OECD Economics Department Working Papers No. 1679

The laws of attraction: Economic drivers of inter-regional migration, housing costs and the role of policies

Orsetta Causa,

Michael Abendschein,

Maria Chiara Cavalleri

https://dx.doi.org/10.1787/da8e368a-en

OECD

Organisation for Economic Co-operation and Development

ECO/WKP(2021)30

Unclassified English - Or. English

ECONOMICS DEPARTMENT

THE LAWS OF ATTRACTION: ECONOMIC DRIVERS OF INTER-REGIONAL MIGRATION, HOUSING COSTS AND THE ROLE OF POLICIES

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By Orsetta Causa, Michael Abendschein and Maria Chiara Cavalleri

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Abstract/Résumé

The laws of attraction: Economic drivers of inter-regional migration, housing costs and the role of policies

This paper sheds light on inter-regional migration, housing and the role of policies, drawing on a new comparative cross-country approach. The results show that OECD countries exhibit stark variation in both levels and trends in inter-regional migration, which is found to be highly responsive to local housing and economic conditions. In turn, a large number of policies in the area of housing, labour markets, social protection and product markets influence the responsiveness of inter-regional migration to local economic conditions. For instance, more flexible housing supply makes inter-regional migration more responsive to local economic conditions while higher regulatory barriers to business start-ups and entry in professions significantly reduce the responsiveness of inter-regional mobility to local economic conditions. The capacity of workers to move regions in response to local economic shocks is one key dimension of labour market dynamism which could, at the current juncture, contribute to the recovery from the COVID-19 crisis. In this context, the paper proposes articulating structural with place-based policies to help prospective movers as well as stayers.

JEL classification*:* R23, R12, R50, R58, J61, H20

Keywords*:* Internal migration; regional mobility; regional economic conditions; regional disparities; housing markets; regional house prices; labour markets; social protection; structural policies; place-based policies.

Les lois de l'attraction : les déterminants économiques des migrations inter-régionales, les prix du logement et le rôle des politiques publiques

Cet article délivre de nouvelles évidences empiriques sur la migration inter-régionale, le rôle du marché de l'immobilier et celui des politiques publiques, sur la base d'une approche comparative entre pays. Les résultats montrent que les pays de l'OCDE sont très différents à la fois en termes de niveau d'évolution de la migration inter-régionale, et que celle-ci est très fortement impactée par les conditions économiques et de logement, notamment les prix immobiliers, au niveau local. Un grand nombre de politiques publiques dans le domaine du logement, du marché des produits, du marché du travail et de la protection sociale façonnent la réponse de la migration aux conditions économiques locales. Par exemple, une offre de logement plus élastique par rapport à la demande augmente la réactivité de la migration inter-régionale aux conditions économiques locales, tandis que de fortes barrières à l'entrée des nouvelles firmes et dans les professions réglementées réduit cette réactivité. La capacité des travailleurs à bouger d'une région à l'autre en réponse à d'éventuels chocs au niveau local est une dimension importante d'un marché du travail dynamique; ce qui, dans le contexte actuel, pourrait d'aider à la sortie de crise COVID-19. A ce titre, l'article propose d'articuler des politiques structurelles avec des politiques au niveau local, pour aider les individus qui souhaitent quitter leur région, mais aussi ceux qui souhaitent y rester.

Classification JEL*:* R23, R12, R50, R58, J61, H20

Mots-clés*:* Migration interne, mobilité régionale ; conditions économes régionales ; inégalité régionales ; marché du logement ; prix du logement ; protection sociale, marché du travail, politiques structurelles, politiques locales.

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The laws of attraction: Economic drivers of inter-regional migration, housing costs and the role of policies

Orsetta Causa, Michael Abendschein and Maria Chiara Cavalleri[1]

[1] The authors thank Åsa Johansson for her full engagement in this project, for the valuable discussions, for her suggestions, inputs and comments from the beginning of the analysis until the drafting of the paper. They thank colleagues from the Economics Department Michael Koelle, Luiz de Mello, Alain de Serres, Guido Franco, Nhung Luu and Volker Ziemann for their inputs and suggestions, colleagues from the Centre for Entrepreneurship Jonathan Barr, Karen Maguire and Joaquim Oliveira Martins for their inputs on place-based policies, colleagues from the Employment Labour and Social affairs Department for their comments on the paper, and participants to the OECD internal seminar organised during the production of the analysis. Last but not least, they are grateful to all delegates of the Working Party No. 1 of the OECD Economic Policy Committee for the excellent discussion on this paper.

Introduction and motivation

Inter-regional migration[2] can spur economic growth, in particular by enhancing labour market dynamism and as such the efficient allocation of workers within a country. It can also enhance social mobility, in particular by allowing people from disadvantaged areas to move to areas that give them better opportunities. Inter-regional mobility is not always desirable: it can accentuate regional inequalities, create depopulation in some areas that are left behind and that sometimes suffer from the closure of essential public amenities. In addition, inter-regional mobility, which is usually directed towards metropolitan areas (OECD, 2020[3]), can create congestion hence contributing to environmental and health damages. There is no ideal level of inter-regional mobility and the extent to which policies should encourage people to move from one area to another will depend on country-specific context and social preferences. While inter-regional mobility is not an end in itself, policy settings should not create obstacle for individuals to move to places where they have better opportunities to fulfil their potential, insofar as they wish so.

The case for inter-regional migration can also be made in the current COVID-19 crisis context. Mobility may help a smooth and inclusive recovery insofar as the crisis may require some labour reallocation (Barrero, Bloom and Davis, 2020[1]), hence potentially regional reallocation. This is relevant even when taking into account the potentially long-lasting rise in teleworking because: i) not all jobs can be done from home, especially low-qualified jobs and elementary occupations (Dingel and Neiman, 2020[1])]; and ii) recent OECD analysis in the context of the COVID-19 crisis shows that cities and densely populated areas, which receive most of regional migrants, have higher shares of occupations amenable to teleworking (OECD, 2020[4]). In this context, factors and policies that create barriers to regional mobility, in particular by reducing the responsiveness of regional mobility to local economic conditions and therefore by reducing labour market dynamism, can have adverse effects on long-term growth, productivity and inclusiveness, and hinder the economic and social recovery from the COVID-19 crisis.

The objective of this paper is to shed light on inter-regional mobility and the role of policies. The underlying rationale for studying this topic is that the capacity of workers to move across regions in response to local economic shocks and conditions is one key dimension of labour market dynamism and also of resilience. The available literature in this area so far has been country-specific, with a large number of studies documenting a concomitant decline in labour and internal mobility in the United States, and a more limited number of studies on European countries.[3] The comparative perspective adopted in this paper allows to deliver new evidence on the role of policies in shaping inter-regional migration flows. Two main stylised facts stand out:

- OECD countries exhibit stark variation in inter-regional migration rates, with more than 4% of the population changing region each year in Hungary and Korea, around 3% changing state in the United States and less than 1% in Poland and Italy.
- Trends in inter-regional migration also differ across countries. Since the early 2000s, inter-regional migration has declined in around half the OECD countries for which data are available, including North American and Asian countries as well as Spain, while it has increased in a number of Continental and Central European countries, including Austria, Germany and Hungary.

[2] Inter-regional migration in this paper refers to movements of the population from one region to another within the same country. The focus is on internal as opposed to international migration. Migration flows across regions are sourced from the OECD Regional database.

[3] On the United States, references include (Bayoumi and Barkema, 2019[8]), (Molloy and Smith, 2019[23]), (Ganong and Shoag, 2017[36]), (Kaplan and Schulhofer-Wohl, 2017[43]), (Molloy, Smith and Wozniak, 2011[26]). On European countries, see (Ciani, David and de Blasio, 2019[30]) on Italy, (Liu, 2018[9]) on Spain, (Poghosyan, 2018[27]) on Finland; see also (Ben-Shahar, Gabriel and Gola, 2020[29])on Israel.

Inter-regional migration responds to local housing and economic conditions: On average across OECD countries, regional GDP per capita is the strongest driver of regional migration inflows: an increase in regional income by 10% triggers a 5% increase in regional inflows. House prices at the regional level are the second most important driver. An increase in regional house price growth by 10% triggers a decline in regional inflows of around 2%. The unemployment rate at the regional level is also a significant economic driver of migration: an increase in regional unemployment by 10% triggers a decline in regional inflows by around 1.3%.

Policy settings are found to influence the responsiveness of inter-regional migration to local economic conditions:

Housing-related policies

- Where housing supply is more flexible, inter-regional migration is more responsive to local economic conditions. Reducing policy-driven barriers in this area, for example by reforming the governance land-use and planning policies, may facilitate moving towards better economic opportunities by reducing house price differences across regions.
- Stricter rental regulations, both rent control and greater security of tenure, are associated with lower responsiveness of inter-regional migration to local labour market conditions. Striking the right balance between tenants' and landlords' interests, adequate security of tenure and encouraging the supply of rental housing for all socio-economic groups is a difficult policy challenge.
- Housing-related social transfers, both in-kind in the form of social housing and cash in the form of housing allowances, are associated with lower responsiveness of inter-regional migration to regional economic conditions. This suggests that social housing may create "lock-in effects" whereby social tenants are reluctant to move for better economic opportunities as they may lose access to social housing.

Labour market and social protection policies

- Excessive job protection on regular contracts is associated with lower responsiveness of inter-regional migration to regional economic conditions and may reduce regional labour mobility.
- Higher levels of public spending on active labour market policies are associated with lower responsiveness of inter-regional migration. This result may reflect that participation in active labour market programmes can create "lock-in" effects, for instance by reducing time for job search, especially outside the region of residence.
- The effect of unemployment benefits varies across the unemployment spell: at early stages of unemployment more generous benefits are associated with lower responsiveness to regional GDP while at later stages with higher responsiveness.
- Higher levels of union coverage and of centralisation of collective wage bargaining are associated with lower responsiveness of inter-regional migration to regional economic conditions. Similarly findings apply to higher minimum cost of labour and minimum wages. These results are likely to reflect the fact that such policies tend to narrow the wage dispersion, hence reducing incentives to move region for higher wages.

Regulatory policies

- Policy barriers to business dynamism, such as barriers to entrepreneurship and administrative burdens, are found to reduce the pass-through from regional economic conditions to inter-regional migration.
- Stringent regulations and occupational licensing for workers in professional and personal services are found to significantly reduce the responsiveness of inter-regional mobility to local economic conditions.

This paper shows that structural policy settings at the country level have a significant effect on the responsiveness of inter-regional mobility to local economic conditions. Yet the extent to which policies should influence inter-regional mobility and the nature of appropriate interventions will vary depending on countries' economic and social context. At the current juncture, there may be a case for helping both prospective movers and stayers: this can be achieved by articulating structural policies with place-based policies seeking to foster skills, economic and labour market dynamism at the local level, to enhance the provision of public amenities where they are lacking, and that of transport and digital infrastructure that allows connecting less developed to more developed areas.

This cross-country exercise is made possible thanks to two major OECD data sources harmonised across countries and regions: the OECD Regional database[4] and the OECD database on regional house prices.[5] The definition of regions is a key aspect for the analysis. Throughout the paper, regions are defined based on the harmonised OECD regional classification grid that distinguishes between larger (TL2) and smaller (TL3) regional entities. The smaller regional definition TL3 is in theory preferable being more granular. It makes it more likely to capture short-distance migration, such as relocations from urban to suburban areas where housing costs are lower, without job change if cross-regional commuting is possible. The larger regional definition TL2 is unlikely to capture short-distance migration and more likely to capture long-distance migration, potentially associated with job or education-related motivations.[6] Data availability issues preclude from using systematically smaller (TL3) regions in the analysis. In particular, the cross-country, cross-region, time series regressions are based on TL2 regions for most countries.

The rest of this paper is structured as follows. Section 2 provides stylised facts on inter-regional migration across OECD countries and over time. Section 3 presents the data and empirical approach for analysing the drivers of inter-regional migration and the role of policies in a cross-country, cross-region panel setting. Section 4 delivers the results from the baseline model. Section 5 delivers new evidence on the effects of housing-related and other structural policies on the responsiveness of regional migration inflows to regional economic conditions including illustrative policy simulations. The paper concludes with a policy discussion, including on encouraging an efficient and inclusive recovery from the COVID-19 crisis.

Inter-regional migration across OECD countries: New evidence and stylised facts

The comparative analysis of inter-regional migration rates across OECD countries delivers the following main stylised facts (Figure 1):

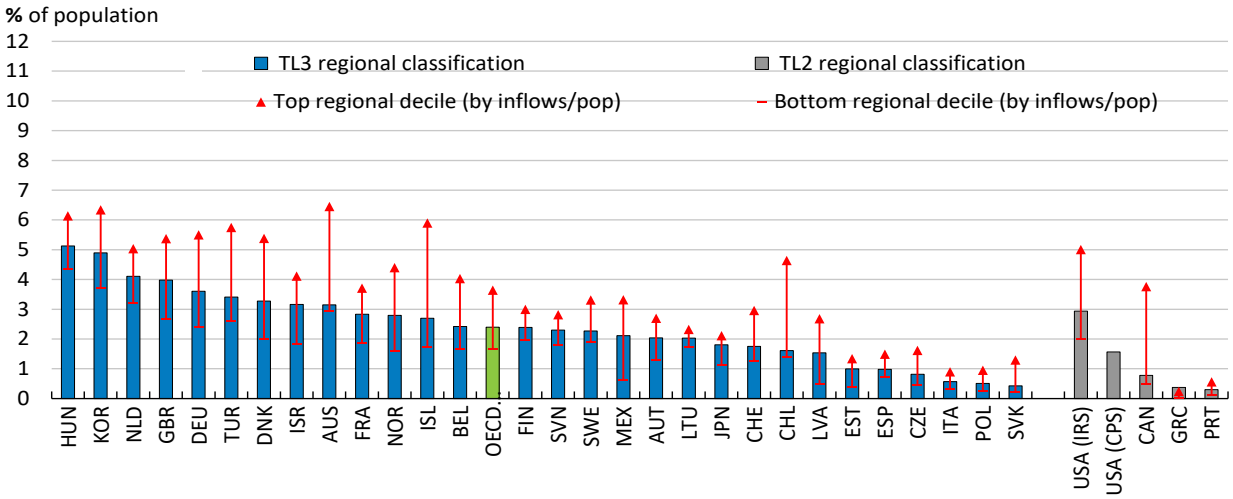
- OECD countries exhibit stark variation in country-level inter-regional migration rates, as conventionally measured by the proportion of the population within each national economy that changes region of residence over one year, ranging from more than 4% in Hungary and Korea to less than 1% in the Slovak Republic, Poland and Italy.
- OECD countries also exhibit stark variation in the dispersion of migration flows across regions, as measured by the differences between top and bottom decile regions ranked by inflow rates: for example, inter-regional migration is relatively equally distributed across regions in Korea and Hungary while less so in Mexico, Chile and Australia.

[4] https://www.oecd.org/regional/regional-statistics/.

[5] https://www.oecd.org/sdd/prices-ppp/national-and-regional-house-price-indices-oecd.htm.

[6] Reasons to move (e.g. labour, family, housing etc.) are not available in the data. See (Causa and Pichelmann, 2020[4]) for an overview of most frequent reasons to change residence across countries based on the special 2012 housing module of the European Union Survey of Income and Living Conditions, yet without information on whether such change takes place within or between regions.

Figure 1. Inter-regional migration in OECD countries



Note: Internal regional migration rates are defined as the number of migrants coming in the region from another region in the same country divided by regional population one year before. Average of years 2012-2017 or closest period i.e. AUS (2012-16), BEL (2012-15), DEU (2012-16), DKN (2012-16), FRA (2013-15), UK (2012-15), ISL (2012-16), ISR (2012-16), ITA (2012-15), LTU (2012-15), MEX (2015), TUR (2012-15), USA (IRS) (2013-14,2016), USA (CPS) (2012-2017). See Annex for the list of regional constituents for UK. The OECD regional classification scheme is applied. TL2 regions indicate large regions, TL3 small ones.
Source: US data from CPS/IRS; GRC and PRT from EULFS; the remaining countries from OECD Regional database.

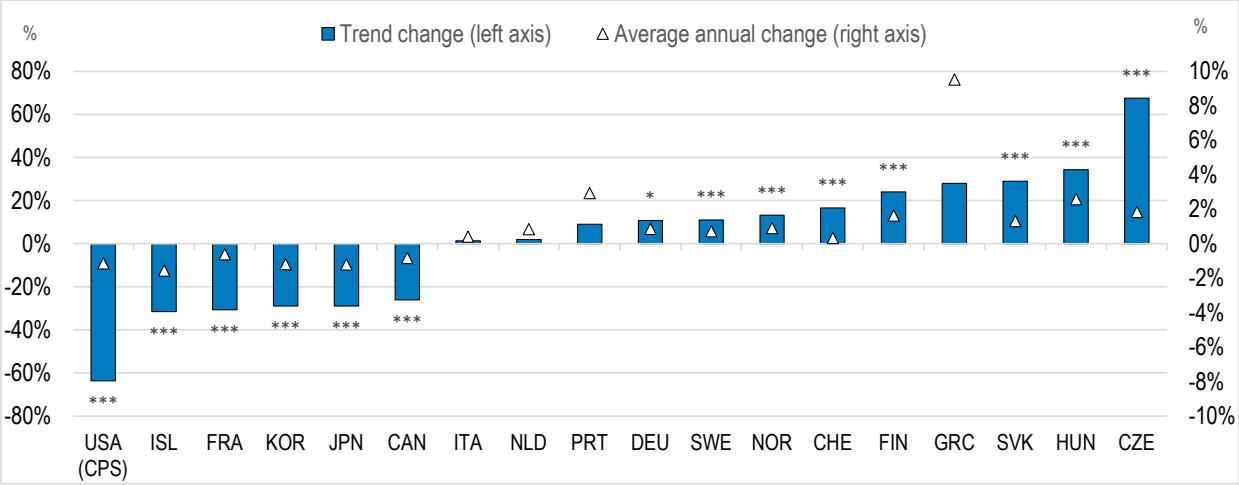
OECD countries have experienced very different developments in inter-regional migration over the last decades, see Figure 2 and Annex with country-specific profiles:

- Less than half of countries for which data are available since the mid-90s have experienced a trend decline in migration including the United States,[7] Iceland, Korea and Japan. By contrast, some countries, in particular in Eastern Europe, have experienced a strong increase in inter-regional migration.
- Since the mid-2000s, inter-regional migration has been on a downward trend in Spain and Australia, while it has been on an upward trend, rising by more than 30% between 2005 and 2017, in Lithuania, Austria and Germany.

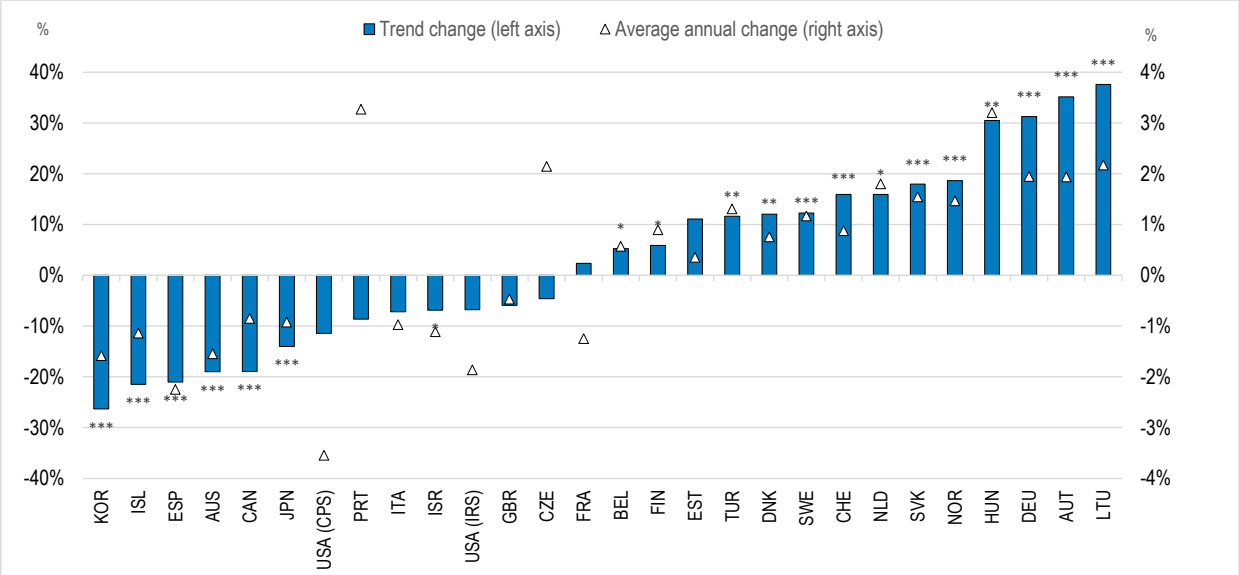
[7] Inter-state migration in the United States has been mostly measured on the basis of two sources: the Current Population Survey (CPS), which is a standard micro-based survey that allows to cover a long time period, and the Internal Revenue Statistics (IRS), which is based on tax declarations and is considered as a superior source to track migration, but is only available for the latest decade. Panel B of Figure 2 presents changes since the mid-2000s on the basis of both CPS and IRS. As already shown in the literature, the CPS tends to overstate the decline in migration. See (Molloy and Smith, 2019[23]) for a discussion.

Figure 2. Developments in inter-regional migration across OECD countries

Panel A. Mid-1990s to latest available year



Panel B. Mid-2000s to latest available year



Note: Internal regional migration rates are defined as the number of migrants coming in the region from another region in the same country divided by regional population one year before. Trend change is computed as the percentage change between the migration rate in the first year and the predicted migration rate in the last year. The predicted value is computed as the sum of the initial migration rate and the product of the number of years between the first and the last observation times the slope coefficient of a regression from the migration rate on a linear time trend. ***, **, * refer to the statistical significance of the estimated slope coefficient at the 1%, 5% and 10%, respectively.

The national average is calculated as the sum across regions of new residents from another region divided by the sum across regions of regional population one year before. For Panel A, the data refers to 1995-2017 with the following exceptions: DEU (1995-2015), FRA (1995-2002, 2006-2017), ISL (1995-2016), ITA (1995-2015), PRT (1999-2017), SVK (1997-2017) and SWE (1998-2017). For Panel B, the data refers to 2005-2017 with the following exceptions: AUS (2005-2016), BEL (2005-2015), DNK (2006-2016), EST (2005-2016), FRA (2006-2017), ISL (2005-2016), ISR (2010-2016), ITA (2005-2015), ESP (2008-2017), TUR (2008-2015), UK (2005-2015), USA (IRS) (2013-2014, 2016).

TL2 regional classification for AUS, BEL, CAN, FRA, GRC, ITA, PRT and USA; TL3 for the other countries. Countries with structural breaks in the time series are excluded (GRC, POL, SVN). See Annex for detailed country profiles.

Source: US data from CPS/IRS; FRA and PRT from EULFS; the remaining countries from OECD Regional database.

This stark variation in levels and trends of inter-regional migration across advanced countries is likely to reflect a variety of non-economic factors that influence people's choices and opportunities to move, embedded in history, culture, and geography. This notwithstanding, economic theory and empirical evidence have modelled and identified the economic drivers of migration (Molloy, Smith and Wozniak, 2011[9]), (Greenwood, 1997[8]), (Treyz et al., 1993[7]): people move towards places that offer them better opportunities, in particular in terms of jobs, incomes and amenities, as well as lower living costs, in particular in terms of housing affordability. In theory, inter-regional migration should thus respond to differences in regional economic performance, and this in turn can trigger higher welfare: at the micro-level as individuals move to better opportunities, and at the macro-level as labour market matching and labour market dynamism improve and regional imbalances may decline. Moving from theory to practice, inter-regional migration does not seem to systematically respond to inter-regional differences[8] in economic performance (Figure 3 and Figure 4):

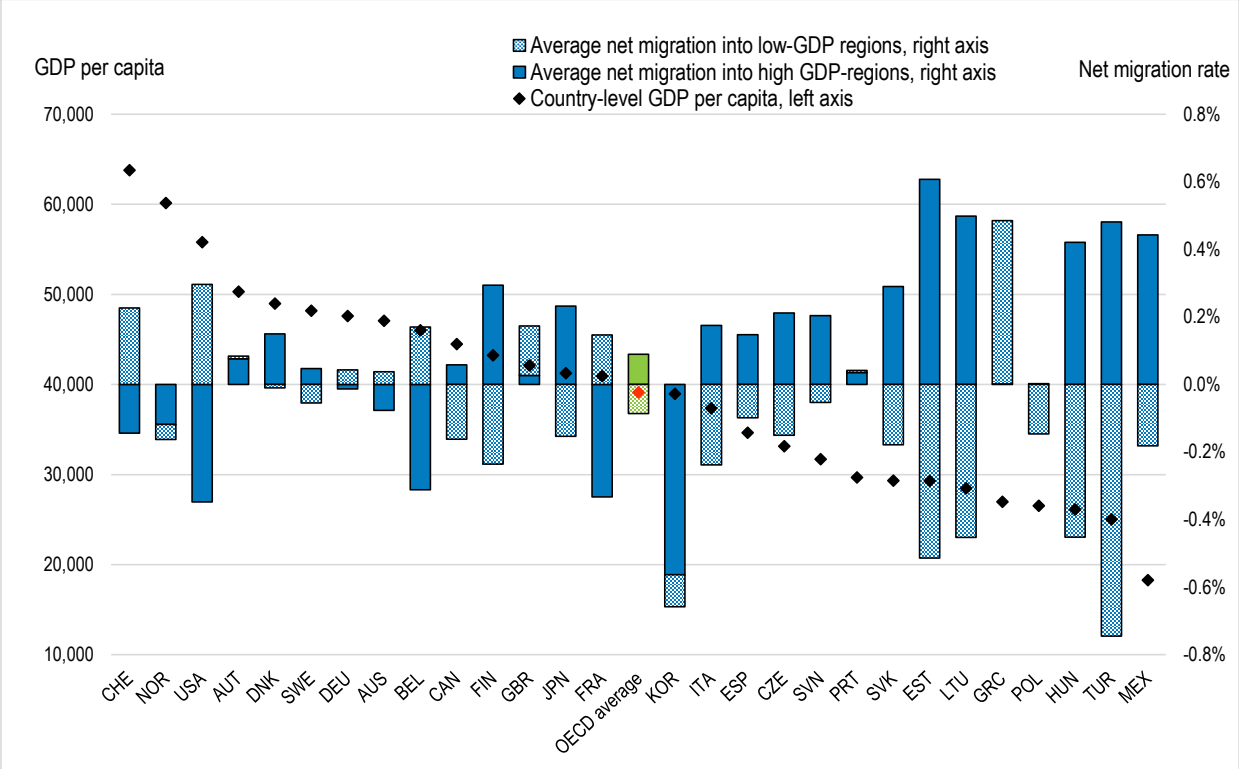
- In number of OECD countries such as Australia, France, Korea and the United States, high-income[9] regions tend to experience negative net migration, that is, less inflows than outflows from other regions. Interestingly, these countries have been identified among those experiencing a trend decline in migration (Figure 2).[10] Migration appears more responsive to regional income disparities in countries at the low-end of the OECD income scale (Figure 3).
- There is no systematic link between the degree of unemployment dispersion between regions and that of net migration to low-unemployment regions (Figure 4): net migration to low-unemployment regions is for example negative in Austria and Turkey, which feature relatively high levels of unemployment dispersion.

[8] It is important to recognise that the level of regional disaggregation used in this paper, which is dictated by data availability, may fail to fully capture regional dispersion. Recent OECD work (OECD, 2020[3]) provides evidence that regional inequalities increase with the level of the regional disaggregation. This is driven by high levels of inequalities between cities (or metropolitan areas) and rural areas within granularly-defined regions.

[9] Income is measured by real GDP per capita, consistent with the regression analysis. Household disposable income cannot be used in the regression analysis because of data availability issues, especially in the time series dimension. While household disposable income is a better measure of living standards relative to GDP per capita, GDP per capita is more likely to capture destination factors associated with higher wages and agglomeration effects. In addition, household disposable income includes income redistribution through country-level income taxes and cash transfers, which may influence international more than internal migration.

[10] This is in line with more granular evidence reported for the United States in e.g. (Brookings, 2018[9]).

Figure 3. Regional migration and regional dispersion in economic performance



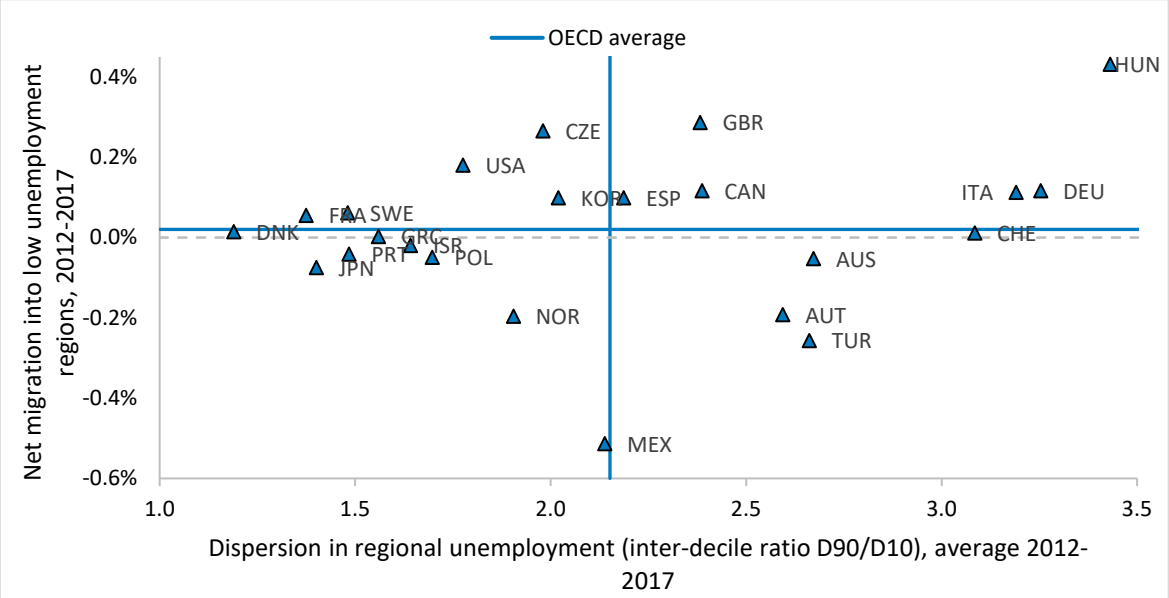
Note: Net migration (in percent) at the country level is computed as the sum of the absolute values of regional net flows divided by two and by the total population one year before. Low-GDP regions are identified by means of a two-step procedure. First, all regions are ranked in ascending order according to their GDP per capita in the first year of the period considered. Then, the regional active labour force is summed across the ranked regions, starting with the region exhibiting the lowest GDP per capita, and regions are identified as low-GDP until the cumulative active labour force passes one third of the total active labour force. The last region in the calculation is included with an appropriate fractional weight. Net migration rates are computed as the sum of (fractionally weighted) net migrants across the respective regions divided by the (fractionally weighted) total population one year before. Fractional weights are based on the first period.

The displayed average values for GDP per capita refer to the period 2012-2017 with the following exception: JPN (2012-2016); average values for net migration rates refer to 2012-2017 with the following exceptions: AUS (2012-2016), BEL (2012-2015), DEU (2012-2016), DNK (2012-2016), GBR (2013-2015), ITA (2012-2015), JPN (2012-2016), LTU (2012-2015), MEX (2015), SWE (2014-2017), TUR (2012-2015), USA (2013-2014, 2016).

TL3 regional classification with the following exceptions (in TL2): CAN, DNK, ISR, JPN, MEX, POL, FIN, FRA, GRC, PRT, TUR, USA.

Source: OECD Regional database, EULFS for migration data on FRA, GRC, PRT, IRS for migration data on the USA.

Figure 4. Dispersion in regional unemployment and net migration into low unemployment regions



Note: Net migration (in percent) at the country level is computed as the sum of the absolute values of regional net flows divided by two and by the total population one year before. Low-unemployment regions are identified by means of a two-step procedure. First, all regions are ranked in ascending order according to their unemployment rate in the first year of the period considered. Then, the regional active labour force is summed across the ranked regions, starting with the region exhibiting the lowest unemployment rate, and regions are identified as low-unemployment until the cumulative active labour force passes one third of the total active labour force. The last region in the calculation is included with an appropriate fractional weight. Net migration rates are computed as the sum of (fractionally weighted) net migrants across the respective regions divided by the (fractionally weighted) total population one year before. Fractional weights are based on the first period.
The regional unemployment dispersion (measured by the inter-decile ratio of unemployment) refers to the average over the period 2012-2017 with the following exceptions: AUS (2012-2016), AUT (2012-2013), NOR (2012-2016), SWE (2013-2017). The average values for net migration rates refer to the period 2012-2017 with the following exceptions: AUS (2012-2016), DEU (2012-2016), DNK (2012-2016), FRA (2013-2015), GBR (2013-2015), ISR (2012-2016), ITA (2012-2015), MEX (2015), SWE (2014-2017), TUR (2012-2015), USA (2013-2014, 2016).
TL3 regional classification with the following exceptions (in TL2): CAN, DNK, ISR, JPN, MEX, POL, FIN, FRA, GRC, PRT, TUR, USA.
Source: OECD Regional database, EULFS for migration data on FRA, GRC, PRT, IRS for migration data on the USA.

The responsiveness of inter-regional migration to local economic conditions is likely to also depend on living costs, especially housing costs. This has been put forward in a number of papers as one of the major explanations beyond the trend decline in internal migration in the United States, in particular for low-educated workers. The wage premium associated with a move has been shown to be too small to compensate for the rise in living costs due to local differences in house prices in high-productivity locations (Bayoumi and Barkema, 2019[10]), (Ganong and Shoag, 2017[12]), (Diamond, 2016[11]).[11] Evidence linking inter-regional migration to regional house prices is much scarcer for other countries [12] and inexistent in a cross-country perspective, given the lack of publicly-available comparable data on regional house prices. This analytical gap has recently been addressed by the OECD as new harmonised regional house price indexes have been produced and made publicly available (Box 1). This allows to deliver insights on regional house price dynamics from a cross-country comparative perspective (Figure 5):[13]

[11] By contrast with this literature, (Molloy and Smith, 2019[23]) and (Kaplan and Schulhofer-Wohl, 2017[43]) argue that regional house price divergence cannot explain the decline in migration in the United States.

[12] See references in the introduction.

[13] See Annex for country-specific profiles on developments in regional house prices.

- OECD countries have been experiencing a "great divergence" in regional house prices dynamics.[14] Between 2005 and 2017, median regional house prices grew by almost 60% in Norway and Sweden, while they declined by around 20% in Poland and Portugal. Growth was extremely unequal in all countries, with house price growth at the top of the distribution being around 30 percentage points higher than at the bottom.
- There tends to be a positive cross-country correlation between median growth in regional house prices and inter-regional house prices growth dispersion (Figure 5), which could suggest common underlying factors contributing to increasing house prices across many regions but also widening the gap between regions. However, there are outliers to this simple correlation as some countries experienced negative house price growth for the median region but marked differences between top and bottom regions: such is the case of the United Kingdom and the United States, where top regions saw house prices increasing by around 20% while bottom regions saw house prices declining by around 20%.

Figure 5. Growth in regional house prices and inter-decile difference of growth

Note: The growth rate is based on the period 2005-2017 with the following exceptions: CZE (2006-2015), ESP (2007-2016), EST (2005-2016), ISR (2018), JPN (2008-2017), POL (2006-2017), TUR (2010-2017). Only countries with more than four regions of data availability on house prices are considered. See Annex for detailed country profiles covering the longest time period available per country. *p<0.1.
Source: OECD database on regional house prices. See Annex for details.

Differences in housing affordability may act as a barrier to mobility for households seeking employment in parts of the country where labour demand is higher but they cannot afford to move due to differences in house prices. The extent to which regional house prices hinder inter-regional mobility and labour market adjustment is an empirical question that is formally addressed below.

[14] These findings are in line with OECD Statistical insights available here http://www.oecd.org/sdd/prices-ppp/statistical-insights-location-location-location-house-price-developments-across-and-within-oecd-countries.htm?utm_source=Adestra&utm_medium=email&utm_content=How%20are%20house%20prices%20evolving%3F%20-%20Read%20more&utm_campaign=Stats%20Flash%2C%20July%202020&utm_term=sdd.

Data and empirical approach

Baseline analysis

The baseline analysis draws on the OECD Regional database, which provides a set of harmonised regional statistics and indicators for about 2000 regions in 30 countries for the period from 2000 to 2017. The advantage of this dataset is harmonisation, making it well suited for cross-country analyses. This is particularly true when it comes to regional classifications, because in any analytical study conducted at the sub-national level, the choice of the territorial unit is of prime importance. In this respect, the territorial grid applied by the OECD reflects the administrative organisation of countries. The regions are defined either at the territorial level 2 (TL2), which correspond to the middle-tier of the subnational government, for example, the Ontario Province in Canada, or at the territorial level 3 (TL3), which correspond to the local government, with the exception of Australia, Canada and the United States.[15]

This database also covers key economic variables such as regional income and (un)employment, and key structural variables such as regional demography and industrial specialisation. One limitation of the dataset is data availability in the time-series dimension, which somewhat restricts the set of indicators that can be used in the analysis and sometimes imply the need to use an alternative data source, such as the European Labour Force survey (EULFS).

Information on regional house prices draws on a recently developed OECD dataset, which enables to track the development of real house prices at the regional level across countries (Box 1). Here again, the key advantage of this dataset is the degree of harmonisation across countries and regions. This makes it possible to produce novel evidence on the effects of regional house prices on regional migration from a cross-country perspective. Country coverage in this new data set is still not comprehensive, which implies that the baseline model can only include a subset of OECD countries.[16]

In practice, combing the different data sources and variables and taking into account data availability, the regression analysis is based on 20 OECD countries and on the TL2 classification for all of them except the Czech Republic and Norway (TL3).[17] The period covered is 2000 to 2017 with an unbalanced sample due to cross-country differences in starting years, as detailed in the Annex.

The baseline model follows the migration literature to identify the fundamental drivers of inter-regional migration flows (Greenwood, 1997[2]). The model is estimated in a cross-country setting as follows:

$$lnMIG_{i,j,t} = \beta_0 + \beta_1 \, ln \, POP_{i,j,t-1} + \beta_2 \, ln \, GDP_{i,j,t-1} + \beta_3 \, ln \, UEM_{i,j,t-1} + \beta_4 \, ln \, HPI_{i,j,t-2} + \alpha_i + \alpha_j \alpha_t + \varepsilon_{i,j,t}$$

[15] Despite harmonisation procedures to define sub-national territorial units, cross-country differences in the size of regions are present, for instance because of geographical differences (e.g. larger TL2 regions in Australia and the United States than in most EU countries). The regression specification accounts for these differences by means of control variables such as population in addition to country-specific time fixed effects, region fixed effects and robustness analysis detailed in the Annex. For a country-level analysis circumventing this issue, see (Cavalleri, Luu and Causa, 2021[6]), where the authors examine inter-regional migration on a country-by-country basis with country-specific individual regional grids. The consistency of the findings reported in this paper for the baseline analysis with that of (Cavalleri, Luu and Causa, 2021[6]) suggests that the issue of size-driven harmonisation does not affect the quality of the cross-country results.

[16] See Annex for more data-related details including country coverage. In addition, the Annex reports baseline estimates without regional house prices, covering a larger set of OECD countries.

[17] The results are robust to using only the TL2 classification. Also, in order to ensure that results are not driven by differences in regional population within and across countries, robustness analysis is performed with an inverse of regional population weighting scheme. All these materials are reported in the Annex.

where i denotes region, j denotes country and t denotes year. $MIG_{i,j,t}$ is the number of migrants moving into region i from another region in the same country j in year t; $POP_{i,j,t-1}$ is the total population in region i in year t-1. $GDP_{i,t-1}$ and $UEM_{i,t-1}$ are GDP per capita and the unemployment rate in region i in year t-1. $HPI_{i,t-2}$ denotes the real house price index in region i in year t-2. The estimation includes region fixed effects and country-specific year fixed effects. Standard-errors are clustered at the country level.[18] The lagged structure of the explanatory variables and the comprehensive set of fixed effects aims at minimising endogeneity and omitted variable biases.[19]

The potential presence of cross-sectional dependence in the error terms has been tested with a CD-test (Pesaran, 2020[3]). This test for spatial autocorrelation has the advantage of being better suited for unbalanced cross-sectional time series data with large N and small T as it is the case in this work, compared to a standard Lagrange multiplier test.

All variables enter the regression in log form such that the resulting coefficients can be interpreted as elasticities. In this context, the parameters of interest are the estimated elasticities of in-migration with respect to income $(\beta_2,)$ unemployment (β_3), and changes in real house prices (β_4) – while regional population is a standard control in migration models to account for the fact that, all else equal, more populated regions experience higher probability of people moving in (and out). The baseline model is expanded to tentatively test the effects of some regional-level variables that have been considered in the literature, such as ageing and industrial structure

The baseline analysis is subject to a number of data-driven caveats: i) the data do not allow for isolating labour migration, nor migration by age groups among the working-age population,[20] ii) the data do not allow for measuring bilateral flows between regions, only flows within each region coming from any other region in the country; and iii) house price levels at the regional level fully harmonised across countries are not yet available, only indexes (see Box 1), such that the effect of house prices is estimated on the basis of cross-regional differences in changes over time, not levels.[21]

[18] Results are robust to clustering at the regional level.

[19] Still, such biases cannot be fully eliminated. One option that is used in the literature to address endogeneity, for instance in the seminal paper by (Blanchard and Katz, 1992[56]), is the so-called Bartik Instrumental variable approach, which consists in instrumenting economic shocks, most often labour demand shocks, by some proxy of local industry-specific demand shocks. Implementing this approach at the cross-country level is not possible as the construction of those instruments implies a large loss of countries and observations due to missing data.

[20] A related important point is that mobility of young people is known to represent a large part of within-country mobility, and almost exclusively towards metropolitan areas (OECD, 2020[7]), yet data is available only for a subset of OECD countries and years, and for individuals aged 15-29. This is a too heterogeneous age group to focus for policy analysis and identification purposes, mixing mobility of the family with individual mobility for training and labour related reasons. However, to address this issue, the Annex reports a baseline applied to inflows of young people. Results are fully in line with the current baseline on total population.

[21] Regional house price in levels, coming most often from national data sources, have been assembled in the context of complementary work by (Cavalleri, Luu and Causa, 2021[6]). These data are not harmonised ex-post, so they are not fully comparable across countries, contrary to house price indexes. They can be used on a country-by-country basis, as done in (Cavalleri, Luu and Causa, 2021[6]), but they cannot be used in a cross-country context. Still, for transparency, the Annex reports baseline estimates replacing real house price indexes by levels coming from the companion paper for countries and regions for which those are available. The results should be interpreted with great care but they are qualitatively and quantitatively in line with the current baseline model, even for the house price elasticity.

Box 1. OECD data on regional house prices

Residential Property Prices Indices (RPPIs) – also named House price indices (HPIs), are index numbers measuring the evolution of residential property prices over time. RPPIs are key statistics not only for citizens and households across the world, but also for economic and monetary policy makers. Among their professional uses, they serve, for example, to monitor macroeconomic imbalances and risk exposure of the financial sector.

This dataset includes RPPI compiled by official statistical agencies following international statistical guidelines. It covers all OECD member countries and some non-member countries. Whenever possible, these RPPIs are broken down by region, dwelling type (single- and multi-family dwellings) and vintage (new and existing dwellings). This dataset presents, for each country, the RPPI that is available at the most aggregate level at both national and regional levels. It mainly contains quarterly statistics.

At regional level, the available RPPIs are classified according to the OECD Territorial Level (TL) classification whenever possible. Regions are classified on two territorial levels reflecting the administrative organisation of countries. The 394 OECD large regions (TL2) represent the first administrative tier of subnational government, for example, the Ontario Province in Canada. The 2258 OECD small regions (TL3) correspond to administrative regions, with the exception of Australia, Canada and the United States. This classification – which, for European countries, is largely consistent with the Eurostat NUTS 2016 – facilitates greater comparability of geographic units at the same territorial level.

The index data is originally computed based on nominal values and transformed to real values by means of the private consumption deflator with base year in 2010.

Source: http://www.oecd.org/sdd/prices-ppp/national-and-regional-house-price-indices-oecd.htm.

Policy analysis

In a second step, the empirical approach exploits cross-country time-series variation in policies and institutions to assess the role of policy settings in influencing the responsiveness of inter-regional migration to local economic conditions.[22] While boosting inter-regional migration is not a policy objective in itself, making inter-regional migration responsive to economic conditions can be considered as a legitimate policy objective to enhance labour market dynamism, with benefits for economic and social resilience (e.g. individual and macro-level adjustment to local economic shocks), equality of opportunities (e.g. transitioning from jobless to job or towards higher quality jobs), and economic efficiency (e.g. matching between workers and jobs). For example in the area of housing policy, previous literature has shown that a less responsive housing supply reduces residential mobility (Causa and Pichelmann, 2020[4]), (Caldera Sánchez and Andrews, 2011[5]). One policy question that is addressed in this paper is whether a less responsive housing supply makes migration less responsive to local economic conditions.

More broadly, the choice of the policies considered in the analysis draws on previous evidence on the effects of policies on internal migration, residential and labour mobility. The current analysis complements existing evidence with a novel one on the effects of policies on the responsiveness of migration to local economic conditions. Against this background, the indicators included in the analysis cover three broad

[22] Regional-level policies cannot be considered in the analysis, mainly because of data availability issues.

policy areas, namely housing-related policies, labour market and social protection policies, and regulatory policies:[23]

- Housing-related policies include: rental market regulations covering both tenant-landlord regulation (rules regarding tenant eviction, tenure security and deposit requirements) and rent control (rules regarding setting of rent levels and rent increases); housing supply elasticity, that is, the responsiveness of housing supply to price signals, which is partly policy-driven by e.g. land-use regulations; housing-related social transfers, both in kind (social housing) and cash allowances.
- Labour market and social protection policies include: active labour market policies, job protection, unemployment benefits replacement schemes and broader measures of income redistribution, minimum wages and collective bargaining institutions, as well as labour taxation and labour costs. In addition, the analysis considers the effect of a set of labour-market related features which can be considered as partly policy-driven and may influence incentives and the possibility to move across regions: those are wage inequalities and labour force education and skills.
- Regulatory policies include: various dimensions of product market regulation such as barriers to entrepreneurship, administrative requirements for limited liability companies (LLCs) and personally owned enterprises, and regulations of professional services; and occupational entry restrictions, e.g. licensing procedures and administrative burdens applying to personal and professional services.

The policy model augments the baseline model with policy interactions for regional income and regional unemployment, respectively:[24]

$$lnMIG_{i,j,t} = \beta_0 + \beta_1\, ln\, POP_{i,j,t-1} + \beta_2\, ln\, GDP_{i,j,t-1} + \beta_3\, ln\, UEM_{i,j,t-1} + \beta_4\, ln\, HPI_{i,j,t-2} + \beta_5\, POL_{j,t-1}\, X\, ln\, GDP_{i,j,t-1} \quad + \alpha_i + \alpha_j\alpha_t + \varepsilon_{i,j,t}$$

$$lnMIG_{i,j,t} = \beta_0 + \beta_1\, ln\, POP_{i,j,t-1} + \beta_2\, ln\, GDP_{i,j,t-1} + \beta_3\, ln\, UEM_{i,j,t-1} + \beta_4\, ln\, HPI_{i,j,t-2} + \beta_6\, POL_{j,t-1} X\, ln\, UEM_{i,j,t-1} \quad + \alpha_i + \alpha_j\alpha_t + \varepsilon_{i,j,t}$$

where $POL_{j,t-1}$ denotes the lagged policy variable. Here, the coefficients of interest are β_5 and β_6. If these coefficients are statistically significant, combined with β_2 and β_3, they allow to estimate the responsiveness of regional migration to regional income (or unemployment), for various levels of the policy indicator. For example in the case of housing supply elasticity, a significant positive (negative) interaction sign with respect to regional income (unemployment) would imply that when housing supply is more elastic, inter-regional migration tends to be more responsive to local economic conditions.

By contrast with the baseline, the estimated coefficients have no longer an intuitive quantitative interpretation. The policy results are thus reported qualitatively in the paper (i.e. estimated signs of β_5 and β_6 when statistically significant) while full regression tables are available in the Annex. Selected estimates are then used to quantify the results with illustrative policy simulations.

As is always the case in cross-country policy regressions, results should be taken with care and not given a causal interpretation, although the regional dimension in the context of this paper attenuates estimation biases, especially with respect to endogeneity.

[23] Acknowledging some inevitable arbitrariness in the assignment of each policy under each area along with some overlap across areas for given policies. For example, occupational licensing can be considered as both a labour market policy and a regulatory policy.

[24] The income and unemployment interactions are not entered together in the same equation to avoid collinearity issues and ease identification. However, policy results are largely robust to estimating with both interactions, as reported in the Annex as robustness test. Multivariate policy regressions pause even greater identification challenges in the context of this econometric analysis. Robustness tests with respect to a number of multivariate policy regressions scenarios are also reported in the Annex.

The core drivers of inter-regional migration flows

Baseline results

Baseline results are presented in column 1 of Table 1:

- On average, regional GDP per capita is the strongest driver of regional migration inflows based on the magnitude of estimated coefficients, with the exception of population size used as a control variable. For example, an increase in regional income by 10% triggers an increase in regional inflows by 5%. This result is broadly in line with the literature and with the country-by-country results in (Cavalleri, Luu and Causa, 2021[6]). The strength of income as an in-migration factor likely reflects agglomeration effects that encourage individuals, and particularly, younger people, to move to cities or metropolitan areas which are characterised by income levels much higher than other areas (OECD, 2020[7]).
- House prices at the regional level are the second most important driver after income. The elasticity of regional migration inflows with respect to regional house prices implies that an increase in regional house price growth by 10% triggers a decline in regional inflows by around 2%. The finding that unaffordable housing has prevented people to move has been put forward in the case of the United States (Bayoumi and Barkema, 2019[8]): the current results would suggest that it applies more broadly across a larger set of advanced economies.
- The labour market situation at the regional level is also a highly significant economic driver of migration, in line with priors and with the literature (e.g. (Bayoumi and Barkema, 2019[8]), (Liu, 2018[9]). The estimated elasticity implies that an increase in regional unemployment by 10% triggers a decline in in regional inflows by around 1.3%.

Table 1. Fundamental drivers of inter-regional migration flows: Baseline results, 2000-2017

Dependent variable: Log number of inflows in region from another region			
	1	2	3
Regional population, (t-1)	0.62***	0.61***	0.61***
	(0.13)	(0.12)	(0.13)
Regional GDP per capita (t-1)	0.55***	0.53***	0.56***
	(0.076)	(0.075)	(0.11)
Regional unemployment rate, (t-1)	-0.12***	-0.13***	-0.13**
	(0.039)	(0.041)	(0.046)
Regional house price index (t-2)	-0.23***	-0.24***	-0.25***
	(0.056)	(0.054)	(0.043)
Regional share of elderly population (% 65+ over total population), (t-1)		-0.15	-0.13
		(0.22)	(0.22)
Regional share of employment in manufacturing (in % of total employment), (t-1)			-0.085
			(0.077)
Region FE	YES	YES	YES
Observations	2,397	2,397	2,309
N_countries	20	20	20
Adj_RSqr	0.98	0.98	0.98
*** p<0.01, ** p<0.05, * p<0.1			

Note: Unbalanced panel covering the period 2000-2017. Robust standard errors in parentheses. All variables are in log form so that the estimates can be interpreted as elasticities. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details.
Source: OECD estimates based on OECD Regional database, EULFS data, and OECD regional house prices data. See Annex for details on data sources.

A number of other potentially influential variables (e.g. regional population, industrial structure, education, innovation, availability of public services and environmental quality) were tested in the estimation. However, only population was positively significant, reflecting well-documented agglomeration effects and the attraction of metropolitan areas (OECD, 2020[7]). This is in line with the available literature that does not broadly support the existence of core regional migration drivers other than the ones included in the baseline model; and with (Cavalleri, Luu and Causa, 2021[6]) that delivers mixed results on the effects of various structural features at the country level such as age and industry structure.

The Annex reports a battery of robustness tests, including a baseline model estimated without regional house prices for a broader set of OECD countries, delivering consistent estimated elasticities for regional incomes and unemployment.

Policies shape the pass-through of regional economic conditions to regional migration

Policy results

Housing-related policies and institutions are found to significantly influence the responsiveness of inter-regional migration to regional economic conditions, in particular with respect to labour market conditions (Table 2):

- Where housing supply is more responsive to housing demand, inter-regional migration is found to be more responsive to both regional GDP per capita and regional unemployment. This result is in line with studies finding a direct positive effect of housing supply elasticity on residential mobility (e.g. (Causa and Pichelmann, 2020[4]), (Andrews, Caldera Sánchez and Johansson, 2011[10])), and with studies finding that low supply responsiveness implies that house prices rise more following stronger demand, which contributes to higher levels of regional dispersion in house prices, typically between higher-income cities and lower-income rural areas (e.g. (OECD, 2017[11])). Taken together, this evidence suggests that when housing supply is weakly responsive to demand, inter-regional migration is relatively less responsive to regional economic conditions because expected income gains from moving are more than offset by increases in living costs due to large differences in regional house prices.
- Stricter rental market regulations, both rent controls and landlord-tenant regulations, are associated with lower pass-through from regional labour market conditions to inter-regional migration. This result is in line with studies finding a direct negative effect of rental market regulations on residential mobility (e.g. (Causa and Pichelmann, 2020[4]), (World Bank, 2018[12]), (Caldera Sánchez and Andrews, 2011[5])). One reason for this is that tenants in rent-controlled dwellings may be reluctant to move and give up their below-market rents. This result could also reflect an indirect channel going from rental market regulations to housing supply and the dispersion of regional house prices: strong de-linking of rents from housing market conditions have been found to curtail the size of rental markets by reducing supply (Cavalleri, Cournède and Özsöğüt, 2019[13]) with negative repercussions for affordability. Too strict rent control could then make tenants in rent-controlled dwellings less responsive to move towards places with better labour market opportunities and, also, makes it unattractive to do so because of unaffordable housing in such places.
- High levels of housing transaction costs in terms of notary and legal fees associated with buying/ selling property are found to reduce the pass-through elasticity from regional labour market conditions to inter-regional migration. This result is consistent with previous studies finding a negative effect of housing transaction costs on residential mobility, especially among young households (e.g. (Causa and Pichelmann, 2020[4]), (World Bank, 2018[12]), (Hilber and Lyytikäinen,

2017[14]), (Caldera Sánchez and Andrews, 2011[5])). The current findings may therefore imply that high levels of notary fees associated with housing transactions may increase relocation costs and thereby reduce incentives to migrate for labour-related reasons among prospective buyers, most often relatively young mobile households.

- Housing-related social transfers, both in-kind in the form of social housing and in cash in the form of housing allowances are associated with lower responsiveness of inter-regional migration to regional income and, for social housing, to labour market conditions. This suggests that social housing may, to the extent that there are constraints to the portability of benefits, create "lock-in effects" whereby social tenants have reduced incentives to move for better economic opportunities to the extent that they may lose access to social housing. This result is in line with various micro-studies of the decision to move finding that social tenants and tenants in subsidised housing are, controlling for individual and housing characteristics other than housing tenure, less likely to move than private tenants and owners (e.g. (Causa and Pichelmann, 2020[4]), (World Bank, 2018[12]), (Caldera Sánchez and Andrews, 2011[5])). While housing allowances are in principle more mobility-friendly, the current results tend to suggest that they may also create disincentives to move for economic reasons, which may reflect weak portability design, at least on average across the countries covered. At the same time, not all evidence goes in the same direction as (Causa and Pichelmann, 2020[4]) found that social spending on housing, which includes both cash and in-kind transfers, is associated with higher residential mobility.

Table 2. Housing-related policies

Policy indicator	Interaction with GDP per capita	Interaction with unemployment
Housing supply elasticity	+ (***)	- (***)
Rent control		+ (**)
Landlord-tenant regulation		+ (**)
Transaction costs: notarial and other legal fees		+ (***)
Relative size of the social rental housing stock	- (**)	+ (***)
Public spending on housing allowances	- (***)	
*** p<0.01, ** p<0.05, * p<0.1		

Note: The baseline specification is column 1 in Table 1. This specification is augmented with an interaction term between a policy indicator and the explanatory variables, once at a time. This table summarises the results by reporting the sign of statistically significant interaction terms between policies and GDP per capita, the unemployment rate and the regional house price index. Policy variables enter one at a time and each interaction effect is estimated separately. The specification systematically includes regional fixed effects and country-specific year fixed effects. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details. The Annex reports detailed regression results.
Source: OECD estimates based on OECD Regional database, EULFS data, OECD regional house prices data; and additional OECD and non-OECD sources for policy variables. See Annex for details on data sources.

Labour market and social protection policies shape the pass-through of regional economic conditions, in particular regional GDP per capita, to inter-regional migration (Table 3):

- Strong job protection on regular contracts is found to significantly reduce the pass-through elasticity from both regional income and regional unemployment to inter-regional migration. One

interpretation of this result is that workers enjoying strong protection have little incentives to move region, even if this would be associated with a better job match or a higher wage. This result is in line with previous empirical evidence on: i) the negative effect of job protection on regular contracts on workers' reallocation, in particular on job-to-job transitions (Bassanini and Garnero, 2012[15]) and, ii) the negative effect of job protection on regular contracts on residential mobility, especially among youth and low-educated individuals (Causa and Pichelmann, 2020[4]). This result is also in line with results in (Mcgowan and Andrews, 2015[16]) showing that less stringent job protection is associated with lower mismatch amongst youth, since it provides scope to improve the quality of job-worker matching, which in turn, is associated with higher residential mobility.

- Spending on active labour market policies is associated with lower migration responsiveness with respect to both regional GDP per capita and regional unemployment, and this result applies in particular to the spending categories of sheltered and supported employment, and public employment services. This suggests that the design or delivery of active labour market policies may provide little incentives for jobseekers to look for and find a job in another region. One reason could be that when jobseekers are engaged in a local programme, they have little time to seek for better opportunities elsewhere and incentives to engage in an intense job search decrease with the length of the programme, as found in the literature on "lock-in effects" associated with programme participation (Wunsch, 2016[17]). This line of interpretation is tentatively confirmed by the significant effect found for spending on sheltered and supported employment to the extent that jobseekers benefitting from such public work programmes in their region may miss better work opportunities in another region. Another tentative explanation for this finding could be lack of coordination between local agencies in different regions given that counselling services are delivered at the local level (OECD, 2020[21]), as well as little incentives or possibilities for workers in such agencies to counsel the unemployed on job opportunities in other regions. These results may indicate that active labour market policies, at least as operating on average across the countries and periods under consideration, do not seem to successfully encourage labour market reallocation and labour market dynamism. This is a policy concern given the crucial importance that such policies have today, as key enablers of the labour market recovery from the COVID-19 crisis.
- Unemployment benefits influence migration with respect to regional GDP per capita where the effect varies depending on the duration of unemployment: benefits tend to weaken responsiveness at the relatively early stages of unemployment (6 months), especially for lone parents, while they tend to increase responsiveness at later stages of unemployment (12 months). On the one hand, adequate income support during the unemployment spell is essential to help jobseekers to find a job. On the other hand, too generous income support may reduce jobseekers' incentives to search for a job, including by moving region. Some studies have found more generous benefits to be associated with higher residential mobility (Causa and Pichelmann, 2020[4]), (Caldera Sánchez and Andrews, 2011[5]), while others have found that being insured against unemployment and more generous benefits reduces the probability of finding a job in another geographical area more than it reduces the probability of finding a job locally (Kristoffersen, 2016[17]), (Antolin and Bover, 1997[18]). The current finding that higher replacement rates dampen migration elasticities in the short-run but increase them in the medium-run may tentatively indicate that unemployment benefit systems tend to balance the objective of protecting jobseekers from potentially disruptive short-term relocation following temporary shocks and that of helping them coping with medium-term relocation following shocks that turn out be of a more permanent nature.
- Personal income taxes and cash transfers have a weak significant positive effect on the pass-through of regional labour market conditions to inter-regional migration. This may tentatively indicate that income support provided by the tax and transfer system can help low-income households and workers to move towards better opportunities, and ultimately contribute to better spatial labour reallocation.

Table 3. Labour market and social protection policies

Policy indicator	Interaction with GDP per capita	Interaction with unemployment
Job protection on regular contracts	- (***)	+ (***)
Spending on active labour market policies, total (% of GDP)	- (***)	+ (***)
Spending on active labour market policies, sheltered and supported employment (% of GDP)	- (***)	+ (***)
Spending on active labour market policies, PES and administration (% of GDP)	- (***)	+ (***)
Unemployment benefit replacement rate, single without children, 12 months	+ (***)	
Unemployment benefit replacement rate, couple with children, 12 months	+ (***)	
Unemployment benefit replacement rate, single with children, 6 months	- (**)	
Income redistribution through taxes and transfers		- (*)
*** p<0.01, ** p<0.05, * p<0.1		

Note: The baseline specification is column 1 in Table 1. This specification is augmented with an interaction term between a policy indicator and the explanatory variables, once at a time. This table summarises the results by reporting the sign of statistically significant interaction terms between policies and GDP per capita and the unemployment rate. Policy variables enter one at a time and each interaction effect is estimated separately. The specification systematically includes regional fixed effects and country-specific time fixed effects. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details. The Annex reports detailed regression results.
Source: OECD estimates based on OECD Regional database, EULFS data, OECD regional house prices data; and additional OECD and non-OECD sources for policy variables. See Annex for details on data sources.

Labour market institutions affecting wage dispersion are found to affect the responsiveness of migration, in particular with respect to regional labour market conditions (Table 4):

- Countries with higher collective wage-bargaining coverage tend to display less responsive migration with respect to inter-regional GDP differences. Similarly, higher labour costs at the bottom of the distribution and minimum wages are found to reduce migration responsiveness to regional unemployment. This could reflect a relatively compressed wage distribution across industries and regions, which may reduce workers' incentives to move for higher wages, as well as a downward wage rigidity that may slow-down regional adjustment following local labour market shocks. The wage distribution interpretation is corroborated by the complementary finding that more centralised wage-bargaining settings, which are typically associated with lower levels of wage dispersion,[25] also reduce the pass-through of regional GDP and unemployment to regional migration. This result is line with (Poghosyan, 2018[25]), who argue that in the case of Finland the wage bargaining system promotes wage compression which tends to depress inter-regional migration. It also echoes recent findings by (Boeri et al., 2019[20]) who find that the more centralised wage bargaining in Italy compared to the more decentralised in Germany tends to reduce spatial reallocation. Finally, these findings are also consistent with recent OECD work on wage premia documenting that the pass-through from firm-productivity to wage, and therefore wage dispersion,

[25] The correlation between collective bargaining coverage and wage centralisation, with these indicators averaged over the period 2000-2015, is -0.8879 and significant at the 1% level.

is lower in countries characterised by highly centralised bargaining systems and higher minimum-to-median wages (Schwellnuss et al., 2020[27])

- Higher labour tax wedges, reflecting both employers' and employees' social security contributions, are associated with lower responsiveness of migration. This may arise because of the potential disincentive effects from higher taxation on labour supply, both at the extensive (moving from jobless to job) and at the intensive margin (increasing hours worked). Evidence shows that such effects are particularly strong among the low-skilled but also among people at the early stages of their career (Blundell, 2014[28]), which are likely to be the most geographically mobile to start with.

Table 4. Labour costs and wage bargaining

Policy indicator	Interaction with GDP per capita	Interaction with unemployment
Collective bargaining coverage	- (**)	
Collective bargaining regime: decentralisation	+ (*)	- (*)
Minimum to median wage ratio		+ (*)
Minimum cost of labour		+ (*)
Average tax wedge, 67% of average wage		+ (*)
Average tax wedge, 100% of average wage		+ (*)
*** p<0.01, ** p<0.05, * p<0.1		

Note: The baseline specification is column 1 in Table 1. This specification is augmented with an interaction term between a policy indicator and the explanatory variables, once at a time. This table summarises the results by reporting the sign of statistically significant interaction terms between policies and GDP per capita and the unemployment rate. Policy variables enter one at a time and each interaction effect is estimated separately. The specification systematically includes regional fixed effects and country-specific time fixed effects. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details. The Annex reports detailed regression results.
Source: OECD estimates based on OECD Regional database, EULFS data, OECD regional house prices data; and additional OECD and non-OECD sources for policy variables. See Annex for details on data sources.

The argument that lower levels of wage inequalities may reduce incentives for inter-regional labour market mobility, especially among low-wage earners, is tentatively supported by the estimated negative correlation between earnings inequalities and the responsiveness of migration to regional economic conditions (Table 5). The estimates suggest that the "overall" inequality effect (D9/D1 ratio) may be driven by a "lower-tail" effect (D5/D1 ratio and incidence of low pay). Moving to the impact of skills, the results indicate that a more educated workforce is more responsive to regional economic dispersion and shocks: where the share of the working-age population with below upper-secondary education and skill shortages are higher,[26] inter-regional migration is less responsive with respect to both GDP and unemployment (Table 5). This result is

[26] The variable "skill needs" from the OECD's new Skills for Jobs Indicators database measures the shortage or surplus of technical skills: positive values indicate skill shortage while negative values point to skill surplus. The larger the absolute value, the larger the imbalance.

in line with micro-based evidence finding that the probability to change residence rises with the education level (Causa and Pichelmann, 2020[5]), (Caldera Sánchez and Andrews, 2011[13]).[27]

Table 5. Earnings inequalities and skills

Policy indicator	Interaction with GDP per capita	Interaction with unemployment
Earnings inequality: D5/D1	+ (***)	- (***)
Earnings inequality: D9/D1	+ (***)	- (*)
Incidence of low pay	+ (***)	- (***)
Share of working age population with below upper secondary education	- (*)	+ (**)
Skill needs	- (***)	+ (**)
*** p<0.01, ** p<0.05, * p<0.1		

Note: The baseline specification is column 1 in Table 1. This specification is augmented with an interaction term between a policy indicator and the explanatory variables, once at a time.
This table summarises the results by reporting the sign of statistically significant interaction terms between policies and GDP per capita and the unemployment rate. Policy variables enter one at a time and each interaction effect is estimated separately. The specification systematically includes regional fixed effects and country-specific time fixed effects. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details. The Annex reports detailed regression results. The variable "skill needs" from the OECD's new Skills for Jobs Indicators database measures the shortage or surplus of technical skills: positive values indicate skill shortage while negative values point to skill surplus. The larger the absolute value, the larger the imbalance.
Source: OECD estimates based on OECD Regional database, EULFS data, OECD regional house prices data; and additional OECD and non-OECD sources for policy variables. See Annex for details on data sources.

Policy barriers to business dynamism can affect labour market dynamism and labour mobility as confirmed in Table 6:

- Policy barriers to business dynamism, such as barriers to entrepreneurship and administrative burdens on LLCs, are found to reduce the pass-through from regional economic conditions on inter-regional migration. This result is in line with results in (Mcgowan and Andrews, 2015[22]) showing that less stringent product market regulations are associated with lower skill mismatch, which in turn, is associated with higher residential mobility.
- Stringent regulations of professional services (e.g. lawyers, accountants, engineers and architects) are found to dampen the economic dynamism of regional migration, in particular with respect to regional GDP.
- Stringent occupational licensing for workers in professional and personal services is found to significantly deter the responsiveness of inter-regional migration to GDP and, to a lesser extent, labour market conditions. This result is coherent with the previous one on regulations of professional services, potentially reflecting that such regulations dampen opportunities to move region for starting-up a small business. This result is also fully consistent with the large evidence on the United States, documenting a strong negative effect of stringent state-level occupational licensing on inter-state mobility, job-to-job-mobility and labour market dynamism, see for example

[27] The finding of an opposite effect between the dispersion of wages in the workforce and the level of education of the workforce may tentatively reflect the equalising effect of education.

the latest OECD Economic Survey of the United States (OECD, 2020[19]), (Hermansen, 2019[20]), (Johnson and Kleiner, 2017[21]).[28] The current findings suggest that the dampening effect of overly stringent occupational licensing on labour market dynamism is present in a wider set of countries beyond the United States, where stricter country-wide occupational licencing could deter workers from changing jobs, hence region. This is in line with recent cross-country evidence on the detrimental effects of strict country-level occupational licensing on labour reallocation-driven productivity (Bambalaite, Nicoletti and Von Rueden, 2020[22]).

Table 6. Regulatory policies

Policy indicator	Interaction with GDP per capita	Interaction with unemployment
Product market regulation: barriers to entrepreneurship		+ (**)
Product market regulation: administrative requirements for LLCs	- (***)	+ (**)
Product market regulation in professional services: lawyers	- (***)	+ (**)
Product market regulation in professional services: accountants	- (***)	+ (**)
Product market regulation in professional services: engineers	- (**)	
Product market regulation in professional services: architects	- (***)	
Occupational entry restrictions: administrative burdens, personal services	- (***)	
Occupational entry restrictions: administrative burdens, professional services	- (***)	+ (*)
*** p<0.01, ** p<0.05, * p<0.1		

Note: The baseline specification is column 1 in Table 1. This specification is augmented with an interaction term between a policy indicator and the explanatory variables, once at a time. This table summarises the results by reporting the sign of statistically significant interaction terms between policies and GDP per capita and the unemployment rate. Policy variables enters one at a time and each interaction effect is estimated separately. The specification systematically includes regional fixed effects and country-specific time fixed effects. TL2 regional classification for all countries with the exception of CZE and NOR (TL3). See text and Annex for details. The Annex reports detailed regression results.
Source: OECD estimates based on OECD Regional database, EULFS data, OECD regional house prices data; and additional OECD and non-OECD sources for policy variables. See Annex for details on data sources.

Illustrative policy simulations to make internal migration more responsive to regional economic conditions

To provide an order of magnitude of the estimated policy effects, the empirical results are used to run some illustrative policy simulations. The direction of the policy change is chosen to enhance labour market dynamism by making internal migration more responsive to regional economic conditions. The simulations are reported in various figures showing how different policies influence the pass-through of GDP and unemployment to migration, with the estimates reported in the Annex. Each dot is the estimated pass-through evaluated at the cross-country policy average, taking the latest available data point for the policy indicator. The distance between the cross-country minimum/maximum and the average is the change in the pass-through associated with a policy change from average to minimum/maximum. Since the simulations are based on estimated interaction effects between country-level policies and regional GDP

[28] The indicators of occupational licensing in this paper are at the country-level as region-level indicators are not yet available on a cross-country basis.

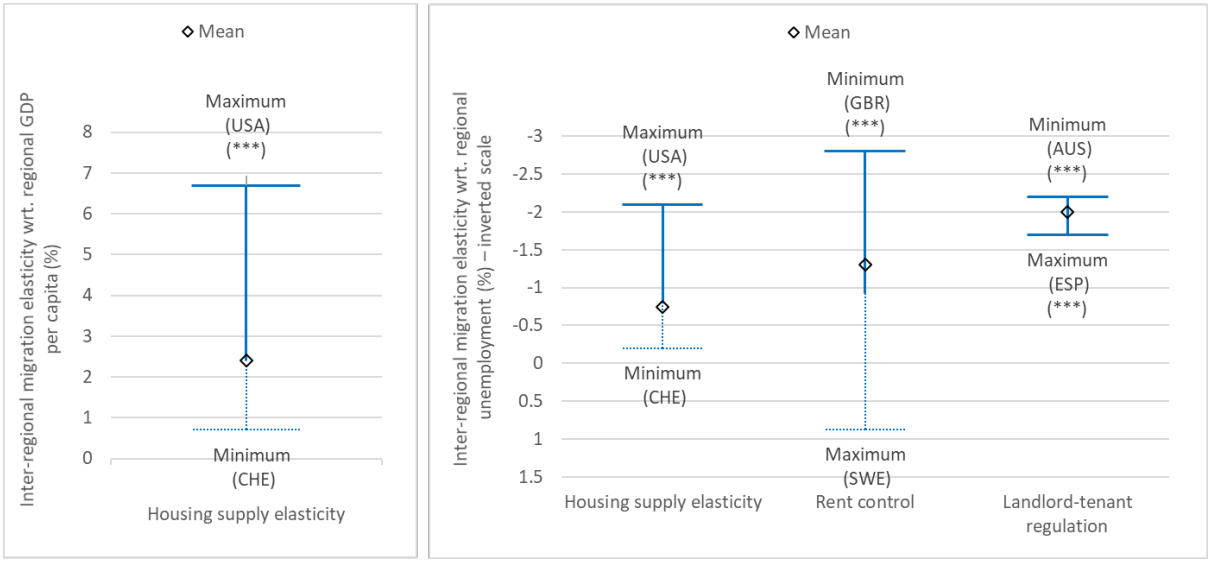
(unemployment), they allow to identify cases where, below or above a certain policy threshold, the pass-through is no longer statistically significant.

This illustrative quantification exercise delivers the following results:

- When housing supply is weakly responsive to housing demand, internal migration is (estimated to be statistically) unresponsive to regional economic shocks (Figure 6, Panels A and B). Moving from the average housing supply responsiveness to the maximum would be associated with an increase in the pass-through from unemployment to internal migration from less than 1 % to around 2% (Figure 6, Panel B).
- Relaxing rental market regulations, especially rent control, would contribute to make internal migration more responsive to regional unemployment shocks (Figure 6, Panel B). According to the estimates, moving from the average rent control to the minimum would be associated with an increase in the pass-through from unemployment to internal migration from around 1% to around 3%. Moving from the maximum to average tenant protection would be associated with an increase in the pass-through from unemployment to internal migration from around 1.7% to close to 2%, a statistically significant but practically negligible impact.

Figure 6. Making housing supply more elastic and relaxing rental market regulation

Panel A. Responsiveness to regional GDP per capita **Panel B. Responsiveness to regional unemployment**



Note: OECD calculations based on selected interaction effect estimates from Table 2. The dot is the estimated in-migration elasticity evaluated at the average policy. The distance between the Min/Max and the average is the change in the estimated elasticity associated with a policy change. Dashed line means that the estimated elasticity is no longer statistically significant. *, **, *** denote the statistical significance of the estimated elasticity (i.e. 10%, 5%, 1%).

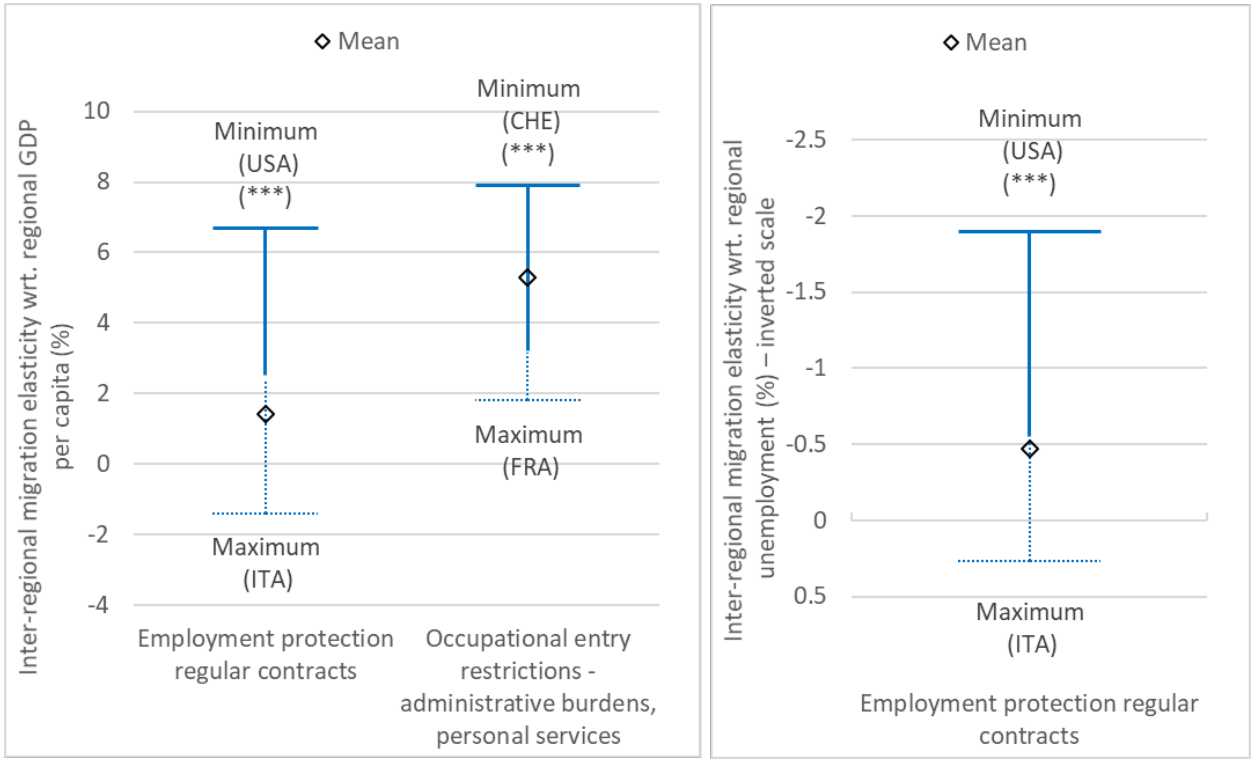
How to read: An increase (decline) in regional GDP per capita (regional unemployment) by 10% is estimated to trigger a statistically insignificant change in in-migration at and below the average of the cross-country distribution of housing supply elasticity, while it is estimated to trigger a rise in in-migration by 6.7% (2%) at the maximum of the cross-country distribution of housing supply elasticity. A decline in regional unemployment by 10% is estimated to trigger a statistically insignificant change in-migration at the maximum of the cross-country distribution of rent control, while it is estimated to trigger a rise in in-migration by 1.3% at the mean and 2.8% at the minimum of the cross-country distribution of rent control. The policy indicators used refer to the latest available year.

- When job protection is very restrictive for workers on regular contracts, internal migration is found to be unresponsive to both regional unemployment and GDP (Figure 7, Panels A and B). According to the estimates, reducing job protection on regular contracts from the average to the minimum

level would be associated with an increase in the pass-through from unemployment to internal migration from around 0.5% to close to 2%. Reforms to ease occupational licensing restrictions in service sectors would also contribute to make internal migration more responsive to regional GDP: moving from the lowest level of restriction to the average is estimated to increase the income-migration pass-through from about 2% to around 5%.

Figure 7. Reducing job protection on regular contracts and occupational licensing restrictions in service sectors

Panel A. Responsiveness to regional GDP per capita **Panel B. Responsiveness to regional unemployment**



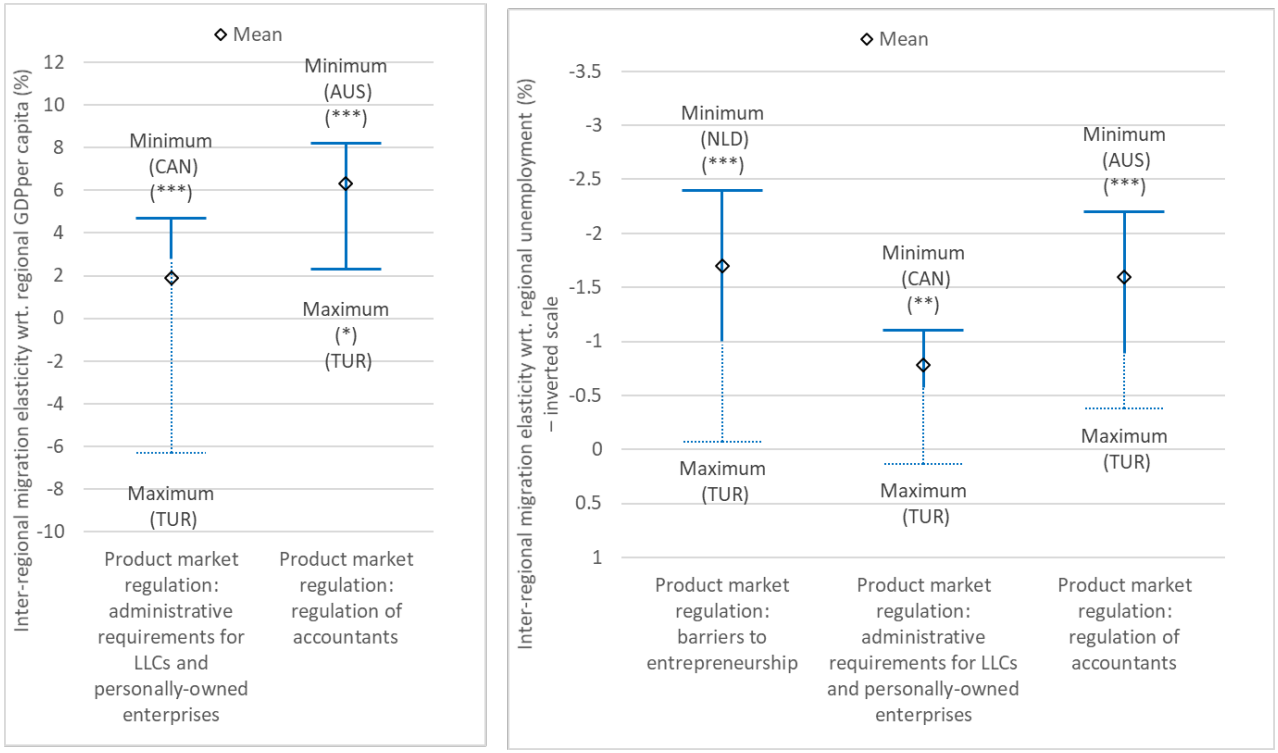
Note: OECD calculations based on selected interaction effect estimates from Table 3 and Table 6. The dot is the estimated in-migration elasticity evaluated at the average policy. The distance between the Min/Max and the average is the change in the estimated elasticity associated with a policy change. Dashed line means that the estimated elasticity is no longer statistically significant. *, **, *** denote the statistical significance of the estimated elasticity (i.e. 10%, 5%, 1%).
How to read: An increase in regional GDP per capita by 10% is estimated to trigger a statistically insignificant change in in-migration at and above the average of the cross-country distribution of job protection on regular contracts, while in-migration would increase by 6.7% at of the minimum of the cross-country distribution of job protection on regular contracts. An increase in regional GDP per capita by 10% is estimated to trigger a statistically insignificant change in-migration at the maximum of the cross-country distribution of occupational entry restrictions, while it is estimated to trigger a rise in in-migration by 5.3% at the mean and 7.9 % at the minimum of the cross-country distribution of rent control. The policy indicators used refer to the latest available year.

- A wide range of product market reforms aimed at easing overly restrictive administrative burdens for business and barriers to entrepreneurship would facilitate internal migration in response to regional unemployment and GDP (Figure 8, Panels A and B). According to the estimates, reducing barriers to entrepreneurship from the maximum to the average level would move the pass-through from unemployment to migration from statistically insignificant to close to 1.7%. The same result applies to regulations of professional services. Reforms to relax barriers to entry in accounting

services is reported as an illustrative example, with an estimated order of magnitude similar to the one reported for overall barriers to entrepreneurship (Figure 8).

Figure 8. Easing administrative burdens for business and barriers to entrepreneurship

Panel A. Responsiveness to regional GDP per capita **Panel B. Responsiveness to regional unemployment**



Note: OECD calculations based on selected interaction effect estimates from Table 6. The dot is the estimated in-migration elasticity evaluated at the average policy. The distance between the Min/Max and the average is the change in the estimated elasticity associated with a policy change. Dashed line means that the estimated elasticity is no longer statistically significant. *, **, *** denote the statistical significance of the estimated elasticity (i.e. 10%, 5%, 1%).

How to read: An decline in regional unemployment by 10% is estimated to trigger a rise in in-migration by 0.8 % at the mean of the cross-country distribution of product market regulations with respect to administrative requirements for LLCs and personally-owned enterprises, 0.1% at the maximum, and -1.1% at minimum. An increase in regional GDP per capita by 10% is estimated to trigger a rise in in-migration by 6.3 % at the mean of the cross-country distribution of product market regulation in professional services - accountants, 2.3 % at the maximum, 8.2% at minimum. The policy indicator used refers to the latest available year.

Policy considerations for the recovery from the COVID-19 crisis

This paper shows that housing affordability has a strong influence on inter-regional migration and that structural policies shape its responsiveness to regional economic conditions and shocks. Inter-regional migration gains policy traction in a context where the recovery from the COVID-19 crisis is likely to require some degree of labour reallocation (Barrero, Bloom and Davis, 2020[1]), hence of geographical reallocation, for example between regions specialised in shrinking sectors and those specialised in expanding sectors. Drawing on the empirical results reported in this paper, policy interventions to support inter-regional migration can be subsumed under two broad categories: addressing policy-driven lock-in effects and removing policy obstacles to mobility. Yet policy interventions may be needed not only for movers but also for stayers. There is a case for policies that create opportunities in places where those are currently lacking, which could, if successful, encourage locals to stay instead of migrating; and attract migrants coming from other regions.

Addressing policy-driven lock-in effects

Addressing policy-driven lock in effects requires policy interventions in the area of social benefits and active labour market and training policies, including:

- Activation and training programmes articulated with adequate cash benefits helping unemployed people searching for and finding appropriate quality jobs available including outside their region of residence.

  To achieve this, information sharing and cooperation between local public employment services in different regions should be encouraged, so as to inform jobless people on job availability in other regions and encourage mobility for those who wish so. This argument can, at the current juncture, also apply to workers on short-time work (STW) schemes employed in non-viable firms that are likely to exit the market once extraordinary policy measures are phased out. Such workers should be encouraged to take training while being in STW, so as to encourage mobility towards viable jobs (OECD, 2020[31]), including by relocation.

  Across OECD countries, jobseekers claiming benefits are in some cases expected to commute or to move to a new location where suitable employment is available, albeit within certain limits. A small number of countries can even require moves to a different locality as part of the availability requirement and suitable work criteria (Immervoll and Knotz, 2018[22]). This requirement may speed-up reallocation but risks lowering the quality of matching and jobs.
- Social housing eligibility rules that support mobility, alongside with fully portable housing allowances.

  Policy design is key to help residential and labour mobility among social housing tenants and incentivise employment, so as to ensure that more vulnerable households have access to affordable housing options in other and potentially distant labour markets that offer better employment opportunities (OECD, 2020[15]). This can be achieved by removing queuing or residency requirements in the case of employment take-up, such as the “Right to Move” policy implemented in English housing associations in 2015. This may also require reinforcing institutional support, as residential mobility for the most vulnerable may be dampened by informational barriers and a lack of support in housing search and application processes. One approach recently introduced in the Paris region in France is an online platform, echangerhabiter.fr, that collects information from 24 major social housing providers (representing around 60% of the regional social housing stock) to enable social housing tenants to exchange their dwellings. In addition, mobility barriers and lock-in effects for lower-income social housing tenants can be reduced by gradually phasing out social rent benefits at higher income levels, as with the income-dependent rent increases introduced in the Netherlands or in France. Such measures can reduce waiting lists for social housing units, which in turn would make residential moves within the social housing system easier.

Removing policy obstacles to mobility

Removing policy obstacles to mobility requires policy interventions in the area of housing, labour and product markets, including:

- Removing poorly-designed land-use regulations contributing to rigid housing supply and therefore to housing unaffordability and house price divergences.

  Increasing the responsiveness of housing supply to demand would contribute to reduce living costs in attractive metropolitan areas, making it possible for prospective low-income movers to actually move there for better opportunities. Reforms in this area often imply revising the design of land-use governance arrangements to avoid overlap in the allocation of housing policy functions across the different levels of administration and to favour planning at the metropolitan level rather than

lower levels of government. This can facilitate the matching of supply and demand within broader catchment areas and therefore increase the responsiveness of supply to evolving demand, mitigating upward pressure on prices and making housing more affordable.

- Reviewing local rental market regulations in places where evidence suggests that they curtail the size of the rental market.

  Reforms to make rental market regulations such as rent control and tenure security more flexible have the potential to contribute to reducing obstacles to mobility as well as making housing markets more efficient and affordable in the long term. Still, they could undermine affordability for some households in the short term, especially for incumbents. There is a case for providing tenants with reasonable security over tenure and rent levels: a compromise can be a system of rent stabilisation, whereby rents can be varied for new contracts and renewals but regulated in line with market developments during the duration of the contract.

- Reforming labour and product market regulations where such policy settings tend to favour insiders and incumbents over outsiders and new entrants.

  Job protection reforms can contribute to reducing barriers to job mobility and are especially relevant in countries characterised by labour market duality. In such cases, reforms in this area are likely to reduce spatial misallocation and make labour markets more inclusive by better integrating outsiders, often the jobless, less-qualified, women and young people. Policy action to reduce labour market duality also involves aligning social contributions and working conditions between temporary and regular contracts.[29]

  Reducing barriers to firm entry and entrepreneurship, including by reviewing occupational entry regulations, may reduce obstacles to job mobility along with promoting labour and business dynamism. New empirical evidence by (Bambalaite, Nicoletti and Von Rueden, 2020[22]) suggests that many countries have ample scope for achieving public goals in terms of safety and consumer satisfaction with lighter occupational entry requirements. In particular, easing regulations concerning qualification requirements in personal services would eliminate mobility restrictions that create unnecessary labour market rigidities, with disproportionate benefits for low or middle-income workers such as aestheticians, hairdressers, nurses, painters, plumbers and taxi drivers. Reforms in this area would thus achieve both productivity and inclusiveness objectives.

The case for place-based policies

Creating opportunities is not necessarily moving individuals out of less developed regions. It can be deploying quality infrastructure and amenities in such regions, for instance to allow individuals to live there and work elsewhere, especially in a context of rising digitalisation and teleworking. This is about helping stayers, which could contribute to achieve several objectives: i) reducing regional labour market imbalances and raising productivity growth; ii) reinvigorating and rejuvenating left-behind places;[30] iii) reducing congestion and air pollution in metropolitan areas; and iv) making housing more affordable in cities and thus reducing regional divergences in house prices. Another argument in favour of this approach is based on evidence that falling migration rates have often been associated with limited migration from struggling to thriving places (Figure 2 and Figure 3). While for some countries this is likely to be a policy concern in itself, it may raise the returns to local interventions, making it less likely that the benefits from

[29] See Chapter 3 in the latest OECD Employment Outlook for a focus on recent developments in job protection legislation (OECD, 2020[42]).

[30] See (OECD, 2019[27]) and (OECD, 2020[22]) for a comprehensive data analysis and discussion on regional inequities with respect to megatrends such as ageing and automation.

such interventions are captured by those who initially live outside the target location, or by landowners in the struggling region.

Place-based policies to support stayers in lagging-behind regions require investing in quality infrastructure, transport and public amenities:

- Hospital and medical facilities
- Quality childcare, schools, vocational training and universities[31]
- Digital coverage and connectivity
- Well-functioning public transportation infrastructure, for instance to improve access to urban areas.

Place-based policies have recently regained interest in many countries and international organisations (OECD, 2020[21]), (OECD, 2020[22]), (OECD, 2020[23]), (OECD, 2019[27]), (Brookings, 2018[37]), (Iammarino, Rodriguez-Pose and Storpe, 2018[34]). However, they often continue to be associated with spatial subsidies and compensatory policies so as ex-post redistribution interventions instead of ex-ante policy interventions that would exploit the growth potential of lagging regions. Place-based policies go beyond direct support for lagging regions, to include recognition of and adaptation to specific territorial assets for all places, investment strategies, involvement of stakeholders, the search for complementarities across different sectoral policy lines and the implementation of an effective multi-level governance system (OECD, 2019[27]).

Articulating structural with place-based policies to help a smooth recovery

One relevant policy issue today is how to articulate structural with place-based policies to help a smooth recovery from the COVID-19 crisis.[32] The crisis has a very heterogeneous economic impact across regions within countries, depending for instance on a region's exposure to tradable sectors, to global value chains and sectoral specialisation.[33] The extent and timing to which certain activities such as tourism and hospitality will recover is uncertain at the current juncture, but it is highly certain that policy interventions are needed to mitigate the negative impact of the crisis on people and places, including by enhancing labour and product market dynamism. The remainder of this section relies on the results of this paper and on the literature to introduce some tentative proposals for articulating structural with place-based policies to help a smooth recovery from the COVID-19 crisis.

Social policies to promote inclusiveness and crisis resilience are very likely to require articulating "spatially-blind" with "spatially-aware" measures. One relevant area of policy intervention is that of jobseekers' support. Unemployment benefits are usually established at the national level yet lessons from crisis episodes suggest that allowing them to vary in response to local labour market shocks can promote resilience. For example as part of the COVID-19 crisis, Canada has allowed an automatic extension of maximum duration according to the regional unemployment rate (Box 2.6 in (OECD, 2020[38])). Adequate, potentially state-contingent, income support needs to be complemented with locally-provided activation and training policies. These could involve local employers and take into account the local context in terms

[31] Evidence suggests large cross-regional disparities in spending and quality. For example in France, there are large geographical variations in spending per student, especially in primary and secondary. In a recent survey (OECD, 2018[64]), two out of five school directors in France complained of insufficient internet access in school which hampers the schools' capacity to provide quality education. Close to 60% also lament lack of computer hardware and software. These gaps appear mostly in disadvantaged zones, rather than in big cities.

[32] The discussion in this paper focuses on the medium-term policy horizon. Most of the large-scale economic and labour market policy responses to combat the initial outbreak of the COVID-19 crisis were national, but local and regional actors also played an important role. See (OECD, 2020[23]) and (OECD, 2020[21]) for a comprehensive analysis and discussion.

[33] (OECD, 2020[22]) (OECD, 2020[21]) (OECD, 2020[23]) (OECD, 2020[30]).

of e.g. unemployment level and persistence, socioeconomic composition and skills of the workforce, availability of jobs or increasingly demanded jobs, and sectoral specialisation in declining/expanding sectors.

At the onset of the pandemic, governments intervened by expanding as much as possible unemployment and other benefits to previously less covered population groups such as temporary workers, self-employed and part-time workers (OECD, 2020[21]). As these emergency measures wind down and the recovery and rebuilding phase starts, local actions will become even more important. Regional and local governments often play a leadership role in delivering relevant employment, skills and economic development policies. For example, in almost half of OECD countries with available data, local and regional governments are wholly or partially responsible for implementing active labour market policies (OECD, 2020[22]). They are also best positioned to coordinate across these policy areas. Some countries have recently implemented spatially targeted policies to encourage the labour market recovery from the COVID-19 crisis, with a focus on training and reskilling at the local level (Box 2).

Box 2. Recent spatially-targeted training measures to encourage the labour market recovery from the COVD-19 crisis

In September 2020, Australia introduced the AUD 63 million Local Jobs Program as part of its economic response to COVID-19. The Local Jobs Program focusses on upskilling, reskilling and establishing employment pathways for those looking to return to work following COVID-19. The programme includes the establishment of Employment Facilitators who will chair Local Jobs and Skills Taskforces across 25 regions and work with local stakeholders including employers, employment services providers and training organisations to drive the development of a Local Jobs Plan. A Local Recovery Fund will be available in each region for local stakeholders to develop projects in line with the employment needs of their region, as identified by their Taskforce and Local Jobs Plan.

In November 2020, Canada established a CAD 1.5-billion in job-training support to the provinces and territories to help Canadians in industries hit hard by the COVID-19 pandemic. This funding is targeted to Canadians in underrepresented groups and those in sectors that have been hardest hit by the pandemic – such as construction, transportation, and hospitality – quickly access supports to re-enter the workforce. It includes skills training, on-the-job training, employer-sponsored training, financial assistance and benefits, employment counselling and services, and job opportunities. This funding is in addition to the CAD 3.4 billion provided to provinces and territories in 2020-21 under the Workforce Development Agreements and Labour Market Development Agreements.

Source: https://www.employment.gov.au/local-jobs-program; https://pm.gc.ca/en/news/news-releases/2020/11/13/helping-canadians-develop-skills-they-need-find-good-jobs.

Job protection reforms advocated in this paper with a view to reducing barriers to mobility may not be desirable in the current crisis context insofar as they risk increasing layoffs and not hirings, given weak labour demand. In the short run, there is a case for temporary hiring subsidies targeted at low-educated workers or young people, as evidence suggests that they have been effective in boosting growth during the global financial crisis (OECD, 2020[38]). Some countries have taken initiatives in this respect, such as Australia with the “Job Maker Hiring Credit”, the United Kingdom with the “Kickstart” and France with the“1 jeune, 1 solution” (1 young, 1 solution) scheme. Depending on countries’ context, it may be impactful to target such temporary subsidies to specific regions, for example regions with a high concentration of low-educated workers, or to tailor them to region-specific context like industrial specialisation.

Finally, place-based policies may imply to direct more investment funds towards disadvantaged zones, where the marginal value of public spending could be highest. In the context of the COVID-19 crisis, number of OECD countries have been taking relevant action to bridge the digital divide across regions (OECD, 2020[22]). For example, in Portugal, in October 2020, the European Commission approved the reallocation of EUR 1 billion from EU Cohesion policy funds to support seven Portuguese regions. Funds will also support the digitalisation of schools, SMEs, and the tourism sector. In the United States, several states have adopted measures to bridge the digital divide. For example, the City of Los Angeles is partnering with the private sector to provide options for low-cost internet, access to computers, and digital literacy services as well as device and digital training resources to its residents through its 'Get Connected' programme.

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Annex A.

Data sources

Migration data come from the OECD Regional database that, amongst others, collects information regarding internal migration flows from national statistical authorities. In cases where such data is not fully available (France, the United Kingdom) or missing (Greece, Portugal), the analysis also relies on alternative data sources: 1) The European Labour Force Study (EU-LFS): This source allows for inferring inter-regional migration based on comparing respondent's replies to current region of residence and region of residence one year before the survey. 2) The Internal Revenue Service (IRS) for the United States: This source provides internal migration data based on tax filings. Previous literature on the United States has often relied on the Current Population Survey (CPS), yet the current consensus suggests that CPS-based internal migration rates are less accurate than IRS-based (Molloy and Smith, 2019[23]). As a result, the paper relies mainly on IRS, in particular in the regression analysis. CPS-based migration series are reported for comparison purposes and for uncovering a longer time span than IRS-based series.

The OECD database on regional house prices provides harmonised index data, measuring the change of regional house prices over time. These indexes are used in the main body of the paper, such that the effect of house prices on internal migration is estimated on the basis of cross-regional differences in changes, not levels. In addition, a variant of the baseline model is also run with house price levels. These variables are retrieved from national data sources and are, by contrast with the indexes produced by the OECD used in the core analysis, only weakly comparable across countries.

Table A.1 delivers an overview of all the data included in the cross-country regressions, in terms of regional variables and national policy variables. Table A.2 summarises data sources for house price levels used in an extension to the baseline regression.

Table A.1. Data definitions and sources

Variable	Description	Source
Internal migration flows	Number of migrants who move into a region from all other regions of the same country.	EU-LFS (FRA, GRC, GBR, PRT), IRS (USA), CPS (USA), OECD Regional Database (all remaining countries, also including FRA and GBR)
GDP per capita	GDP per capita in real terms (base year 2010) in national currency.	OECD Regional Database
Unemployment rate	Number of unemployed over active population (15-64 years).	OECD Regional Database
House price index	The index measure the evolution of residential property prices over time. It is originally computed based on nominal values and transformed to real values by means of the private consumption deflator with base year in 2010.	OECD National and Regional House Price Indices
Housing supply elasticity	Measures the extent to which housing supply responds to price changes in the housing market.	Cavalleri, M., B. Cournède and E. Özsöğüt (2019), How Responsive Are Housing Markets in the OECD? National Level Estimates.
Rent control	This measure relies on data from QuASH that is extrapolated using data from the DIW rental market regulation index. It accounts for the number of regulations that restrict rents with respect to real rent freeze, nominal rent freeze, rent level control, intertenancy control and other specific rent controls. The values range between 0 and 1 with larger values indicating stronger rental control.	2017 OECD Questionnaire on Affordable and Social Housing (QuASH), DIW Rental Market Regulation Index
Landlord-tenant regulation	This measure captures the difficulty associated with tenant eviction as well as tenure security and deposit requirements. Higher values correspond to stricter landlord-tenant regulation.	Andrews, D., Sánchez, A. C., and Johansson, Å. (2011). Housing markets and structural policies in OECD countries.
Notary fees	Notarial and other legal fees are fees linked to property transaction. The indicator's value is based on the member countries' replies to the 2010 OECD Housing Market Questionnaire.	Andrews, D., Sánchez, A. C., and Johansson, Å. (2011). Housing markets and structural policies in OECD countries.
Relative size of the social rental housing stock	Number of social rental dwellings in percent of the total housing stock.	OECD Affordable Housing Database
Public spending on housing allowances	This indicator measures public spending on housing allowances, where housing allowances denote means- and/or income-tested income transfers to households directed at supporting households in meeting their housing costs.	OECD Affordable Housing Database

Variable	Description	Source
Land use governance	This indicator assesses the organisation of land-use decision-making processes across different levels of government. Higher values of the indicator reflect more overlap and/or more decentralisation. The indicator is calculated by summing the values of importance for the corresponding level of government in the land-use decision-making process (from none=0 to very high=5) across the three administrative levels and weighting the values by the level of decentralisation (metropolitan=1, municipal=2, district=3).	Cavalleri, M., B. Cournède and E. Özsöğüt (2019), "How Responsive Are Housing Markets in the OECD? National Level Estimates"
Spending on active labour market policies, total	Public spending on active labour market policy as percentage of GDP.	OECD Labour Market Programmes Database
Spending on active labour market policies, sheltered and supported employment	Public spending on supported employment and rehabilitation under active labour market policy as percentage of GDP.	OECD Labour Market Programmes Database
Spending on active labour market policies, PES and administration (% of GDP)	Public spending on public employment services and administration as percentage of GDP.	OECD Labour Market Programmes Database
Job protection on regular contracts	The OECD indicators of employment protection legislation measure the procedures and costs involved in dismissing individuals or groups of workers and the procedures involved in hiring workers on fixed-term or temporary work agency contracts. The indicators have been compiled using the Secretariat's own reading of statutory laws, collective bargaining agreements and case law as well as contributions from officials from OECD member countries and advice from country experts.	LFS – Strictness of EPL Database
Unemployment benefit replacement rate, single without children, 12 months	Measure of the proportion of previous in-work income that is maintained for a single person without children after 12 months of unemployment, formerly earning 67% of the average wage, housing benefits included.	OECD Social Protection and Well-being Database
Unemployment benefit replacement rate, couple with children, 12 months	Measure of the proportion of previous in-work income that is maintained for a couple with children after 12 months of unemployment, formerly earning 67% of the average wage, housing benefits included.	OECD Social Protection and Well-being Database
Unemployment benefit replacement rate, single with children, 6 months	Measure of the proportion of previous in-work income that is maintained for a single person with children after 6 months of unemployment, formerly earning 67% of the average wage, housing benefits included.	OECD Social Protection and Well-being Database

Variable	Description	Source
Income redistribution through taxes and transfers	It is computed as the ratio of the difference between Gini before taxes and transfers and after taxes and transfers to the Gini before taxes and transfers.	OECD Income Distribution Database
Collective bargaining coverage	Percentage of employees with the right to bargain	Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts
Minimum to median wage ratio	Minimum relative to median wages of full-time workers	LFS - Minimum relative to median wages of full-time workers
Minimum cost of labour	Minimum cost of labour in percent of labour cost of media worker.	OECD Going for Growth 2019
Average tax wedge, 67% of average wage	Average tax wedge, 67% of average wage, single person without children	OECD Going for Growth 2019
Average tax wedge, 100% of average wage	Average tax wedge, 100% of average wage, couple with two children.	OECD Going for Growth 2019
Earnings inequality: D5/D1	Decile ratio (D5/D1) of gross earnings of full-time dependent employees.	LFS - Decile ratios of gross earnings
Earnings inequality: D9/D1	Decile ratio (D9/D1) of gross earnings of full-time dependent employees.	LFS - Decile ratios of gross earnings
Incidence of low pay	This measure is defined as the share of full-time workers earning less than two-thirds of gross median earnings of all full-time workers	LFS - Decile ratios of gross earnings
Share of working age population with below upper secondary education	Share of working age population (24-64 years) with educational attainment below upper secondary education (ISCED 3).	OECD Regional Education Database
Skill needs	Technical skills are defined as developed capacities used to design, set-up, operate, and correct malfunctions involving application of machines or technological systems. Positive values indicate skill shortage while negative values point to skill surplus. The larger the absolute value, the larger the imbalance. Results are presented on a scale that ranges between -1 and +1.	OECD Skills for Jobs Indicator
Product market regulation: barriers to entrepreneurship	Indicator based on data from 1998-2013.	OECD Product Market Regulation Database

Variable	Description	Source
Product market regulation: administrative requirements for LLCs and personally owned enterprises	Indicator based on data from 2018	OECD Product Market Regulation Database
Product market regulation in professional services: lawyers	Indicator based on data from 1998-2018	OECD Product Market Regulation Database
Product market regulation in professional services: accountants	Indicator based on data from 1998-2018	OECD Product Market Regulation Database
Product market regulation in professional services: engineers	Indicator based on data from 1998-2018	OECD Product Market Regulation Database
Product market regulation in professional services: architects	Indicator based on data from 1998-2018	OECD Product Market Regulation Database
Occupational entry restrictions: administrative burdens, personal services	It captures limitations and procedural hurdles set on obtaining the legal authorisation to practice with regards to personal services such as being a baker, driver or electrician.	Bambalaite, I., Nicoletti, G., and von Rueden, C. (2020). Occupational entry regulations and their effects on productivity in services: Firm-level evidence.
Occupational entry restrictions: administrative burdens, professional services	It captures limitations and procedural hurdles set on obtaining the legal authorisation to practice with regards to professional services such as being an accountant, lawyer or real-estate agent.	Bambalaite, I., Nicoletti, G., and von Rueden, C. (2020). Occupational entry regulations and their effects on productivity in services: Firm-level evidence.

Table A.2. Real house price data: Definitions and sources

Country	Unit	Source
AUS	Median house price per sqm	Australian Bureau of Statistics
BEL	Mean house prices per sqm	Houselev database, European Commission
CAN	Median house price per sqm	Canada Mortgage and Housing Corporation
CHE	Mean house prices per sqm	Houselev database, European Commission
CZE	Mean house prices per sqm	Czech Statistical Office
DNK	Median house price per sqm	Danish mortgage bank
ESP	Mean house prices per sqm	Houselev database, European Commission
FIN	Median house price per sqm	Statistics Finland
FRA	Mean house prices per sqm	Houselev database, European Commission
GBR	Mean house prices per sqm	Land Registry Open Data
ITA	Mean house prices per sqm	Houselev database, European Commission
KOR	Mean house prices per sqm	Ministry of Land, Infrastructure, and Transport
NLD	Mean house prices per sqm	Houselev database, European Commission
POL	Mean house prices per sqm	Houselev database, European Commission
PRT	Mean house prices per sqm	Houselev database, European Commission
SWE	Mean house prices per sqm	Houselev database, European Commission
TUR	Mean house prices per sqm	Houselev database, European Commission
USA	Median house price per sqm	American Community Survey

Regional classification and decomposition

The OECD regional classification grid allows for producing a consistent and comparable analysis of regional characteristics across countries and over time. Inevitably, there are some data availability issues, particularly for measures of internal migration flows and house prices. The chosen regional classification for a specific country always reflects a trade-off between maximising granularity and minimising data losses. Whenever possible, the analysis relies on the most granular regional classification, that is, TL3 and the notes of each figure indicate the underlying country-specific regional classification. However, in particular the matching of different economic variables for the purpose of the regression analysis often requires a less granular regional classification, since the availability of data on all model parameters is often more complete for larger regions in TL2. Table A.3 presents an overview of regional data availability, coverage and classification as used for the regression analysis.

Table A.3. Regional classification and decomposition

Country	Regional classification	Number of regions	Missing regions (unless indicated differently)	Timespan
Australia	TL2	8		2005 - 2016
Belgium	TL2	3		2002 - 2015
Canada	TL2	10	Yukon, Northwest Territories, Nunavut	2000 - 2017
Czech Republic	TL3	10		2011 - 2017
Denmark	TL2	5		2011 - 2016
Finland	TL2	2		2008 - 2016
France	TL2	4	Included regions: Île-de-France, Hauts-de-Franc, Auvergne-Rhône-Alpes, Provence-Alpes-Côte d'Azur	2009 - 2017
United Kingdom	TL2	11	Northern Ireland	2001 - 2017
Italy	NUTS 1	4	Sardinia, Sicily	2001 - 2017
Japan	TL2	11		2012 - 2015
Korea	TL2	12	Jeolla Region	2010 - 2017
Netherlands	TL2	12		2006 - 2017
Norway	TL3	5		2001 - 2010
Poland	TL2	9	Kuyavian-Pomerania, Warmian-Masuria, Lodzkie, Swietokrzyskie, Lublin Province, Podkarpacia, Podlaskie, Warsaw, Mazowiecki Region	2007 - 2017
Portugal	TL2	4	Metropolitan Area of Lisbon, Autonomous Region of the Azores, Autonomous Region of Madeira	2008 - 2017
Spain	TL2	19		2002 - 2017
Sweden	TL2	6	Stockholm, Småland with Islands	2001 - 2017
Switzerland	TL2	6	Ticino	2012 - 2015
Turkey	TL2	26		2009 - 2017
United States	TL2	51		2000 - 2016

Data availability on migration at the TL3 level is not fully exhaustive for the United Kingdom as only approximately two thirds of all regions are covered. In order to still make use of these granular data, most figures rely on this dataset for the United Kingdom. On the contrary, the regression analysis relies on the more disaggregate TL2 classification with migration data computed based on EU-LFS data to profit from the more complete regional coverage. The missing regions at the TL3 level are:

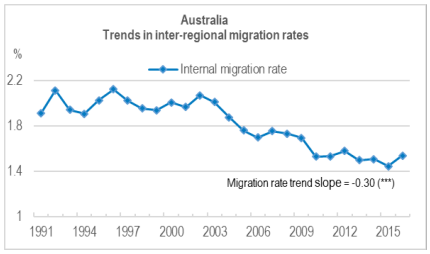
Aberdeen City and Aberdeenshire; Angus and Dundee City; Barking and Dagenham & Havering; Barnet; Bexley & Greenwich; Breckland & South Norfolk; Brent; Bromley; Caithness & Sutherland and Ross & Cromarty; Camden & City of London; Central Hampshire; Chorley & West Lancashire; City of Edinburgh; Clackmannanshire and Fife; Croydon; Dumfries & Galloway; Ealing; East Ayrshire and North Ayrshire Mainland; East and West Dunbartonshire and Helensburgh & Lomond; East Kent; East Lancashire; East Lothian and Midlothian; East Surrey; Eilean Siar (Western Isles); Enfield; Essex Haven Gateway; Essex Thames Gateway; Falkirk; Glasgow City; Greater Manchester (GM) North East; GM North West; GM South East; GM South West; Hackney & Newham; Haringey & Islington; Harrow & Hillingdon; Heart of Essex; Hounslow & Richmond upon Thames; Inverclyde; East Renfrewshire and Renfrewshire; Inverness & Nairn and Moray, Badernoch & Strathspey; Kensington and Chelsea & Hammersmith and Fulham; Kent Thames Gateway; Lambeth; Lancaster & Wyre; Lewisham & Southwark; Lochaber, Skye & Lochalsh, Arran & Cumbrae and Argyll & Bute; Manchester; Merton, Kingston upon Thames & Sulton; Mid Kent; Mid Lancashire; North and West Norfolk; North Hampshire; North Lanarkshire; Norwich & East Norfolk; Orkney Islands; Perth & Kinross and Stirling; Redbridge & Waltham Forest; Scottish Borders; Shetland Islands; South Ayrshire; South Hampshire; South Lanarkshire; Tower Hamlets; Wandsworth; West Essex; West Kent; West Lothian; West Surrey; West Sussex (North East); West Sussex (South West); Westminster.

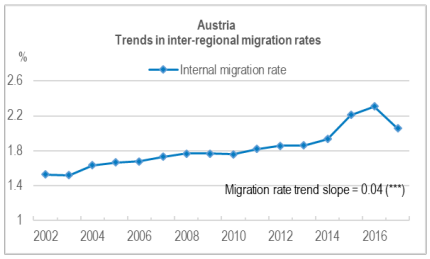
Additional material

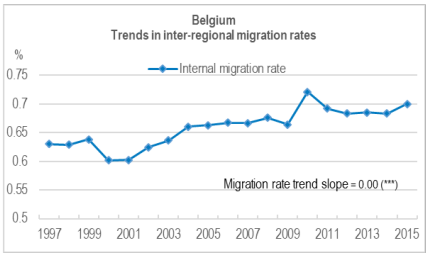
This section presents additional material to complement the empirical analysis of the main paper, covering two major aspects: i) more granular country-specific stylised facts, ii) additional material underlying the empirical analysis, and iii) full regression tables for the policy analysis.

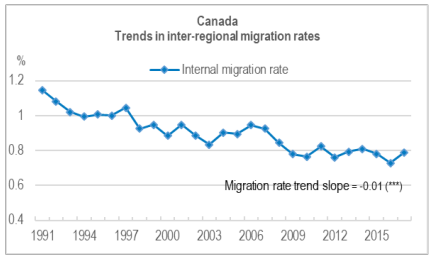
Figure A.1 and Figure A.2 deliver country-specific profiles of developments in internal migration and in regional house prices, respectively.

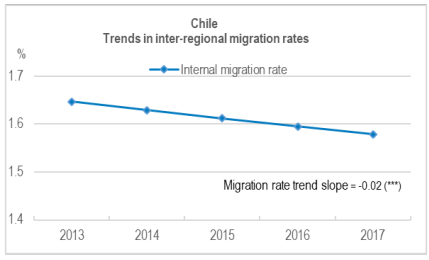
Figure A.1. Developments in internal-regional migration rates, country profiles

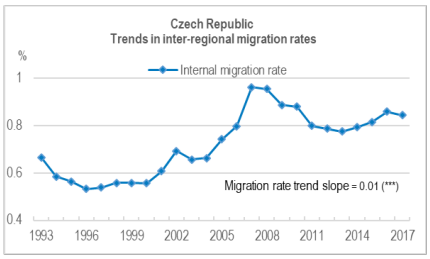


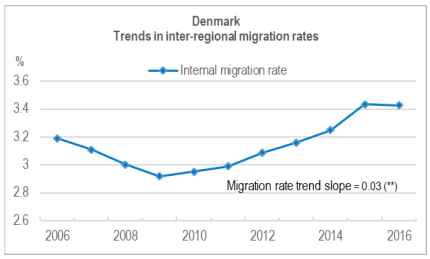


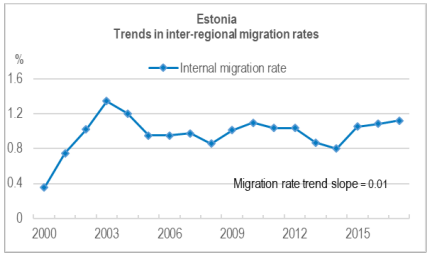


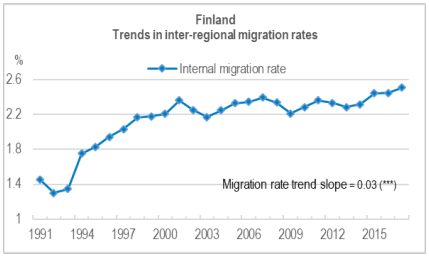


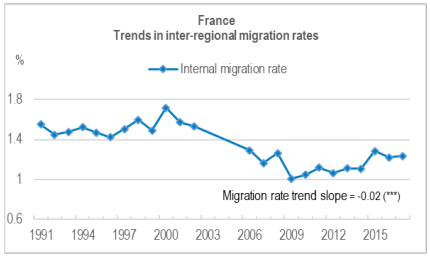


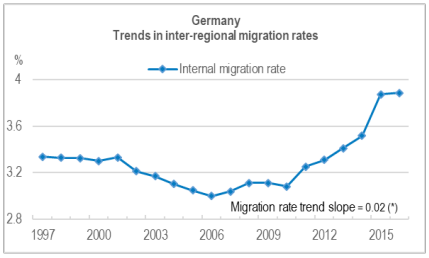


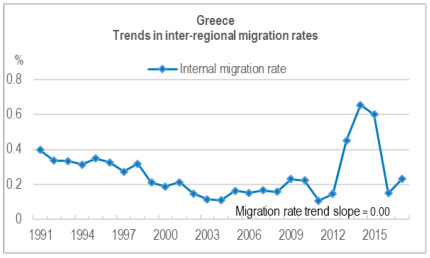


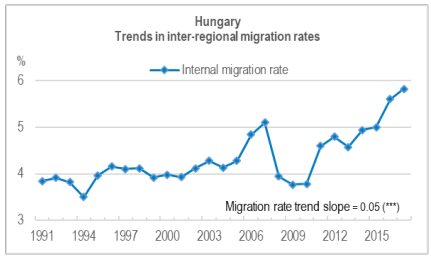


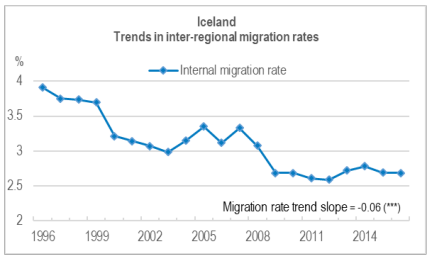


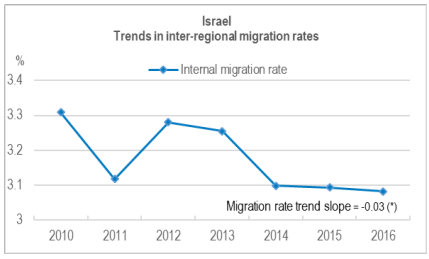


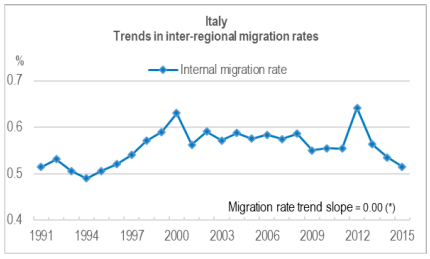


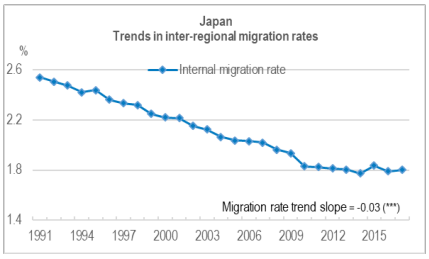


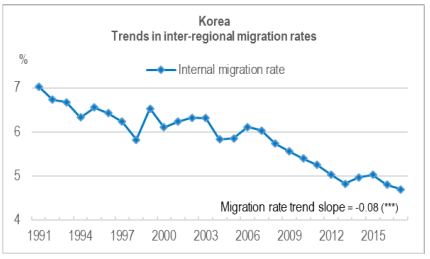


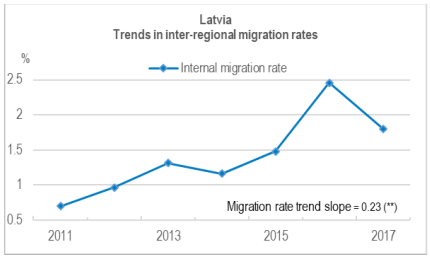


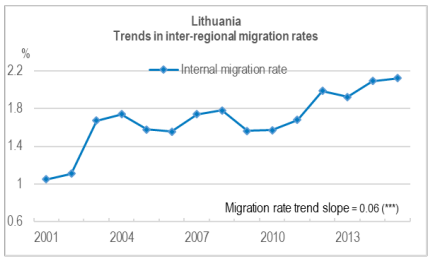


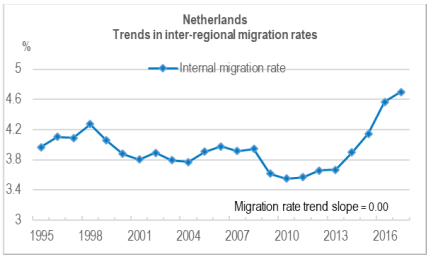


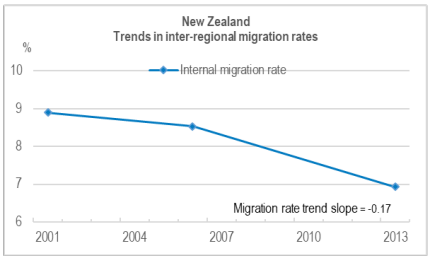


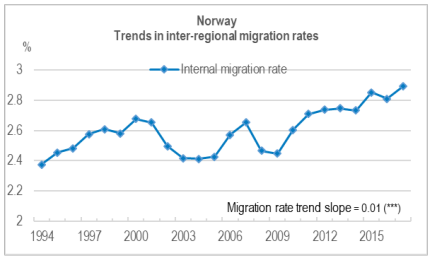


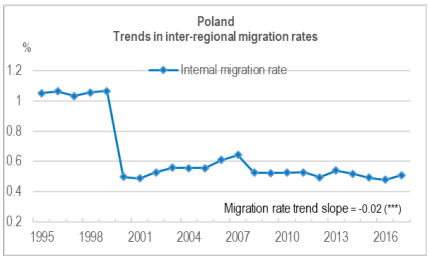


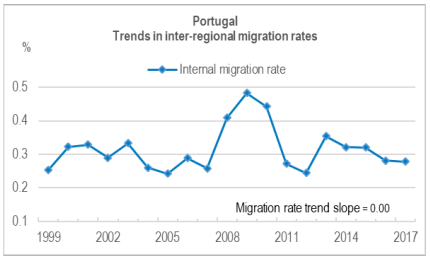


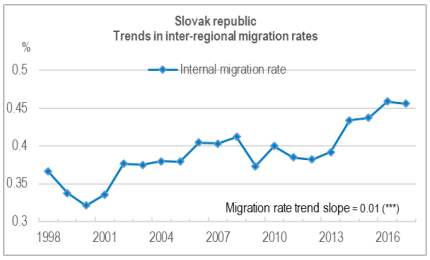


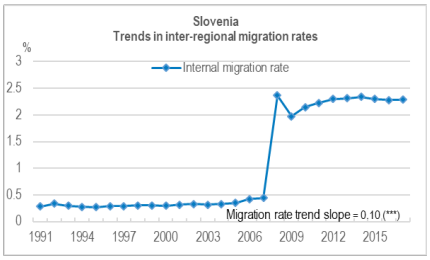


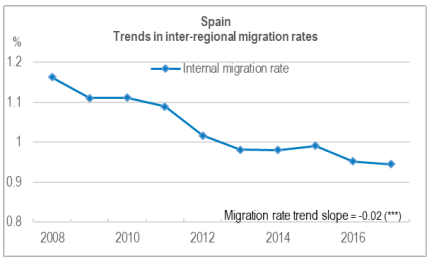


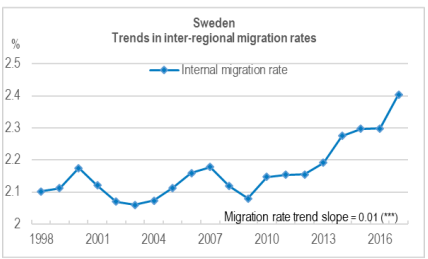


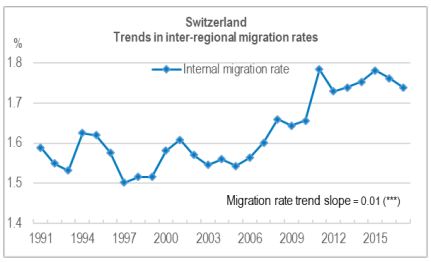


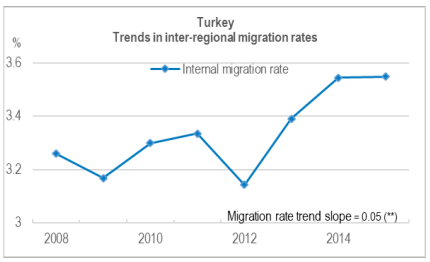


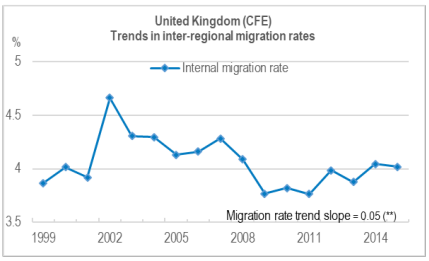


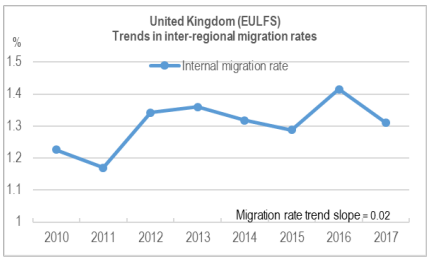


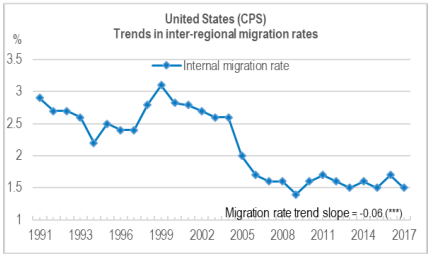


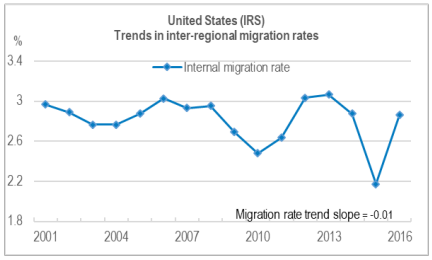






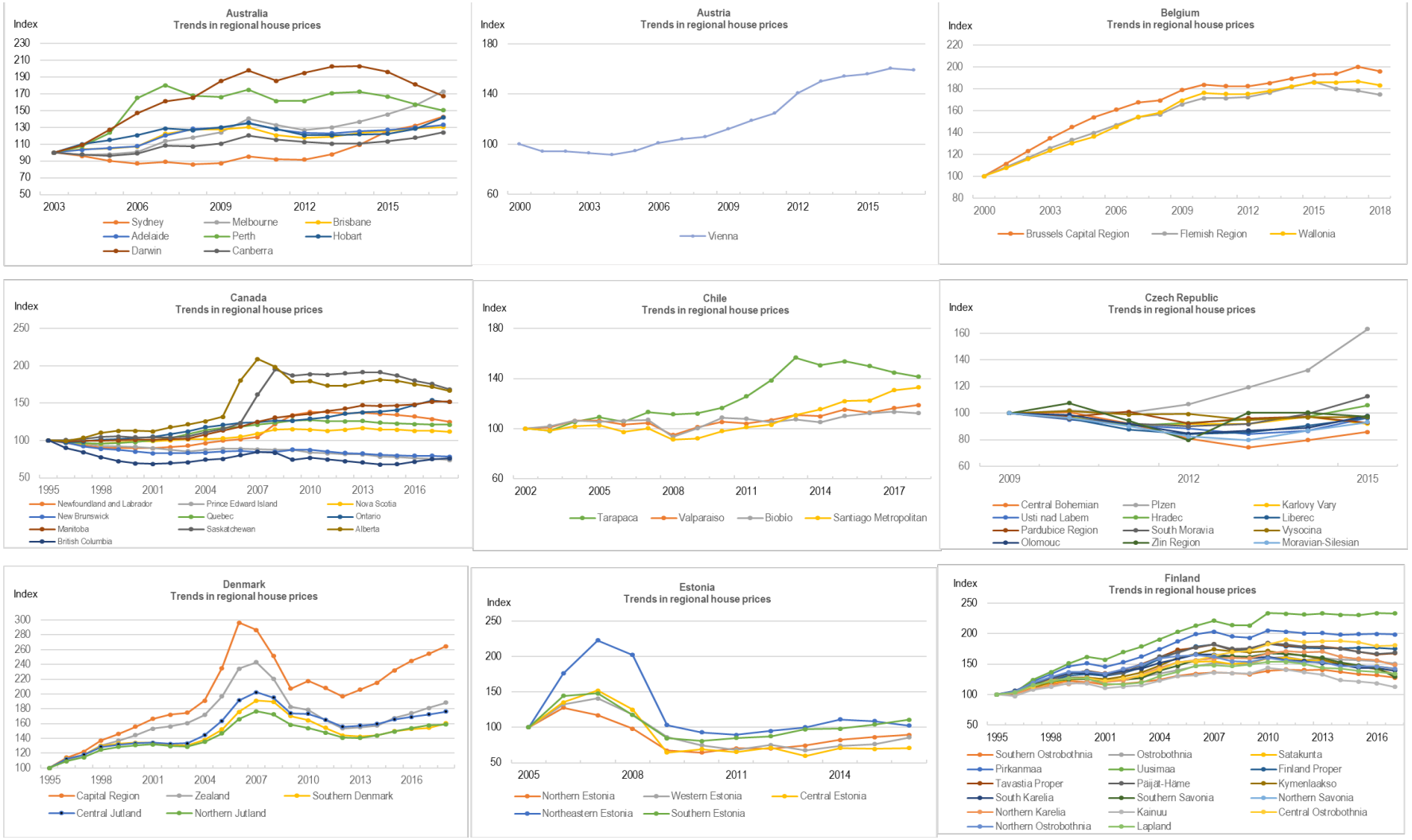


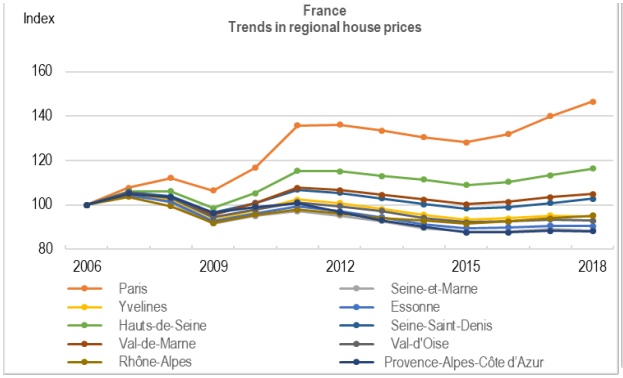


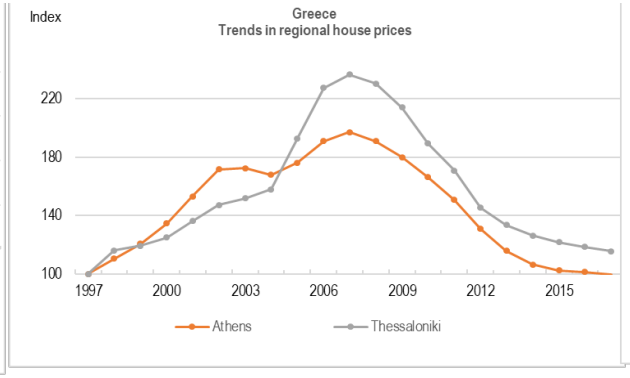


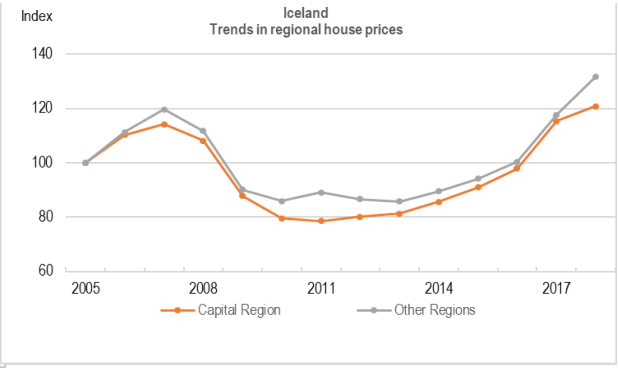
Note: Internal regional migration rates are defined as the number of migrants coming in the region from another region in the same country divided by regional population one year before. The trend slope is the coefficient of a regression from the migration rate on a linear time trend. ***, **, * refer to the statistical significance of the estimated slope coefficient at the 1%, 5% and 10%, respectively.
TL2 regional classification for AUS, BEL, CAN, FRA, GRC, (GBR-EULFS), ITA, PRT and USA; TL3 for the other countries (and GBR). Source: OECD Regional database, EULFS for FRA, (GBR), GRC and PRT, CPS and IRS for the United States.

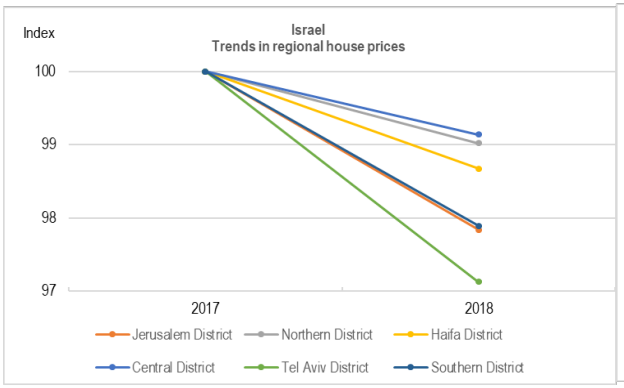
Figure A.2. Developments in regional house prices, country profiles

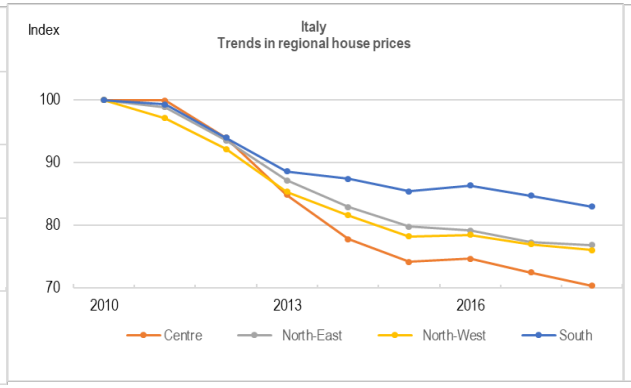


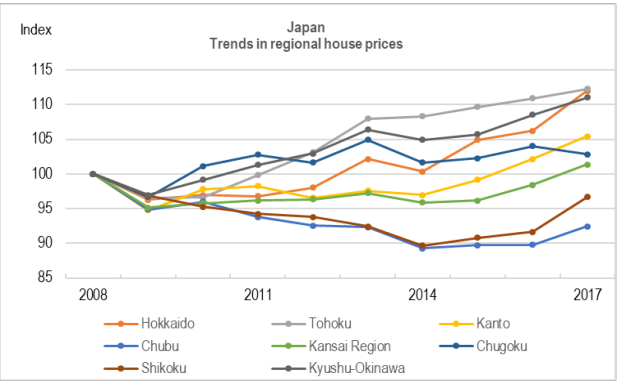

France
Trends in regional house prices
Index
160
140
120
100
80
2006
2009
2012
2015
2018
Paris
Yvelines
Hauts-de-Seine
Val-de-Marne
Rhône-Alpes
Seine-et-Marne
Essonne
Seine-Saint-Denis
Val-d'Oise
Provence-Alpes-Côte d'Azur

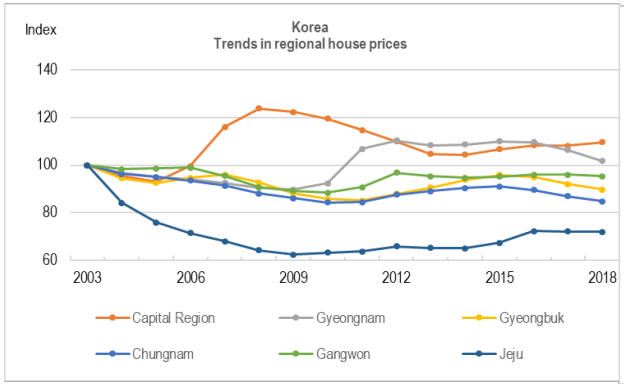

Greece
Trends in regional house prices
Index
220
180
140
100
1997
2000
2003
2006
2009
2012
2015
Athens
Thessaloniki

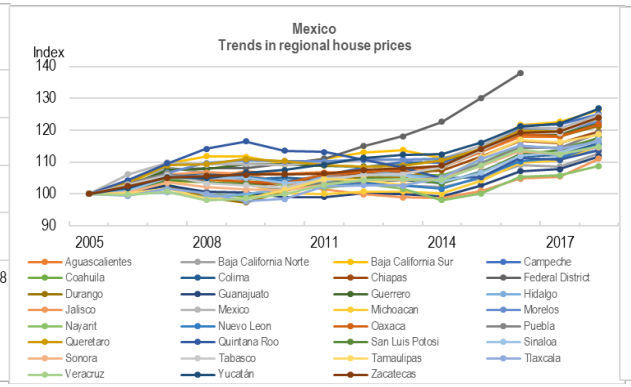

Iceland
Trends in regional house prices
Index
140
120
100
80
60
2005
2008
2011
2014
2017
Capital Region
Other Regions

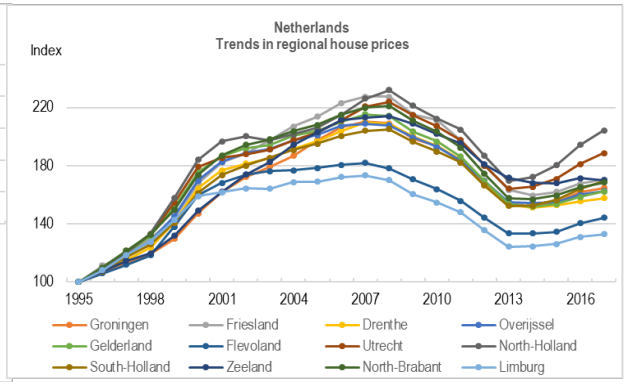

Israel
Trends in regional house prices
Index
100
99
98
97
2017
2018
Jerusalem District
Northern District
Haifa District
Central District
Tel Aviv District
Southern District


Italy
Trends in regional house prices
Index
100
90
80
70
2010
2013
2016
Centre
North-East
North-West
South


Japan
Trends in regional house prices
Index
115
110
105
100
95
90
85
2008
2011
2014
2017
Hokkaido
Tohoku
Kanto
Chubu
Kansai Region
Chugoku
Shikoku
Kyushu-Okinawa


Korea
Trends in regional house prices
Index
140
120
100
80
60
2003
2006
2009
2012
2015
2018
Capital Region
Gyeongnam
Gyeongbuk
Chungnam
Gangwon
Jeju


Mexico
Trends in regional house prices
Index
140
130
120
110
100
90
2005
2008
2011
2014
2017
Aguascalientes
Baja California Norte
Baja California Sur
Campeche
Coahuila
Colima
Chiapas
Federal District
Durango
Guanajuato
Guerrero
Hidalgo
Jalisco
Mexico
Michoacan
Morelos
Nayarit
Nuevo Leon
Oaxaca
Puebla
Queretaro
Quintana Roo
San Luis Potosi
Sinaloa
Sonora
Tabasco
Tamaulipas
Tlaxcala
Veracruz
Yucatán
Zacatecas


Netherlands
Trends in regional house prices
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220
180
140
100
1995
1998
2001
2004
2007
2010
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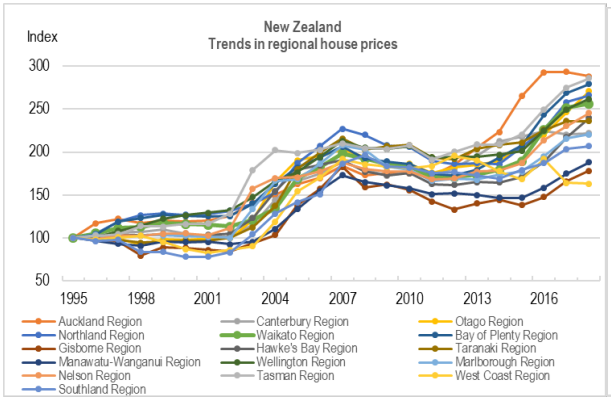
2016
Groningen
Friesland
Drenthe
Overijssel
Gelderland
Flevoland
Utrecht
North-Holland
South-Holland
Zeeland
North-Brabant
Limburg


New Zealand
Trends in regional house prices
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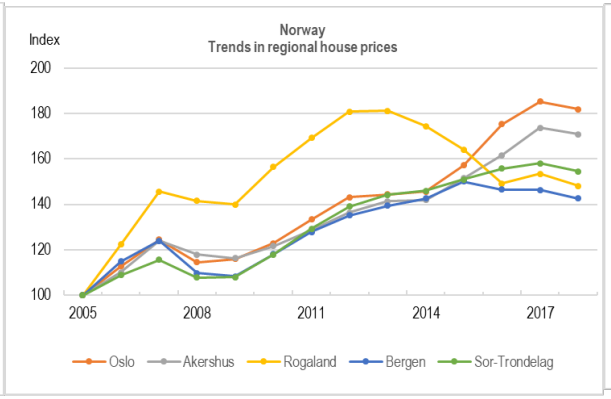
Auckland Region
Northland Region
Gisborne Region
Manawatu-Wanganui Region
Nelson Region
Southland Region
Canterbury Region
Waikato Region
Hawke's Bay Region
Wellington Region
Tasman Region
Otago Region
Bay of Plenty Region
Taranaki Region
Marlborough Region
West Coast Region


Norway
Trends in regional house prices
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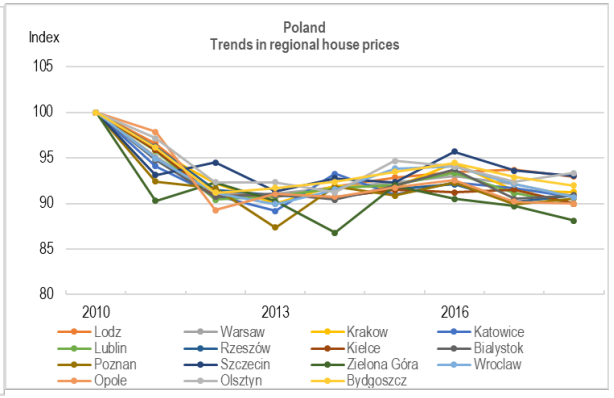
Oslo
Akershus
Rogaland
Bergen
Sor-Trondelag


Poland
Trends in regional house prices
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Lodz
Lublin
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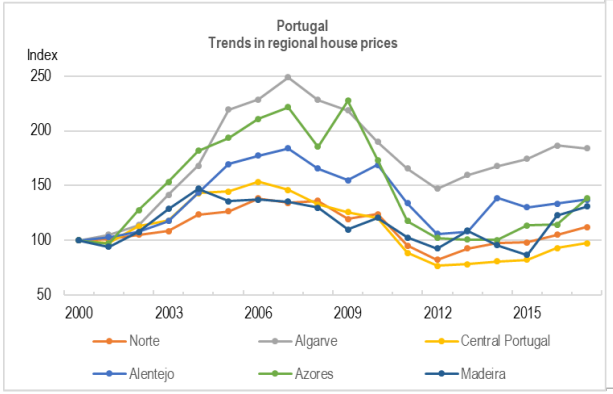
Bydgoszcz
Katowice
Bialystok
Wroclaw


Portugal
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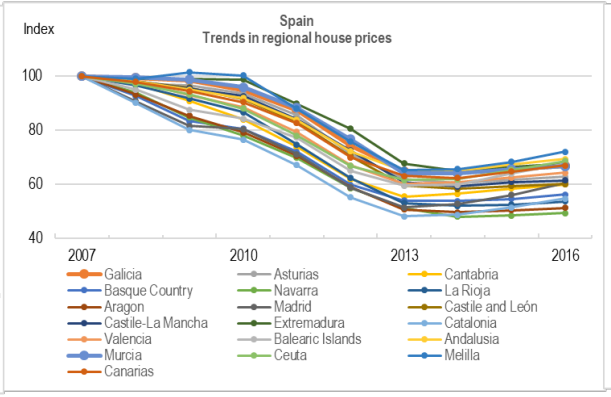
Madeira


Spain
Trends in regional house prices
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Galicia
Basque Country
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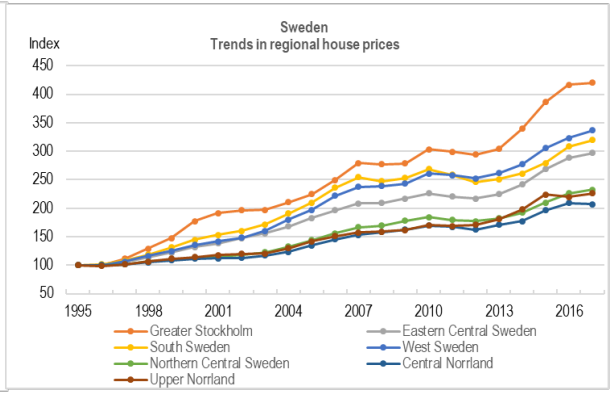
Navarra
Madrid
Extremadura
Balearic Islands
Ceuta
Cantabria
La Rioja
Castile and León
Catalonia
Andalusia
Melilla


Sweden
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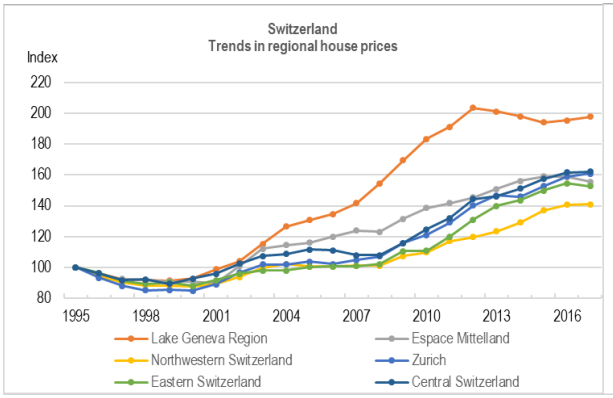
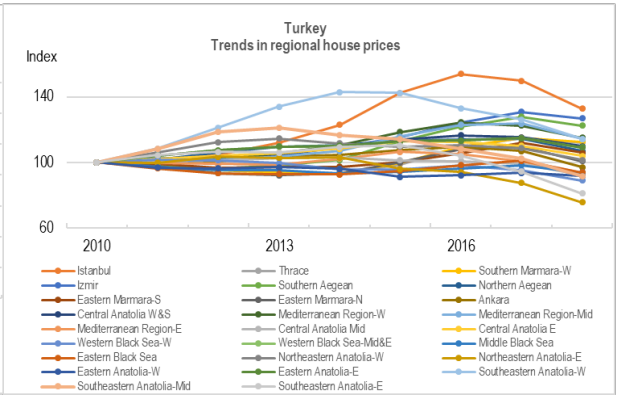
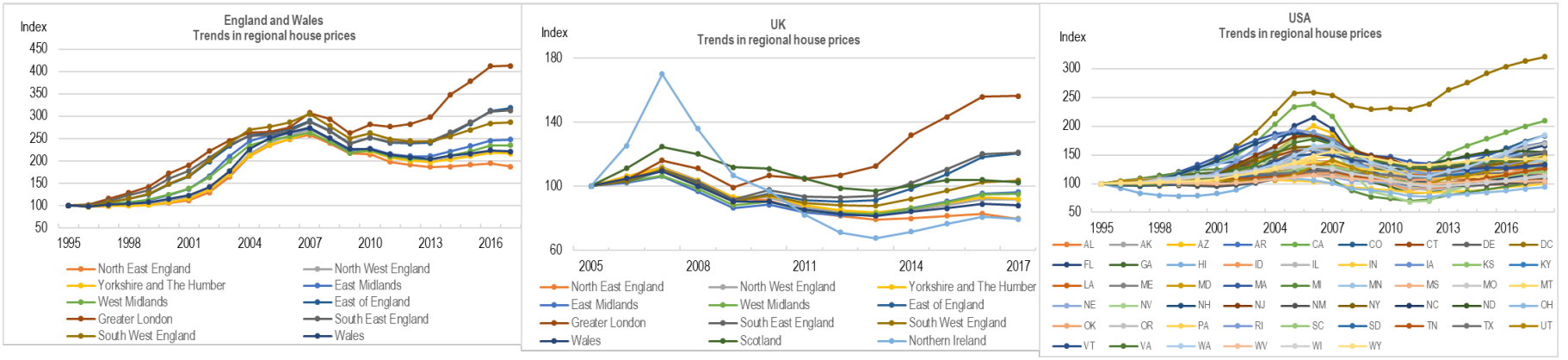
Greater Stockholm
South Sweden
Northern Central Sweden
Upper Norrland
Eastern Central Sweden
West Sweden
Central Norrland


Switzerland
Trends in regional house prices
Index
Lake Geneva Region
Northwestern Switzerland
Eastern Switzerland
Espace Mittelland
Zurich
Central Switzerland

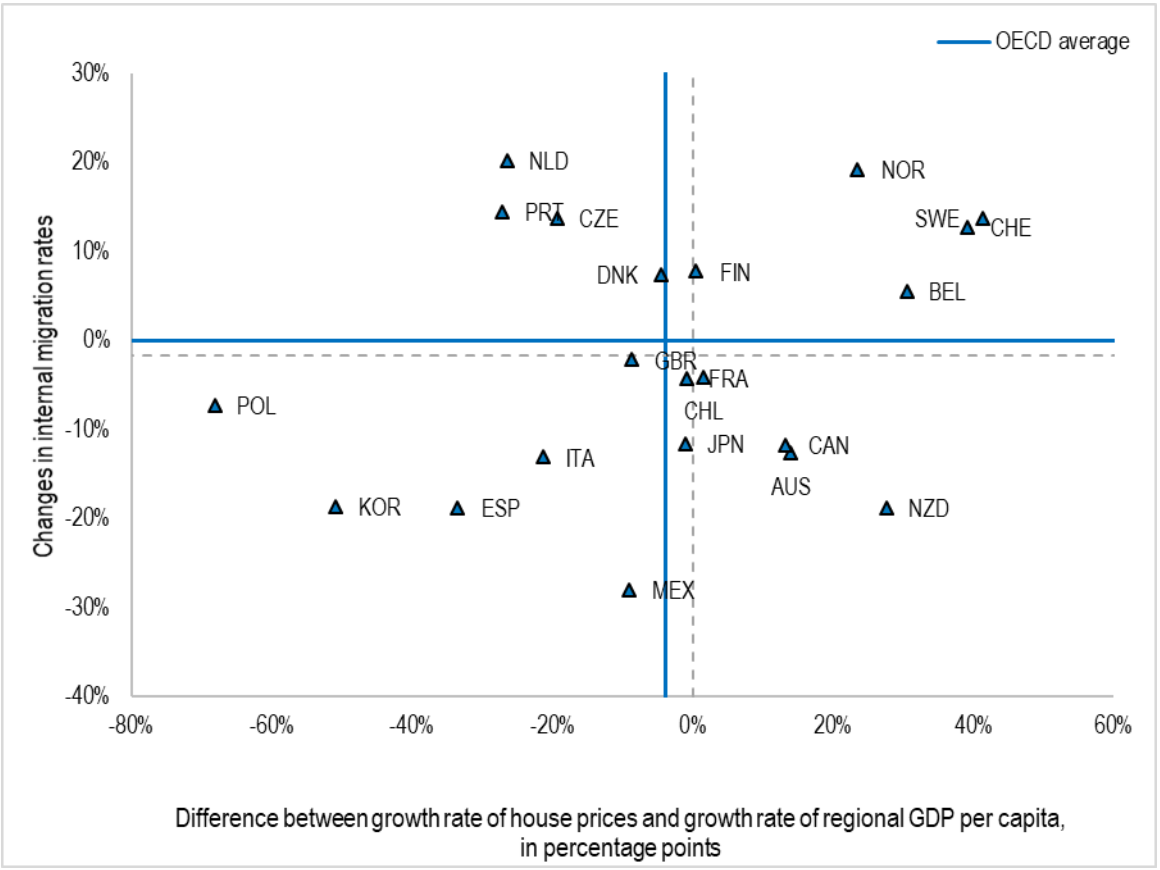

Turkey
Trends in regional house prices
Index
Istanbul
Izmir
Eastern Marmara-S
Central Anatolia W&S
Mediterranean Region-E
Western Black Sea-W
Eastern Black Sea
Eastern Anatolia-W
Southeastern Anatolia-Mid
Thrace
Southern Aegean
Eastern Marmara-N
Mediterranean Region-W
Central Anatolia Mid
Western Black Sea-Mid&E
Northeastern Anatolia-W
Eastern Anatolia-E
Southeastern Anatolia-E
Southern Marmara-W
Northern Aegean
Ankara
Mediterranean Region-Mid
Central Anatolia E
Middle Black Sea
Northeastern Anatolia-E
Southeastern Anatolia-W



Note: Regional index data is normalized to 100 in the first year of observation. House price data is available for England and Wales starting in 1995 while it is only available for a shorter period for the whole United Kingdom. Two figures are displayed to better depict the trend for both periods.
Source: OECD regional house price data

Figure A.3 presents a bivariate cross-country correlation scatterplot assessing developments in regional house price-to-incomes against developments in inter-regional migration.

Figure A.3. Developments in inter-regional migration rates and in regional house price-to-income ratios (2005-2017)



Note: Internal regional migration rates are defined as the number of migrants coming in the region from another region in the same country divided by regional population one year before.
Migration data refers to 2005-2017 with the following exceptions: AUS (2005-2016), DNK (2006-2016), EST (2005-2016), FRA (2006-2017), ISR (2010-2016), ESP (2008-2017), TUR (2008-2015), GBR (2005-2015). TL2 regional classification for AUS, CAN, FRA, and PRT; TL3 for the other countries.
Source: House price data from OECD regional house price; data on internal migration from OECD Regional database, EULFS for FRA and PRT.

Table A.4 reports baseline estimates substituting regional house price indexes with regional house price levels. Still, the baseline results turn out to be very similar to the core model with regional house price indexes.

Table A.4. Baseline model with levels of real house prices

Dependent variable: number of in-migrants	1	2	3
Regional population, (t-1)	0.67*** (0.16)	0.67*** (0.15)	0.66*** (0.14)
Regional GDP per capita (t-1)	0.58*** (0.078)	0.57*** (0.074)	0.62*** (0.085)
Regional unemployment rate, (t-1)	-0.11** (0.042)	-0.12** (0.045)	-0.12** (0.050)
Real regional house prices (t-2)	-0.25*** (0.066)	-0.26*** (0.065)	-0.27*** (0.044)
Regional share of elderly population (% 65+ over total population), (t-1)		-0.13 (0.15)	-0.089 (0.15)
Regional share of employment in manufacturing (in % of total employment), (t-1)			-0.14** (0.065)
Constant	-3.34 (2.06)	-2.75 (1.82)	-3.48* (1.96)
Region FE	YES	YES	YES
Observations	2,409	2,409	2,388
N_countries	18	18	18
Adj_RSqr	0.98	0.98	0.98
*** p<0.01, ** p<0.05, * p<0.1			

Note: Robust standard errors in parentheses. All variables are in log form so that the estimates can be interpreted as elasticities. See text and Annex for details.
Source: OECD estimates based on OECD Regional database, EULFS data, and national sources for house prices.

As reported in the main text, young people represent the bulk of internal migrants. OECD Regional Statistics allow to isolate internal migration among individuals aged 15-29 years for a sub-sample of countries. Table A.5 presents estimates of the baseline model applied to youth migration. The responsiveness of youth migration is estimated to be higher when overall population and unemployment rate are replaced with their 15-24 years old counterparts. Including proxies of regional educational outcomes and resources does not deliver significant results. Overall, the results are stable and similar to the baseline model. The regional house price elasticity remains highly significant. This may signal that too high living costs act as a deterrent for prospective students or young workers to relocate in high-productivity areas such as cities. One implication is that, even when high education is free, the housing market can create educational inequalities between those whose parents can afford sending their children to expensive areas with good training and job opportunities, and those who cannot.

Table A.5. Baseline model applied to youth migration

Dependent variable: number of in-migrants (age 15-29)	1	2	3	4
Regional population (15-24 years), (t-1)	0.71** (0.33)		0.81** (0.35)	0.72* (0.35)
Regional population (total population), (t-1)		0.59 (0.43)		
Regional GDP per capita, (t-1)	0.42** (0.18)	0.30** (0.14)	0.57*** (0.11)	0.44** (0.19)
Regional unemployment rate (15-24 years), (t-1)	-0.078*** (0.025)		-0.064** (0.026)	-0.084** (0.031)
Regional unemployment rate (total labour force), (t-1)		-0.098 (0.057)		
Regional house price index, (t-2)	-0.26* (0.13)	-0.23* (0.13)	-0.33** (0.13)	-0.26* (0.14)
Regional share of labour force with tertiary education, (t-1) (in % of labour force)			-0.0051 (0.10)	
Regional share of employment in public services and education (in % of total employment), (t-1)				0.088 (0.16)
Constant	-2.94 (5.30)	-1.40 (7.00)	-5.50 (4.49)	-3.14 (5.60)
Region FE	YES	YES	YES	YES
Observations	1,166	1,195	1,001	1,106
N_countries	16	17	15	16
RSqr	0.99	0.99	0.99	0.99
Adj_RSqr	0.99	0.99	0.99	0.99
*** p<0.01, ** p<0.05, * p<0.1				

Note: Robust standard errors in parentheses; country FE, time FE, country*time FE included. All variables are in log form so that the estimates can be interpreted as elasticities. See text and Annex for details.
Source: OECD estimates based on OECD Regional database, EULFS data, and OECD regional house prices data.

The main paper reports policy-related results in a qualitative manner because estimates of interaction terms are not directly interpretable and to save space. The following Table A.6, Table A.7, Table A.8 and Table A.9 present full regression estimates of the policy-augmented model.

Table A.6. Policy regressions - full regression output - housing-related policies

Dependent variable: number of in-migrants	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Regional population, (t-1)	0.56***	0.56***	0.61***	0.58***	0.62***	0.61***	0.61***	0.61***	0.55***	0.54***	0.62***	0.61***	0.61***	0.60***
	(0.12)	(0.12)	(0.093)	(0.074)	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.14)	(0.15)	(0.13)	(0.13)
Regional GDP per capita (t-1)	0.24*	0.48***	0.39**	0.48***	0.38	0.51***	0.34	0.52***	0.25	0.53***	0.083	0.58***	0.53***	0.55***
	(0.13)	(0.088)	(0.14)	(0.089)	(0.25)	(0.086)	(0.22)	(0.083)	(0.15)	(0.072)	(0.082)	(0.064)	(0.051)	(0.069)
Regional unemployment rate, (t-1)	-0.14***	-0.075	-0.16***	-0.11***	-0.12***	-0.069**	-0.13***	-0.090***	-0.15***	-0.14***	-0.12**	-0.083	-0.12***	-0.11***
	(0.040)	(0.043)	(0.027)	(0.034)	(0.039)	(0.032)	(0.038)	(0.026)	(0.030)	(0.012)	(0.042)	(0.049)	(0.039)	(0.031)
Regional house price index (t-2)	-0.23***	-0.22***	-0.24***	-0.24***	-0.23***	-0.23***	-0.23***	-0.22***	-0.25***	-0.25***	-0.20***	-0.20***	-0.23***	-0.23***
	(0.052)	(0.055)	(0.055)	(0.055)	(0.054)	(0.056)	(0.055)	(0.056)	(0.065)	(0.062)	(0.035)	(0.037)	(0.055)	(0.058)
Housing supply elasticity	0.24***	-0.077***												
	(0.069)	(0.024)												
Rent control			-0.75	0.44**										
			(0.68)	(0.20)										
Landlord-tenant regulation					-0.10	0.053**								
					(0.14)	(0.025)								
Notary fees							-0.43	0.12***						
							(0.42)	(0.042)						
Relative size of the social rental housing stock									-0.049**	0.0072***				
									(0.018)	(0.00048)				
Public spending on housing allowances											-2.41***	0.26		
											(0.37)	(0.19)		
Land use governance													0.025	-0.014*
													(0.017)	(0.0070)

Constant	-1.78	-2.40	-3.19*	-2.97*	-3.27	-3.74	-3.02	-3.82	-0.98	-2.75	-2.32	-4.69*	-4.23*	-3.86*
	(1.89)	(2.16)	(1.65)	(1.48)	(2.65)	(2.18)	(2.37)	(2.22)	(2.19)	(2.39)	(2.56)	(2.43)	(2.09)	(2.16)
Observations	2,047	2,047	2,044	2,044	2,397	2,397	2,397	2,397	2,027	2,027	2,013	2,013	2,397	2,397
N_countries	16	16	17	17	20	20	20	20	14	14	15	15	20	20
RSqr	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98
Adj_RSqr	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98
*** p<0.01, ** p<0.05, * p<0.1														

Note: All variables besides policy variables are in log form so that the estimates can be interpreted as elasticities. Country-, region- and year- fixed effects as well as country*year interactions included. Policy variables are interacted with GDP or unemployment as indicated at the top of the column. Robust standard errors in parentheses. See text and Annex for details.
Source: See Table A.1 for list of data sources and definitions.

Table A.7. Policy regressions - full regression output - labour market and social protection

Dependent variable: number of in-migrants	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Regional population, (t-1)	0.62***	0.62***	0.65***	0.63***	0.59***	0.60***	0.47**	0.45**	0.72***	0.71***	0.67***	0.67***	0.69***	0.71***	0.25	0.25	0.60***	0.61***
	(0.14)	(0.13)	(0.14)	(0.14)	(0.13)	(0.13)	(0.19)	(0.19)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.47)	(0.45)	(0.13)	(0.13)
Regional GDP per capita (t-1)	0.31***	0.50***	0.42***	0.51***	0.39***	0.51***	0.10	0.46***	0.60***	0.58***	0.59***	0.59***	0.50***	0.58***	0.53***	0.43***	0.23	0.52***
	(0.092)	(0.084)	(0.069)	(0.080)	(0.059)	(0.079)	(0.15)	(0.083)	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.11)	(0.13)	(0.10)	(0.16)	(0.081)
Regional unemployment rate, (t-1)	-0.14***	-0.088***	-0.14***	-0.12***	-0.14***	-0.11***	-0.10*	-0.037	-0.12***	-0.11**	-0.13***	-0.13***	-0.12***	-0.12**	-0.10**	-0.13**	-0.12***	-0.084*
	(0.036)	(0.021)	(0.035)	(0.017)	(0.036)	(0.023)	(0.050)	(0.024)	(0.038)	(0.042)	(0.039)	(0.038)	(0.040)	(0.044)	(0.048)	(0.052)	(0.039)	(0.044)
Regional house price index (t-2)	-0.24***	-0.22***	-0.23***	-0.22***	-0.24***	-0.22***	-0.19***	-0.17***	-0.26***	-0.25***	-0.26***	-0.26***	-0.26***	-0.25***	-0.38***	-0.39***	-0.24***	-0.23***
	(0.052)	(0.054)	(0.054)	(0.052)	(0.056)	(0.058)	(0.028)	(0.044)	(0.058)	(0.060)	(0.061)	(0.064)	(0.057)	(0.059)	(0.10)	(0.10)	(0.054)	(0.056)
Spending on active labour market policies, total (% of GDP)	-0.58***	0.22***																
	(0.19)	(0.040)																
Spending on active labour market policies,			-1.55***	0.52***														

sheltered and supported employment (% of GDP)			(0.48)	(0.064)														
Spending on active labour market policies, PES and administration (% of GDP)					-2.04***	0.76***												
					(0.57)	(0.18)												
Job protection on regular contracts							-0.41***	0.11***										
							(0.13)	(0.017)										
Unemployment benefit replacement rate, single without children, 12 months									0.0014***	0.00046								
									(0.00042)	(0.00069)								
Unemployment benefit replacement rate, couple with children, 12 months											0.0032*	-0.00048						
											(0.0017)	(0.0016)						
Unemployment benefit replacement rate, single with children, 6 months													-0.0058***	-0.00033				
													(0.0022)	(0.0018)				
Income redistribution through taxes and transfers															1.92	-0.54*		
															(1.83)	(0.29)		
Collective bargaining coverage																	-0.0096***	0.0018
																	(0.0042)	(0.0013)
Constant	-2.46	-3.83*	-3.81*	-4.18*	-2.82	-3.61	0.28	-1.09	-5.20*	-5.12*	-4.12	-4.37	-3.44	-5.19*	3.04	3.65	-2.03	-3.87*
	(2.47)	(2.19)	(2.09)	(2.16)	(2.06)	(2.26)	(3.14)	(2.52)	(2.71)	(2.73)	(2.70)	(2.76)	(2.65)	(2.74)	(7.48)	(7.22)	(2.07)	(2.11)
Observations	2,238	2,238	2,238	2,238	2,238	2,238	1,947	1,947	2,253	2,253	1,982	1,982	2,253	2,253	1,291	1,291	2,397	2,397
N_countries	19	19	19	19	19	19	20	20	20	20	14	14	20	20	19	19	20	20
RSqr	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98
Adj_RSqr	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98

*** p<0.01, ** p<0.05, * p<0.1

Note: All variables besides policy variables are in log form so that the estimates can be interpreted as elasticities. Country-, region- and year- fixed effects as well as country*year interactions included. Policy variables are interacted with GDP or unemployment as indicated at the top of the column. Robust standard errors in parentheses. See text and Annex for details.
Source: See Table A.1 for list of data sources and definitions.

Table A.8. Policy regressions - full regression output - earnings inequalities and skills

Dependent variable: number of in-migrants	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Regional population, (t-1)	0.59***	0.59***	0.65***	0.65***	0.68***	0.67***	0.69***	0.66***	0.61***	0.61***	0.57***	0.60***	0.55***	0.54***	0.54**	0.60***	0.56***	0.55***
	(0.13)	(0.13)	(0.14)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.21)	(0.17)	(0.12)	(0.12)
Regional GDP per capita (t-1)	0.54***	0.54***	0.58***	0.56***	0.52***	0.55***	0.55***	0.54***	0.16	0.53***	0.24**	0.53***	0.056	0.53***	0.31*	0.53***	0.35***	0.49***
	(0.13)	(0.078)	(0.16)	(0.10)	(0.13)	(0.10)	(0.089)	(0.10)	(0.12)	(0.070)	(0.10)	(0.068)	(0.15)	(0.069)	(0.17)	(0.12)	(0.095)	(0.078)
Regional unemployment rate, (t-1)	-0.13***	-0.12***	-0.12***	-0.12***	-0.12***	-0.094***	-0.12***	-0.084**	-0.13***	-0.094***	-0.13***	-0.086*	-0.13***	-0.11***	-0.11**	-0.097***	-0.12**	-0.099***
	(0.040)	(0.026)	(0.040)	(0.025)	(0.036)	(0.032)	(0.037)	(0.033)	(0.037)	(0.027)	(0.040)	(0.044)	(0.035)	(0.025)	(0.045)	(0.031)	(0.041)	(0.027)
Regional house price index (t-2)	-0.23***	-0.23***	-0.25***	-0.25***	-0.25***	-0.25***	-0.24***	-0.25***	-0.27***	-0.26***	-0.29***	-0.26***	-0.26***	-0.26***	-0.22***	-0.18***	-0.21***	-0.22***
	(0.055)	(0.058)	(0.056)	(0.058)	(0.056)	(0.056)	(0.051)	(0.058)	(0.054)	(0.065)	(0.053)	(0.067)	(0.055)	(0.065)	(0.036)	(0.044)	(0.049)	(0.050)
Minimum to median wage ratio	-0.16	0.37*																
	(1.09)	(0.18)																
Minimum cost of labour			0.00077	0.0038*														
			(0.011)	(0.0019)														
Average tax wedge, 67% of average wage					-0.0083	0.0077*												
					(0.017)	(0.0042)												
Average tax wedge, 100% of average wage							-0.0018	0.0087*										
							(0.014)	(0.0043)										
Earnings inequality: D5/D1									1.15***	-0.20***								
									(0.26)	(0.059)								
Earnings inequality: D9/D1											0.27***	-0.056*						
											(0.044)	(0.029)						

Incidence of low pay													0.066***	-0.0085***				
													(0.017)	(0.0022)				
Share of working age population with below upper secondary education															-0.021*	0.0039**		
															(0.012)	(0.0014)		
Skill needs																	-3.55***	0.82**
																	(1.05)	(0.38)
Constant	-3.56	-3.45	-4.06	-3.92	-4.33	-4.33	-4.64*	-4.18	-1.01	-3.75*	-0.21	-3.67*	-1.43	-2.60	-1.11	-3.26	-2.32	-2.67
	(2.19)	(2.18)	(2.50)	(2.65)	(2.60)	(2.65)	(2.36)	(2.68)	(2.27)	(1.94)	(2.16)	(1.93)	(1.81)	(2.14)	(3.07)	(2.99)	(1.74)	(2.02)
Observations	2,119	2,119	2,058	2,058	2,336	2,336	2,336	2,336	2,361	2,361	2,361	2,361	2,154	2,154	1,961	1,961	2,258	2,258
N_countries	14	14	14	14	20	20	20	20	20	20	20	20	17	17	17	17	18	18
RSqr	0.99	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98
Adj_RSqr	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98

*** p<0.01, ** p<0.05, * p<0.1

Note: All variables besides policy variables are in log form so that the estimates can be interpreted as elasticities. Country-, region- and year- fixed effects as well as country*year interactions included. Policy variables are interacted with GDP or unemployment as indicated at the top of the column. Robust standard errors in parentheses. See text and Annex for details.
Source: See Table A.1 for list of data sources and definitions.

Table A.9. Policy regressions - full regression output -product market regulations and occupational entry restrictions

Dependent variable: number of in-migrants	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Regional population, (t-1)	0.60***	0.60***	0.65	0.67	0.58***	0.62***	0.56***	0.56***	0.57***	0.59***	0.68***	0.72***	0.66***	0.67***	0.66***	0.66***
	(0.14)	(0.13)	(0.40)	(0.41)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.12)	(0.21)	(0.21)	(0.11)	(0.12)	(0.11)	(0.11)
Regional GDP per capita (t-1)	0.50***	0.49***	0.19	0.37**	0.44***	0.52***	0.50***	0.53***	0.61***	0.55***	0.63***	0.60***	0.53***	0.54***	0.44***	0.54***
	(0.085)	(0.090)	(0.16)	(0.14)	(0.064)	(0.075)	(0.056)	(0.068)	(0.070)	(0.076)	(0.11)	(0.14)	(0.049)	(0.059)	(0.088)	(0.055)
Regional unemployment rate, (t-1)	-0.13***	-0.11***	-0.074*	-0.078*	-0.13***	-0.12***	-0.13***	-0.12***	-0.13***	-0.13***	-0.10**	-0.11***	-0.16***	-0.16***	-0.15***	-0.12**
	(0.041)	(0.028)	(0.038)	(0.039)	(0.042)	(0.029)	(0.039)	(0.028)	(0.042)	(0.038)	(0.038)	(0.036)	(0.029)	(0.030)	(0.030)	(0.045)

Regional house price index (t-2)	-0.25***	-0.23***	-0.31**	-0.30**	-0.26***	-0.23***	-0.27***	-0.24***	-0.27***	-0.24***	-0.26***	-0.27***	-0.25***	-0.25***	-0.25***	-0.25***
	(0.050)	(0.060)	(0.12)	(0.11)	(0.049)	(0.058)	(0.045)	(0.060)	(0.046)	(0.059)	(0.062)	(0.068)	(0.064)	(0.066)	(0.064)	(0.067)
Product market regulation: barriers to entrepreneurship	-0.14	0.14**														
	(0.13)	(0.067)														
Product market regulation: administrative requirements for LLCs			-0.44***	0.049**												
			(0.14)	(0.020)												
Product market regulation in professional services: lawyers					-0.18***	0.036**										
					(0.038)	(0.015)										
Product market regulation in professional services: accountants							-0.12***	0.037**								
							(0.036)	(0.013)								
Product market regulation in professional services: engineers									-0.14**	-0.0026						
									(0.057)	(0.035)						
Product market regulation in professional services: architects											-0.21***	0.036				
											(0.063)	(0.028)				
Occupational entry restrictions: administrative burdens, personal services													-1.71***	0.10		
													(0.45)	(0.54)	-0.82***	
Occupational entry restrictions: administrative burdens, professional services															(0.23)	0.27*
																(0.13)
Constant	-3.23	-3.43	-0.096	-2.10	-1.66	-3.91*	-2.25	-3.11	-2.46	-3.84*	-5.64	-5.24	-4.74**	-4.62**	-4.27*	-4.41**
	(2.60)	(2.13)	(6.31)	(6.37)	(2.35)	(2.21)	(2.31)	(2.37)	(2.15)	(2.14)	(3.49)	(3.72)	(1.78)	(1.55)	(1.98)	(1.43)
Observations	2,397	2,397	1,530	1,530	2,397	2,397	2,369	2,369	2,389	2,389	2,193	2,193	1,752	1,752	1,752	1,752
N_countries	20	20	19	19	20	20	20	20	20	20	20	20	12	12	12	12
RSqr	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj_RSqr	0.98	0.98	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
*** p<0.01, ** p<0.05, * p<0.1																

Note: All variables besides policy variables are in log form so that the estimates can be interpreted as elasticities. Country-, region- and year- fixed effects as well as country*year interactions included. Policy variables are interacted with GDP or unemployment as indicated at the top of the column. Robust standard errors in parentheses. See text and Annex for details.
Source: See Table A.1 for list of data sources and definitions.

Robustness analysis

This section presents robustness analysis of the regression results reported in the main paper.

Baseline model

The following robustness tests are conducted:

1. A weighted regression framework is applied to control for differences in the number of regions per country. To offset the potential influence of countries characterised by a relatively high number of regions, weights are based on the inverse of the number of regions per country.
2. The regression model is estimated based on TL2 regions, only.
3. The baseline model is estimated without house prices, which allows to cover a larger set of countries since the coverage of regional house prices is still incomplete.

Table A.10 summarises the results of the robustness analysis by comparing the regression output from the baseline with that from the weighted regression, from the non-weighted regression without house prices, and from the weighted regression without house prices. Overall, this exercise points to a high degree of robustness of the baseline model.

Table A.10. Baseline model: robustness and estimation without house prices for a larger set of countries

Dependent variable: number of in-migrants	Baseline model	Baseline model with weights	Baseline model based on TL2 regions	Baseline model without house prices for a larger sample of countries	
					Weighted
Regional population, (t-1)	0.62***	0.90**	0.64***	0.52***	0.68***
	(0.13)	(0.33)	(0.14)	(0.12)	(0.21)
Regional GDP per capita (t-1)	0.55***	0.46***	0.55***	0.40***	0.40**
	(0.076)	(0.14)	(0.073)	(0.11)	(0.16)
Regional unemployment rate, (t-1)	-0.12***	-0.080**	-0.12***	-0.082**	-0.066*
	(0.039)	(0.038)	(0.042)	(0.037)	(0.038)
Regional house price index (t-2)	-0.23***	-0.27**	-0.24***		
	(0.056)	(0.099)	(0.061)		
Constant	-4.28*	-7.75	-4.47**	-1.93	-4.36
	(2.11)	(5.33)	(2.09)	(1.82)	(3.39)
Region FE	YES	YES	YES	YES	YES
Observations	2,397	2,397	2,256	4,153	4,153
N_countries	20	20	18	26	26
RSqr	0.98	0.97	0.98	0.94	0.94
Adj_RSqr	0.98	0.96	0.98	0.93	0.93

*** p<0.01, ** p<0.05, * p<0.1

Note: All variables are in log form so that the estimates can be interpreted as elasticities. Country- and year- fixed effects as well as country*year interactions included. See text and Annex for details.
Source: OECD estimates based on OECD Regional database, EULFS data, and OECD regional house prices data. Robust standard errors in parentheses. See Table A.1 for details on data sources.

Policy-augmented model

The following tests are conducted to assess the robustness of major policy results:

1. A weighted regression framework (see above).
2. A policy augmented model whereby each policy indicator is interacted simultaneously with both GDP per capita and the unemployment rate.
3. A multivariate regression framework whereby two or three policy indicators are simultaneously interacted either with GDP per capita or with the unemployment rate.

Table A.11 delivers an overview of the results. Overall, the various tests tend to corroborate the robustness of major policy findings. Product market regulation effects appear relatively less robust in the multivariate analysis. This may reflect their high correlation with other policies, for example with job protection; as well as with housing supply elasticity, possibly because very tight businesses regulations are likely to reduce the responsiveness of housing supply to demand. In addition, product market regulation indicators are not available on a yearly basis and therefore exhibit less variation over time, making econometric identification more sensitive to the reduction in the degrees of freedom in the multivariate setting.

Table A.11. Policy-augmented model: an overview of the robustness analysis

	Weighted estimation		Joint analysis of GDP and unemployment policy interactions		Multivariate policy analysis	
	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Housing supply elasticity	✔	✔	✔	✔	✔	-
Rent control		-		✔		✔
Landlord-tenant regulation		✔		✔		✔
Notary fees		✔		✔		✔
Public spending on housing allowances	✔	□	✔	□	✔	
Job protection on regular contracts	✔	✔	✔	✔	✔	✔
Spending on active labour market policies, total (% of GDP)	✔	✔	✔	✔	✔	✔
Unemployment benefit replacement rate, single without children, 12 months	-		✔		✔	-
Occupational entry restrictions: administrative burdens, personal services	-		✔		✔	
Product market regulation: barriers to entrepreneurship	□	✔		✔		-
Product market regulation: administrative requirements for LLCs	-	-	✔	-	-	-
Product market regulation in professional services: accountants	-	✔	✔	✔	✔	-

Note: The table summarizes the robustness of the cross-country regressions with an interaction term based on a policy indicator and either GDP or unemployment towards three different model specifications. "✔" indicates the robustness of a significant policy indicator in the baseline model towards an alternative model specifications as defined at the top of the respective column; "-" indicates non-robustness, while a blank entry indicates that the policy interaction is insignificant in the baseline. (1) refers to a model variant where weights based on the inverse of the number of regions per country are added. (2) highlights the robustness towards the inclusion of a second interaction term based on the same policy indicator and the alternative macroeconomic variable (GDP/unemployment). (3) summarizes the robustness towards the inclusion of a second interaction term based on a different policy indicator, by keeping the same macroeconomic variable (GDP/unemployment). With twelve policy indicators at hand, eleven bivariate specifications can be formed for each univariate policy regression. Here, "a" indicates the robustness towards more than five out of eleven bivariate regressions, while "-" indicates that the univariate effects remains significant in five or less than five specifications. Results are illustrated for a sub-set of policy indicators, while further results are available upon request.
Source: OECD estimates based on OECD Regional database, EULFS data, and OECD regional house prices data. See Table A.1 for details on data sources.

Table A.12 provides additional detailed information on the specific multivariate robustness tests.

Table A.12. Policy-augmented model: details on the results from robustness with respect to multivariate regressions

	Robust to the inclusion of a second interaction term (third interaction term) with									
	Housing supply elasticity		Rent control		Landlord-tenant regulation		Notary fees		Public spending on housing allowances	
	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Housing supply elasticity			✔ (✔)	-	✔ (✔)	-	✔ (✔)	✔ (-)	-	-
Rent control		✔ (-)				-		✔ (✔)		-
Landlord-tenant regulation		✔ (-)		-				-		✔ (✔)
Notary fees		✔ (-)		✔ (-)		-				✔ (✔)
Public spending on housing allowances	-		✔ (✔)		✔ (✔)		✔ (✔)			
Job protection on regular contracts	-	-	✔ (✔)	✔ (✔)	✔ (✔)	✔ (-)	✔ (✔)	✔ (✔)	-	✔ (✔)
Spending on active labour market policies, total (% of GDP)	✔ (✔)	✔ (✔)	✔ (-)	-	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)
Unemployment benefit replacement rate, single without children, 12 months	✔ (✔)	-	✔ (✔)	-	✔ (✔)	-	✔ (✔)	-	✔ (✔)	-
Occupational entry restrictions: administrative burdens, personal services	-		✔ (✔)		✔ (✔)		✔ (✔)		-	
Product market regulation: barriers to entrepreneurship		-		-		✔ (-)		✔ (-)		-
Product market regulation: administrative requirements for LLCs	-	-	-	-	✔ (✔)	✔ (-)	✔ (✔)	✔ (-)	-	-
Product market regulation in professional services: accountants	-	-	✔ (✔)	-	✔ (✔)	-	✔ (✔)	-	✔ (✔)	-

Table A.12 continued

	Robust to the inclusion of a second interaction term (third interaction term) with													
	Job protection on regular contracts		Spending on active labour market policies, total (% of GDP)		Unemployment benefit replace-ment rate, single without children, 12 months		Occupational entry restrictions: administrative burdens, per-sonal services		Product market regulation: barriers to entrepreneurship		Product market regulation: administrative requirements for LLCs		Product market regulation in professional services: accountants	
	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP	GDP	UNEMP
Housing supply elasticity	-	-	✔ (✔)	-	✔ (✔)	✔ (-)	-	✔ (-)	✔ (✔)	✔ (-)	-	-	-	✔ (✔)
Rent control		-		-		✔ (✔)		✔ (-)		✔ (✔)		✔ (-)		✔ (✔)
Landlord-tenant regulation		-		-		✔ (-)		✔ (✔)		✔ (-)		✔ (-)		✔ (-)
Notary fees		-		-		✔ (-)		✔ (-)		✔ (-)		✔ (-)		✔ (-)
Public spending on housing allowances	✔ (✔)		✔ (-)		✔ (✔)		✔ (-)		✔ (✔)		✔ (✔)		✔ (✔)	
Job protection on regular contracts			✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (-)	✔ (-)	✔ (✔)	✔ (✔)	-	-	✔ (-)	✔ (-)
Spending on active labour market policies, total (% of GDP)	-	-			✔ (✔)	✔ (✔)	✔ (-)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)	✔ (✔)
Unemployment benefit replacement rate, single without children, 12 months	✔ (✔)	-	✔ (✔)	-			✔ (✔)	-	✔ (✔)	-	✔ (-)	✔ (-)	✔ (✔)	-
Occupational entry restrictions: administrative burdens, personal services	-		✔ (✔)		✔ (✔)				✔ (✔)	-	-	-	-	-
Product market regulation: barriers to entrepreneurship		-		-		✔ (✔)		-				✔ (✔)		-
Product market regulation: administrative requirements for LLCs	-	-	-	-	-	✔ (-)	-	-	✔ (-)	-			✔ (-)	✔ (-)
Product market regulation in professional services: accountants	-	-	✔ (✔)	-	✔ (✔)	✔ (-)	✔ (-)	-	✔ (✔)	-	-	-		

Note: This table summarizes the robustness of cross-country regressions with one interaction term based on a given policy indicator and either GDP or unemployment (UNEMP) towards the inclusion of a second (and third) interaction term with further policy indicators by keeping the same macroeconomic variable (GDP/UNEMP). " ✔ " indicates that a significant interaction term based on the policy indicator given in the first column remains significant when a second interaction term as given at the top of the respective column is added; "-" indicates that it does not remain significant and a blank field indicated that the interaction term is univariately insignificant. In case the interaction with the policy indicator given in the first column remains significant when adding a second policy interaction, each of the ten remaining policy interactions are added individually as a third interaction. "(✔)" indicates that five or more specifications thereof remain robust, while "(-)" indicates that less than five specifications remain robust. Results are illustrated for a sub-set of policy indicators, while further results are available upon request.
Source: OECD estimates based on OECD Regional database, EULFS data, and OECD Regional house prices data. See Table A.1 for details on data sources.