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MACROECONOMIC IMPACT OF HOUSING AVAILABILITY IN THE EU

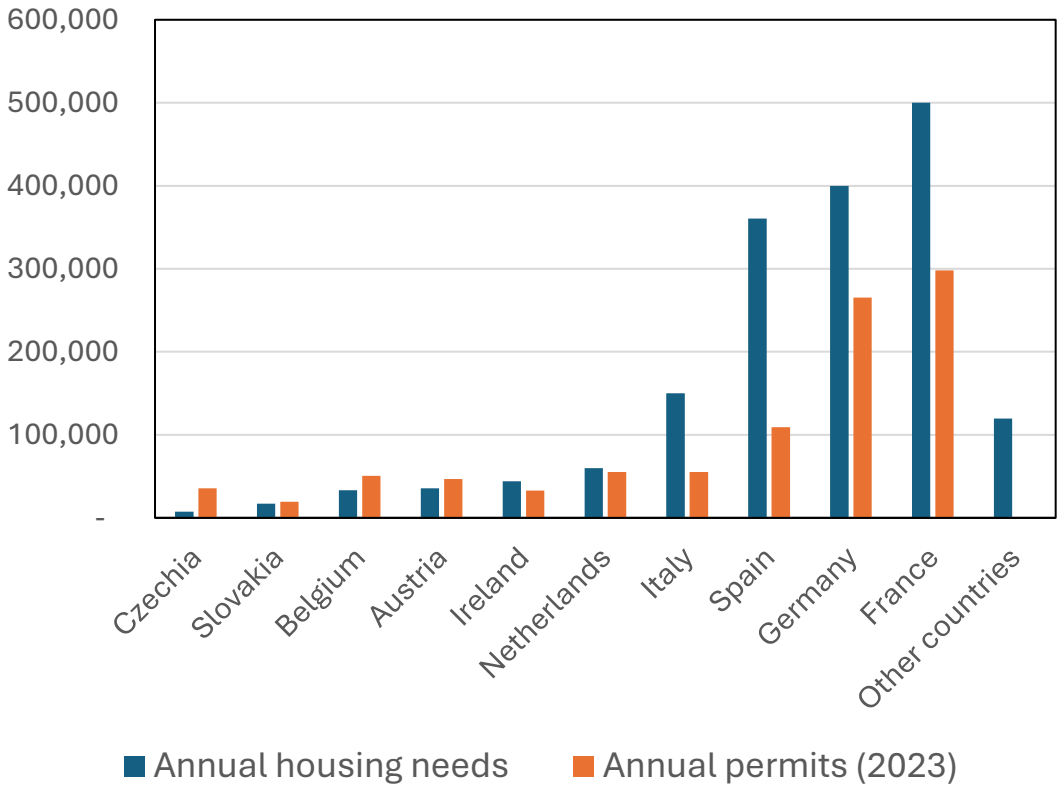
CHIARA FRATTO, MAGNUS RAAB

NOVEMBER 2026



Future housing needs vs housing supply

Projected housing needs and permits in the EU (number of units, annual)



To cope with demand, the EU must build an estimated 1.7 million housing units per year

Source: EIB Investment Report 2024/2026

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THIS PAPER

- **Quantifies macroeconomic impact of lack of housing affordability in the EU**:
  - **WHY TO ADDRESS HOUSING AFFORDABILITY?**
    a) macroeconomic implications of housing constraints (GDP, labour allocation, inequality)
    b) how many workers cannot access better labour markets due to lack of affordable housing
  - **HOW TO ADDRESS HOUSING AFFORDABILITY?**
    a) which regions/cities to prioritise for housing interventions
    b) how much employment/GDP specific distressed cities are giving up

- **Approach:**
  - **Use NUTS3 level data** (ESPON provided data on housing prices)
  - **Calibrate a Rosen-Roback** model linking workers' location choices, housing and GDP (building on a long academic tradition from the US – first of its kind in the EU)
  - **Compute counterfactuals** where we increase housing supply/reduce housing prices

- **Limitations:**
  - no social considerations
  - no meaningful difference between renting vs owning
  - no optimal policy mix of housing interventions

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THE SIMPLEST MODEL

Workers:
- Provide inelastically 1 unit of labour
- Choose where to locate within the country
- Consume everything they earn

$$V_i = \frac{W_i Z_i}{P_i^{\beta}}$$

Firms:
- Produce a homogeneous good using labour L and land T
- The production function has decreasing returns to scale

$$Y_i = A_i L_i^{\alpha} T_i^{1-\alpha}$$

Landlords:
- Housing prices respond to housing demand, proxied by population
- An absent landlord earn the rent

$$P_i = \overline{P_i} L_i^{\gamma_i}$$

In equilibrium:

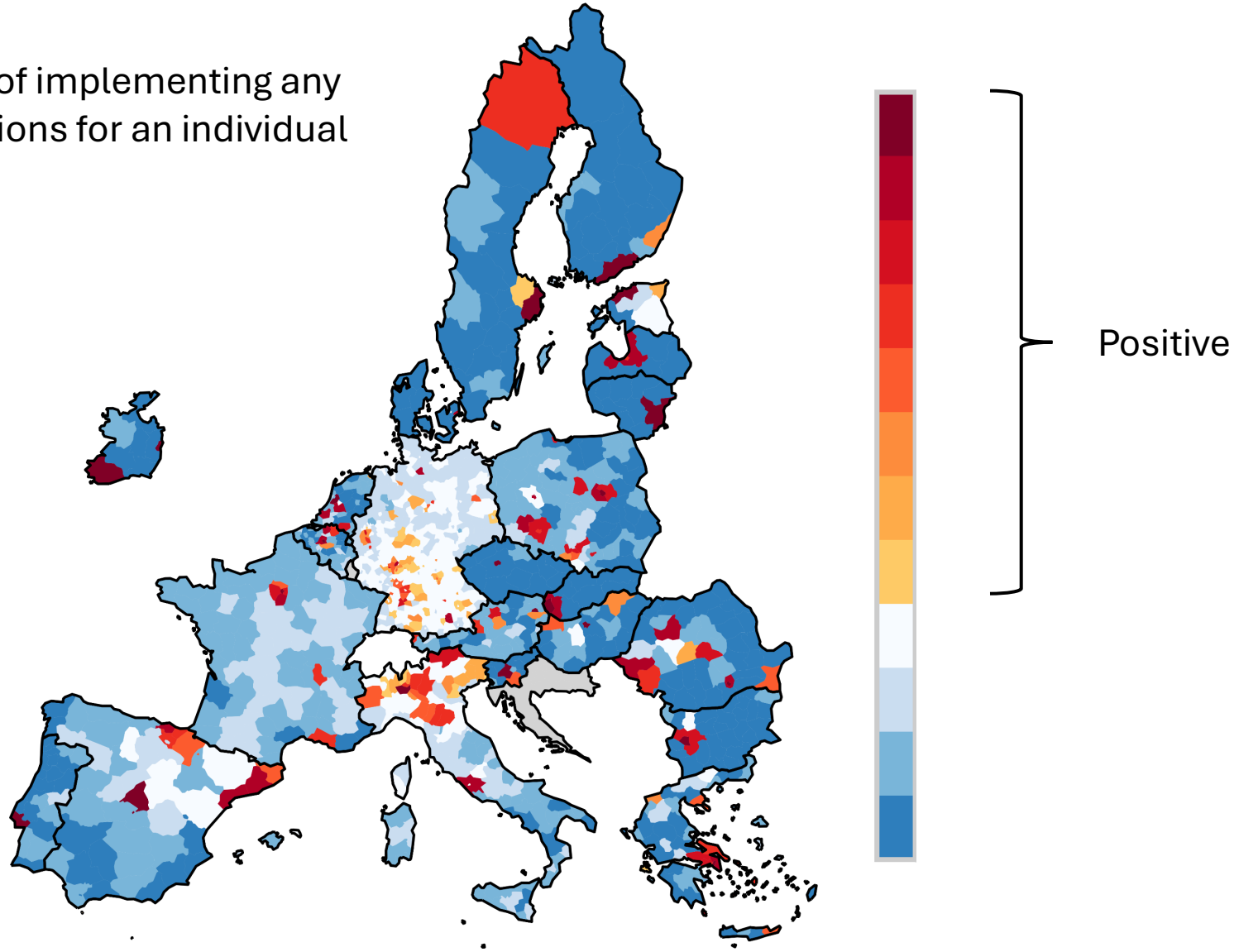
- Workers choose optimally where to locate such that utility equal across cities
- Firms minimise costs

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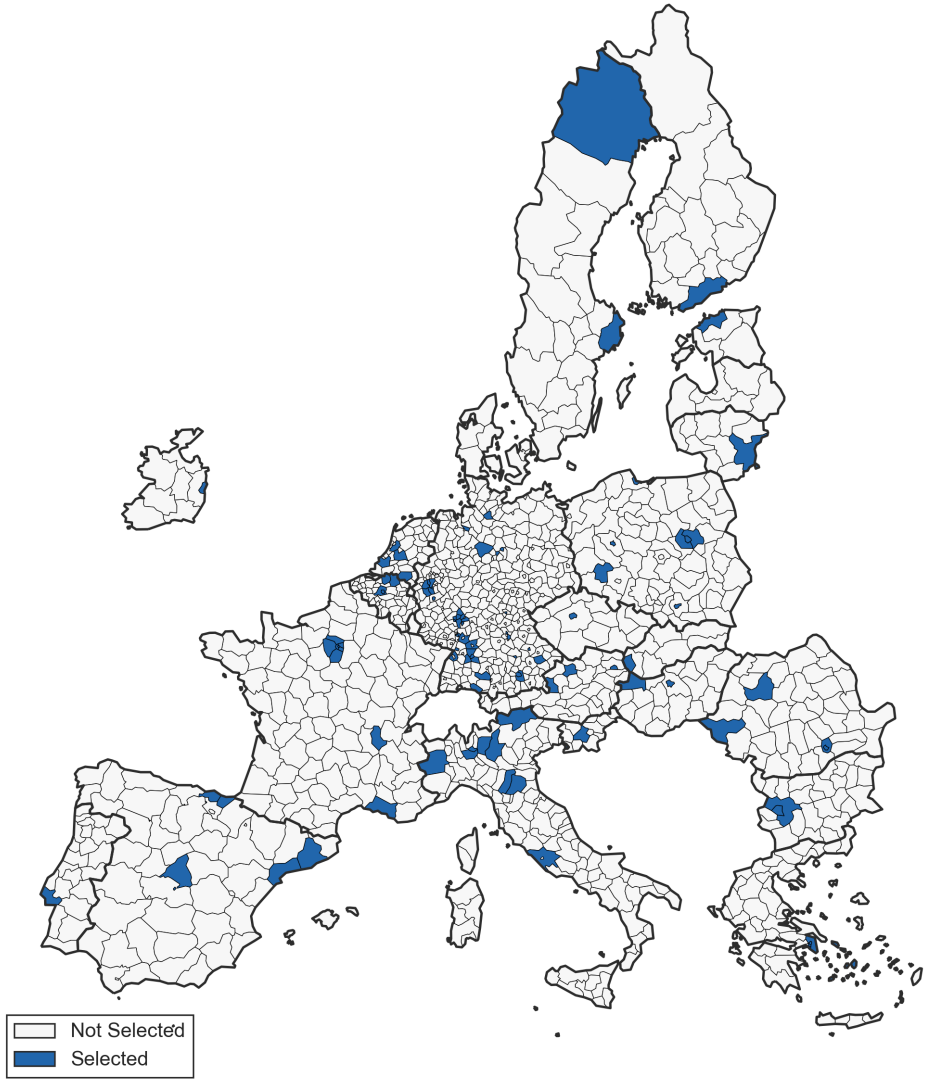
HOW TO TARGET HOUSING INTERVENTIONS TO MAXIMISE MACROECONOMIC BENEFITS?

PRIORITISE REGIONS WITH HIGH HOUSING COSTS AND HIGH LABOUR PRODUCTIVITY

Impact on national GDP of implementing any kind of housing interventions for an individual NUTS3 region



QUANTIFYING THE MACROECONOMIC COST OF THE LACK OF AFFORDABLE HOUSING



Counterfactual exercise:

1. Select the 10% of the regions

2. Compare the current equilibrium with a counterfactual where housing interventions lead to housing costs in those regions decrease to the national average

EU-wide results: No migration from outside the EU

Notes: Baltics considered as one single geographical area. Luxembourg, Cyprus, and Malta dropped due to too few NUTS3 regions. Croatia dropped due to missing data.

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MEDIUM-TERM BENEFITS OF ADDRESSING HOUSING AFFORDABILITY CRISIS

EU-WIDE RESULTS WITH IMPERFECT LABOUR MOBILITY

Housing price reduction in 10% of the EU regions to the national average

→ Making available 5.5 million extra housing units (with 0.6 house price elasticity)

→ Consistent with pre-existing housing gap of 4.6 million units (JRC) + future housing gap of 1.7 million units per year (EIBG)

→ Estimated cost: 0.7% of GDP

EU-Level Results:

- EU's GDP increases by 1.7%
- Wage inequality decreases by 1.5%

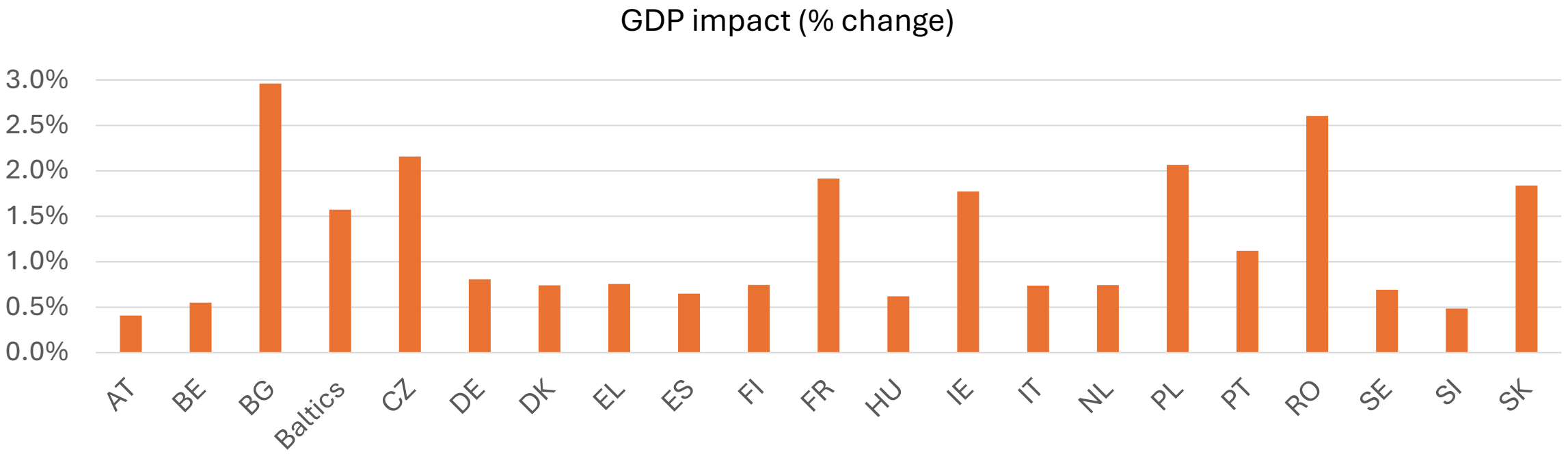
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MEDIUM-TERM BENEFITS OF ADDRESSING HOUSING AFFORDABILITY CRISIS

COUNTRY-SPECIFIC RESULTS WITH IMPERFECT LABOUR MOBILITY

Country-Level Results:

- National GDP increases by 0.4 to 3%
- Wage inequality decreases by 0.6 to 3.1%



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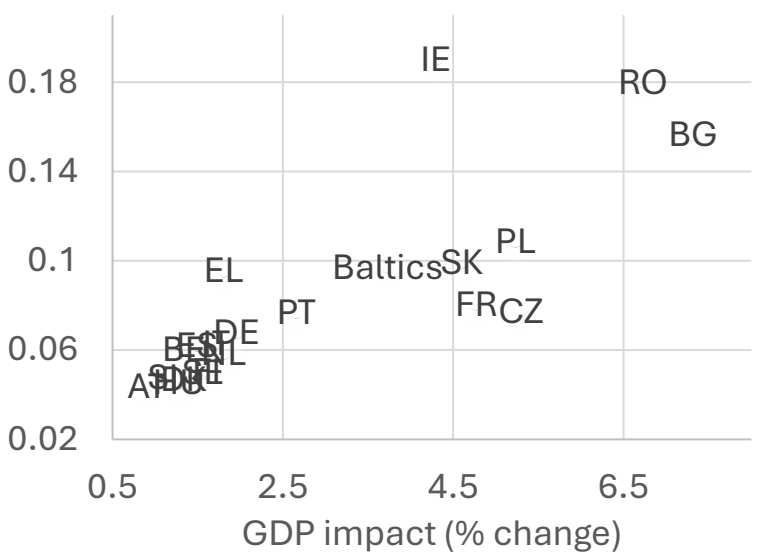
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EXPLAINING THE HETEROGENEITY IN THE GDP IMPACT:
CONCENTRATION IN NATIONAL INCOME, LABOUR PRODUCTIVITY, POPULATION

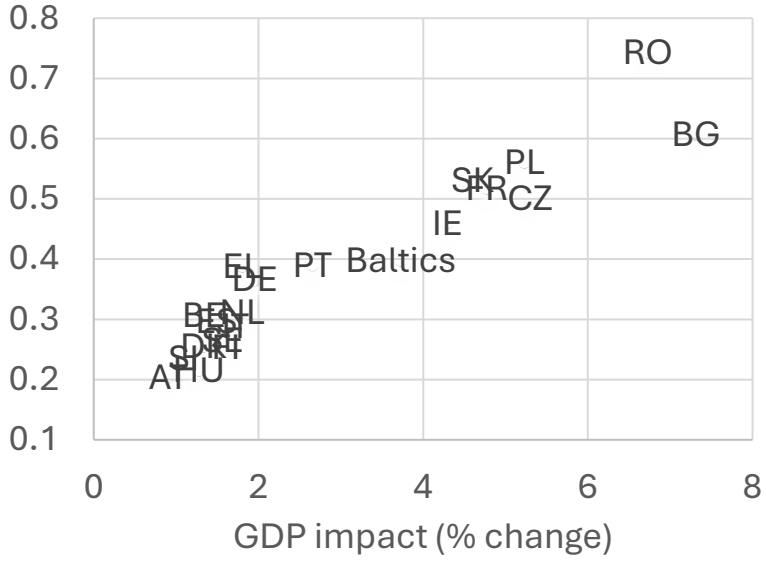
Impact is greater when:

- More regional heterogeneity in labour productivity
- More concentration in national income and population

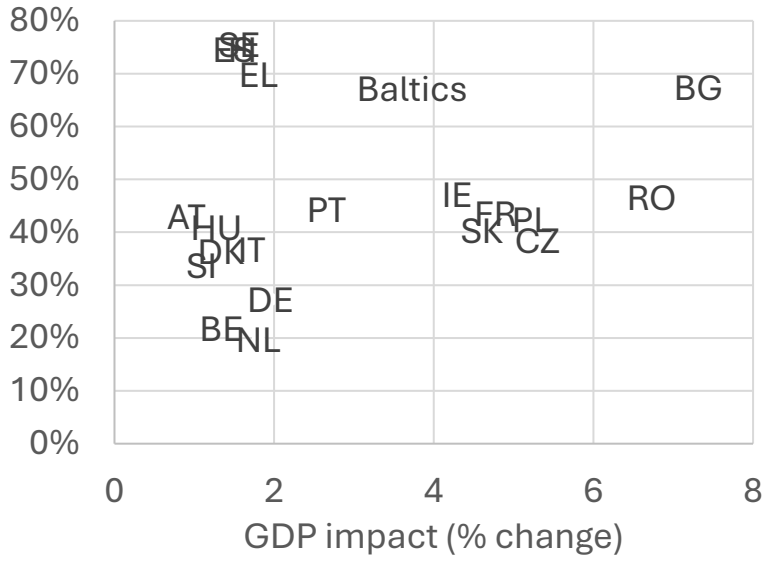
Concentration in national income



Concentration in TFP



Concentration in population



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MAIN CONCLUSIONS

Lack of affordable housing is an urgent and macro-relevant issue:

it prevents workers from accessing key labour markets, curbs GDP, increases wage inequality and increases labour costs for firms

Tackling the housing affordability crisis is also a step towards addressing Europe's competitiveness issues

Reducing housing costs has the potential to:

- increase EU GDP by 1.7%
- decrease wage inequality by 1.5%

The lack of affordable housing in particularly distressed cities such as Paris and Dublin is depressing national GDP by 2%.

8% of the EU population would relocate to better labour markets and earn a higher wage

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Thank you!

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THE MACROECONOMIC IMPACT OF HOUSING

IMPLICATION 1: the macroeconomic impact of housing.

Addressing frictions in the housing market increases aggregate output and productivity
ONLY IF
it reduces labour productivity differentials

IMPLICATION 2: labour misallocation.
Differences in labour productivity between cities are driven by differences in local amenities and housing costs:

$$\frac{W_i}{\bar{W}} = \frac{{P_i}^{\beta}/Z_i}{\bar{P}^{\beta}/\bar{Z}}$$

IMPLICATION 3: inequality. Between region wage inequality is also driven by differences in local amenities and housing costs

IMPLICATION 4: regions to prioritise. Regions to be targeted should exhibit a) high LP and b) high housing costs

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MODEL EXTENSION: IMPERFECT LABOUR MOBILITY

Workers:
- have exogenous individual preferences over cities

$$V_{ji} = \epsilon_{ji} \frac{W_i Z_i}{P_i^{\beta}}, \text{ where } \{\epsilon_{j1}, \epsilon_{j2}, \dots \epsilon_{jN}\} \overset{d}{\sim} Fréchet(\theta)$$

- Amenities – common component: availability of restaurants, proximity to the beach, quality of the schools, hospitals
- Individual preferences: proximity to your mother and childhood friends, Paris reminds me of when we first met, I prefer the food here.

In equilibrium:

With mobility frictions not all workers are indifferent between locations, only the *marginal* worker is.

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HOW THE PREVIOUS CONCLUSIONS ARE ALTERED BY THE INTRODUCTION OF MOBILITY FRICTIONS

IMPLICATION 1a: labour misallocation under imperfect labour mobility. Differences in labour productivity between cities are driven by differences in local amenities, housing prices and mobility frictions:

$$\frac{W_i}{\bar{W}} = \frac{{P_i}^{\beta}/Z_i}{\overline{P^{\beta}/Z}} L_i^{1/\theta}$$

IMPLICATION 2a: inequality under imperfect labour mobility. (Wage) inequality is also driven by differences in local amenities, housing prices and mobility frictions

IMPLICATION 5: macroeconomic impact of housing. Medium-term benefits (~ 30 years) of addressing housing availability reduced by the strength of the mobility frictions

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Hoover Index

The Hoover Index (also known as the Robin Hood Index) is a measure of inequality that quantifies the extent to which a resource is unevenly distributed across a set of in our case regions. Conceptually, it represents the minimum proportion of the total resource that would need to be reallocated for all units to have an equal share:

$$H_c = \frac{1}{2}\sum\left|\frac{x_i}{X} - \frac{p_i}{P}\right|$$

Where:

$x_i = variable\ in\ Region\ i, \qquad X = Sum\ of\ all\ x_i, \qquad p_i = Pop\ in\ Region\ i, \qquad P = Total\ Population$

- Range: 0 ≤ H ≤ 1. $H = 0$ indicates perfect equality; $H = 1$indicates maximal inequality.
- Intuition: The index measures the fraction of the total resource that must be transferred from units with above-average shares to those with below-average shares to achieve equality.

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DERIVATIONS PERFECT LABOUR MOBILITY (1/2)

Starting with a simplified Production Function that takes in Labour L_i and Land T_i

$$Y_i = A_i L_i^{\alpha} T_i^{1-\alpha}$$

Letting Wage be Marginal Product of Labour we get the following Labour Demand

$$L_i = \left(\alpha \frac{A_i}{W_i}\right)^{\frac{1}{1-\alpha}} T_i$$

Using this equation, we can estimate the *Local TFP* from now defined as:

$$A_i^{\frac{1}{1-\alpha}} T_i = \left(\frac{W_i}{\alpha}\right)^{\frac{1}{1-\alpha}} L_i$$

The indirect utility V of a worker in city i is can be expressed in terms of the wage W_i, amenities Z_i and Housing Costs P_i and the share β that is spend on housing

$$V = \frac{W_i Z_i}{P_i^{\beta}} \quad \rightarrow W_i = V \frac{P_i^{\beta}}{Z_i}$$

The Amenities can be approximated using the equation of Albouy (2008):

$$Z_i = \widetilde{w_i} * \left(1 + \left(\beta\left(\frac{p_i - \widetilde{\mathrm{p_i}}}{\overline{p_i}}\right) - (1-\tau)\left(\frac{w_i - \widetilde{w_i}}{\overline{w_i}}\right)\right)\right), \text{where } p_i = \frac{P_i}{\overline{P_i}} \text{ and } \widetilde{\mathrm{p_i}} \text{ the } \textbf{regional} \text{ mean}$$

The Data

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DERIVATIONS PERFECT LABOUR MOBILITY (2/2)

Based on the following equations we can start with how a reduction in Housing Costs will decrease wages

$$\frac{W_i'}{W_i} = \frac{V'}{V}\frac{{P_i'}^{\beta}/Z_i}{P_i^{\beta}/Z_i} \rightarrow \quad W_i' = \frac{V'}{V} * \left(\frac{P_i'}{P_i}\right)^{\beta} W_i$$

Using the adjusted Wages W_i' we can model the new labour distribution

$$L_i' = \left(\frac{\alpha}{W_i'}\right)^{\frac{1}{1-\alpha}} * LocalTFP$$

Using the changes in Labour we can estimate the changes in GDP

$$\frac{Y'}{Y} = \frac{\sum LocalTFP^{1-\alpha} * {L_i}'}{\sum LocalTFP^{1-\alpha} * L_i}$$

The Data

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CHANGE IN WAGE INEQUALITY (1/2)

The Theil-Index is a specific measure of inequality that can be separated into different groups. Specifically, in our case we can separate the national wage inequality $T(Y)$ in the between region component $T^{BR}(Y)$ and the within region component $T^{WR}(Y)$, so that:

$$T(Y) = T^{BR}(Y) + T^{WR}(Y)$$

$$where$$

$$T(Y) = \frac{1}{N}\sum\left(\frac{x_i}{\mu}\ln\left(\frac{x_i}{\mu}\right)\right)$$

$$T^{BR}(Y) = \frac{1}{N}\sum\left(n_r\frac{\bar{x}_r}{\mu}\ln\left(\frac{\bar{x}_r}{\mu}\right)\right)$$

$$T^{WR}(Y) = v_r T(Y^r)$$

$$\bar{x}_r = mean\ wage\ in\ region\ r; \quad v_r = region\ r's\ share\ of\ total\ income \quad T(Y^r) = Theil\ Index\ in\ region\ r \quad \mu = mean$$

We estimate total wage inequality from EU-SILC and between-region inequality from our NUTS3 wage estimates. Within-region wage inequality is derived residually.

Estimates on the impact of housing interventions on wage inequality are obtained holding constant within-region wage inequality.

W.-Ineq.

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Notes: total wage inequality is computed using household gross income for 2021, removing zero or negative values.

THE DATA

Summary statistics of the data used

	Number of regions	Average	Median	Standard deviation	Min	Max
Employment (in thousands)	1,165	180.5	113.5	248.7	3.8	3,544.7
Wages (EUR, annual)	1,165	31,493.1	35,110.0	13,413.8	3,921.2	79,401.1
Housing costs* (EUR, annual)	1,158	7,552.2	6,946.4	3,734.1	1,421.1	25,574.7

Source: ESPON, EUROSTAT, ARDECO.
Notes: Geographical unit is NUTS3. Housing costs in 6 NUTS3 regions in Croatia and 1 in Spain are missing. NUTS3 wages are estimated using labour productivity differences within NUTS2 regions

* Housing costs computed as 5% of the purchasing prices of a 60smq housing unit.

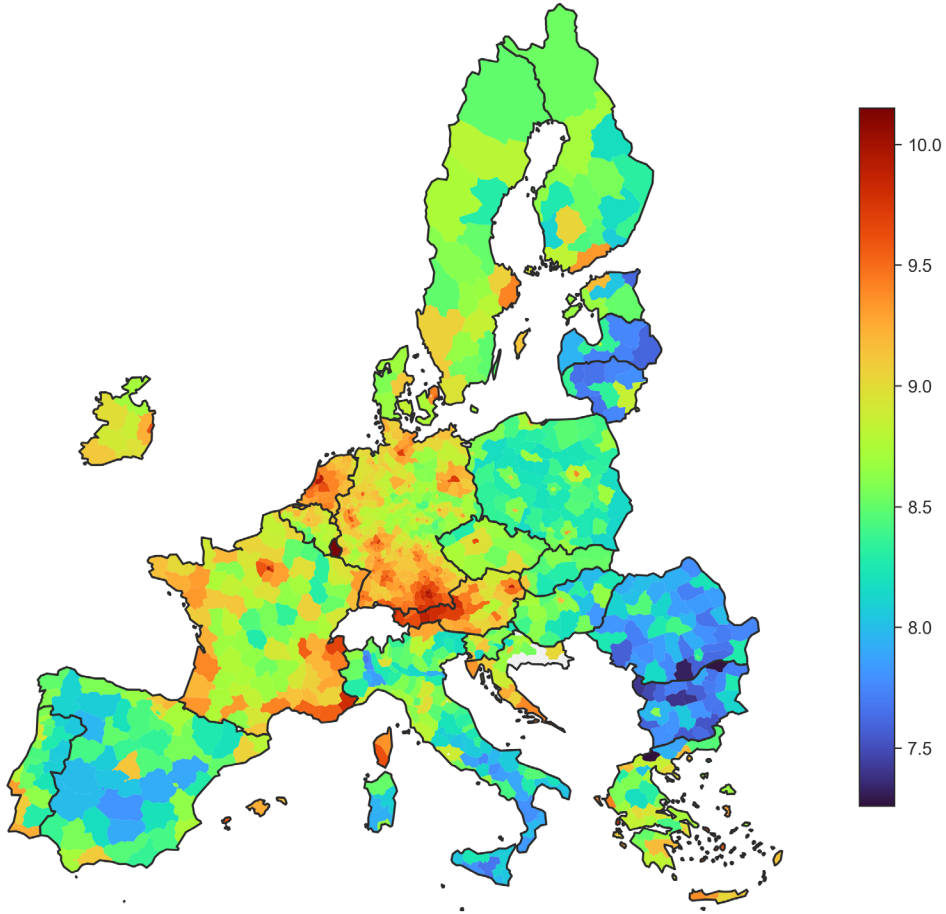
Links:
Parameters
Equations and Derivations

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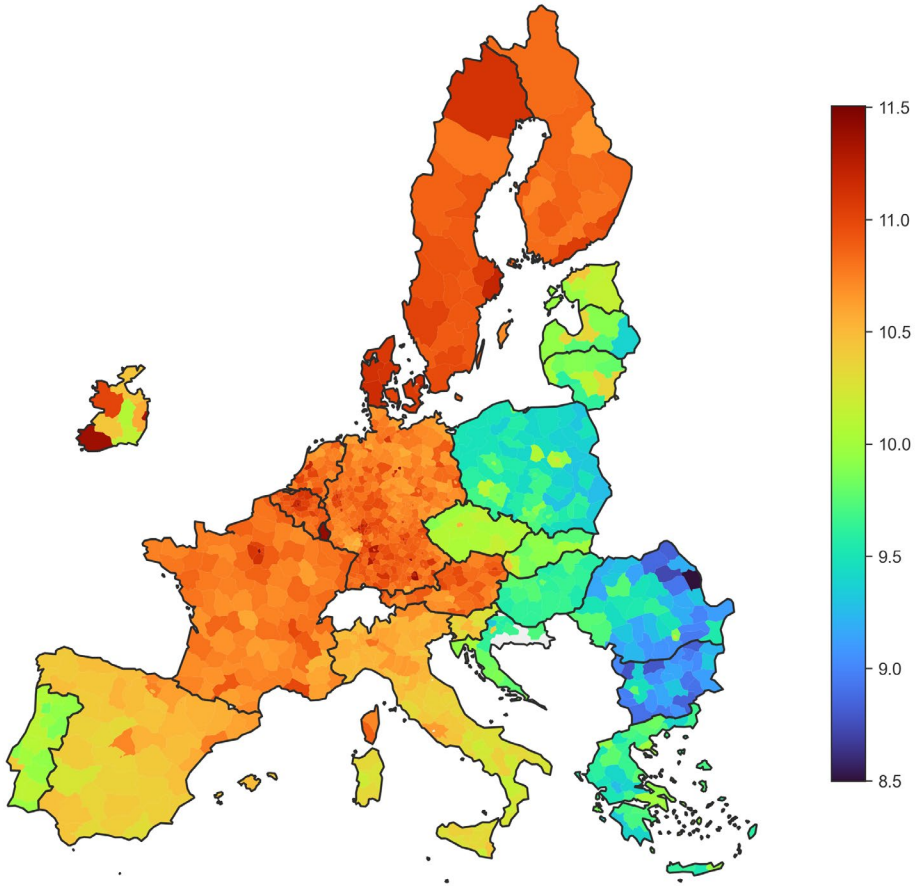
HOW TO TARGET HOUSING INTERVENTIONS TO MAXIMISE MACROECONOMIC BENEFITS?

PRIORITISE REGIONS WITH HIGH HOUSING COSTS AND HIGH LABOUR PRODUCTIVITY

Distribution of housing prices (log)



Distribution of labour productivity (log)



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CALIBRATION OF KEY PARAMETERS

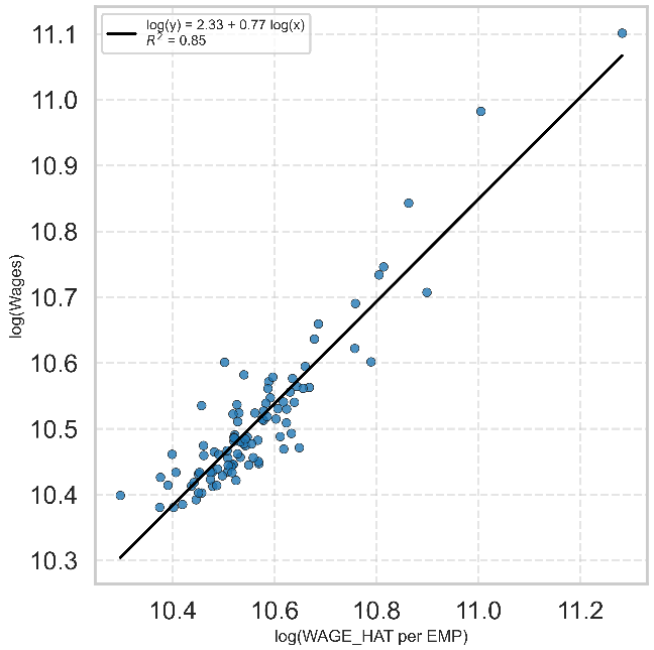
- $1-\alpha$: Share of land in the production function: 0.2 based on Valeninyi and Herrendorf (2008)
- $1/\theta$: Degree of imperfect labour mobility: 0.33 based on Moretti and Hornbeck (2019)
- β: Share of income spent on housing : 0.25 calibrated on EUROSTAT data for the EU
- γ: Price responsiveness of housing supply: 0.6 based on 12 EU countries from OECD (2011)

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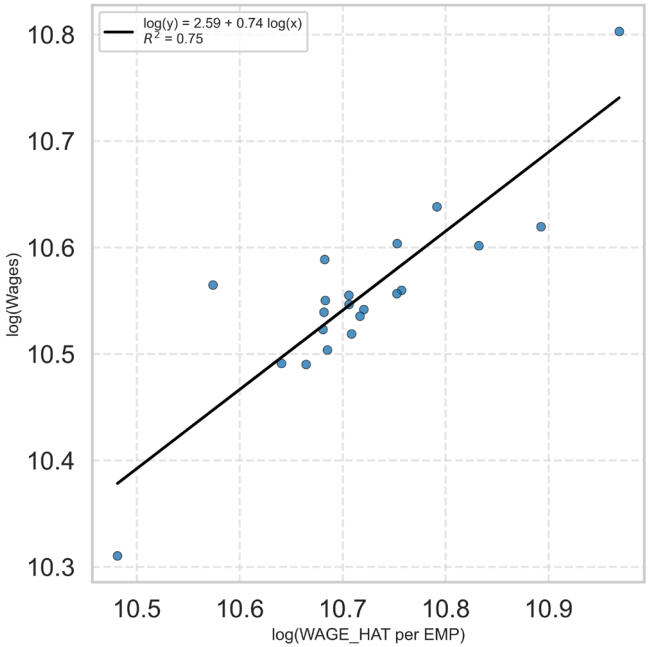
ESTIMATED WAGES VS. ACTUAL WAGES

The Data

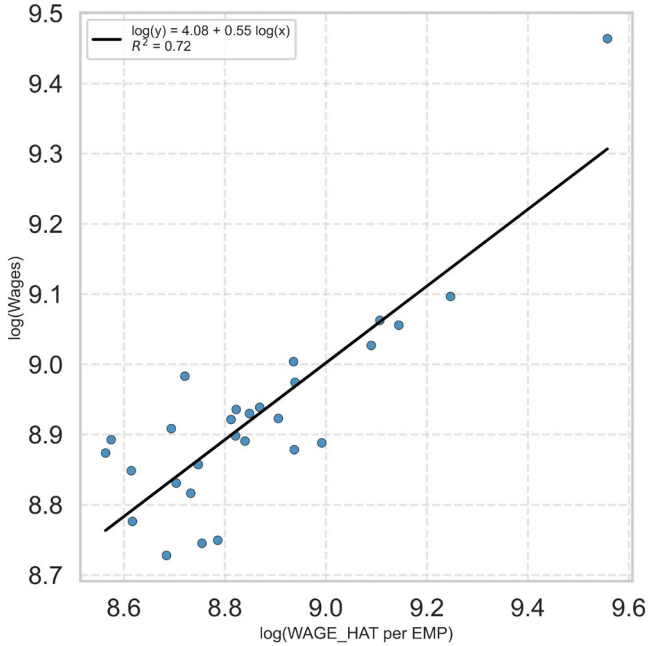
Panel A: France



Panel B: Sweden



Panel C: Bulgaria



$$\widehat{Wage}_{N3} = \frac{LP_{N3}}{\overline{LP}_{N2}} * l_{N3} * Wage_{N2}$$

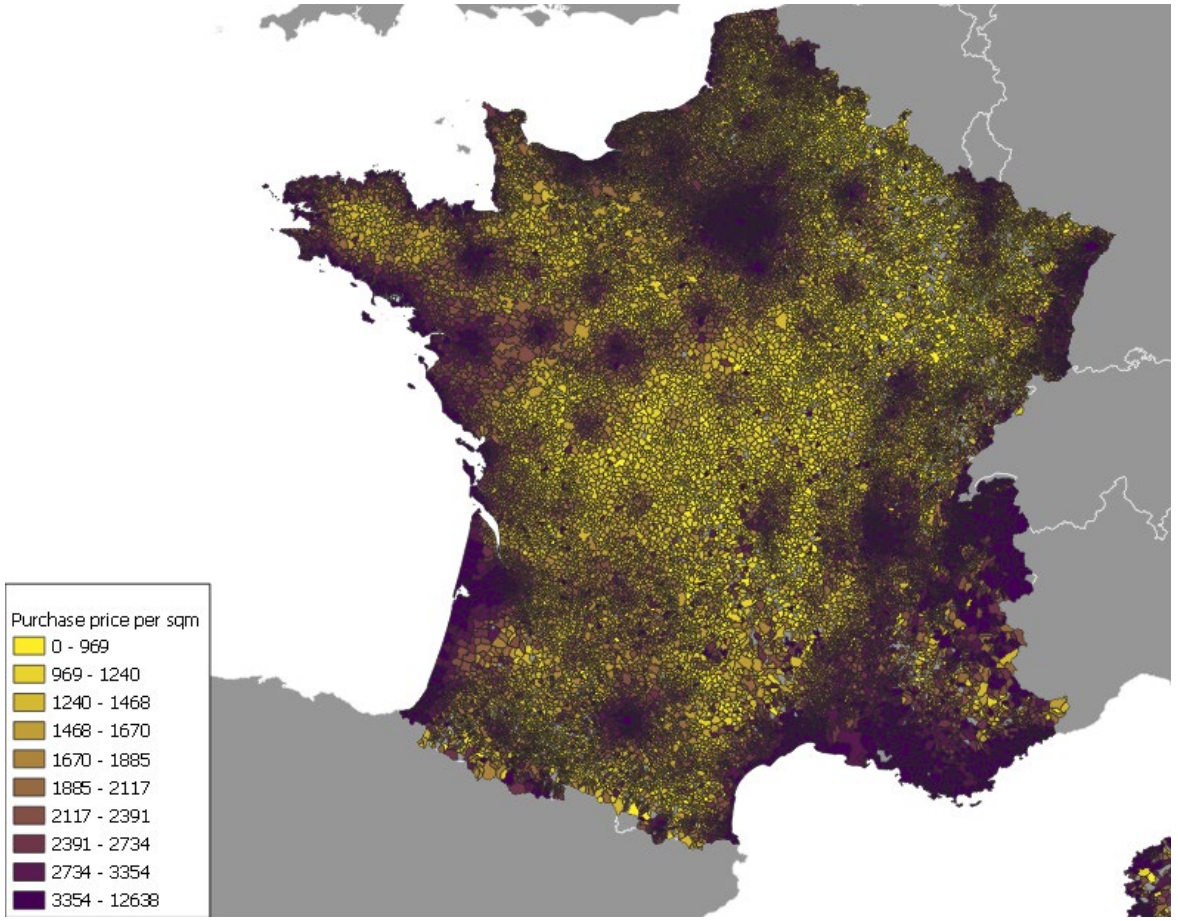
Where:

$$LP_{N3} = \frac{GDP_{N3}}{L_{N3}} \; and \; l_{N3} = \frac{L_{N3}}{L_{N2}}$$

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EXAMPLE ESPON HOUSE4ALL : FRANCE

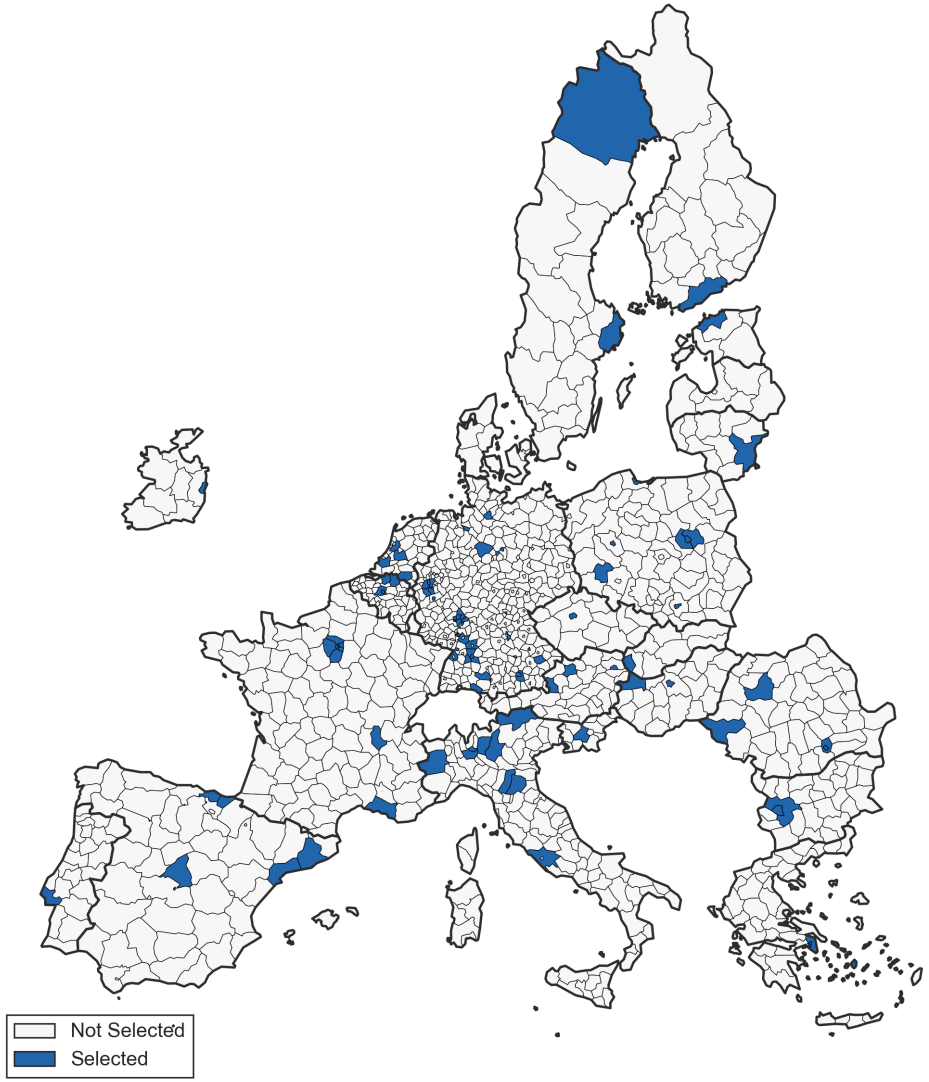
Mean housing prices per square meter in French regions



Source: ESPON. *Notes*: geographical unit is NUTS3.

QUANTIFYING THE MACROECONOMIC COST OF THE LACK OF AFFORDABLE HOUSING

PART 1: COUNTRY-SPECIFIC RESULTS



Counterfactual exercise:

1. Select the 10% of the regions in each country that would increase the national GDP the most following a decrease to the housing costs

2. Compare the current equilibrium with a counterfactual where housing interventions lead to housing costs in those regions decrease to the national average

→ No migration from outside the country

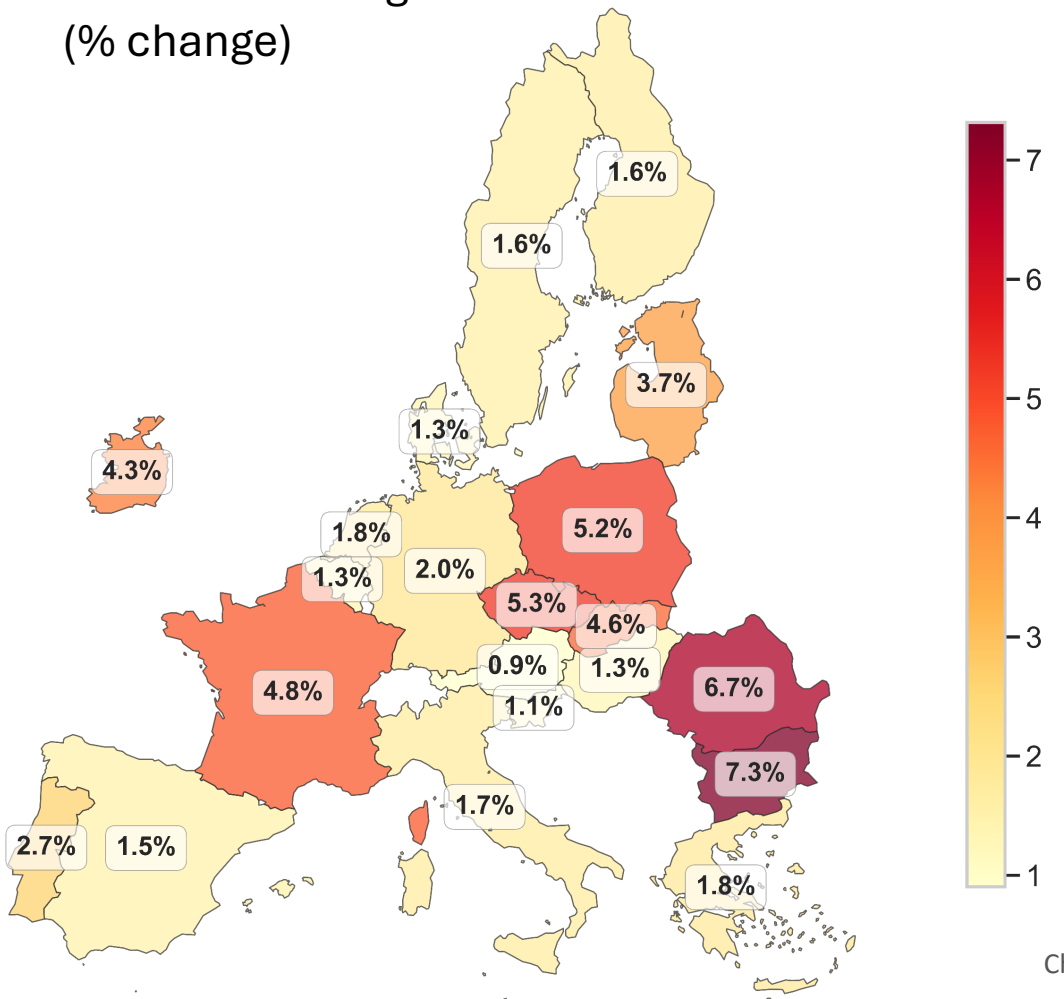
Notes: Baltics considered as one single geographical area. Luxembourg, Cyprus, and Malta dropped due to too few NUTS3 regions. Croatia dropped due to missing data.

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QUANTIFYING THE MACROECONOMIC COST OF THE LACK OF HOUSING AFFORDABILITY (GDP)

COUNTRY-SPECIFIC RESULTS, PERFECT LABOUR MOBILITY

Effect of housing interventions on national GDP (% change)



Results:

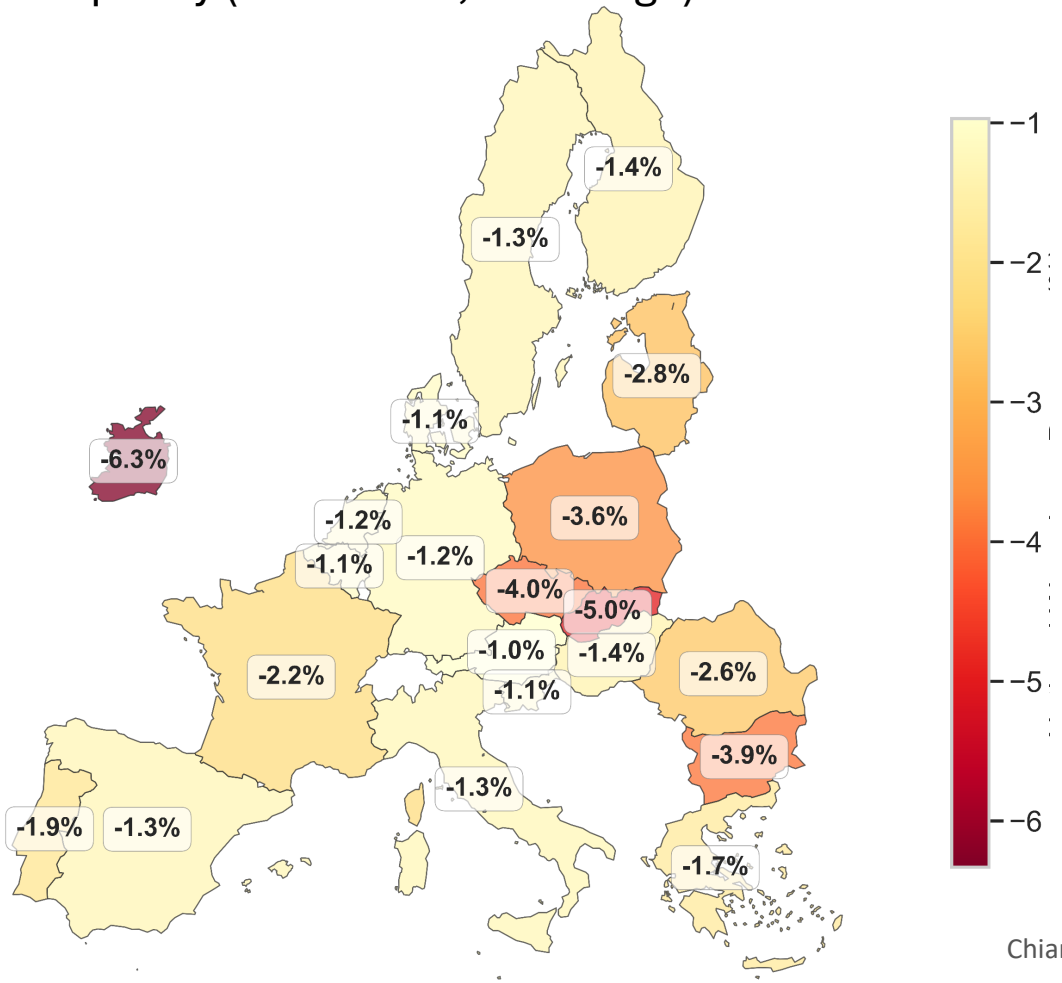
- National GDP increase by 0.9 to 7.3% (simple average is 3%)
- On average 10.6% of the population would relocate (between 5.6 and 16.2%). This the fraction of people that cannot access better labour markets because due to lack of affordable housing

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QUANTIFYING THE MACROECONOMIC COST OF THE LACK OF HOUSING AFFORDABILITY (WAGE INEQUALITY)

COUNTRY-SPECIFIC RESULTS, PERFECT LABOUR MOBILITY

Effect of housing interventions on national wage inequality (Theil index, % change)



Results:

- National wage inequality decreases by 1.0% to 6.3 % (simple average of 2.3%)
- The housing interventions would lead to a convergence of national wages

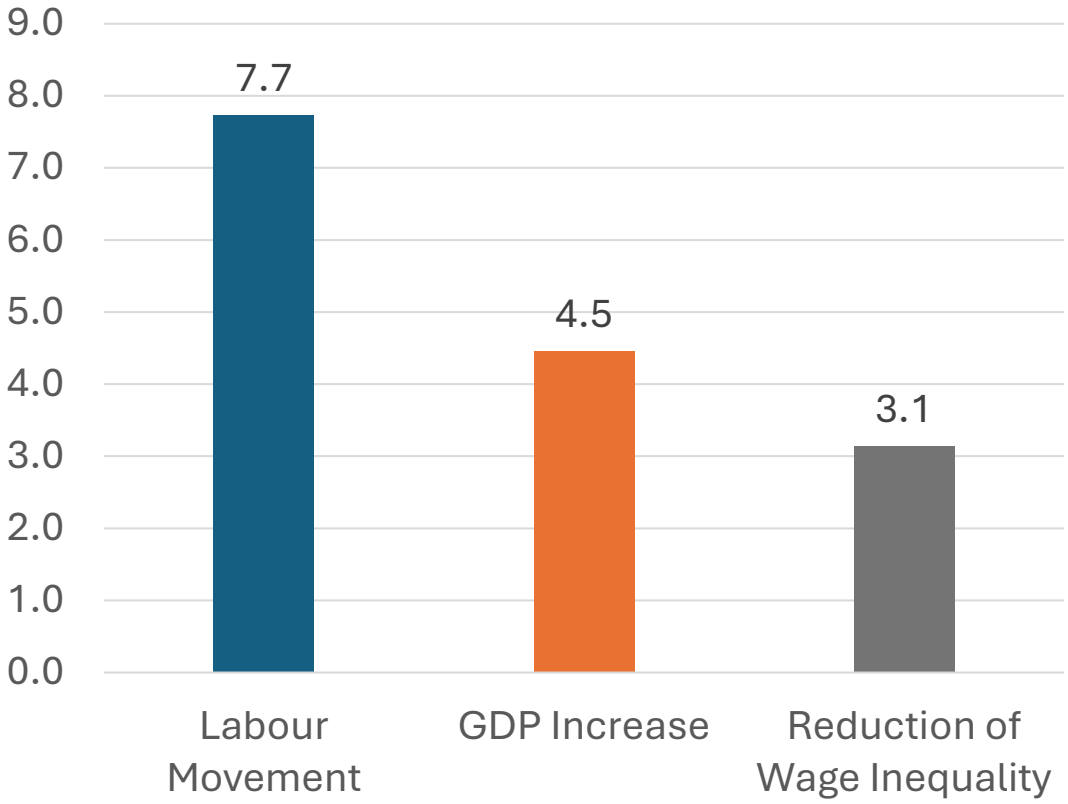
Details

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QUANTIFYING THE MACROECONOMIC COST OF THE LACK OF HOUSING AFFORDABILITY

EU-WIDE RESULTS, PERFECT LABOUR MOBILITY

Effect of housing interventions on workers' relocation, GDP and wage inequality (% change)



Results

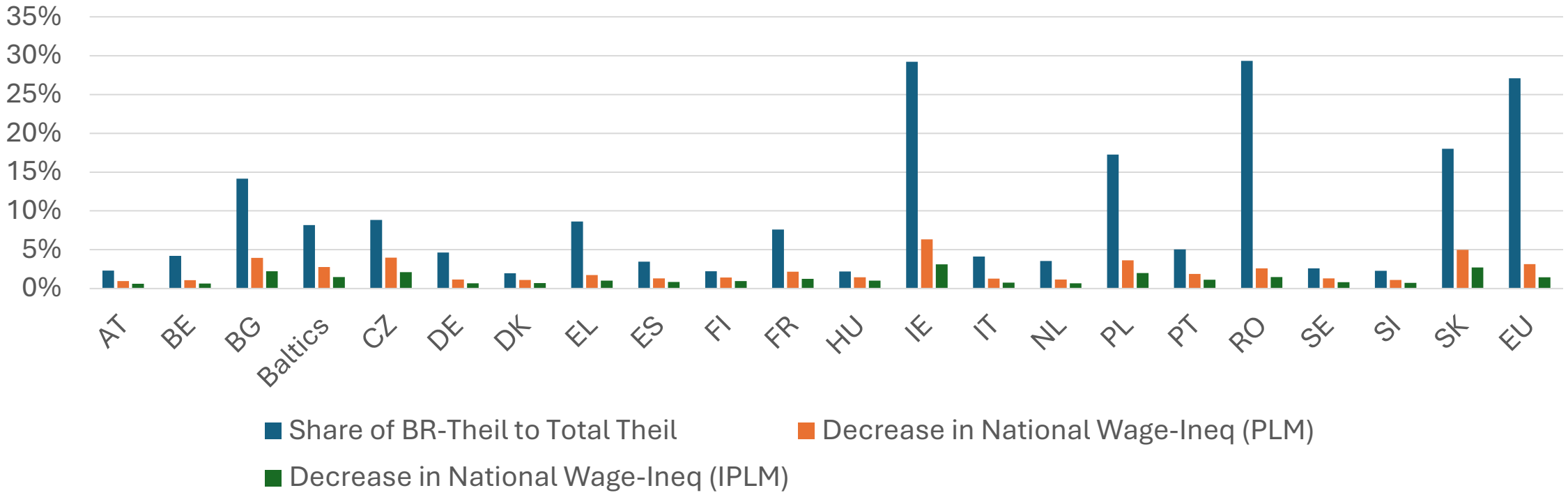
- EU's GDP increases by 4.5%
- 7.7% of the population cannot access to better labour markets due to high housing costs
- EU-wide wage inequality would decrease by 3.1%

→ Allowing migration between countries, but no migration from outside the EU

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CHANGE IN WAGE INEQUALITY (2/2)

IN THE EU BETWEEN-REGION INEQUALITY ACCOUNTS ON AVERAGE FOR 28% OF TOTAL INEQUALITY

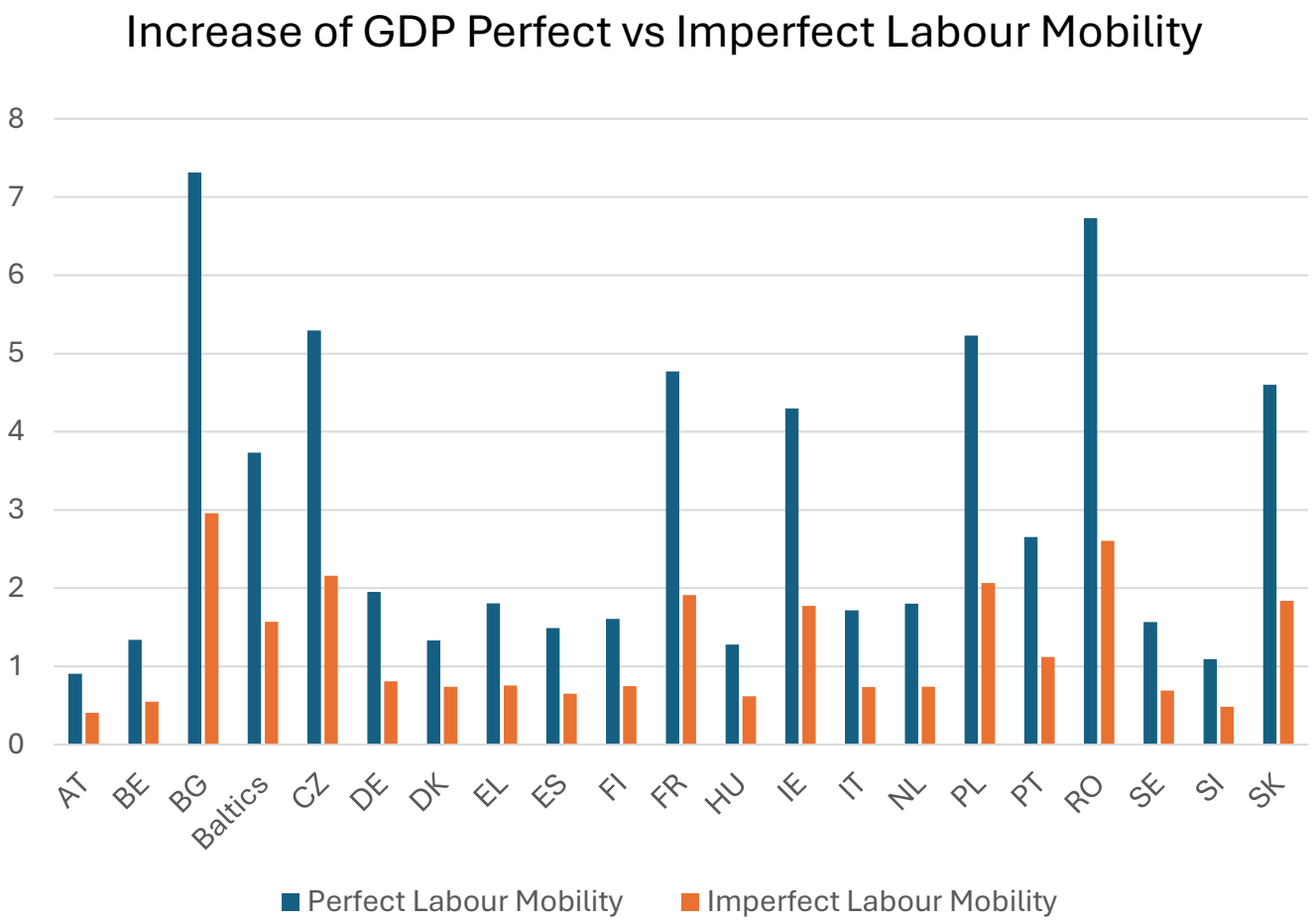


W.-Ineq.

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MEDIUM-TERM BENEFITS OF ADDRESSING HOUSING AVAILABILITY REDUCED BY THE STRENGTH OF THE MOBILITY FRICTIONS

EU-WIDE RESULTS AND COUNTRY-SPECIFIC RESULTS WITH MOBILITY FRICTIONS



EU-Level Results

- EU's GDP increases by 1.7% (vs 4.5% in case of perfect labour mobility)
- Wage inequality would reduce by 1.5% (vs. 3.1% under PLM)

- With imperfect labour mobility, GDP is expected to rise ~1.7% (vs. 4.5% under perfect mobility).
- Approximately 2.8% (vs. 7.7% under PLM) of the EU population would relocate due to lower housing costs.

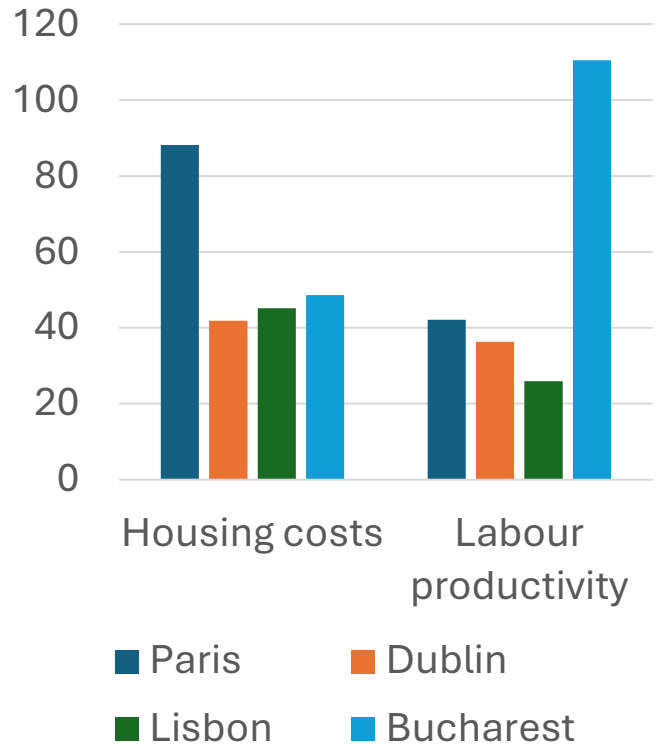
Country-Level Results

- GDP gains under imperfect mobility range 0.4–3%, averaging 1.2% (vs. 3% under perfect mobility).
- Population relocation varies by country, from 2.1–5.6%, averaging 3.9%.
- Wage inequality would reduce between 0.6 to 3.1% with an average of 1.3% (vs. 1-6.3% with an average of 2.3% under PLM)

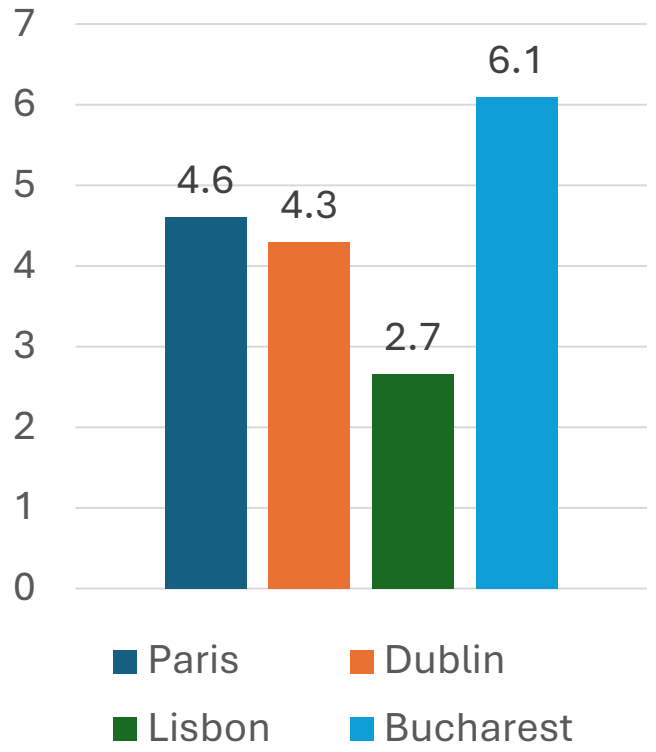
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THE IMPACT OF LACK OF HOUSING AFFORDABILITY ON SELECTED CITIES

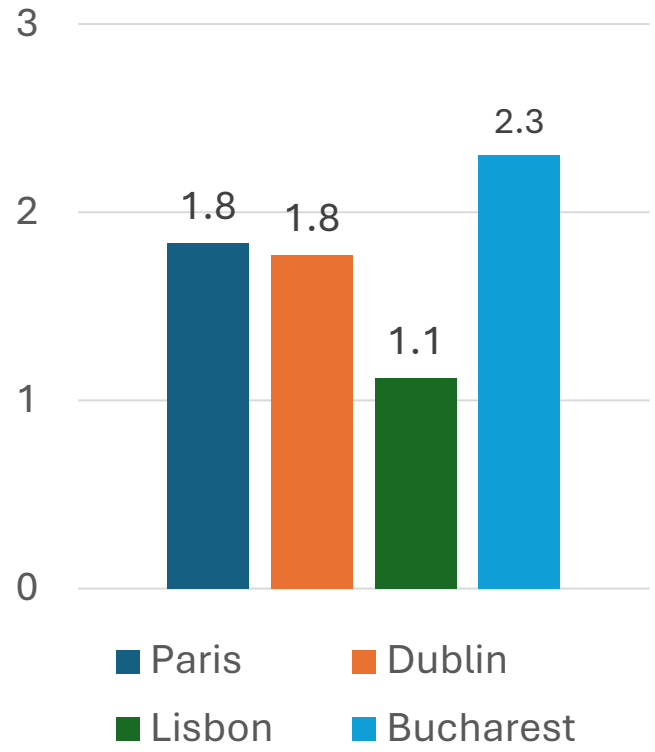
Housing prices and labour productivity in selected cities vs national average



Impact on national GDP (perfect labour mobility, % change)



Impact on national GDP (imperfect labour mobility, % change)



Notes: Paris here is defined as the metropolitan area of Paris encasing 4 NUTS3 Units; The plotted impact on GDP, is the effect on national GDP if we would reduce the housing prices in these specific regions to the national average.