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INTERNATIONAL MIGRATION: THE RELATIONSHIP WITH ECONOMIC AND POLICY FACTORS IN THE HOME AND DESTINATION COUNTRY

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ABSTRACT/RÉSUMÉ

International Migration: The Relationship with Economic and Policy Factors in the Home and Destination Country

Unfavourable demographic trends in many OECD countries threaten the sustainability of potential labour resources, GDP growth and fiscal positions. One factor that is expected to mitigate these trends is continued inflows of migrant workers from low income economies. However, a rapid catch-up in productivity and wages in these traditional source countries vis-à-vis the OECD may weaken economic incentives for migration and imply a transition away from current migration patterns. This paper uses data of the high-skilled and low-skilled migrant stock between 92 origin and 44 destination countries to highlight the relationship between economic factors and migration. The paper also attempts to uncover links with policy and demographic factors prevailing in the origin and destination countries. The analysis suggests that higher skill-specific wages in the destination country are associated with more migration. This relationship appears to be particularly strong for migrants from middle-income countries, supporting theories of an inverted-U relationship between origin country economic development and the propensity to migrate. Policy differences between the destination and origin also appear important, for example in terms of regulations on businesses and labour markets, along with the relative quality of institutions. In some instances, the effects on high-skilled and low-skilled migrants differ markedly. Combining the estimated coefficients from the model with the skill-specific wage profile from the OECD long-term growth projections highlights the potential for weaker future migrant flows to OECD countries than implied by past trends and embedded in official projections.

JEL classification codes: F22; J01; O15.
Keywords: International migration, labour economics, economic development, public policy.

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Migrations internationales : les liens avec le contexte économique et stratégique dans les pays d'origine et de destination

Les tendances démographiques défavorables en vigueur dans de nombreux pays de l'OCDE mettent en péril la pérennité de la main-d'œuvre, la croissance du PIB et les situations budgétaires. L'arrivée constante de travailleurs migrants en provenance d'économies à faible revenu est un facteur qui devrait atténuer ces tendances. Toutefois, ces pays sources traditionnels rattrapent rapidement les pays de l'OCDE sur le plan de la productivité et des salaires, ce qui risque d'affaiblir les incitations économiques à l'émigration et entraîner une modification des schémas de migration actuels. Les auteurs du présent document ont eu recours à des données relatives aux migrants hautement qualifiés et faiblement qualifiés représentant 92 pays d'origine et 44 pays de destination, afin de souligner les liens entre facteurs économiques et migrations. Ils se sont également attachés à mettre au jour les relations entre le contexte stratégique et les facteurs démographiques en vigueur dans les pays d'origine et de destination. Leur analyse tend à démontrer que des salaires plus élevés pour des emplois correspondant à des compétences spécifiques sont associés à des migrations plus nombreuses. Cette relation est particulièrement forte pour les migrants originaires de pays à revenu intermédiaire, un constat qui vient confirmer les théories selon lesquelles il existe une relation en U inversé entre le développement économique des pays d'origine et la propension à migrer. Les différences au niveau des politiques publiques entre les pays de destination et les pays d'origine semblent également importantes, par exemple pour ce qui est des réglementations applicables aux entreprises et de celles en vigueur sur le marché du travail, ainsi que la qualité relative des institutions. Dans certains cas, les effets sur les migrants hautement et faiblement qualifiés varient fortement. Si l'on combine les coefficients estimés du modèle et le profil des salaires correspondant à des compétences spécifiques établi à partir des projections de croissance à long terme de l'OCDE, on s'aperçoit que les flux de migrants en direction des pays de l'OCDE pourraient être plus faibles que les tendances antérieures et les projections officielles le laissent entendre.

Codes JEL : F22 ; J01 ; O15.
Mots clés : Migrations internationales, économie du travail, développement économique, politique publique.

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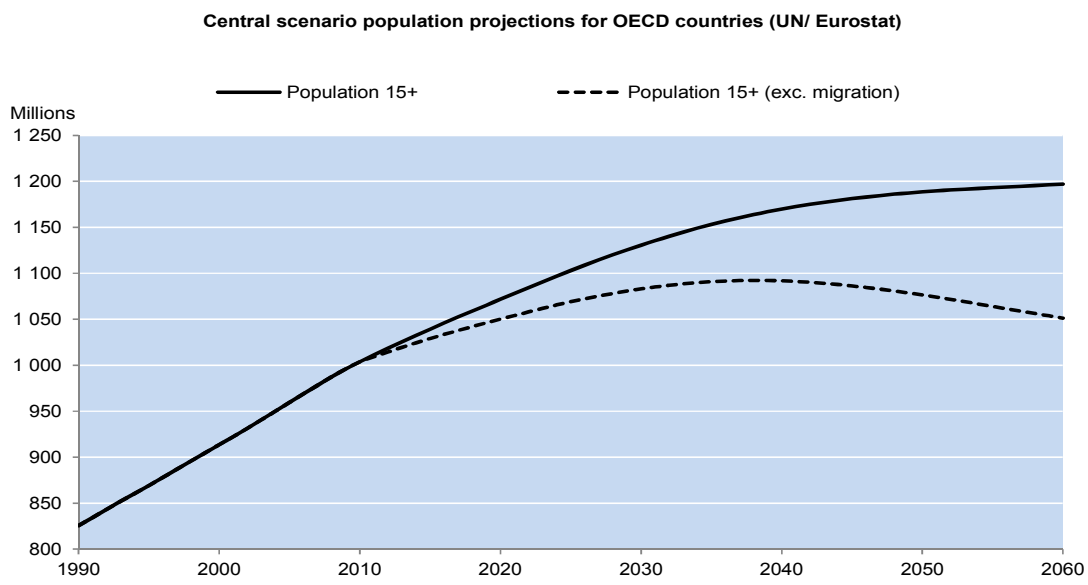
INTERNATIONAL MIGRATION: THE RELATIONSHIP WITH ECONOMIC AND POLICY FACTORS IN THE HOME AND DESTINATION COUNTRY

By Ben Westmore[1]

1. Introduction

1. Population ageing will be a headwind to future global growth, with the share of the global working age population expected to decline over the period to 2060. In addition to policy movements which increase retirement ages in line with gains in life expectancy, the central scenario in the OECD long-term growth projections (Johansson et al., 2013 and OECD, 2014) assumes that inflows of migrant workers will be one factor to mitigate ageing in most OECD economies. The OECD region has experienced steady inflows of immigrants in recent decades and the migration projections underlying the long-term central scenario suggest these trends will be extrapolated into the future (Figure 1).[2]

Figure 1. Population and migration 2010-2060



1. Ben Westmore (ben.westmore@oecd.org) is a member of the Economics Department of the OECD. Without implication, the author would like to thank several OECD colleagues; Giuseppe Nicoletti, Henrik Braconier, Friedrich Poeschel and Theodara Xenogiani for valuable comments and suggestions, Catherine Chapuis for technical assistance and Sarah Michelson for editorial support. He would also like to thank Frédéric Docquier for providing the bilateral migrant stock data used in the analysis. The views expressed in this paper are those of the author and do not necessarily reflect those of the OECD and its member countries.

2. Population projections in the central scenario are taken from Eurostat for some European countries (Austria, Belgium, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, UK, Hungary, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovakia, Slovenia, Sweden, Switzerland, Poland and Norway) or the United Nations Population Division otherwise.

Source: UN, Eurostat, OECD estimates.

2. While there may be some persistence in migration paths over time (Beine et al*.,* 2009), due to diaspora or common attributes between a particular origin-destination country pair, migration flows are not guaranteed to mimic past patterns. Countries can rapidly undergo migration transitions, with a number of southern European and emerging Asian countries having shifted from net emigration to net immigration regions over the past few decades.

3. In some cases, an important catalyst for migration transitions has been changes in relative wages between countries. Taking Korea as an example, much of the decline in emigration and increased immigration through the late 1980s and early 1990s has been attributed to improvements in domestic labour demand and the resulting increase in wages relative to other countries (Fields, 1994). Similarly, recent work has suggested that comparatively strong future income growth in many non-OECD Asian countries could reduce the pace of net emigration (OECD, 2012; Hatton and Williamson, 2012).

4. The theoretical and empirical importance of expected income differentials in motivating international migration has been well documented (Harris and Todaro, 1970; Borjas, 1990; Hatton and Williamson, 2002; Mayda, 2007). An implication of the emphasis on *expected* income is that despite a positive wage differential, migration between a country pair may remain low if individuals in the low-income origin country anticipate significant relative improvements in future economic conditions (Mansoor and Quillin, 2007). For many, moving away from family and friends is not desirable and may be avoided unless the economic case for doing so will be sustained for the foreseeable future.

5. A body of recent work has emphasised that, for a given wage differential, the propensity to emigrate may not be the same across all countries. Specifically, there is evidence of a "migration hump" where emigration rates increase as economic development rises before declining at higher development levels (de Haas, 2010; Martin and Taylor, 1996). This may result from individuals in mid-development origins being less likely to face the financial constraints to migration experienced in low income countries, while a move abroad can offer a greater increase in opportunity than for populations from very high income nations.

6. Although relative wages are integral to many individuals' migration decision, the motives for migration can be very diverse. While some of these are difficult to quantify and hence introduce into empirical models (*e.g.* social attitudes), factors such as the relative age profile, education level and institutional setting, as well as common origin/destination links in terms of language, geography and colonial ties can be accounted for (Bauer and Zimmerman, 1999). Policy settings may also play a role, especially those regarding tax and benefit systems (Kureková, 2011) and the structural policies that govern the product and labour markets.

7. In this work, the role of destination to origin country wage differentials are incorporated into an empirical model that attempts to explain the bilateral migration stocks between a large number of country pairs (see Section 2 for the empirical model and Section 3 for the estimation strategy). There is also some attempt to identify any discernable relationships between migrant stocks and various demographic and policy factors. The model is estimated on the total, high skilled and low skilled migrant stock separately (results are presented in Section 4), with the independent variables defined as a ratio of conditions in the destination to origin country. The estimated coefficients are then used to approximate skill-specific bilateral stocks at 2060 that are consistent with the wage movements projected in the OECD long-term

central scenario (Section 5).[3] Potential economic consequences of the model projections are highlighted with the help of assumptions about the age distribution of migrant flows.

8. With regard to the projections presented in Section 5, it must be acknowledged from the outset that there are non-economic factors (such as the diaspora-effects mentioned above) that are also likely to impact the migration patterns to 2060. The projections attempt to capture some of these influences by assuming a degree of persistence along traditional migration paths. However, it is possible that the projected wage effects could be somewhat offset by larger than expected changes in non-economic factors that are outside the scope of this analysis.

2. Empirical model

9. Following recent cross-country level work on migration (Grogger and Hanson, 2011; Beine et al., 2009; Ortega and Peri, 2009), the empirical specification is derived from a representation of an individual's utility-maximising migration decision, where the relationship between migration and wages is represented explicitly. Existing studies have incorporated wage considerations through a variable that reflects either the average wage in the destination country (*i.e.* Ortega and Peri, 2012), the differential between the destination and origin country wage rate (*i.e.* Bazillier and Moullan, 2010) or a ratio of the two (*i.e.* Lewer and Van den Berg, 2008). Here the latter approach is taken, with the utility of migration from country *o* (origin) to country *d* (destination) for an individual with skill level *j* given by the function:

$$U_{odj} = \alpha\left(\frac{w_{dj}}{w_{oj}}\right) + \delta\left(\frac{X_d}{X_o}\right) - \beta(f_{od}) + A_o + A_d + \varepsilon_{odj} \qquad (1)$$

where *w* is the wage differentiated by skill level, f are fixed costs to migration from country *o* to country *d*, A_o and A_d are origin and destination country fixed effects respectively and ε is an identical and independently distributed error term.[4] *X* represents vectors of destination and origin specific factors that may affect utility from migration. As with the wage term the variable relating to these factors is defined as a ratio of settings in the destination to origin country, reflecting the importance of relative conditions to the migration decision.

10. In the regression analysis, the revealed utility of migrating from country *o* to destination *d* is assumed to be proportionate to the bilateral migrant stock, which becomes the dependent variable. A measure of the stock of migrants is taken as the dependent variable as this is most likely to reflect the long-run trend in migration along a particular bilateral path. This complicates the regression analysis as the migrants that make up the stock at any point will have arrived at different times during the preceding period. To tackle this, independent variables are constructed as averages over the decade before the migrant stock is taken, though it must be acknowledged that for some individuals these variables may still be inadequate proxies of conditions at the time of migration. The fixed costs of migration between a particular origin-destination country pair are captured by a series of gravity variables specific to the bilateral pair; dummy variables for a common language (Lang), a common border (Bord) and colonial ties (Col), and a measure of geographical distance (Dist). The vector *X* includes *inter alia* the relative unemployment rate as a control variable, reducing the potential for the estimated coefficient on the wage term to reflect non-wage labour market developments. This leads to the following estimation equation:

3. These are based on OECD Economic Outlook 93.

4. Country fixed effects control for any unobserved factors specific to either the sending or receiving country, examples include conflict in the origin country or the attitudes of the destination country toward accepting refugees.

$$\log(MS_{odj}) = \alpha_j \left(\frac{w_{dj}}{w_{oj}}\right) + \delta_j \left(\frac{X_d}{X_o}\right) + \beta_{1j} \log(Dist)_{od} + \beta_{2j} Col_{od} + \beta_{3j} Lang_{od} + \beta_{4j} Bord_{od} + A_o + A_d + e_{odj} \quad (2)$$

11. Three sets of regressions are run on different definitions of the dependent variable: the total, high skilled and low skilled migrant stock. The estimated effects are averages across migrants with common skill level across all bilateral pairs.

3. Data and estimation strategy

12. The analysis is undertaken over a broad country sample that includes both OECD and non-OECD countries. Much of the past work in the field has focused on migration to OECD destinations, however, this work attempts to capture potential influences on migration to and from both the developed and developing world. A trade off from this broad focus is that in some cases indicators are chosen due to country coverage despite being lower quality than comparable measures that are only available for OECD members. The data sources for a number of the policy and demographic variables are detailed in the Data Annex.

13. Bilateral migrant stocks are taken from an updated World Bank sponsored data set documented by Docquier et al. (2012).[5] These data are appealing because they decompose bilateral migration stocks by skill level and are available for two cross-sections in time (1990 and 2000). A number of the observations in the original data set are imputed from a pseudo-gravity model similar to the estimation equation presented above (equation 2). In order to avoid bias in the estimated coefficients, all such observations are omitted from the regression analysis.

14. The regressions are run on the bilateral stock at 2000. The availability of the 1990 cross-section allows for a robustness test (discussed in Section 4) through a specification that models the migrant flow between 1990 and 2000 by including the 1990 stock as an independent variable.[6] One appeal of such a specification is that it takes into account diaspora effects, the influence of social or family networks that may draw migrants from a specific origin to a specific destination country (Tumbe, 2012). While these are not explicitly captured in the base specification, they are likely to be highly correlated with a number of the gravity factors that are included.

15. The data set contains around 30% of bilateral migration stocks that equal zero[7], adding complications to the analysis given that the estimation equation is in log-linear form. Some past work either omits observations that equal zero from the sample or adds one to all observations before taking the log and estimating with Ordinary Least Squares. However, such techniques can lead to inconsistent estimates of the parameters of interest. To avoid this problem, an estimator that has identical first-order conditions to the Poisson pseudo-maximum-likelihood estimator is used (for further details, see Silva and Tenreyro, 2006).

5. Illegal immigrants, which can be a considerable share of the migrant stock in some cases, are unlikely to be included for most countries (Docquier et al., 2009). To the extent that most of these immigrants are low skilled, it is likely that the stock of low skilled migrants in some countries is significantly underestimated.

6. Such a specification heightens the potential for reverse causality given that most of the independent variables reported in Table 1 reflect conditions in the 1990 to 2000 period.

7. The proportion of zeros is roughly the same across both the high skilled and low skilled stock data. Some statistical agencies report a zero when the migrant stock is below some threshold value. As such, a zero may not reflect the total absence of migrants along a particular path.

16. Gravity variables are taken from CEPII's *GeoDist* database, specifically; i) the language dummy is for a pair of countries with a common language spoken by at least 9% of the population, ii) the colonial ties dummy is for any country pair that have ever had a colonial link, and iii) the distance variable is a measure of the distance between two countries, taking into account the geographical distribution of the population inside each (Mayer and Zignago, 2005).

17. Wage data are taken from Grogger and Hanson (2011) and are utilised due to broad country coverage and the fact that they approximately differentiate between the high skill (HS) and low skill (LS) wage level. Specifically, high skilled wages are taken as the 80th percentile of the wage distribution and low skilled wages the 20th percentile. This measure has obvious limitations. For example, it is not uncommon for migrants with post-secondary education to earn in the bottom half of the wage distribution. The wage data relate to the period 1988-2000 which is also the window to which most of the independent variables reported in Section 4 relate.

18. With the available data, the base specification of the regression analysis can be conducted on the migrant stock between 92 origin countries and 44 destinations, which is a large number of bilateral pairs relative to past studies in this field. The majority of the destinations are developed (*i.e.* "North") countries, though one quarter of the sample are from outside the OECD (*i.e.* "South"; Appendix 1). The origin countries are an eclectic mix of both North and South areas.

4. Estimation results

4.1 Economic factors

19. The estimation results provide evidence that, holding the relative aggregate unemployment rates constant, relative wages between destination and origin countries are positively associated with bilateral migrant stocks. Despite the absence of perfect indicators for high and low skilled wages, there is some indication that skill specific wage differentials are important for the migration decision: high (low) skilled migration appears to respond to developments in differentials at the upper (lower) end of the wage distribution (Column 1, Table 1 and 2). The estimated coefficient on the relative unemployment rate variable (Table 1, 2 and 3) suggests a negative relationship between migration and the probability of being unemployed in the destination country.

20. Consistent with past literature, the results provide some support for an inverted U-relationship between the level of economic development in the origin country and the propensity to emigrate. These results highlight the relationship through the wage channel: migration from middle income countries appears to be more sensitive to wage differentials between destination and origin countries than migration from either low income or high income countries. Initially, this is identified through interaction variables between the wage differential term and dummy variables for middle-income countries and high income countries (Column 2 of Table 1, 2 and 3).[8] Then, the robustness of this relationship is tested by including two interaction terms between; i) the wage differential and a continuous indicator of GDP per capita and ii) the wage differential and the square of GDP per capita. The positive and significant coefficient on the *Wage*GDP per capita* term coupled with the significantly negative coefficient on the *Wage*(GDP per*

8. The high income dummy is defined as countries in the top 10% of the cross-country GDP per capita distribution. The middle income dummy is defined as countries above the top 60% and below the top 10% of the cross-country GDP per capita distribution. The cut off points for these variables were chosen with reference to the bivariate analysis of De Haas (2011) which suggests that emigrant stocks begin to rise for countries with US$ PPP GDP per capita in 2005 above $5000, with countries transitioning to net immigration countries as GDP per capita rises above $20,000.

capita)^2 term supports the posited heterogeneous effect of wage differences (Column 3 of Table 1, 2 and 3).[9] The inverted-U relationship appears to hold in the case of both high skilled and low skilled migrants.

21. When the bilateral stock of migrants at 1990 is included as an independent variable, the estimated coefficient is highly significant with a value of around 0.8 (Column 12 of Table 1, 2 and 3). The inclusion of the variable has no impact on the statistical significance of the wage term and it is only for high skilled workers that the estimated wage coefficient is statistically lower than in the base specification. Appendix 2 reports the results when the inverted-U specification is estimated, controlling for the 1990 migrant stock. These indicate that, when modelling the migrant flow between 1990 and 2000, the differential sensitivity of migrants to relative wage differences depending on origin is only discernable for low skilled individuals.

4.2 Gravity factors

22. Consistent with past empirical work, gravity factors are estimated to have a strong relationship with migrant stocks. In particular, the results indicate a link between higher migrant stocks and bilateral pairs of countries that have: a shared border, a common language spoken and a colonial relationship. There is also a statistically significant relationship between geographic proximity of a country pair and the migrant stock, as highlighted by the negative coefficient on the distance term. The results in Column 12 indicate that the inclusion of the 1990 migrant stock term causes a number of the coefficients on the gravity factors to become statistically insignificant (*i.e.* shared border, colonial ties, distance). This suggests a degree of multicollinearity between these factors and the size of the existing bilateral migrant stock and that the gravity variables in the base specification may go some way to capturing diaspora effects.

4.3 Relative demographic factors and government policies

23. There are various demographic factors that may be associated with bilateral migration. The results in Column 4 support past evidence that migration decreases with the average age in the sending region (Bauer and Zimmerman, 1999; Hatton and Williamson, 2012), though the coefficient is not statistically significant for low skilled migrants. While the estimated relationship may reflect that populations are less likely to migrate abroad as they become older, it could also be influenced by more liberal immigration policy in some destination countries that face a declining working age population.

24. The results in Column 5 suggest that higher average years of schooling in the destination relative to the origin country is associated with lower bilateral migration. This accords with human capital theories of migration that argue that more educated individuals should exhibit a higher migration probability, as education improves the ability to collect and process information and reduces the risk of the move (Bauer and Zimmerman, 1999). Comparing the results for the different skill classes, the effect is statistically higher for low skilled workers. This may be surprising given that higher average education in the origin should raise the stock of potential high skilled migrants. However, the higher sensitivity of low skilled migration to increasing education may reflect the large number of migrants from developing countries in the sample for whom insufficient pre-tertiary education is a constraint to international mobility.

9. This interpretation is consistent with past empirical work examining the presence of inverted-U relationships (e.g. Guellec and van Pottelsberghe, 2003). It should be noted that the data validates a slightly different form of U-shaped than outlined in much of the theoretical literature. Here, migrants' sensitivity to changes (positive or negative) in relative wages increases when they come from a middle income country, emphasising the role of aspirations as well as capability in motivating economic migration as countries develop (De Haas, 2011).

25. There also appears to be some relationship between the migrant stock and relative tax and benefits systems. For both skill classes, there appears to be a significant positive relationship between immigration and relative government transfers as a share of GDP (Column 6). This is consistent with existing work which finds that countries with less generous welfare states have significantly higher shares of their workers leaving to work abroad (Kureková, 2011). Column 7 presents the results of a specification that further investigates this effect by including a dummy variable that equals 1 when social security systems in the destination country are relatively generous. The estimated coefficient suggests a positive relationship with migration, with the effect statistically stronger for low skilled workers.

26. Controlling for the generosity of government benefits, column 6 suggests a negative link between relative tax rates and migration of low skilled workers, though the coefficient is not significant for high skilled migrants. This result is not easily explained, especially given that the variable relates to the highest marginal income tax rate which is likely to be more relevant for high skilled workers. In any case, this estimate should be interpreted with caution given the potential endogeneity for tax policy to migrant flows in some regions.[10]

27. Relatively high business regulations in the destination country are associated with less migration of both high skilled and low skilled workers (row 18 in column 8). While care must be taken in drawing strong conclusions based on dummy variables in a cross-section panel (the potential for omitted variables looms large), prospective migrants that aim to start a business in the destination country may indeed be deterred by regulatory hurdles. More generally, the negative coefficient may reflect that countries with more onerous regulations are less dynamic and biased towards incumbents. There is also evidence that stronger and more impartial legal systems in the destination country are associated with higher migration, highlighting the potential importance of well-developed institutions to migrants.

28. Relative labour market regulations may have heterogeneous effects depending on the type of regulation and the migrants' skill level. Column 9 reports the estimated coefficients from a specification with a dummy variable based on a broad measure of labour market regulation (see Data Annex for more details). The results suggest that relatively strict labour market regulations in the destination country are associated with higher migration of both high skilled and low skilled workers. However, the inclusion of a variable that specifically relates to the level of protection of part-time workers (column 10) suggests that a relative increase in this type of regulation in the destination is associated with a decline in the migrant stock of low skilled workers. This may reflect that low skilled migrants are often employed on temporary contracts. As such, an increase in the regulations around such contracts could impede the flow of low skilled immigrants.[11]

29. All the regressions also control for bilateral dummy variables that reflect the presence of a free trade agreement (FTA) between the origin and destination country (*FTA dummy)* and whether both countries were signatories to the Schengen Agreement when it was initially implemented (*Schengen dummy)*. In general, the estimated coefficients on these dummies are not statistically significant. However, there is some indication of a significant effect of an FTA for high skilled migrants in the flow specification (Table 2, Column 12). This may reflect the increasing incidence of FTAs over the recent period and the positive relationship between such agreements and migrant flows.

10. For example, an origin country that is experiencing substantial unwanted emigration may lower tax rates in response.

11 . Whether this is a result of lower demand or supply of low skilled migrant workers may depend on the specific change to the part-time worker regulations.

4.4 Unreported regressions

30. Unreported regressions included dummy variables for the stance of immigration policy in the destination and origin countries (constructed from the UN World Population Policies Database).[12] There was also no discernable relationship found between relative levels of inequality (measured by the Gini coefficient) and migrant stocks, contrary to some existing theories (Martin and Taylor, 1996). Indicators of relative political stability (mostly sourced from the Polity IV database) and other measures of wellbeing (*e.g.* hospital beds per capita) were also included but not found to be statistically significant.

31. The robustness of the results was tested by altering the country sample of the analysis. In general, this led to very little change in the sign and magnitude of the estimated coefficients, with only a few instances when an estimated coefficient changed its level of statistical significance. This is highlighted in Tables 1-3, in which a lack of data availability for some variables resulted in significant changes in the country sample between specifications.

12. For example, a dummy variable equal to 1 if the destination country immigration policy was reported to be aiming to lower immigration (in the 1976-1996 period) at the same time as the origin country policy stance was aiming to lower emigration.

Table 1. Total migrant stock estimation results

Dependent variable = log(Total migrant stock)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Shared border	0.70***	0.61***	0.66***	0.63***	0.51**	0.57**	0.59**	0.65***	0.68***	0.69***	0.63***	0.03
	(3.02)	(2.62)	(2.85)	(2.60)	(2.14)	(2.41)	(2.42)	(2.82)	(3.03)	(2.95)	(2.76)	(0.51)
(2) log(distance)	-0.76***	-0.77***	-0.72***	-0.78***	-0.69***	-0.72***	-0.65***	-0.64***	-0.64***	-0.61***	-0.69***	-0.06
	(7.37)	(7.95)	(6.97)	(6.71)	(6.49)	(7.47)	(6.24)	(5.90)	(6.22)	(5.41)	(6.75)	(1.58)
(3) Common language	1.09***	1.10***	1.05***	1.05***	1.12***	1.16***	1.02***	1.09***	1.04***	1.01***	1.09***	0.28***
	(6.44)	(6.59)	(6.16)	(6.17)	(6.45)	(6.38)	(5.63)	(6.06)	(6.12)	(5.77)	(6.48)	(6.31)
(4) Average w age	0.04	0.06*										0.06***
	(1.21)	(1.79)										(3.65)
(5) Colonial ties	1.13***	1.19***	1.20***	1.19***	1.17***	1.16***	1.20***	1.17***	1.19***	1.24***	1.20***	0.01
	(5.95)	(6.47)	(6.47)	(6.33)	(5.94)	(6.24)	(6.10)	(6.00)	(6.03)	(6.38)	(6.48)	(0.10)
(6) Unemployment rate	-0.71***	-0.69***	-0.76***	-0.76***	-0.77***	-0.86***	-0.83***	-0.94***	-0.94***	-0.89***	-0.8***	-0.02
	(4.90)	(4.70)	(5.02)	(4.93)	(4.45)	(4.49)	(4.90)	(4.97)	(5.08)	(5.25)	(4.69)	(0.35)
(7) Schengen dummy	0.35	0.41	0.38	0.41	0.35	0.36	0.43	0.48	0.43	0.34	0.52	0.01
	(0.90)	(1.06)	(0.98)	(1.06)	(0.95)	(0.88)	(1.14)	(1.29)	(1.16)	(0.92)	(1.38)	(0.12)
(8) FTA dummy	-0.04	-0.01	0.05	0.06	0.21	0.12	0.15	0.26	0.26	0.19	0.14	0.15**
	(0.20)	(0.03)	(0.24)	(0.28)	(0.95)	(0.59)	(0.72)	(1.16)	(1.23)	(0.84)	(0.62)	(2.13)
(9) Average w age * High income dummy		-0.66										
		(1.13)										
(10) Average w age * Middle income		0.46**										
		(2.54)										
(11) Average w age * GDPpc origin			0.17***	0.16***	0.14***	0.22***	0.17***	0.21***	0.21***	0.18***	0.21***	
			(4.13)	(3.89)	(3.39)	(5.24)	(3.77)	(5.10)	(5.40)	(3.86)	(5.12)	
(12) Average w age * (GDPpc origin)^(2)			-0.005***	-0.004***	-0.005***	-0.005***	-0.004***	-0.005***	-0.005***	-0.005***	-0.005***	
			(3.92)	(3.14)	(3.93)	(4.66)	(3.58)	(4.59)	(4.62)	(3.97)	(4.59)	
(13) Age				4.40**								
				(2.12)								
(14) Education					-0.84***							
					(2.85)							
(15) Income tax rate						-2.73***						
						(2.73)						
(16) Government transfers						0.16***						
						(3.85)						
(17) Social security dummy							0.49**					
							(2.42)					
(18) Business regulations dummy								-0.49**				
								(2.26)				
(19) Labour market regulation dummy									0.47**			
									(2.31)			
(20) Alternative employment contracts dummy										-0.59**		
										(2.43)		
(21) Legal integrity dummy											0.32	
											(1.39)	
(22) log(Total migrant stock 1990)												0.82***
												(38.72)
(23) Constant	15.52***	15.36***	14.56***	10.08***	16.66***	17.72***	13.59***	14.53***	14.18***	13.59***	14.81***	1.88***
	(15.18)	(16.46)	(14.81)	(4.45)	(14.52)	(11.92)	(12.76)	(13.08)	(13.09)	(12.59)	(14.05)	(3.49)
Observations	4 004	4 004	4 004	4 004	2 847	3 053	2 720	2 772	2 772	2 680	3 311	4 004

*** p<0.01, ** p<0.05, * p<0.10

Note: t-statistics in parentheses. The regressions are estimated with origin and destination country fixed effects and robust standard errors. Consistent with the model outlined in Section 2, the independent variables are defined as a ratio between the destination and origin country. All data sources and definitions are provided in the Data Annex.

Table 2. High skilled migrant stock estimation results

Dependent variable = log(High skilled migrant stock)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Shared border	0.40**	0.34*	0.37**	0.35*	0.23	0.35*	0.34*	0.37**	0.36**	0.37**	0.36*	0.06
	(2.15)	(1.88)	(1.98)	(1.82)	(1.26)	(1.87)	(1.84)	(2.02)	(2.03)	(1.97)	(1.95)	(0.81)
(2) log(distance)	-0.64***	-0.65***	-0.62***	-0.66***	-0.55***	-0.59***	-0.56***	-0.55***	-0.55***	-0.56***	-0.59***	-0.03
	(6.20)	(6.65)	(5.81)	(5.65)	(5.12)	(5.54)	(5.16)	(4.95)	(5.20)	(5.05)	(5.50)	(0.55)
(3) Common language	0.96***	0.97***	0.93***	0.94***	1.02***	0.98***	0.91***	0.95***	0.91***	0.91***	0.96***	0.30***
	(7.17)	(7.27)	(6.92)	(7.18)	(7.30)	(6.89)	(6.30)	(6.86)	(6.95)	(6.45)	(7.22)	(4.73)
(4) HS w age	0.07**	0.06**										0.03**
	(2.41)	(2.37)										(2.32)
(5) Colonial ties	1.08***	1.14***	1.13***	1.13***	1.07***	1.12***	1.09***	1.11***	1.15***	1.10***	1.13***	0.11
	(7.19)	(7.71)	(7.53)	(7.61)	(7.05)	(7.46)	(6.99)	(7.34)	(7.13)	(7.10)	(7.60)	(1.55)
(6) Unemployment rate	-0.53***	-0.56***	-0.62***	-0.61***	-0.6***	-0.65***	-0.64***	-0.74***	-0.7***	-0.69***	-0.63***	-0.04
	(4.14)	(4.25)	(4.67)	(4.66)	(3.94)	(3.77)	(4.47)	(4.52)	(4.47)	(4.84)	(4.19)	(0.62)
(7) Schengen dummy	0.27	0.30	0.32	0.35	0.32	0.33	0.36	0.49*	0.47*	0.32	0.49*	0.15
	(1.00)	(1.12)	(1.20)	(1.31)	(1.22)	(1.22)	(1.30)	(1.83)	(1.79)	(1.20)	(1.70)	(1.58)
(8) FTA dummy	-0.11	-0.08	-0.02	-0.04	0.18	0.05	0.06	0.13	0.14	0.04	0.07	0.28***
	(0.63)	(0.46)	(0.09)	(0.20)	(0.96)	(0.29)	(0.31)	(0.68)	(0.76)	(0.23)	(0.39)	(2.69)
(9) HS w age * High income dummy		-0.75										
		(1.40)										
(10) HS w age * Middle income		0.26*										
		(1.91)										
(11) HS w age * GDPpc origin			0.08**	0.07*	0.05	0.11***	0.09**	0.11***	0.11***	0.07*	0.10***	
			(2.13)	(1.95)	(1.22)	(3.02)	(2.15)	(2.90)	(2.99)	(1.73)	(2.81)	
(12) HS w age * (GDPpc origin)^(2)			-0.002**	-0.002*	-0.002*	-0.003***	-0.002**	-0.003***	-0.003***	-0.002**	-0.003***	
			(2.23)	(1.87)	(1.81)	(2.75)	(2.26)	(2.87)	(2.61)	(2.01)	(2.71)	
(13) Age				4.12***								
				(3.04)								
(14) Education					-0.44**							
					(2.11)							
(15) Income tax rate						-0.74						
						(0.89)						
(16) Government transfers						0.07**						
						(2.04)						
(17) Social security dummy							0.30*					
							(1.72)					
(18) Business regulations dummy								-0.42**				
								(2.32)				
(19) Labour market regulation dummy									0.45**			
									(2.53)			
(20) Alternative employment contracts dummy										-0.02		
										(0.08)		
(21) Legal integrity dummy											0.36**	
											(2.06)	
(22) log(High skilled migrant stock 1990)												0.74***
												(20.26)
(23) Constant	13.46***	13.62***	13.59***	9.26***	14.98***	14.74***	12.84***	14.05***	13.66***	13.21***	14.18***	2.30***
	(13.21)	(15.39)	(13.61)	(6.18)	(13.11)	(9.99)	(11.60)	(12.18)	(12.08)	(12.43)	(13.05)	(3.41)
Observations	4 004	4 004	4 004	4 004	2 847	3 053	2 720	2 772	2 772	2 680	3 311	4 004

*** p<0.01, ** p<0.05, * p<0.10

Note: t-statistics in parentheses. The regressions are estimated with origin and destination country fixed effects and robust standard errors. Consistent with the model outlined in Section 2, the independent variables are defined as a ratio between the destination and origin country. All data sources and definitions are provided in the Data Annex.

Table 3. Low skilled migrant stock estimation results

Dependent variable = log(Low skilled migrant stock)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Shared border	0.85***	0.83***	0.85***	0.83***	0.69***	0.76***	0.78***	0.82***	0.87***	0.89***	0.82***	0.01
	(3.35)	(3.34)	(3.32)	(3.15)	(2.62)	(2.83)	(2.77)	(3.17)	(3.57)	(3.23)	(3.15)	(0.16)
(2) log(distance)	-0.86***	-0.91***	-0.90***	-0.93***	-0.88***	-0.92***	-0.82***	-0.84***	-0.84***	-0.78***	-0.88***	-0.11***
	(7.86)	(8.98)	(8.24)	(7.62)	(7.81)	(9.04)	(7.34)	(7.28)	(7.82)	(6.71)	(8.23)	(2.74)
(3) Common language	1.11***	1.14***	1.15***	1.14***	1.20***	1.29***	1.12***	1.22***	1.16***	1.13***	1.20***	0.25***
	(5.88)	(6.43)	(6.02)	(5.98)	(6.30)	(6.46)	(5.56)	(5.99)	(6.10)	(5.66)	(6.36)	(5.33)
(4) LS w age	0.02**	0.03***										0.02***
	(2.04)	(2.96)										(2.89)
(5) Colonial ties	1.19***	1.18***	1.21***	1.20***	1.16***	1.13***	1.22***	1.15***	1.15***	1.23***	1.21***	-0.01
	(5.40)	(5.43)	(5.64)	(5.55)	(5.10)	(5.25)	(5.40)	(5.01)	(5.09)	(5.47)	(5.71)	(0.07)
(6) Unemployment rate	-0.78***	-0.74***	-0.79***	-0.78***	-0.82***	-0.93***	-0.89***	-1***	-1.02***	-0.95***	-0.84***	-0.05
	(4.52)	(4.27)	(4.35)	(4.31)	(3.99)	(4.07)	(4.26)	(4.37)	(4.53)	(4.61)	(4.15)	(0.83)
(7) Schengen dummy	0.39	0.44	0.41	0.42	0.37	0.36	0.45	0.47	0.44	0.31	0.61	0.00
	(0.92)	(1.11)	(0.99)	(1.02)	(0.93)	(0.82)	(1.14)	(1.15)	(1.08)	(0.78)	(1.52)	(0.07)
(8) FTA dummy	-0.09	-0.20	-0.13	-0.11	0.07	-0.08	-0.02	0.05	0.07	0.02	-0.05	0.10
	(0.39)	(0.98)	(0.58)	(0.51)	(0.29)	(0.38)	(0.07)	(0.24)	(0.29)	(0.10)	(0.21)	(1.26)
(9) LS w age * High income dummy		-0.81										
		(1.54)										
(10) LS w age * Middle income		0.66***										
		(3.96)										
(11) LS w age * GDPpc origin			0.14***	0.13***	0.15***	0.15***	0.15***	0.15***	0.15***	0.15***	0.16***	
			(4.67)	(4.72)	(3.99)	(5.29)	(4.03)	(4.99)	(5.00)	(4.37)	(5.00)	
(12) LS w age * (GDPpc origin)^(2)			-0.004***	-0.003***	-0.005***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	
			(4.42)	(3.74)	(5.21)	(4.87)	(4.03)	(4.27)	(4.53)	(4.47)	(4.63)	
(13) Age				2.40								
				(1.25)								
(14) Education					-1.12***							
					(3.39)							
(15) Income tax rate						-4.20***						
						(4.01)						
(16) Government transfers						0.18***						
						(4.44)						
(17) Social security dummy							0.57***					
							(2.60)					
(18) Business regulations dummy								-0.47*				
								(1.95)				
(19) Labour market regulation dummy									0.53**			
									(2.27)			
(20) Alternative employment contracts dummy										-0.68***		
										(2.81)		
(21) Legal integrity dummy											0.47*	
											(1.73)	
(22) log(Low skilled migrant stock 1990)												0.84***
												(42.27)
(23) Constant	15.91***	16.11***	15.36***	12.97***	18.21***	21.32***	14.18***	16.39***	16.23***	14.32***	16.45***	2.80***
	(16.05)	(17.01)	(16.12)	(6.20)	(16.28)	(14.76)	(13.88)	(14.89)	(15.28)	(14.00)	(15.98)	(5.25)
Observations	4 004	4 004	4 004	4 004	2 847	3 053	2 720	2 772	2 772	2 680	3 311	4 004

*** p<0.01, ** p<0.05, * p<0.10

Note: t-statistics in parentheses. The regressions are estimated with origin and destination country fixed effects and robust standard errors. Consistent with the model outlined in Section 2, the independent variables are defined as a ratio between the destination and origin country. All data sources and definitions are provided in the Data Annex.

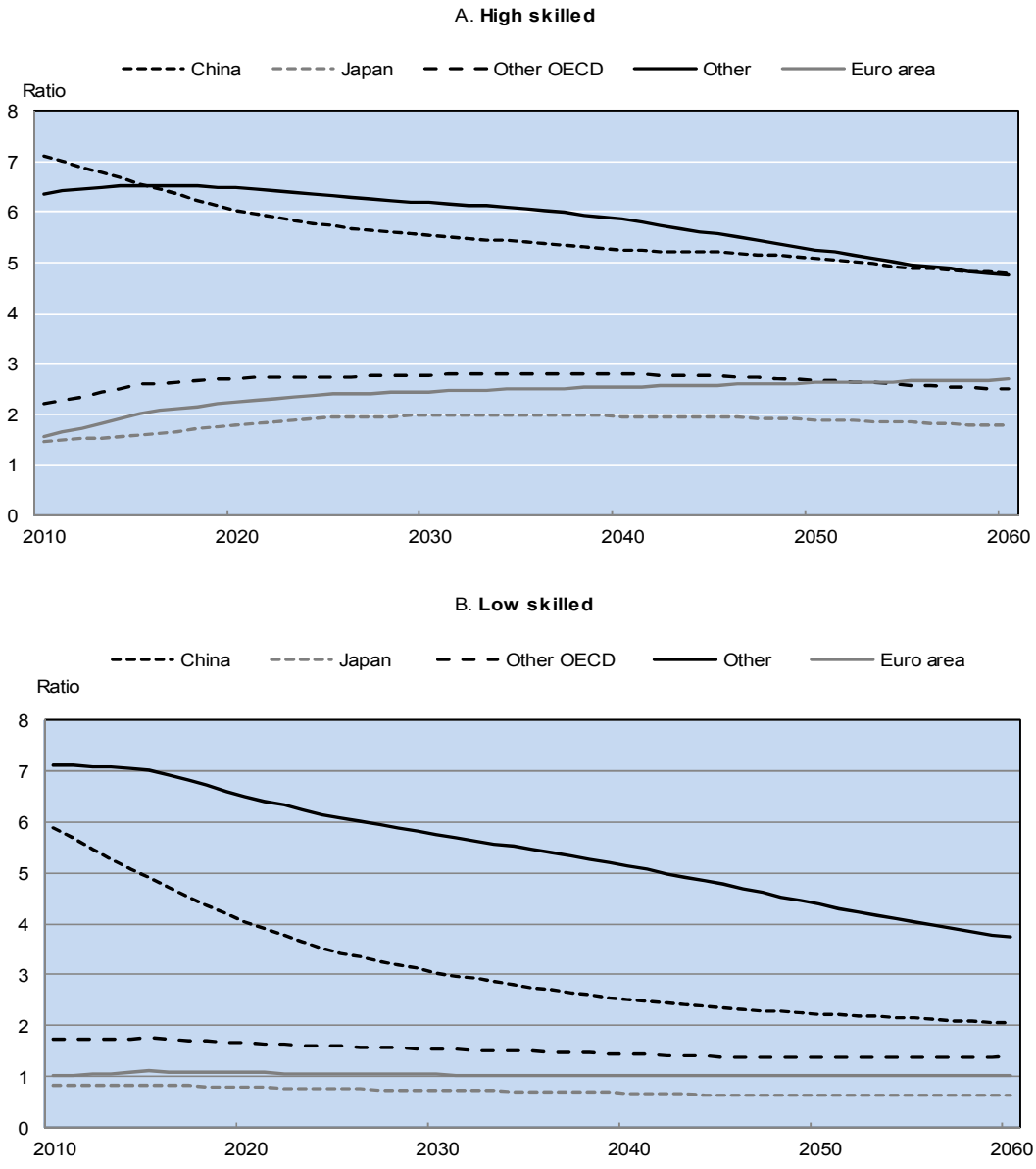
5. Scenario analysis

5.1 Economic migration in perspective

32. The OECD long-run growth projections are characterised by an increasing shift in the global economic balance as developing regions grow relatively rapidly and converge toward the GDP per capita of advanced economies (Johansson et al., 2013). For both high skilled and low skilled workers, the ratio of wages in the US to those in China and other non-OECD countries is expected to fall steadily in this scenario (Figure 2).

Figure 2. Wage projections for high- and low-skilled labour, 2010-2060

US wage level as a proportion of other regions



Source: OECD estimates

33. The primary purpose of the estimation results presented in Section 4 is to highlight possible economic and structural factors associated with cross-country migration and not to produce time series projections of migration patterns. The empirical model is static in nature and only controls indirectly for a number of factors likely to influence cross-country migration. Keeping this in mind, it is informative to ask what the projected wage differentials at 2060 under the OECD long-term growth scenario might imply for the cross-country migration stock at that point in time. While there may be a degree of persistence along many migrant paths - as assumed by the UN and Eurostat projections that underpin the OECD scenario - projection methods that do not incorporate anticipated structural changes across countries have little hope of highlighting future migration transitions. Although there are a number of other influences on migration patterns, predictions of conflicts, natural disasters or changes in country-specific immigration policy are outside the scope of this analysis.[13]

34. The estimated migration model is fed with the wage projections, with the starting point being the migrant stocks in 2000 for 195 country pairs (for a description of the procedure, see Appendix 3). By utilising the estimated coefficients in Column 2 of Tables 1, 2 and 3, the projection at 2060 takes into account not only on relative wage developments but also the differing propensity to emigrate depending on economic development as well as anticipated population growth of origin countries over the forecast horizon.[14] One significant data limitation is that the OECD scenario wage projections only differentiate between 26 economic regions in the world (for further information, see Johansson and Olaberria, 2014). As such, countries that lie within the same region are assumed to experience the same growth in wages over the period to 2060. This assumption is a further limitation of the scenario analysis, warranting caution when interpreting the migration projections.[15]

35. Comparing the migration projections of the model with those in the OECD scenario highlights marked differences in expected migration over the period to 2060. While the OECD (*i.e.* UN/Eurostat) numbers anticipate continued strong flows of South-to-North migration, the model that incorporates predicted movements in wage differentials highlights the potential for a reversal of this trend. According to the model-based projections, while some developed regions such as the US will continue to witness a net inflow of migrants, others, such as the euro area, may experience a net outflow over the period to 2060 (Figure 3A). Decomposing the projections by skill level (Figure 3B), the net outflow of migrants from euro-countries is expected to be mostly low-skilled. Rather than a sharp increase in emigration, this trend reflects a substantial decline in the flow of low skilled immigrants that have traditionally moved to the euro area, owing to relatively strong projected wage growth in their countries of origin.

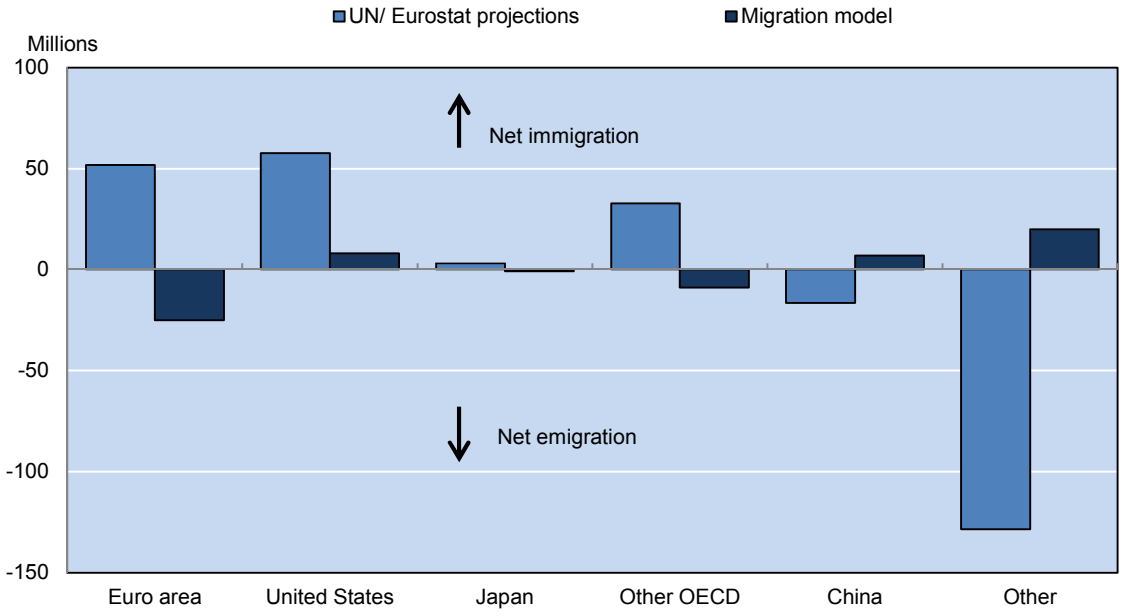
13. This limited scope is consistent with past simulation exercises of this sort (e.g. Hatton and Williamson, 2012).

14. Although the migration model is a static framework, there is some attempt in the simulation exercise to allow for persistence along traditional migration channels by extrapolating starting period migrant stocks to 2060 based on the non-migrant population projections of origin countries. These stocks are then adjusted to take into account the increasing propensity of populations in middle-income countries to migrate and the projected movements in relative wages between 2010 and 2060 (Appendix 3).

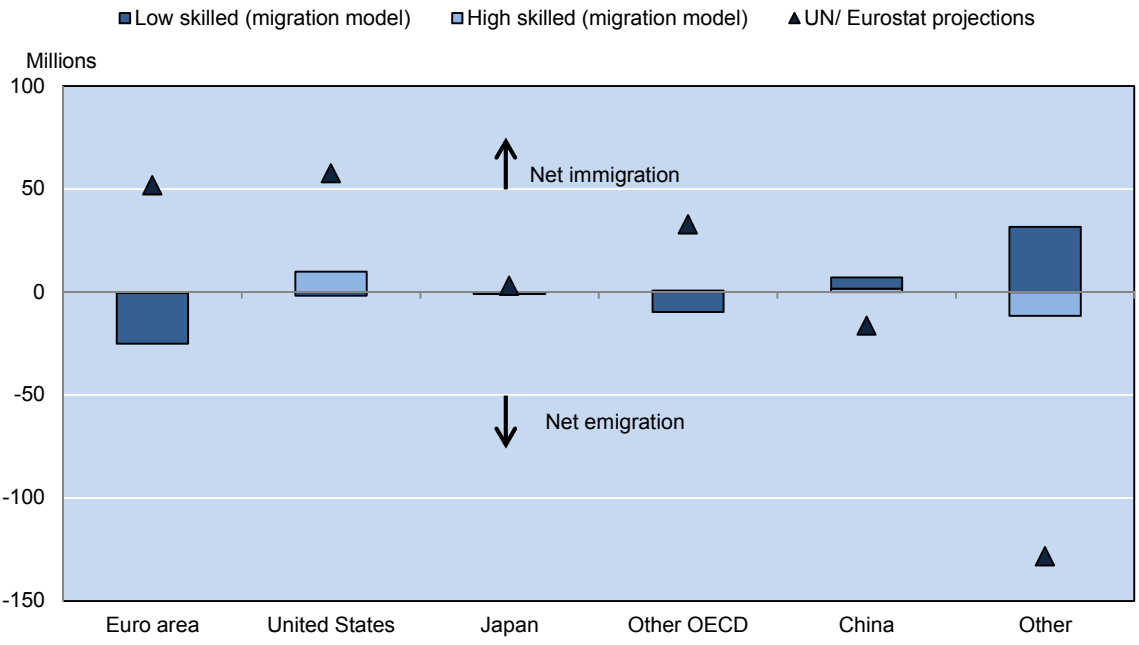
15. In addition, the OECD scenario assumes some convergence in framework conditions, while the scenario analysis holds policy factors constant.

Figure 3. Migration projections

A. **Between 2010 and 2060, comparison**



B. **Decomposed by skill level**



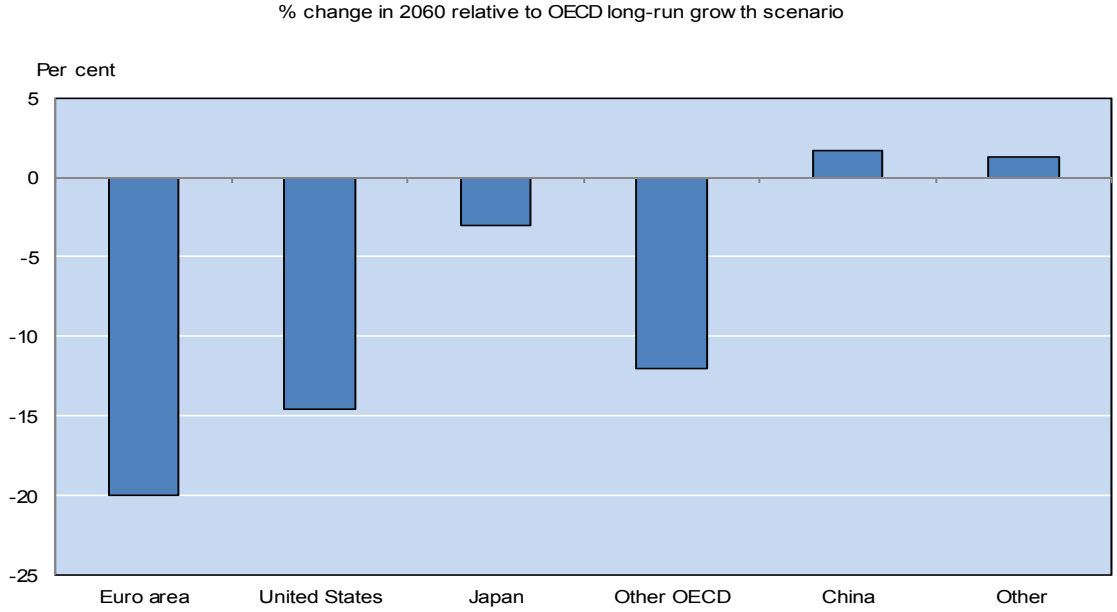
Note: Only those countries included in the long-run growth scenarios are included in the Euro area, Other OECD and Other groups.

Source: UN, Eurostat, OECD estimates.

5.2 Potential GDP effects of wage-based migration

36. The model-based migration projections highlight a significant downside economic risk to the central scenario. For example, potential labour in the euro area and the US at 2060 may fall by as much as 20% and 15% respectively as a result of lower economic migration (Figure 4).[16] This owes to both the decline in migrant flows and the fact that migrants are more likely to be of working age than the native population in many destination countries (Johansson et al., 2013). Taking the age profile of migrants assumed in the official projections, the model-based estimates suggest that the old-age dependency ratio could rise by as much as 6 percentage points at 2060 in the euro area relative to the OECD long-run growth scenario.

Figure 4. Potential labour force with modelled migration flows



Source: OECD estimates.

6. Conclusion

37. Sustaining future working age populations will rely on international immigration flows for many OECD countries. Some migration flows will continue to persist along traditional paths. However, significant changes in the global economic balance towards non-OECD countries – as foreshadowed in the OECD long-term economic projections – may imply transitions away from historical migration patterns.

38. In this context, an understanding of the potential impact on international migration of changes in economic, demographic and policy factors is important. The model presented here highlights a number of such factors based on migration data for both OECD and non-OECD countries. Skill-specific wage differentials between countries are confirmed to be a key driver of migration. Moreover, there is evidence that wage differentials are relatively more important for migrants deriving from middle income countries.

16. See Appendix 3 for the assumptions behind the potential labour projections.

39. On top of wages, and the gravity and demographic influences highlighted by past work, the empirical results suggest that cross-country differences in structural economic policies may also explain some international migration. Less strict regulations on businesses, as well as stronger and more impartial legal systems, may be associated with higher immigration. Likewise, immigration may be positively related to the generosity of government benefits, but perhaps particularly so for low skilled migrants. The impact of policies could depend on the specific type of regulation. For example, while stricter labour market regulations are associated with higher migration, the opposite is true for low skilled migrants in the case of regulations pertaining to part-time workers.

40. Nevertheless, the analytical framework presented in this paper is static in nature and allows for only limited heterogeneity among migrants. Future work continuing to explore these relationships in a time series context or by using more disaggregated data will help provide additional insights. For example, country-specific studies using micro data may give a better indication of the impact of government migration policy which was not discernable in this cross-country study. To the extent that there is correlation between the government stance on migration and broader economic policies, such work may improve the precision of the estimated effects of the structural policies included in this analysis.

DATA ANNEX

Bilateral migrant stocks: The migrant stock data are for migrants aged 25 and above and are based on country of birth as opposed to citizenship. As discussed in Section 3, these data decompose bilateral migration stocks by skill level and are available for two cross-sections in time (1990 and 2000). They are compiled by combining:

- Migration stocks for the 34 OECD member countries (from all 195 other countries) from an earlier dataset described in Docquier, Lowell and Marfouk (2009).
- Migration stocks for 42 non-OECD countries in 2000 and 27 countries in 1990 are collected from national statistical offices, publicly available censuses and, for the 6 Gulf Cooperation Council countries, labour force surveys. These data comply with the methodology used to construct the data for OECD countries.
- Data for the remaining countries that are imputed from estimated coefficients derived from a gravity model. However, as discussed in Section 3, these data are omitted from the analysis.

Gravity factors: These data are described in Section 3 and can be downloaded from: http://www.cepii.fr/anglaisgraph/bdd/distances.htm

Wages: These data are described in Section 3 and can be downloaded from: http://harrisschool.uchicago.edu/research/data/migration-data To construct these data, Grogger and Hanson (2011) rely on two sources: 1) Combining Gini coefficients from the WIDER World Income Inequality Database with GDP per capita from the World Development Indicators; and 2) Freeman and Oostendorp (2000) who have collected information on earnings from the International Labor Organization's October Inquiry Survey.

Unemployment rate: Average rate in the 1990 to 2000 period, taken from the World Development Indicators (http://data.worldbank.org/data-catalog/world-development-indicators).

Schengen dummy: Equals 1 if both the destination and origin country were signatories to the Schengen agreement when it was first implemented (Belgium, Germany, France, Luxembourg, Netherlands, Spain and Portugal).

FTA dummy: Equals 1 if a free trade agreement existed between the origin and destination country as at 2000.

Age: Average median age of the total population in the 1990-2000 period from *UN World Population Prospects: The 2012 Revision*

Education: Barro-Lee measure of average years of schooling in the 1990-2000 period (Barro and Lee, 2013).

Income tax rate: The top marginal income tax rate from the Economic Freedom of the World Database in the 1990-2000 period.

Government transfers: Government transfers and subsidies as a percent of GDP from the Economic Freedom of the World Database in the 1990-2000 period.

Social security dummy: Based on a composite indicator of social security laws that takes into account government benefits relating to old age, disability, death, sickness, unemployment and health is sourced from Botero et al. (2003).

Business regulations dummy: Based on a measure from the Economic Freedom of the World Database that increases with the level of regulation over the 1990-2000 period. The measure takes into account i) administrative requirements, ii) Bureaucracy costs, iii) Cost and duration to start a business, iv) incidence of extra undocumented payments v) Licensing restrictions and vi) Cost of tax compliance.

Labour market regulation dummy: Based on a measure from the Economic Freedom of the World Database that increases with the level of regulation over the 1990-2000 period. The measure takes into account hiring and firing regulations, the minimum wage, extent of centralized collective bargaining, hours regulations, mandated cost of worker dismissal and the presence of military conscription.

Alternative employment contracts dummy: Based on a measure from Botero et al., (2004) that captures the level of protection of part-time workers.

Legal integrity dummy: Based on a measure from the Economic Freedom of the World Database that increases with the legal systems strength and impartiality and observance of the law in the 1990-2000 period.

REFERENCES

Barro, R. and J. Lee (2013), "A New Data Set of Educational Attainment in the World, 1950-2010", *Journal of Development Economics,* Vol. 104, September 2013, pp. 184-198.

Bazillier, R. and Y. Moullan (2010), "Employment Protection and Migration", *Université Paris Pantheon-Sorbonne Working Paper Series*.

Beine, M., F. Docquier and C. Ozden (2009), "Diasporas", *Journal of Development Economics,*

Borjas, G.J (1990), "Friends or Strangers: The Impact of Immigrants on the US Economy", *New York; Basic Books*

Botero, J, S. Djankov, R. La Porta, F. Lopes-de-Silanes and A. Shliefer (2003), "The Regulation of Labour", *NBER Working Paper,* No. 9756

Botero, J, S. Djankov, R. La Porta, F. Lopes-de-Silanes and A. Shliefer (2004), "The Regulation of Labour", *The Quarterly Journal of Economics,* November 2004.

De Haas, H (2010), "Migration transitions: a theoretical and empirical enquiry into the developmental drivers of international migration", *DEMIG* project paper no. 1

De Haas, H (2011), "The determinants of international migration: conceptualizing policy, origin and destination effects", *DEMIG* project paper no. 2

Docquier, F., B.L. Lowell and A.Marfouk (2009), "A gendered assessment of highly skilled emigration", *Population and Development Review*, vol. 35 (2), pages 297-321.

Docquier, Frédéric ; Özden, Çağlar ; Parsons, Christopher ; Artuc, Ehran. (2012), "A Global Assessment of Human Capital Mobility: the Role of non-OECD Destinations", *IRES Discussion Papers*, p. 45

European Commission (2011), "The 2012 Ageing Report: Underlying Assumptions and Projection Methodologies", *European Economy 4/2011,* pp. 37-45

Freeman, R.B. and R.H. Oostendorp (2000), "Wages around the world: pay across occupations and countries", *NBER Working Paper,* No. 8058.

Grogger, J. and G.H. Hanson (2011), "Income maximization and the selection and sorting of international migrants", *Journal of Development Economics*, 95 (2011) pp. 42-57.

Guellec, D. and B. Van Pottelsberghe de la Potterie (2003), "The Impact of Public R&D Expenditure on Business R&D", *Economics of Innovation and New Technology,* Vol. 12(3), pp. 225-243.

Harris, J.R., and M.P. Todaro (1970), "Migration, Unemployment and Development: A Two-Sector Analysis", *The American Economic Review,* Vol. 60, No. 1 (1970), pp. 126-142

Hatton, T.J., and J.G. Williamson (2002), "What Fundamentals Drive World Migration?" NBER Paper no. 9159.

Hatton, T.J., and J.G. Williamson (2011), "Are Third World Emigration Forces Abating?" *World Devlopment,* Vol. 39, No. 1, pp. 20-32

Johansson, Å and E. Olabberia (2014) "Long-term Patterns of Trade and Specialisation", OECD *Economics Department Working Papers,* No 1136, OECD, Paris

Johansson, Å., Y. Guillemette, F. Murtin, D. Turner, G. Nicoletti, G., de la Maisonneuve, C., Bagnoli,F., Bousquet, G., and F. Spinellie (2013), "Long-Term Growth Scenarios", OECD *Economics Department Working Papers*, No. 1000, OECD, Paris.

Juhn, C., K.M. Murphy, R.H. Topel (2002), "Current Employment, Historically Contemplated", *Brookings Papers on Economic Activity*, 1:2002

Mansoor, A. and B. Quillin (2007), "Migration and Remittances: Eastern Europe and the Former Soviet Union", *World Bank.*

Martin, P.L and J.E Taylor (1996) "The anatomy of a migration hump" in *Development strategy, employment, and migration: Insights from models*, ed. JEe Taylor, pp. 43-62. Paris: OECD, Development Centre

Mayda, A.M (2007), "International migration: A panel data analysis of the determinants of bilateral flows", *Centre for Research and Analysis of Migration Discussion Paper Series,* No. 07/07

Mayer, T and S. Zignago (2005), "Market Access in Global and Regional Trade", *CEPII, Working Paper No 2005-02.*

McClelland, R. and S. Mok (2012), "A Review of Recent Research on Labor Supply Elasticities", *Congressional Budget Office Working Paper Series*

OECD (2012), "The changing role of Asia in international migration", *in International Migration Outlook 2012*, OECD Publishing.

OECD (2014), "OECD Economic Outlook", Vol. 2014/1. OECD Publishing.

Ortega, F and G. Peri (2009), "The Causes and Effects of International Migrations: Evidence from OECD Countries 1980-2005", *NBER Working Paper* No. 14833

Ortega, F and G. Peri (2012), "The Role of Income and Immigration Policies in Attracting International Migrants", *IZA Discussion Paper* No. 6655

Santos Silva, J.M.C. and S. Tenreyro (2006), "The Log of Gravity", *The Review of Economics and Statistics*, November 2006, 88(4), pp. 641-658.

Skeldon, R (2002), "Migration and poverty", Asia-Pacific Population Journal, 17(4), pp. 67-82

Skeldon, R (2008), "Migration and Development", *United Nations Expert Group Meeting on International Migration and Development in Asia and The Pacific*. September 2008.

United Nations (2006), "International Migration and Development: Report of the Secretary General", *General Assembly*, New York.

United Nations (2013), "World Population Prospects: The 2012 Revision, Highlights and Advance Tables", Working Paper No. ESA/P/WP.228.

APPENDIX 1 – COUNTRIES INCLUDED IN THE BASE SPECIFICATION OF THE REGRESSION ANALYSIS

Origin countries (92)	Australia, Armenia, Austria, Azerbaijan, Bahamas, Bangladesh, Belgium, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Hong Kong, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Honduras, Hungary, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Korea, Kyrgyzstan, Latvia, Lesotho, Lithuania, Luxembourg, Macedonia, Madagascar, Malaysia, Mali, Mauritius, Mexico, Moldova, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Russia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Swaziland, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Uganda, Ukraine, United Kingdom, United States, Venezuela, Vietnam, Zambia, Zimbabwe
Destination countries (44)	Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Macedonia, Mexico, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, Venezuela.

APPENDIX 2 – INVERTED U RELATIONSHIP IN THE PRESENCE OF A LAGGED DEPENDENT VARIABLE

Table A2.1. Base specification including lagged dependent variable

Dependent variable	log(Total Mig. Stock)	log(HS Mig. Stock)	log(LS Mig. Stock)
	(1)	(2)	(3)
Shared border	0.05	0.06	0.06
	(0.93)	(0.94)	(1.08)
log(distance)	-0.05	-0.04	-0.12***
	(1.40)	(0.65)	(3.06)
Common language	0.27***	0.30***	0.25***
	(6.28)	(4.98)	(5.47)
Colonial ties	0.03	0.09	0.007
	(0.39)	(1.22)	(0.09)
Unemployment rate	-0.06	-0.05	-0.07
	(1.22)	(0.75)	(1.15)
Schengen dummy	-0.004	0.13	-0.02
	(0.07)	(1.33)	(0.27)
FTA dummy	0.18**	0.26**	0.11
	(2.45)	(2.49)	(1.34)
Wage * GDPpc origin	0.02	-0.03	0.03**
	(0.95)	(1.45)	(2.47)
Wage * (GDPpc origin)^(2)	-0.001***	0.0002	-0.002***
	(3.33)	(0.31)	(8.17)
log(Total migrant stock 1990)	0.83***	0.75***	0.84***
	(38.81)	(20.36)	(44.06)
Constant	2.45***	2.80***	3.00***
	(5.30)	(4.59)	(5.72)
Observations	4,004	4,004	4,004

*** p<0.01, ** p<0.05m * p<0.10.

Note: t-statistics in parentheses. The regressions include country and time fixed effects and robust standard errors. The "Wage" variable refers to the average wage, high skilled wage and low skilled wage in columns 1, 2 and 3 respectively.

APPENDIX 3 – PROJECTING WAGE-BASED MIGRATION PATTERNS

41. This appendix describes the procedure used to project wage-based bilateral migrant stocks at 2060. One significant data limitation is that the baseline wage projections are derived from a computable general equilibrium (CGE) model that only differentiates between 26 economic regions (for details, see Johansson and Olaberria, 2014). As such, countries that lie within the same region are assumed to experience the same growth in wages over the period to 2060. The projections are based on the following steps:

1. Working age bilateral migrant stocks at 2000 between 195 origin and 195 destination countries are taken for high skilled and low skilled workers separately. These comprise the countries included in the regression analysis as well as those for which Docquier *et al.* (2012) impute migrant stocks from a gravity equation.

2. The migration stocks are initially extrapolated to 2060 based on UN non-migrant population projections for the origin country and a scaling factor (∂_o) depending on projected GDP per capita of the origin country under the central scenario.

   - $Initial\ migrant\ stock_{odj,2060} = migrant\ stock_{odj,2000} * \left(1 + \frac{(pop\ growth_o * \partial_o)}{100}\right)$

   - For each origin country, the scaling factor (∂_o) is estimated depending on projected real GDP per capita of the origin country and estimates from unreported regressions that suggest that individuals from the "middle income" group (as defined in the results presented in Section 4) are around 20% more likely to emigrate, holding all else constant.[17]

3. The 2060 bilateral migrant stocks are recalculated given the estimated coefficients from the regression analysis (Column 2 of Tables 2 and 3) and projected changes in the ratio of destination to origin country wages from the central scenario to 2060.

   - $Migrant\ stock_{odj,2060} = Initial\ migrant\ stock_{odj,2060} * \left((\delta_{oj} * 100) * \left(\frac{w_{dj,2060}}{w_{oj,2060}} - \frac{w_{dj,2000}}{w_{oj,2000}}\right)\right)$

   - Where δ is the estimated coefficient on the wage term for migrants from country o of skill level j.

   - Individual wage projections are available for high skilled and low skilled workers, allowing separate migration projections by skill level. Specific coefficients (based on those presented in rows 4, 9 and 10 of Column 2, Tables 2 and 3) are applied to wage differentials in a bilateral pair depending on the projected path of GDP per capita of the origin country in the central scenario. Specifically, the coefficient will depend on the point at which GDP per capita of the origin country surpasses the threshold value used to define the dummy variable.[18]

17. For example, a country that is in the middle income group for 60% of the projection period will have a scaling factor of 1.12 = 1*(0.4)+1.2*(0.6).

18. For example, Indonesia moves into the middle income category in 2030 when projected GDP per capita of the country increases above the 3894 US 2005 PPP threshold for the "middle income" dummy. As such,

4. For each country and skill class, the total change in the emigrant stock between 2000 and 2060 and the total change in the immigrant stock are calculated by aggregating up from the movements in bilateral migrant stocks.

5. Net migration over the period is calculated by subtracting total emigration from total immigration for each country. The net migration figures are then scaled to allow for comparability with the official (UN/Eurostat) projections that are for the 2010-2060 period.

6. The potential labour projections at 2060 are obtained by assuming migrant flows are evenly distributed over the projection period and the time-varying country-specific age distribution of net migrants is the same as in the UN/Eurostat projections. The potential labour stocks at 2060 are estimated by calculating the number of immigrants in each country at 2060 that are above 15 years of age and holding the labour force participation rate and the natural rate of unemployment constant at the value assumed in the OECD long-run growth scenario. It is assumed that life expectancy is 81 years across countries, consistent with the average over the forecast horizon under the OECD scenario. The potential labour projections are calculated for all countries included in the long-run OECD scenario (Johansson et al., 2013) apart from Estonia and Saudi Arabia that are excluded due to poor data quality for the migrant age profile. The country-level estimates are then aggregated into the regions presented in Figure 3.

7. The migrant population that is above 65 years of age at 2060 is estimated for both the OECD scenario and the model-based projections. From these estimates, measures of the old-age dependency ratio can be calculated for each scenario.[19]

42. In summary, the assumptions made to produce the model based migration projections are numerous. Particularly strong assumptions are that;

- the stock of world migrants will grow in accordance with official projections for population growth in the origin countries of the existing migrant stock;
- the propensity to migrate will depend on income per capita in the origin country, captured by a rough estimate that migrants from middle income countries are 20% more likely to move abroad;
- countries that lie within the same region (of the 26 defined in the CGE model) will experience the same growth in skill-specific wages over the period to 2060.

43. For estimating the potential labour stocks at 2060 given the modelled migrant flows, the strongest assumptions are that;

- the modelled change in the stock of migrants (i.e. the flow) is evenly distributed over the 2010-2060 period;

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for low skilled workers, the value of $\delta_{Indonesia,ls}$ =(0.03*(2030-2000)+0.66*(2060-2030)), where 0.03 is the estimated coefficient on the interaction term between the relative wage and low income dummy (see Column 2 of Table 3) and 0.66 is the estimated coefficient for the interaction term between the relative wage and the middle income dummy.

19. Calculated as $\left(1 - \frac{POP_{15-64}}{POP_{15+}}\right) \times 100$

- the age distribution of net migrants for a country are as estimated by the UN/Eurostat.
- the labour force participation rate and natural rate of unemployment are unchanged to those projected in the OECD scenario and life expectancy across countries is 81 years.

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