be planned together (Section 17.1).

1. Faster licensing and greater construction capacity. In Lisbon the median licensing time has exceeded one year since 2015. In February 2022 about 3,100 building applications were pending. Since 2019, however, licenses in Lisbon have exceeded completions (Section 10). Deemed approval has existed since 2024, and Decreto-Lei 108/2026 shortened the deadlines (Presidência do Conselho de Ministros, 2026a, art. 23), but developers do not always invoke it, and missed deadlines carry no effective sanction (Caetano, 2026). Making deemed approval effective requires deadlines with consequences, acceptance of the resulting titles, publication of decision times, and a right of appeal to an independent body when the municipality does not decide, as in England. Public land in the areas of eastern and northern Lisbon still to be consolidated, and in the metropolitan area, should be allocated to housing. Employment in construction remains below its 2008 level. Vocational training in the building trades, legal entry channels for immigrant construction workers and industrialized construction would raise the capacity of the sector.

2. Metropolitan planning of employment and housing. The centers of Lisbon and Porto have little land. They can add dwellings by building higher outside the historic centers (Section 16), but most of the dwellings they need have to be built in the suburbs. The concentration of employment in the center limits the relocation of demand to the suburbs (Section 11). Office locations in the suburbs and additional crossing capacity over the Tagus widen households' choice of location. In the three-zone model their effect on prices is at most a few percent (Section 12); they may be justified by benefits the model does not measure. The plan should also include upzoning near rail and metro stations with spare capacity, under an authority with planning powers over the whole metropolitan area.

3. Macroprudential policy and housing supply. Banks tightened loan-to-value terms in 2008–2012, before the 2013 break in building, and did not reverse the tightening afterwards (Section 10). The cumulative tightening accounts for about half of the estimated post-2013 break in suburban supply in the inner ring and almost three quarters on the south bank. The borrower-based limits of 2018 may also restrain building; the national series suggests it, but the comparison of developers shows no difference after 2020. Maintaining them gives priority to financial stability at a cost in housing supply. In the preferred specification, the national real price is about 1.4 standard deviations above the level implied by fundamentals, an estimate that inherits the imprecision of the income share (Section A.5). Credit to developers should remain available; the welfare model evaluates developer credit through a guarantee fund (Section 16.1).

4. Public rental housing on public land. Public and cooperative rental housing on public land where demand pressure is highest, with the participation of the sectors that employ most immigrants and with tenancy contracts independent of employment contracts. Social housing is about 2% of the Portuguese housing stock.

5. Students. A housing supplement graded by household income, with a student copayment and set against a reference rent for the municipality, and the savings spent on residence beds (Section B.4).

6. Immigrants. Planning of land, transport and schools for expected immigration before it arrives; small, mixed developments near transport and jobs, without new large estates;

enforcement of overcrowding standards, with workers' housing built or leased with employers; and renewal of the estates of the 1990s without forced displacement (Section B.3).

7. Tourism. Limits on new short-term rental beds in the central parishes, as in Lisbon's containment zones, and the allocation of part of the tourist tax to housing.

8. Vacant dwellings. The surcharge on the municipal property tax for vacant dwellings, faster partition of inheritances and rehabilitation. These measures add dwellings in the center, but even in the high recovery case they cover a small part of the shortfall (Section 13).

9. The older residents of the center. A voluntary offer to older tenants and owners in the center of modern dwellings in the suburbs, near transport and services, with compensation for the move; the landlord's gain can finance the offer (Section 17).

Demand subsidies. Demand subsidies are partly capitalized into prices and rents. The income tax relief for the young (IRS Jovem) raises house prices, and public guarantees on mortgage credit raise them further. A cut in the tax on rents that is not tied to new supply benefits mainly existing lettings.

An integrated approach. The measures above are complementary, and none is sufficient in isolation. Institutional reform comes first, with a metropolitan planning authority. Land and height rules in the centers, licensing, the planning of the suburbs as complete urban centers with orbital transport, employment and relocated public services, and means-tested demand support have to be implemented together. Within this approach, social housing policy is of particular relevance. Public and cooperative rental housing on public land adds dwellings at a social benefit close to its cost, in a country where social rental housing is about 2% of the stock. The program has to last beyond electoral cycles, with priority and sequencing within total public investment, because the large investment programs draw on the same savings, construction inputs and workers (Section 17.3).

21 Limits

- The effects are municipal averages. In the central parishes, where short-term rentals and hotels concentrate, prices are higher and the effects larger.
- With Portuguese data, the component of the effect of tourism common to the whole country cannot be separated from other national shocks. For that component, the paper uses elasticities estimated on cross-country data.
- Tourism and immigration grew at the same time. The 2021 population revision breaks the series before and after that year. The paper spreads the revision back over 2012–2021 (Section A.3.2), and the immigration estimates rest on that choice.
- The calculations of Sections 7 and 8 hold income and the housing supply constant; in the three-zone model construction responds to prices. New building and the rules on short-term rentals, which have limited new registrations in Lisbon since 2023, reduce the effect. The rise in income that tourism generates raises prices and improves the price-to-income ratio.

- Lisbon prices before 2011 link different series; from 2005 to 2008 they follow the national index, because no Lisbon series is published. In the structural model, the income coefficient also captures credit and the foreign demand correlated with household income; foreign demand not correlated with it, such as second homes and dwellings kept empty, enters the residual. Across the nine NUTS II regions in 2019–2025, the share of transaction value bought by non-residents is not correlated with regional prices once region and year effects are removed. In Grande Lisboa that share fell from 8.5% to 6.1% while the real median price rose by 44 log points. Foreign buyers concentrate in the central parishes of Lisbon and pay about a quarter more per square meter than resident buyers in the city, but INE publishes their purchases only down to NUTS II, so their local effect cannot be measured. Lourenço et al. (2024, p. 81) find the pressure of foreigners greatest in the Lisbon and Porto metropolitan areas and its effect on the median value limited. Their finding concerns levels, and changes in foreign purchases since 2019 are not correlated with regional price changes, so the two findings are consistent.
- The decomposition gives every person the same weight. Immigrants form households at working ages and live in more crowded dwellings, so their effect per person on the demand for dwellings may be larger or smaller; the data do not determine the sign of the difference.
- The paper assumes that households priced out of central Lisbon move gradually to the suburbs. It holds no data on moves within the metropolitan area to test this. If households stay and the occupancy of their dwellings rises, the cost of the shortage takes the form of overcrowding, which the paper documents for immigrants (Section B.2).

Limits of the zone analysis. A partition into three zones is coarse. A model that locates each dwelling and each job would capture the gradients within each zone; it is outside the scope of this paper. The free simulation of the three-zone model underpredicts the city's real price in 2017–2021, with a gap of up to 0.24 in the log price, and reproduces only part of the rise in Porto. It is an in-sample check. The model takes the population of each metropolitan area as given from the data and does not measure welfare. The data do not identify the weight of job access in location choice. The elasticity of location choice with respect to price, the share of non-residents' purchases withdrawn from the residential stock and the elasticity of commuting time with respect to traffic are construed. After 2021 the number of Portuguese nationals follows its 2011–2021 trend, and the estimated number of immigrants is consistent with the stock of legal residents only in the city. The Porto ring comprises 11 municipalities of its metropolitan area. INE does not publish the municipality of origin of movers, nor the dwellings added by rehabilitation or lost to demolition, so the moves from the city to each suburb and part of the stock account are inferred. The measure of free urban land comes from the current municipal plans and counts parks as free, so it is an upper bound on buildable land.

Data, code and the use of AI

Data and code. All series, estimates and charts are in the statistical annex that accompanies this paper; the code is available from the author on request.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process. During the preparation of this work the author used Claude (An-

thropic) to write and check the code for the estimates, to draft and edit text, and to verify references. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of this paper.

Data sources

The data and the results of this study are in the statistical annex (in Portuguese): Anexo_ Estatístico_Turismo_Imigração_Habitação_2026-11-09_PT.xlsx.

INE, local statistics on housing rents; local statistics on housing prices; bank appraisal survey on housing; survey of guests in hotels and other accommodation; annual estimates of the resident population; demographic indicators (population change and natural balance); airport survey.

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A Data, model and estimation

This annex gives the detail behind the main text: the literature, the data, the municipal estimates, the stock-flow model and its estimates, and the comparison of prices with fundamentals.

A.1 Related literature

The paper draws on the following strands of work.

The stock-flow model. DiPasquale and Wheaton (1992) separate the market for housing space from the market for housing as an asset and show how demand, income and financial shocks move rents, prices, construction and the stock. Poterba (1984) prices housing as an asset through its user cost, which links prices to interest rates and taxes. Our equations (5)–(7) are a compact empirical version of this framework. Duca et al. (2021) survey the drivers of house price cycles, with emphasis on credit, expectations and macroprudential policy. In 2000–2013, credit is the main determinant of prices that our model omits, and its effect is contained in the residual of the demand equation.

Supply. Glaeser et al. (2005) show that Manhattan prices exceed the cost of building an extra floor by more than double and attribute the gap to land-use regulation. Saiz (2010) measures developable land with satellite data and finds that supply is inelastic where geography and regulation constrain building. Glaeser and Gyourko (2018) argue that the gap between price and construction cost acts as a regulatory tax. The data for Lisbon are consistent with this literature. Completions are a small fraction of the stock, and the stock changed little while real prices doubled.

Immigration. Saiz (2007) finds, for U.S. metropolitan areas, that an immigrant inflow equal to 1% of the population raises rents and house values by about 1%. The elasticity of the real price with respect to occupancy (persons per dwelling) estimated on our municipal panel, about 1, is close to that value. Gonzalez and Ortega (2013) estimate that immigration accounts for about a quarter of the Spanish price boom of 2000–2010. In Lisbon in 2011–2025, the counterfactual of the city model attributes to residents 26% of the rise in the real price, and the counterfactual of the three-zone model, in which residents move between zones, attributes to immigrants 41% (25% with the national elasticity). Sá (2015) finds the opposite sign in the United Kingdom, because higher-wage natives leave areas that receive immigrants. In Portugal the population of the large cities grew with immigration while deaths exceeded births. In our municipal panel, the real price rises with occupancy (persons per dwelling), whose increase came mostly from immigration.

Tourism and short-term rentals. Barron et al. (2021) find that a 1% rise in Airbnb listings raises U.S. rents by 0.018% and prices by 0.026% at the median zip code, as units move from long-term to short-term rental. Garcia-López et al. (2020) find larger effects in Barcelona, up to 17% on transaction prices in the most exposed neighborhoods. For Portugal, Franco and Santos (2021) estimate that a 1 percentage point rise in the Airbnb share of a municipality raises prices by 3.7%, with effects concentrated in historic centers; Banco de Portugal (2021) finds that both local accommodation and purchases by non-residents raise municipal prices; and Batalha et al. (2022) show that the collapse of short-term rentals

during COVID-19 lowered rents in Lisbon's exposed parishes by 4.1%. Cocola-Gant and Gago (2021) document from fieldwork in Alfama that short-term rentals turned housing into a financial asset and displaced residents. At the country level, Anastasiou et al. (2025) and Cró and Martins (2024) find that tourism lowers housing affordability, more in tourism-dependent economies.

Bubbles and Portugal. Case and Shiller (2003) and Himmelberg et al. (2005) warn that price-to-rent and price-to-income ratios can mislead and propose comparing prices with fundamentals such as the user cost. Mian and Sufi (2009) show how a credit expansion can drive prices beyond fundamentals. For Portugal, Lourenço and Rodrigues (2017) study the price recovery after the crisis, and Lourenço et al. (2024) find that real prices rose 83% from 2013 to 2023, with signs of overvaluation from 2017 driven by demand and a supply that failed to respond.

Vacancy and rehabilitation. Some vacancy is normal in a working housing market. Wheaton (1990) shows in a search model that vacancy sets the time needed to sell and to find a home, and that prices fall as vacancy rises. Gabriel and Nothaft (2001) estimate equilibrium vacancy rates for U.S. metropolitan areas and find that rents move with the gap between observed and equilibrium vacancy. A census count of empty dwellings therefore overstates the stock that could house new residents. Molloy (2016) makes the same point for the United States. Long-term vacancy is a better measure of excess supply, and it is concentrated in a few neighborhoods. Policy can bring part of this stock back. Segú (2020) finds that the French tax on vacant housing introduced in 1999 cut vacancy rates by 13%, mostly long-term vacancy, and that most of those units became primary residences. Housing is also durable. Glaeser and Gyourko (2005) show that durable housing keeps people in cities where it costs less than new construction. For Lisbon, Lestegás (2019) documents that rehabilitation of the historic center after 2007 did not stop the loss of long-term residents, as tourists and other international gentrifiers occupied the upgraded dwellings. This literature guides our reading of the 2021 census. We treat the dwellings vacant for other reasons as the pool that rehabilitation and taxation could recover, and we compare the most that can be recovered with the housing shortfall.

Supply beyond the center. Where supply can respond, price booms are smaller. Glaeser et al. (2008) find that U.S. places with elastic supply had fewer and shorter bubbles, and that the price run-ups of the 1980s happened almost only where supply was inelastic. Hilber and Vermeulen (2016) show for England that planning constraints raise the response of prices to local earnings, and that scarce developable land matters mainly in highly urbanized areas. Gyourko and Molloy (2015) survey the evidence that land-use regulation raises prices and reduces construction. Transport determines where new housing can be built. Duranton and Puga (2015) review the theory and evidence on land use within cities, including sprawl and residential decentralization. Baum-Snow (2007) finds that each new highway through a U.S. central city reduced its population by about 18%. Gonzalez-Navarro and Turner (2018) find, for 632 large cities, that subways make cities more decentralized with little effect on their total population. New housing also has effects beyond the sites where it is built. In Helsinki, new market-rate dwellings set off chains of moves that free dwellings in lower-income areas (Bratu et al., 2023); Mast (2023) finds the same chains in U.S. cities, and Asquith et al. (2023) find that large new apartment buildings lower nearby rents. These results are consistent with our conclusion that most new supply in Lisbon must be built outside the historic center, in eastern and northern Lisbon and in the metropolitan area, and that it needs transport links

to the center. None of these studies covers Lisbon.

Comparing price levels. Knoll et al. (2017) build house price series for 14 advanced economies since 1870. Real prices were flat until the middle of the twentieth century and then rose strongly. Rising land prices account for about 80% of the increase since World War II. Their series are indices and track growth over time. We add a comparison of levels. We set Lisbon's house prices against other European capitals in euros and in purchasing-power standards, and we compare prices with incomes. Demography also affects prices over long periods. Mankiw and Weil (1989) attribute the rise of U.S. real house prices in the 1970s mainly to the baby boom generation reaching house-buying age. In Lisbon deaths exceed births, so the growth of the population that buys or rents housing comes from immigration.

The estimates against the literature. Table 34 compares the main estimates of the paper with published ones. Each figure from the literature is given with the page where it was read.

Table 34: The estimates of the paper and the literature.

Parameter	This paper	Literature (study, estimate, page)	Comparison
Elasticity of the real price with respect to occupancy (persons per dwelling) or to population	Municipal panel, 2SLS: 0.98 (0.12). Panel with year effects, population: 1.17 (0.17). National DOLS: 2.18 (0.55).	U.S. cities: about 1 (Saiz, 2007, abstract). Spanish provinces: about 1.3, from 1.5% a year more population and about 2% a year on prices (Gonzalez and Ortega, 2013, abstract). Portuguese municipalities, new households: 0.69 (Amador, 2026, table 1, p. 17). United Kingdom: negative (Sá, 2015).	Within the positive estimates, above the Portuguese one, which counts households and leaves out tourists. The national DOLS estimate exceeds all of them; over 26 years it also captures the credit cycle.
Rents relative to prices (ratio of the rent effect to the price effect)	Municipal panel: rent elasticity 0.79 (0.17), 0.67 of the price elasticity. The rent figures of the paper use 0.80 (New Economics Foundation, 2026).	Portuguese municipalities: 0.37 against 0.69, ratio 0.53 (Amador, 2026, table 1, p. 17). U.S. zip codes: 0.018 against 0.026, ratio 0.69 (Barron et al., 2021, abstract). Barcelona: rents +1.9%, prices +4.6%, ratio 0.41 (Garcia-López et al., 2020, abstract). Los Angeles: rents and prices both −2%, ratio 1.0 (Koster et al., 2021, abstract).	Both within the range of 0.4 to 1.0. The panel's ratio gives the lower bound of the rent effects (Section A.3).
Income (elasticity of the real price)	Restricted relation, 2000–2025: Portugal 1.20 (0.35), Lisbon 0.73 (0.47). Other samples (Table 40): −0.41 to 1.39 for Portugal.	21 OECD countries, long run: 0.6 (Ireland) to 4.4 (France); Spain 1.6, Italy 1.8, Germany 0.7, United States 0.8 (Caldera Sánchez and Johansson, 2011, table 1, pp. 16–17); Portugal is not in the sample. Survey: 1.5 to 2.5 with the housing stock held fixed (Duca et al., 2021, p. 844).	Portugal within the OECD range, in its lower half, and below the survey band. Lisbon near the bottom of the OECD range; its price is set against national income. The coefficient changes with the sample.

(continued)

Parameter	This paper	Literature (study, estimate, page)	Comparison
Real mortgage rate (semi-elasticity)	National DOLS: −0.082 (0.011), that is −7.9% for one point. Lisbon DOLS: −0.108 (0.032). Other samples: −0.071 to −0.053.	Survey: about −3 on average; reviewed range 0 to −8 (Dieckelmann et al., 2023, pp. 3–4). Euro area: about −5% after two years, about −9% at low rates (Battistini et al., 2022, charts B and C). The response is stronger at low rates (Dieckelmann et al., 2023, abstract).	Above the average value, at the top of the reviewed range, close to the ECB's value at low rates. The real rate of Portugal was below zero in 6 of the 26 years.
Supply response (elasticity)	Completions over the stock, national, on lagged q: 2.62 (0.36); long run 3.99. Municipal panel, lagged price: 1.22 (0.21); Lisbon and Porto 1.79. The stock over ten years, at the completion rate since 2013: 0.08 national, 0.01 Lisbon.	New supply, long run: 0.15 (Switzerland) to 2.0 (United States); Spain 0.45, Italy 0.26, France 0.36, Germany 0.43 (Caldera Sánchez and Johansson, 2011, table 2, pp. 18–19). Portugal: 0.84, an OECD estimate as reported by Lourenço et al. (2024, p. 89). The stock, U.S. metropolitan areas: 1.75 on average, below 1 where land is scarce (Saiz, 2010, pp. 1255 and 1281).	The flow is above the European values and close to the U.S. one; the stock response is far below every comparison. Completions remain elastic with respect to q, but from 2013 their level at given q is about 27% of the earlier level.
Short-term rentals, local price effect (elasticity)	Parishes of Lisbon and Porto, prices on short-term rental beds: 0.10 (0.03); rents 0.02 (0.02), not significant.	U.S. zip codes: 0.026 on prices and 0.018 on rents for 1% more listings (Barron et al., 2021, abstract). Los Angeles: listings −50%, prices −2%, about 0.03 by this paper's conversion (Koster et al., 2021, abstract).	About 4 times the U.S. value. Central Lisbon has far more short-term rentals per dwelling than a median U.S. zip code, and the estimate is imprecise.
Short-term rentals, one point of the dwelling stock (price effect)	About 1.6%, by this paper's conversion: one point of Lisbon's dwellings let to tourists adds 3.87 beds per unit to the people to house, with 2.38 people per dwelling and the panel elasticity.	Portugal: 3.7% in municipalities and 3.2% in the parishes of Lisbon and Porto for one point more of Airbnb share (Franco and Santos, 2021, abstract).	Below, about half. Counting each bed as a resident understates the price effect of short-term rentals.
Tourism in the rise of prices	17% of Lisbon's real rise in 2011–2025 (11% with short-term rentals only), that is 0.5 to 0.8 log points a year.	U.S. median zip code: 0.7 points a year of price growth (Barron et al., 2021, working-paper version, p. 30).	Within; close to the U.S. median zip code.
Immigration in the rise of prices	Arrivals less departures, city model: 30% of Lisbon's real rise and 16% of Portugal's, 2011–2025. Immigrants, three-zone model: 41% of Lisbon city's rise (25% with the national elasticity).	Spain, 2000–2010: one quarter of the rise in prices (Gonzalez and Ortega, 2013, abstract).	Portugal below and Lisbon above the Spanish share; immigrants concentrate in Lisbon.
Speed of adjustment of prices (share of the gap closed in a year)	Restricted error correction: 19% in Portugal (standard error 0.08), 25% in Lisbon (0.13). Supply: 32%.	OECD countries: 12% (Spain) to 41% (United Kingdom), median 20%, annualized from quarterly terms (Caldera Sánchez and Johansson, 2011, table 1, pp. 16–17).	Within, near the median.

Elasticity: percent change in the price for a 1% change in the driver. Semi-elasticity: percent change in the price

for one percentage point of the rate. Pages refer to the version read; "abstract" marks a figure read in the abstract. The conversions of this paper: the stock response is the flow elasticity times the mean completion rate since 2013, over ten years; the effect of one point of the stock uses 3.87 beds per registered unit (national register of short-term rentals) and 2.38 people per dwelling in Lisbon in 2025; Koster et al.: $\ln 0.98 / \ln 0.5$.

A.2 Data

The paper asks what drove house prices in Lisbon and Porto in 2011–2025 and what housing policy can do. Annex D applies the results to a new airport.

The data are public. From INE: median rents of new leases and median sales and bank appraisal values, by municipality and parish; nights in tourist accommodation, by municipality; resident population; passengers at Lisbon airport. From Turismo de Portugal: the national register of short-term rentals, with the registration date and the beds of each unit. From Eurostat: GDP per head of the NUTS 3 regions, the harmonized index of consumer prices and nights booked through platforms.

The paper combines five methods: a panel of municipalities; a comparison of parishes in Lisbon and Porto; a time-series regression with Coimbra as control; the equivalence of tourism and residents as demands for housing; and the elasticities estimated in the literature, on data for many countries.

The paper measures the effect on house prices, which have longer and more complete series: the bank appraisal value since 2011 and the value of sales by municipality and parish. The effect on rents is derived from the effect on prices. Following New Economics Foundation (2026), the paper assumes that rents rise by 80% of the rise in prices.

Prices. For Portugal we use the residential property price index compiled by Banco de Portugal and distributed by the BIS (series Q:PT:N:628). Before 2009 it is the hedonic index of Confidencial Imobiliário, based on asking prices; from 2009 it is the transactions index of Statistics Portugal (Lourenço and Rodrigues, 2017). For Lisbon we build one series for 2000–2025 by linking growth rates: the Confidencial Imobiliário (HMS) price per square meter for Lisbon city in 2000–2004; the national index in 2005–2008, for which no Lisbon series is published; the bank appraisal value of Statistics Portugal (INE) for the Lisbon Metropolitan Area in 2009–2010; and the municipal bank appraisal value from 2011. The municipal panel uses the INE median bank appraisal value, deflated by the harmonized index of consumer prices. In the time series, prices, income and construction cost are deflated by one index, the private consumption deflator of the European Commission's AMECO database, which covers the whole sample.

People to house. Residents come from the INE annual population estimates. The 2021 census revealed a large undercount of immigrants, and the revised series starts in 2021. We spread the gap between the revised 2021 level and the old estimate back over 2012–2021 in proportion to recorded immigration, which removes the break. For 2000–2010 we use the older INE estimates, scaled to meet the series in 2011, with the 2011 census correction spread geometrically over 2001–2011. Tourist beds are hotel beds (INE; Eurostat for national and regional series before 2011) plus local-accommodation beds from the national register of Turismo de Portugal, accumulated by year of registration. The register lists active units only, so early years are understated. The Azores keep a regional register and are excluded.

Supply and macro variables. The housing stock is the INE estimate of classic family dwellings, with census-based levels in 2001, 2011 and 2021 and geometric paths between them

where the annual estimates break; before 2001, the stock follows the stock-flow identity with completions; for the long samples of the robustness check the national stock is carried back the same way to 1991, and the Lisbon stock is set in 1991 by the census growth from 1991 to 2001 (Censos 91, provisional results), with Lisbon's completions from 1995 and a geometric path in 1992–1994. Completions are dwellings completed in new construction. Income is real household gross disposable income per head (AMECO, spring 2026). The nominal mortgage rate is the rate on new housing loans (ECB). The model uses the real rate: the nominal rate minus expected inflation, measured as the mean of this year's and last year's inflation of the private consumption deflator. Construction cost is the Eurostat index for new residential buildings. The long samples of the robustness check (1991–2025) link each series back: household income with the long series of Banco de Portugal and INE (2020) before 1995; the mortgage rate with the Banco de Portugal rate on loans to households over five years before 2000, joined to the ECB series by their average gap in 2000–2002; construction cost with the deflator of housing investment before 2000. For the comparison of capitals we use the BIS detailed residential property prices and the BIS consumer price series.

Natural balance, vacancy, price levels and city tourism. Births minus deaths by municipality come from three INE series, one for each version of the regional classification: 0006201 for 2000–2010, 0008270 for 2011–2023 and 0012432 for 2024–2025; in the years where they overlap they agree to within a few people. Vacant dwellings, their reason for vacancy and the repair needs of their buildings come from the 2021 and 2011 censuses (INE 0013315, 0011482, 0006304). Price levels per square meter in 2025 are the average asking prices of new dwellings in the Deloitte Property Index, completed with national sources for four capitals and with the INE median sales value for Lisbon; we convert them to purchasing power standards with the Eurostat price level index of actual individual consumption and compare them with household disposable income per head in PPS (Eurostat). Nights per resident in cities come from the Eurostat urban statistics (urb_ctour, urb_cpop1) for 2019, the last year before the pandemic with data for most cities, and from INE for the municipalities of Lisbon and Porto.

A.3 Municipal estimates

A.3.1 What the estimates show

Panel of 266 municipalities, 2011–2025, bank appraisal value. With municipality effects, inflation and the real GDP of the region, the elasticity of the price with respect to tourist nights per resident three years earlier is 0.057 (standard error 0.008); six years earlier, 0.024 (0.009). With year effects, only tourism six years earlier is significant: 0.019 (0.009). Without year effects, the elasticity of prices to population is 1.25 (0.17); with year effects, it is 1.17 (0.17). The year effects remove every shock common to all municipalities, including the part of the effect of tourism that spreads to the whole territory.

Parishes of Lisbon and Porto. Across parishes, the elasticity of prices with respect to short-term rental beds is 0.10 (standard error 0.03). Applied to the whole city, it corresponds to 13% on Lisbon prices and 20% on Porto prices between 2016 and 2025. The comparison of parishes measures only the local effect and does not capture the effect common to the whole city.

Time series against Coimbra, 2011–2025. The elasticity of prices relative to Coimbra with respect to tourism relative to Coimbra, with a four-year lag, is 0.54 (0.24). The estimate rests on few years and is imprecise. Relative population, whose growth came mostly from immigration, has a large and stable coefficient.

Panel of Lisbon, Porto, Coimbra and Beja, 2011–2025. With municipality and year effects, only the differences among the four cities count, and Coimbra and Beja serve as controls. Measuring tourism as tourist beds per resident, the coefficient of tourism lies between 4.5 and 5.1 with one to three years of lag, and that of population between 0.9 and 1.3. Here the coefficient of a tourist bed exceeds that of a resident, possibly because beds concentrate in central areas, where housing is more expensive. Four cities are too few to test whether the two coefficients differ; the municipal instruments of Section A.4 give beds and accumulated arrivals similar point estimates, although a test of equal effects rejects at the 10% level.

The literature. Anastasiou et al. (2025), with 38 OECD countries, find that tourism raises the ratio of house prices to income, with a larger effect in tourism-dependent economies and where inequality is greater. The effect builds up over five to six years. Because it compares countries, it captures the common effect that the panel and the parishes cannot measure (Table 35).

Table 35: Elasticities of the literature used in the paper.

Study	Relation	Elasticity used
Anastasiou et al. (2025), economies less dependent on tourism	+10% in arrivals → +0.65% in the price-to-income ratio	0.065
Anastasiou et al. (2025), tourism-dependent economies	+10% in arrivals → +1.6% in the price-to-income ratio	0.16
Cró and Martins (2024), long run	+10% in receipts → +2.9% in prices	0.29

Source of the relations: New Economics Foundation (2026), table 3 and text. Rents: 80% of prices passed to rents, as in New Economics Foundation (2026). The three values are as reported by New Economics Foundation (2026), table 3. They are elasticities to tourist arrivals or to tourism receipts, which the paper applies to the growth of tourist nights.

A.3.2 Immigration and population

The resident population grew mostly through immigration. Between 2011 and 2025 the population of Lisbon went from 542,589 to 658,236 residents, that of Porto from 235,882 to 273,476 and that of Coimbra from 143,410 to 156,359. In 2022 and 2023 arrivals less departures in the country were 678,565 people and its natural balance −73,335. By the population rule of Section 4, the Lisbon metropolitan area gained 529,610 residents in 2011–2025: 534,356 immigrants, while nationals fell by 4,746. Around Porto, residents grew by 95,610 and immigrants by 150,460, while nationals fell by 54,850.

INE revised its population estimates for 2021 to 2025 to count immigrants that the earlier estimates missed. The revision adds 12.9% to the population of Lisbon, 6.7% to that of Porto and 4.1% to that of Coimbra. The paper uses the most recent estimate and spreads the difference back. From 2021 to 2025 the population is the revised INE estimate. In each municipality, the revised 2021 level minus the sum of the earlier 2020 estimate and the natural balance of 2021 is spread over 2012 to 2021 in proportion to the immigration

recorded in each year; 2020 and 2021, the pandemic years, receive the immigration of 2019. The series is continuous, starts from the 2011 census and reaches the revised level.

Table 36: Elasticities of the median bank appraisal value, 2011–2025, with tourism and population in the same regression.

Specification	Tourism (nights per resident)	Population	Base population	Accumulated immigration	Municipalities
No year effects, tourism three years earlier	0.057 (0.008)	1.25 (0.17)			266
Same, population split into base and immigration	0.058 (0.009)		2.63 (0.28)	0.99 (0.16)	266
Year effects, tourism six years earlier	0.019 (0.009)	0.97 (0.16)			263
Same, population split into base and immigration	0.014 (0.009)		2.92 (0.28)	0.65 (0.14)	263

Standard errors clustered by municipality in parentheses. Every specification has municipality effects and the real GDP per head of the region; those without year effects have inflation and the years 2020 and 2021. The base population is the residents of 2011 plus the natural balance; accumulated immigration is the rest, measured as $\ln(1 + \text{immigrants/base})$. Source: INE.

In every specification the elasticity of the price with respect to population is large and precisely estimated, between 0.97 and 1.25 (Table 36). When population is split into the base population and accumulated immigration, the elasticity with respect to accumulated immigration is significant, between 0.65 and 0.99. The elasticity with respect to tourism is small and positive, 0.057 without year effects; with year effects it is significant only at a six-year lag (0.019).

In the panel of the four cities (Lisbon, Porto, Coimbra and Beja, 2011–2025), with city and year effects, accumulated immigration and tourism both enter as people housed per base resident: the immigrants and the tourist beds. With one to three years of lag, the coefficient of tourist beds lies between 3.5 and 3.8 and that of immigrants between 0.9 and 1.4. The coefficient of a tourist bed is about 3 times that of an immigrant, possibly because tourist beds concentrate in the center, where housing is more expensive. With four cities, the levels of these coefficients are imprecisely estimated.

In 2025 the immigration accumulated since 2011 equaled 25% of the base population of Lisbon and tourist beds 20%; in Porto, 24% and 22%; in Coimbra, 14% and 4%. In Lisbon and Porto the two demands now have a similar scale.

A.3.3 The effect of tourism in 2011–2025

Table 37: The effect of tourism in 2011–2025 on prices and rents.

	Demand equivalence (prices / rents)	Literature, low	Literature, central	Literature, high	Monthly rent of an 80 m^2 two-bedroom due to tourism
Lisbon	13.0% / 10.3%	6.1% / 4.9%	15.7% / 12.4%	30.2% / 23.5%	126 to 149 euros
Porto	16.2% / 12.7%	8.9% / 7.0%	23.3% / 18.3%	46.2% / 35.5%	128 to 175 euros

Effects at constant income, on 2025 levels (Lisbon: rent of 1,350 euros a month and price of 390 thousand euros for 80 m^2; Porto: 1,130 euros and 268 thousand euros). Median rents of new leases and median sales values, INE.

With the central elasticity of the literature, tourism in 2011–2025 accounts for a rise of about 16% in prices and 12% in rents in Lisbon (Table 37). Since 2011, Lisbon's residents grew 21.3%. By the population rule, immigrants added 25.9% to the 2011 population and nationals fell by 4.6%. The growth of residents contributed more than tourism to the growth of demand.

Foreign buyers across regions. Table 38 regresses the log real median price of each of the nine NUTS II regions on the share of transaction value bought by non-residents, with region and year effects, over 2019–2025 (INE). With nine regions, inference uses the wild cluster bootstrap and randomization inference over the regions' share paths. The coefficient is small and imprecise in every variant. Only the sample without Madeira gives a bootstrap p-value below 5%, and randomization inference does not confirm it.

Table 38: Log real median price on the share bought by non-residents, NUTS II regions, 2019–2025.

Specification	Coefficient	(s.e.)	Wild bootstrap p	Randomization p	Obs.
Main: value share	0.20	(0.54)	0.88	0.81	63
Without the Algarve	0.33	(0.80)	0.73	0.75	56
Without Madeira	−0.46	(0.24)	0.03	0.61	56
Value share, one year earlier	0.20	(0.82)	1.00	0.80	54
Share in number	0.57	(0.94)	0.66	0.64	63
Log real value bought by non-residents	0.01	(0.05)	0.89	0.92	63
Value share, with regional income, 2019–2023	−0.58	(0.52)	0.14	0.45	45

Region and year effects; standard errors clustered by region. Sources: INE, value and number of transactions by the buyer's tax domicile, median value of sales per m^2, household disposable income per head; deflated by the private consumption deflator.

A.4 The stock-flow model and its estimates

The model is estimated on Lisbon and on Portugal as separate series. Its reading rests on the assumption stated in Section 2: households priced out of central Lisbon move gradually to the suburbs, because the center is congested and densely built and the suburbs have land; the demand that the city cannot house therefore moves to the metropolitan area.

The equations

Let p_t be the real house price, R_t residents, B_t tourist beds, $N_t = R_t + B_t$ people to house, H_t the stock of dwellings, C_t completions, y_t real income per head, i_t the real mortgage rate (nominal rate minus expected inflation), k_t the real construction cost and $q_t = p_t/k_t$ Tobin's q; α and c are constants, and u_t and v_t are error terms. The model has three equations:

$$\ln p_t = \alpha + \beta \ln(N_t/H_t) + \gamma \ln y_t + \delta\, i_t + u_t, \tag{5}$$

$$\ln(C_t/H_{t-1}) = c + \eta \ln q_{t-1} + \theta\, \mathbf{1}[t \geq 2013] + v_t, \tag{6}$$

$$H_t = (1-\rho)H_{t-1} + C_t. \tag{7}$$

We make five assumptions. (A1) A tourist bed occupies the housing of one resident for the whole year. (A2) The price clears the market for the existing stock, up to u_t; the decomposition compares these equilibrium levels. (A3) Completions depend on the previous year's price and cost. (A4) In the municipal panel, year effects capture income, interest rates and credit conditions common to all municipalities. (A5) In the municipal panel, past tourist beds and accumulated arrivals net of departures affect prices only through people per dwelling.

Equation (5) is the inverse demand for housing services per person. The coefficient β is the elasticity of the real price with respect to occupancy N_t/H_t (persons per dwelling), and $1/\beta$ is the absolute price elasticity of the demand for housing services per person. The coefficient γ is the income elasticity of the real price, and δ its semi-elasticity with respect to the real mortgage rate. Equation (6) is a q-theory of construction. The coefficient η is the elasticity of the completion rate C_t/H_{t-1} with respect to lagged q; θ, the coefficient of the indicator $\mathbf{1}[t \geq 2013]$, equal to 1 from 2013, measures the shift in the log completion rate after the 2008–2012 crisis. In the panel version of (6) the lagged log real price replaces lagged $\ln q$, and its elasticity may differ in Lisbon and Porto. Equation (7) is the stock-flow identity; ρ is the demolition rate implied by the stock and completions data (0.24% a year).

The estimates

Table 39 reports the demand equation. The time series estimates in levels use Newey–West errors and dynamic OLS (Stock and Watson, 1993); the panel uses municipality and year effects with errors clustered by municipality. On the 2SLS sample, OLS gives 1.12 and 2SLS 0.98. The overidentification test does not reject the instruments at 5% but rejects them at 10% (Sargan statistic 3.59, $p = 0.058$). The test compares the price effect of people per dwelling moved by tourist beds with that moved by the accumulated arrivals, so it also tests assumption (A1). Each instrument alone gives a similar estimate (1.07 with the tourist beds, 0.96 with the arrivals), as two instruments with the same bias also would. The national time series gives 2.18 and the Lisbon series 0.67. These regressions in levels run on trending series of 26 years and serve only as a comparison. In the national series the semi-elasticity of the real price with respect to the real mortgage rate is -0.082 (standard error 0.011); a rate one percentage point higher lowers the real price by about 7.9%. With β fixed at the panel value and the rate coefficient fixed at this national estimate, the income elasticity is 1.20 for Portugal and 0.73 for Lisbon (standard errors 0.35 and 0.47). Higher income raises the demand for housing; with an almost fixed stock, higher demand raises the real price. The cost of credit enters through the real rate. An Engle–Granger test on the levels regressions gives ADF statistics on the residuals of -4.41 for Portugal and -2.62 for Lisbon (10% critical value -4.15); on the residual of the restricted relation it gives -3.56 and -3.24 (critical value -3.21). The Johansen trace statistic for no cointegration, corrected for the small sample, is

45.5 for Portugal and 40.1 for Lisbon, against a 5% critical value of 47.9. Three tests reject the absence of cointegration at the 10% level: the levels Engle–Granger test for Portugal and the restricted Engle–Granger tests for Portugal and Lisbon. Three do not: the corrected Johansen tests for Portugal and Lisbon and the levels Engle–Granger test for Lisbon. On 26 annual observations these tests have little power, and they disagree; they cannot settle whether the long-run relation holds, and the shares that rest on it are estimated imprecisely. The speed of adjustment, the share of the gap to this relation closed each year, is about 25% in Lisbon (standard error 13%) and about 19% in Portugal (standard error 8%). On the usual t critical values the Lisbon estimate is significant at the 10% level ($t = -1.90$) and the Portuguese one is significant at the 5% level ($t = -2.28$). On the critical values of Banerjee et al. (1998) for error-correction tests, neither is significant. The income, mortgage-rate and residual shares below, and the price effect of the income tax relief for the young, carry this imprecision. The shares of residents and tourism depend only on β.

Table 39: Demand equation (5). Dependent variable: log real house price.

	Portugal 2000–2025, DOLS	Lisbon 2000–2025, DOLS	Municipalities 2011–2025, FE	Municipalities 2014–2025, FE-2SLS
$\ln(N/H)$	2.177	0.675	0.906	0.976
	(0.550)	(0.637)	(0.112)	(0.121)
$\ln y$	1.487	1.133		
	(0.323)	(0.638)		
i	-0.082	-0.108		
	(0.011)	(0.032)		
Year effects	–	–	yes	yes
Observations	23	23	3,117	2,627
First-stage F				899

Standard errors in parentheses: Newey–West (2 lags) for the time series, clustered by municipality for the panel. Instruments: tourist beds per dwelling three years earlier and accumulated arrivals net of departures over the base population one year earlier.

Table 40 repeats the restricted estimates on other data. The long samples run from 1991 to 2025 for both series; Lisbon's stock is set in 1991 by the census. The 1990s were a different credit regime: credit was liberalized, and nominal mortgage rates fell from about 20% to 5% as Portugal converged to the euro, while real house prices changed little (−0.2%) over 1991–1999. With one rate coefficient for the whole period, the income elasticity is −0.41 (0.59) for Portugal and −0.01 (0.30) for Lisbon, not significantly different from zero. Letting the rate coefficient differ before 1999 gives −0.07 from 1999 and −0.03 before (the difference has a standard error of 0.027); the income elasticity is then 0.22 (0.37) for Portugal and 0.62 (0.19) for Lisbon, and the contribution of income to Lisbon's real price rise in 2011–2025 is 20% (8% to 32%). On these 35 observations the corrected Johansen test rejects the absence of cointegration for Portugal and Lisbon. Measuring expected inflation by this year's inflation alone, the contribution of income is 30% (2% to 59%) of Lisbon's rise and 44% of Portugal's. The shares of residents and tourism are the same in every row, because they depend only on β.

Table 40: Robustness of the restricted demand relation. Shares of Lisbon's real price rise, 2011–2025.

	Sample	Income coefficient		Lisbon, share of the rise			Johansen
		Portugal	Lisbon	Income	Rate	Residual	PT / LX
Main: real rate, expected inflation	2000–2025	1.20 (0.35)	0.73 (0.47)	24% (−7% to 54%)	+21%	+11%	45.5 / 40.1
Long sample, one rate coefficient	1991–2025	−0.41 (0.59)	−0.01 (0.30)	0% (−20% to 19%)	+13%	+43%	51.6 / 51.3
Long sample, rate coefficient free before 1999	1991–2025	0.22 (0.37)	0.62 (0.19)	20% (8% to 32%)	+17%	+19%	51.6 / 51.3
Real rate on current inflation	2000–2025	1.39 (0.37)	0.92 (0.44)	30% (2% to 59%)	+17%	+9%	37.1 / 33.0

$\beta = 0.98$ from the municipal panel. The rate coefficient is fixed at the national DOLS estimate of each row; the income coefficient is estimated on each series with Newey–West errors (standard errors in parentheses); the income band is the share at the coefficient plus and minus two standard errors. Johansen: trace statistic for no cointegration with a small-sample correction (degrees of freedom); 5% critical value 47.9. The shares of residents (26%) and tourism (17%) are the same in every row.

Table 41 reports the supply equation. Nationally, the elasticity of completions with respect to lagged Tobin's q is 2.6, and from 2013 the log completion rate is 1.30 log points lower at given q. In the panel, the price elasticity of completions is 1.22; the additional term for Lisbon and Porto is 0.57 and imprecise. Lisbon completed on average 246 dwellings a year in 2016–2025, 0.08% of its stock.

Table 41: Supply equation (6). Dependent variable: log of completions over the previous stock.

	Portugal	Portugal, lag 2	Lisbon	Municipalities
$\ln q$ (lagged)	2.62 (0.36)	2.84 (0.35)	1.43 (0.77)	
Regime from 2013	-1.30 (0.15)	-1.10 (0.15)	-1.03 (0.59)	
$\ln p$ (lagged)				1.22 (0.21)
$\ln p$ (lagged) × Lisbon or Porto				0.57 (0.68)
R^2	0.92	0.92	0.22	
Observations	25	24	25	2,850

Standard errors in parentheses: Newey–West for the time series; clustered by municipality, with municipality and year effects, for the panel.

Why supply did not respond. The estimates locate the failure. They do not separate its causes. Lisbon's stock of dwellings went from 322,944 in 2011 to 320,935 in 2025 (−0.6%). Nationally, completions still respond to the price relative to construction cost, with an elasticity of 2.6, but since 2013 they run at about 27% of their earlier rate at the same price and cost; the break has a t-statistic of −8.8. Across municipalities the response is 1.22; the additional term for Lisbon and Porto, 0.57, is not significant. Four constraints documented in the sources are consistent with this pattern. Central Lisbon has few free plots, and height rules preserve the skyline of the historic city, so most new supply has to come from the suburbs. Land scarcity constrains supply in the city, but it does not explain the fall in construction. If it did, construction would have fallen more in the municipalities with less land available, and it fell less (Section 9). Licensing in Lisbon is slow: in February 2022 about 3,100 building processes were pending, and a municipal master plan takes over 5 years to revise. The national ecological and agricultural reserves limit peri-urban land, and rural land could be reclassified for housing only from 2024. And part of the existing stock is vacant or in degraded buildings, often under old leases with low rents. Bringing it back into

use would cover 8% to 20% of the shortfall (Section 13). The timing of the break also points to the crisis, which reduced credit to developers and led construction firms and workers to leave the sector. The sector now depends on immigrant labor. Section 10 tests the credit channel. To keep the 2011 number of people per dwelling, Lisbon would need about 110,000 more dwellings in 2025.

A.5 Prices and fundamentals

Were there bubbles? A bubble is a price that leaves its fundamentals and is sustained only by the expectation of further gains (Case and Shiller, 2003; Himmelberg et al., 2005). We measure the gap as the residual of the restricted demand equation, centered on its mean. The measure has limits: it has mean zero by construction, it is persistent, and its level moves with the specification. We therefore read it only against its history (Figure 11). Prices stood above fundamentals in the early 2000s and, after the crisis, below them in 2012–2017, by 18% in Lisbon at the trough. In 2025 the Lisbon gap is 0.5 of a standard deviation of its values since 2000, inside the range it has covered since 2000; the national gap is about 1.4 standard deviations, among its highest since the early 2000s. The ratio of price to annual rent in Lisbon went from 21 years in 2017 to 26 in 2021 and 24 in 2025, a rise of 14% over the period. In 2025 Lisbon prices are within the range of their past deviations from the model's fundamentals. The measure cannot detect a bubble that moves with income or credit, and the residual accounts for 28% of the rise since 2013.

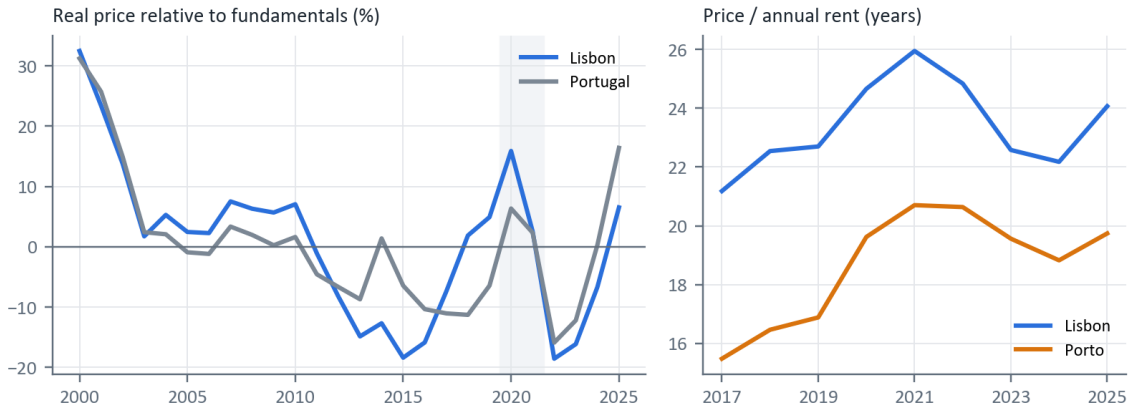

Figure 11: Left: real price relative to the fundamentals of equation (5), in percent. Right: sale price per square meter divided by annual rent per square meter (INE).

Formal tests. The generalized sup ADF test of Phillips et al. (2015) dates periods of explosive price growth, the statistical signature of a bubble. On the real house price index of Portugal (OECD, 1988Q1–2026Q2) it dates explosive growth from 2017Q3 to 2022Q3 and again from 2024Q3, at the conventional Monte Carlo critical values ($p = 0.035$). With the stricter wild bootstrap critical values of Phillips and Shi (2020), used by Lourenço et al. (2024), the null hypothesis of no explosive growth is rejected only for the ratio of house prices to the rent component of the harmonized index of consumer prices ($p = 0.017$); that index follows sitting tenancies and lags the rents of new leases. It is not rejected for the real price ($p = 0.28$) or for the ratio of prices to income ($p = 0.27$). Real prices fell by 18% in 2005–2011, and no test detects explosive growth before 2017. With the lagged real rate, the gap between the price and its fundamental value for Portugal is negative in 2022–2024 and becomes positive only in 2025, between 8% and 13% depending on the rate coefficient (the

higher value is the largest since 2002). For Lisbon the 2025 gap lies between −1% and 4%. These results do not establish a bubble, and no test of explosive growth was run on Lisbon alone.

B Specific groups and places

This annex covers suburban supply, employment and commuting; the housing conditions of immigrants; the European and Lisbon experience with the housing of immigrants; and student housing.

B.1 Suburbs, jobs and commuting

Most new supply has to come from the suburbs, yet suburban construction fell as much as Lisbon's. Sintra completed 9.2 dwellings per 1,000 dwellings of its stock a year in 2002–2007 and 1.5 in 2016–2025. The price elasticity of construction is higher in the suburbs of Lisbon than elsewhere. In the municipal panel, the elasticity of completions with respect to the real price lagged one year is 0.98, and it is higher by 0.82 (standard error 0.23) in those suburbs. Suburban construction remained low while suburban prices fell relative to Lisbon's. The appraisal value of the 17 suburbs averaged 58% of Lisbon's in 2011 and 44% in 2019, and returned to 58% in 2025.

Employment did not decentralize. Lisbon's share of the jobs of its metropolitan area rose from 37.1% in 2010 to 40.1% in 2024, and Porto's share of the jobs of its area from 24.9% to 26.7%. Suburbs with more construction also recorded higher employment growth. Across 28 suburbs of the two areas, the correlation between job growth in 2010–2024 and construction in 2016–2025 is 0.54. In a cross-section regression of construction in 2016–2025 that controls for pre-crisis construction, the 2011 commuting time and the metropolitan area, the coefficient of job growth is 2.42 ($p = 0.02$); the coefficient of the commuting time is not significant ($p = 0.44$). The estimate is an association and does not identify a causal effect. One plausible mechanism is the local demand for retail, schools and services that new residents generate. After 2013, suburban completions fell below the level implied by their pre-2013 relation to the real price (Section 9), and the concentration of employment in the core cities does not explain that fall.

The census commuting times understate congestion in a normal year. The 2011 census was taken in a recession year with light traffic, and the 2021 census during the pandemic, when working from home tripled. The two census figures are levels for two atypical years, and the paper does not treat them as a trend. Traffic counts cover the later years. Average daily traffic on the two Tagus bridges fell to 189,706 vehicles in 2013 and rose to 225,576 in 2025, an increase of 19% that took it above the 2008 peak; on the Vasco da Gama bridge the increase was 44%. Traffic entering Lisbon on the A1 rose by 13% from 2012, and passengers on the train across the 25 de Abril bridge by 31% from 2019 to 2025. Among suburban residents who work in Lisbon, the car's share of commuting trips rose from 46.9% in 2011 to 50.9% in 2021. Traffic has grown on the same two bridges, the newer of which opened in 1998, so commuting times into Lisbon most likely rose after 2013. The regression uses the 2011 census commuting time, which predates this increase; this may be why its coefficient is not significant.

Until 2018, relative prices are consistent with a congestion discount. The suburbs south of the Tagus, which reach Lisbon over the bridges, fell from 53% of Lisbon's appraisal value in 2011 to 36% in 2018, a relative fall of 32%; the northern suburbs fell from 63% to 49%,

a relative fall of 23%. Congestion did not prevent the recovery. With bridge traffic at its maximum, the southern suburbs returned to 52% of Lisbon's value in 2025, which is consistent with demand displaced by Lisbon's prices moving to the south bank. Longer commutes may have reduced the substitutability of suburban for central housing until 2018. Suburban relative prices fell until 2018 and recovered afterwards.

These results support planning at the scale of the metropolitan area. Land use is decided by each of the 18 municipalities of the Lisbon area, and transport by separate operators and agencies. The evidence favors higher residential density near stations with spare capacity. Additional crossing capacity over the Tagus and land for offices in the suburbs would widen households' choice of location. The costs and benefits of each of these measures extend beyond municipal boundaries. The municipality that would gain the dwellings is rarely the one that would host the bridge, the station or the jobs. Housing, transport and land for jobs need to be planned together, by a body with authority over the whole metropolitan area.

B.2 Immigrants' housing conditions

Without immigration, the resident population would have fallen: deaths exceeded births by 410,667 between 2011 and 2025. Immigration added to the labor force, and the resident population rose from 10.56 million in 2011 to 11.42 million in 2025.

The EU survey on income and living conditions shows that immigrants from outside the EU have much lower incomes than Portuguese citizens (Figure 12). The survey classifies people by citizenship, so it describes the stock of non-EU citizens, recent and older arrivals together. In 2025, 26% of adults with non-EU citizenship were at risk of poverty, against 15% of Portuguese citizens; 38% had housing costs above 40% of their income (4% of Portuguese citizens); 29% lived in overcrowded dwellings (10%); and 18% owned their home, against 75%. The ownership rate of non-EU citizens fell from 36% in 2021. Immigration adds to housing demand mainly through the rental market and through higher occupancy, with more persons per dwelling and per room. The model measures this margin by persons per dwelling. Higher rents raise the return on buy-to-let investment, which can transmit the rental pressure to purchase prices. The burden falls on low-income households, immigrant and Portuguese, who pay high rents or live in overcrowded dwellings.

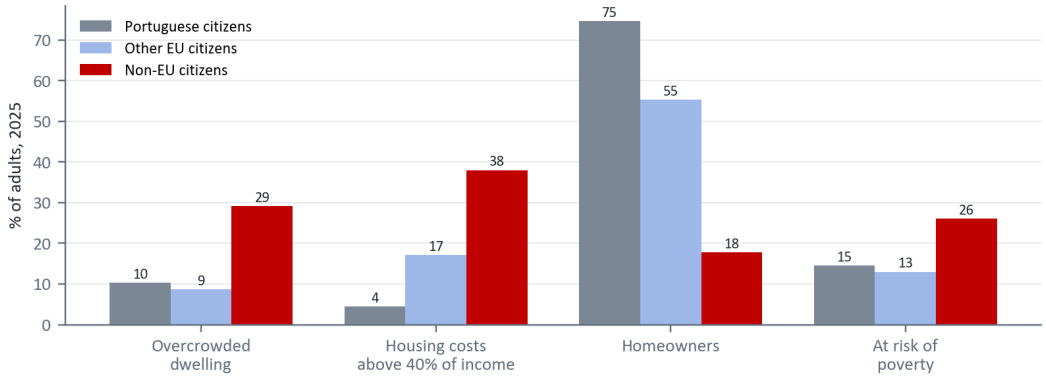

Figure 12: Housing conditions of adults by citizenship, Portugal, 2025. Source: Eurostat, EU-SILC (ilc_lvho15, ilc_lvho25, ilc_lvps15, ilc_li31). Samples of foreign citizens are small.

B.3 Housing for immigrants: lessons from Europe and from Lisbon

Several European countries have received large inflows of immigrants. Their experience distinguishes two problems that the Portuguese debate tends to conflate: the residential concentration of immigrants, and the concentration of poverty far from employment.

Sweden. The Million Programme built about 1,000,000 dwellings between 1965 and 1974, many of them in large estates on the edge of the cities (Hall and Vidén, 2005). The Stockholm estates remained close to the regional average until 1990 and diverged from it after the crisis of the 1990s, as changes in tenure and immigration altered their population (Andersson and Bråmå, 2018). In 2025 the police classified 65 areas as vulnerable, 19 of them as particularly vulnerable. Between 1985 and 1994 Sweden also assigned refugees to municipalities, which provides a natural experiment. Controlling for residential sorting, living among compatriots raised the earnings of less-skilled immigrants: a one-standard-deviation increase in ethnic concentration raised their earnings by 13% (Edin et al., 2003). Outcomes were worse where local labor-market conditions on arrival were weak, an effect that lasted at least ten years (Åslund and Rooth, 2007), and where jobs were distant: doubling the number of nearby jobs raised the employment probability by 2.9 percentage points (Åslund et al., 2010).

Denmark. A similar dispersal policy shows the same pattern: a larger ethnic enclave raised refugees' earnings by 18% (Damm, 2009). In 2018 Denmark adopted a plan against "parallel societies" that classified 15 areas as "hard ghettos". The housing law requires the share of public family dwellings in the listed areas to fall to 40% by 2030, through sales, conversions and demolitions. By December 2025, 5 areas remained on the list, with 13,489 residents. Critics argue that the law makes social rights conditional on the place of residence (Seemann, 2021). In December 2025 the Court of Justice of the EU held that defining the areas by the share of residents of non-Western origin can constitute direct discrimination (Case C-417/23).

France, the Netherlands and Germany. France's priority neighborhoods house 5.3 million people, 8.1% of the population of metropolitan France. Its urban renewal program operated in 546 neighborhoods, demolishing 164,400 social dwellings and building 142,000, at a total investment of 48.4 billion euros, as reported by the Banque des Territoires; it had no significant effect on house prices around the renewed neighborhoods (Chareyron et al., 2022). The Rotterdam Act of 2006 allows the city to refuse new residents without income from work in designated neighborhoods. It changed the composition of residents, but the living environment deteriorated and no improvement in safety was demonstrated (van Gent et al., 2018). Germany requires recognized refugees to reside for three years in the Land that received them (§ 12a of the Residence Act); those subject to this obligation are 6.1 percentage points less likely to be employed (Brücker et al., 2020), and, as in Sweden, local labor-market conditions on arrival shape their integration (Aksoy et al., 2023).

Summary of the evidence. The adverse outcomes are associated with concentrated poverty far from employment; the residential concentration of immigrants raised earnings in Sweden and Denmark. Children who moved to lower-poverty areas before the age of 13 earned more as adults (Chetty et al., 2016), and the European evidence favors social mixing that is voluntary and gradual (Galster and Friedrichs, 2015). For mixing imposed by demolition or by restrictions on who may move in, the evidence of benefits is weak, and in Denmark it has created a legal risk.

Lisbon. The Special Rehousing Program of 1993 (PER) registered 48,416 households living in shanty settlements in the Lisbon and Porto metropolitan areas and rehoused most of them in large estates, many on the periphery. The segregation of the immigrant groups from the former Portuguese colonies in Africa was moderate and falling in the 1990s: for Cape Verdeans, the segregation index fell from 0.45 to 0.37 between 1991 and 2001. The problem lay in housing conditions. In 2001, 12.6% of Cape Verdeans lived in shacks or similar dwellings, against 0.7% of Portuguese citizens (Malheiros and Fonseca, 2011). Southern European cities combine low segregation with the peripheralization and exclusion of immigrants (Arbaci and Malheiros, 2010; Malheiros and Vala, 2004). Some neighborhoods were not covered by rehousing, such as Cova da Moura in Amadora (Colombo and Allegra, 2024). In 2018, 25,762 households still lived in inadequate housing; the largest numbers were in Lisbon (2,867), Amadora (2,839), Almada (2,735) and Loures (2,673).

Of these four municipalities, Lisbon and Almada have crime rates above the national rate and Amadora and Loures below it (Table 42). In 2025 the national rate was 32.0 crimes per 1,000 residents. Lisbon (49.9), Barreiro (36.0) and Almada (32.9) were above it; Amadora (25.8), Sintra (25.7), Loures (26.8) and Seixal (24.7) were below. The rates record crimes at the place of occurrence, which raises Lisbon's rate because of commuters and visitors; they contain no information on the residence or nationality of offenders. Municipal rates may not reveal problems confined to particular neighborhoods.

Table 42: Crime rate by municipality, Lisbon metropolitan area, 2025. Crimes registered by the police where they occurred, per 1,000 residents. Source: INE and DGPJ, indicator 0012260.

Municipality	Crimes per 1,000 residents, 2025
Portugal	32.0
Lisbon	49.9
Barreiro	36.0
Almada	32.9
Moita	29.8
Loures	26.8
Amadora	25.8
Sintra	25.7
Seixal	24.7
Odivelas	17.2

Table 43 summarizes the experience of the six countries.

Table 43: The housing of immigrants in six countries. Sources in Section B.3.

Country	Program or legislation	Findings of the evaluations
Sweden	Large suburban estates (Million Programme, 1965–1974); dispersal of refugees, 1985–1994	Enclaves raised the earnings of less-skilled immigrants (13%); job access and local unemployment on arrival affected outcomes; 65 vulnerable areas in 2025
Denmark	Dispersal of refugees; 2018 law on "parallel societies", cap of 40% on public family housing by 2030	Enclaves raised earnings (18%); 5 listed areas in 2025; EU Court: the origin criterion can be discrimination
France	Grands ensembles; urban renewal program from 2004, with demolition and rebuilding	No significant effect on surrounding house prices
Netherlands	Rotterdam Act, 2006: limits on new residents without income from work	Changed the composition of residents; living environment deteriorated; no gain in safety shown
Germany	Residence obligation for recognized refugees, three years, 2016	Employment 6.1 percentage points lower for those subject to it
Portugal	Rehousing program of 1993 (48,416 households), many in large peripheral estates	Moderate and falling segregation; 25,762 households in inadequate housing in 2018

Recommendations. Five recommendations for Portugal follow. First, build public and cooperative housing in small developments across the metropolitan area, with a mix of incomes and tenures, near transport and employment, and no new large estates. Second, use the existing stock by acquiring or leasing dispersed dwellings, vacant ones included, and letting them at controlled rents. Third, enforce occupancy standards against overcrowding and provide an alternative supply: workers' housing built or leased jointly with the sectors that employ most immigrants, under public standards. Fourth, plan land, transport and school capacity in advance for projected immigration. Fifth, regenerate the rehousing estates of the 1990s through investment in schools, public space and transport, without forced displacement or restrictions on who may reside there.

B.4 Student housing in Lisbon and Porto

Students account for a large and rising share of housing demand in both cities. Their housing is also the segment whose public supply the State plans directly. Enrollment in higher education in the municipality of Lisbon rose from 110,781 in 2014/15 to 140,307 in 2025/26, an increase of 27%; in Porto, from 55,251 to 73,231, an increase of 33%. A large share of these students live away from their families: in 2016/17, 30% of the students of the Lisbon metropolitan area and 35% of those of the Porto area studied away from home, and in 2020/21, during the pandemic, 61.2% of the students in Lisbon lived with their parents. International students add to this demand. The literature on Lisbon describes them as a new group of urban consumers who compete with tourists for the same central dwellings (Malet Calvo, 2018; França et al., 2023). Digital platforms now let rooms by the semester, an intermediate form between short-term tourist rental and the long-term lease (Cocola-Gant and Malet Calvo, 2023).

Public supply did not keep pace. Public residences offered 15,013 beds in 2009 and 15,073 in 2021. In 2016/17 the residences of the municipality of Lisbon had beds for 6.6% of its displaced students, against 10.6% in Porto and 9.2% and 9.7% in the two metropolitan areas.

The national plan for student housing (PNAES), financed since 2021 by the recovery plan, has contracted 18,758 beds in 134 projects. Of these, 7,159 are renovations of existing beds, so the net addition to the stock is 11,599 beds. By 24 June 2026, 5,014 beds in 53 projects had been completed (Brito and Serpa, 2026).

Rents rose with the shortage of beds. The asking rent of a room listed for students in Lisbon went from €350 a month in January 2022 to €500 in November 2025, and in Porto from €286 to €400. Students in Lisbon who did not live with their parents reported a median housing cost of €350 a month in 2022/23. Students in Lisbon and Porto report poorer housing conditions than students elsewhere in the country, and the gap varies with family income (Aguiar et al., 2026). No official estimate of the shortfall of beds exists for either city.

The housing supplement. Displaced students with a scholarship who do not obtain a place in a residence receive a monthly supplement equal to the rent they pay, up to a cap. In 2024/25 the cap was €483.80 in Lisbon and €458.33 in Porto; from 2025/26 it is 95% of the social support index (IAS) in both. Eligibility is means-tested through the scholarship. The amount is not means-tested. Within the cap, the supplement covers the full rent irrespective of family income. In 2024/25 displaced students without a scholarship could receive up to half the cap if their household income per head was at most 28 times the IAS. A law of 2025 extended the full supplement, up to the same caps, to students from households with annual income up to the sixth bracket of the personal income tax (Law 8/2025). The asking rent of a room in Lisbon in November 2025, €500, stood above the cap of 2025/26, €496.38.

When the stock does not grow, a supplement equal to the rent paid can pass into rents; the extent of the pass-through depends on the share of renting students who receive it. Below the cap, the student gains nothing from a cheaper room, and the landlord can set the rent up to the cap. In France, housing benefits raised rents by a large fraction of their value (Fack, 2006). The result of Section 8, that additional demand raises prices when the stock is inelastic, applies with greater force to a subsidy tied to the rent paid. Four changes to the supplement follow. First, grade the supplement by household income, so that it covers a share of the rent that falls as income rises, with the full share only for the poorest scholarship holders. Second, keep a co-payment in every case, so that the student gains from a cheaper room. Third, set the supplement against a reference rent for the municipality, such as the median rent of rooms. A supplement set this way removes the incentive to set rents at the cap. Fourth, allocate the savings to residence beds. Each additional bed moves one student out of the private rental market, which lowers rents for students and for the residents who compete for the same rooms.

Student housing in five other countries. Portugal has the fewest public beds per student of the six countries and the lowest share of students in student housing (Table 44). Germany sets the housing part of its student grant as a flat amount, whatever the rent; France pays the rent up to a ceiling less a contribution that rises with income; the Netherlands and Denmark tie a means-tested benefit to the rent. Portugal pays the rent up to a cap, with no contribution that rises with income. Estimates of the pass-through to rents differ widely. In France, each euro of housing benefit raised rents by about 78 cents (Fack, 2006). In Finland, earlier studies found 60 to 70 cents (Kangasharju, 2010) and a third to a half (Viren, 2013), and a recent study of a reform found 3.6 cents, where recipients did not change their housing choices (Eerola et al., 2026). A benefit equal to the rent paid gives the recipient an incentive to choose a more expensive room; this is the channel through which benefits pass into rents. A flat amount or a reference rent removes that incentive.

Table 44: Student housing in six countries. Beds: Germany, Studierendenwerke and other public halls (2025); France, Crous (2025); Netherlands, housing corporations (2024/25); Denmark, social youth housing (2024); Sweden, all student dwellings (2025, an upper bound); Portugal, public residences (2021) over enrollment in 2021/22. Denominators differ by country. Share in student housing: EUROSTUDENT VIII (Germany 2021, France and Portugal 2023, the others 2022).

Country	Public or non-profit beds per 100 students	Students in student housing (%)	How the housing support is set
Portugal	3.5	9	Rent paid up to a municipal cap; access means-tested, amount not graded by income
Germany	10.1	13	Flat €380 a month in the means-tested student grant, whatever the rent
France	5.9	12	Rent paid up to a zonal ceiling, less a contribution that rises with income
Netherlands	17.8	29	Means-tested rent benefit on the rent paid up to a cap; self-contained dwellings only
Denmark	18.7	27	Means-tested benefit tied to the rent; private kitchen required
Sweden	29.9	27	Small means-tested allowance; rent counted up to a cap unchanged since 1997

C The welfare model of housing policies

This annex reports all the columns of the welfare model of Section 16.1 for both metropolitan areas (Table 45) and the main parameters of the model (Table 46). Each parameter has a band. The values taken from data come from the paper's estimates; the construed values are declared.

Table 45: Housing policies and social welfare, Lisbon and Porto: all columns.

Policy	Zone	Dwellings (main; lower)	Prices, % (main; lower)	Welfare, M€ (main; lower [band])	Per euro	Shortfall by year 10, % (main; lower)	Time to effect, years	P(loss)	Fiscal exposure, M€	Welfare, 5th–95th, M€
Lisbon										
Upzoning near rail and metro	both	18,892; 19,879	C −1.7, S −2.7; C −0.9, S −1.4	847; 908 [363 to 1,611]	no public cost	3.1 (1.2–7.9); 3.3	5.0 (2.6–6.0)	6%	none	−36 to 2,642
Faster licensing	both	2,603; 2,742	C −0.2, S −0.4; C −0.1, S −0.2	449; 456 [133 to 930]	no public cost	0.7 (0.1–1.5); 0.7	2.0 (1.0–3.0)	0%	none	47 to 1,164
Public rental on public land, city (large derelict sites)	city	9,468; 9,741	C −2.3, S −0.6; C −1.8, S −0.3	1,106; 1,126 [645 to 1,567]	covers its cost	1.3 (0.7–3.2); 1.4	5.6 (3.3–7.0)	0%	537	406 to 1,919
Public rental on public land, suburbs	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	304; 330 [37 to 571]	1.19	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	15%	706	−185 to 835
Land lease by tender with a land fund (surface rights)	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	336; 363 [80 to 554]	3.63	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	11%	393	−106 to 817
Developer credit through a guarantee fund	suburbs	25,947; 27,358	C −2.0, S −3.8; C −0.9, S −2.0	965; 1,063 [−2 to 1,768]	49.82	6.8 (2.2–23.0); 7.1	2.0 (1.0–3.0)	40%	129	−137 to 3,741
Limited-profit housing associations with a guarantee fund	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	354; 379 [135 to 572]	83.26	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	9%	21	−39 to 797
Housing cooperatives on public land in surface rights	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	306; 331 [39 to 573]	1.26	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	12%	534	−146 to 798
Social housing for low incomes (rents geared to income)	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	208; 234 [−59 to 475]	0.28	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	22%	1,246	−289 to 732
Rehabilitation of vacant homes, owners with means (deadlines, forced sale or letting)	city	4,554; 4,685	C −1.1, S −0.3; C −0.9, S −0.1	1,025; 1,032 [473 to 1,573]	no public cost	1.2 (0.2–2.8); 1.2	2.0 (1.8–2.3)	0%	none	242 to 2,283

Policy	Zone	Dwellings	Prices	Welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure	Welfare, 5th–95th
Rehabilitation of vacant homes, poor or elderly owners and blocked inheritances (public works loan)	city	6,154; 6,332	C −1.5, S −0.4; C −1.2, S −0.2	1,366; 1,377 [823 to 1,906]	18.03	1.6 (0.6–3.2); 1.6	2.0 (1.8–2.3)	0%	290	488 to 2,677
Tax on vacant homes (IMI surcharge)	city	1,600; 1,646	C −0.4, S −0.1; C −0.3, S −0.0	393; 395 [215 to 571]	covers its cost	0.4 (0.1–0.9); 0.4	2.0 (1.8–2.3)	0%	raises revenue	124 to 824
Conversion of public buildings to housing (per 1,000 dwellings)	city	947; 974	C −0.2, S −0.1; C −0.2, S −0.0	147; 148 [100 to 193]	covers its cost	0.2 (0.1–0.3); 0.2	2.7 (2.1–3.3)	0%	16	83 to 230
Student residences (per 1,000 beds)	city	379; 390	C −0.1, S −0.0; C −0.1, S −0.0	84; 85 [59 to 110]	covers its cost	0.1 (0.0–0.2); 0.1	5.6 (3.3–7.0)	0%	20	41 to 120
Permanent affordability of subsidized homes	national	–	C 0.0, S 0.0; C 0.0, S 0.0	−27; −27 [−108 to 27]	−0.20	–; –	–	68%	595	−162 to 40
New suburban centers (township: dwellings + land fund + transport link)	suburbs	8,996; 9,485	C −0.7, S −1.3; C −0.3, S −0.7	101; 127 [−197 to 1,637]	0.16	1.3 (0.7–3.2); 1.3	5.6 (3.3–7.0)	39%	1,008	−594 to 3,983
Transport link between suburbs (Linha Violeta, Loures-Odivelas)	suburbs	–	C 0.0, S 0.0; C 0.0, S 0.0	−236; −236 [−533 to 1,301]	−0.45	–; –	–	62%	685	−735 to 3,502
Moving public services to the suburbs (per 1,000 jobs)	both	–	C −0.0, S 0.0; C −0.0, S 0.0	2; 2 [0 to 10]	cost not known	–; –	–	0%	not known	0 to 50
Housing First	national	–	–	–	−0.20; 1.80 weighted	–; –	–	–	–	–
Rent control, second generation (limits on increases within a tenancy)	both	–	C 0.0, S 0.0; C 0.0, S 0.0	−198; −198 [−475 to −79]	no public cost	–; –	–	100%	none	−950 to −40
Demand subsidies (buyer support, rent supplements, IRS Jovem)	both	207; 218	C 0.5, S 0.3; C 0.5, S 0.3	−234; −234 [−356 to −112]	−0.19	–; –	–	100%	1,698	−445 to −78
Student rent supplement	city	–	C 0.0, S −0.0; C 0.0, S −0.0	−4; −4 [−8 to −2]	−0.20	–; –	–	100%	46	−13 to −2

Policy	Zone	Dwellings	Prices	Welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure	Welfare, 5th–95th
Rent control, first generation (ceiling on all rents)	both	–	C 0.0, S 0.0; C 0.0, S 0.0	−4,243; −4,243 [−8,487 to −2,122]	no public cost	–; –	–	100%	none	−12,730 to −1,061
Faster commuting, network-wide (zone model scenario)	both	296; 188	C −0.8, I −1.2, O 3.1; C −0.7, I −0.9, O 2.2	13,437; 13,437 [3,366 to 65,409]	cost not known	–; –	–	0%	not known	2,505 to 65,409
City jobs held at the 2010 share (zone model scenario)	both	87; 49	C −0.5, I 0.1, O 0.5; C −0.5, I 0.0, O 0.3	61; 61 [15 to 435]	cost not known	–; –	–	0%	not known	5 to 2,119
Porto										
Upzoning near rail and metro	both	15,776; 17,511	C −4.2, S −4.8; C −2.7, S −2.2	328; 397 [−40 to 649]	no public cost	16.8 (6.2–41.6); 18.6	4.5 (2.3–5.5)	20%	none	−358 to 1,342
Faster licensing	both	1,991; 2,196	C −0.7, S −0.6; C −0.5, S −0.3	269; 276 [80 to 555]	no public cost	3.1 (0.4–6.4); 3.4	2.0 (1.0–3.0)	0%	none	30 to 668
Public rental on public land, city (large derelict sites)	city	7,984; 8,596	C −4.4, S −1.2; C −3.6, S −0.5	412; 440 [137 to 687]	2.13	7.5 (3.6–17.5); 8.1	5.1 (3.0–6.5)	9%	693	−94 to 926
Public rental on public land, suburbs	suburbs	8,189; 9,189	C −1.4, S −3.0; C −0.6, S −1.4	−3; 32 [−241 to 179]	−0.01	7.7 (4.0–18.3); 8.6	5.1 (3.0–6.5)	46%	786	−409 to 423
Land lease by tender with a land fund (surface rights)	suburbs	8,189; 9,189	C −1.4, S −3.0; C −0.6, S −1.4	21; 56 [−217 to 204]	0.08	7.7 (4.0–18.3); 8.6	5.1 (3.0–6.5)	42%	548	−350 to 411
Developer credit through a guarantee fund	suburbs	13,762; 15,443	C −2.3, S −5.0; C −0.9, S −2.3	100; 163 [−222 to 348]	7.73	21.2 (4.9–70.1); 23.8	2.0 (1.0–3.0)	58%	83	−641 to 848
Limited-profit housing associations with a guarantee fund	suburbs	8,189; 9,189	C −1.4, S −3.0; C −0.6, S −1.4	71; 103 [−120 to 218]	18.76	7.7 (4.0–18.3); 8.6	5.1 (3.0–6.5)	32%	19	−253 to 421
Housing cooperatives on public land in surface rights	suburbs	8,189; 9,189	C −1.4, S −3.0; C −0.6, S −1.4	35; 68 [−156 to 216]	0.19	7.7 (4.0–18.3); 8.6	5.1 (3.0–6.5)	36%	398	−326 to 422
Social housing for low incomes (rents geared to income)	suburbs	8,189; 9,189	C −1.4, S −3.0; C −0.6, S −1.4	−74; −40 [−311 to 109]	−0.10	7.7 (4.0–18.3); 8.6	5.1 (3.0–6.5)	58%	1,163	−474 to 354

Policy	Zone	Dwellings	Prices	Welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure	Welfare, 5th–95th
Rehabilitation of vacant homes, owners with means (deadlines, forced sale or letting)	city	1,575; 1,695	C −0.9, S −0.2; C −0.7, S −0.1	244; 248 [112 to 375]	no public cost	2.4 (0.5–5.8); 2.6	2.0 (1.8–2.3)	0%	none	51 to 545
Rehabilitation of vacant homes, poor or elderly owners and blocked inheritances (public works loan)	city	2,128; 2,291	C −1.2, S −0.3; C −1.0, S −0.1	323; 329 [194 to 451]	10.39	3.3 (1.1–6.6); 3.5	2.0 (1.8–2.3)	0%	119	103 to 629
Tax on vacant homes (IMI surcharge)	city	553; 596	C −0.3, S −0.1; C −0.3, S −0.0	95; 96 [53 to 137]	covers its cost	0.8 (0.2–1.8); 0.9	2.0 (1.8–2.3)	0%	raises revenue	28 to 195
Conversion of public buildings to housing (per 1,000 dwellings)	city	798; 860	C −0.4, S −0.1; C −0.4, S −0.1	78; 80 [50 to 105]	covers its cost	1.1 (0.6–1.8); 1.2	2.7 (2.1–3.3)	0%	30	34 to 132
Student residences (per 1,000 beds)	city	319; 344	C −0.2, S −0.0; C −0.1, S −0.0	48; 49 [23 to 65]	covers its cost	0.3 (0.1–0.8); 0.3	5.1 (3.0–6.5)	0%	20	12 to 73
Permanent affordability of subsidized homes	national	–	C 0.0, S 0.0; C 0.0, S 0.0	−20; −20 [−81 to 20]	−0.20	–; –	–	66%	444	−121 to 30
Moving public services to the suburbs (per 1,000 jobs)	both	–	C −0.0, S 0.0; C −0.0, S 0.0	8; 8 [2 to 37]	cost not known	–; –	–	0%	not known	1 to 37
Housing First	national	–	–	–	−0.20; 1.80 weighted	–; –	–	–	–	–
Rent control, second generation (limits on increases within a tenancy)	both	–	C 0.0, S 0.0; C 0.0, S 0.0	−68; −68 [−162 to −27]	no public cost	–; –	–	100%	none	−324 to −14
Demand subsidies (buyer support, rent supplements, IRS Jovem)	both	621; 682	C 1.1, S 0.6; C 1.1, S 0.7	−193; −192 [−302 to −85]	−0.18	–; –	–	100%	1,530	−404 to −52
Student rent supplement	city	18; 19	C 0.1, S −0.0; C 0.1, S −0.0	−3; −3 [−6 to −1]	−0.15	–; –	–	99%	46	−11 to −1
Rent control, first generation (ceiling on all rents)	both	–	C 0.0, S 0.0; C 0.0, S 0.0	−1,449; −1,449 [−2,898 to −724]	no public cost	–; –	–	100%	none	−4,347 to −362

Policy	Zone	Dwellings	Prices	Welfare	Per euro	Shortfall by year 10	Time	P(loss)	Fiscal exposure	Welfare, 5th–95th
Faster commuting, network-wide (zone model scenario)	both	33; 60	C 0.4, R −0.2; C 0.4, R −0.1	875; 875 [219 to 4,259]	cost not known	–; –	–	0%	not known	165 to 4,259
City jobs held at the 2010 share (zone model scenario)	both	–	C −0.2, R 0.1; C −0.1, R 0.0	104; 104 [26 to 504]	cost not known	–; –	–	0%	not known	20 to 504

Every column is computed by the model; the table gives no overall ranking. Each cell gives the main run first and the lower bound second; in brackets, the range of the main run when each parameter is set, one at a time, at either end of its band. Shortfall by year 10 and time to effect: central value and the 5th and 95th percentiles of the random combinations, which include the delivery lags (Section 16.1). Prices: percentage change; C the city, S the suburbs; I and O the inner ring and the south bank in the zone-model scenarios.

Table 46: Calibration of the welfare model (main run).

Parameter	Low	Central	High	Status	Source
Horizon (years)	5	10	15	construed	declared
Shadow cost of public funds	0.10	0.20	0.30	construed	declared band
Construction cost (€/m², 2025)	983	1,278	1,662	data	Portaria 69-B/2024 and INE
Opportunity cost of land (share of price)	0.00	0.15	0.30	construed	declared band
Discount rate	0.03	0.04	0.05	construed	declared band
Licensing delay (years)	1.62	2.98	2.98	data	Lisbon open data, 2025
Share of the 2013–2025 lengthening reversed	0.25	0.50	1.00	construed	declared band
Share of Auckland's increase in the rate of construction attained	0.25	0.50	1.00	construed	declared band
Share of the post-2013 credit-related supply break removed by a guarantee fund	0.00	0.50	1.00	construed	declared band
Crowd-out of private construction	0.00	0.20	0.50	construed	declared band
Weight of renters and entrants	1.00	1.25	1.50	construed	value judgement
Weight of the long-term homeless	2.00	3.00	5.00	construed	value judgement
Elasticity of the price with respect to occupancy, Lisbon city	1.16	1.32	1.78	data	zone model
Elasticity of the price with respect to occupancy, Lisbon suburbs	0.98	2.18	2.44	data	zone model
Price elasticity of supply, Lisbon suburbs	1.35	1.60	1.86	data	zone model
Elasticity of occupancy with respect to the relative price	0.00	1.02	1.36	construed	zone model, construed
Weight of access to jobs	0.07	0.29	1.41	data	zone model (not identified)

The lower bound changes only the elasticities of the price with respect to occupancy: every zone takes the national elasticity, 0.98. The full list of parameters and their sources is in the statistical annex (workbook), sheet G9.

D The new Lisbon airport and housing

This annex applies the results of the paper to two scenarios for the growth of air traffic: a Lisbon airport with 100 million passengers a year, and a network of airports that spreads the same added traffic over Lisbon, Porto and Faro.

D.1 An airport with 100 million passengers

Lisbon airport handled 36.1 million passengers in 2025. Since 2011, nights in Lisbon have grown at the same rate as passengers (elasticity 1.02). An airport of 100 million multiplies traffic by 2.77. A hub grows mostly with transit passengers, who do not stay in the city. According to the demand study of the Independent Technical Commission (PT1, Summary Report, table 2), 25% of the passengers of Lisbon airport were in transit in the base year, and the share should rise to values below 35%, the Schiphol benchmark. With 35% at 100 million passengers, 41% of the added traffic would be in transit. This is the central case. Table 47 also gives other assumptions.

Table 47: A Lisbon airport with 100 million passengers: effects on Lisbon rents and prices.

Transit in added traffic	Visitor arrivals (multiplier)	Added equivalent residents	Rents: demand equivalence (euros a month, two-bedroom)	Rents: literature, central (euros a month)	Prices
25%	2.77	186,281	22.7% (306)	13.9% (188)	17.7% to 29.1%
40%	2.42	149,025	18.2% (245)	11.9% (161)	15.2% to 23.2%
50%	2.18	124,187	15.1% (205)	10.5% (142)	13.3% to 19.3%
65%	1.83	86,931	10.6% (143)	8.0% (108)	10.1% to 13.4%

Long-run effects, at constant income and housing supply, on Lisbon's 2025 levels. The central case uses the transit share projected by the Independent Technical Commission. Added equivalent residents: Lisbon's tourist beds in 2025 times the visitor multiplier minus one.

In the central case, with about 40% of the added traffic in transit, the rent of a two-bedroom dwelling in Lisbon rises by 11.9% to 18.2%, or 161 to 245 euros a month, and prices rise by 15.2% to 23.2% (Figure 13). These figures net out the passengers in transit, which reduces the effect.

The most visible effect is on tourism intensity, measured by nights per resident. With the hub, nights in the municipality of Lisbon would go from 16.0 million in 2025 to 39.2 million in the central case, and from 24.3 to about 57 per resident, assuming population growth of 4%, as the Independent Technical Commission projects for the metropolitan area. Depending on the transit share, the value runs from 43 to 66. In 2019 only Venice (49.8) had a value of this order among European cities; Florence had 29.6 and Rome 11.0. Lisbon would have more nights per resident than Venice; with the balanced network it would stay at about 47, close to Venice. Venice charges an access fee to day visitors.

D.2 A balanced network of airports

The alternative spreads the same added traffic, 63.9 million passengers, over Lisbon, Porto and Faro, in proportion to their 2025 traffic (57%, 27% and 16%), including today's share of transit passengers. Beja has no scheduled traffic and is left out. Each airport doubles its visitor arrivals; nights follow passengers with the elasticity observed in each city (Table 48).

Table 48: A balanced network of airports: effects on rents and prices.

	Added passengers (million)	Visitor arrivals (multi-plier)	Elasticity of nights to passengers, 2011–2025	Rents	Rent of a two-bedroom (euros a month)	Prices
Lisbon	36.4	2.01	1.02	9.5% to 13.3%	129 to 180	12.0% to 16.9%
Porto	17.1	2.01	1.25	11.8% to 19.5%	134 to 221	15.0% to 25.0%
Faro	10.4	2.01	1.61	15.5% to 16.4%	120 to 127	19.7% to 20.9%
Lisbon, hub of 100 million	63.9			8.0% to 22.7%	108 to 306	

Ranges between demand equivalence, which counts tourist beds, and the central elasticity of the literature. Long-run effects, at constant income and supply.

The effect on housing depends on the number of visitors who stay in the city. A hub that grows mostly with transit passengers adds little housing demand in Lisbon: with two thirds of the added traffic in transit, its effect on rents is smaller than that of the balanced network. The balanced network reduces the effect in Lisbon when the hub's added traffic would be mostly visitors, and then it shifts the same demand to Porto and Faro, where the effect is similar or larger. With the projection of the Independent Technical Commission, about 40% of the hub's added traffic would be in transit and the rest visitors; the hub would raise Lisbon rents by 11.9% to 18.2%, more than the balanced network (9.5% to 13.3%).

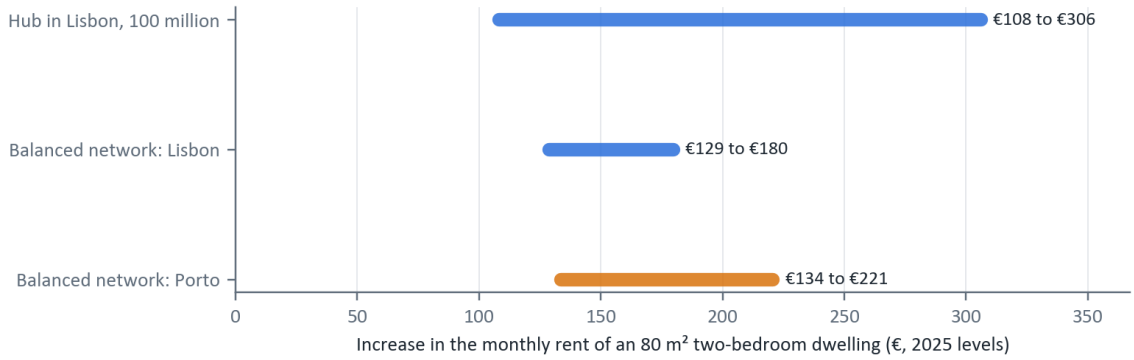

Figure 13: Increase in the monthly rent of an 80 m^2 two-bedroom dwelling: hub in Lisbon and balanced network. Ranges between demand equivalence and the central elasticity of the literature.

Limits of this application.

- The share of passengers in transit follows the projection of the Independent Technical Commission; a larger share reduces the effect. The national register of short-term rentals lists active units only. Canceled units do not appear, so short-term rentals are understated in the early years.