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IMMIGRATION AND MACROECONOMIC OUTCOMES IN OECD COUNTRIES

by Gaetano Basso*, Mithali R. Mathur** and Giovanni Peri***

Abstract

OECD countries experienced declining native population growth and rising net immigration over 1990-2024. We compile a new dataset of net immigration rates to OECD countries from all origins and show that most of the increase came from non-OECD countries and was predominantly high-skilled. Push factors, network effects, and policy indices explain little of the large cross-country heterogeneity in immigration dynamics; unexpected shocks and surges were common. Using local projections and several sources of identifying variation, we then estimate the relationship between immigration and growth in GDP per capita, labor productivity, capital investment, and total factor productivity (TFP). Immigration from non-OECD countries was a significant predictor of GDP per worker growth, primarily through higher investment. High-skilled immigration, in particular, was associated with stronger human capital accumulation, faster TFP growth, and greater capital deepening. Native population growth, by contrast, had no or weakly negative effects on GDP per capita and productivity. These results are consistent with a large literature documenting the positive productivity and growth effects of immigration, especially high-skilled immigration.

JEL Classification: F22, O47, J61.

Keywords: OECD economies, immigration, population change, immigration policies, push-driven shift share, labor productivity, TFP, investment, human capital.

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1 Introduction[1]

Three important changes have characterized the evolution of OECD countries' adult population over the period 1990-2024. The first is that native population growth, driven by the difference between births and deaths, which was positive and substantial in the 1990s, slowed sharply in the 2010s and turned negative in the 2020s. The second is that *total* population growth in OECD countries has not experienced a similarly pronounced slowdown, because immigration has contributed, at least in the aggregate, to overall population growth. The third is that the largest part — and in many cases all — of immigrant-driven population growth in receiving OECD countries was due to the increase in immigration from non-OECD countries, namely the poorer and middle-income countries of Eastern Europe, Asia, Africa, and Latin America.

Several European countries, and the European Union (EU) as a region, have been at the forefront of these transformations (see the recent work by Consolo et al., 2026, on the evolution of European labor force). Aggregating the 27 countries of the European Union, immigration from the outside has been as large as, or larger than, immigration to the US in 2023 and 2024 (United Nations, 2025). Additionally, migrant inflows have been the main source of aggregate labor force growth in European countries over the past decade and many of these countries rank among the advanced economies with the steepest declines in native population growth driven by persistently low birth rates since the late 1970s, early 1980s, translating in slower growth in the adult population starting in the 1990s and 2000s

Motivated by such evidence, we first describe the characteristics of immigrants to OECD countries in terms of their origins and education. We then analyze whether push factors in origin countries, global crises and destination country-specific immigration policies are able to predict the immigration evolutions and differences since 1990 across OECD countries. We also identify less predictable and more idiosyncratic immigration shocks that affected OECD countries. Then, aware that causal identification is not easy, we deploy different approaches to study how immigration, and more broadly the demographic transformation (higher immigration rates and lower

[1]This paper was prepared for the European Central Bank Forum, 2026, in Sintra, Portugal. We are grateful to anonymous reviewers for their comments and to Hillel Rapoport for his constructive discussion. We also benefited from comments at the First International Pireus Conference in Spetses, Greece. This paper uses data from Eurostat, European Labour Force Survey, 2005-2024, accessed by Gaetano Basso thanks to the agreement 34/2021 between Eurostat and Banca d'Italia. The views expressed in this paper are those of the authors and do not necessarily reflect those of Banca d'Italia or the Eurosystem; the responsibility for all conclusions drawn from the Eurostat data lies entirely with the author who accessed the data. Any remaining errors are the sole responsibility of the authors.
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natural population growth), affected a set of macro variables, including growth in GDP per capita, investments, human capital, productivity, employment-to-population ratio and inflation rates. We then investigate heterogeneity in the impact by skill level of immigrants, we identify responses to immigration shocks, to sudden surges and to immigration policy changes. For this analysis we focus on the impact on labor productivity, total factor productivity, human capital and investment.

We compiled a new and harmonized dataset on net immigration (i.e., changes in the stock of foreign-born residents) by country of origin for 38 OECD countries over the period 1990–2024. We focus on immigrants from non-OECD countries. We combine data from the United Nations (United Nations Department of Economic and Social Affairs, Population Division, 2020a,b, 2024b,a), OECD (OECD, 2000, 2005, 2010, 2015, 2020)and the EU Labor Force Survey (European Commission, Eurostat, 2025a). All sources allow us to distinguish between aggregate and working-age immigrant stocks and national population. We mainly rely on the UN data that have precise measures of foreign-born stocks based on national administrative registers, censuses or inter-census adjustments on all residing foreign-born individuals regardless of the way of entry (i.e., including regularly residing refugees), rather than the less precise gross inflow measures used in prior studies, which do not account properly for return migration and irregular ways of entry and overstays. Because these census-based data are most reliable in counting foreign-born in destination countries at five-year intervals, we use them to analyze changes in immigration and its effects over the medium to long run (five- and ten-year horizons). For national outcomes, we use data on adult population, real GDP per capita (at constant prices), real GDP per worker, capital per worker, human capital intensity, total factor productivity (TFP), and the GDP deflator obtained from Penn World Tables version 11.0, (Feenstra et al., 2025, for 35 OECD countries). Using a local projection approach following (following Jordà, 2005), we analyze how immigration rates (and its predictors) and native population growth predict changes in these outcomes over five- and ten-year horizons.

The large literature on the impact of immigration has often focused on labor market and wage effects (Borjas, 2003; George J. Borjas, 2014; Dustmann et al., 2013; Foged and Peri, 2016; Peri and Sparber, 2009; Ottaviano and Peri, 2012, among many others), implicitly treating immigrants only as workers. More recently, studies have examined immigration effects on productivity (Peri, 2016), investments (Beerli et al., 2021b), and firm creation and matching (Anelli et al., 2023; Orefice and Peri, 2024), recognizing immigrants as entrepreneurs (Azoulay et al., 2022a) and innovators (Terry et al., 2026). Other papers examined their impact on demand and prices, acknowledging their role as consumers (Dustmann et al., 2017a; Galaasen et al., 2025; Dang, 2026).

While a consensus is emerging that immigrants affect receiving economies in multiple ways — likely through productivity, investment, and prices — very few systematic cross-country macro studies estimate the aggregate magnitude of these effects on employment, labor productivity, investment, human capital, and total factor productivity. Prior studies such as Engler et al. (2023) on OECD countries and Peri (2012) on US States have been the few examples, but more limited in scope, outcomes, specifications, and time horizons.

This paper expands that literature in two steps. First, we characterize aggregate immigration flows from non-OECD countries and investigate their potential determinants, including immigration policies, push factors, and global crises, looking at all OECD countries, and then with attention to Western Europe, the US, UK, Canada, Australia, and New Zealand (EU-14-plus) — the largest immigration-receiving developed democracies, spanning a broad range of recent evolutions in immigration rates.

Second, we analyze how immigration from non-OECD countries predicts key macro-aggregates — population growth, GDP per worker, investment, human capital, TFP, and inflation — using local projections on panel data, and accounting for country-specific and time-specific effects.

While we use several different approaches, using different margins of variation of immigration rates, our findings should be interpreted carefully in terms of causality. Rather than an ideal identification strategy, hard to find in cross-country analysis over a long period, it is the convergence of similar basic findings from a set of different approaches, different identifying variation margins and different samples that suggests that our main results are at least informative and robust. First, we estimate how an increase in the immigration rate predicts macroeconomic outcomes up to ten years afterwards, controlling for past economic performance. Then we separate how skilled and unskilled immigration differ in their impact on those variables. We use sudden immigration shocks and immigration surges to specific countries, to assess causal impacts across countries. We also analyze the response of country growth to immigration policy changes, focusing on policies regulating the inflow of immigrants (called “external regulations”) that have (significant) effects on immigration flows. We conduct most of the analysis at the country level and compare the predictive power (impulse response) of immigration with that of native demographic change. Additionally, we extend the framework to regional-level analysis within Europe (NUTS-2 regions) where we can use a more traditional shift-share instrumental variable approach to assess the effects on labor productivity.

Our findings point to three main results. First, immigration policies and network-mediated push factors from origin countries explain little of the variation in immigration rates across OECD countries despite substantial but highly heterogeneous growth. Only an index of openness in "external regulation" of immigration has some power in predicting variation of immigration rates, especially in the EU-14-plus sample. Large shocks and sudden surges remain largely unexplained and idiosyncratic, so that we also use them as a source of variation of immigration rates.

Second, net immigration, more open immigration policies, positive immigration shocks and immigration surges are all associated with positive population growth just as native demographic change is. However — unlike native population change — immigration, open policies and immigration shocks and surges had positive and (often) significant predictive power on contemporaneous and future labor productivity growth, TFP, human capital, and especially investment. Native demographic changes do not show such association. These findings are reinforced by the regional analysis.

Third, when separating high- and low-skilled immigration, we find that very significant positive coefficients on high-skilled immigration drive the positive coefficients, especially in the long-run, while low-skilled immigration is neutral (close to 0 coefficients, never statistically significant) on TFP growth, investments and labor productivity. As immigration in most OECD countries was either balanced or more highly-skilled than the native population, the positive effects prevailed in the aggregate.

Then, we show no evidence of "saturation" as the size of the positive coefficients on productivity outcomes, did not decline in the presence of very large inflows of immigrants, or for immigration into countries with larger shares of immigrants. Finally, we discuss recent microeconomic evidence and how it is consistent with these macro findings, and at the same time how these macro-results point at some promising avenues of micro analysis, better suited to establish causality, but more limited in their focus. In the conclusion of the paper, we provide some calculations illustrating the magnitudes of the estimated effects for some representative countries.

2 Trends: The Evolution of Immigration, Local Demographics and Skills

Our key measure of immigration into an OECD country is the 5-year change in the total stock of foreign-born, as a percentage of the initial total adult population of the country.[2] This measure

[2] OECD countries include 38 of them, namely: Australia, Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel,

captures "net" immigration rates, namely how the adult population, is affected by the inflow of immigrants over time (see Appendix A1 for a more detailed description of this and other variables). While some studies of the impact of immigration (especially those analyzing yearly data and short-term effects) use "gross immigration", from border-crossing and visa data, there are several advantages to our variable. First, the Census sources ensures higher-quality, comparable data. Second, as we focus on medium- to long-run effects, our data account mainly for immigrants who stay in the country for at least 5 years, rather than for the many short-term immigrants whose economic impact is smaller. Finally, census data allow for a more consistent definition of immigrants as "foreign-born". The gross flows data, instead, are often measured at the border and may introduce measurement error in defining origin, as they collect information on residence, birthplace and citizenship depending on the source.

Similar indicators capture high- and low-skilled net immigration, and are defined similarly including only the net change of foreign-born adult people with tertiary education (high) or at most secondary education (low), respectively, divided by the total adult population of the receiving country (detailed description in Appendix A1). These indices decompose total percent immigration rates between the groups of more- and less-educated as they contribute differently to human capital and may have different impacts on labor productivity, income per worker and investments.

We measure native population change as the growth of native-born population in working age over the five-year period as a percentage of the initial total adult population of the country (see Appendix A1 for more detail). These two measures allow us to capture the contribution of immigrants and natives to adult population changes, and as they are standardized by the same adult population, they are comparable with each other.

Average Changes in Immigration Rates and Native Population Growth

Table 1 shows the evolution over the period 1990-2024 of measures of net immigration and of native population changes, on average for EU-14 Plus countries[3], in five-year intervals. The first row shows the increase in net total working-age immigrants, increasing from 1.5 percent of adult population in the 1990-1995 period, to 3.8 percentage points in 2020-2024, and the second row shows the increase in the same net immigration measures from non-OECD countries only from

Italy, Japan, Republic of Korea, Latvia, Luxembourg, Malta, Mexico, Norway, Netherlands, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States of America.

[3]EU-14 countries include: Austria, Belgium, Denmark, Greece, Luxembourg, Germany, Finland, France, The Netherlands, Italy, Spain, Sweden, Portugal and Ireland. "EU-14+" include EU-14-plus UK, USA, Canada, Australia and New Zealand.

a low of 1.1 pp in 1990-1995 to a high of 2.9 pp in 2015-2020. A fact that stands out is that most of the growth in immigration rates — namely 1.8 percent of the 2.6 percent increase in the net immigration rate between the 1990-1995 and 2015-2020 period — is accounted for by the growth in immigration from non-OECD countries. The next two rows show the immigration rates separated between high- and low-skilled. Due to data availability (the source of these data is OECD (2000, 2005, 2010, 2015, 2020)) these figures are only available for the period 2000-2020. On average, half of the net immigration into EU-14 Plus countries was represented by high skilled immigrants (i.e., those with a tertiary degree) as evidenced by similar rates between high and low skilled or larger for high skilled in 2010-2020. This is remarkable because in most EU-14 Plus countries the ratio of high to low skilled in the population is well below 1/2 (as we will show more clearly below). The growth in immigration, mainly from non-OECD countries, therefore was on average balanced between college and non-college educated, and hence quite skill-intensive relative to natives.[4]

Then, in row 5 of Table 1, we report the net change in EU-14-plus-average *native* working age population as percentage of adult population in the initial period. This growth rate has experienced a steady large decline from a positive 1.4 percent growth of the adult population in the period 1990-1995 to -3.6 percent in 2020-2024. In the EU-14 Plus countries, on average, the native working-age population has been shrinking since 2010. However, the decline is much less dramatic in terms of *total population growth*, reported in row six of the table, as net immigration compensated a large part of the native population decline. As a consequence, net total adult population growth only declined from 3.4 pp of the initial value to 2.2 pp in 2020-2024. The last row of the Table shows the growth rate of GDP per person in EU-14 Plus countries, exhibiting large differences across periods driven often by large global events (Great Recession and Debt Crisis that led to reduced growth in the 2005-2015 period and Covid-19 in 2020).

Growth in Non-OECD Migration to OECD and Main Immigration-receiving Countries

In Figure 1, to visualize the aggregate and country-specific trends in immigration, we include several panels showing the evolution of immigrants as a share of the population. The top three panels of Figure 1 show the trends in immigrant shares for the OECD countries as an aggregate (left), for European Union-14 (EU-14) countries (essentially Western and Northern Europe; middle) and for

[4]This fact contrasts with the perception of people in receiving countries, who often describe immigrants as low skilled. There is abundant evidence of misperception of citizens about facts relative to immigration, as shown in Alesina et al. (2023). We will discuss the issue of
skill downgrading", i.e. high-educated immigrants doing less skilled jobs in Section 7.2.

"EU-14+" (right) over the period 1990-2024.[5] The bottom six panels show the same trends separately for Germany, France, the UK, Italy, Spain, and the US. We separate immigrant shares in total (black line), OECD origin (green line) and non-OECD origin (light-blue line). This helps us visualize the substantial immigration growth from non-OECD countries in the largest economies, not just on average.

Three facts emerge. First, in the aggregates as well as in each large economy, the population share of foreign-born has grown steadily and substantially, ranging around 5-10% at the beginning and around 15-20% at the end of the period. Second, most, if not all, of the growth across the destinations considered was driven by increases in immigration from non-OECD countries. While in 1990 the immigrant population in most OECD destinations was composed roughly equally of migrants from OECD and non-OECD countries, by 2024 the stock of immigrants from non-OECD countries had become significantly larger than that from OECD countries, both in individual destination countries and in the aggregate. Third, the EU-14 and the large European economies, especially Spain, Italy, the UK and Germany, have experienced among the strongest and most significant growth of non-OECD immigrants, usually larger than for the OECD average.

The country groups defined in the first row of Figure 1, especially OECD aggregate and "EU-14+" will constitute the samples for most of our subsequent analyses. These countries encompass the largest receivers of immigrants among rich democracies in the world, spanning similar level of development and institutions. We focus the regression analyses especially on the full OECD sample, as it allows more precision, having a larger number of observations, and it illustrates potential immigration impacts over a range of immigration shares, larger than the simple European Union. Countries like Canada and Australia have larger share of immigrants and countries like Japan and Korea have smaller shares. Hence, this range allows to better predict what can happen in Europe if immigration shares of the population continue to increase or if they are reduced relative to the current range.

As for regions of origin of the stock of non-OECD immigrants, we show their evolution in Figure 2, separating all the largest sending areas: non-EU Europe, Asia, Middle East and North Africa, South Saharan Africa, Latin America, China and India[6]. We notice that all groups had

[5]EU-14 countries include: Austria, Belgium, Denmark, Greece, Luxembourg, Germany, Finland, France, The Netherlands, Italy, Spain, Sweden, Portugal and Ireland. "EU-14+" include EU-14-plus UK, USA, Canada, Australia and New Zealand.

[6]While our use of non-OECD countries as "low- to middle-income" countries of origin of immigrants, includes most of the relevant origins, Mexico and Turkey, are not included as origins, as they are part of OECD. Their emigration was more relevant in the 1980s and 1990s than recently. Their emigration rates in the 2000s declined, in line with what happened to migration from other OECD countries, and differently from other non-OECD.

a significant and rather similar growth, so that the total number of these immigrants in OECD countries increased from about 25 million in 1990 to about 100 million in 2024. The similar and rather linear growth over the decades of immigrants from each region of origin, so that their proportions remain rather stable over time, is also a key reason why the shift-share push-driven index has little power to explain changes in immigration rates across OECD countries, as we will see in Section 3 below.

Skill Intensity of Immigrants

Figure 3 provides a representation of the skill content of net immigration relative to the skills of the receiving country residents. Each point represents a 5-year receiving country observation: the vertical axis measures the ratio of high-to-low-skilled net immigrants from non-OECD countries in the period, while the horizontal axis measures the high-to-low-skilled ratio in the resident population at the beginning of the period in the receiving country. The vertical axis is truncated at one, as some OECD countries receive immigrants who are so high-skilled (ratio of 10 or more) that including those observation would make the relevant area (that between 0 and 1) hard to visualize. The points clustered at one on the vertical axis include countries that receive immigrants with a skill ratio larger than one.

Points above the 45-degree line imply that immigration increased the education-skill intensity in the receiving country. In more than 81% of observations, net immigration was more skilled than the local population (above the 45 degree). In some cases, the skill ratio of immigrants is two-to-three times larger than that of natives. Some of the countries with a skill-intensity of immigrants lower than that of natives (below 45 degree line) are European (red dots), but even for them the skill ratio of immigrants is not far below that of residents, in most cases. So, in the aggregate and in most of the OECD countries, immigrants contributed to *increasing* the human capital intensity of the receiving country by adding more people with advanced education than existing residents.

Correlation between Net Immigration and Native Demographic Change

One important open question is whether natives' demographic decline is associated with increased immigration. Namely, whether there is a negative and significant correlation between native population growth and immigration, so that one can think of foreign born filling the demographic gap left by native population decline across OECD countries. Table 1 shows that the decline of native population and the increase in immigrants occurred roughly in the same years, on average, in OECD countries. We further report the correlation across countries and over time in Figure 4: the native population change is on the horizontal axis and net immigration on the vertical axis. Each point represents a 5-year period-destination country pair.

Three interesting facts emerge from the scatterplot. First, there is very small correlation, between net immigration and native population change across country-periods (OLS coefficient -0.041). Immigration therefore is not "replacing" natives in any significant way as only 4 percent of native decline in population is is associated with higher immigration.[7] Second, the variance of native population decline (horizontal axis) is much larger across the country-period than the variance of immigration rates. This implies that, in some countries, we observe large population declines despite some immigration. Third, European countries (marked with red dots) are among those that exhibit the most dramatic losses in native populations. Many observations relative to them are in the negative quadrant for native population growth, revealing a decline in adult population over most of the periods considered.

Having established the importance of net immigration from non-OECD countries, its skill-intensive nature in most cases, and its lack of significant correlation with native population growth, we examine the potential predictors of country-specific immigration changes. We focus first on potential "push-factors" from origin countries, and then we analyze some measures of immigration policies, developed to summarize the degree of openness to immigration of destination countries and available for all OECD countries over the considered period. Last, to characterize the more idiosyncratic variation across receiving countries, we also define immigration shocks and immigration surges, across OECD countries, aimed at capturing large immigration episodes not predicted by push-factors and policies.

3 Predictors of Immigration: Push-Factors, International Migration Crises and Receiving Country Policies

Our first goal is to better understand the determinants of the increase in *net immigration rates* in the post-1990 decades and their differences across OECD countries. Such an increase implies that immigrants as a share of the total population increased markedly by 2024 and their share vary greatly across destination economies. We analyze whether measures of push-driven factors, inter-

[7] A coefficient equal to -1 would imply 100% –full– replacement. The estimate of 0.04 is much closer to 0 replacement.

acted with existing international networks, episodes of crisis-migration and changes in immigration policies, captured by aggregate indicators, have any predictive role for the differential *change in net immigration rates* across OECD countries and across the "EU-14+" group defined above.

These push-driven shift-share indices and policy indicators are typically used as instruments for immigration rates when assessing their impacts. Most of the time, empirical studies use the shift-share variation across sub-national regions (commuting zones, counties) to proxy exogenous variation of immigration. In our case we construct such index at the national level and we will see that its very low power does not allow us to use it as IV. We will use only the one policy indicator that has some (weak) explanatory power, in a reduced-form regression, to analyze what the aggregate effects of more open immigration policies across OECD countries are. Such exercise allows us to check whether the predictive power of more open immigration policies is consistent with the predictive power of higher immigration rates on aggregate variables.

We adapt the existing concepts of "shift-share" push-migration by constructing two indices. The first captures overall push-driven flows, while the second those originating from crises in the origin countries (consistent with the classic approach of Card, 2009; Goldsmith-Pinkham et al., 2020). We then use detailed and homogenized measures of "external regulation" and "external control" of immigration (i.e., at the border) developed in Berger et al. (2024) and recently used in the literature to analyze consequences of tightening such policies on diverting migration (see IMF Staff, 2025). Our application is more demanding than most of the existing literature looking at cross-country immigration analysis, as we isolate only the receiving country-specific changes in immigration rates over time (and not the individual bilateral flows). We only consider, that is, the variation of the push-factors and of the policies affecting *changes of immigration rates* over time for the receiving country. By measuring immigration as rates (relative to population) and then including country fixed effects and time effects, we consider the impact of changing push-factors and changing policies in predicting changes in immigration rates. In most of the immigration literature focused on cross-country differences (Alesina et al., 2016; Ortega and Peri, 2014), similar indicators have been used to predict immigration rates rather than their changes. Additionally, most of the variation used to analyze immigration effects in the literature has been across sub-national regions or local areas, not across receiving countries. Seminal papers, such as Card (2001); Peri et al. (2015b); Peri (2012), as well as more recent ones (such as Goldsmith-Pinkham et al., 2020; Foged and Peri, 2016; Beerli et al., 2021a; Monras, 2020, and others) used regional variation.

Push-driven factors and networks that lead to shift-share style indices of immigration predict immigration-rate changes (and can be used to estimate their impact) only if the source-countries of immigrants, or their reltive relevance, change over time, as clearly shown by Jaeger et al. (2018). Otherwise the strong persistence of networks would generate very high correlation of these predicted immigration rates over time. This would make them hard to be distinguished from receiving-country (or region)-specific fixed effects and to be separated from pre-existing trend. New international crises can generate such sudden shifts — we capture them in the "crises-based" shift-share — but may not be large enough to generate a significant impact to net immigration at a large scale for OECD countries. These push-driven shocks have, in most cases, not been used to predict country-level immigration, but only "regional-level" one within a country. When they have, they have been used mainly to predict *levels* of immigration, or at most *immigration rates* (e.g., in Ortega and Peri, 2014; Alesina et al., 2016) but not their changes.

3.1 Push-driven Migration Shift-share and Country-crises Shift-share

Our main measure of push-driven migration changes is a "shift-share" index capturing the predicted flow of immigrants from non-OECD countries of origin o into specific OECD countries, i. Such prediction is based on the pre-existing network of migrants from o to i interacted with net outflows from origin o in each five-year period, between $t-5$ and t. The variable is called $\frac{\Delta \widehat{Immi_{i;t\ t-5}^{nonOECD}}}{Pop_{i,1990}^{15+}}$ and aggregates all the net predicted inflows from non-OECD countries. This variable is defined in detail in the Appendix A1.

Similarly, the "crises shift-share" uses pre-existing networks at destination to allocate the large emigration flows from crises in non-OECD countries. This index includes the flows from seven countries that experienced the largest crisis-driven emigration rates in the period 1990-2024.[8] The variable is defined in details in the Appendix A1.

While both indices have predictive power in explaining the aggregate flows of migrants, we will show that they have very little power in explaining the *changes* in immigration rates across OECD receiving countries and, therefore, very limited value in predicting their effects in receiving economies. We will not pursue them as instruments due to their very low power at the country-level.

[8]Namely, Albania in 1990s and 2000s (post-Soviet collapse); Bosnia in 1990s (war); El Salvador in 1990s and 2000s (hurricane Mitch, gang violence surge); Romania post 2000s (post-Soviet collapse and access to EU); Syria post 2010 (civil war); Venezuela post 2015 (economic collapse); Ukraine post 2021 (Russian invasion).

3.2 The Immigration Policies in Comparison (IMPIC) dataset: External regulations and controls

In order to measure changes in immigration policies (i.e., reforms) that could have an impact on the size of immigration flows and to ensure sufficient coverage for the considered period across OECD countries, we use the indicators produced by the Immigration Policies in Comparison (IMPIC) Dataset.[9] This project is the most comprehensive in its kind and has produced several indicators of immigration policies across countries and years. We focus on those defined as "external" in that they affect the conditions and rules of entry of immigrants, hence more relevant to affect their flows, as opposed to "internal" policies that relate to immigrant integration, assimilation and to the second generation[10]. The project generated measures characterizing the intensity of "External Regulation" of a country, and measures relative to the "External Control" in matters of immigration.

The IMPIC dataset is, to our knowledge, the most accurate, comparable and complete database, based on a "legal coding exercise": national legal scholars identified the relevant laws, on more than 70 aspects of migration policies in each country, and researchers systematically coded their content into a standardized questionnaire across 35 OECD countries from 1980 to 2020. Each type of law is an item — and each item is coded individually for each year. The resulting scale runs from 0 to 1, where 1 is maximum restrictiveness, derived from the actual content of the law. Then the items are averaged within categories (described below).

External Regulation indices capture the legal provisions that govern the terms under which immigrants may enter and reside in a country, focusing on rules applied at or before the border. They include "eligibility" requirements, namely the criteria a person must meet to qualify for a given entry route in the first place (for example, age limits, nationality restrictions, family membership criteria, quotas for labor or humanitarian migrants and similar) as well as "conditions", which are the additional requirements that must be fulfilled once eligibility is established — such as financial thresholds, proof of accommodation, job offers, language skills, application fees, or place-of-application rules.

Together, these two sub-dimensions capture how restrictive countries are in setting the terms of legal entry across the four main policy fields: family reunification (A in the IMPIC database),

[9]The project, the methodology and the data are from Helbling et al. (2024) and described in details in Helbling et al. (2017) and Berger et al. (2024).

[10]This is also the reason why we use the index IMPIC over MIPEX, an alternative index of immigration policies, IMPIC focuses more on admission while MIPEX focuses more on post-arrival indicators

labor migration (B), asylum/refugees (C), and co-ethnic migration (D). These are the dimensions of "External Regulation"

The "External Control" indicator, instead, measures enforcement mechanisms that monitor whether those regulations are being implemented. External controls specifically target irregular migration at or near the border and cover mechanisms directed at preventing unauthorized entry or sanctioning those who facilitate it. The specific items included are: whether illegal residence is classified as a criminal or administrative offense (E1 in the IMPIC dataset); penalties for airlines and other carriers that transport passengers without proper documentation (E3); the existence of an alien's register or population register including foreigners (E5); international cooperation and information-sharing on persons entering the country or deemed a security risk (E6); the collection of biometric information from immigrants (E7); and penalties for immigrants found with forged or expired documents (E8).

All items in both sub-indices are scored on a 0–1 scale from most open to most restrictive, and the sub-index scores are computed as arithmetic means of their constituent items, with equal weighting at each level of aggregation. The external regulation score for each policy field (A–D) is the mean of the sub-dimensions, while the external control score pools items E1, E3, E5, E6, E7, and E8 across all policy fields and averages them.

In our use, we will show and use the index $1-$IMPIC (rather than IMPIC itself) so as to have larger values associated to more open immigration policies, still with a range between 0 and 1. Hence, such an index should have a potentially positive correlation with net immigration. This, to keep it consistent with the shift-share predictor, should be positively correlated with net immigration.

Figures 6 and 7 show the evolution of the average policy indicators over the period of analysis for the average OECD (top left panel) and for the eight large OECD destination countries. Given the representation of $1-$IMPIC, an increase of the index implies more open policies.

We notice a few interesting facts. Beginning with the External Regulation index, in panels of Figure 6, we notice that it is rather stable over time, at least for the average of OECD countries. In most of the large immigration countries (the US, UK, Germany), it actually declined somewhat over the period, implying less open policies. Spain, and to a lesser extent Italy and France, show a softening in the early years (1990-2000) when several reforms introduced and expanded a quota system for foreigners admitted for work and for family reasons (the Martelli Law in Italy in 1992, the labor quota system to respond to short- and long-term labor market shortages in Spain, used in

1993–1995 and again in 1997–1999). After that period, the index is stable or it declines somewhat also in those countries.

On the other hand, the evolution of the External Control index (Figure 7) points to a more significant tightening (as $1-$IMPIC declines). In several European countries, the measures introduced in the 1990s and 2000s with the accession to the Schengen agreement (1992), which implied information sharing on immigrants and carrier sanctions to bring in undocumented immigrants are responsible for such decline of the index. Similarly, between 2000 and 2010, the legislative response in the US to 9/11 with the Patriot Act (2001), which strongly enhanced border security and biometric data collection (starting in 2004), caused a strong decline in that index.

In the more recent period, one difference that stands out in the external control index is the increase of $1-$IMPIC for France in 2010-2020 while Spain and Italy continued to experience a tightening. This is likely due to the passing of a law eliminating the offense of "illegal residence" by the Holland administration in 2012, while both Italy and Spain maintained a more restrictive policy. While the cross-country comparison is interesting, we do not certainly observe a trend to more open external regulation and control over the period, even for countries that experienced very large growth in net immigration such as Spain, UK and Italy.

There is a limitation of the IMPIC index for EU countries. Namely, we should think of it as capturing the immigration of "extra-EU" people. As our focus is on non-OECD immigration into OECD countries, this is consistent with the goal. The index will not capture as an immigration policy change, the events following accession to the EU of some new countries, as those do not imply modification of specific national laws. The "accession" of countries like Romania and Bulgaria, on the other hand, and their consequences on immigration to EU countries, can be captured by the shift-share index, if receiving countries have a larger share of people from those countries and the accession generates a surge in their emigration rates.

4 Large Immigration Shocks and Immigration Surges

The policy changes and the push-driven immigration predictors defined in the previous Section identify factors potentially affecting immigration, and are less correlated with past economic trends of the receiving countries. Hence, they are often used to assess the causal effects of immigration on economic outcomes, either using them as instrumental variables for immigration rates or as reduced-form variables.

In our demanding framework, however, in which we control for country and time-specific immigration rates in a panel analysis, those factors, as we will see in the next Section, have low predictive power and cannot be used as Instrumental Variables. International migrants have grown across destinations for a set of reasons depending on destination desirability, changing networks, diffusion of information, economic opportunities and other factors that are not easy to capture systematically and in the aggregate. Hence an exogenous and powerful source of migration differences is not easy to identify. As an additional strategy to track the impact of immigration, we alternatively isolate what we call "immigration shocks" and "immigration surges".

"Immigration shocks" are 5-year periods of unusually high immigration rates for an OECD country, defined as high values relative to the destination country immigration rates and relative to immigration in all OECD countries in that period. In particular, we identify as "large immigration shocks" those period-country combinations when the immigration rate from non-OECD origins was larger than the 75th percentile in the immigration rate distribution for that period (across 38 OECD) and above the 75th percentile for the distribution of immigration rates in that country over the full period. As such, those episodes are rare and significant and capture idiosyncratic outlier in the immigration rates[11]. They can be considered hard to predict. Israel in the 1990s (after the Soviet Collapse) Spain, Italy, Greece and Great Britain in the 2000s and Colombia, Chile (Venezuelan crisis) and Turkey after 2020 experienced some of those episodes. Figure 8 shows as a square all the period/country episodes that we classify as these extreme (and rather unpredictable) positive immigration shocks.

After controlling for lagged economic outcomes, it is interesting to track their predictive power on economic variables (which we will do in the next Section). While we are not isolating exogenous changes in immigration rates in a rigorous sense, we are, however, looking at episodes that have changed in a short time the population of a country and were hard to predict based on push factors, policies and past economic variables.

We also identify a second type of "unusual immigration episodes" by constructing "immigration surges". These are sudden surges in immigration rates that persisted at least for 2 periods. We isolate them by identifying a jump, larger than 50th percentile of non-OECD immigration rates, from one period to the next, persisting for at least 2 (5-year) periods and we only consider the first time such an episode happened for each country during the period. Figure 9 shows in terms of

[11] This approach is consistent with Engler et al. (2023), who identify similarly defined immigration shocks–larger than the median of the distributions

countries and years such events, representing with a dark blue square the period of the "surge" and then with light blue squares the post-immigration surge period. These surges were experienced by 14 of the 38 OECD countries. We use such an indicator for the initial period of these surges to construct a response to them, in the form of a local projection, to see what their predictive power is on GDP per worker and its determinants. The main feature of a surge is that during the periods preceding it, the receiving country experienced relatively low immigration, and hence this was the first significant "immigration event" experienced by a country. We track the responses of productivity using the local projection over horizons of 5 and 10 years.

5 Panel Analysis: Predictions of Net Immigration

5.1 Country-level analysis

We first analyze how the push-driven shift-share indicators (either global or crisis-driven) and the policy indicators predict net immigration rates in a simple country-level panel regression with country and period fixed effects. Then we also test how the "shock" and the "surge" variables are correlated to net immigration overall, when controlling for those factors. We estimate the following regression, in which we always control for native change in population and fixed country and period effects:

$$\left(\frac{\Delta Immi_{i,t\ t-5}^{nonOECD}}{Pop_{i,1990}^{15+}}\right) = \beta_i + \beta_t + b_{SS}(ShiftShare)_{i,t,t-5} + b_P(1 - IMPIC)_{i,t-5,t} + \\ + b_{sh}I(shock = 1)_{i,t,t-5} + \left(\frac{\Delta Native_{i,t\ t-5}^{WorkAge}}{Pop_{i,1990}^{15+}}\right) + \epsilon_{i,t\ t-5} \tag{5.1}$$

Table 2 shows the coefficients on the explanatory variables, first introduced one at a time and always controlling for native population changes. Table 3 then shows the predictive power of each when combining the policy indices together with the shift share variables (alternatively global or crises-driven) and then adding the indicators for immigration shocks and immigration surges, as defined in the previous Section. The sample we use in Table 2 and 3 is the full set of OECD countries, while in Table 4 and 5 we show the same predictive panel regression, only including the EU-14-plus sample. The second sample is smaller but a bit more homogeneous culturally and institutionally to European countries, and with a broad range of immigration rates, hence possibly the impact of changes in policies can be identified a bit more precisely in this sub-sample, with a common institutional background.

First, we notice that the shift-share push-driven indices have no explanatory power on net immigration, neither when included on their own nor with controls, in either of the samples. Once we include country and year fixed effects, those variables do not predict the changes in immigration rates experienced by OECD countries (Table 3). They have no power in predicting immigration in the EU-14-plus sample either (Table 5). While in a regression without fixed effects (not reported) they have some (weak) predictive power, this vanishes once we control for country-specific immigration rates over the period. This would be the case if the networks of immigrants are persistent and emigration rates from non-OECD countries increased uniformly over the period without large relative changes, which is exactly what is shown in Figure 2. That is, the lack of time variation in non-OECD immigrants flows by origin substantially reduces the power of the shift-share index across OECD countries.

Second, the $1-$IMPIC policy indices have weak predictive power. However, the index of external regulation has a coefficient that is positive and relatively large across specifications, when controlling for push-driven factors and shocks. The implied change of the index from the most to the least restrictive scenario would increase immigration by between 2 and 4.5 percent of population (Table 3). The estimates are not statistically significant. However, this coefficient is often significant (albeit weakly) in the specifications for the EU-14-plus group in Table 5. Controlling for the shift-shares push-immigration, the external regulation index has a coefficient between 6 and 12 percent of the population, which implies that a variation as the one observed in the 1990s in Spain — which increased its value by 0.2 points — could trigger higher immigration rates by 1.2 to 2.4 percent of the population, similar to the median to 75th percentile of this variable (equal to 1 percentage point). The fact that EU-14+ is a more institutionally and historically homogeneous group (than the full OECD) and hence the policy index variation may reflect more cleanly differences in immigration policies (for given institutions), may help reduce noise and identify the variation of these policies, so that their coefficients are estimated more precisely.

Third, the native change in population is never correlated with immigration and its coefficient is imprecisely estimated and very small. This confirms that there is no mechanical correlation between demographic decline and increased immigration across OECD countries. These two variables (native demographic change and immigration) are relatively uncorrelated, and we treat them as independent when estimating their predictive power for GDP and its components.

Fourth, the "immigration shock" and the "immigration surge" variables are associated to a jump of the immigration rate around 2 and 1.6 percentage points, respectively, for OECD countries, and of similar magnitude for EU-14-plus sample. Their explanatory power is unaffected by the inclusion of policies and push-migration index, confirming that they are rather idiosyncratic, and we will think of them as close to "immigration surprises". They capture significant jumps comparable to one standard deviation of net immigration (around 2 percentage points).

The overall messages of this "first stage" analysis are three. First, the changes in immigration rates across OECD countries (and in the EU-14-plus group) are not predicted by push factors mediated by pre-existing networks (the shift-share), likely because the networks are rather stable over time and the flows from non-OECD origins changed similarly and progressively over time, not generating much within receiving-country variation in sources. Second, while the comprehensive IMPIC measures of stringency in external immigration regulation and controls have only low predictive power on net immigration, the "external regulation" one has always a positive coefficient, and for the more homogeneous EU-14-plus sample, it is significant in predicting positive changes in immigration rates. Hence, while we cannot use it as an IV, due to the low power, we will use it in a reduced-form regression to analyze whether introducing more open immigration policies has the same correlation with aggregate outcomes as an increase in immigration rates. Third, we identified some significant immigration shocks and immigration events that we will study further in the rest of the paper, and take as rather idiosyncratic and not predictable, hence generating a very different source of variation of immigration than the other two. We will discuss in Section 6.1 how the source of identifying variation of immigration rates over time used in this paper, compares to the identifying variation used in other (usually local and country-specific) analyses of migration flows in the literature. Our key idea is that, while one has to be careful with causal interpretation, identifying different sources of variation, and looking at their impact on aggregate variables is informative in the presence of robust results and is the only strategy that one can apply to a cross-country empirical analysis.

5.2 Predictive Power of Regional Shift-Share

While many immigration policies are decided at the country level, it is well known that immigration varies substantially across regions within countries. The existing literature, mostly analyzed the impact of immigration by considering local labor markets and other definition of local economies. The intuition for this empirical framework is that within-country variations of immigration rates are better explained by local network-based shift-shares than cross-country variation is. Additionally, it is easier to find within country comparable data and hence the past focus on this design. In this Section we show that it is true also for our European sample that the shift-share instrument is more powerful in predicting regional changes in net immigration, and we will use such regional analysis and shift share IV's to corroborate some results.

Our focus in this Section is on NUTS-2 regions (or more simply "regions") for European Union countries. We exploit information contained in EU-LFS data from 2005 to 2024, where we observe broad country-of-birth-agglomerates for the foreign born.[12] We analyze how the shift-share indicator predicts immigration rates at the regional level, using a similar framework as we did in Section 3 for national immigration rates. We have to make assumptions and empirical choices to obtain a consistent panel of regions over the period, the most important being a definition non-OECD immigrants that is compatible with the EU-LFS data and is as close as possible to the one we use in the rest of the analysis. To achieve this, we use four region-of-birth groups that are mostly composed of lower-income non-OECD countries: North Africa and Middle East, other African countries, rest of Asia, South America. The limitations of this choice are two-fold. First, we miss-classify some migrants as non-OECD/lower-income countries when indeed they are not (e.g., those from Chile, Colombia, Japan, Korea). Such measurement error could be problematic in some cases (especially for immigration from higher-income South American countries to Spanish regions), but its magnitude should be limited, as these countries represent a minority share of immigration flows in Europe. Second, we do not include in the shift-share variable immigration from lower-income Eastern European countries.[13]

Despite the limitations in the data, we are able to run a specification analogous to that of Equation 5.1. Here, we focus only on the predictive power of the shift-share instrument and do not control for changes in migration policy (IMPIC) or large idiosyncratic surges in migration (shock variable). Furthermore, we are not controlling for the lag economic aggregate outcomes that will be instead included in the second-stage regional analysis in Section 8 and might alter the predictive power of the shift-share.

The results in Table 6 show that we are able to predict the change in the stock of immigrants

[12] Germany provides country-of-birth-agglomerates only starting in 2017, which we use as base year for the first 5-year windows we observe for this country. Bulgaria, Malta, Croatia, Poland, Romania and Slovenia do not report detailed information on the country-of-birth-agglomerates at a detailed enough level or in a consistent way across time and regions and are thus excluded from the analysis.

[13] Further details about the regional data and variable definition we use in this Section and in Section 8 is provided in Appendix A1.7 and in the notes of Table 6.

from lower-income countries using the shift-share indicator at the regional level, even controlling for the 5-year period and region fixed effects. In Column (2) we further control for the local demographic change of natives and the results hold. The size of the estimated coefficients is just below 1 and the statistical significance of the instrument meets conventional levels.

These results confirm previous analyses that find a positive association between shift-share instrumental variable and immigration at local level for many countries and time periods following the seminal work by Card (2001). Based on this empirical evidence, and being aware of the empirical limitations of our setting and data, we will validate the main empirical results for the European regions using a 2SLS approach in Section 8.

6 Immigration's Impact on GDP Components: 10-year Local Projections

To address the central question of this paper, we estimate several local-projection regressions, following Jordà (2005), to measure the dynamics response of crucial aggregate economic variables y (income per person, labor productivity, capital per worker, TFP, price index) in country i over the horizon of h years in response to immigration (or its determinants) in the $t-5, t$ period measured as share of the population of the receiving country, i in 1990. The basic Ordinary Least Square specification, using the measure of net immigration in the period from $t-5$ to t defined above and the demographic change as explanatory variables, is as follows:

$$y_{i,t+h} - y_{i,t-5} = \beta_i + \beta_t + b_I \left(\frac{\Delta Immi^{nonOECD}_{i,t\ t-5}}{Pop^{15+}_{i,1990}} \right) + b_D \left(\frac{\Delta Native^{WorkAge}_{i,t\ t-5}}{Pop^{15+}_{i,1990}} \right) + Lag(y_i) + \epsilon_{i,t\ t-5} \quad (6.1)$$

where the left-hand side measures the change in outcome y, between year $t-5$ and $t-5+h$, and the horizon h can be equal to 5 years, and 10 years so that we can track a dynamic response over the medium-long term. β_i is a set of country-specific fixed effects and their coefficients, β_t is a set of period-specific fixed effects and their coefficients, $Lag(y_i)$ is a polynomial in lags of the dependent variable (in our case we include one lag) and $\epsilon_{i,t\ t-5}$ is a zero-mean random error capturing unobserved factors. We weight observations by initial 15+ 1990 population stock and standard errors clustered at the destination country level.

The coefficient b_I captures the predictive power of net immigration changes on the outcomes, controlling for lagged outcomes and fixed effects, while b_D captures the predictive power of the demographic change.

The outcomes, y, that we consider in our analysis are obtained from the Penn World Table version 11.0 and we focus on their growth rates (see Appendix A1.6 for more details). In particular, to have a complete picture of the impact of immigration and demographic change on the main components of population growth, GDP per person and GDP per worker (labor productivity) growth, we analyze the response of the following variables between time s (the horizon of the local projections) and time $t-5$:

- Population growth, measured as the difference in the ratio (working age population/adult population in 1990);
- Change in the log GDP per capita in constant 2021 US dollars, captured by the variable $\ln(rgdpe/\text{adult population})$;
- Change in the log GDP per worker in constant 2021 US dollars, captured by the variable $\ln(rgdpe/\text{employment})$;
- Change in the employment/population ratio, measured as $(emp/\text{adult population})$;
- Growth of human capital index, measured as h, which is a measure based on share of people with different schooling levels multiplied by the return to schooling;[14]
- Change in total factor productivity measured as log TFP, $ln(rtfpna)$, in constant 2021 US dollars;
- Change in capital per worker, which captures net investments $ln(rnna/emp)$;

In a few specifications, we also assess how immigration affects inflation dynamics (measured as changes in the GDP deflator reported in the PWT data). All the previous outcomes are in "real" terms.

6.1 Identification

While the local projection method, including country and year fixed effects as well as the lagged dependent variable, is a broadly used method in macro to assess the effects of different type of

[14]The index is computed as $h = \exp(\phi(s))$, where $\phi(s)$ is a piecewise linear function of average years of schooling s. More specifically: a return of 13.4% per year for the first 4 years of schooling. A return of 10.1% per year for years 5 through 8. A return of 6.8% per year for schooling beyond 8 years.

shocks, its causal interpretation rests on strong assumptions. Namely, as per Jordà (2005), the immigration rate shock need to be orthogonal to other determinants of the outcome at every horizon h conditional on the lagged controls and fixed effects. If this holds, the LP coefficient at horizon h gives the average causal effect of a unit shock on the outcome h periods later — the building block of the impulse response function. We show these results in Section 7.1.

As this is unlikely, due to omitted variables and potential reverse causality, our paper provides a series of additional exercises that corroborate the initial results and, as they rely on different identifying variation and strengthen our interpretation. First, in Section 7.3 we use the fact that reforms in immigration policies are less correlated to past economic conditions than immigration itself and we estimate the impact of changes in those on GDP per worker components. This is interesting per se, as it evaluates the impact of immigration policy changes. Additionally, as this policy shows (weak) positive impact on immigration, it reinforces the interpretation of the previous results as caused by immigration. Then, in Section 7.4 we estimate the impulse response to large immigration shocks (larger than the 75th percentile of immigration rates) and to immigration surges. As those are less predictable, sudden and large, the response to those may approximate a causal effects. Finally, in Section 8, we estimate the impact on labor productivity of immigration shocks *at the regional EU level*, where we can use the shift-share as an instrumental variable, being more powerful for such local variation. While one has to still be very careful in interpreting the coefficients as causal, the size and consistence of estimates using different sources of immigration rates variation, different samples and different approaches, suggests that our results are informative.

Let us emphasize three important points to explain the difference in the identifying variation of immigration rates that we use in this analysis relative to other sources in the literature, which also analyze determinants of immigration rates but in different contexts. First, a large set of existing studies uses bilateral flows (origin-destination) and shows variation of several origin and destination factors affecting them (e.g., Mayda, 2010; Beine et al., 2016; Fernández-Huertas Moraga, 2025). However, as it is well known (for instance from Ortega and Peri, 2014; Alesina et al., 2016), once the flows are aggregated at the destination country level, the variation is significantly reduced and very little of it is left when fixed effects are included. As we need to identify the effects of changes in aggregate flows at destination, that type of identification is too weak. A second set of papers, such as Furlanetto and Robstad (2019), uses a VAR identification, with some assumptions on the innovation of immigration shocks, used to track its impact. Those studies use much higher frequency data (quarterly) and are focused on short-run effects (6-10 quarters) of immigration, often over a business cycle. The identifying assumptions rely on independence of short-term shocks, less likely to have persistent and long-term consequences. In our paper, we focus on medium and long-run growth effects and have fewer time-series observations, but lower autocorrelation than in those analyses, and we capture the changes in immigration that affected countries in the long run. Finally, the type of studies that use "natural experiments" (e.g., Beerli et al., 2021b; Peri and Yasenov, 2019; Dustmann et al., 2017b), while certainly better identified, focus on specific regions or cities, specific historical events in a limited time period and regarding a specific type of immigrants. Hence, they are hard to generalize to all OECD or European countries: their external validity is limited, as it is their ability to identify long-run effects.

6.2 Preliminary Evidence

Before showing the estimates and the impulse response produced by the local projections, we show some suggestive correlations. Figure 5 shows binned scatterplots, which reveal the correlation between native population growth (top rows) and total population growth (left panel), and between native population growth and GDP per capita growth (right panel) after residualizing for country, period effects and lagged dependent variable. The bottom row shows the same type of correlation using net non-OECD immigration rates on the horizontal axis and population growth (in the left panel) and GDP per capita growth (in the right panel), also residualized.

Both types of changes (natives and immigration) have a positive and significant association with population growth (left panels), where the OLS regression line has a slope close to one, implying that one percent more native population or one percent more immigrants in an OECD country are associated with close to a one percent larger population in the country, as one would expect. Both changes are part of the aggregate population demographic change; hence, both of them result in a close-to-proportional increase in the population.

The two right panels show, however, different partial correlations to GDP per capita growth. Non-OECD immigration is associated to *faster* growth of GDP per capita, while native demographic growth has a negative partial correlation with it. While at this stage, this evidence is purely correlational, it provides a stylized fact supporting the idea that immigration may support growth in GDP per capita. However, this is not true of all types of population growth, as native population growth seems to have a negative correlation with GDP per capita growth. Immigrants and their inflow are different from native population changes. Such a finding will be confirmed by the more formal econometric analysis too.

6.3 Focus on Labor Productivity Growth

In the previous Section we listed eight outcomes for which we will initially show the impact of immigration using the Local Projection approach. Our focus on most of the subsequent specifications and checks will be on labor productivity, namely income per worker, and its components. This is the key variable on which the effects of immigration have been studied the most (see the review in Peri, 2016). Additionally, we use a simple accounting decomposition of growth. Starting from a production function of the type:

$$Y_t = A_t K_t^{\alpha} (h_t L_t)^{1-\alpha} \tag{6.2}$$

where Y_t is aggregate output; A_t is total factor productivity (TFP); K_t is physical capital; h_t is human capital per worker; L_t is labor (number of workers); $\alpha \in (0, 1)$ is the capital income share and $1 - \alpha$ is the labor income share. We then define $ypw = Y/L$, income per worker $k = K/L$ capital per worker and g as growth rates of each variable (which can be approximated by log-changes). If we divide by L both sides of equation 6.2, and take growth rates (logarithmic changes) we have the standard decomposition of GDP per worker growth as follows:

$$g_{ypw} = g_A + (1 - \alpha)\, g_k + \alpha\, g_h \tag{6.3}$$

Hence, we will analyze the impact of net immigration on g_{ypw} as well as on each component on the right-hand side of equation 6.3, and we will include these 4 outcomes (GDP per worker, human capital, TFP and capital per worker) in all the remaining parts of our analysis.

7 Estimation Results

7.1 Basic Estimates

In this Section, we present the main local projection results for the set of eight outcomes that we can measure at the country level: population growth, GDP per capita growth, GDP per worker growth, change in employment-population ratio, TFP growth, capital per worker growth and change in GDP deflator. We include as explanatory variables net immigration rate (main) and native population change (control).[15]

[15] As mentioned above we first analyze this large set of outcomes and include in the analysis all OECD countries. We also show estimates in a sample of only EU-14 countries plus UK, Canada, US, Australia, New Zealand. Restricting

Table 7 shows the estimated effect in the first period (0-5 years, in column 1) and in the second period (5-10 years, in column 2) of a change in non-OECD immigration and in native population equal to one percent of the initial adult population, when we consider the sample of all OECD countries. For each outcome reported on the left, we show the coefficient and standard error of the cumulative response to net immigration and to native demographic change. The first column shows the impact for years 0-5 and the second for years 5-10. Such an extended horizon is longer than what was estimated in the only previous study on the impact of immigration using cross-country analysis that we are aware of (Engler et al., 2023).

Correspondingly, Figure 10 shows eight panels that report the estimated impulse response (from Table 7) for each of the outcomes, and the 95% confidence interval for a one percent increase in net immigration from non-OECD (in blue) and from one percent increase in native population (in orange). While the estimates are somewhat noisy, some clear findings emerge.

First, both immigration and net native population changes have similar, persistent effects on total population. The coefficients imply that they both increase roughly "one to one" the population of the receiving country, as one would expect. The 10-year coefficient is a bit larger than one for non-OECD immigration and relatively smaller for native change, but they are not statistically different from each other. The difference may suggest that immigration from non-OECD also predicts (attracts) immigration from OECD, which is the remaining group in the population beyond natives and non-OECD immigrants. Changes in native population has a 10-year coefficient close to one.

The second interesting fact is that their coefficients in the GDP per capita and, even more so, in the GDP per worker regressions are quite different and "divergent" between immigration rates and native population growth. While net immigration is associated to a positive persistent and significant growth of GDP per worker equal to 1.2 in the first 5 years and 1.9 in the 10-year horizon, net native changes has a smaller, non-significant (and negative in the 5-year horizon) coefficient. This translates similarly on GDP per capita, which increases (not significantly) after the immigration change while decreases (also not significantly) after native population change.

Immigration has a non-significant coefficient on employment-population ratio and a positive but non-significant on human capital and TFP. The size of this effect is not negligible (+0.5 percentage points growth for the human capital index and +0.3 in the 10-year horizon, percentage

country-level analysis to only EU-14 countries only results in excessively imprecise and unstable estimates. Using only European countries in the analysis shows similar quantitative results but larger standard errors, so that the coefficients are not significant. These results are not reported but available upon request.

points for TFP, for each one percent of the population higher net immigration). However, it is imprecisely estimated and, thus, not statistically significant. Growth of native population has weak, non-significant but negative coefficients on human capital index and on TFP.

Large and statistically significant instead is the impact of immigration on capital per worker, generating +1.57 percentage points higher investment in the 0-5 years and 2.87 percentage points more in 5-10 years. This effect is very strong and persistent, especially when compared to the much smaller and insignificant coefficient on native population growth. Aggregating these effects suggests that net immigration stimulates almost all components of labor productivity, and especially investments, resulting in a labor productivity boost that accumulates over 10 years.The estimated effects are large but imprecise.

These results are consistent with the idea that immigration stimulates the growth of GDP per capita, via stronger investments, and weakly through higher human capital and productivity. Additionally, these effects do not seem simply linked to the addition of people (population) to the economy, as the native-born population growth does not show any of those responses, but rather has an insignificant and negative correlation with GDP per person and GDP per worker growth.

Connecting these results with the decomposition of GDP per worker into its components, described in Section 6.3, we can say that an increase of immigrants by one percent of the receiving country population, is associated, to an increase of GDP per worker growth by 1.2 percent within five years and with higher growth by 1.9 percent over ten year. Of this ten-year long-run growth, assuming a share of income going to labor (1-α) equal to 0.6 (consistent with the estimate in Karabarbounis and Neiman, 2014), a full 1.2 percent (0.4*2.9) is due to faster capital per worker accumulation, 0.3 (=0.5*0.6) to faster human capital growth and another 0.3 percent to faster TFP growth.

Finally, the effect on inflation (price deflator) is rather unstable and not significant and very imprecisely estimated in the 0-5 and 5-10 year horizon. As some recent papers have shown (see, for instance, Richter and Zhou, 2024; Galaasen et al., 2025), the aggregate demand and supply effects of immigrants tend to be roughly equal, even in the short run, so that the change in the price level (inflation) is not much affected, especially over a five-to-ten year horizon. Our results, albeit imprecise and with many caveats, are consistent with this neutral effect of immigration on the inflation rate.

Table 8 shows the coefficients estimated on the same outcomes, but restricting the sample to the EU-14-plus. Notice the much smaller number of observations and in several cases the larger standard error. Again, the impact on population growth are not far from one for both immigration and native demographic growth (larger for immigration rates).

The point estimates on the coefficients on GDP per worker are much larger and positive for immigration and negative or much smaller for native demographic change. As the coefficients are imprecisely estimated in this sample the positive coefficients are not significant, and only the impact on capital per worker is positive and statistically significant in the 5-10 years horizon. The impact on GDP deflator are very imprecise and unstable, not significant in the 5-10 year horizon. While this sample show a significant degree of imprecision on the estimates of the coefficients, the overall results confirm those for all OECD (somewhat weaker) of a positive long-run effect on GDP per worker, with strong channel in increased investments (i.e., changes in capital per worker).

We should be careful in interpreting these results in a causal sense, especially when we restrict the sample to be rather small so that estimates are imprecise. Yet, the estimated effects are consistent with the literature that emphasizes the role of immigrants in bringing efficiency, growth, innovation and firm creation at the local and micro level (which we will review in Section 9 below).

In fact, the results suggest that investment, possibly in the form of new companies and new establishments, is a crucial outcome stimulated by immigration. Interestingly, if labor and skills are increasingly scarce, labor markets have frictions (and are more sluggish to adjust than capital), several models predict that immigration will reduce inefficiency stimulating job creation and firm growth. In OECD countries with a declining population and with the labor market exhibiting search frictions, immigrants can increase supply overall of specific skills (Peri and Sparber, 2009). They could lubricate the labor markets (Cadena and Kovak, 2016; Basso and Peri, 2020) so that firms may hire more easily, and more production and investment can take place, reducing the inefficiencies of excessively tight labor markets (as in Michaillat, 2024).

In the next Subsections, we will use different sources of variation, and decompose the coefficient on net immigration, separating more and less skilled immigrants, focusing on the growth of GDP per worker growth (labor productivity) and its components: growth in human capital, physical capital per worker and total factor productivity. Those are the main determinants of average wages in the long run and capture key potential effects of immigration on the economy.[16]

[16]While we tried to produce estimates on the inflation rates in most cases their standard error was too large to be informative.

7.2 Separating High and Low-skilled Immigration

In this Section, we analyze the response to inflows of high- and low-skilled immigrants, separately, by including both of them at the same time as explanatory variables in the local projections analysis. We focus on their role in affecting labor productivity and its components and report the impulse responses to each of them in Table 9 and visualize them in Figure 11. For those, all OECD countries are included in the analysis. Table 10, then shows the same coefficients focusing on the EU-14, plus UK, US, Canada, Australia and New Zealand sample. Because the immigration by education data come from the OECD database (OECD, 2000, 2005, 2010, 2015, 2020), they do not cover the same period as the aggregate data from the United Nations (United Nations Department of Economic and Social Affairs, Population Division, 2020a, see Appendix A1 for more details). Therefore the analysis is limited to the period 2000-2020, still partitioned in 5-year intervals.

Notice that countries and periods in which the inflow of high-skilled was higher were also those in which the inflow of low-skilled was higher, and as we showed in Section 2 in most OECD countries the inflow of high-skilled was larger than the one of low-skilled and their ratio was larger then in the local population. While limited by the number of observations and by the strong correlation between the two variables, which implies less precise estimates, the coefficients suggest differences between the predictive power of high- and low-skilled immigration on macroeconomic outcomes.

Using the full OECD sample (Table 9) high-skilled immigration is associated with weak positive effects on GDP per worker in the 5-10 year horizon and close to zero effects in the 1-5 years horizon. The latter effect can be rationalized by their higher human capital generating some reallocation and creative disruption in the short-run (see also the negative coefficient on TFP). However, in the long run they contribute positively to each component of workers' productivity. First, and directly, skilled migrants increase the human capital of the destination country in the medium and long run, i.e. schooling levels weighted by their returns (see the second panel of Table 9). Second, they are associated with significantly faster TFP growth in the long run (as in Peri et al., 2015b; Terry et al., 2026), possibly after an initial adjustment period. Because skilled immigrants are usually scientists, engineers, entrepreneurs and promote innovation, these effects unfold over time. These effects are consistent with a large body of evidence in the micro literature (as in Peri et al., 2015a). Third, they weakly increase capital per worker confirming the idea that high-skilled workers are complementary to capital (as in Beerli et al., 2021b). In aggregate, skilled immigration generates a positive and close to significant coefficient on GDP per worker.

On the other hand, low-skilled immigrants mechanically reduce human capital in the receiving country (second panel), but then have no significant effect on TFP and on capital per worker in the medium or long run. Notice that the negative impact of low-skilled immigration on human capital is smaller (in absolute value) that the positive effect of high-skilled immigration. The simple average of the two effects is always positive, especially in the 5-10 year period, confirming the positive and sometimes significant aggregate effects shown in Table 7 proceeding from the combination of those effects.

In the sample restricted to EU-14-plus countries, the results also confirm that high-skilled immigration is associated with positive long-run effects on GDP per worker, now significant at the 10% confidence level (Table 10). The effect implies a 1.5 percent faster growth of GDP per worker, per skilled immigration rates equal to one percent of the adult population. Positive and significant are also the coefficients on human capital (somewhat mechanically) and on TFP in the 5-10 year horizon. The large, positive coefficients on TFP and GDP per worker growth in this sample may proceed from the fact that it includes some of the countries known to be magnet to many innovative and research-focussed high-skilled in the world, such as the US, the UK and Canada.

In this sample, low-skilled immigration (mainly observed in larger intensity in some European countries) is associated with non significant and close to 0 coefficients both within 5 years, and in the 5-10 year horizon for GDP per person, TFP and capital per worker. As in the OECD sample, low-skilled immigration is mechanically correlated to lower human capital at destination, and has no significant additional effects on GDP per worker.

The message emerging from separating high- and low-skilled immigration is that high-skilled immigrants (which are the larger part of immigrants in most OECD countries) contribute to destination human capital, and more importantly stimulate productivity and investment. They have a strong positive predictive power on growth of GDP per worker, especially in the EU-14-plus sample. Low-skilled immigrants, on the other hand, while reducing local human capital (mechanically) do not have significant medium and long-run impact on TFP, capital per workers and on GDP per person, especially in the long-run. In all cases, taking a simple average of the two effects (which would prevail if immigration is balanced between high and low skilled) the net effects on GDP per worker and on its components are positive, confirming the aggregate analisys above.

It is often argued that, especially for Europe, the formal schooling/education of immigrants does not correspond with the type of occupations they perform in the labor market, a phenomenon often referred to as "skill downgrading" (e.g. Dustmann et al. (2013)). Hence, some argue, the human capital content measured using schooling may overestimate the skills and human capital contribution of immigrants. Let us, however, push back in two ways and argue that the schooling of immigrants, especially the share of immigrants with an advanced degree, is an effective measure of their productive contributions. First, several studies, and most notably Portugal et al. (2024), show that schooling has productivity (wage) effects that are partly mediated by the occupation it gives access to. However, 60-70% of the returns to schooling is experienced within occupations; hence, even if there is occupational downgrading, highly educated immigrants would be more productive than less educated natives in the same occupations. The second relevant point is that over time, and especially within 10 years — which is the horizon considered here — the immigrant-native occupation and productivity gap, especially for highly educated, is by and large eliminated (or substantially reduced), as shown in Lee et al. (2022) among others. In our framework, therefore, highly skilled immigrants reach their potential for contributing to human capital and productivity within the considered horizon. The observed estimates confirm the strong positive human capital and productivity effect of highly-educated immigrants.

7.3 The Impact of Loosening External Immigration Regulations: Reduced-form Local Projections

As we have shown in Section 3, the index $1-$IMPIC, which captures the loosening of external regulation to immigrations, has some (mild) predictive power in increasing net immigration, especially in the EU-14-plus sample. In general, these policy measures are weakly positively correlated with net total immigration. Hence, we can consider policy changes that increase such an index as supporting more immigration.[17] The predictive power of this index is, however, weak so that using it as instrumental variable for net immigration would result in excessively large standard errors. We use the index, instead, in a reduced-form local projection analysis.[18] The analysis is only suggestive, but it is still interesting to establish the predictive power of immigration policy changes on country-level outcomes, as these explanatory variables are under the more direct control of governments.

[17] The predictive power of other indices affecting external immigration policies, especially external "control" policies was found to be extremely low. Hence we do not consider that index in this analysis at all. In additional analysis, available upon request, we found no correlation between the "external control" index with any of the outcomes.

[18] The IV estimate have all the same sign as those in the reduced form below but are very imprecise.

Table 11 — for the OECD sample — and 12 — for the EU-14-plus sample — show the estimated coefficients on the policy variable (always controlling for demographic change, fixed country and period effects and lagged dependent variable) for the four outcomes of interest: growth of GDP per worker, growth of Human capital, of TFP, and of capital per worker. Figure 12 shows graphically the impulse responses for the OECD sample.

The coefficients express the predictive power of a change from the lowest to the highest value (0 to 1) on growth rates in percentage points. The estimates of the role of external regulation policies are fully consistent with (and reinforce) the estimates in Table 7. When considering the full OECD sample (Table 11), relaxing external immigration regulation to the full extent of the index is associated with 0.26 to 0.37 percentage point faster growth in GDP per worker in the 1-5 and 5-10 year periods, respectively. Such faster growth is spurred by a non-significant increase in human capital growth (both in the 0-5 and 5-10 period), and significant increases in TFP growth (+0.14 percentage point) and in capital per worker growth (+0.23 percentage point), especially in the 5-10 year period.

When considering the EU-14-plus sample (Table 12), the estimates are similar in magnitude but somewhat noisier (due to the the smaller sample size) but still showing a significant positive predictive power on GDP per worker in the 5-10 years (at 10 percent confidence), and positive but not significant in the 1-5 year period. The largest positive coefficients in this case are of human capital growth and of capital per worker growth.

While we need to be still very cautious in any causal interpretation, the results of this Section suggest that innovations in immigration policies of a country that relax its external regulation and allow larger immigrant inflows are pro-growth as they predict stronger growth of GDP per worker both in the 5- and 10-year horizon, as well as growth of each of its components: human capital, TFP and capital per worker. Let us emphasize again that all the variables we are analyzing in these Sections represent outcomes above and beyond the role of immigration on population growth (which is significant and will certainly help aggregate GDP). They are, instead, affecting labor productivity and GDP per capita growth, which are outcomes directly benefiting natives (and not simply enlarging the size of the economy). Notice instead that the native demographic change (the other variable shown in most regressions) has never a positive and significant coefficient on growth of productivity per worker and its determinants, and sometimes exhibits negative coefficients instead.

7.4 The Impact of Immigration Shocks

An additional interesting aspect of the impact of immigration is the analysis of large and sudden/isolated immigration shocks. As described in Section 3, these are 5-year periods that stand out for their high immigration rates both in terms of the receiving country and in terms of overall immigration in OECD during the period. We consider the set of large shocks defined in Section 3 above and shown in Chart 8 and analyze their predictive power in local projections shown in Tables 13, for the OECD sample and 14 for the EU-14-plus sample. As these shocks are rather hard to predict, relatively rare and they occur suddenly, the response to them may come closer to identify a causal coefficient. Notice that, moreover, such immigration shock may strain the receiving economy, at least in the short run.

The outcomes have been multiplied by 100 to obtain coefficients that can be interpreted as the impact of the shock on percentage point growth of the outcomes. Recall that on average such shocks increased net immigration rates by 2 percentage points of adult population in a 5-year period. The main takeaways is that the point estimates for the impact on GDP per worker and its components are all positive but not significant. The fact that these shocks are rare makes the precision of estimates quite low. The size of coefficients implies a 2-3 percent higher growth of GDP per worker in OECD countries following these shocks (1-5 and 5-10 years after it) and 0-1 percent faster in EU-14-plus countries. The largest positive coefficients are on capital per worker (one coefficient on the 5-10 year period for OECD countries is significant), suggesting investment booms stimulated by large immigration episodes. In economies with frictions where workers and skills become scarcer, while capital is more abundant, and therefore the labor market is inefficiently tight (as in Michaillat, 2024), expanding the labor and skill supply would have such a positive investment-enhancing and firm-creating effect.

We certainly do not find any evidence in these regressions that large inflows of immigrants are associated with a decline in capital per worker as a classical model with fixed capital would predict — which used to be the workhorse of immigration models one decade ago (see George J. Borjas, 2014). Furthermore, we do not observe a decline in efficiency and productivity, as a model with crowding out or other fixed factors would predict. Instead, we find the opposite, suggesting positive agglomeration and growth effects of immigration booms, positive externalities from size, as models of endogenous growth and human capital would predict (e.g., Moretti, 2004; Docquier et al., 2014) and consistent with a beneficial impact in relaxing bottlenecks on hiring as in

(Michaillat, 2024).

7.5 The Impact of Immigration Surges

As described in Section 3, we define immigration surges as the first episode, during the period, in which a country experiences a 5-year period when the immigration rate is larger than the previous period by a difference equal to the 50th percentile of the distribution; such level has to persist for at least 2 periods (10 years). These are episodes that can be considered as the first "immigration event" in that specific OECD country. Usually immigration rates before this period were relatively small and stable and during and after it they surged in a substantial way. Such "surges" and the post-surge periods are shown in Section 3, Chart 9. We analyze their predictive power on the key aggregate outcomes in a local projection analysis shown in Table 15, which includes all OECD countries, and shows post-surge local projection coefficients.

The outcomes have been multiplied by 100 so as to obtain coefficients to be interpreted as the impact of the shock on percentage point growth of the outcomes, just as in the previous Section. On average, such surges increased net immigration rates by 1.2 percentage points of adult population in a 5-year period. The main takeaway from the coefficients is that the point estimates for the impact on GDP per worker and all its components, in the cumulated 10-years effects, are positive, albeit mostly not significant. The size of coefficients on GDP per worker in OECD countries following the surge implies -0.2 (s.e. 1.6) in the 5-year and +1.5 (s.e. 1.8) percent in the 10 year cumulative change. Human capital and TFP growth have very small responses. The largest positive and significant coefficient is on capital per worker (as in many other specifications), suggesting investment booms stimulated by immigration surges, equal to 3.3 percentage point growth of capital per worker, cumulated over 10 years. This confirms the results obtained in the previous Section about immigration shocks. Expanding the labor and skill supply through immigration has a positive investment-enhancing and firm-creating effect, especially if we allow 10 years of accumulation after the surge.

7.6 Saturation and Non-linear Effects

In this Section, we analyze whether changes in immigration rates have non-linear predictive effects on economic outcomes. Namely, we ask whether the estimated coefficients on the productivity measures for smaller net inflows (below the median) are different from those on larger ones (above median). This will help clarify whether the data suggest larger benefits from slower immigrant arrivals or, instead, that periods of higher immigration rates spur productivity and investment booms (as partially suggested by the analysis of large shocks in the previous Section).

Then, we ask whether, the arrival of new immigrants has different correlation with productivity when the share of immigrants in an economy is larger or smaller. Is there saturation/attenuation of the positive effects of new immigrants when the country already has a significant share of them in the population? Or does the positive impact remain strong within the observed range of immigrant shares experienced by OECD countries?

In Table 16 we consider interactions of the immigration rate (explanatory variable) with two dummies capturing rates below the median (equal to 1.2 percent of adult population) or above the median. These specifications estimate a "linear spline" with different coefficients for the impact in the two ranges.[19] We report the results for the key productivity outcomes for the full OECD sample (in this case we need the larger sample to estimate all the coefficients). In almost all cases the point estimates of the coefficients are larger for the smaller changes.[20], both in the 1-5 and in the 5-10 year horizon. Most of the estimated impact on GDP per worker are significant, but imprecisely estimated. Especially for TFP the coefficients suggest that smaller inflows, potentially more promptly absorbed in the economy, generate a larger per-unit impact. However, the effects are positive and sometimes significant for all components of labor productivity, even for larger shocks. Within the existing range of experienced inflows, higher immigration has been predictive of strong positive GDP per worker growth even in episodes of large inflows.

Table 16 shows a similar structure, but the explanatory variable (immigration rates) is now interacted with two dummies for the *population share of immigrants* in the receiving country being below (low share) or above (high share) 10 percentage points. Most European countries started in the 1990s with immigrant shares well below 10 percent and surpassed such a level in the 2000s or 2010s. In this case, while the impact on capital per worker growth (investment push) seems larger when immigrants flow in countries with lower population share of them, the overall impact on GDP per worker and on other variables seems similar for the two subgroups. This suggests a mild potential saturation for the investment effect, but also no dramatic decline in the positive GDP per worker boost associated with immigration as countries increased their share of immigrants within the observed range.

[19] We also tried more demanding splines with 3 or 4 segments but the precision of the estimates deteriorates sharply.

[20] They are also more imprecisely estimated for the smaller variance of the explanatory variable.

Most European countries exhibit, as of 2025, a foreign born share of the population between 10 and 20 percent, still far from some of the levels in top OECD countries (Canada was 25% and Australia 35%). These results suggest that there should be room to absorb immigration, at the rate of recent decades, and still experience a positive response of productivity and investment.

8 Estimated Impulse Responses from Regional Analysis

Using a similar approach as for the national analysis, we estimate local projections for regional migration rates and their effects on the economic aggregates for all European NUTS-2 regions. To this end, we rely on Eurostat Regional Economic Accounts data (European Commission, Eurostat, 2025b) and focus on the main outcomes that are comparable to those reported in the PWT: namely, GDP per capita growth, labor productivity (GDP per worker) growth, and capital accumulation. The goal is to estimate impulse responses as those of the cross-country analysis that support the main findings on labor productivity growth, possibly improving on the identification strategy.

We follow the same empirical approach as in Equation 6.1 but with variation at the regional level. That is, we track the change over the horizon of h years for each outcome y of the region r (which belongs to country i) as a function of the change in net immigration in $t-5, t$. First, we estimate the IRF by means of OLS-LPs. Then, we use the shift-share IV in an LP-IV setting (Jordà et al., 2015) following the first-stage results in Section 5.2, which show that the shift-share variable predicts net migration changes $\left(\frac{\Delta Immi^{nonOECD}_{r(i),t\ t-5}}{Pop_{r(i),2005}}\right)$.[21] The second stage of the LP-IV specification is as follows:

$$y_{r(i),t+h} - y_{r(i),t-5} = \beta_{r(i)} + \beta_t + b_I \left(\frac{\widehat{\Delta Immi^{nonOECD}_{r(i),t\ t-5}}}{Pop_{r(i),2005}}\right) + b_D \left(\frac{\Delta Native_{r(i),t\ t-5}}{_{r(i),2005}}\right) + Lag(y_{r(i)}) + \epsilon_{i,t\ t-5} \tag{8.1}$$

As in the country analysis, the coefficient of interest is b_I, which captures the predictive power of the net changes in immigration in the regional economic aggregates. We further control for lagged outcomes, region and period fixed effects, and native demographic change (whose estimated coefficient is not reported in the main results). Standard errors are clustered at the country level. Unlike in the country analysis, however, we do not specifically focus on working age population as the main total population measure is from Regional Economic Accounts.

[21] The strength of the first-stage reported in Section 5.2 is just above conventional levels and refers only to the two-way fixed effects panel setting. Controlling for the lagged outcomes, as we do in the LP-IV, reduces it further.

Table 18 reports the main results. In panel A, the OLS estimates confirm the positive correlation between net migration, GDP per capita growth, labor productivity growth and one of its main determinants, capital accumulation. Panel B reports the 2SLS estimates: the positive association between immigration and long-run labor productivity is still present despite some adjustments in the medium-run. These effects are mainly driven by an increase in capital per worker through higher investments, consistent with the evidence at the country-level. The impact on GDP per capita growth is also positive, though the standard errors are large. Interestingly, and also consistently with the national level results, native demographic change is not predicting any of these effects as the coefficients are much closer to zero.

An important caveat to the 2SLS analysis is that the point estimates are large, especially at the ten-year horizon, and should be interpreted with much caution — i.e., mainly in a qualitative sense. Explanations for such large coefficients include genuine economic effects, such as spillovers and agglomeration effects which could be stronger at the local level, and attenuated at the national level because of internal migration and reallocation. However, there are also signs of large heterogeneity across regions, which is hard to explore further due to data limitations and a severe weakness of the IV, as mentioned above.

These results, therefore, need to be interpreted as qualitative and preliminary — further research focused on regions, should explore different time horizons and additional specifications. Nevertheless, they support the idea that immigration has an impact on medium-to-long-term local economic growth also at the regional level in Europe confirming most of the country-level results.

9 Discussing the Results and Connecting to the Micro Literature

The set of macro results produced by our analysis is especially interesting, as it confirms and supports, using a macro approach, several results that have been emphasized in more local and limited contexts, but usually with better identification strategy, by recent papers. We will review them here in a systematic way and relate them to our current findings.

First, the two most comparable recent studies are Engler et al. (2023), who adopt a similar macro approach and estimate the response to immigration surges within a shorter-run horizon for OECD countries, and Peri (2012), who study the response to push-driven immigrant shocks in a similar 10-year horizon for US states. Both studies have produced estimates on productivity (TFP) and capital per worker that are compatible with those shown in Table 7. In Engler et al. (2023), an increase in immigration by one percent of the population, associated with an immigration surge, generates a +0.84 (s.e. 0.23) percent increase in the growth of capital per worker and a +0.56 percent (s.e. 0.23) increase in the growth of TFP. The corresponding 5-year coefficients in Table 7 are +1.7 (s.e. 0.82) and +0.36 (s.e. 0.40). There are many methodological differences, including the definition of immigration rates (net and from non-OECD in our sample, gross and total in theirs) and country-periods (1990-2024 in our case 1980-2020 in theirs) and identification. However, the message of strong positive investment growth and positive TFP effects are similar. As for the estimated impact for US states from Peri (2012), the 10-year impact in the 2SLS panel analysis with shift-share IV in that paper, is +0.27 (s.e. 0.23) on growth in capital per worker, and +0.97 (s.e. 0.36) on TFP versus the +2.8 (s.e. 0.65) on capital per worker and +0.29 (s.e. 0.40) on TFP of this paper. The magnitudes are different, but positive effects — with one of them being significant — adding up to a significant effect on GDP per worker larger than one percent, are in line with the current findings. As the method (panel IV) and the sample (US states 1960-2010) are very different in that paper relative to ours, qualitatively consistent results are a strong finding.

Other studies emphasize additional and broader channels through which immigrants, both high- and less-skilled can contribute to TFP growth in a country. They show positive effects via increasing trade and international knowledge diffusion (Ortega and Peri, 2014), providing different and complementary workers' skills (Alesina et al., 2016) and promoting better firm-worker matches (Orefice and Peri, 2024). They can also bring specific knowledge lacking in the receiving countries and help shape their comparative advantages (Bahar et al., 2022; Bahar and Rapoport, 2018).

Second, the result that resonates more clearly with a series of recent papers is the positive effect of skilled immigrants on labor productivity (GDP per worker) and TFP, shown in Tables 9 and 10. Bernstein et al. (2022) show that foreign skilled professionals, especially in the STEM sector contribute (directly and indirectly) about 30% of the US innovation measured in patents. Similarly, using data on the universe of French firms from 1995 to 2010, Mayda et al. (2022) find that the arrival of skilled migrants in a French district significantly raised the number of patents. Peri et al. (2015a), using local wage and productivity variation, show that about half of the productivity growth of US locations in the 1990-2010 period can be attributed to foreign skilled STEM workers. Jaumotte et al. (2016) show that a one percentage point increase in the share of migrants in the adult population can increase GDP per capita by up to 2 percent in the long run, with this effect mainly coming from increased labor productivity. This is a very similar estimate to our 1.9 percent effect in 7.

A third result that is gaining center stage in recent applied research is the positive effect of skilled (and unskilled) immigrants in attracting investments, spurring firm formation and entrepreneurship. These results resonate with the findings of positive and significant coefficients of immigration (high-skilled and overall) on capital per worker, shown in almost all our results of Tables 7 to 14. Descriptive evidence in Fairlie and Lofstrom (2015) first showed the high entrepreneurship rate of immigrants relative to natives. More recently, Chodavadia et al. (2024), using surveys and administrative employment records, find that immigrants to the US are more entrepreneurial than the native population and are overrepresented among high-growth startups and venture-backed tech firms. Immigrants accounted for 15% of the 2020 US population but 27% of new businesses formed in 2021–2023. Related to this, Dimmock et al. (2022), uses the H-1B visa lottery as a natural experiment and finds that young firms that employ high-skilled foreign workers are more likely to attract high-reputation venture capital and win more patents and citations. H-1B lottery wins boost a startup's chance of obtaining VC funding, successfully going public. Azoulay et al. (2022b) shows that immigrants in the United States are 80% more likely to start businesses than native-born Americans, and more than half of America's billion-dollar startup companies trace their roots to immigrant founders. Tareque et al. (2024) find that the effect of high-skilled immigration on entrepreneurial quality is nearly three times larger than its effect on quantity, suggesting an important role for knowledge spillovers. Finally, Beine et al. (2023) show that foreign master students are much more likely than natives to create successful start-ups in the US, and are responsible for a doubling of start-up rates among foreign master graduates.

The positive association between immigration, especially high-skilled, on TFP and investments is much stronger at the 5-10 year horizon. This is consistent with three findings in the applied literature. First, there is evidence that the initial immigrant-native productivity gap, especially for highly educated, is partly eliminated (or substantially reduced) within 10 years, as shown in Lee et al. (2022) and Peri and Rutledge (2022), among others. Highly skilled immigrants reach their maximum potential for contributing to human capital and productivity only after such period of adjustment. Second, many high-skilled immigrants migrate to OECD countries to complete their education (graduate school) and only then they contribute to start-ups and innovation (see Beine et al. (2023)). Finally, if part of the positive productivity effect (as in Peri and Sparber, 2009) is generated by optimal reallocation across tasks and occupations, this may generate a short-run transition with a productivity cost, for natives, with long-run productivity gains. The full expression of beneficial productivity effects may require up to a decade to occur.

We want to emphasize that the strong response of capital, firms and start-ups to the inflow of immigrants, especially high-skilled, is also compatible with the idea that the markets for some workers and skills are inefficiently tight, so that vacancies are hard to fill. In this situation, models as in Michaillat (2024) and evidence from Beerli et al. (2021b) confirm that inflow of immigrants will reduce bottlenecks and promote investment and firm creation as found in this paper.

It is also worth noting that the results of Table 9 and 10, showing no significant coefficient of low skilled immigration on labor productivity and TFP or capital per worker, but rather small and non-significant effects, are consistent with the long series of studies that fail to find a depressing effect of low skilled immigrants on native wages, such as Ottaviano and Peri (2012), Peri and Yasenov (2019), Peri and Sparber (2009), Caiumi and Peri (2024)Manacorda et al. (2012), among others. The consensus that low-skilled immigrants have small effects on wages, as capital adjustment and complementarities reduce their competition effects, and high-skilled immigrants can actually increase wages by boosting productivity is confirmed in the aggregate macro results of this paper.

10 Conclusions

This paper provides evidence that OECD economies, and European economies among them, likely benefited from non-OECD immigration in their labor productivity growth over the period 1990–2024. Our results show that labor productivity in receiving countries grew significantly during and after periods of higher immigration rates, as well as following immigration shocks and more open immigration policies. The predictive coefficients are often statistically significant and economically large, and a substantial portion of the immigration-associated growth in GDP per worker is realized through strong growth in investment.

To illustrate how strongly immigration could be associated with growth in income per worker in some OECD countries where inflows have been large, we combine the estimated 0–5 year horizon coefficient in Table 7 with the growth of immigrants as a share of the population in some illustrative cases. These calculations imply that in a country like Canada, where the immigrant share of the adult population increased by 17 percentage points between 1990 and 2024 (and immigrants were highly skilled relative to the local population), this change predicts a substantial 19.9 percent higher growth of GDP per worker. Comparing this figure with Canada's actual GDP per worker growth over the period — about 33% in 35 years — suggests that more than half of it could be associated with the inflow of immigrants.[22] A similar calculation for the UK, which experienced an 11 percentage point increase in immigrants as a share of the population (with immigrants significantly more skilled than the native population), implies a 12.8% GDP per worker growth out of the 51% experienced during this period — about one fourth of the total. In Italy, where the immigrant share of the population grew by 8.4 percentage points, the estimated coefficient predicts an extra 9.8% GDP per worker growth, out of a total of 40% over this period. Immigration to Italy was relatively low-skilled by OECD standards, but so is its native population; hence, the implied GDP gains likely operate less through productivity-enhancing human capital effects than the average coefficient would suggest. Finally, in France, where immigration was lower — an increase of only 6.1 percentage points of the adult population over 1990–2024, with immigrants more skilled than the native population — it can account for 7.2% GDP per worker growth, out of a total of 41% in the period (about one sixth). These examples should be taken as illustrative of the order of magnitude of the predictive power of immigration for labor productivity growth, not as causal estimates.

We emphasize that the estimates in this paper should be considered suggestive and taken with many caveats, as they are carefully executed "partial correlations," rather than causal coefficients. However, the economic magnitude of these correlations, the consistency and robustness of the results across different margins of variation, their correspondence with micro evidence, and their novelty in covering a comprehensive OECD sample over 35 years make them important inputs for our future understanding of, and research on, the productivity effects of immigration in a period of native population decline.

An additional word of caution is warranted regarding the broader implications of immigration for political systems and economic outcomes. Because of our macro approach and cross-country data limitations, we focus on average, aggregate effects and cannot analyze the distributional effects of immigration. Prior studies find that higher levels of low-skilled and temporary immigration can lead to worse economic outcomes for less skilled workers at the local level (Dustmann et al., 2017b). Natives at the lower end of the income distribution are more likely to bear the economic costs of low-skilled migration (Dustmann et al., 2013), although this is not the case in every migration episode and depends on the skill composition of immigrants. Additionally, such dis-

[22] For this calculation, we use GDP per worker growth from the Penn World Table, Version 11.0, based on the expenditure definition of real GDP at constant prices, and the 5-year coefficient equal to 1.17 from Table 7

tributional effects could have political implications, as they have been associated with the rise of populism (Docquier et al., 2026), which can entail significant economic costs (Funke et al., 2023). Nevertheless, our analysis makes an important point: while the impact of immigration on inequality is still debated and can vary across countries, our macro analysis suggests that, by increasing the "size of the economic pie" for a country and its citizens, immigration, accompanied by redistribution, could potentially benefit all citizens.

Three additional important messages emerge from our data analysis. First, the immigration flows that changed OECD countries and Europe in this period came mostly from non-OECD countries. Second, many of the immigrants had advanced education relative to the receiving-country population. Even if initially employed in lower-skilled occupations, their higher human capital — especially as they closed the productivity gap with natives over ten years — allowed them to generate, over time, the strong positive association with labor productivity growth through boosting investment, revealed by the local projection analysis in this paper. Third, the positive predictive power of non-OECD immigration for productivity does not simply reflect the addition of young workers to OECD economies: native population change (which turned negative in these years for most countries) shows none of the positive correlations with productivity found for immigrants.

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Tables and Figures

Table 1: Immigration and Native Population Change, EU-14 Plus average by 5-year Period, 1990-2024

Outcome	1990–1995	1995–2000	2000–2005	2005–2010	2010–2015	2015–2020	2020–2024
Total immigration in working age, as % of initial adult population	0.015	0.019	0.027	0.028	0.032	0.041	0.038
Total non-OECD origin immigration, as % of initial population	0.011	0.012	0.017	0.016	0.017	0.029	0.026
Total high-skilled non-OECD immigration in working age, as % of initial adult population	.	.	0.007	0.012	0.010	0.016	.
Total low skilled non-OECDimmigration in working age, as % of initial adult population	.	.	0.005	0.023	0.003	0.013	.
Change of native population in working age, as % of initial total adult population	0.014	0.008	0.009	0.007	-0.019	-0.026	-0.036
Total change of population, as % of initial total population (PWT)	0.034	0.029	0.041	0.046	0.039	0.047	0.022
Percentage change in GDP per person (PWT)	0.068	0.164	0.085	0.013	0.034	0.014	0.091

Table notes: The table reports cross-country averages of the following indicators for each 5 year period. **Indicator 1** (Total immigration in working age, as % of initial adult population) uses data from the United Nations Department of Economic and Social Affairs (UNDESA). For each country and year t, we calculate the change in the total stock of immigrants of working age (15-64) between year t and year $t-5$, as a share of the 1990 population stock (ages 15+). Since the UNDESA age specific data only exists up until 2020, we impute the stock of immigrants of working age in 2024. Our imputation follows three steps: (i) we calculate the share of working age immigrants to total immigrants in 2010 and 2020, (ii) we calculate the average annual change of this share over the decade, and project that forward five years, (iii) we apply this imputed proportion of working aged immigrants to total immigrants to the 2024 total stock of immigrants. **Indicator 2** (Total non-OECD origin immigration, as % of initial adult population) uses data from UNDESA. For each country and year t, we calculate the change in the total stock of immigrants from non-OECD countries between year t and year $t-5$, as a share of the 1990 population stock. **Indicator 3** (Total high-skilled non-OECD immigration in working age, as % of initial adult population) uses the Database on Immigrants in OECD and non-OECD Countries (DIOC). For each country and year t, we calculate the change in the total stock of immigrants (ages 15+) born in non-OECD countries with advanced education between year t and $t-5$, as a share of the 2000 population stock (ages 15+). Advanced education refers to individuals with tertiary education, equivalent to UNESCO International Standard Classification of Education (ISCED) levels 5-8. **Indicator 4** (Total low-skilled non-OECD immigration in working age, as % of initial adult population) follows Outcome 3, except uses changes in the stocks of non-OECD immigrants with basic education, defined as individuals with below tertiary education, equivalent to ISCED levels 0-4. **Indicator 5** (Change of native population in working age, as % of initial total adult population) uses UNDESA data. For each country, we calculate the change in the total stock of natives of working age (15-64) between year t and $t-5$, as a share of the 1990 population stock (ages 15+). Using the same process as used in Outcome 1, we impute the 2024 stock of natives of working age in 2024. **Indicator 6** (Total change of population, as % of initial total population (PWT)) uses data from the Penn World Tables. For each country and year t, we calculate the change in the total population between year t and $t-5$, as a share of the 1990 total population. **Indicator 7** (Percentage change in GDP per person (PWT)) uses data from the Penn World Tables. For each country and year t, we calculate the differences between the log of real GDP between year t and $t-5$. Values reported for EU-14 Plus countries.

Table 2: Predicting Net Immigration, OECD countries

	(1)	(2)	(3)	(4)	(5)	(6)
Shift Share (T-5)	-0.128					
	(0.169)					
Crisis Shift Share (T-5)		0.247				
		(0.277)				
1 - IMPIC External Controls			0.000585			
			(0.0115)			
1 - IMPIC External Regulations				0.0297		
				(0.0355)		
Shock (p75)					0.0196^{***}	
					(0.00287)	
Surge (p50, 2 periods)						0.0162^{***}
						(0.00317)
Native Demo Change	-0.0608	-0.0730	-0.0406	-0.00515	-0.0620^{**}	-0.0526
	(0.0408)	(0.0451)	(0.0508)	(0.0543)	(0.0291)	(0.0510)
Year FE	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Observations	266	259	196	132	266	266

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. The sample includes all OECD destination countries: AUS, AUT, BEL, CAN, CHE, CHL, COL, CRI, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ISL, ISR, ITA, JPN, KOR, LTU, LUX, LVA, MEX, NLD, NOR, NZL, POL, PRT, SVK, SVN, SWE, TUR, USA. The dependent variable represents net immigration, defined as the change in stock of immigrants from non-OECD countries between years t and $t-5$ as a share of the 1990 initial population (See Equation A1.1 in the Appendix). **Shift Share (T-5)** follows equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 7 non-OECD origin regions: Latin America, Middle East and North Africa, Sub-Saharan Africa, Eastern Europe, Asia (excluding China and India), China, and India. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. **Crisis Shift Share (T-5)** follows equation A1.6 in the Appendix. The instrument is constructed from bilateral migrant stock data from non-OECD origin countries with political/humanitarian crises: Albania, Bosnia & Herzegovina, El Salvador, Romania, Syria, Venezuela, and Ukraine. The instrument highlights variation in immigration flows driven by humanitarian/political crises. **1 - IMPIC External Controls** refers to the aggregate, rescaled IMPIC index of external controls. These external controls refer to specific enforcement mechanisms used to enforce border-crossings. **1 - IMPIC External Regulations** refers to the aggregate, rescaled IMPIC index of external controls. These external regulations refer to the legal rules governing who can enter a country. The index is constructed only for countries with non-missing values of IMPIC External Regulations across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. Both IMPIC rescaled variables, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). **Shock (p75)** represents an indicator that takes the value of 1 for country-year observations where net immigration (the change in non-OECD origin migrant stock between years t and $t-5$ as a share of the initial population) exceeds *both* the destination country's own 75th percentile of net immigration across all years *and* the cross-country 75th percentile of net immigration in year t. The variable captures country-year observations with large episodes of net immigration. **Surge (p50, 2 periods)** is an indicator that equals 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. **Native Demo Change** follows equation A1.2 in the Appendix and represents the change in the stock of working age (ages 15-64) natives between years t and $t-5$ as a share of the initial 1990 population (ages 15+).

Table 3: Predicting Net Immigration, OECD countries

	(1)	(2)	(3)	(4)	(5)	(6)
Shift Share (T-5)	-0.00116	-0.0264	-0.122			
	(0.358)	(0.244)	(0.312)			
Crisis Shift Share (T-5)				0.368	0.188	0.399
				(0.599)	(0.254)	(0.369)
1 - IMPIC External Controls	-0.0136	-0.0128	0.0279*	-0.00811	-0.0105	0.0392*
	(0.0102)	(0.00783)	(0.0138)	(0.00675)	(0.00853)	(0.0192)
1 - IMPIC External Regulations	0.0280	0.0180	0.0392	0.0303	0.0195	0.0450
	(0.0342)	(0.0238)	(0.0284)	(0.0394)	(0.0286)	(0.0319)
Shock (p75)		0.0200***			0.0197***	
		(0.00312)			(0.00266)	
Surge (p50, 2 periods)			0.0228***			0.0237***
			(0.00514)			(0.00510)
Native Demo Change	-0.0172	-0.0315	0.0220	-0.0308	-0.0432	0.0320
	(0.0523)	(0.0504)	(0.0548)	(0.0568)	(0.0563)	(0.0564)
Year FE	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Observations	132	132	132	126	126	126

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. The sample includes all OECD destination countries: AUS, AUT, BEL, CAN, CHE, CHL, COL, CRI, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ISL, ISR, ITA, JPN, KOR, LTU, LUX, LVA, MEX, NLD, NOR, NZL, POL, PRT, SVK, SVN, SWE, TUR, USA. The dependent variable represents net immigration, defined as the change in stock of immigrants from non-OECD countries between years t and $t-5$ as a share of the 1990 initial population (See Equation A1.1 in the Appendix). **Shift Share (T-5)** follows equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 7 non-OECD origin regions: Latin America, Middle East and North Africa, Sub-Saharan Africa, Eastern Europe, Asia (excluding China and India), China, and India. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. **Crisis Shift Share (T-5)** follows equation A1.6 in the Appendix. The instrument is constructed from bilateral migrant stock data from non-OECD origin countries with political/humanitarian crises: Albania, Bosnia & Herzegovina, El Salvador, Romania, Syria, Venezuela, and Ukraine. The instrument highlights variation in immigration flows driven by humanitarian/political crises. **1 - IMPIC External Controls** refers to the aggregate, rescaled IMPIC index of external controls. These external controls refer to specific enforcement mechanisms used to enforce border-crossings. **1 - IMPIC External Regulations** refers to the aggregate, rescaled IMPIC index of external controls. These external regulations refer to the legal rules governing who can enter a country. The index is constructed only for countries with non-missing values of IMPIC External Regulations across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. Both IMPIC rescaled variables, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). **Shock (p75)** represents an indicator that takes the value of 1 for country-year observations where net immigration (the change in non-OECD origin migrant stock between years t and $t-5$ as a share of the initial population) exceeds *both* the destination country's own 75th percentile of net immigration across all years *and* the cross-country 75th percentile of net immigration in year t. The variable captures country-year observations with large episodes of net immigration. **Surge (p50, 2 periods)** is an indicator that equals 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. **Native Demo Change** follows equation A1.2 in the Appendix and represents the change in the stock of working age (ages 15-64) natives between years t and $t-5$ as a share of the initial 1990 population (ages 15+).

Table 4: Predicting Net Immigration, EU-14-plus USA, CAN, AUS, NZL, GBR

	(1)	(2)	(3)	(4)	(5)	(6)
Shift Share (T-5)	-0.116					
	(0.227)					
Crisis Shift Share (T-5)		-0.338				
		(0.340)				
1 - IMPIC External Controls			0.0142			
			(0.0129)			
1 - IMPIC External Regulations				0.0835		
				(0.0613)		
Shock (p75)					0.0167***	
					(0.00260)	
Surge (p50, 2 periods)						0.0140***
						(0.00212)
Native Demo Change	-0.0311	-0.0318	-0.0263	-0.0205	-0.0650*	-0.0117
	(0.0618)	(0.0623)	(0.0427)	(0.0859)	(0.0353)	(0.0613)
Year FE	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Observations	133	133	114	74	133	133

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. The sample only includes EU-14 destination countries (AUT, BEL, DEU, DNK, ESP, FIN, FRA, GRC, IRL, ITA, LUX, NLD, PRT, SWE) and other large OECD destination countries (AUS, CAN, GBR, NZL, USA). The dependent variable represents net immigration, defined as the change in stock of immigrants from non-OECD countries between years t and $t-5$ as a share of the 1990 initial population (See Equation A1.1 in the Appendix). **Shift Share (T-5)** follows equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 7 non-OECD origin regions: Latin America, Middle East and North Africa, Sub-Saharan Africa, Eastern Europe, Asia (excluding China and India), China, and India. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. **Crisis Shift Share (T-5)** follows equation A1.6 in the Appendix. The instrument is constructed from bilateral migrant stock data from non-OECD origin countries with political/humanitarian crises: Albania, Bosnia & Herzegovina, El Salvador, Romania, Syria, Venezuela, and Ukraine. The instrument highlights variation in immigration flows driven by humanitarian/political crises. **1 - IMPIC External Controls** refers to the aggregate, rescaled IMPIC index of external controls. These external controls refer to specific enforcement mechanisms used to enforce border-crossings. **1 - IMPIC External Regulations** refers to the aggregate, rescaled IMPIC index of external controls. These external regulations refer to the legal rules governing who can enter a country. The index is constructed only for countries with non-missing values of IMPIC External Regulations across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. Both IMPIC rescaled variables, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). **Shock (p75)** represents an indicator that takes the value of 1 for country-year observations where net immigration (the change in non-OECD origin migrant stock between years t and $t-5$ as a share of the initial population) exceeds *both* the destination country's own 75th percentile of net immigration across all years *and* the cross-country 75th percentile of net immigration in year t. The variable captures country-year observations with large episodes of net immigration. **Surge (p50, 2 periods)** is an indicator that equals 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. **Native Demo Change** follows equation A1.2 in the Appendix and represents the change in the stock of working age (ages 15-64) natives between years t and $t-5$ as a share of the initial 1990 population (ages 15+).

Table 5: Predicting Net Immigration, EU-14-plus USA, CAN, AUS, NZL, GBR

	(1)	(2)	(3)	(4)	(5)	(6)
Shift Share (T-5)	-0.354	-0.354	-0.0864			
	(0.414)	(0.308)	(0.345)			
Crisis Shift Share (T-5)				-0.609	-0.345	0.139
				(0.538)	(0.490)	(0.333)
1 - IMPIC External Controls	0.0150	0.0119	0.0508**	0.00505	0.00583	0.0539*
	(0.0140)	(0.0145)	(0.0205)	(0.0196)	(0.0228)	(0.0287)
1 - IMPIC External Regulations	0.0970	0.0687*	0.119**	0.0868	0.0620	0.120**
	(0.0643)	(0.0377)	(0.0426)	(0.0635)	(0.0431)	(0.0470)
Shock (p75)		0.0166***			0.0161***	
		(0.00355)			(0.00280)	
Surge (p50, 2 periods)			0.0212***			0.0221***
			(0.00485)			(0.00568)
Native Demo Change	-0.0263	-0.0493	0.0863	-0.0261	-0.0402	0.0993
	(0.0595)	(0.0675)	(0.0743)	(0.0778)	(0.0768)	(0.0985)
Year FE	X	X	X	X	X	X
Country FE	X	X	X	X	X	X
Observations	74	74	74	74	74	74

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**} p < 0.05, ^{***} p < 0.001$. The sample only includes EU-14 destination countries (AUT, BEL, DEU, DNK, ESP, FIN, FRA, GRC, IRL, ITA, LUX, NLD, PRT, SWE) and other large OECD destination countries (AUS, CAN, GBR, NZL, USA). The dependent variable represents net immigration, defined as the change in stock of immigrants from non-OECD countries between years t and $t-5$ as a share of the 1990 initial population (See Equation A1.1 in the Appendix). **Shift Share (T-5)** follows equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 7 non-OECD origin regions: Latin America, Middle East and North Africa, Sub-Saharan Africa, Eastern Europe, Asia (excluding China and India), China, and India. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. **Crisis Shift Share (T-5)** follows equation A1.6 in the Appendix. The instrument is constructed from bilateral migrant stock data from non-OECD origin countries with political/humanitarian crises: Albania, Bosnia & Herzegovina, El Salvador, Romania, Syria, Venezuela, and Ukraine. The instrument highlights variation in immigration flows driven by humanitarian/political crises. **1 - IMPIC External Controls** refers to the aggregate, rescaled IMPIC index of external controls. These external controls refer to specific enforcement mechanisms used to enforce border-crossings. **1 - IMPIC External Regulations** refers to the aggregate, rescaled IMPIC index of external controls. These external regulations refer to the legal rules governing who can enter a country. The index is constructed only for countries with non-missing values of IMPIC External Regulations across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. Both IMPIC rescaled variables, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). **Shock (p75)** represents an indicator that takes the value of 1 for country-year observations where net immigration (the change in non-OECD origin migrant stock between years t and $t-5$ as a share of the initial population) exceeds *both* the destination country's own 75th percentile of net immigration across all years *and* the cross-country 75th percentile of net immigration in year t. The variable captures country-year observations with large episodes of net immigration. **Surge (p50, 2 periods)** is an indicator that equals 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. **Native Demo Change** follows equation A1.2 in the Appendix and represents the change in the stock of working age (ages 15-64) natives between years t and $t-5$ as a share of the initial 1990 population (ages 15+).

Table 6: Predicting Net Immigration at Regional Level, EU countries

	(1)	(2)
Shift Share (t-5)	0.975***	0.748***
	(0.260)	(0.224)
Native Demo Change		-0.285**
		(0.124)
5-year period FE	X	X
Region FE	X	X
F-stat. IV	14.085	11.137
Observations	439	439

Table Notes: All regressions are weighted by the 2005 population stock (as measured by Eurostat Regional Accounts). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Unless otherwise specified, the sample is composed of the NUTS-2 regions of Austria (only NUTS-1 available), Belgium, Cyprus (whole country), Czech Republic, Germany (NUTS-1), Denmark, Estonia (whole country), Greece, Spain, Finland, France, Hungary, Ireland, Italy, Lithuania (whole country), Luxembourg (whole country), Latvia (whole country), the Netherlands (whole country), Portugal, Sweden and Slovakia. NUTS-2, where available, can be aggregated over time for consistency. The dependent variable represents net immigration, defined as the change in stock of immigrants from a proxy non-OECD countries (North Africa and Middle East, other African countries, rest of Asia, South America) between years t and $t-5$ as a share of the 2005 population. The definition of the shift-share (with shares measured at t-5) follows Equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 4 lower-income origin regions proxing for non-OECD countries: North Africa and Middle East, other African countries, rest of Asia, South America. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. In Columns (2) we additionally control for native demographic change.

Table 7: Estimated Local Projection Coefficients, All OECD sample

	Horizon 0-5 years	Horizon 5-10 years
Population Growth		
Net Immigration	1.242***	1.374***
	(0.0789)	(0.400)
Native Demo Change	0.715***	1.074***
	(0.0825)	(0.201)
ln(RGDP per Person)		
Net Immigration	0.921	1.013
	(0.588)	(0.968)
Native Demo Change	-0.607	-0.150
	(0.584)	(0.793)
ln(RGDP per Worker)		
Net Immigration	1.177*	1.896***
	(0.609)	(0.678)
Native Demo Change	-0.240	0.0345
	(0.465)	(0.706)
ln(Capital per Worker)		
Net Immigration	1.568**	2.869***
	(0.694)	(0.630)
Native Demo Change	0.435	0.349
	(0.329)	(0.466)
Employment-Population Ratio		
Net Immigration	0.0256	-0.176
	(0.247)	(0.185)
Native Demo Change	-0.0926	-0.128
	(0.123)	(0.169)
Human Capital		
Net Immigration	0.161	0.513
	(0.472)	(0.641)
Native Demo Change	-0.211	-0.290
	(0.163)	(0.237)
ln(TFP)		
Net Immigration	0.250	0.277
	(0.315)	(0.404)
Native Demo Change	-0.178	-0.145
	(0.201)	(0.337)
ln(GDP Deflator)		
Net Immigration	1.803	-2.052
	(2.096)	(2.322)
Native Demo Change	0.678	-0.484
	(0.680)	(0.897)
Observations	266	228
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years). Sample sizes slightly differ: (i) population growth, n = 190 in the second horizon due to missing values in 2025, (ii) TFP, n = 260 in the first horizon and n = 222 in the second due to missing data from CZE, EST, LTU, LVA, SVK, SVN in 1990 and missing data for all countries in 2025. See Figure 10.

Table 8: Estimated Local Projection Coefficients, EU-14-plus USA, CAN, AUS, NZL, GBR

	Horizon 0-5 years	Horizon 5-10 years
Population Growth		
Net Immigration	1.286***	1.343***
	(0.0848)	(0.245)
Native Demo Change	0.525***	0.713***
	(0.106)	(0.187)
ln(RGDP per Person)		
Net Immigration	0.386	0.101
	(0.465)	(1.150)
Native Demo Change	-0.552	0.206
	(0.366)	(0.489)
ln(RGDP per Worker)		
Net Immigration	-0.0144	0.944
	(0.573)	(0.900)
Native Demo Change	-0.154	0.0397
	(0.458)	(0.558)
ln(Capital per Worker)		
Net Immigration	0.0497	1.234*
	(0.770)	(0.679)
Native Demo Change	0.239	-0.316
	(0.352)	(0.339)
Employment-Population Ratio		
Net Immigration	0.146	-0.332
	(0.361)	(0.334)
Native Demo Change	-0.135	0.0703
	(0.113)	(0.117)
Human Capital		
Net Immigration	-0.470**	-0.317
	(0.218)	(0.501)
Native Demo Change	-0.342**	-0.357
	(0.125)	(0.255)
ln(TFP)		
Net Immigration	0.0450	0.266
	(0.339)	(0.297)
Native Demo Change	0.179	0.534*
	(0.264)	(0.283)
ln(GDP Deflator)		
Net Immigration	4.329***	-0.578
	(1.126)	(1.625)
Native Demo Change	-0.205	-1.413
	(0.667)	(1.095)
Observations	133	114
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years). Sample sizes slightly differ: (i) population growth, n = 190 in the second horizon due to missing values in 2025, (ii) TFP, n = 260 in the first horizon and n = 222 in the second due to missing data from CZE, EST, LTU, LVA, SVK, SVN in 1990 and for all countries in 2025. See Figure A1 in Appendix A2.

Table 9: The impact of high- and low-skill immigrants, All OECD sample

	Horizon 0–5 yrs	Horizon 5–10 yrs
ln(RGDP per Worker)		
High-skilled	-0.190	1.567
	(1.091)	(1.059)
Low-skilled	0.0943	-0.551
	(0.918)	(0.869)
Human Capital		
High-skilled	1.430*	1.958**
	(0.827)	(0.833)
Low-skilled	-0.822*	-1.295**
	(0.470)	(0.532)
ln(TFP)		
High-skilled	-0.678*	1.294**
	(0.376)	(0.580)
Low-skilled	0.0659	-0.579
	(0.273)	(0.370)
ln(Capital per Worker)		
High-skilled	-1.006	1.101
	(1.213)	(0.798)
Low-skilled	0.840	0.130
	(0.594)	(0.388)
Observations	82	82
Lags	X	X
Native Demo Change	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for high-skilled net immigration from non-OECD countries, an indicator for low-skilled net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. High-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with tertiary education (defined by ISCED 5/6/7/8 education levels) as a share of the 2000 population (ages 15+). Low-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with secondary or below education (defined by ISCED 0/1/2/3/4 education levels) as a share of the 2000 population (ages 15+). Values reported for all OECD countries. See Figure 11.

Table 10: The impact of high- and low-skill immigrants, EU-14-plus USA, CAN, AUS, NZL, GBR

	Horizon 0–5 yrs	Horizon 5–10 yrs
ln(RGDP per Worker)		
High-skilled	-0.150	1.496*
	(1.185)	(0.717)
Low-skilled	0.0192	-0.490
	(0.979)	(0.537)
Human Capital		
High-skilled	1.982**	2.016*
	(0.784)	(1.081)
Low-skilled	-1.186**	-1.269**
	(0.491)	(0.585)
ln(TFP)		
High-skilled	-0.911*	0.862*
	(0.457)	(0.484)
Low-skilled	0.292	-0.259
	(0.257)	(0.347)
ln(Capital per Worker)		
High-skilled	-0.0671	0.783
	(1.166)	(0.554)
Low-skilled	-0.0551	0.212
	(0.700)	(0.186)
Observations	56	56
Lags	X	X
Native Demo Change	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for high-skilled net immigration from non-OECD countries, an indicator for low-skilled net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. High-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with tertiary education (defined by ISCED 5/6/7/8 education levels) as a share of the 2000 population (ages 15+). Low-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with secondary or below education (defined by ISCED 0/1/2/3/4 education levels) as a share of the 2000 population (ages 15+). Values reported for EU-14-plus countries. See Figure A2 in Appendix A2.

Table 11: The impact of ”loosening” external immigration regulations, All OECD sample

	Horizon 0-5 years	Horizon 5-10 years
ln(RGDP per Worker)		
1 - IMPIC External Regulations	0.254*	0.376*
	(0.140)	(0.214)
Native Demo Change	-0.605	0.481
	(0.396)	(0.700)
Human Capital		
1 - IMPIC External Regulations	0.0584	0.156
	(0.101)	(0.155)
Native Demo Change	-0.179	-0.283
	(0.165)	(0.258)
ln(TFP)		
1 - IMPIC External Regulations	0.0970**	0.143**
	(0.0400)	(0.0544)
Native Demo Change	-0.343*	-0.243
	(0.189)	(0.306)
ln(Capital per Worker)		
1 - IMPIC External Regulations	0.0975	0.230*
	(0.0948)	(0.125)
Native Demo Change	0.218	0.213
	(0.492)	(0.585)
Observations	132	132
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for loosening external immigration regulations, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The indicator for loosening external immigration regulations is a rescaled variable: 1 - (the average external regulation score governing how restrictive countries are to allowing immigrants to enter for family reunification, labor migration, asylum/refugees, and co-ethnic migration). The continuous measure “1 - IMPIC External Regulations” ranges from 0 (restrictive) to 1 (open). Values reported for all OECD countries. See Figure 12.

Table 12: The impact of "loosening" external immigration regulations, EU-14-plus USA, CAN, AUS, NZL, GBR

	Horizon 0-5 years	Horizon 5-10 years
ln(RGDP per Worker)		
1 - IMPIC External Regulations	0.227	0.473*
	(0.320)	(0.264)
Native Demo Change	-0.611*	-0.0484
	(0.316)	(0.403)
Human Capital		
1 - IMPIC External Regulations	0.178	0.440
	(0.180)	(0.273)
Native Demo Change	-0.216	-0.391
	(0.217)	(0.383)
ln(TFP)		
1 - IMPIC External Regulations	-0.0684	0.0229
	(0.115)	(0.129)
Native Demo Change	-0.0856	0.302
	(0.139)	(0.253)
ln(Capital per Worker)		
1 - IMPIC External Regulations	-0.0617	0.181
	(0.200)	(0.153)
Native Demo Change	-0.455	-0.606
	(0.328)	(0.356)
Observations	74	74
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**} p < 0.05, ^{***} p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for loosening external immigration regulations, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The indicator for loosening external immigration regulations is a rescaled variable: 1 - (the average external regulation score governing how restrictive countries are to allowing immigrants to enter for family reunification, labor migration, asylum/refugees, and co-ethnic migration). The continuous measure "1 - IMPIC External Regulations" ranges from 0 (restrictive) to 1 (open). Values reported for EU-14-plus countries. See Figure A3.

Table 13: The impact of large immigration shocks, All OECD sample

	Horizon 0-5 years	Horizon 5-10 years
ln(RGDP per Worker)		
Shock Dummy (p75)	1.746	3.027
	(2.041)	(2.120)
Human Capital		
Shock Dummy (p75)	0.689	0.468
	(0.852)	(0.913)
ln(TFP)		
Shock Dummy (p75)	0.466	0.380
	(0.921)	(0.727)
ln(Capital per Worker)		
Shock Dummy (p75)	3.126	4.400***
	(2.006)	(1.416)
Observations	266	228
Lags	X	X
Native Demo Change	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The binary variable for immigration surge is defined by a country-year whose net immigration from non-OECD countries exceeds the 75th percentile of the country's net immigration across years and the cross-country's net immigration for the particular year. The dummy has been multiplied by 100 so as to obtain coefficients to be interpreted as the impact of the shock on percentage point growth of the outcomes. Values reported for all OECD countries. See Figure A4 in Appendix A2.

Table 14: The impact of large immigration shocks, EU-14-plus USA, CAN, AUS, NZL, GBR

	Horizon 0-5 years	Horizon 5-10 years
ln(RGDP per Worker)		
Shock Dummy (p75)	-0.364	1.040
	(2.134)	(2.113)
Human Capital		
Shock Dummy (p75)	0.072	0.383
	(0.550)	(0.798)
ln(TFP)		
Shock Dummy (p75)	-0.115	0.428
	(1.022)	(0.862)
ln(Capital per Worker)		
Shock Dummy (p75)	0.703	2.576
	(1.471)	(1.497)
Observations	133	114
Lags	X	X
Native Demo Change	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The binary variable for immigration surge is defined by a country-year whose net immigration from non-OECD countries exceeds the 75th percentile of the country's net immigration across years and the cross-country's net immigration for the particular year. Values reported for EU-14-plus countries. See Figure A5 in Appendix A2.

Table 15: The impact of immigration surges, All OECD sample

	Horizon 0–5 yrs	Horizon 5–10 yrs
ln(RGDP per Worker)		
Surge Dummy (1st period)	-0.208	1.480
	(1.614)	(1.848)
Human Capital		
Surge Dummy (1st period)	-0.249	0.156
	(0.648)	(1.324)
ln(TFP)		
Surge Dummy (1st period)	-0.179	0.036
	(0.572)	(0.585)
ln(Capital per Worker)		
Surge Dummy (1st period)	0.165	3.320^{*}
	(1.199)	(1.803)
Observations	266	228
Lags	X	X
Native Demo Change	X	X
Year FE	X	X
Country FE	X	X

All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. We construct a binary "surge" indicator that takes the value of 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's non-OECD net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. We then construct a binary indicator for an immigration surge that takes the value of 1 for the first period of each "surge" indicator. This indicator that is only equal to 1 for the first year of a sustained immigration surge is the indicator used in the local projection regression. See Figure A6 in Appendix A2.

Table 16: Separating the impact for high and low immigration rates, All OECD countries

	Horizon 0–5 yrs	Horizon 5–10 yrs
ln(RGDP per Worker)		
Net Immigration × Low Change	4.575*	5.123
	(2.315)	(3.316)
Net Immigration × High Change	1.384**	2.022***
	(0.646)	(0.635)
Native Demo Change	-0.192	0.0749
	(0.455)	(0.659)
Human Capital		
Net Immigration × Low Change	1.101	0.610
	(1.222)	(1.797)
Net Immigration × High Change	0.217	0.517
	(0.486)	(0.666)
Native Demo Change	-0.194	-0.289
	(0.148)	(0.233)
ln(TFP)		
Net Immigration × Low Change	1.576	0.979
	(1.152)	(1.858)
Net Immigration × High Change	0.332	0.307
	(0.337)	(0.399)
Native Demo Change	-0.150	-0.135
	(0.200)	(0.337)
ln(Capital per Worker)		
Net Immigration × Low Change	1.027	3.327
	(1.628)	(2.089)
Net Immigration × High Change	1.536**	2.888***
	(0.718)	(0.647)
Native Demo Change	0.429	0.352
	(0.327)	(0.469)
Observations	266	228
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 1990 population stock (ages 15+). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Each column reports estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on the interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country-year having below median net immigration from non-OECD countries, the interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country-year having above median net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. Values reported for all OECD countries. See Figure A7 in Appendix A2.

Table 17: Separating the impact for high and low share of immigrants in the receiving country, All OECD countries

	Horizon 0–5 yrs	Horizon 5–10 yrs
ln(RGDP per Worker)		
Net Immigration × Low Share	1.172*	1.874**
	(0.687)	(0.753)
Net Immigration × High Share	1.224	2.053
	(1.067)	(1.553)
Native Demo Change	-0.239	0.0376
	(0.471)	(0.715)
Human Capital		
Net Immigration × Low Share	0.184	0.539
	(0.531)	(0.752)
Net Immigration × High Share	-0.0123	0.349
	(0.850)	(1.116)
Native Demo Change	-0.215	-0.294
	(0.165)	(0.245)
ln(TFP)		
Net Immigration × Low Share	0.303	0.315
	(0.341)	(0.454)
Net Immigration × High Share	-0.204	0.00131
	(0.447)	(0.772)
Native Demo Change	-0.182	-0.147
	(0.199)	(0.336)
ln(Capital per Worker)		
Net Immigration × Low Share	1.674**	3.012***
	(0.744)	(0.642)
Net Immigration × High Share	0.703	1.886*
	(0.691)	(1.048)
Native Demo Change	0.407	0.314
	(0.323)	(0.466)
Observations	266	228
Lags	X	X
Year FE	X	X
Country FE	X	X

Table Notes: All regressions are weighted by the 2005 population stock (as measured by Eurostat Regional Accounts). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.001$. Unless otherwise specified, the sample is composed of the NUTS-2 regions of Austria (only NUTS-1 available), Belgium, Cyprus (whole country), Czech Republic, Germany (NUTS-1), Denmark, Estonia (whole country), Greece, Spain, Finland, France, Hungary, Ireland, Italy, Lithuania (whole country), Luxembourg (whole country), Latvia (whole country), the Netherlands (whole country), Portugal, Sweden and Slovakia. NUTS-2, where available, can be aggregated over time for consistency. The dependent variable represents net immigration, defined as the change in stock of immigrants from a proxy non-OECD countries (North Africa and Middle East, other African countries, rest of Asia, South America) between years t and $t-5$ as a share of the 2005 population. The definition of the shift-share (with shares measured at t-5) follows Equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 4 lower-income origin regions proxing for non-OECD countries: North Africa and Middle East, other African countries, rest of Asia, South America. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. In Columns (2) we additionally control for native demographic change.

Table 18: Estimated Local Projection Coefficients, All European Regions

	(1) Horizon 0-5 years	(2) Horizon 5-10 years
Panel A. OLS estimates		
ln(RGDP per Person)		
Net Immigration	-0.344	1.534
	(1.123)	(2.303)
Native Demo Change	-0.848	-0.120
	(0.656)	(1.983)
ln(RGDP per Worker)		
Net Immigration	-0.137	3.116
	(0.952)	(3.485)
Native Demo Change	0.181	1.105
	(0.822)	(2.021)
ln(Capital per Worker)		
Net Immigration	1.650	3.005
	(2.532)	(3.611)
Native Demo Change	-0.470	2.084
	(1.770)	(2.232)
Observations	457	294
Panel B. 2SLS		
ln(RGDP per Person)		
Net Immigration	-2.398	8.964
	(1.501)	(7.605)
Native Demo Change	-1.641**	1.061
	(0.700)	(2.323)
ln(RGDP per Worker)		
Net Immigration	-4.704***	13.944**
	(1.226)	(6.255)
Native Demo Change	-1.427*	1.904
	(0.733)	(1.319)
ln(Capital per Worker)		
Net Immigration	-4.375	14.098**
	(2.935)	(7.129)
Native Demo Change	-2.569	3.587*
	(1.975)	(2.051)
Observations	439	282
Lags	X	X
Year FE	X	X
Region FE	X	X

Table Notes: All regressions are weighted by the 2005 population stock (as measured by Eurostat Regional Accounts). Standard errors in parentheses, clustered at the destination country level. $^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.001$. The sample is composed of the NUTS-2 regions of Austria (only NUTS-1 available), Belgium, Cyprus (whole country), Czech Republic, Germany (NUTS-1), Denmark, Estonia (country), Greece, Spain, Finland, France, Hungary, Ireland, Italy, Lithuania (country), Luxembourg (whole country), Latvia (country), the Netherlands (country), Portugal, Sweden and Slovakia. The dependent variable represents net immigration, defined as the change in stock of immigrants from a proxy non-OECD countries (North Africa and Middle East, other African countries, rest of Asia, South America) between years t and $t-5$ as a share of the 2005 population. The definition of the shift-share (with shares measured at t-5) follows Equation A1.3 in the Appendix. The instrument is constructed from bilateral migrant stock data from 4 lower-income origin regions proxing for non-OECD countries: North Africa and Middle East, other African countries, rest of Asia, South America. The instrument highlights variation in the change of stock of immigrants driven by origin-country push factors. In Columns (2) we additionally control for native demographic change.

Figure 1: Immigrants as a share of the population, 1990-2024, separating OECD and non-OECD origins

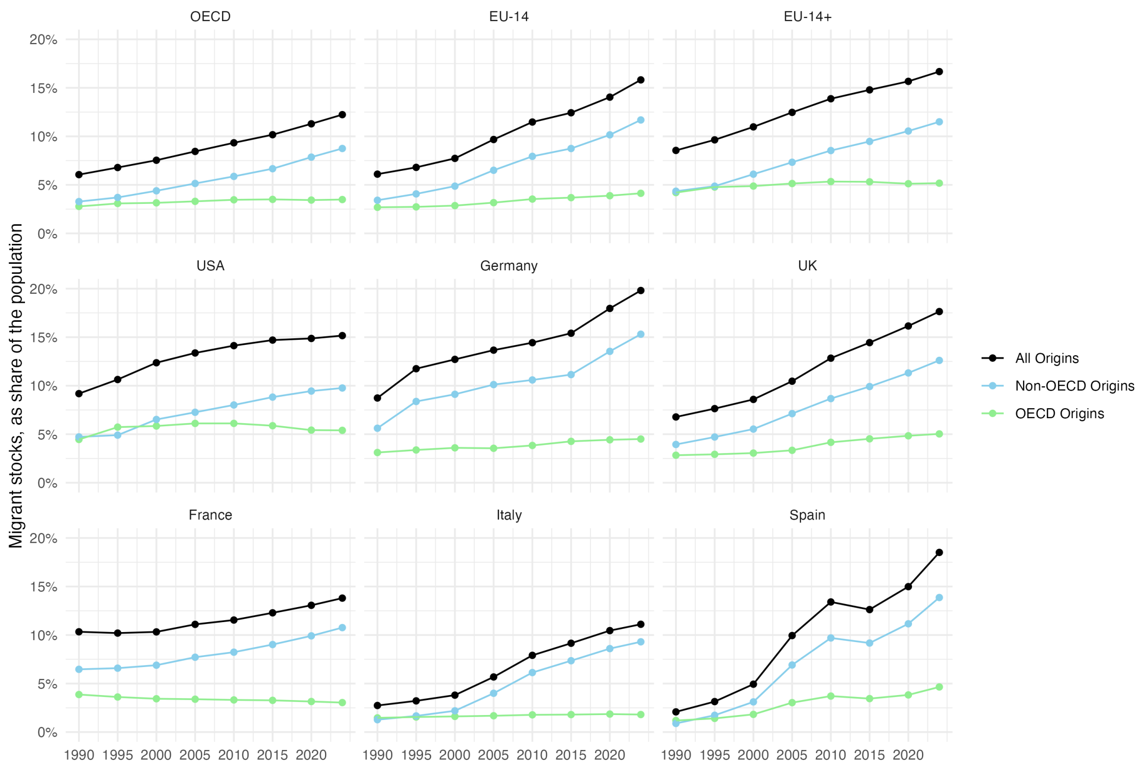

Figure notes: Data is from UNDESA. OECD countries include: Australia, Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Luxembourg, Malta, Mexico, Norway, Netherlands, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States of America. EU-14 countries include Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom. EU-14+ countries include the EU-14-plus Australia, Canada, New Zealand, and the United States of America. For each destination country and year, we calculate the total stock of immigrants from a particular origin group (non-OECD or OECD countries) as a share of the total population. For the three aggregated destination groups (OECD, EU-14, EU-14-plus), we plot the average shares across countries within each destination group, per year. The sample used all OECD destination countries.

Figure 2: Total stocks of immigrants from different non-OECD origins, 1990-2024

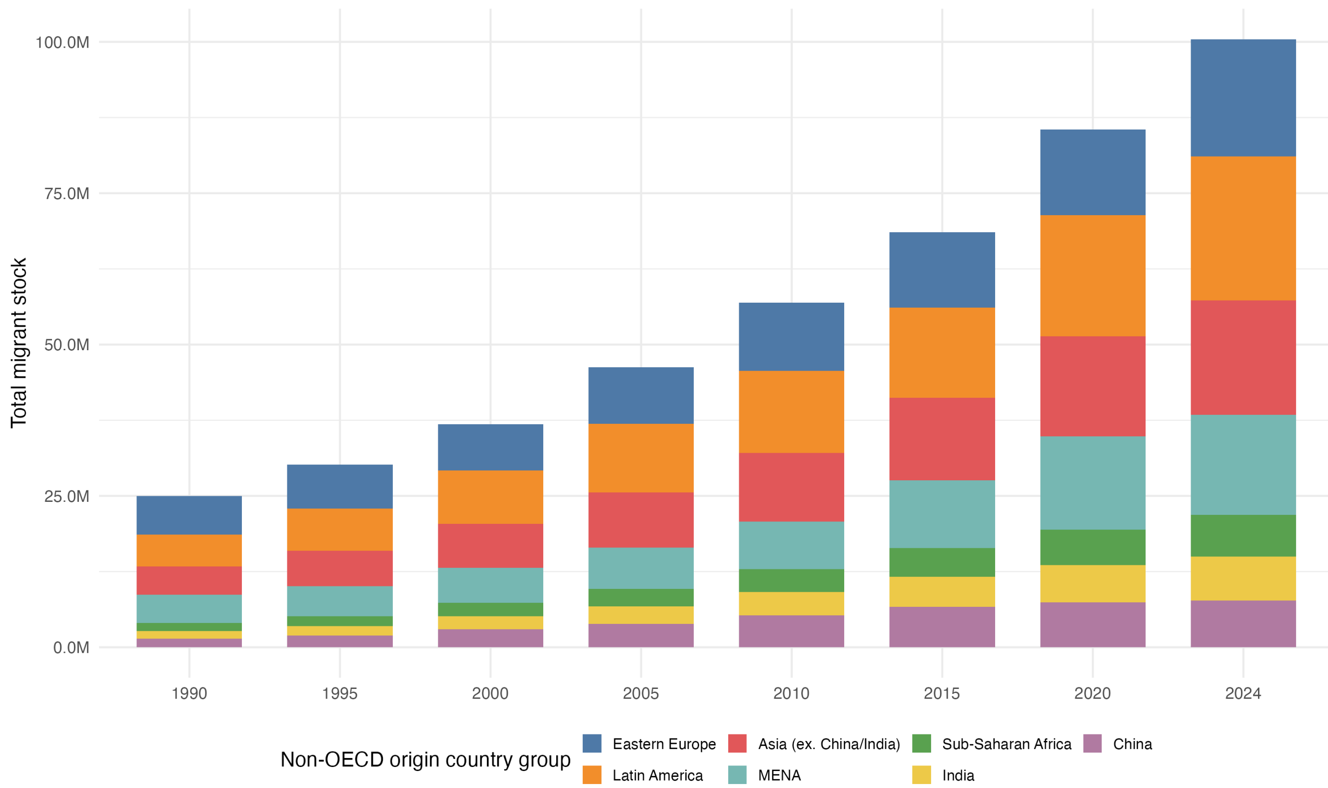

Figure Notes: The Y-axis represents the total stock of immigrants in OECD countries who were born in non-OECD countries across each origin group. Non-OECD countries from Eastern Europe include: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, North Macedonia, Republic of Moldova, Romania, Russia, Serbia, TFYR Macedonia, and Ukraine. Non-OECD countries from Asia (excluding India and China) include: Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Brunei, Cambodia, Dem. People's Republic of Korea, Georgia, Indonesia, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Turkmenistan, Uzbekistan, Vietnam. Non-Oecd countries from Sub-Saharan Africa include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe. Non-OECD Latin American countries include: Argentina, Belize, Bolivia, Brazil, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Suriname, Trinidad and Tobago, Uruguay, Venezuela. Non-OECD countries from the Middle East and North Africa (MENA) include: Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Tunisia, United Arab Emirates, Western Sahara, Yemen. We include Hong Kong and Macau within China. Data on migrant stocks is from UNDESA.

Figure 3: Relative human capital intensity of non-OECD immigration

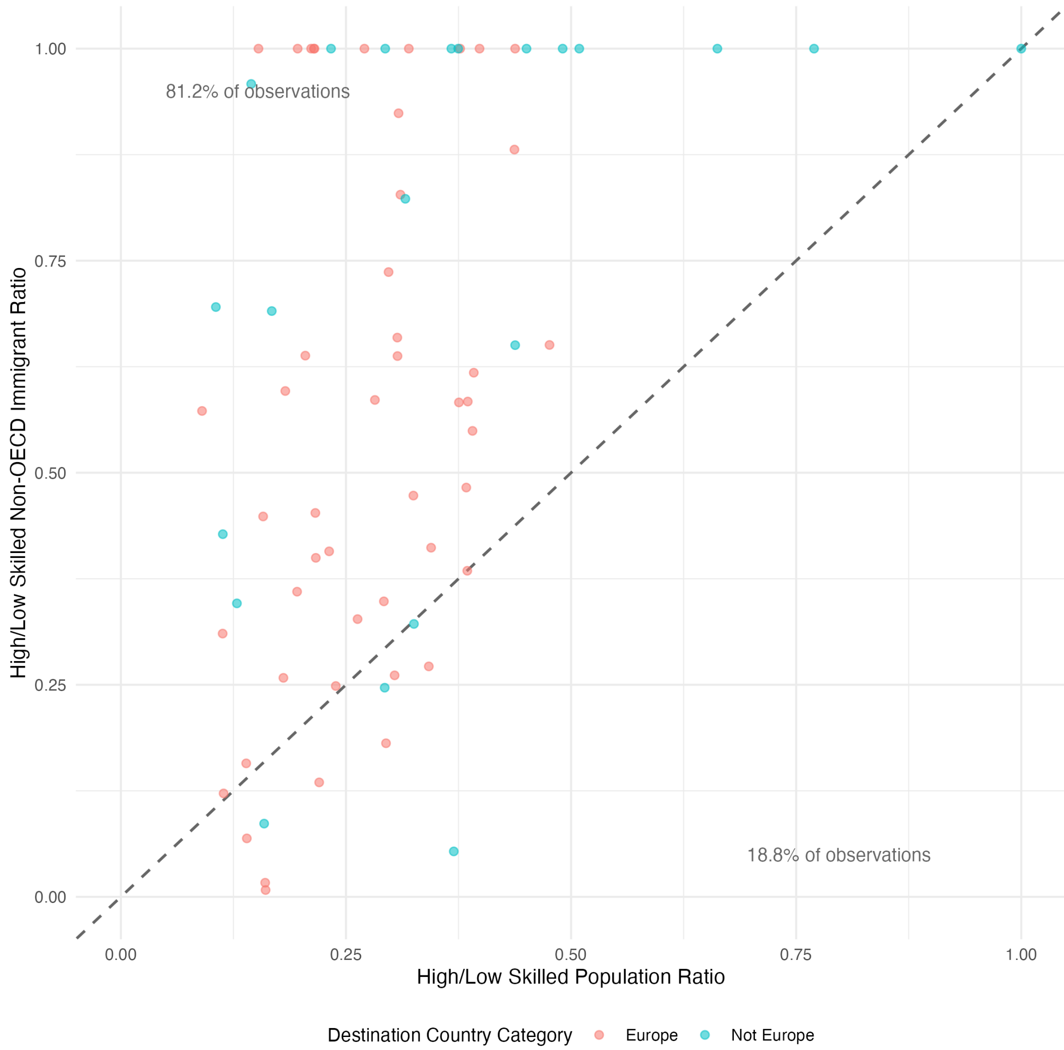

Figure notes: Each point represents a destination-year. European countries include: AUT, BEL, CZE, DNK, EST, FIN, FRA, DEU, GRC, HUN, ISL, IRL, ITA, LVA, LTU, LUX, NLD, NOR, POL, PRT, SVK, ESP, SWE, CHE, GBR. All other OECD destination countries are non-European. The Y-axis reports the ratio of High-skilled non-OECD immigrants to Low-skilled non-OECD immigrants and is defined by the change in migrant stock of high-skilled non-OECD migrants between years $t+5$ and t divided by the change in migrant stock of low-skilled non-OECD migrants between years $t+5$ and t. High-skilled immigrants are those with tertiary levels of education (ISCED 5/6/7/8) while Low-skilled immigrants are those with secondary or below levels of education (ISCED 0/1/2/3/4). The changes in migrant stocks are calculated using data from the Database on Immigrants in OECD and non-OECD countries (DIOC). The X-axis reports the population ratio of High-skilled and Low-skilled individuals. We impute these values in the following steps: (i) we calculate the proportion of high-skilled (and low-skilled) individuals to the total population of high-and-low skilled individuals in the DIOC dataset for each country-year, (ii) we use the 2000 proportion for 1990 and 1995, (iii) we multiply this proportion by the total population stock (ages 15+) using data from the UN Department of Economic and Social Affairs. With the imputed stocks of the high-and-low skilled population, we calculate the ratio of the high-to-low skilled population as the change in the population stock of high-skilled individuals between years $t+5$ and t divided by the change in the population stock of low-skilled individuals between years $t+5$ and t. Across both ratio measures, for observations with ratios > 1, we impose a value of 1. We report the percentage of destination country-year observations above and below the 45 degree line, representing the share of observations in which the ratio of high-to-low skilled non-OECD immigrants is *higher/lower* than the ratio of the high-to-low skilled population. The sample used all OECD destination countries.

Figure 4: Correlation between Native demographic change and non-OECD immigration

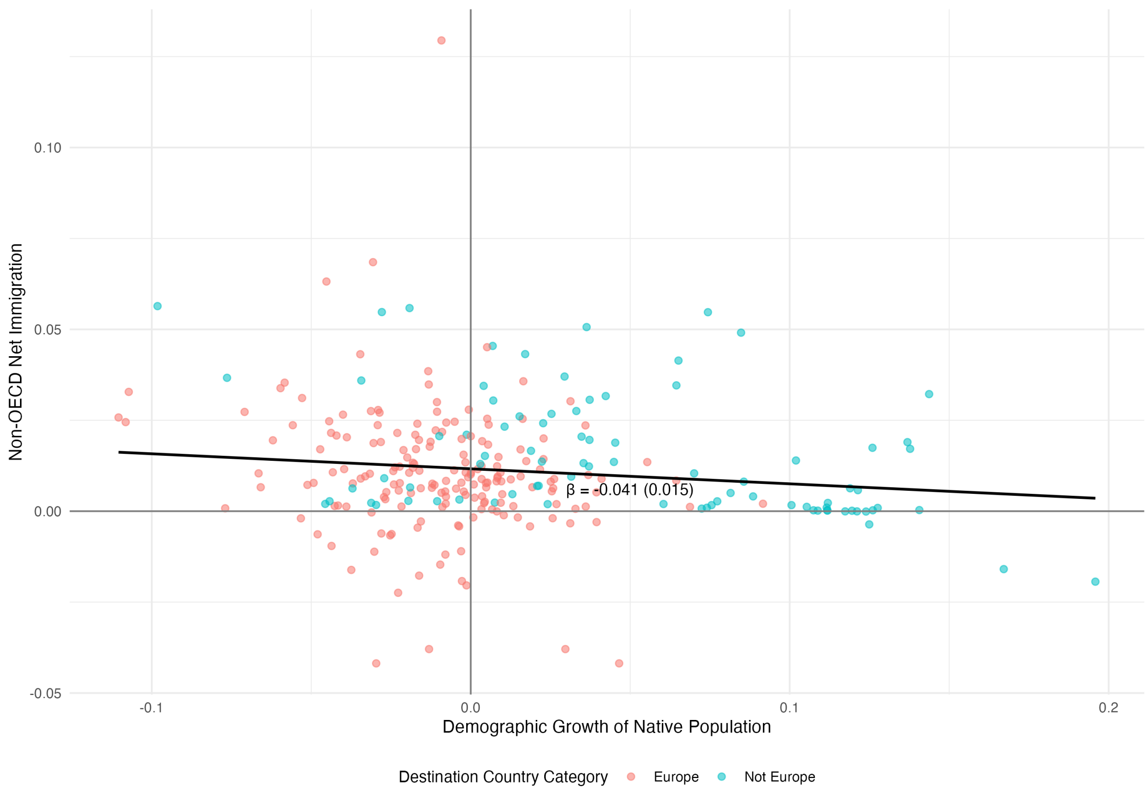

Figure notes: Each point represents a destination-year. European countries include: AUT, BEL, CZE, DNK, EST, FIN, FRA, DEU, GRC, HUN, ISL, IRL, ITA, LVA, LTU, LUX, NLD, NOR, POL, PRT, SVK, SWN, ESP, SWE, CHE, GBR. All other OECD destination countries are non-European. The X-axis represents the change in the native population, defined as the change in the stock of natives between year t and $t-5$ as a share of the initial population, described in Equation A1.2 in the Appendix. The Y-axis represents the change in the stock of immigrants from non-OECD countries between year t and $t-5$ as a share of the initial population, described in Equation A1.1 in the Appendix. The sample used all OECD destination countries.

Figure 5: Correlations of Population growth and real GDP per capita growth with native population changes and non-OECD immigration rates (binned + residualized)

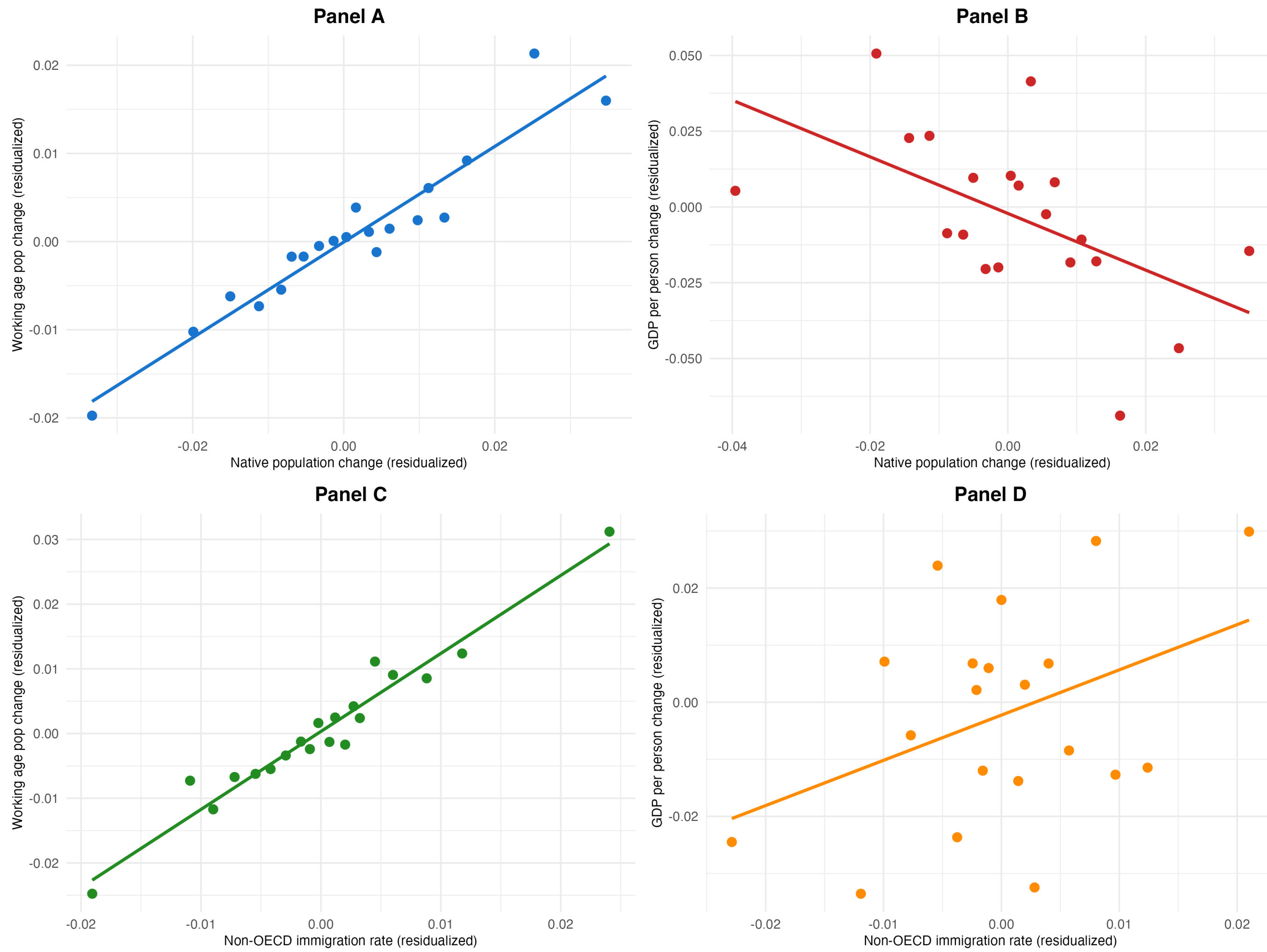

Table Notes: The figure displays binned scatter plots of the conditional relationship between demographic flows and economic outcomes, after partialling out country and year fixed effects. Each panel plots 20 equal frequency bins where each point represents the main of the residualized X and Y variables within that bin. **X-axis Variables:** The native demographic change variable (panels A and B) is defined as the change in the stock of natives between year t and year $t-5$ as a share of the initial 1990 population. The non-OECD net immigration indicator (panels C and D) is defined as the change in the stock of immigrants from non-OECD countries between year t and $t-5$ as a share of the initial 1990 population. **Y-axis Variables:** The working age population change (panels A and C) is the change in the stock of individuals (ages 15+) between year t and $t-5$ as a share of the initial 1990 population. The GDP per person change is the log difference in real GDP per capita between year t and year $t-5$, approximating a 5 year percentage change. **Residualization:** We regress both the X-axis and Y-axis variables on country fixed effects, year fixed effects, the other demographic indicator, and a one-period lag of the outcome variable. This removes mean differences across destination countries, time trends, the confounding role of the other demographic flow, and baseline differences in the outcome. The resulting variation is within-country, within-year, and net of other regressors. **Weighting:** All regressions and bin means are population-weighted using the stock of the total population in 1990 (ages 15+). **Binning:** To reduce noise from outliers, we collapse the residualized data into 20 equal frequency bins. We rank all observations on the residualized X-axis variable and divide them into 20 groups of equal size so that each bin has approximately the same number of country-year observations. The sample used all OECD destination countries.

Figure 6: (1 - IMPIC) external regulation levels across countries and years

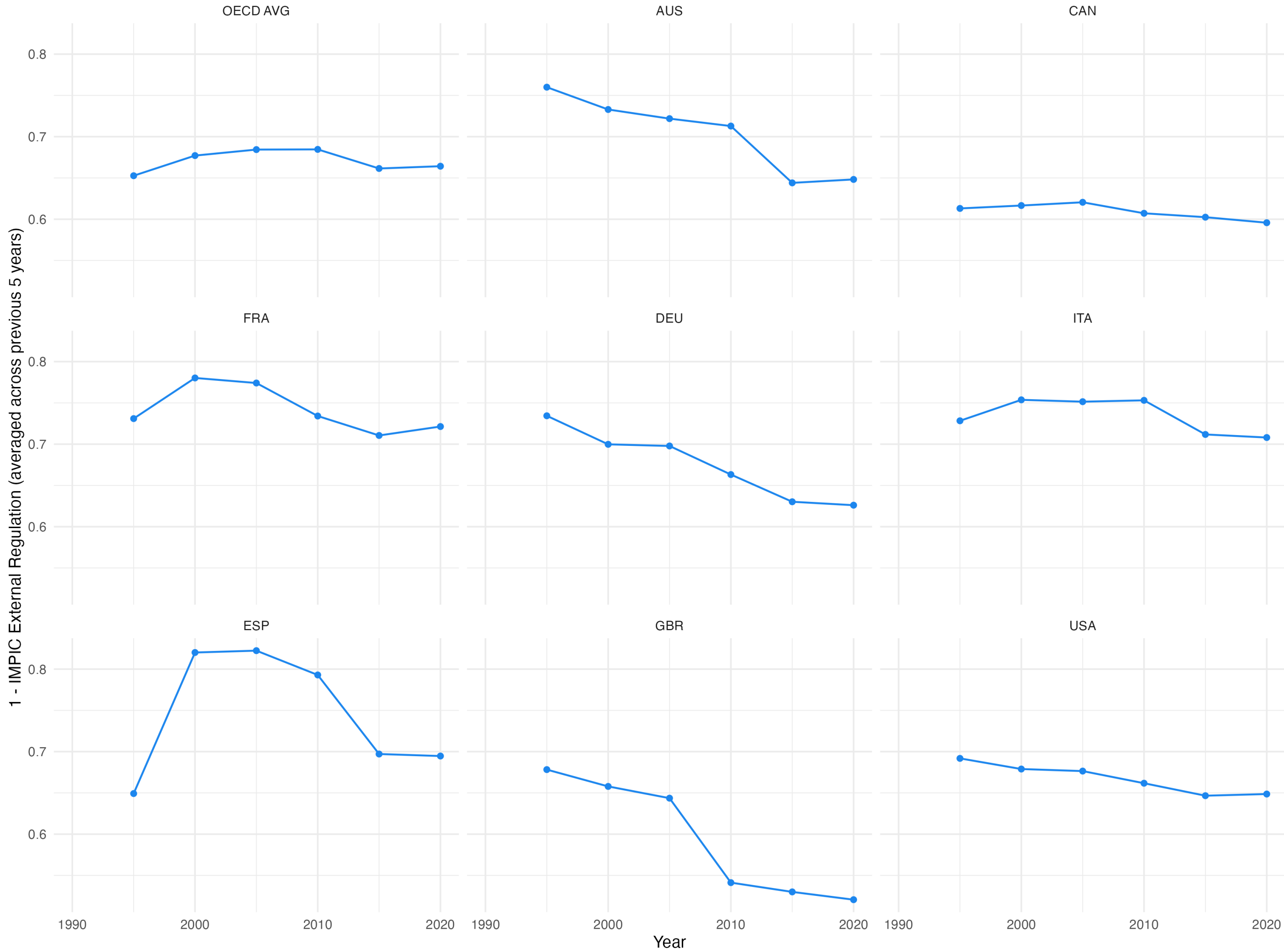

Figure notes: The indicator 1 - IMPIC External Regulations is a continuous measure of the average, rescaled IMPIC index of external controls. These external regulations refer to the legal rules governing who can enter a country. For the OECD Average, AUS, FRA, DEU, ITA, ESP, and GBR, the IMPIC External Regulations index averages across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. For CAN and USA, the index averages across three policy dimensions: Family reunification, Labor migration, and Asylum and refugees. Across all panels, the plotted rescaled indicator, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). In the OECD Panel, we average the indicator across all countries. For the remaining panels, we show variation in the raw value of the indicator across time.

Figure 7: (1 - IMPIC) external control levels across countries and years

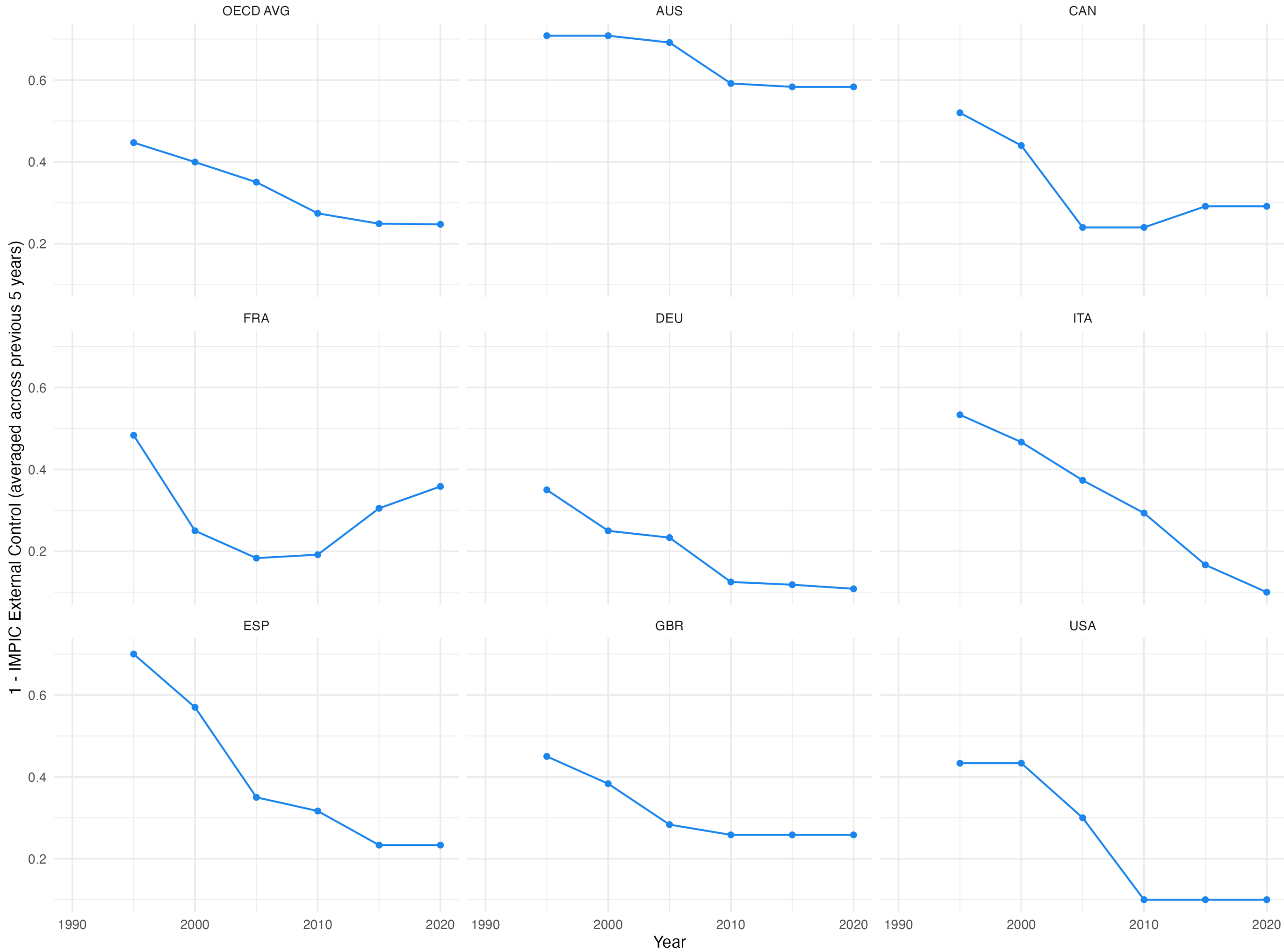

Figure notes: The indicator 1 - IMPIC External Controls is a continuous measure of the average, rescaled IMPIC index of external controls. These external controls refer to specific enforcement mechanisms used to enforce border-crossings. The index is constructed only for countries with non-missing values of IMPIC External Controls across all four policy dimensions: Family reunification, Labor migration, Asylum and refugees, and Co-ethnics. The rescaled indicator, 1 - IMPIC, takes on continuous values between 0 (restrictive) and 1 (open). In the OECD Panel, we average the indicator across all countries. For the remaining panels, we show variation in the raw value of the indicator across time.

Figure 8: Immigration Shocks, All OECD Sample

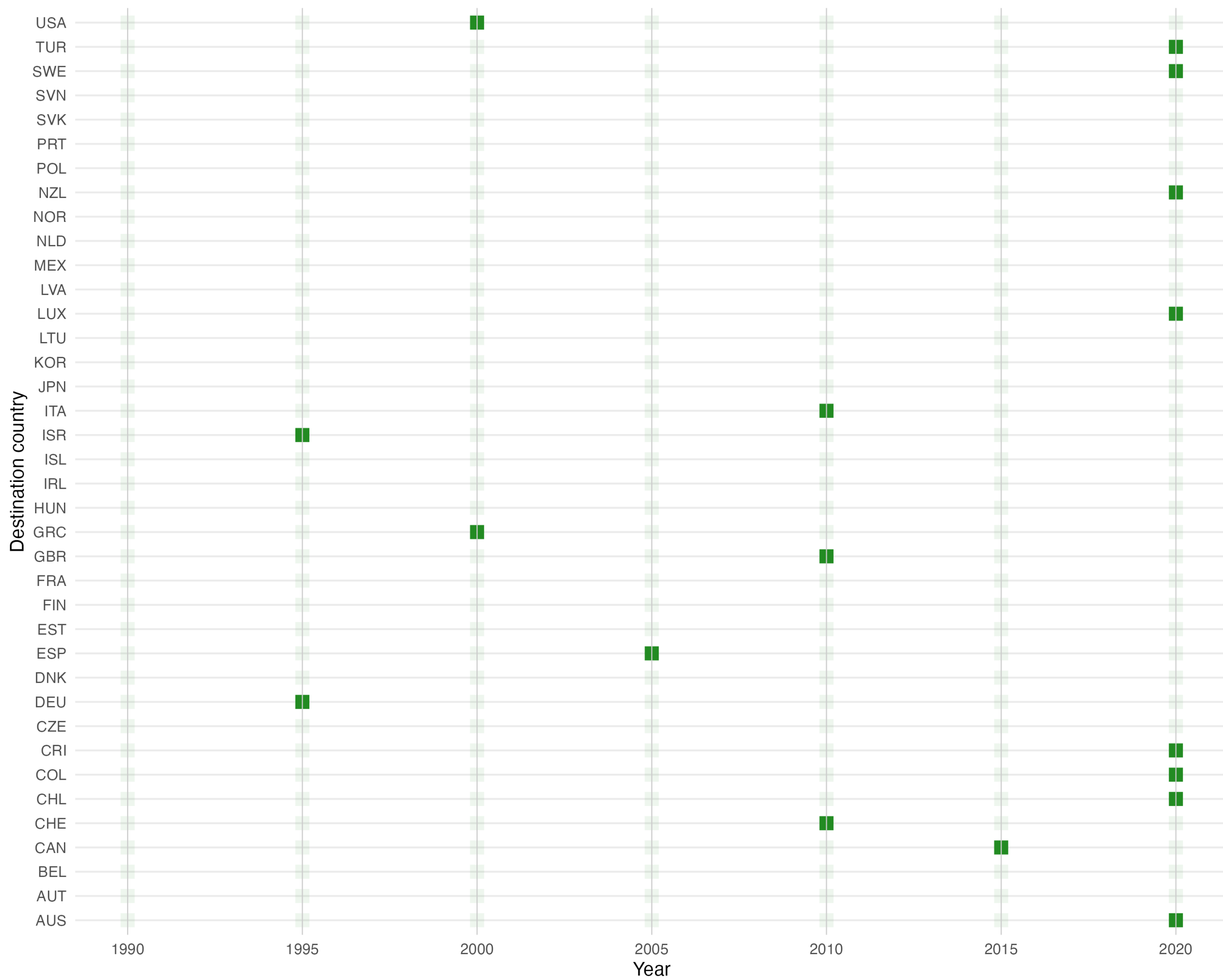

Table Notes: We construct a binary "shock" indicator that takes the value of 1 for country-year observations where net immigration (the change in non-OECD origin migrant stock between years t and $t-5$ as a share of the initial population) exceeds *both* the destination country's own 75th percentile of non-OECD net immigration across all years *and* the cross-country 75th percentile of non-OECD net immigration in year t. The variable captures country-year observations with large episodes of net immigration. The shaded in green squares highlight the country-year "shock" events.

Figure 9: Sustained Immigration Surges, All OECD Sample

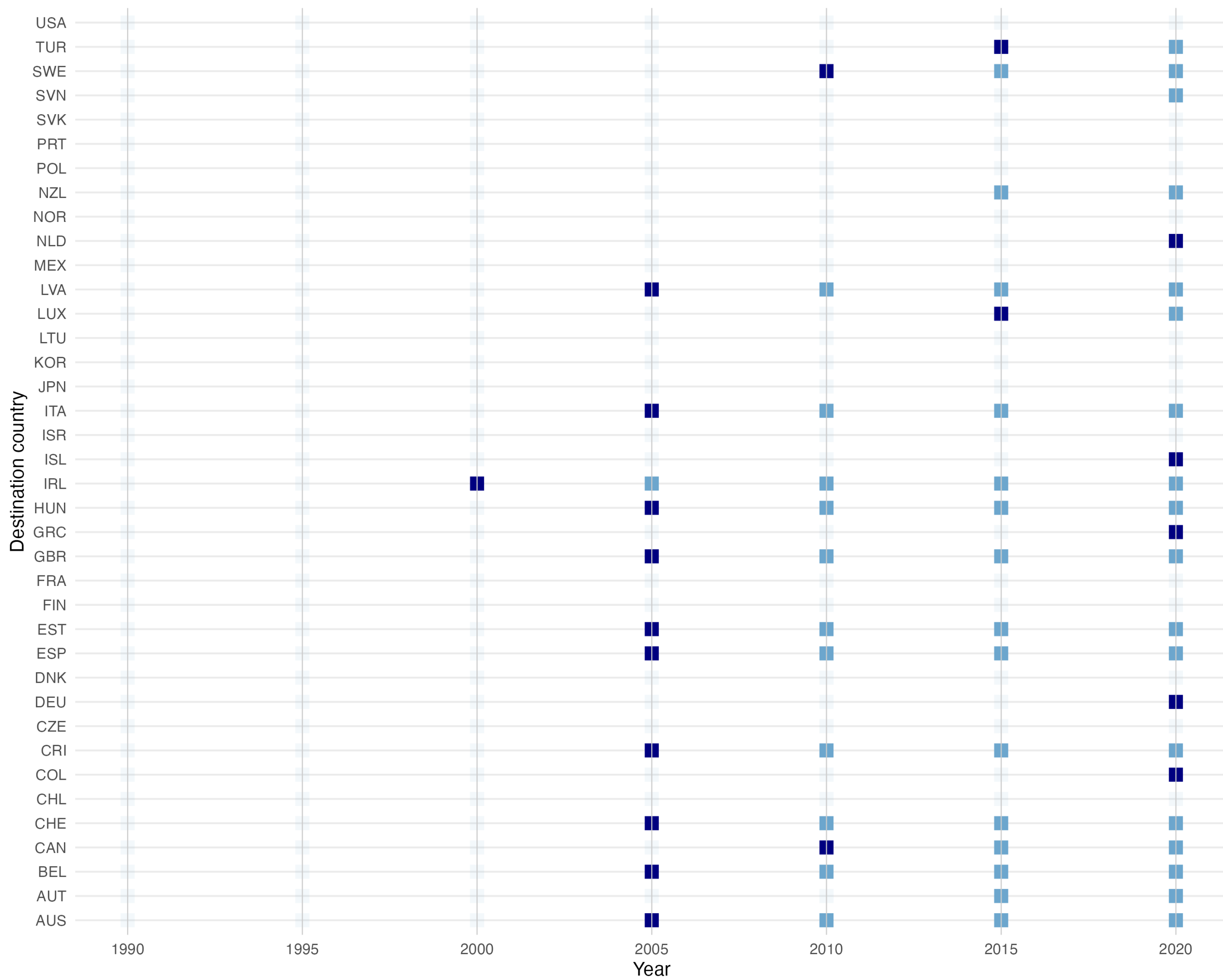

Table Notes: We construct a binary "event" indicator that takes the value of 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's non-OECD net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. The variable captures country-year observations with large episodes of non-OECD net immigration. The light blue squares highlight all of the country-year events. The navy squares highlight the first period of the surge.

Figure 10: Impulse responses to changes in non-OECD immigration rates, All OECD countries

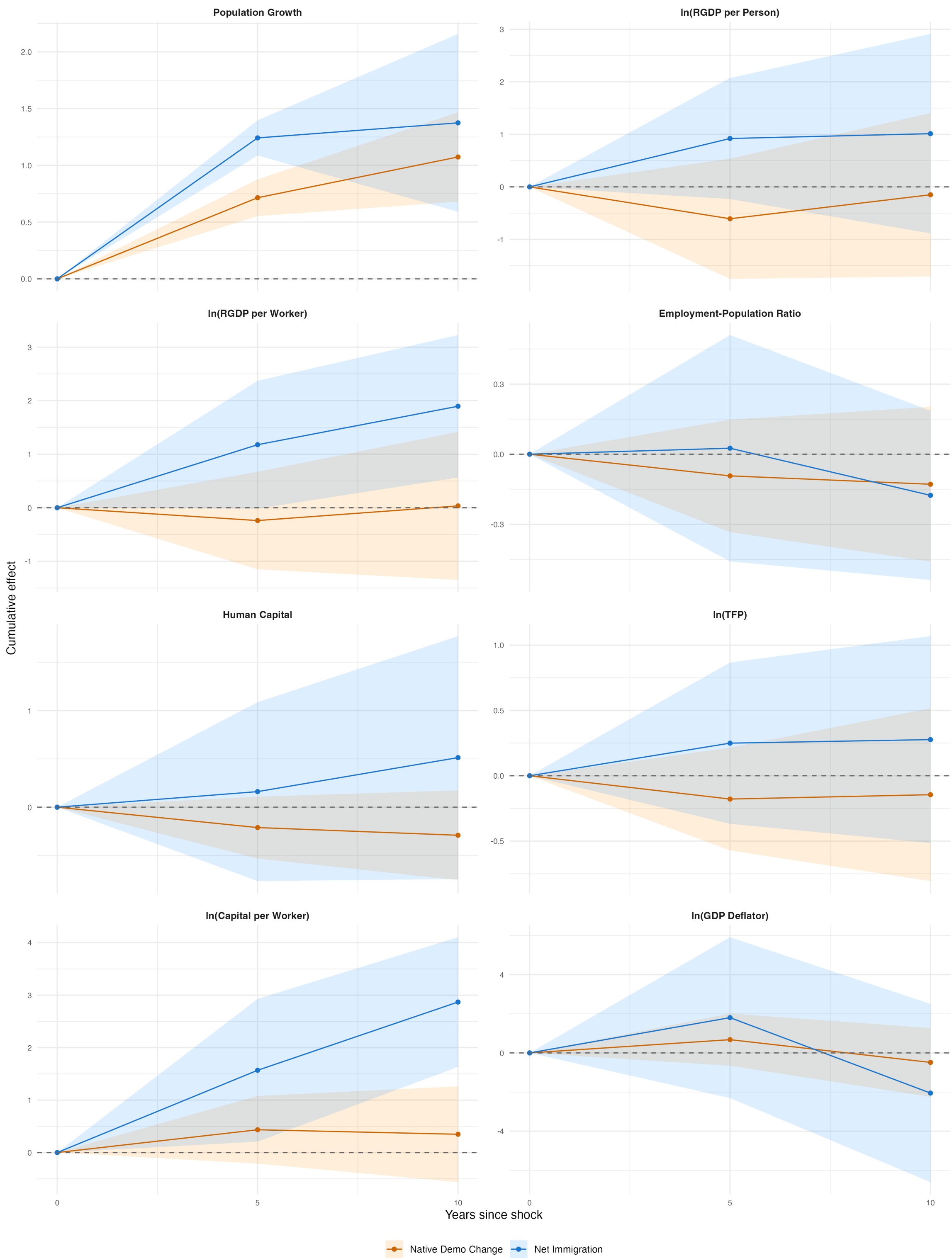

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix.

Figure 11: Impulse responses to changes in High- and Low-Skilled Immigration, all OECD countries

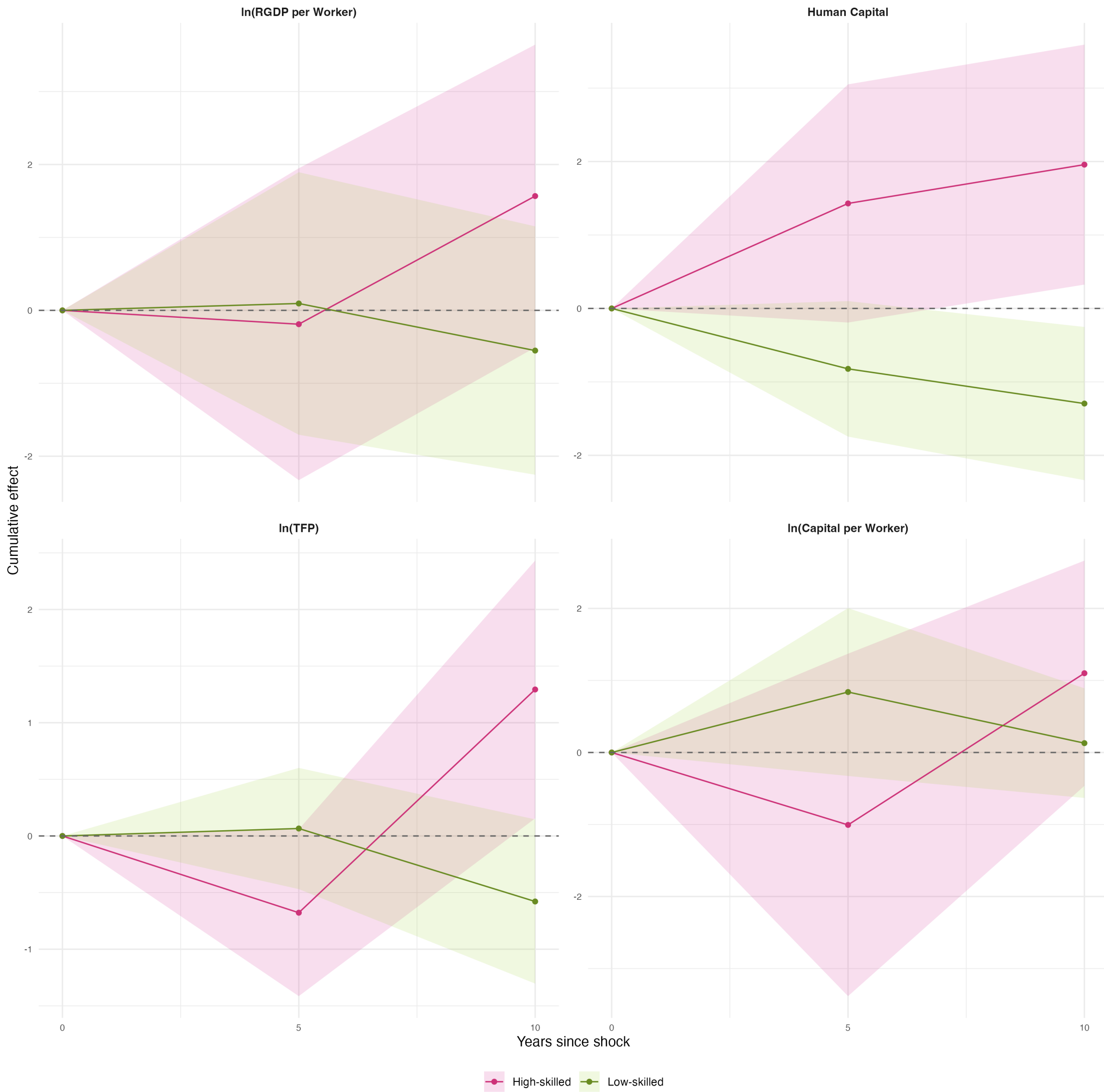

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for high-skilled net immigration from non-OECD countries, an indicator for low-skilled net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. High-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with tertiary education (defined by ISCED 5/6/7/8 education levels) as a share of the 2000 population (ages 15+). Low-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with secondary or below education (defined by ISCED 0/1/2/3/4 education levels) as a share of the 2000 population (ages 15+). All outcomes are defined in the appendix.

Figure 12: Impulse Responses to changes in (1-IMPIC) index of external regulation, all OECD countries

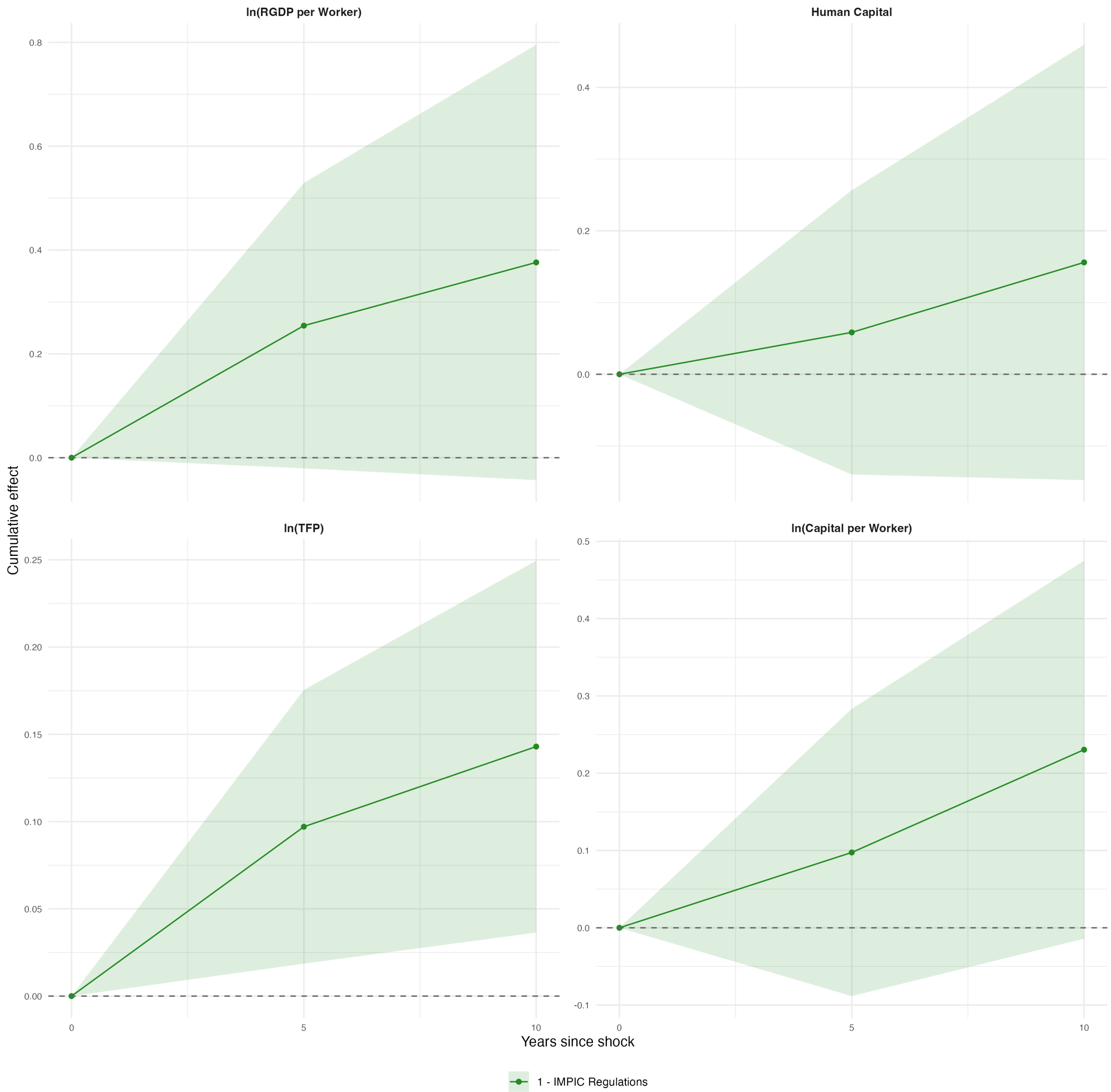

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for loosening external immigration regulations, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. The indicator for loosening external immigration regulations is a rescaled variable: 1 - (the average external regulation score governing how restrictive countries are to allowing immigrants to enter for family reunification, labor migration, asylum/refugees, and co-ethnic migration). The continuous measure "1 - IMPIC External Regulations" ranges from 0 (restrictive) to 1 (open). All outcomes are defined in the appendix.

A1 Appendix: Detailed Data and Variable Description

A1.1 Period and Sample

The main focus of our analysis includes 38 OECD destination countries, namely, Australia, Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Luxembourg, Malta, Mexico, Norway, Netherlands, New Zealand, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom, United States of America. The period of analysis is 1990-2024. The observations are relative to five-year intervals, which is the timing for the most accurate data on stocks of immigrants, corresponding to the periods 1990-1994; 1995-1999; 2000-2004; 2005-2009; 2010-2014; 2015-2019; 2020-2024. We specifically use the following key data sources to capture demographic changes:

- **UNDESA**: Data from the United Nations Department of Economic and Social Affairs. The data include stocks of natives and immigrants (by country of origin) at 5-year increments between 1990-2024. Data are disaggregated by age. (United Nations Department of Economic and Social Affairs, Population Division (2024b), United Nations Department of Economic and Social Affairs, Population Division (2020a), United Nations Department of Economic and Social Affairs, Population Division (2024a), United Nations Department of Economic and Social Affairs, Population Division (2020b))

- **DIOC:** Data from the OECD's Database on Immigrants in OECD and non-OECD Countries (DIOC). The data include stocks of natives and immigrants (from OECD or non-OECD country of origins) at 5-year increments between 2000-2020. Data are disaggregated by age and education level. (OECD (2000, 2005, 2010, 2015, 2020))

A1.2 Measuring Immigration Flows and Demographic Change

Our main measure of immigration into an OECD country from non-OECD countries. i, in period $t, t-5$ is the net increase in the stock of foreign-born from non-OECD countries, $NonOECDBornStock$ over the five-year intervals defined above, as a share of the adult (15 years and older) population in 1990. Namely:

$$\left(\frac{\Delta Immi^{nonOECD}_{i,t\ t-5}}{Pop^{15+}_{i,1990}}\right) = \left(\frac{NonOECDBornStock_{i,t} - NonOECDBornStock_{i,t-5}}{Pop^{15+}_{i,1990}}\right) \tag{A1.1}$$

Our main measure of native demographic change is the change in the native-born working-age population, $NativeBorn^{workAge}$ in a five-year interval, as a share of the total adult (15-year-and older) population in 1990:

$$\left(\frac{\Delta Native^{WorkAge}_{i,t\ t-5}}{Pop^{15+}_{i,1990}}\right) = \left(\frac{NativeBorn^{workAge}_{i,t} - NativeBorn^{workAge}_{i,t-5}}{Pop^{15+}_{i,1990}}\right) \tag{A1.2}$$

Such a change in the working age population of Native-Born is due to the "aging" into and out of the relevant population (between 15 and 64 years of age), and hence is very closely predicted by the 5-year-earlier difference in size between the cohort aged 11-15 minus the cohort aged 60-64. The age-specific data is available for 1990-2020 in the UN data. We impute the stock of immigrants of working age in 2024. Our imputation follows three steps: (i) we calculate the share of working age natives to total natives in 2010 and 2020, (ii) we calculate the average annual change of this share over the decade, and project that forward five years, (iii) we apply this imputed proportion of working aged natives to total natives to the 2024 total stock of natives.

A1.3 Separating by Skill/Education

Expression A1.1 can be specialized to measure the net immigration of high-skilled (in education groups with at least tertiary education ("Advanced") based on the International Standard Classification of Education (ISCED) levels 5/6/7/8) and less-skilled (in education groups with secondary education or lower ("Less than Basic", "Basic", "Intermediate") based on the International Standard Classification of Education (ISCED) levels 0/1/2/3/4) individuals. Those will be indicated as $\frac{\Delta ImmiH^{nonOECD}_{i,t\ t-5}}{Pop^{15+}_{i,2000}}$ and $\frac{\Delta ImmiL^{nonOECD}_{i,t\ t-5}}{Pop^{15+}_{i,2000}}$ where $ImmiH$ is obtained using the stock of foreign born with advanced education and $ImmiL$ using the stock of foreign-born with intermediate and basic education, leaving the rest of the definitions unchanged. The standardization of the population in the denominator still includes all adults in the country, but at year 2000. These skill variables are only available in the DIOC data for the years 2000-2020.

A1.4 Global Push-Driven shift-share immigration

In order to predict net immigration flows (as a share of the receiving country's adult population) using changes in global "migration push" factors from countries of origin and pre-existing networks, we construct two shift-share indices and analyze what part of the changes in net immigration to OECD country i, over time, is predicted by those.

The first is a "shift-share" index capturing the interaction between the share in year $t-5$ of immigrants from non-OECD countries of origin and their aggregate net flow in each five-year period, between $t-5$ and t.

We define non-OECD countries of origin of these immigrants as 7 regions of the world (non-OECD Central and South America, Sub-Saharan Africa, North Africa and the Middle East; non-OECD Asia [excluding China and India], non-OECD Eastern Europe) plus China and India (the countries with the largest population in the world by far). We measure the "initial shares" in year $t-5$ and the aggregate 5-year net flows of migrants from these countries to OECD countries. The index is constructed as follows:

$$\left(\frac{\Delta \widehat{Immi^{nonOECD}_{i;t\ t-5}}}{Pop^{15+}_{i,1990}}\right) = \frac{\sum\limits_{o\in non-OECD}\left(sh_{i;o,t-5}\cdot \Delta Immi^{toOECD}_{o;t,t-5}\right)}{Pop^{15+}_{i,1990}} \tag{A1.3}$$

In expression A1.3, the index o represents an area of origin and "$non-OECD$" is the set of seven non-OECD countries/areas of origin defined above. $sh_{i;o,t-5}$ is the share of the stock of migrants from area of origin o residing in OECD country i, in year $t-5$, relative to all migrants from area o residing in the aggregate of OECD countries in $t-5$, namely:

$$sh_{i;o,t-5} = \frac{nonOECDBornStock_{i,o;t-5}}{\sum\limits_{i\in OECD} nonOECDBornStock_{i,o;t-5}} \tag{A1.4}$$

The expression $\Delta Immi^{toOECD}_{-i,o;t,t-5}$ in equation A1.3 represents the net change in the stock of non-OECD foreign-born from area of origin o residing in the aggregate set of OECD countries excluding destination i (leave-one-out), between year $t-5$ and t, namely:

$$\Delta Immi^{toOECD}_{-i,o;t,t-5} = \sum_{j\neq i, j\in OECD} nonOECDBornStock_{j,o;t} - \sum_{j\neq i, j\in OECD} nonOECDBornStock_{j,o;t-5} \tag{A1.5}$$

The leave-one-out correction and use of lagged shares ensure the instrument captures origin-country push factors rather than destination-specific demand pulls.

A1.5 Crisis-driven Shift-Share immigration

We implement an alternative shift-share variable, proxying for immigration to OECD countries that was pushed, more specifically, by crises in the countries of origin and hence more idiosyncratic and less correlated to the economic evolution of the world economy. This variable is constructed in the same way as the push shift-share described in equation A1.3 but it only includes a subset of "crises" countries as origin. As in the previous case we use the share of immigrants' stock across countries in year $t-5$ to predict the inflows between $t-5$ and t.

We define "crisis countries" as those experiencing the largest emigration rates (measured as percentage of the population at origin) during some sub-periods of the covered 1990-2024 period, and for which we could identify a political/military/economic crisis in this period. This set includes seven countries: Albania in 1990s and 2000s (post-soviet crisis and eocnomic collapse); Bosnia in 1990s (War); El Salvador in 1990s and 2000s (Hurricane Mitch, gang violence surge); Romania post 2000s (post-Soviet collapse and access to EU); Syria post 2010 (Civil War); Venezuela post-2015 (Economic Collapse); Ukraine post-2020 (Russian Invasion); We call the set of these seven countries "$Crises$" and we implement the following shift-share specialized only on those 7 origins:

$$\left(\frac{\widehat{\Delta Immi^{Crises}_{i;t\ t-5}}}{Pop^{15+}_{i,1990}}\right) = \frac{\sum_{o\in Crises}\left(sh_{i;o,t-5}\cdot \Delta Immi^{OECD}_{o;t,t-5}\right)}{Pop^{15+}_{i,1990}} \tag{A1.6}$$

A1.6 Outcome Variables

The main outcome variables used are constructed using data from the UNDESA (United Nations Department of Economic and Social Affairs, Population Division (2024a)) and the Penn World Tables (PWT) (Feenstra et al. (2025), Feenstra et al. (2015)). These outcomes are used in the local projections analysis.

- **Population Growth:** Calculated using UN data as the population of working-aged individuals (ages 15-64) as a proportion of the total population stock of individuals in 1990 (ages 15+).
- **Log(rGDP per Worker):** Calculated using PWT data as the natural log of: real GDP divided by the population of employed individuals. Reported in constant 2021 US Dollars.
- **Log(rGDP per Hour):** Calculated using PWT data as the natural log of: real GDP divided by the product of the population of employed individuals and average hours worked by those employed. Reported in constant 2021 US Dollars.
- **Log(rGDP per Person):** Calculated using PWT data as the natural log of: real GDP divided by the population. Reported in constant 2021 US Dollars.

- **Employment-Population Ratio:** Calculated using PWT data as the ratio of the population of employed individuals to the total population.
- **Human Capital:** An index in PWT data used without any manipulation
- **Log(TFP):** Calculated using PWT data as the natural log of: total factor productivity.
- **Log(Capital per Worker):** Calculated using PWT data as the natural log of: capital stock divided by the population of employed individuals. Reported in constant 2021 US Dollars.
- **Log(GDP Deflator):** Calculated using PWT data as the natural log of: the price level as calculated by the GDP Deflator. Reported in constant 2021 US Dollars.

A1.7 European Regions Dataset

At the regional level, we combine data from the European Labour Force Survey (EU-LFS) microdata with Eurostat Regional Economic Accounts. Our goal is to construct a balanced panel of NUTS-2 regions (European regions with a population size between 800,000 and 3,000,000 residents). To this end, we re-coded regions over time to preserve comparability across NUTS revisions and to match them with the latest definition used in the Eurostat Regional Accounts. The sample covers Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, Slovakia, Slovenia, Spain, and Sweden, plus Austria and Germany at NUTS-1, the most granular region available for these two countries. Bulgaria, Malta, Croatia, Poland, Romania and Slovenia do not report detailed information on the country-of-birth-agglomerates at a detailed enough level or in a consistent way across time and regions and are thus excluded from the analysis.

The period of observation is 2005-2024 which we collapse to four five-year windows for consistency with the cross-country analysis: 2005–2009, 2010–2014, 2015–2019, and 2020–2024. For Germany, the country-of-birth agglomerates described below are available only from 2017 onward, so the country enters only from 2017 and the first German window is 2017–2019.

For each region and period, the EU-LFS microdata are collapsed into annual region-by-origin stocks and then averaged within each five-year window, using the 15–64 population as the relevant stock measure. Our main variable of interest in EU-LFS is net immigration from non-advanced economies, defined as the five-year change in the stock of foreign-born individuals from North Africa and the Middle East, other African countries, the rest of Asia, and South America, scaled by the 2005 population. We also construct the change in native population using information on the country of birth contained in the EU-LFS. The Card-style shift-share instrument is constructed as described in Section A1.4 for the cross-country data. We use lagged regional settlement shares from the four country-aggregates described above measured at the beginning of each window and interacted with leave-one-out changes in the aggregate stock of immigrants from the same four origin regions across all other European regions. For Germany, the instrument can be constructed only from 2017. Finally, we use as main population measure that available from the Regional Accounts: therefore, we use the proportions of foreign born and natives as measured in EU-LFS and apply them to the Regional Accounts population to obtain the group-specific population stock and its change.

The outcome variables of interest are taken from the Eurostat Regional Accounts database and are also averaged over the same five-year windows. The Accounts are constructed by National Statistic Institutes and combine many data sources: consistency is ensured by the ESA2010 Manual. For comparability with the outcome variables constructed from the PWT, we focus on real GDP per capita, GDP per worker (labour productivity) and gross fixed capital formation.

A2 Additional Impulse Response Figures

Figure A1: Impulse responses to changes in non-OECD immigration rates, EU-14-plus USA, CAN, AUS, NZL, GBR

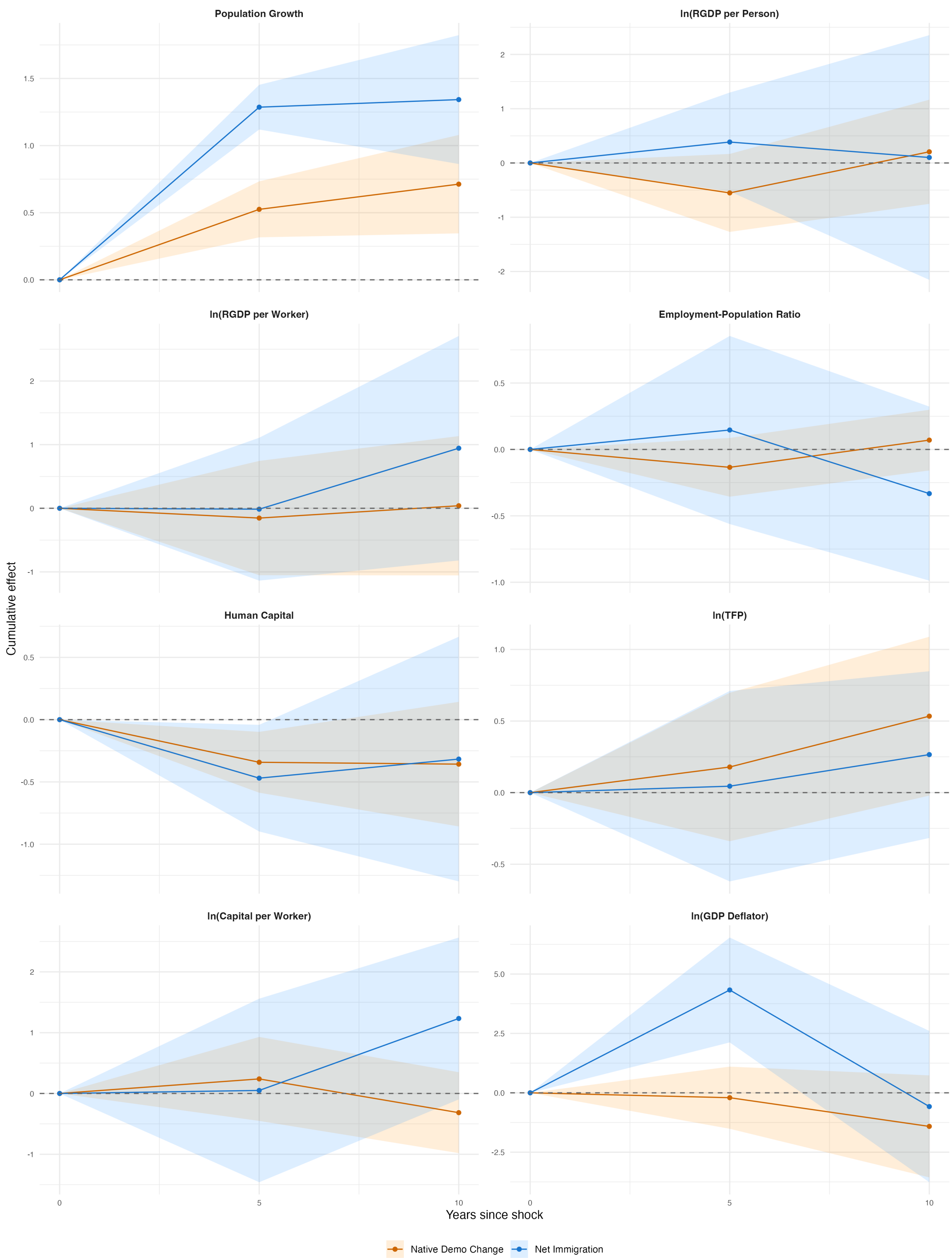

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects.

Figure A2: Impulse responses to changes in High- and Low-Skilled Immigration, EU-14-plus USA, CAN, AUS, NZL, GBR

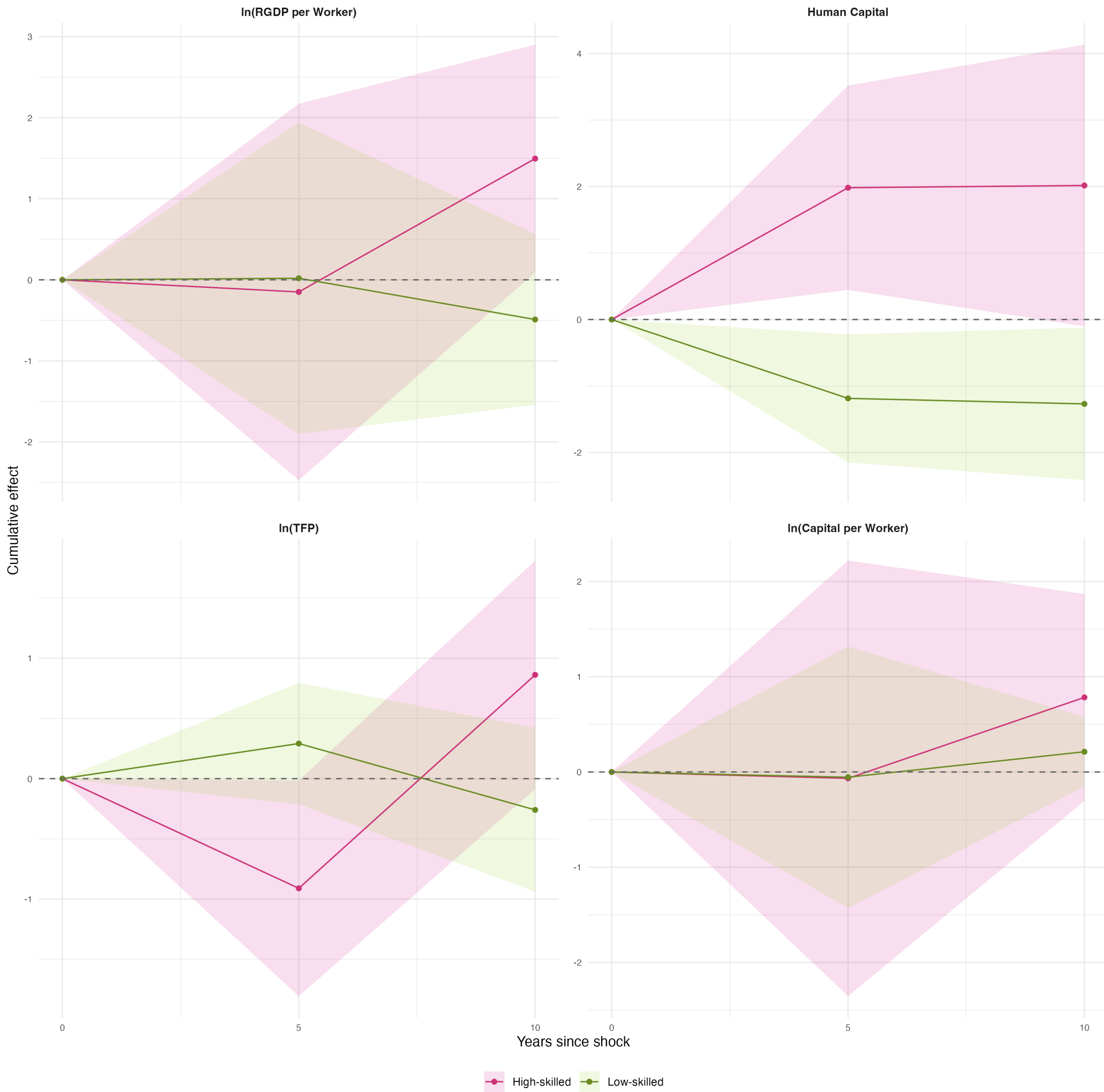

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for high-skilled net immigration from non-OECD countries, an indicator for low-skilled net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. High-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with tertiary education (defined by ISCED 5/6/7/8 education levels) as a share of the 2000 population (ages 15+). Low-skilled net immigration is defined by the change in the stock of immigrants from non-OECD countries with secondary or below education (defined by ISCED 0/1/2/3/4 education levels) as a share of the 2000 population (ages 15+).

Figure A3: Impulse Responses to changes in (1-IMPIC) index of external regulation, EU-14-plus USA, CAN, AUS, NZL, GBR

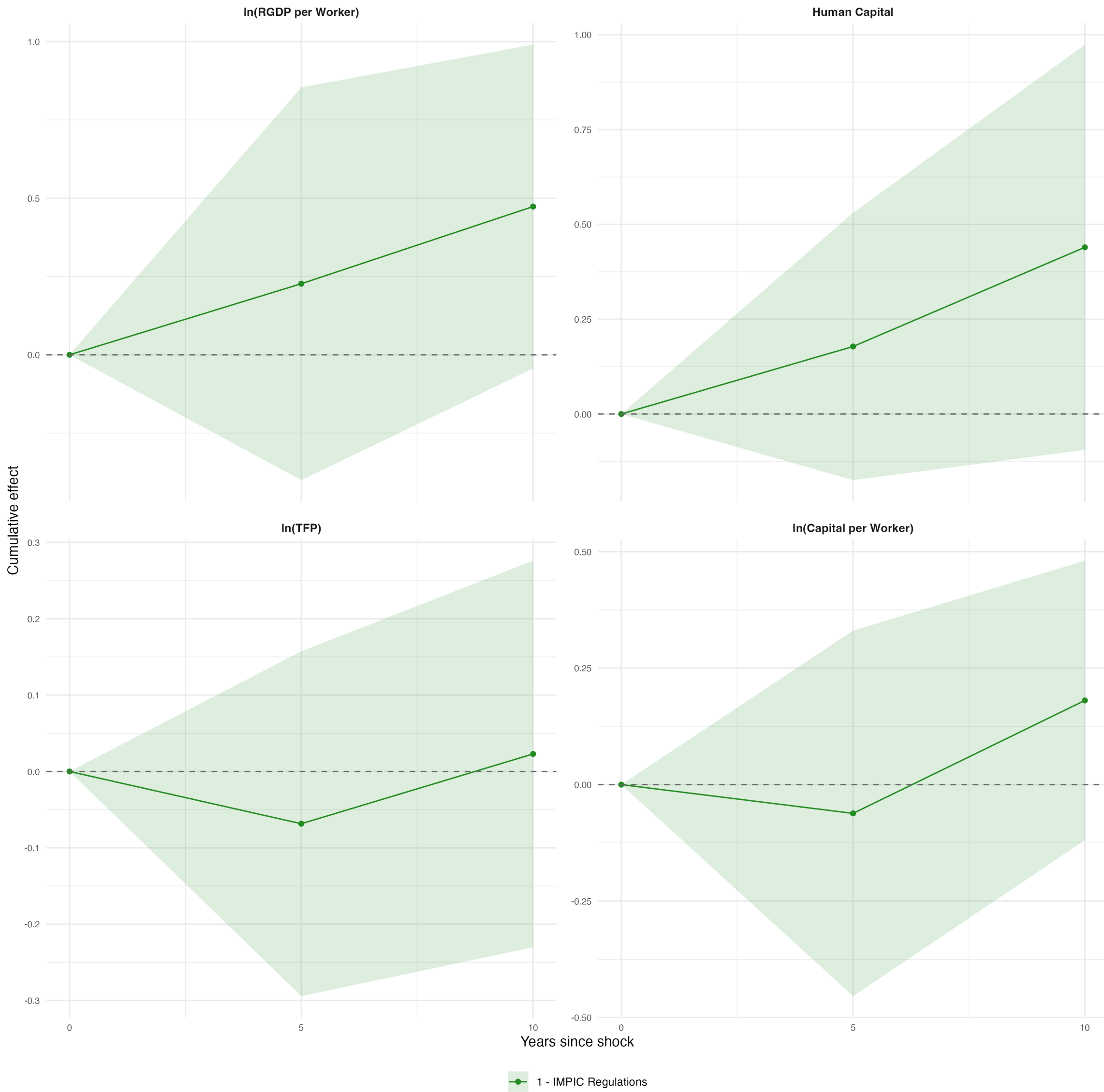

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on an indicator for loosening external immigration regulations, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. The indicator for loosening external immigration regulations is a rescaled variable: 1 - (the average external regulation score governing how restrictive countries are to allowing immigrants to enter for family reunification, labor migration, asylum/refugees, and co-ethnic migration). The continuous measure “1 - IMPIC External Regulations” ranges from 0 (restrictive) to 1 (open).

Figure A4: Impulse Responses to large immigration shocks, All OECD Sample

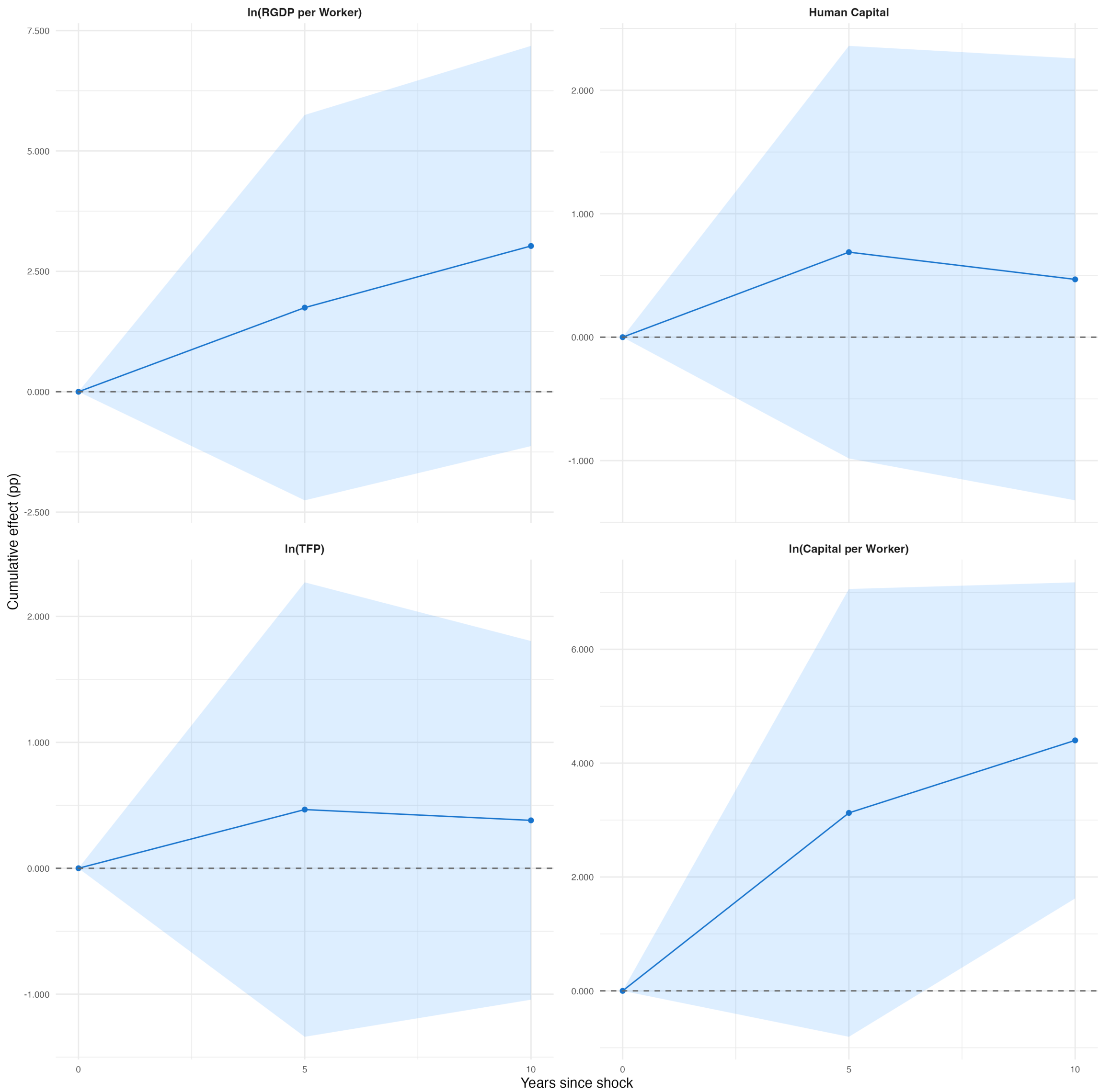

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at t - 5 (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The binary variable for immigration surge is defined by a country-year whose net immigration from non-OECD countries exceeds the 75th percentile of the country's net immigration across years and the cross-country's net immigration for the particular year.

Figure A5: Impulse Responses to large immigration shocks, EU-14-plus USA, CAN, AUS, NZL, GBR

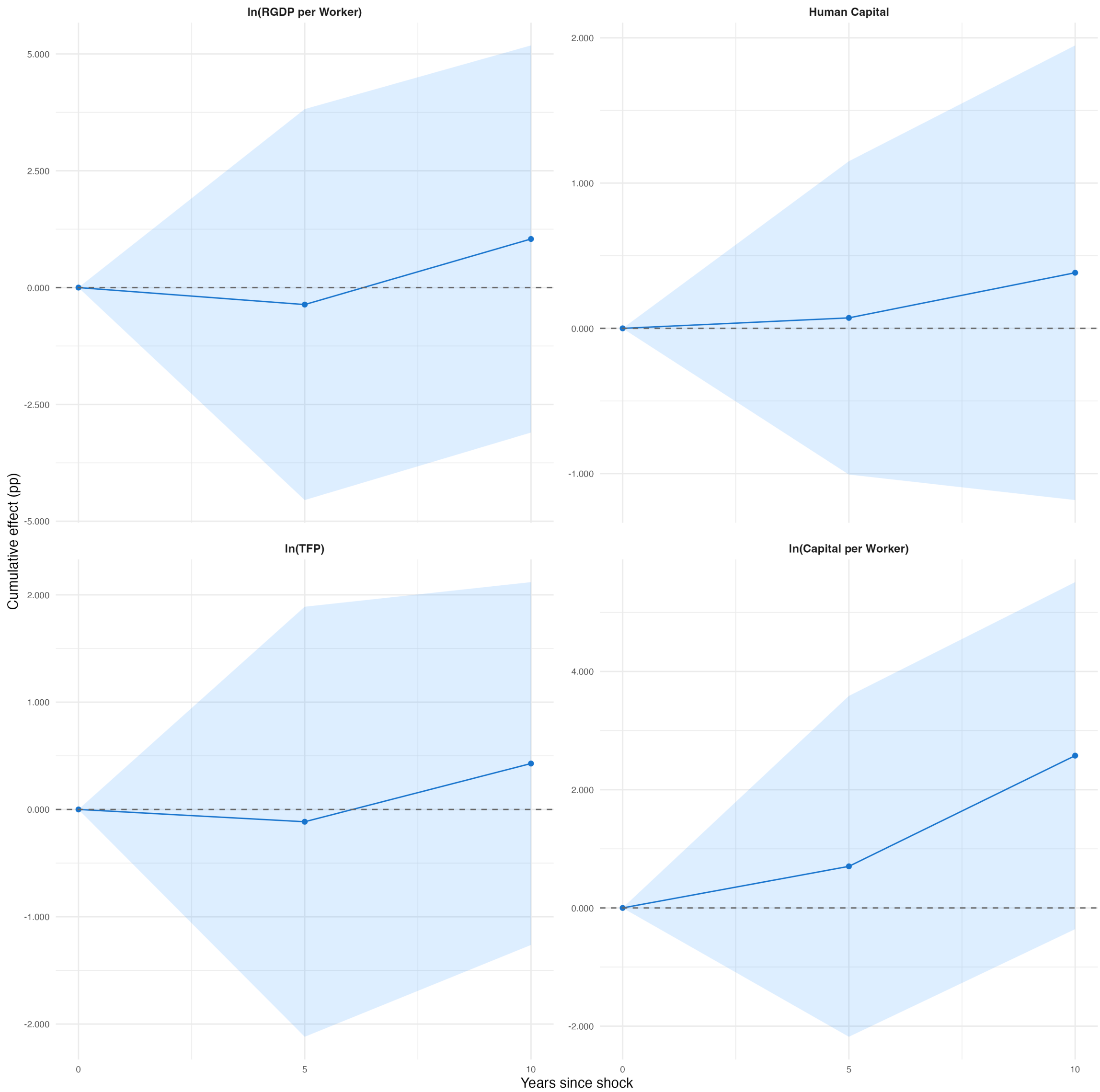

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at t - 5 (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The binary variable for immigration surge is defined by a country-year whose net immigration from non-OECD countries exceeds the 75th percentile of the country's net immigration across years and the cross-country's net immigration for the particular year.

Figure A6: Impulse Responses to large immigration surges, All OECD Sample

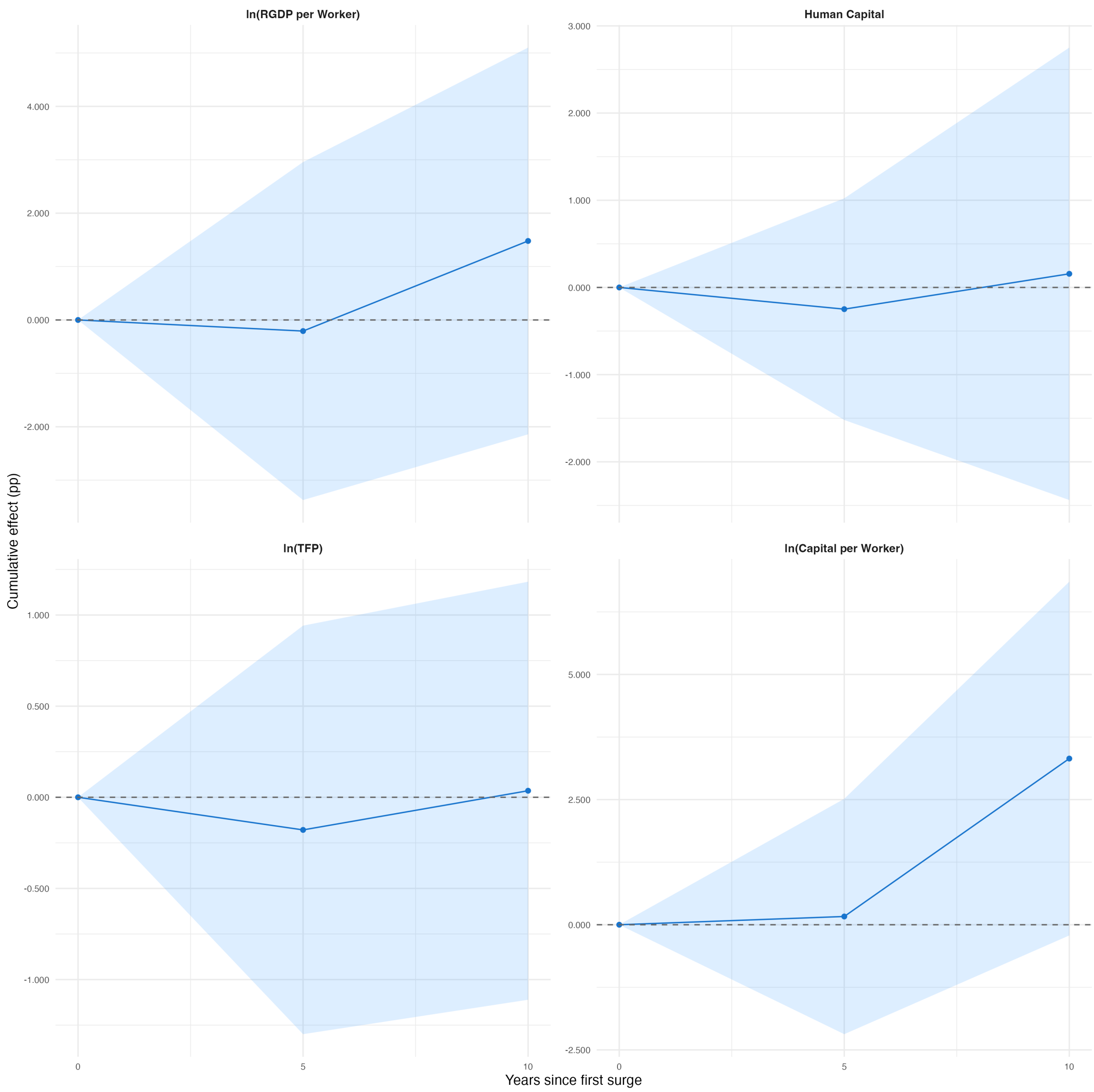

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on a binary indicator for an immigration surge, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. We construct a binary "surge" indicator that takes the value of 1 for all years at or after the first period in which a country experiences a sustained surge in immigration. A sustained surge is defined as a case in which a destination country's non-OECD net immigration exceeds the sample median in both the current five-year period *and* the subsequent five-year period. We then construct a binary indicator for an immigration surge that takes the value of 1 for the first period of each "surge" indicator. This indicator that is only equal to 1 for the first year of a sustained immigration surge is the indicator used in the local projection regression. Values reported for all OECD countries.

Figure A7: Separating the impact for high and low immigration rates, All OECD countries

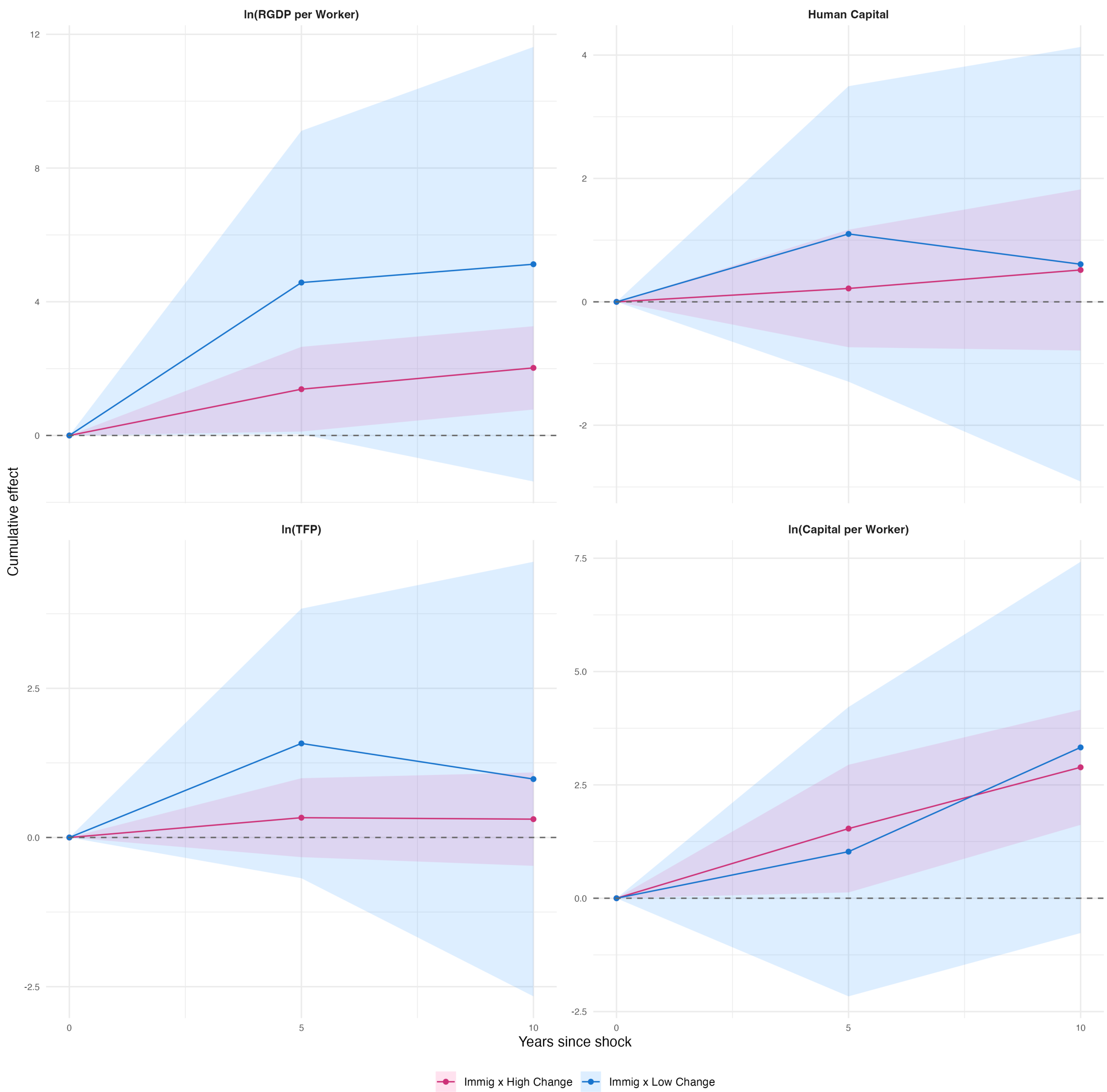

Figure Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variableis the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on the interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country-year having below median net immigration from non-OECD countries, the interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country-year having above median net immigration from non-OECD countries, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects.

Figure A8: Separating the impact for high and low share of immigrants in the receiving country, All OECD countries

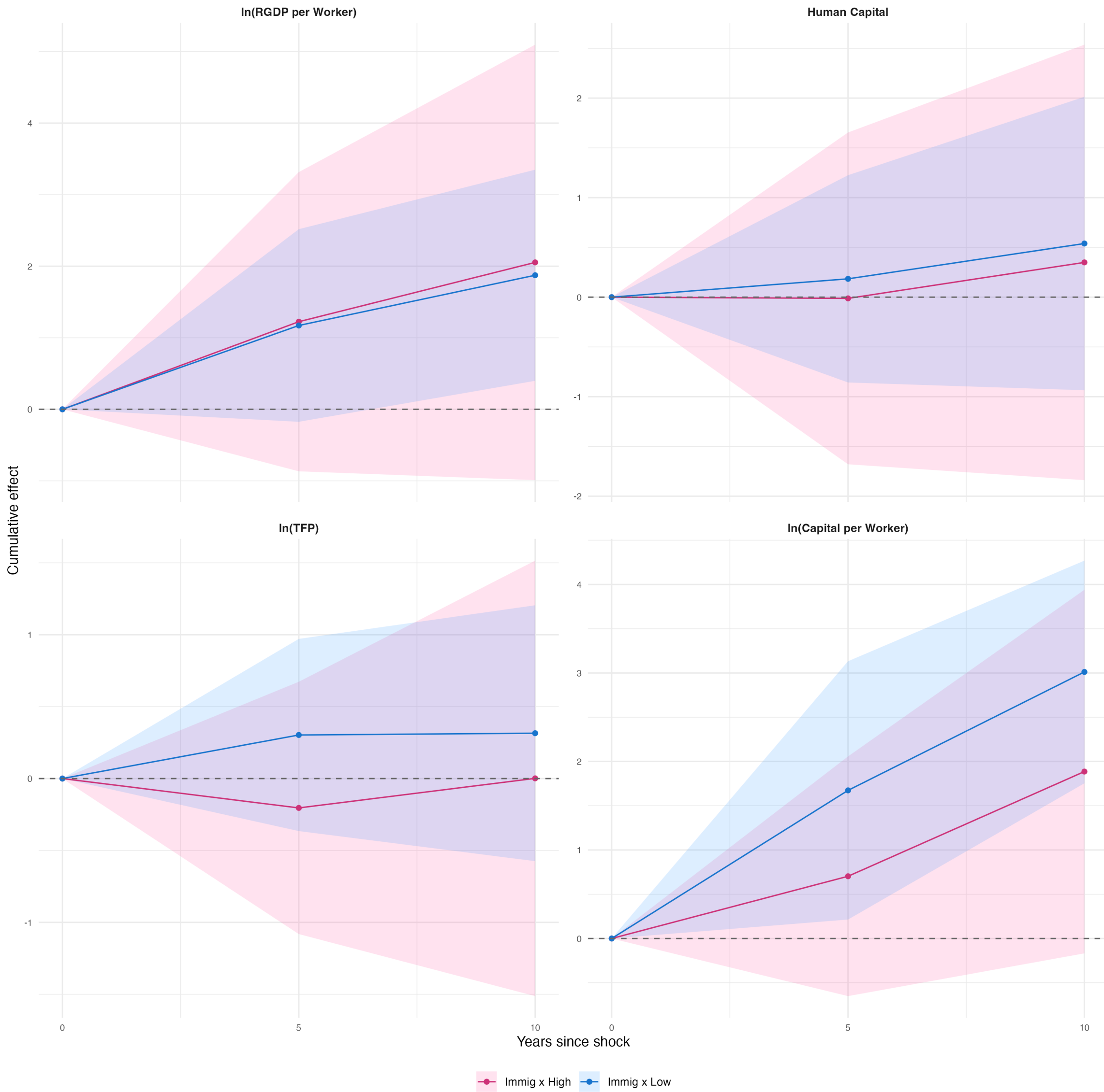

Table Notes: The figure highlights coefficient estimates from a local projection regression where the dependent variable is the cumulative change in the outcome from $t-5$ to t (Horizon 0-5 years) or $t-5$ to $t+5$ (Horizon 5-10 years), regressed on the interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country having a low initial share of total immigration, interaction between the indicator for net immigration from non-OECD countries and a binary indicator for a country having a high initial share of total immigration, an indicator for native demographic change, the outcome at $t-5$ (Lags), year fixed effects, and country fixed effects. All outcomes are defined in the appendix. The initial share of immigration is calculated in 1990 as the total stock of immigrants as a share of the total population. The share is considered low when below median and high when above median.