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The Gravity of High-Skilled Migration Policies

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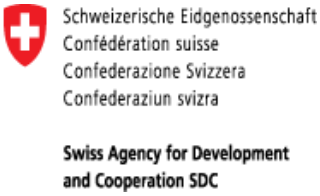

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The Gravity of High-Skilled Migration Policies*

Mathias Czaika and Christopher R. Parsons †

Abstract

Despite the almost ubiquitously held belief among policy makers that immigration policies aimed at attracting high-skilled workers meet their desired aims, academics continue to debate their efficacy. This paper presents the first judicious assessment of the effectiveness of such policies. We combine a unique new data set of annual bilateral high-skilled immigration labor flows for 10 Organisation for Economic Co-operation and Development destinations between 2000 and 2012 with new databases comprising both unilateral and bilateral policy instruments to examine which types and combinations of policies are most effective in attracting and selecting high-skilled workers using a micro-founded gravity framework. Points-based systems are much more effective in attracting and selecting high-skilled migrants than requiring a job offer, labor market tests, or shortage-listed occupations. Financial incentives yield better outcomes in "demand-driven" systems, which require a job offer, than when combined with points-based systems, however. Offers of permanent residency, while attracting the highly skilled, overall reduce the human capital content of labor flows because they prove more attractive to non-high-skilled workers. Bilateral recognition of diploma and social security agreements foster greater flows of high-skilled workers and improve the skill selectivity of immigrant flows. Conversely, double taxation agreements deter high-skilled migrants, although they do not alter overall skill selectivity. Higher wages for skilled workers increase the number and skill selectivity of labor flows, whereas higher levels of unemployment exert the opposite effects. Migrant networks, contiguous borders, common language, and freedom of movement, while encouraging greater numbers of high-skilled workers, exert greater effects on non-high-skilled workers, thereby reducing the skill content of labor flows. Greater geographic distances, however, while deterring both types of workers, affect the high skilled less, thereby improving the selection of skills. Our results are robust to a variety of empirical specifications that account for destination-specific amenities, multilateral resistance to migration, and the endogeneity of immigration policies.

Keywords: High-skilled immigration, human capital, immigration policy
JEL classification: F22, J61

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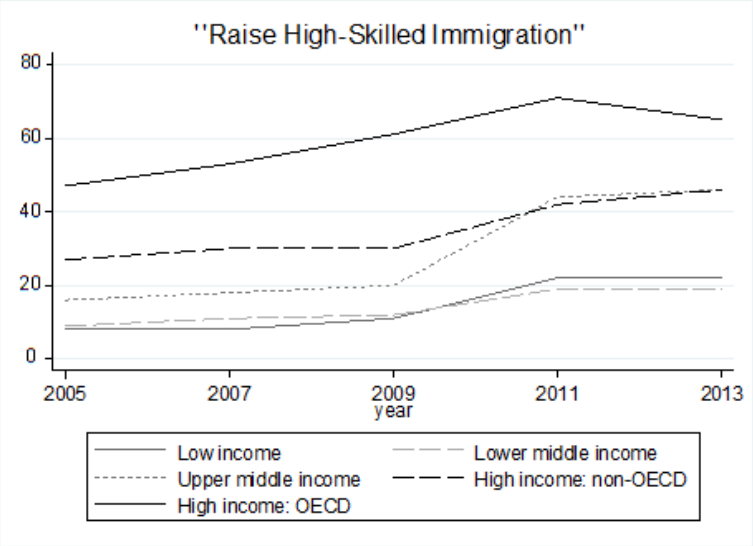
1. Introduction

> *[M]ore than 40 percent of Fortune 500 companies were founded by immigrants or their children…The revenue generated …is greater than the GDP…of every country in the world outside the U.S., except China and Japan.*
>
> Forbes (2011)[1]

> *[I]f Europe really wants to have a knowledge based economy, if it wants to play a leading role in innovation and research, if it wants to be competitive in the global economy, it needs to do much more to attract the smartest and the brightest.*
>
> Cecilia Malmström, European Union Commissioner (2012)[2]

Policy makers worldwide, cognizant of the pivotal role human capital plays in the economic development of receiving nations, increasingly vie to attract "the best and brightest" (Kapur and McHale 2005) in the "global competition to attract high-skilled migrants" (Boeri et al. 2012). At the center of this contest are the countries of the Organisation for Economic Co-operation and Development (OECD), which historically have attracted the largest proportion of high-skilled migrants (Artuç et al. 2014), at least in part because the domestic supply of skills is falling short of domestic demand (Papademetriou and Sumption 2013). However, because high-skilled migrants are motivated to move internationally by myriad factors, the efficacy of nation states' high-skill immigration policies remains highly contested. Indeed, scientific debate on immigration policy until now has largely focused on low-skilled, asylum, or illegal migration, and states' efforts to reduce and control these forms of migration as opposed to analyzing the efficacy of high-skilled migration policies (Boeri et al. 2012). The lack of existing evidence is largely due to conceptual and methodological flaws and the paucity of adequate data (Czaika and de Haas 2013). This paper contributes to the literature by overcoming these shortfalls to test the efficacy of high-skilled migration policies with rich panel data.

Figure 1. Government Policy Objectives on High-Skilled Migration (percent of countries)



Source: Data from UN World Population Policies 2013 (http://esa.un.org/PopPolicy).
Note: OECD = Organisation for Economic Co-operation and Development.

1. http://www.forbes.com/sites/stuartanderson/2011/06/19/40-percent-of-fortune-500-companies-founded-by-immigrants-or-their-children/.

2. http://europa.eu/rapid/press-release_SPEECH-12-312_en.htm?locale=fr.

Faced with a limited domestic supply of labor in certain skills and occupations, national governments increasingly vie to attract talent to respond to immediate and long-term labor requirements and skill shortages. As shown in figure 1, ever more countries are engaging in the intense global competition to attract internationally mobile human capital by redesigning their immigration regimes, thereby leading to a diffusion of high-skilled migration policies globally. In 2013, approximately 40 percent of the 172 United Nations member states declared an explicit interest in increasing the level of high-skilled migration (UN World Population Policies, 2013,). This share has almost doubled since 2005, when 22 percent expressed a similar preference. Highly developed destinations are at the vanguard of this global trend, with two-thirds of OECD nations having implemented, or being in the process of implementing, policies specifically aiming to attract high-skilled migrants. Thus, between the last two census rounds, in 2000/01 and 2010/11, OECD countries witnessed an unprecedented 70 percent rise in the number of tertiary-educated migrants to 35 million (Arslan et al. 2014).[3] The desirability of high-skilled immigrant workers, and thus the reason for the proliferation of policies aimed at attracting the highly skilled, has been well documented.

First, increasing the human capital stock through immigration raises overall productivity and contributes to economic growth in receiving countries (Boubtane, Dumont, and Rault 2014). A key global trend in international migration is that increasing numbers of origin countries send high-skilled migrants who agglomerate in the main destination countries of the world, a process that, in turn, increases the diversity of the migrant stocks in receiving countries (Czaika and de Haas 2014; Özden and Parsons 2015). Alesina, Harnoss, and Rapoport (2013) demonstrate that such diversity by birthplace significantly and positively spurs economic growth. Peri, Shih, and Sparber (2015) show that science, technology, engineering, and math (STEM) workers are the main drivers of productivity growth in the United States. These authors show H1-B–driven increases in STEM workers raise both college- and non-college-educated native wages, but far more for the college educated. Because no effects on employment are found, these results imply a significant positive impact of STEM workers on total factor productivity. High-skilled immigrants spur technological progress through the creation and diffusion of knowledge and innovation (Kerr and Lincoln 2010). Hunt and Gauthier-Loiselle (2010) show for the United States that between 1990 and 2000, the 1.3 percent increase in the share of the population composed of immigrant graduates, and the comparable 0.7 percent increase in the share of post-college immigrants, increased patenting per capita by 21 percent,[4] a substantial proportion of which is estimated to be the positive spillovers from skilled workers. In particular, knowledge that cannot be codified and transmitted through other information channels requires "knowledge-carriers" to physically move to transfer knowledge across borders and to create spillovers elsewhere (OECD 2008).

High-skilled migrants might be better received in comparison with low-skilled migrants by host country populations for many reasons. Facchini and Mayda (2012) analyze a specific question pertaining to high-skilled immigration from the 2002–03 round of the European Social Survey to examine more than 30,000 individuals' attitudes toward high-skilled immigration across 21 European countries. These authors' summary statistics demonstrate that, on average, public opinion is in favor of additional skilled migration. In other words, high-skilled migration is likely politically more

3. In shares, the proportion of highly skilled (that is, tertiary educated) migrants increased from 24 percent in 2000 to 29.9 percent in 2010.

4. This estimate is based upon those authors' instrumental variable estimates.

acceptable as well as economically attractive. In their analysis, Facchini and Mayda (2012) examine two economic channels through which high-skilled migrants may affect natives' attitudes toward them, a labor market channel (in which migrants' education is the key determinant of attitudes) and a welfare channel (through which immigrants' income levels, and thus immigrants net fiscal contributions to society, are the pivotal factor). The results conform to their theoretical predictions—higher levels of education among natives reduce natives' pro-high-skilled immigrant stance, while wealthier individuals are more likely to favor high-skilled immigration.

Of course, noneconomic factors also determine natives' attitudes (Card, Dustmann, and Preston 2012). Since high-skilled migrants will likely integrate into host economies faster and will be less likely to become undocumented, *a priori* a pro-high-skill positive bias might be accepted. However, in political science it is assumed that native workers will be less in favor of immigrants at the same skill level as themselves because additional migration will lead to additional competition for their jobs. Hainmueller and Hiscox (2010), however, find that both low- and high-skilled natives favor high-skilled migrants. Corroborative evidence is offered by a recent YouGov poll, the fieldwork for which was conducted across the United Kingdom between January 16 and 22, 2015. This survey found, even among the selected sample of *Sun* newspaper readers that supported the United Kingdom Independence Party—which campaigned in the 2015 U.K. general election primarily on an anti-immigration platform—that 55 percent of those canvassed were still in favor of maintaining or raising the present numbers of well-educated and high-skilled migrants in the domestic labor market.[5]

Despite the concurrent rise in the number of high-skilled immigrants worldwide and the proliferation of high-skilled immigration policies, the degree to which high-skilled immigration policies have been effective remains contested (Bhagwati and Hanson 2009). Jasso and Rosenzweig (2009) examine the roles of skill premiums and cultural proximity in their study of the skill composition of immigration to Australia and the United States and conclude that "There is no evidence that the differences in the selection mechanism used to screen employment migrants in the two countries play a significant role in affecting the characteristics of skill migration" (Jasso and Rosenzweig 2009, 4). A general review concludes that immigration policies are likely relatively ineffective when compared with other social, economic, and political determinants (Czaika and de Haas 2013). Doomernik, Koslowski, and Thränhardt (2009) argue that attracting high-skilled migrants will likely depend upon broader economic and social factors as opposed to the "technical approach" now in use. High-skilled migrants likely value myriad noneconomic factors, such as the standard of living; the quality of schools, health services, and infrastructure; and the presence of a well-established professional network (Papademetriou, Somerville, and Tanaka 2008). Papademetriou, Somerville, and Tanaka (2008) coined the term "immigration package" to describe the overall basket of factors that feature in high-skilled migrants' calculus when deciding where to move.

This paper examines the degree to which skill-selective migration policies are effective in increasing the inflow and selection of high-skilled labor immigrants, having accounted for a raft of economic and noneconomic factors. The empirical (pseudo-gravity) model is derived from, and consistent with, an underlying micro-founded Random Utility Model (RUM) (Beine, Bertoli, and Moraga 2014; Bertoli and

5. The detailed results of the survey can be found at https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/document/9n3rbm3yf2/YG-Archive-150122-TheSun-Immigration.pdf.

Moraga 2015) and is arguably the richest to date in terms of the model being well-specified. It also accounts for recent innovations in the empirical literature, namely a high proportion of zeroes in the dependent variable and Multilateral Resistance to Migration (MRM) (Santos Silva and Tenreyro 2006; Bertoli and Moraga 2013).

Broadly, the paper contributes to the literature on the determinants of international migration, which to date has emphasized the roles of income and wage differentials (Grogger and Hanson 2011; Belot and Hatton 2012; Ortega and Peri 2013; Beine, Bricongne, and Bourgeon 2013), social networks and diasporas (Pedersen, Pytlikova, and Smith 2008; Beine, Docquier, and Özden 2011; Beine and Salomone 2013), credit constraints (Vogler and Rotte 2000; Clark, Hatton, and Williamson 2007; Belot and Hatton 2012) and (un)employment (Beine, Bricongne, and Bourgeon 2013; Bertoli, Brücker, and Moraga 2013). However, this paper speaks most directly to the strand of this literature that specifically examines immigration policies as drivers of international migration. To date these studies have used cross-country panels to evaluate the effects of entire immigration regimes on aggregate bilateral migration flows (Mayda 2010; Ortega and Peri 2013; Czaika and de Haas 2014) or else focused on particular migration categories such as asylum seekers (Vogler and Rotte 2000; Holzer, Schneider, and Widmer 2000; Hatton 2005, 2009; Thielemann 2006) or irregular migrants (Czaika and Hobolth 2014).

Rinne (2013) provides a literature review of the evaluation of immigration policies, highlighting the scarcity of empirical evidence on the efficacy of immigrant selection policies. Cobb-Clark (2003) examines the effect of a change in the selection criteria in Australia on migrants' labor market integration and finds that immigrants facing more stringent entrance criteria fared significantly better in the labor market. Antecol, Cobb-Clark, and Trejo (2013) conduct a cross-sectional empirical analysis for Australia, Canada, and the United States and argue that migrants to all three countries have similar observable skills once Latinos in the United States are removed from the analysis, thereby concluding that the relatively low average skill level of migrants to the United States is largely driven by the geographic and historic proximity of Mexico as opposed to differences in immigration policy. For Canada, Green and Green (1995) conduct a time-series analysis to examine the impact of changes in the Canadian points-based system (PBS) introduced in 1967 on the occupational composition of immigrants. They find that changing point requirements proved effective in altering the occupational composition of migrant inflows, but that it was predominantly large changes in the required points that exerted the greatest effect on the occupational composition.

Boeri et al. (2012) analyze the role of "pro-skill" policy changes in 14 Western immigration countries on constructed bilateral skill-specific flows, applying dyadic skill shares as recorded in stock data (in 1990 and 2000) to aggregate immigrant flows as recorded elsewhere for 1980 through 2005.[6] These authors conclude that high-skilled migration policies have a noticeable impact on the skill composition of immigration flows. This methodology, however, suffers from the fact that migrant stocks are a function of net migration flows (as well as any attrition in the stocks). Therefore, it is unclear whether contemporary flows reflect the skill level of the prevailing stock. A constant skill flow alters the share of high skill at destination, which would not be captured by applying a constant skill share to the inflow of immigrants. Furthermore, these authors' use of an index to record policy changes means that conclusions can only be drawn regarding the variation of policy changes because it is unclear to which

6. Specifically, the 1990 skill shares are applied to flows before 1990, the 2000 skill shares to years after 2000, and interpolated skill shares are applied to the flows between 1990 and 2000.

level of "restrictiveness" these countries have initially anchored their immigration policy. No conclusions can therefore be made regarding the effectiveness of specific skill-selective policy instruments.

To assess the efficacy of specific high-skilled immigration policies across countries, the analysis in this paper combines three new data collections for the first time. The first is a unique data set of bilateral migration flows harmonized by skill level and migrants' origins for 10 OECD destinations and 185 origin countries (see appendix table A.1) for the period 2000–12, as detailed in Czaika and Parsons (forthcoming). These data allow the determinants of high-skilled migration dynamics to be analyzed, thereby moving beyond existing studies that examine the determinants of aggregated data (that is, data comprising all skill levels) on migration flows (for example, Pedersen, Pytlikova, and Smith 2008; Mayda 2010; Ortega and Peri 2013) or else skill-specific migration stocks (for example, Belot and Hatton 2012 Grogger and Hanson 2011; Brücker and Defoort 2009; Beine, Docquier, and Özden 2011).

The second is a unique data base of unilateral high-skilled immigration policies. These policies are modeled by implementing a dummy variable for each policy that takes the value of one should a particular policy be in place in a specific country-year (see Czaika and Parsons, forthcoming). This innovation is important for two reasons. First, the data are specifically coded for high-skilled immigrants. Therefore, policy changes that relate to an unknown share of the migration flow in question need not be applied; instead the unique effects of these policy instruments on high-skilled immigration flows can be identified rather than resorting to modeling immigration policies by using an index of policy restrictiveness (Mayda 2010; Ortega and Peri 2013). Second, modeling each unilateral policy individually also allows the effects of such policies to be compared, both over time and across countries, and allows how various policies work in combination to be examined.[7]

The third data collection comprises myriad additional factors that form part of the "migration package." These include a battery of bilateral migration policies, such as social security agreements, recognition of diplomas, and double taxation agreements. Several variables that capture additional factors that might influence the mobility of the highly skilled are also included, such as measures of health, education, taxation, quality of life, and infrastructure.

The results show that PBSs are much more effective in attracting and selecting high-skilled migrants in comparison with demand-led policies that include requiring a job offer, clearance through a labor market test, or working in a shortage-listed occupation. The provision of post-entry rights, as captured in the model by the offer of permanent residency, is effective in attracting high-skilled migrants, but overall is found to reduce the human capital content of labor flows. "Roads to permanency" prove more attractive to non-high-skilled workers. Particular policies, however, are more effective when combined with other policy instruments. For example, financial incentives in demand-driven systems that require a job offer yield better outcomes than the same financial incentives combined with PBSs.

The analysis finds that bilateral agreements that recognize the credentials of diplomas earned overseas and that transfer social security rights between country pairs foster greater flows of high-skilled workers. They also improve the skill selectivity of immigrant flows. Conversely, double taxation

7. An important ongoing effort in this regard is the IMPALA project (see Beine et al. 2015).

agreements, on net, are found to deter high-skilled migrants, although no evidence is found that such policies alter the overall skill selectivity of labor flows.

Higher wages for the high skilled increase both the overall number of high-skilled workers and the degree of human capital within migration corridors. The opposite is found for higher levels of unemployment. Finally, many of the variables that capture various migration costs—migrant networks, contiguous borders, common language, and freedom of movement—while all encouraging greater numbers of high-skilled workers, also all exert greater effects on non-high-skilled workers, thereby reducing migrant skill selection. The distance measure, however, has the opposite effect and although deterring both types of workers affects the high skilled less, such that greater geographic distances are associated with improved skills selection.

Section 2 outlines the theoretical approach. Section 3 discusses a number of empirical considerations that the model needs to account for. Section 4 details the data used in the model. Section 5 presents the baseline results, a series of robustness checks, the results when policies are used in combination, and the results on the skill selectivity of immigrant flows.

2. Theoretical Framework

Sjaastad's (1962) canonical paper laid the foundation for the modern theoretical approaches adopted in the economics of migration, casting potential migrants as rational maximizers of human capital investments who weigh the attractiveness of potential destinations by comparing their associated costs and benefits. Nowadays, the micro-founded pseudo-gravity model of international migration has become the theoretical workhorse on which the majority of studies that examine the determinants of migrants' location decisions are based. The theoretical foundations of the analysis in this paper, derived from a random utility model, are therefore largely off the shelf and have been detailed elsewhere (see Grogger and Hanson 2011; Beine, Docquier, and Özden 2011; Boeri et al. 2012; Ortega and Peri 2013; Beine, Bricongne, and Bourgeon 2013; Beine and Salomone 2013; Bertoli and Moraga 2013; Bertoli, Brücker, and Moraga 2013; Beine, Bertoli, Moraga 2014; Beine and Parsons 2015; Bertoli and Moraga 2015). In particular, the analysis denotes scale (of the total of high-skilled migration) and selection (the share of high-skilled to migrants out of all skill categories) equations (see, for example, Grogger and Hanson 2011; Beine, Docquier, and Özden 2011; Boeri et al. 2012; Ortega and Peri 2013).

The model comprises agents of z-skilled persons ($z = \text{high (H)}, \text{low(L)}$), who reside in country $o \in O = \{1, \dots O\}$ and who face a static optimization problem in time t as to whether to remain at home or migrate abroad to one of multiple destinations, $d \in D = \{1, \dots D\}$. For a representative agent i, of skill-group z, the utility derived from migration from origin o to destination d in year t can be expressed as a function of the net costs and benefits from migration (which are assumed to be identical across similar individuals between the same country pairs in the same year) γ_{odt}^{z}, as well as an idiosyncratic agent-specific term ∂_{odit}^{z}. In turn, γ_{odt}^{z} is assumed to be an increasing function f_1 of expected wages for individuals of skill-type z at destination d, and h_1 of any amenities at destination d that migrants of both skill types may consume in year t, A_{dt}; and a decreasing function f_2 of expected wages of skill-type z at origin and h_2 of any amenities at origin o net of bilateral migration costs that are captured by the function $g(C_{odt})$. These costs are assumed to be identical across skill

groups. Formally, and assuming separability of migration costs and benefits, the utility function can be expressed as follows:

$$U_{odit}^{z} = \gamma_{odt}^{z} - \partial_{odit}^{Z} = f_1(W_{dt}^{z}) + h_1(A_{dt}) - f_2(W_{ot}^{z}) - h_2(A_{ot}) - g(C_{odt}) - \partial_{odit}^{Z} . \quad (1)$$

Following McFadden (1974) and assuming that ∂_{odit}^{Z} follows an Extreme Value Type-1 (EVT-1) distribution, such that ∂_{odit}^{Z} are independent and identically distributed (i.i.d.), the problem at hand can be considered a discrete choice logit problem wherein the utility of an agent's migration decision is commensurate to the logarithm of the share of migrants of skill-type z from origin o that move to each destination d in year t, s_{odt}^{z}, relative to those that remain at home s_{oot}^{z}:

$$ln\, s_{odt}^{z} - ln s_{oot}^{z} = f_1(ln\, W_{dt}^{z}) + h_1(ln\, A_{dt}) - f_2(ln\, W_{ot}^{z}) - h_2(ln\, A_{ot}) - g(ln\, C_{odt}) , \quad (2)$$

in which $s_{odt}^{z} = n_{odt}^{z}/n_{ot}^{z}$. The term n_{ot}^{z} is the total number of individuals of skill-type z born in origin o. The term s_{oot}^{z} is the total number of individuals of skill-type z born in origin o that remain at home. Rearranging equation (2) and solving for lnn_{odt}^{z} and including origin-time fixed effect, δ_{ot}, to control for wages at origin in addition to the proportion of natives that remain at home, both of which are unobservable in the data, yields the following:

$$ln\, n_{odt}^{z} = f_1(ln\, W_{dt}^{z}) + h_1(ln\, A_{dt}) - g(ln\ C_{odt}) + \delta_{ot}. \quad (3)$$

The estimated coefficient on $f_1$will provide a measure of the difference in expected earnings of migrants between the origin and destination (when estimated for each skill type separately). We broadly conceive migration costs C_{odt} to comprise time-varying economic factors at destination E_{dt}, which include the prevailing unemployment rate and the total population; time-varying destination-specific migration policies P_{dt}; time-invariant bilateral factors X_{od} that include geographical factors, physical distance between origins and destinations, and whether country pairs share a common border; as well as cultural factors, common languages, or a colonial heritage; time-varying migrant networks M_{odt}; and finally time-varying bilateral and multilateral policies P_{odt}.

Putting everything together, equation (4) is the *scale* equation subsequently used to estimate total high-skilled migration flows to the 10 OECD destinations:

$$ln\, n_{odt}^{HIGH} = \beta_1(ln\, W_{dt}^{HIGH}) + \beta_2(ln\, A_{dt}) - \beta_3(ln\, E_{dt}) - \beta_4(P_{dt}) - \beta_5(X_{od}) - \beta_6(ln\, M_{odt}) - \beta_7(P_{odt}) + \delta_{ot} + \varepsilon_{odt}^{HIGH} .$$

(4)

To derive the *selection* equation, the share of high-skilled migrants in the total labor inflow, that is, the sum of high- and non-high-skilled migrants, is estimated:

$$ln(n_{odt}^{HIGH}/\textstyle\sum_z n_{odt}^{z}) = \beta_1(ln\, W_{dt}^{HIGH} - ln\, W_{dt}^{AVERAGE}) + \beta_2(ln\, A_{dt}) - \beta_3(ln\, E_{dt}) - \beta_4(P_{dt}) - \beta_5(X_{od}) - \beta_6(ln\, M_{odt}) - \beta_7(P_{odt}) + \delta_{ot} + \varepsilon_{odt} .$$

(5)

3. Empirical Considerations

Given recent advances in the literature, the estimation of equation (4) evokes a number of empirical considerations. A particular feature of both trade and migration data is the large proportion of zeroes that are typically present, particularly at finer levels of disaggregation. Equation (4) is therefore estimated using the pseudo-Poisson maximum likelihood (PPML) estimator. In their seminal paper, Santos Silva and Tenreyro (2006) show, in the presence of zeroes in the dependent variable, when the variance of the error term is a function of the independent variables in equation (4), that the expected value of the error term will also depend on the value of the regressors. In addition, in the presence of many zeroes, as in this data set—8,168 zeroes out of the maximum 23,920 observations—the Gauss Markov homoscedasticity assumption will be violated, resulting in biased and inconsistent ordinary least squares estimates. Santos Silva and Tenreyro (2006) propose the use of the PPML estimator that instead results in consistent and unbiased estimates in the presence of heteroscedasticity.

Next, as discussed in detail in Beine, Bertoli, and Moraga (2014) and Bertoli and Moraga (2015), the derivation of equation (4) is dependent upon the assumptions that (1) the utility derived from each destination varies neither across origins *nor* individuals and (2) the stochastic component of utility is i.i.d. and conforms to an EVT-1 distribution, which although computationally appealing may not be the case. Two key implications result. The first is that the scale of migration from country *o* to country *d* crucially depends upon the utility associated with all other possible destinations. Bertoli and Moraga (2013) coined the term "multilateral resistance to migration" (MRM), a concept analogous to the idea first introduced by Anderson and van Wincoop (2003) in the context of trade. The second is that for the model to be consistent with the underlying RUM, one which does not violate the Independence of Irrelevant Alternatives (IIA) assumption, a set of origin-time dummies must be used to control for the population at origin, which in turn implies that the expected value of the gross migration flow conditional on the independent variables (as well as the dummies) is independent across all individuals in the data set. It is important to note that the imposition of these fixed effects also controls for credit constraints, the omission of which will likely lead to alternative results (Belot and Hatton 2012).

A failure to account for MRM constitutes an omitted variable bias. Across the trade and migration literatures a number of approaches have been adopted to deal with this potential omission. In their famous paper, Anderson and van Wincoop (2003) estimate a large set of nonlinear simultaneous equations to explicitly calculate the relevant terms. Feenstra (2004) states that the easiest way to deal with MRM is through the imposition of origin-time and destination-time fixed effects. Head, Mayer, and Ries (2010) calculate MRM terms by estimating trade triads—the relative importance of trading pairs' trade links with major trading countries of the world. Bertoli and Moraga (2013) take advantage of particularly rich and high-frequency data, which allows them to use Peseran's (2006) Common Correlated Effects (CCE) estimator. The present paper adopts an alternative approach as suggested by Baier and Bergstrand (2009) to explicitly model the MRM terms, as first applied to the migration literature by Gröschl (2012).[8]

8. Following Gröschl (2012), the MRM terms are calculated as:
$MRDIST_{odt} = [(\sum_{k=1}^{C} \theta_{kt} lnDist_{ok}) + (\sum_{m=1}^{C} \theta_{mt} lnDist_{md}) - (\sum_{k=1}^{C} \sum_{m=1}^{C} \theta_{kt}\theta_{mt} lnDist_{km})]$
$MRADJ_{odt} = [(\sum_{k=1}^{C} \theta_{kt} Adj_{ok}) + (\sum_{m=1}^{C} \theta_{mt} Adj_{md}) - (\sum_{k=1}^{C} \sum_{m=1}^{C} \theta_{kt}\theta_{mt} Adj_{km})]$.

Quantitative empirical research has operationalized migration policies using two alternative techniques. The first approach constructs policy indices that measure the restrictiveness of various facets of immigration systems (Mayda 2010; Boeri et al. 2012; Peri and Ortega 2013). Typically a value of zero is assigned to the index for a particular country in period zero; this value is increased or decreased by one should a policy in a particular year be deemed to be more or less restrictive. Such an approach assumes an equal weighting of the relative importance of various policies, however, and further assumes that such policies affect various groups of immigrants in a uniform way. Finally, the level of restrictiveness with which each destination country began the period is unclear, which means that assigning a zero value to each country prevents cross-country variations from being examined. The second approach is to use a binary variable that equals unity should a particular policy be in force in a specific year, or zero if the policy is absent (Czaika and de Haas 2014). This approach is advantageous in that variations both within and across countries can be exploited. This paper follows the latter approach given that it focuses on a range of policy instruments specifically targeted at high-skilled migrants and that are indicated by separate dummy variables.

4. Data

The core analysis of the paper requires new data on both bilateral migration flows disaggregated by skill and measures of migration policies specifically targeting high-skilled migrants. Additionally, given the contested nature of the efficacy of these policies, a full battery of other potential determinants must also be considered. All three data collections represent substantial contributions of the current work.

4.1. High-Skilled Migration Flows

The migration flow data disaggregated by skill are derived from a variety of sources including administrative data files (Australia, Canada, Israel, New Zealand, the United States), work or residence permits (Switzerland, the United Kingdom), population and employment registers (Norway, Sweden), and employment visas (the Republic of Korea), the precise details of which are provided in Czaika and Parsons (forthcoming). As opposed to immigrant stocks, immigration flows are seldom recorded by immigrants' educational attainment. Czaika and Parsons (forthcoming) therefore collate immigration flow data pertaining to incoming economic migrants who are entering destination country labor markets and whose occupations are recorded. This focus upon migrants entering destination countries for employment purposes is important; these are the individuals who the policies, the efficacy of which is being tested in this paper, are attempting to attract. Moreover, because the data record those entering countries for the purposes of work, the results are not capturing high-skilled individuals who are employed in jobs not commensurate with their levels of education, that is, those suffering from so-called brain waste (Mattoo, Neagu, and Özden 2008).

As discussed in detail in Czaika and Parsons (forthcoming), these data are harmonized to the greatest degree possible. First, the flow data pertain to labor migrants arriving from abroad as opposed to

θ refers to a country's share of population as a fraction of the world population: N_{kt}/N and N_{mt}/N. Dist stands for our measure of bilateral distances while Adj is a binary variable equal to one if two countries in a pair border one another.

those individuals that change their status in the destination country. Second, with the exception of Israel,[9] all the data refer to immigrants' nationality as opposed to their country of birth or country of last previous residence, which is important because migration costs are determined, at least in part, by nationality (Beine, Bertoli, and Moraga 2014). Third, the data refer to those staying for 12 months or more. Finally, because countries use differing nomenclature when recording individuals' occupations (Parsons et al. 2014), these data were collected at the lowest possible level of disaggregation to ensure that they could be suitably harmonized to a broad notion of human capital, one based on the first three major groups of the International Standard Classification of Occupations (ISCO) 2008: (1) managers, senior officials, and legislators; (2) professionals; and (3) technicians and associate professionals. This broader measure of skill was decided upon because (1) these three categories are commensurate with tertiary or graduate educational attainment, (2) the third group includes many science and technology occupations, and (3) for the sake of pragmatism this broader definition ensures an accurate match with those data from countries that do not adhere to the ISCO classification (see Czaika and Parsons, forthcoming). These harmonizations are important because they facilitate meaningful cross-country comparisons over time. Between 2000 and 2012, these data capture, on average, more than 700,000 skilled migrants per year from 185 origins that reside in 10 OECD destinations, according to our harmonized definition, with the greatest number in 2007, when more than 830,000 were recorded in total.[10]

4.2. High-Skilled Migration Policies

Labor immigration systems can broadly be distinguished by whether labor migrants are required to have obtained a job offer before gaining entry to the domestic labor market. Immigration systems that do require such a job offer have been termed "demand-driven" systems (Chaloff and Lemaitre 2009), and employers typically take a leading role in the recruitment process. Most European systems as well as the U.S. labor immigration system are, at least in part, employer driven. This means that an employer must sponsor a foreign worker for the worker to qualify for a work permit. The job offer requirement is in effect a general test about a foreign worker's employability in the domestic labor market. Such requirements are effective in selecting migrant workers that are immediately employable, but skilled migrants that do not fill an immediate shortage in the domestic labor market might be deterred. As discussed in Parsons et al. (2014), demand-driven systems often comprise further assessment mechanisms that indirectly impose additional transition and uncertainty costs on incoming migrants, giving rise to increasing incentives for both the migrants themselves and their would-be employers to pursue entry through other channels.

Immigration systems in which highly qualified migrants can apply for work permits without job offers have conversely been termed "supply-driven" systems (Chaloff and Lemaitre 2009), although an offer of a job may still grant preferential access. Under such policy regimes, qualifications, age, work experience, language skills, and previous wages are usually assessed on an individual basis through a PBS, whereby applicants are selected independently of prevailing labor market conditions. Canada

9. The majority of immigrants that arrived in Israel during the period (74 percent) comprised individuals from the countries of the former Soviet Union, which is recorded as a single entity in the data set. This no doubt reduces any discrepancies between the two series.

10. It is important to emphasize that although this number is somewhat artificially inflated because of the inclusion of H1-B visa data for the United States, which are based on I-94 admissions data (see Czaika and Parsons, forthcoming), the results remain robust to their inclusion and exclusion.

since 1967 and Australia since 1989 pioneered these skill-selective immigration systems, which aim to attract high-skilled migrants in large numbers. Despite any potential downside regarding the immediate employability of workers admitted through a PBS, supply-driven systems are often seen as relatively effective in attracting high-skilled migrants (Facchini and Lodigiani 2014). In fact, Boeri et al. (2012) argue that it is only such supply-driven systems that can meaningfully attract and capitalize upon human capital over the longer term.

Whether a country has implemented an employer-driven (demand) system, an immigrant-driven (supply) system, or a mixture depends upon policy makers' priorities when addressing long-term deficiencies in human capital compared with short-term labor market shortages. In practice, despite countries leaning toward a demand- or supply-side orientation, immigration policies tend to comprise a mixture of elements, both demand and supply, termed "hybrid systems" (Papademetriou et al. 2008). For example, Australia and Canada have recently begun to combine their PBSs with shortage lists that constitute demand elements; applicants gain additional credit if their occupations are recognized as being in high demand.

Therefore, to capture immigration policy systems, this paper chooses six separate policy elements that collectively capture many of the key differences between destination countries' policy stances. It is unlikely that a single policy instrument makes a particular destination country more or less attractive for high-skilled migrants, but rather a combined set of immigration policies. The six policy elements are job offer, PBS, labor market test, shortage list, offers of permanent residency, and financial incentives.

Labor market tests are case-by-case assessments of whether an "equivalent" domestic worker is currently available to fill an advertised position. Labor market tests avoid the recruitment of unemployable migrants and those that might reduce the employability of native workers. To lower the bureaucratic burden of labor market tests, particularly if it is obvious that entire occupations cannot be filled locally, countries have developed shortage lists of occupations that are exempt from labor market tests. Labor market shortages are assessed on an occupation-by-occupation basis (in contrast to the individual job approach of a labor market test) by experts, the accuracy of who in identifying and assessing labor market needs has been criticized (Sumption 2013). High-skilled migrants are also hypothesized to be strongly attracted by prospects of permanent residency, and today most OECD destinations offer a "road to permanency" after a migrant lives and works in the country for a number of years. Finally, financial incentives, including tax exemptions and other economic incentives, predominantly target high-skilled migrants.

For each of the six policy variables, the analysis codes a dummy variable as a 1 should the answer to a particular statement be "yes." For example, for a labor market test, the statement is simply "Is there a mechanism in place to attempt to ensure the position cannot be filled by domestic workers?" The remaining statements can be found in appendix table A.2. Nevertheless, since destination countries typically implement numerous policies that often relate to more than one class of migrant (Czaika and de Haas 2014), a series of coding assumptions was adhered to, to ensure that the data are comparable both across countries and over time. These assumptions can also be found in appendix table A.2.

The contest to the efficacy of immigration policies generally, and policies that focus on attracting and selecting high-skilled immigrants in particular, derives from the fact that migrants endowed with high levels of human capital are likely attracted to particular destinations by a broad range of social and

economic factors above and beyond any immigration policies that might be orientated toward them. Therefore, to test for the efficacy of high-skilled policies, other key constituent elements of the policy package must be controlled for. The analysis thus includes measures of bilateral migration policies and a range of destination country amenities in addition to the usual economic and gravity controls.

Many countries have signed various types of bilateral agreements. This paper includes bilateral treaties that relate to social security, double taxation (and tax evasion), and the recognition of diplomas, all of which aim to facilitate the admission and transition of high-skilled employees. Social security agreements regulate the equality in treatment between signatories regarding the payment of benefits abroad, including old age pension, pension portability, disability support, parenting payment for widowed persons, and unemployment benefits. Double-taxation agreements prevent the double taxation of income, capital, and inheritances and are increasingly important for attracting highly mobile skilled workers who may hold multiple residences, including in their home country. These agreements also seek to reduce fiscal evasion. Finally, bilateral agreements are included that aim to recognize the credentials of migrants to better streamline their integration into host country labor markets. The three bilateral agreement variables in the analysis are each coded one should a particular policy be in place for a particular country pair in a given year.

To isolate the effect of unilateral immigration policies, it is necessary to control for treaties that facilitate the freedom of movement of people. Existing studies have shown, for example, that the Schengen agreement, which established continental Europe's borderless Schengen area, significantly fosters bilateral migration flows between signatories (Grogger and Hanson 2011; Beine, Bricongne, and Bourgeon 2013; Ortega and Peri 2013). This paper constructs a single variable that is both bilateral and time varying, thereby capturing whether the two members of a country pair in a particular year are signatories to a freedom-of-movement agreement. The agreements captured by the variable include the Schengen agreement, the freedom of movement afforded to member states of the European Union and the European Free Trade Association, the de facto right of abode between Australia and New Zealand, and the Common Travel Area comprising Ireland, the United Kingdom, the Isle of Man, Jersey, and Guernsey. It is important to note that the variable captures both the Outermost Regions (OMR) of the European Union that comprise part of an EU member state as well as those Overseas Countries and Territories (OCT) for which nationals are granted citizenship of an EU member state and who therefore also have freedom of movement.

4.3. Amenities and "Gravity" Variables

A rich set of covariates is drawn upon to ensure that the model is well specified. Turning first to the unilateral destination country controls, the total unemployment data are taken from the OECD,[11] while total population is taken from the International Database of the U.S. Census Bureau.[12] High-skilled wages are also taken from the OECD.[13] To calculate high-skilled wages, average annual wages

11. https://data.oecd.org/unemp/unemployment-rate.htm (OECD Data Unemployment)

12. http://www.census.gov/population/international/data/idb/informationGateway.php. (US Census Bureau, International Database)

13. https://data.oecd.org/earnwage/average-wages.htm (OECD Data Earnings and Wages)

are multiplied by the ratio of the 9th decile to the 5th decile, the data for which are also available from the OECD website.

The dyadic control for immigrant networks is taken from the three rounds of the OECD DIOC (Database of Immigrants in OECD Countries), which provides statistics for the numbers of immigrants residing in each of the OECD countries in 2000, 2005, and 2010.[14] Flows from 2000–04 are equated with the 2000 network, as captured by the stock of migrants in 2000, flows from 2005–09 with the 2005 stock, and flows from 2010–12 with the 2010 stock. The now-standard gravity variables ubiquitous throughout the literature—contiguity, common language, distance, and the sharing of a colonial heritage—are all taken from the CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) database (see Head, Mayer, and Ries 2010).

Finally, a number of amenity variables are included that aim to capture the relative attractiveness—the quality of life—of the 10 OECD destinations. The *Net-of-tax* measure captures differences in tax rates across countries. This measure is calculated by subjecting a fixed annual salary of $150,000 (in purchasing power parity terms) to the differing tax schedules as provided by the OECD.[15] All else equal, it is believed that lower taxes increase the relative attractiveness of particular destinations for high-income earners.[16] The appeal of global cities, in which high-skilled migrants no doubt agglomerate, is proxied by the prevailing UN salary country multipliers in each year.[17] These multipliers are calculated based on the cost of living in major cities in each of the OECD destinations and reflect, among other things, the variety of goods high-skilled migrants are able to consume and the urban amenities available to them. A quality-of-education variable is included by way of the Programme for International Student Assessment scores, as provided by the OECD,[18] since it is hypothesized that high-skilled workers value the provision of education for their children. Finally, the level of technological development that high-skilled migrants are hypothesized to favor is proxied by the density of mobile phone use (information and communications technology [ICT] coverage), measured as the number of mobile or cellular phone subscriptions per 100 inhabitants. These data are taken from the United Nations.[19]

14. http://www.oecd.org/els/mig/dioc.htm (OECD Database on Immigrants in OECD and non-OECD Countries: DIOC)

15. http://www.oecd.org/tax/tax-policy/tax-database.htm (OECD Tax Database)

16. The results do not change when alternative annual salaries of $150,000, $200,000, and $250,000 are considered.

17. These were calculated from data available from http://icsc.un.org/secretariat/cold.asp?include=par (United Nations International Civil Service Commission, Post Adjustment Reports).

18. http://www.oecd.org/pisa/. (OECD, PISA)

19. http://data.un.org/Default.aspx. (UN Data)

5. Results

5.1. Baseline Results

Table 1 reports the baseline results from estimating the scale equation, equation (4). Model (1) reports estimates of the economic and standard gravity variables, in addition to the freedom-of-movement dummy variable. Models (2) and (3) add measures of bilateral and unilateral policies, respectively, while model (4) presents the results from estimating all of the core variables. All regressions reported in table 1 include a full set of origin-time fixed effects to ensure the theoretical consistency of the empirical estimates.

Notably, across the first four models, the estimates are remarkably stable. Even though all 10 destination countries are highly developed, an increase in high-skilled wages of 10 percent is associated with an increase in high-skilled immigration flows of between 6 and 11 percent. The results also demonstrate that high-skilled migrants include in their calculus prevailing unemployment rates and are deterred from moving to areas with fewer job opportunities. Migration networks facilitate, and potentially perpetuate, high-skilled migration flows. A 10 percent increase in the size of the bilateral migrant community is associated with an increase in high-skilled flows of more than 1 percent along the same migrant corridor. Other migration-cost-reducing factors captured by cultural, linguistic, geographical, and political proximity are all statistically significant and in the expected direction. Shared common border, language, colonial heritage, and freedom of movement between origin and destination all have a positive influence on high-skilled flows. Increasing geographical distance, however, a proxy for migration costs, naturally reduces high-skilled worker flows.

Models (2) and (4) include three major types of bilateral agreements that have been suggested as shaping the dynamic of high-skilled migration, among which are agreements aimed at recognizing foreign qualifications. However, policy makers in most countries remain agnostic with regard to the efficacy of such instruments since recognition might erode occupational standards and depreciate the value of domestic degree programs. Nevertheless, some migration policy instruments, in particular shortage occupations, may be rendered ineffective should foreign degrees not be recognized, or only recognized after additional training or examinations. The results of this analysis show a robust positive effect of degree recognition in increasing the number of high-skilled migrants by 30 to 60 percent. The exercise does not find any evidence that bilateral agreements that regulate social security concerns, such as pension transfers, affect bilateral flows of high-skilled workers in model (2) but does find mild evidence of such an effect in the full model (4). The net effect of the two countervailing forces underpinning the expected sign of the double-taxation-agreements variable interestingly is negative. This suggests that high-skilled individuals care more about avoiding tax than they care about only being taxed once as provided for in such agreements.

Table 1. Drivers of High-Skilled Migration Flows (scale equation)

		(1) PPML	(2) PPML	(3) PPML	(4) PPML	(5) PPML
Destination controls	**High-skilled wages (log)**	1.069***	1.066***	0.751***	0.749***	0.657***
		(0.119)	(0.120)	(0.123)	(0.124)	(0.128)
	Unemployment (log)	−0.719***	−0.695***	−0.533***	−0.482***	−0.445***
		(0.113)	(0.117)	(0.148)	(0.145)	(0.150)
	Population (destination, log)	1.544***	1.519***	1.083***	0.976***	0.912***
		(0.127)	(0.132)	(0.174)	(0.172)	(0.181)
Dyadic controls	**Network size (log)**	0.130***	0.119***	0.141***	0.128***	0.125***
		(0.0107)	(0.0104)	(0.0112)	(0.0105)	(0.0115)
	Contiguity	0.577***	0.648***	0.317***	0.420***	0.456***
		(0.122)	(0.124)	(0.0979)	(0.0972)	(0.0977)
	Common language	0.950***	0.953***	0.878***	0.846***	0.850***
		(0.0914)	(0.0962)	(0.0729)	(0.0762)	(0.0796)
	Distance (log)	−0.0812	−0.117**	−0.0958**	−0.111**	−0.138***
		(0.0545)	(0.0545)	(0.0464)	(0.0443)	(0.0463)
	Colonial heritage	0.324***	0.305***	0.300***	0.216***	0.183**
		(0.0572)	(0.0623)	(0.0612)	(0.0637)	(0.0797)
	Freedom of movement	1.139***	1.017***	0.719***	0.552***	0.494***
		(0.135)	(0.136)	(0.120)	(0.115)	(0.116)
Bilateral agreements	**Diploma recognition**		0.305***		0.631***	0.599***
			(0.0896)		(0.100)	(0.0978)
	Social security		−0.0369		0.121**	0.117*
			(0.0628)		(0.0603)	(0.0596)
	Double taxation		−0.299***		−0.375***	−0.343***
			(0.0487)		(0.0480)	(0.0473)
Unilateral policies	**Permanency**			1.062***	1.075***	1.193***
				(0.156)	(0.152)	(0.159)
	Financial incentive			0.0801	0.0358	−0.192*
				(0.0967)	(0.0932)	(0.115)
	Job offer			−1.854***	−1.896***	−1.893***
				(0.175)	(0.166)	(0.172)
	Labor market test			0.169	0.143	0.113
				(0.164)	(0.159)	(0.158)
	Shortage list			−0.641***	−0.699***	−0.649***
				(0.0778)	(0.0813)	(0.0977)
	Points-based system (PBS)			1.492***	1.382***	
				(0.124)	(0.117)	
	PBS (United Kingdom)					1.299***
						(0.122)
	PBS (Canada)					0.959***
						(0.192)
	PBS (Australia)					1.530***
						(0.183)
	PBS (New Zealand)					1.507***
						(0.195)
	Origin × Time fixed effects	yes	yes	yes	yes	yes
	Number of observations	20,240	20,240	20,240	20,240	20,240
	R^2	0.961	0.962	0.969	0.971	0.971

Note: Dependent variable is the total number of high skilled individuals born in origin country *o*, living in destination country *d* at time *t* as given in equation (4). Standard errors in parentheses: * p < 0.10, ** p < 0.05, *** p < 0.01. PPML = pseudo-Poisson maximum likelihood.

Models (3) and (4) include a set of six skill-selective unilateral policies. Two of the three main instruments of demand-driven immigration systems—the need to obtain a job offer and shortage

lists—significantly deter the absolute inflow of high-skilled migrants. The job offer contingency shows by far the strongest negative effects. Countries with a job offer requirement recruit almost half as many high-skilled migrants. Labor market tests, however, which are often required before a sponsoring employer can offer a job to an applicant, have no influence on high-skilled migration flows in the baseline models. Shortage lists, which are even more rigid in preselecting high-skilled migrants, seem to be an additional barrier for recruiting high-skilled migrants in large numbers. It must be noted, however, that the main purpose of occupational shortage lists is to avoid the recruitment of skilled, though *unemployable*, migrants.

The main result of the analysis is that PBSs appear to be the most effective policy for attracting high-skilled migrants. Major PBS countries (Australia, Canada, New Zealand, the United Kingdom) attract, on average, one-and-a-half times the number of high-skilled migrants when compared with countries that adopt alternative policy tools. As opposed to the other policy measures, however, the PBSs across the destination countries might well operate differently, at least in respect to the proportion of high-skilled migrants that enter a labor market through such a mechanism. To address this concern, model (5) includes separate PBS-country dummy variables; the results show that Australia's and New Zealand's systems are the most effective.

The provision of permanency rights is also an important incentive for high-skilled migrants. Countries providing a road to permanency attract, on average, 100 percent more high-skilled migrants than countries that are reluctant to provide such post-entry rights. Permanency rights, even if permanent settlement is not the prime intention of the migrant at entry, increase the option value of staying longer in the host country and expand future opportunities. Apart from providing more generous post-entry rights to high-skilled workers, extra financial incentives such as tax breaks are another attempt to attract international talent. However, the baseline model finds that such schemes have no effect.

5.2. Robustness Checks

Table 2 reports a series of robustness tests of the core model specification. Model (1) in table 2 includes two MRM terms that, although both significant, do not alter the other estimates significantly—except for financial incentive schemes, which become statistically significant at the 10 percent level. The estimates for these terms (negative for the distance measure and positive for the adjacency measure) are omitted for the sake of brevity. Model (2) includes dyad fixed effects to address concerns that an omitted variable, for example, cultural distance, might be driving the results. They adequately control for such an omission since, as shown by the pioneering work of Geert Hofstede (Hofstede 1980; Hofstede, Hofstede, and Minkov 2010), cultural distances change extremely slowly over time. Although the addition of dyad fixed effects improves the goodness of fit, several of the other estimates become smaller in size; the social security variable is no longer significant and the labor market test variable becomes negative and significant. Nevertheless, the key findings remain intact.

Another particular concern (as shown in appendix table A.3) is that the policy variables fail to capture many policy *changes* over the period 2002–12, meaning that the estimation needs to rely on both the within and between variations between countries in the data. Therefore, we cannot impose a set of destination fixed effects, which might lead to fears of an omitted (destination country) variable bias. To address such concerns, model (3) in table 2 is equivalent to the core model that includes both origin-time and destination-time fixed effects. However, the difference between the R^2 in model (3)

in table 2 and the R^2 from the core model (4) in table 1 is only 0.1 percent, which provides confidence that an omitted variable is not responsible for driving the results.

Model (4) in table 2 extends the core model with the inclusion of five additional variables that proxy for the role of economic and social amenities that have traditionally been viewed as determining the relative attractiveness of potential destinations (Tiebout 1956; Gosnell and Abrams 2011). All of the variables are included simultaneously, without causing any significant changes in the other variables of interest. The coefficients on the amenity variables are largely as expected. The ICT coverage variable is used to capture the degree to which a location is culturally and technologically avant-garde, since it has been argued that a rising creative class (Florida 2002) is attracted to such places. A 10 percent increase in ICT coverage is associated with a nearly 9 percent increase in the inflow of high-skilled workers.

The net-of-tax variable proxies the attractiveness of national tax schemes and is shown, rather unsurprisingly, to significantly attract large numbers of foreign high-skilled workers. Whereas the importance of global cities for attracting international talent is well established (for example, Sassen 2011), rising living costs, including property prices and rents, are major disincentives to moving to those cities. The coefficient on the global city living-cost variable is insignificant and negative, however, which suggests that the cornucopia of urban amenities and available product varieties compensates for relatively high living costs.

The estimates of the coefficient on the educational sector, as measured by global PISA scores, is significantly negative. In other words, the results would suggest that high-skilled workers locate to those destinations that fare relatively poorly in education. This result is almost certainly driven by the fact that Korea, which performs best overall on the PISA, plays host to the fewest high-skilled migrants in the sample, whereas the United States, which performs worst overall on the PISA, plays host to the greatest number of migrants. No doubt, had the analysis included a broader range of destination countries (that is, non-OECD), the estimates on the education variable would change. Of course, it is also likely that high-skilled migrant workers are able to place their children in private schools, so concerns about average PISA scores across the country might not be taken into consideration when they are deciding where to move.

Finally, a measure of life expectancy is included in the estimation as a proxy for the overall quality of living conditions (including health services provision), in addition to other factors that affect longevity. The coefficient on this measure is insignificant, which might suggest that high-skilled migrants care more about the provision of good health care, for example, privately, as opposed to average health outcomes across the country. The imposition of the amenity measures does not alter any of the results that concern economic or policy variables. Moreover, the R^2 of model (4) in table 2 is identical to that of the core model (4) in table 1, suggesting that in the empirical framework, amenities, that is, noneconomic factors, seem to play little role in determining the destination choices of high-skilled migrants.

Table 2. Drivers of High-Skilled Migration Flows: Robustness Tests

		(1) PPML	(2) PPML	(3) PPML	(4) PPML	(5) PPML	(6) GMM-sys
Destination controls	**High-skilled wages (log)**	0.830***	0.0986***		0.639***	3.900***	0.208**
		(0.129)	(0.0324)		(0.117)	(0.288)	(0.032)
	Unemployment (log)	−0.406***	−0.164**		−0.366**	−0.887***	−0.654**
		(0.155)	(0.0639)		(0.159)	(0.206)	(0.071)
	Population (destination, log)	0.914***	2.561***		0.941***	1.019***	1.110**
		(0.182)	(0.166)		(0.190)	(0.217)	(0.075)
Dyadic controls	**Network size (log)**	0.142***	0.0162***	0.136***	0.127***	0.101***	0.092**
		(0.0122)	(0.00455)	(0.00992)	(0.0102)	(0.00849)	(0.008)
	Contiguity	0.488***		0.157*	0.427***	0.169	−0.735*
		(0.103)		(0.0916)	(0.0964)	(0.111)	(0.334)
	Common language	0.822***		0.606***	0.826***	0.714***	0.387**
		(0.0786)		(0.0712)	(0.0773)	(0.0816)	(0.078)
	Distance (log)	−0.142***		−0.186***	−0.118***	−0.200***	−0.175**
		(0.0448)		(0.0428)	(0.0455)	(0.0539)	(0.064)
	Colonial heritage	0.186**		0.251***	0.165**	0.302***	0.074
		(0.0734)		(0.0935)	(0.0787)	(0.0841)	(0.195)
	Freedom of movement	0.402***	0.413***	0.497***	0.475***	0.380***	−0.142
		(0.119)	(0.125)	(0.117)	(0.119)	(0.139)	(0.190)
Bilateral agreements	**Diploma recognition**	0.619***	0.453***	0.727***	0.667***	0.695***	3.479**
		(0.100)	(0.0506)	(0.102)	(0.0993)	(0.101)	(0.571)
	Social security	0.131**	−0.0356	0.194***	0.109*	0.158**	−2.760**
		(0.0565)	(0.0695)	(0.0579)	(0.0570)	(0.0714)	(0.602)
	Double taxation	−0.375***	−0.209***	−0.332***	−0.364***	−0.269***	−0.071
		(0.0468)	(0.0379)	(0.0459)	(0.0466)	(0.0549)	(0.289)
Unilateral policies	**Permanency**	1.024***	0.297***		1.344***	1.395***	0.485**
		(0.147)	(0.0914)		(0.156)	(0.243)	(0.046)
	Financial incentive	0.196*	0.248***		0.229**	−0.00905	−0.114*
		(0.111)	(0.0478)		(0.0960)	(0.142)	(0.051)
	Job offer	−1.797***	−2.096**		−2.110***	−1.420***	−0.069
		(0.173)	(0.828)		(0.255)	(0.192)	(0.115)
	Labor market test	0.169	−0.210***		−0.0862	0.172	0.617**
		(0.156)	(0.0565)		(0.184)	(0.115)	(0.058)
	Shortage list	−0.657***	−0.0633*		−0.361***	−0.333***	−0.265**
		(0.0803)	(0.0330)		(0.0789)	(0.0862)	(0.054)
	Points-based system	1.499***	2.063**		1.977***	1.192***	0.789**
		(0.119)	(0.833)		(0.220)	(0.174)	(0.131)
Amenities	**ICT coverage**				0.886***		
					(0.187)		
	Net-of-tax				2.350***		
					(0.492)		
	Global city living costs				−0.0590		
					(0.0451)		
	Schooling quality				−7.467***		
					(2.381)		
	Life expectancy				−5.710		
					(3.756)		
	MRM terms	yes	no	no	no	no	no
	Origin × Time FE	yes	yes	yes	yes	yes	no
	Destination × Time FE	no	no	yes	no	no	no
	Origin + Time FE	no	no	no	no	no	yes
	Dyad FE	no	yes	no	no	no	no
	Number of observations	20,130	20,240	20,240	20,240	11,040	18,400
	R^2	0.972	0.997	0.972	0.971	0.971	0.779

Note: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. System dynamic generalized method of moments model (6) includes AR(1): 0.170*** (standard error = 0.027). Arellano-Bond test for AR(2) in first differences fails to reject null of no autocorrelation in errors (p = 0.092). AR = Arrelano-Bond; FE = fixed effects; GMM = generalized method of moments; MRM = multilateral resistance to migration; PPML = pseudo-Poisson maximum likelihood.

Model (5) in table 2 is estimated to address concerns that the results might be driven, at least in part, by the fact that the overarching data set is not perfectly balanced. Model (5) is therefore estimated on a reduced, although balanced, panel of dyad-year observations for the period 2003 to 2008. Again, the main results remain unchanged. Finally, model (6) in table 2 is estimated with an Arrelano-Bond dynamic panel estimator (Roodman 2006) to capture serial correlation and any potential endogeneity in the policy variables. In addition to internal lags and first difference instruments, unionization in the destination country's labor force is included as another external instrument.[20] Unfortunately, given the large number of variables included in the system-GMM estimation, it is not possible to include a full set of origin-time fixed effects, but separate origin and time fixed effects are included, a modification that might drive some of the differences in the results. Nevertheless, the major policy results based on the estimates on permanency, PBSs, and shortage lists remain intact, although the coefficients on these variables become significantly smaller.

5.3. Skill-Selective Policy Combinations

To explore the effectiveness of skill-selective policy instruments in broader policy packages, in particular to identify whether a specific policy instrument is contingent upon the existence of other unilateral policy instruments, the analysis estimates binary policy interaction effects for all policy combinations. Based on model (4) (table 1), the effects of dual policy combinations are estimated by running separate regressions that include an interaction term $(\mathrm{P}_{\mathrm{dt}}^{\mathrm{q}} \times \mathrm{P}_{\mathrm{dt}}^{\mathrm{r}})$, to capture the combined effect of two (out of six) unilateral policy instruments with $\mathrm{q}, \mathrm{r} \in \{1, \ldots, 6\}$. We estimate $\beta^{\mathrm{q}}, \beta^{\mathrm{r}}, \text{and } \beta^{\mathrm{q,r}}$, which in combination yield estimates of the effects of respective policy combinations.[21]

Table 3 reports the estimated effects of all available policy combinations on the number of high-skilled migrants. Several interesting findings result. The negative effect of a labor market test, for example, can turn positive if implemented either in combination with a shortage list or in combination with the provision of permanency rights. Similarly, the negative effect of a shortage list is reduced in combination with a labor market test. Financial incentive schemes are ineffective in attracting skilled migrants but only in the absence of a shortage list or a PBS. Financial incentives seem to be more effective in so-called demand-driven systems, although the employability of high-skilled migrants that are recruited through a combination of a PBS and a shortage list may be higher. The most constraining (demand-driven) skill-selective policy instrument, the job offer contingency, is not significantly affected by other policy instruments.

20. Trade union density corresponds to the ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners (see https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN). (Trade Union Density - OECD.Stat)

21. As an example, these effects are calculated: $\beta^{shortage} = -0.927$ is the unique average effect of an occupational shortage list *in the absence of* a labor market test. If, and only if, both policy instruments (that is, a shortage list and a labor market test) are implemented in the same year, the average effect of a shortage list remains negative but increases to $\beta^{shortage} + \beta^{shortage,lmt} = -0.477$. On the other hand, a labor market test does not have a significant unique effect on high-skilled flows in the absence of a shortage list but turns positive and significant *if* implemented in combination with a shortage list ($\beta^{lmt} + \beta^{shortage,lmt} = 0.450$).

Table 3. High-Skilled Migration Policy Interaction Effects

Policy: / combined with:		Labor market test	Shortage list	Points-based system	Job offer contingency	Permanent residency	Financial incentives
Labor market test	No		−0.927	1.400	−1.813	0	0
	Yes		−0.477	1.400	−1.813	1.770	0
Shortage list	No	0		1.391	−1.887	1.312	−0.569
	Yes	0.450		1.391	−1.887	0.037	0.238
Points-based system	No	0	−0.685		−1.896	1.075	−0.264
	Yes	0	−0.685		NA	NA	0.200
Job offer contingency	No	0	−0.721	1.382		−0.821	0.200
	Yes	0	−0.721	NA		1.075	0.664
Permanent residency	No	−1.371	0	1.382	NA		0
	Yes	0.399	−1.275	NA	−1.896		0
Financial incentives	No	0	−1.053	1.270	−2.486	1.057	
	Yes	0	−0.246	1.734	−2.022	1.057	

Note: Only interaction effects significant at the 5 percent level are reported. "0" means not significantly different from zero. NA = interaction not available.

5.4. The Skill Composition of International Migration Flows

The analysis so far has explored the unique and combined effects of skill-selective immigration policies on the absolute levels of high-skilled immigration. Even if particular skill-selecting and -attracting policies are associated with larger inflows of high-skilled migrants, however, the overall effect on the *composition* of total labor migration flows—operationalised as the share of high-skilled in the total labor inflow—remains uncertain, because fundamentally the skill composition of labor flows also depends upon the movement of those who are not high skilled.

This overall effect might in part result from the definition of high-skilled migration (ISCO classification categories 1 to 3) used in this paper. At least some skill-selective policies do not solely target these occupations and may similarly apply and encourage workers of lower skill levels. Shortage lists, for example, often include occupations that are not highly skilled according to this definition. Labor market tests and job offer requirements are policy instruments that may be argued to be *a priori* skill neutral, although their application largely depends upon underlying labor market demand and labor shortages. Given that such shortages are generally more prevalent in high-skilled occupations, however, we may still expect that even these demand-driven policies somehow have stronger effects on high-skilled labor inflows.

Whether these skill-selective policies are effective in altering the composition of labor inflows in favor of the highly skilled remains an empirical question, however. Table 4 reports estimates of the proportion of high-skilled migrants in total labor migration flows (see equation (5)). Since this share is bounded between 0 and 1, the effects of the explanatory variables tend to be nonlinear, while the variances tend to decrease when the mean approaches the limits. As a result, linear models may be inappropriate. Instead, a zero-one inflated beta-fit model is applied with slightly modified zero-one boundaries (Smithson and Verkuilen 2006). Model (1) in table 4 reports the baseline, model (2) includes the set of bilateral policy variables, model (3) adds the unilateral policy variables. Model (4)

simultaneously runs seemingly unrelated regressions (SUR) on high-skilled migration (4a) and on non-high-skilled migration (4b) to control for the cross-correlation in the error terms between the two groups of workers and to ensure that the greatest number of observations are maintained in the data.[22]

Similar to the results in table 1, a rising skill premium, as captured by the difference between the measure of high-skilled wages and the prevailing median salary in a particular year, significantly alters the composition of labor flows in favor of high-skilled immigrants. While the wage gap between the 90th percentile and the mean wage was about 45 percent in 2000, it increased to more than 63 percent in 2012 across these 10 OECD destination countries. Thus, a rising skill premium shifts the skill composition of labor inflows toward higher skilled, as predicted by the Roy model (Borjas 1987).

Models (1) through (3) in table 4 provide evidence that high-skilled foreign workers are more sensitive to business cycle fluctuations, such that higher unemployment at destination reduces the skill selectivity of incoming migrants. It is interesting, however, that the SUR estimates show that although high-skilled migrants are significantly deterred by high unemployment, their lesser skilled counterparts are attracted to such areas. Evidence is also found that migrant networks play a more important role in facilitating migration for lower-skilled workers, a result consistent with Beine, Docquier, and Özden (2011). This result is perhaps unsurprising given that migrant networks are purported to reduce migration costs that are no doubt relatively higher for lower-skilled workers; thus, the existence of migrant networks may alter the selection of migrants over time (see McKenzie and Rapoport 2010).

The beta-fit regressions show that flows between contiguous country pairs tend to encourage fewer high-skilled workers, since low-skilled workers are more sensitive to migration costs and may take advantage of migrating to neighboring countries. Country pairs with freedom of movement also encourage larger shares of non-high-skilled workers, thereby leading to a more negative selection on skills. The results from the beta-fit regressions also seem to suggest that longer distances between two countries increase the skill selectivity of the migration flow, which again would suggest, as the SUR estimates show, that non-high-skilled workers are more sensitive to increases in migration costs. Somewhat surprisingly, the regressions show that migration between countries that share a colonial heritage tend to be more skill selective, and the SUR regressions show that this effect might be driven by a large deterrent effect for non-high-skilled workers. Similarly, the estimated coefficient on language in the beta-fit regressions indicates that common language reduces the selection on skills, and the SUR regressions suggest this is because a common language spurs the movement of non-high-skilled more than their high-skilled counterparts.[23]

22. When calculating the shares of the high skilled in the total (models 1–3), regressions cannot be run if the total number of high skilled is equal to zero because these observations are dropped from the estimation.
23. However, the SUR regressions show there is no significant difference of the effect of common language on skill selectivity.

Table 4. High-Skilled vs. Non-High-Skilled Migration Flow Composition (selection equation)

		(1) Beta	(2) Beta	(3) Beta	(4a) SUR	(4b) SUR
Destination controls	High-skilled wage premium (log)	1.019***	1.003***	0.946***		
		(0.049)	(0.049)	(0.057)		
	High-skilled wages (log)				0.617***	
					(0.029)	
	Non-high-skilled wages (log)					0.223***
						(0.038)
	Unemployment (log)	-0.746***	-0.754***	-0.684***	-0.728***	0.194***
		(0.037)	(0.037)	(0.044)	(0.040)	(0.049)
	Population (destination, log)	0.870***	0.879***	0.922***	1.198***	-0.083*
		(0.040)	(0.040)	(0.047)	(0.041)	(0.050)
Dyadic controls	Network size (log)	-0.046***	-0.050***	-0.045***	0.153***	0.229***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
	Contiguity	-0.261***	-0.268***	-0.265***	-0.176**	0.079
		(0.093)	(0.094)	(0.092)	(0.087)	(0.107)
	Common language	-0.183***	-0.164***	-0.045*	0.492***	0.530***
		(0.024)	(0.025)	(0.025)	(0.026)	(0.032)
	Distance (log)	0.004	0.010	0.074***	-0.143***	-0.187***
		(0.017)	(0.017)	(0.018)	(0.015)	(0.018)
	Colonial heritage	1.371***	1.350***	1.321***	-0.097**	-1.545***
		(0.050)	(0.051)	(0.052)	(0.041)	(0.050)
	Freedom of movement	-0.027	-0.102*	-0.235***	0.470***	1.180***
		(0.055)	(0.056)	(0.055)	(0.045)	(0.055)
Bilateral Agreements	Diploma recognition		0.190***	0.204***	1.050***	0.820***
			(0.028)	(0.028)	(0.037)	(0.046)
	Social security		0.036	0.082**	-0.097***	-0.111**
			(0.033)	(0.032)	(0.037)	(0.045)
	Double taxation		-0.012	-0.009	0.144***	0.287***
			(0.022)	(0.022)	(0.025)	(0.031)
Unilateral Policies	Permanency			-0.345***	0.860***	1.015***
				(0.040)	(0.029)	(0.037)
	Financial incentive			0.575***	-0.114***	-0.550***
				(0.031)	(0.023)	(0.029)
	Job offer			0.155**	-0.582***	-0.351***
				(0.069)	(0.046)	(0.056)
	Labor market test			0.239***	0.328***	0.027
				(0.037)	(0.028)	(0.035)
	Shortage list			-0.389***	-0.488***	0.078**
				(0.032)	(0.026)	(0.032)
	Points-based system			0.238***	0.805***	0.198***
				(0.061)	(0.043)	(0.053)
	Origin × Time FE	yes	yes	yes	yes	yes
	Number of observations	14,352	14,352	14,352	20,240	20,240
	R^{2a}	0.115	0.125	0.121	0.82	0.73

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. FE = fixed effects; SUR = seemingly unrelated regressions.

a. R^2 for beta regressions are calculated as the squared correlation coefficient between the actual and fitted values.

With regard to the measures of migration policies, PBSs prove most effective in improving the incoming distribution of skills at destination. PBSs assess skill profiles and filter labor migrants according to perceived long-term skill requirements and therefore are effective instruments, not only for recruiting relatively large numbers of high-skilled migrants, but also for shifting the skill composition in favor of the high skilled.

Potentially because of sample selection bias, the beta-fit regression in model (3) suggests (albeit weakly) that employer-driven demand systems, for example, those that require a job offer at entry, increase the skill selectivity of incoming workers. However, the SUR results based on the full sample suggest the opposite—that job offer systems deter both sets of workers, the high-skilled worst of all, the overall effect of which would be to reduce the incoming selectivity on skills. Highly skilled workers are less constrained when considering their options for migration; they might simply choose an alternative destination with easier entry requirements. Interestingly, labor market tests are shown to increase the share of high-skilled relative to lower-skilled migrants in a particular labor flow. The SUR regressions suggest this result is due to a positive effect exerted on the high-skilled flow. This finding may indicate that countries that implement labor market tests might be more successful at filling lower-skilled positions domestically, meaning that the overall skill composition of the incoming flow increases. The imposition of shortage lists, however, significantly reduces the overall selection on skills because they deter high-skilled more than low-skilled migrants. Shortage lists seem somewhat inflexible and may even become politicized instruments. This instrument is therefore not effective in attracting highly qualified migrants since the lists often comprise occupations that are not classified as highly skilled.

Similarly, the beta-fit regressions show that the availability of permanency rights reduces the overall skill selectivity of immigrant flows. The SUR results indicate that although permanency rights are positive incentives for both high- and otherwise-skilled workers, the effect on the latter is larger, such that the overall effect is negative. Both skill groups somewhat counterintuitively seem to be deterred by financial incentive schemes. Although tax breaks and allowances are expected to be relevant in the decision of high-income earners to migrate, robust empirical support for this presumption is not found. Finally, turning to the measures of bilateral agreements, recognition of diplomas, and social security agreements, both seem to be effective in increasing the skill composition of migrant flows, while no overall effect of international double taxation agreements is seen.

6. Conclusion

High-skilled migration policies are *en vogue*, in large part because of increasing demand from various businesses that lobby governments for political support in filling labor market shortages with foreign workers. The phenomenon of business-driven labor migration policies is not new, as demonstrated by the guest worker programs of the 1950s and 1960s. The main difference, though, is that employers increasingly demand skill sets that often require tertiary education or other highly qualified expertise, skills that cannot be fully met by domestic labor. Governments have decided to respond to these demands by implementing various types of skill-specific and skill-selective immigration regimes that facilitate the international recruitment of desired workers.

This paper is the first assessment of these policies to attract and select high-skilled migrant workers in a panel comprising 10 major OECD destinations and 185 origins over the period 2000–12. The analysis finds strong evidence that supply-led systems, that is, points-based systems, increase both the absolute numbers of high-skilled migrants and the skill composition of international labor flows. Conversely, demand-driven systems, which are usually based on the principle of job contingency and which are often supplemented by case-by-case (labor market test) or occupation-by-occupation (shortage lists) assessments of labor market needs, are shown to have little, and potentially even a negative, effect. This general conclusion needs to be taken with caution, however, given that the aims of these policy tools differ. Points-based systems, like those pioneered by Canada and Australia, were initially introduced with the idea that "there can never be enough of a good thing" and implemented as population policies with the aim of achieving the large-scale immigration of skilled workers. Other countries' immigration policies, for example, those largely used across Europe, have been founded on the notion of integrating migrants both economically and socially. The European focus on the socioeconomic integration of foreigners is reflected by the implementation of demand-driven systems that prioritize labor market *outcomes* over the *numbers* of migrants actually recruited.

Recent policy developments demonstrate, however, an increasing hybridization of skill-selective immigration systems—demand-driven policies coexist with supply-driven elements in an attempt to balance the conflicting aims of numbers versus employability. The recent policy developments in Canada and Australia are examples of this change. The results of this paper show that some policy combinations can actually increase the efficacy of particular policy instruments. For example, financial incentives as a separate policy scheme are significantly more effective in demand-driven systems than in combination with a points-based system. The analysis further finds some evidence for the relevance of international agreements, in particular agreements that address the mutual recognition of diplomas and credentials, in facilitating the mobility of migrants with foreign degrees. However, the results demonstrate that being a member of a freedom-of-movement area increases the overall numbers of highly skilled immigrants; such membership also serves to reduce the overall skill selectivity of total labor flows.

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Appendix

Appendix Table A.1. List of Countries and Economies

Origin (185) Afghanistan; Albania; Algeria; Andorra; Angola; Anguilla; Antigua and Barbuda; Argentina; Australia; Austria; The Bahamas; Bahrain; Bangladesh; Barbados; Belgium; Belize; Benin; Bermuda; Bhutan; Bolivia; Botswana; Brazil; British Virgin Islands; Brunei Darussalam; Bulgaria; Burkina Faso; Burundi; Cambodia; Cameroon; Canada; Cape Verde; Cayman Islands; Central African Republic; Chad; Chile; China; Colombia; Comoros; Republic of Congo; Cook Islands; Costa Rica; Côte d'Ivoire; Cuba; Cyprus; Czechoslovakia; Democratic Republic of Congo; Denmark; Djibouti; Dominica; Dominican Republic; Ecuador; the Arab Republic of Egypt; El Salvador; Equatorial Guinea; Eritrea; Ethiopia; Falkland Islands; Federated States of Micronesia; Fiji; Finland; France; Gabon; The Gambia; Germany; Ghana; Gibraltar; Greece; Grenada; Guatemala; Guinea; Guinea Bissau; Guyana; Haiti; Honduras; Hong Kong SAR, China; Hungary; Iceland; India; Indonesia; the Islamic Republic of Iran; Iraq; Israel; Italy; Jamaica; Japan; Jordan; Kenya; Kiribati; the Republic of Korea; Kuwait; the Lao People's Democratic Republic; Lebanon; Lesotho; Liberia; Libya; Luxembourg; Macau SAR, China; Madagascar; Malawi; Malaysia; Maldives; Mali; Malta; Marshall Islands; Mauritania; Mauritius; Mexico; Mongolia; Montserrat; Morocco; Mozambique; Myanmar; Namibia; Nauru; Nepal; the Netherlands; Netherlands Antilles; New Zealand; Nicaragua; Niger; Nigeria; Niue; the Democratic Republic of Korea; Norway; Oman; Pakistan; Palau; Panama; Papua New Guinea; Paraguay; Peru; the Philippines; Poland; Portugal; Puerto Rico; Qatar; Ireland; Romania; Rwanda; Saint Helena; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; San Marino; São Tomé and Príncipe; Saudi Arabia; Senegal; Seychelles; Sierra Leone; Singapore; Solomon Islands; Somalia; South Africa; Spain; Sri Lanka; Sudan; Suriname; Swaziland; Sweden; Switzerland; the Syrian Arab Republic; Taiwan, China; Tanzania; Thailand; Timor Leste; Togo; Tonga; Trinidad and Tobago; Tunisia; Turkey; Turks and Caicos Islands; Tuvalu; Uganda; the United Arab Emirates; the United Kingdom; the United States; Uruguay; USSR; Vanuatu; República Bolivariana de Venezuela; Vietnam; the Republic of Yemen; Yugoslavia; Zambia; Zimbabwe
Destination (10) Australia, Canada, Israel, the Republic of Korea, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, the United States

Appendix Table A.2.

High-Skilled Migration Policy Database, Definitions of Variables

- **Labor Market Test:** Is there a mechanism in place to attempt to ensure the position cannot be filled by domestic workers?
- **Shortage List:** Is there a list of in-demand or otherwise valued occupations that is somehow incorporated into the selection process for high-skilled migrants?
- **Points-Based System:** Is there a selection system that grants applicants points for particular attributes and allows entry to all those over a particular threshold?
- **Job offer contingency:** Is it possible to enter the country as a high-skilled migrant without first having a job offer?
- **Permanency rights (Immediate or with delay?):** Are high-skilled migrants privileged in getting permanent residence or citizenship? If so, is this because there are permanent-stay entry categories that are immediately accessible, or is it because they are privileged in broader applications for permanent residence once they have met the general requirements?
- **Financial Incentives:** Are there special financial arrangements (such as tax exemptions, or allowances) pertaining to high-skilled migrants?

High-Skilled Migration Policy Database, Assumptions Made When Coding

Data will always be coded for the highest level of specificity: The scope of this project was to research policies relevant to high-skilled migrants rather than the impact of policies in general. Thus, for each indicator, the data and the resulting score are based on the policy most relevant to high-skilled migrants. If broader provisions (that is, those applying to a wider pool of migrants) may favor high-skilled migrants, but specific provisions favor them to a greater extent, the specific provision will be recorded and coded rather than the broader one. If broader provisions have effects that are relevant to high-skilled migrants but apply equally to others, they will not be coded as positive. For example, if the permanency rights of high-skilled migrants are simply through broad permanent resident routes, a policy for high-skilled migrants will not be considered to exist.

Data will always be for the most attractive policies: As above, if more than one route of entry for high-skilled migrants entails significant numbers, the "most appealing" route will be the one coded for. If this route is eliminated but others remain, the coding will pertain to the next most appealing, and so on. Similarly, if more-appealing routes are newly introduced, coding will prioritize them over the previously existing routes. This means that the coding at any one time may not relate to a single route of entry; instead, the coding may reflect the most appealing route of entry The above assumption is not made if it has been decided to focus upon a specific route of entry to fit with the data.

Continuity is assumed on the basis of highly similar conditions and legal continuity: If the conditions for high-skilled entry at two times are highly similar (and, when possible, if they can be shown to be the artifact of the same law), it will be assumed that the conditions in the intervening period between the times are also the same. Most notably, this risks missing new laws that were introduced and then revoked in the intervening period, as well as some bureaucratic reforms that may more subtly alter the entry regime.

More detailed sources are privileged: If different sources report conflicting information, and the conflict cannot be resolved by seeking an additional, authoritative source, the source that provides greater detail will be used.

Appendix Table A.3. High-Skilled Migration Policies across 10 Western Destinations, 2000-12

	Labor market test	Shortage list	Points-based system	Job offer contingent	Immediate permanency rights	Financial incentives
Australia						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						
Canada						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						
Switzerland						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						

	Labor market test	Shortage list	Points-based system	Contingent on job offer	Immediate permanency rights	Financial incentives
Korea						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						
Norway						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						
New Zealand						
2012						
2011						
2010						
2009						
2008						
2007						
2006						
2005						
2004						
2003						
2002						
2001						
2000						

United Kingdom							Sweden						
2012							2012						
2011							2011						
2010							2010						
2009							2009						
2008							2008						
2007							2007						
2006							2006						
2005							2005						
2004							2004						
2003							2003						
2002							2002						
2001							2001						
2000							2000						
Israel							United States						
2012							2012						
2011							2011						
2010							2010						
2009							2009						
2008							2008						
2007							2007						
2006							2006						
2005							2005						
2004							2004						
2003							2003						
2002							2002						
2001							2001						
2000							2000						

Note: Light grey = policy does not exist; dark grey = policy implemented.


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