

Inertia, Attractiveness and Policy Shocks: Residential Mobility between Rural and Urban Areas in France

Over the past decade, rural attractiveness has re-emerged as a central theme in European regional debates. Rising housing costs in large metropolitan areas, concerns over congestion and quality of life, the expansion of remote work, and increasing exposure to environmental risks have all contributed to renewed interest in possible demographic rebalancing between urban and rural territories. In parallel, European and national place-based policies seek to promote territorial cohesion and to support lagging or peripheral regions. However, despite this renewed attention, robust empirical evidence on the determinants of residential mobility and on the responsiveness of migration flows to economic, environmental or policy shocks remains limited. In particular, it is unclear whether recent developments signal structural changes in migration patterns or whether they reflect short-lived fluctuations within a largely stable spatial system.

This paper investigates residential mobility between French inter-municipal territories through the lens of structural gravity models. Our objective is twofold. First, we aim to quantify the extent to which residential migration is driven by persistent spatial structures as opposed to time-varying economic and environmental factors. Second, we assess whether recent shocks, including climate-related risks and the Covid-19 period, are associated with measurable shifts in migration patterns between rural and urban areas. By doing so, we contribute to ongoing discussions on rural development paths and territorial attractiveness within advanced economies.

The empirical analysis relies on exhaustive annual inter-municipal migration flows from the French population census (INSEE) over the period 2012 to 2020. We conduct the analysis at the level of EPCI (Établissements Publics de Coopération Intercommunale), a spatial scale that reflects functional local labor markets and peri-urban dynamics while mitigating the extreme sparsity observed at the municipal level. The dataset includes bilateral migration flows between all pairs of EPCI, covering the full national territory. These flows are matched with a rich set of origin and destination characteristics, including population size, income levels, employment structure, housing prices and rents per square meter, and measures of environmental exposure such as flood risk, heatwave intensity and wildfire incidence. Bilateral variables include geographic distance, contiguity and regional belonging.

The presence of a large number of zero flows in inter-territorial migration data makes log-linear ordinary least squares estimation inappropriate. We therefore adopt the Poisson Pseudo-Maximum Likelihood estimator within a structural gravity framework. This approach, widely used in the trade literature, accommodates zero flows and remains consistent under heteroskedasticity. Our baseline specification includes origin-year fixed effects, destination-year fixed effects and dyadic origin–destination fixed effects. This three-way gravity structure absorbs time-invariant bilateral frictions and territory-specific size effects, allowing identification to rely on within-dyad time variation in explanatory variables. In other words, the model isolates the contribution of time-varying push and pull factors net of persistent spatial relationships.

A first and striking result concerns the magnitude of spatial inertia. Once origin-year, destination-year and dyadic fixed effects are included, more than 95 percent of the variation in bilateral migration flows is absorbed. This finding indicates that residential mobility in France is overwhelmingly shaped by stable territorial characteristics and enduring bilateral linkages.

Geographic distance remains a strong negative predictor of flows, and crossing an inter-municipal border significantly reduces migration intensity. Internal flows, defined as moves within the same EPCI, represent a substantial share of total residential mobility, highlighting the short-range nature of relocation decisions. These patterns point to a highly inertial spatial system in which most movements occur within relatively narrow geographic perimeters and along established corridors.

When turning to time-varying push and pull factors, the results are considerably more modest. Standard economic variables such as income differentials between origin and destination rarely display robust effects once high-dimensional fixed effects are included. Labor market indicators show some correlation with flows in simpler specifications, but their explanatory power diminishes substantially under the full structural gravity model. These findings suggest that much of what is often interpreted as economic pull or push may in fact reflect persistent cross-sectional differences already captured by fixed effects.

Housing market variables exhibit somewhat more consistent associations with migration flows. Higher housing prices or rents at destination are generally associated with lower inflows, while price differentials may play a role in shaping certain corridors. However, the interpretation of these coefficients is complicated by potential endogeneity between prices and migration. Residential inflows can themselves exert upward pressure on local housing markets, making it difficult to disentangle causal effects from equilibrium relationships. Even so, the housing block contributes more to explaining residual variation than income or employment variables.

Environmental exposure variables, including measures of flood risk, cumulative heatwave days and wildfire density, display weak and heterogeneous correlations with migration flows. We do not observe systematic large-scale migration away from high-risk territories over the period considered. While certain territories exposed to specific events may experience localized adjustments, aggregate migration patterns do not suggest the emergence of climate-induced mass relocation. Similarly, comparisons between the pre-Covid and Covid years do not reveal a structural break in the gravity parameters. Although descriptive statistics indicate some compositional changes in flows after 2020, particularly involving certain rural areas, the underlying gravity structure remains remarkably stable. Distance, border effects and persistent territorial characteristics continue to dominate the explanation of flows.

To further investigate territorial attractiveness beyond direct coefficient interpretation, we extract estimated origin and destination fixed effects from the gravity model and regress them on blocks of socio-economic and environmental characteristics. This decomposition approach allows us to evaluate the extent to which persistent territorial attributes correlate with long-run attractiveness. In addition to linear regressions, we employ non-linear machine learning techniques, notably boosted trees, to assess predictor importance without imposing restrictive functional forms. The objective is not pure prediction but rather to identify which structural features account for the limited share of variation that remains explainable once bilateral inertia is controlled for.

The results confirm that only a relatively small subset of variables meaningfully contributes to explaining cross-sectional differences in territorial attractiveness. Housing market characteristics and certain environmental indicators correlate with fixed effects, but their incremental explanatory power remains modest relative to the overwhelming role of structural gravity components. In particular, a simple indicator capturing whether a move crosses an inter-municipal border explains a substantial share of variation, underscoring the importance of

administrative and functional boundaries in structuring mobility. Overall, the analysis highlights the difficulty of explaining push and pull dynamics once persistent spatial structures are taken into account.

These findings carry important implications for rural development and regional policy. Narratives of rapid rural revival driven by remote work, environmental risks or short-term fiscal incentives should be treated with caution. While some rural territories may benefit from specific circumstances, aggregate migration patterns remain strongly anchored in pre-existing spatial hierarchies and bilateral linkages. Demographic reallocation appears to be a slow-moving process embedded in durable territorial structures rather than a rapid response to shocks. For policymakers, this suggests that place-based strategies aimed at influencing migration flows may need to operate over long time horizons and focus on structural transformations, such as housing supply, accessibility, service provision and socio-economic composition, rather than relying on short-term incentives to trigger large population movements.

Methodologically, the paper contributes by combining structural gravity estimation with fixed-effect decomposition and machine learning tools within a unified empirical framework applied to high-resolution administrative data. Substantively, it documents the magnitude of spatial inertia in residential mobility and provides a systematic assessment of the limited responsiveness of migration flows to economic and environmental shocks. In doing so, it offers a grounded perspective on rural attractiveness and highlights the central role of persistent territorial structures in shaping contemporary mobility patterns in France.