



The **global mobility** of **skilled workers** – lessons for Sweden

The international mobility of skilled workers has become a crucial component in the process of innovation, scientific discovery and technology transfer. This study summarizes some recent findings based on global bilateral migration databases developed by the OECD and the World Bank. It also highlights findings especially relevant for Sweden.

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Foreword

This paper is the first study in Growth Analysis' framework project being carried out during 2017–2018, *What can the state do to facilitate knowledge intensive industries' attraction of international talent?*. This issue is addressed in the Swedish government's Export Strategy and Smart Industry – a strategy for new industrialization of Sweden, as well as by representatives of industry. Internationalization of firms' personnel can have many positive effects on growth. Access to competence and human capital are important factors in firms' decisions on investments and localization of high value-added activities.

The aim of this study is to analyze global flows of high-skilled persons and benchmark Sweden with other European countries as regards attraction of international talent. This study summarizes some of the latest research based upon the bilateral migration databases developed by the OECD and the World Bank. It also presents some new results with bearing on Sweden. The study concludes with some recommendations for countries seeking to attract more high-skilled persons. Coming studies within the main project will focus on the establishment of international students on the Swedish labor market and firms' international recruitment to high-skilled professions in Sweden.

Growth Analysis commissioned this paper from Dr. Sari Pekkala Kerr, Wellesley College. Her research centers on high-skilled migration, labor market economics, education and gender equality. Carl Wadell, Sofia Tano, Anne Kolmodin and Carly Smith Jönsson, from Growth Analysis contributed to the paper.

Most of the work in this study is based on data created in collaboration with William Kerr, Caglar Özden, and Christopher Parsons. Dr. Pekkala Kerr is especially grateful to Christopher Parsons for his assistance in putting together the country-specific data sets. She also wishes to thank Sofia Tano for producing the Statistics Sweden data for 2005–2015. In addition, she is grateful to Erling Barth, Mette Foged, Hanna Sutela, Liisa Larja, Alfred Moest, Florian Götttsche, Carly Smith Jönsson, and INSEE for providing assistance in putting together the most recent data for all the countries compared.

Östersund, October 2017

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Förord

Detta pm utgör den första delstudien inom Tillväxtanalys ramprojekt *Vad kan staten göra för att underlätta kunskapsintensiva industriers attraktion av internationell kompetens?* som pågår 2017–2018. Frågan lyfts fram i både exportstrategin och nyindustrialiseringsstrategin, samt av näringslivsföreträdare. Internationalisering av personalstyrkan kan ha många positiva effekter på företagens tillväxt. Kompetensförsörjning och tillgång till kvalificerad arbetskraft är i sin tur viktiga attraktionsfaktorer för investeringar och företagens val av lokalisering av aktiviteter med högt värdeskapande.

Syftet med den här delstudien är att analysera globala flöden av högkvalificerad arbetskraft och se hur Sverige står sig vad gäller attraktionskraft av densamma, i jämförelse med några andra europeiska länder. Studien sammanfattar några av de senaste forskningsresultaten som bygger på globala bilaterala migrationsdatabaser utvecklade av OECD och Världsbanken. Den presenterar även nya resultat som har särskild betydelse för Sverige. Studien utmynnar i rekommendationer för länder som söker attrahera internationell kompetens. Kommande studier inom ramprojektet fokuserar på internationella studenters etablering på den svenska arbetsmarknaden och på internationell rekrytering inom högkvalificerade yrken i Sverige.

Tillväxtanalys har beställt detta pm av Dr Sari Pekkala Kerr vid Wellesley College. Hennes forskning fokuserar på migration, arbetsmarknadsekonomi, utbildning och jämställdhet. Carl Wadell, Sofia Tano, Anne Kolmodin och Carly Smith Jönsson från Tillväxtanalys har medverkat i denna studie.

Större delen av studien bygger på forskning gjord i samarbete med William Kerr, Caglar Özden och Cristopher Parsons. Dr Pekkala Kerr vill särskilt tacka Cristopher Parsons för hans hjälp med att sammanställa de landsspecifika uppgifterna. Hon vill också tacka Sofia Tano för att hon sammanställt uppgifter från SCB för 2005–2015. Hon är dessutom tacksam för den hjälp som Erling Barth, Mette Foged, Hanna Sutela, Liisa Larja, Alfred Moest, Florian Götsche, Carly Smith Jönsson och INSEE bidragit med genom att sammanställa de absolut senaste uppgifterna för samtliga länder som jämförts.

Östersund, oktober 2017

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Summary

The international mobility of skilled workers has become a crucial component in the process of innovation, scientific discovery and technology transfer. In the last few decades, we have seen a rapid increase in global talent flows with increasing competition from firms, universities and countries all interested in attracting the best talent. This report summarizes some recent findings based on global bilateral migration databases developed by the OECD and the World Bank. The report also summarizes some new findings that are especially relevant for Sweden.

Sweden is attracting high-skilled immigrants

Overall, Sweden's immigrant population consists of relatively skilled individuals, at least when compared with the other countries included in this study (Finland, Denmark, Norway, France, Germany and the Netherlands). This is true for both males and females immigrants. Sweden is also gaining more human capital than it is losing via international migration and the country is particularly successful in attracting high-skilled women. Over time (1990–2010), immigrant selection has trended towards becoming more skilled, although that trend may have been, at least temporarily, broken in 2015–16 with the relatively low-skilled refugee cohorts arriving in Sweden during that time. On the basis of the Swedish register data, the total migration flow to Sweden is rather small at the very top of the skill distribution, i.e. post-graduate level. This phenomenon is not untypical compared with other Nordic countries.

Though many are underutilized

Sweden appears to be at the lower end of the spectrum as regards effectively utilizing its immigrants on the labor market, when compared with the other countries in this study. The relatively low employment rate of immigrants compared with natives holds true for both men and women and across all skill groups in Sweden. Earlier studies have identified specific factors that make it harder for immigrants to assimilate in Sweden, for instance, high minimum wages, low number of available low-skill jobs, and strict employment protection laws. Despite these obstacles, after some time in Sweden, all immigrant groups tend to improve their employment rates, exhibit income growth and move up in the job skill hierarchy.

Policy can make a difference

Despite the lack of a perfect policy recipe to attract skilled immigrants, there are a few general rules for countries hoping to attract and retain more skilled individuals. Firstly, one “needs to let the immigrants come”, which means creating a less restrictive immigration policy at least with respect to high-skilled immigrants. Many Nordic countries use somewhat restrictive practices that slow down the ability of firms to hire the skilled workers they need in a timely manner. Secondly, one “needs to let the immigrants stay”, meaning there must be clear pathways to permanent residency and eventually citizenship for highly skilled individuals coming to Sweden on a temporary work visa.

Other considerations include the provision of opportunities for international students upon graduation. Many countries act as educators for foreign students, yet lack a clear plan in terms of retaining these newly qualified individuals once they are ready to enter the labor market. Finally, it is important to recognize that many immigrant groups tend to be

chronically under-utilized on host countries' labor markets. The reasons for this include a lack of work authorization, language requirements, and so on. Recognizing these factors and alleviating them through well designed policies, language training opportunities, and other means can boost the positive impact of immigration.

Sammanfattning

Den internationella rörligheten av högkvalificerad arbetskraft är en viktig faktor när det gäller innovation, forskning och tekniköverföring. Under de senaste decennierna har vi fått se en snabb ökning av det globala talangflödet tillsammans med en hårdnande konkurrens mellan företag, universitet och länder där alla är intresserade av att locka till sig de bästa förmågorna. Detta pm sammanfattar några av de senaste forskningsresultaten som bygger på globala bilaterala migrationsdatabaser utvecklade av OECD och Världsbanken. Rapporten presenterar även nya resultat som har särskild betydelse för Sverige.

Sverige attraherar internationell kompetens

Överlag består Sveriges utrikes födda befolkning av relativt välutbildade personer, åtminstone i jämförelse med övriga länder i studien (Finland, Danmark, Norge, Frankrike, Tyskland och Nederländerna). Detta gäller både för män och kvinnor. Sverige får också in mer humankapital än man förlorar genom den internationella migrationen och landet utmärker sig vad gäller attraktion av högkvalificerade kvinnor. På sikt (1990–2010) tenderar den utrikes födda populationen att vara mer välutbildad även om den trenden åtminstone tillfälligt kan ha brutits under 2015–16 till följd av de relativt lågutbildade grupper som under den perioden kom till Sverige. Med utgångspunkt från svenska registerdata, är det sammanlagda invandrarflödet till Sverige ganska litet när det gäller den högsta kompetensnivån, det vill säga disputerade. Denna trend delas i de övriga nordiska länderna.

Kompetensen utnyttjas ofta dåligt

Vid en jämförelse med andra länder förefaller Sverige ligga i den undre delen när det gäller att effektivt utnyttja den utrikes födda befolkningen på arbetsmarknaden. Den relativt låga anställningsgraden för utrikes födda jämfört med inrikes födda gäller för både män och kvinnor i Sverige, oavsett utbildningsnivå. Tidigare studier har fastställt särskilda faktorer som gör det svårare för utrikes födda att assimileras i Sverige – till exempel höga minimilöner, få tillgängliga arbeten för lågutbildade samt strikta anställningsskyddslagar. Trots dessa hinder tenderar alla grupper av invandrade människor efter en viss tid i Sverige att förbättra sysselsättningsgraden, att få högre löner och att flytta uppåt i hierarkin.

Policy har betydelse

Trots bristen på ett perfekt recept för att locka till sig högkvalificerad arbetskraft från andra länder, finns det ett par generella regler för länder som vill dra till sig och behålla högkvalificerade personer. För det första behöver man ”låta dem komma”, vilket innebär att skapa en mindre restriktiv immigrationspolitik, åtminstone när det gäller högkvalificerade personer. Flera nordiska länder har ganska restriktiva principer som minskar företagets möjligheter att vid behov anställa kvalificerad arbetskraft från utlandet. För det andra behöver man ”låta dem stanna”. Det måste alltså finnas tydliga vägar till permanent uppehållstillstånd och så småningom medborgarskap för högkvalificerade personer som kommer till Sverige med tillfälliga arbetstillstånd.

Andra överväganden handlar bland annat om att skapa möjligheter till arbete för internationella studenter efter examen. Många länder välkomnar utländska studenter, men saknar planer på hur man ska kunna behålla dessa nyutbildade personer när de väl är klara för arbetsmarknaden. Slutligen är det viktigt att inse att många utrikes födda tenderar att

ständigt vara underutnyttjade på värdländernas arbetsmarknader. Skälen till detta är bland annat svårigheter med arbetstillstånd, språkrav och så vidare. Genom att ta hänsyn till dessa faktorer och minska deras inverkan med väl utformade policyer, möjligheter till språkutbildning och andra resurser kan invandringens positiva effekter ökas.

1 Introduction

The matters of migration and the location of highly skilled individuals are gathering great interest world-wide, and many countries are keen to attract global talent in the hope that it will have a positive impact on economic growth and the overall pace of technological progress. Indeed, there is evidence supporting this notion. For example, research on Danish firms has shown that ethnic diversity favors firms' engagement on international markets (Parrotta et al., 2016) and facilitates the patenting activity of firms (Parrotta et al., 2014).

The pace and concentration of skilled migration have increased rapidly over the last two decades, as has been shown in two recent studies (Kerr, Kerr, Özden, and Parsons, 2016 and 2017). The increased concentration of migrants in just a handful of destination countries has been accompanied with a broadening set of sending countries and a rapid increase of international migration among skilled women. This short synthesis will summarize the key results from the two studies, with the specific aim of providing relevant policy lessons for Sweden. It will also review the global migration data from the perspective of Sweden and other Nordic countries, and contrast the OECD migration patterns with data drawn from the Swedish population register that covers the period 2005 to 2015, along with the latest available data from a set of comparison countries.

Before proceeding with the summary of global migration trends, it is worth dealing with a few definitional issues, most importantly: what do we mean by “skilled immigrants”? Given the fact that the OECD migration data combine harmonized national register data from a large number of countries, we need a broad and uniform definition that can be applied to the data sets across all the studied countries. For the purposes of the two academic studies summarized below, a “skilled immigrant” is someone who has at least some university education (i.e. education aiming for at least a Bachelor’s degree) and who resides outside of their country of birth. This gives rise to many potential situations. For example, individuals may move to a country specifically to pursue a university degree and then decide to stay in the country to work. Alternatively, they may have moved to a country as a child with their parents and later obtained a university degree in that country. From the data used in this report, it is impossible to tell how many individuals arrived in their destination country with at least some tertiary education and how many came with just their “raw talent”, obtaining their degree later. Moreover, the data for each year include the whole stock of immigrants residing in the destination country at that point in time, regardless of when they immigrated.

Section 3 discusses the patterns of both high-skilled immigration and emigration. The emigration data come from the same data source as the immigration data and have similarly derived definitions. For example, a high-skilled emigrant from Sweden is someone who was born in Sweden, has obtained some tertiary education (in Sweden or abroad), and during the observed years (1990, 2000 and 2010) resided in another OECD country. From these data, it is not possible to distinguish permanent residents from seasonal workers, but the applied rule is that any foreign-born individual responding to (or

present in) the population census in a destination country will be considered an immigrant in that destination country and an emigrant from the source country.¹

The data used in the two studies come from the global bilateral database described in Docquier, Lowell, and Marfouk (2009), and the recently updated DIOC database (Database on Immigrants in the OECD Countries)². One of the main issues in using those data for the purposes of e.g. policy evaluation is that the process of collecting and harmonizing census data from multiple countries by definition involves long time lags. Therefore, the latest available data in the current studies is for 2010 and this obviously excludes the recent large refugee migration flows that have taken place in Europe, especially during 2015–16. In general, however, immigrants who come to Sweden as refugees or for family reunification tend to be less skilled than those who come to work (Bevelander, 2000).

To the extent possible, these latter patterns will be discussed below, based on data obtained from national statistical authorities, collaborators, and survey studies. Moreover, the ability of population registers to capture the educational degrees obtained abroad poses some issues for the comparability of data across countries. For the most recent years of data drawn directly from the registers, the share of immigrants with unknown education is therefore also reported whenever available. Nevertheless, some caution is warranted when using the register-based information to infer the composition of the educational attainment of immigrant populations, especially when no data harmonization is involved.

Finally, in terms of the large refugee waves of 2015 and 2016 that have affected the composition of the immigrant stock in all of the countries studied here, it is perhaps still too early to study that group in the register data. In most cases, immigrants only show up in the population register once they have been granted asylum and have resided in the country for at least one year. Current data on the human capital and skill levels of the refugees who have been granted asylum are still quite sparse in most refugee-receiving countries, including the Nordic countries. Anecdotal and survey evidence indicates, however, that most of the new migrants arriving in 2015–16 were relatively low-skilled at least upon arrival, and would therefore mostly not be captured (at least in the near future) by the high-skilled definition used in this study.³

¹ It should be noted that different countries use different systems for collecting their population census data. For example, the United States has traditionally relied on paper forms mailed to each household. It is therefore possible that temporary workers answer the census form, and immigrants who are in the country illegally may not respond. Other countries such as the Nordic countries use register-based systems where any foreign-born individual who has taken up permanent residence in a municipality or who has registered with a tax authority will be captured by the register. Seasonal workers and refugees might therefore not be captured as immigrants in that system. The tracking of foreign degrees and educational qualifications may also be an issue in the register-based systems, while the census-based approaches may suffer from a self-reporting bias.

² For more details on the latter, see Arslan, Dumont, Kone, Moullan, Özden, Parsons, and Xenogiani (2014).

³ For further discussion on the age and skill distribution of the 2015–16 refugees, see the German Agency for Labor (2016). For earlier data, see OECD (2016a), which shows that about 20 percent of refugees arriving in Europe by 2014 had some tertiary education. By 2014, there was already a declining trend in the skill level of refugees, and many observers argue that the recent large waves are even less skilled. Given the young age of many recent refugees, it is likely that a number of them will eventually obtain tertiary education, but this is a process that first involves native language and English language acquisition. Finland also launched a survey study that captured the educational degrees of foreign-born individuals in 2014: http://www.stat.fi/tup/maahanmuutto/uth-tutkimus_en.html

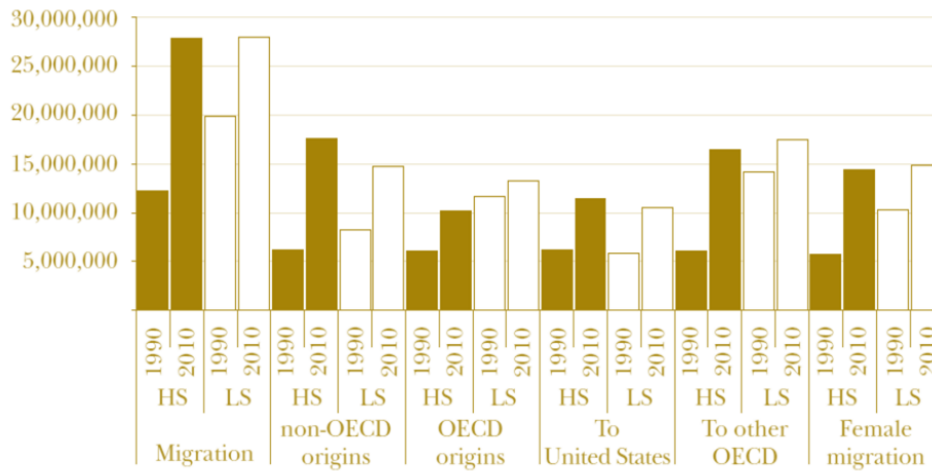
2 Key global migration trends

Sections 2 to 6 summarize the key findings from Kerr, Kerr, Özden, and Parsons (2016 and 2017) and further elaborate these findings from the Swedish perspective. Over the last two decades there have been significant changes both in the number and composition of skilled migrants in the OECD countries. The rate of international migration for highly educated individuals increased by 130 percent between 1990 and 2010, with a total of 28 million skilled migrants currently residing in the OECD. For Sweden skilled immigration increased by 180 percent and skilled emigration increased by 110 percent during the same time period. Currently about 3 percent of the global population live outside their country of birth and this share has actually not changed much since 1960. Instead, the composition of the migrant flow has changed, with a much more rapid increase in skilled movers relative to unskilled ones.

As the rate of skilled migration has rapidly grown, the source country composition has also changed markedly. OECD countries used to send about half of the global skilled migrants in the 1990s, yet in 2010 only about 35 percent of the total originated from OECD countries (Figure 1). Sweden has also seen a similar decline in the share of high-skilled immigration that originates from the OECD countries: in 1990, about 70 percent of all high-skilled immigrants to Sweden were born in other OECD countries, but by 2010 that share had dropped to just 46 percent.⁴ High-skilled migrants also travel farther than low-skilled from their source countries to their final destinations, with the average migration distance being about 11,000 kilometers. Notably, the widening set of source countries includes some that have extraordinarily high rates of high-skilled emigration. For example, smaller island nations such as Haiti, Jamaica and Barbados have 60 to 80 percent of all their highly educated former natives living outside of the country (most of them in the United States). It should be noted that many of these “skilled emigrants” have of course obtained their education in the U.S. and stayed to work upon graduation, rather than emigrated with their education and skills already complete.

⁴ Interestingly, a similar decline in the OECD share has also occurred for low-skilled migration. In 1990, 74 percent of all low-skilled immigrants to Sweden originated from other OECD countries, but by 2010 that share had fallen to 53 percent.

Figure 1 Summary of OECD migrant stocks, 1990 and 2010



Interestingly, the one thing that has not changed much over the last few decades is the set of destination countries: the top 4 countries (US, UK, Canada, and Australia) are still receiving nearly 70 percent of all skilled migrants to the OECD countries (Figure 1). Sweden has traditionally also been a significant receiving country of high-skilled immigrants, ranking number 13 in 1990, and number 11 in 2010. The most notable change related to the concentration across destination countries is that the U.S. is becoming less dominant as a receiving country, although still capturing about 40 percent of the skilled movers in 2010. On the other hand, when focusing on the very highest skill levels (e.g. Ph.Ds. or Nobel Prize winners), the dominance of the U.S. as a receiving country remains extremely high.

Kerr, Kerr, Özden, and Parsons (2016) point out that the recent growth in high-skilled female migrants has been particularly remarkable. That study does not specifically look at the source and destination countries by gender, but Table 1 below shows a breakdown of the top sending and top receiving countries by gender. It is notable that the country rankings are very similar for both male and female migrants but for almost all destination countries, the rate of growth of female migration has outpaced that of male migration. For Sweden, the difference in high-skilled immigration growth rates by gender is very large: the number of skilled female immigrants grew by 202 percent while the growth for men was 158 percent. The table ranks countries according to the 2010 levels but it is worth noting that in terms of the 1990 levels, Sweden ranks at number 13 both for the inflow of high-skilled men and high-skilled women. These patterns will be discussed in more detail in Section 7.

Table 1 Ranking of receiving countries by gender

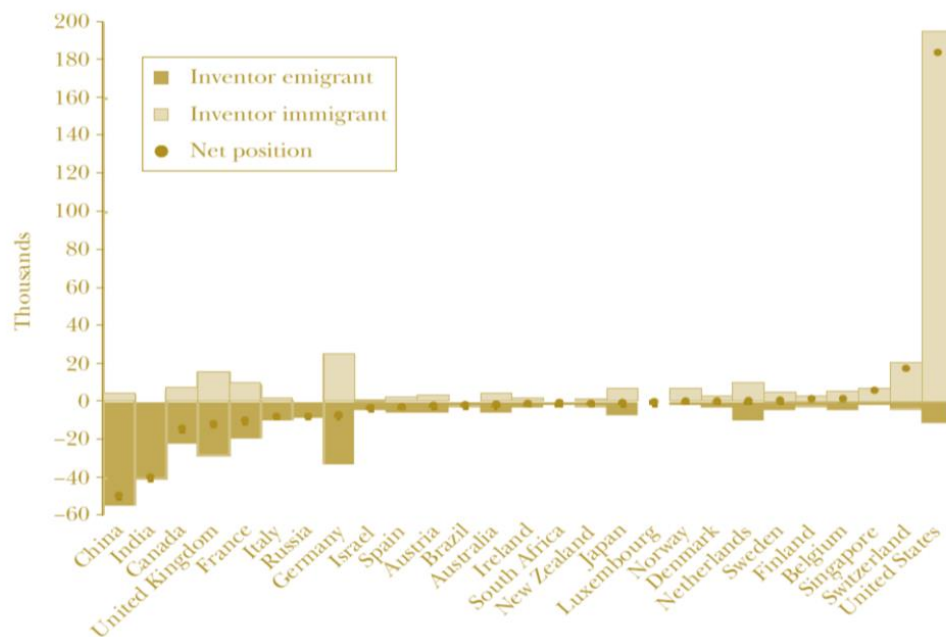
Female High-Skilled					Male High-Skilled				
Destination	1990	2000	2010	Growth 1990–2010	Destination	1990	2000	2010	Growth 1990–2010
United States	2 955 087	5 169 584	5 880 001	99%	United States	3 244 757	5 174 804	5 540 932	71%
Canada	845 105	1 315 980	1 723 690	104%	Canada	1 029 064	1 405 285	1 596 015	55%
United Kingdom	269 658	619 575	1 591 966	490%	United Kingdom	283 802	613 600	1 500 688	429%
Germany	224 298	461 802	881 819	293%	Germany	320 397	559 060	870 686	172%
Australia	529 344	773 286	869 565	64%	Australia	596 009	796 889	795 989	34%
France	138 157	283 939	752 137	444%	France	199 070	325 215	743 695	274%
Spain	64 057	148 440	574 105	796%	Spain	56 806	139 560	557 290	881%
Switzerland	65 968	115 436	256 867	289%	Switzerland	109 952	149 570	287 737	162%
Italy	45 367	78 584	239 792	429%	Netherlands	133 707	190 577	177 099	32%
Netherlands	135 077	203 369	183 137	36%	Japan	67 822	128 562	142 277	110%
Sweden	53 032	98 980	160 300	202%	New Zealand	104 517	111 663	132 936	27%
New Zealand	74 394	103 434	158 616	113%	Sweden	51 355	92 660	132 570	158%

Note: Sweden #13 by 1990 ranking, both for male and female

3 Concentration patterns, selection and sorting

As was pointed out above, skilled migration is quite concentrated towards a specific set of destination countries. Looking at this more finely, broken down by skill level, rather than combining everyone with at least some tertiary education into one single group, it can be seen that the more skilled the migrant group, the greater its geographic concentration both across and within destination countries. For example, Nobel Prize winners and inventors are highly concentrated in just a few locations. As another example, Figure 2 shows how just a few countries are capturing the vast majority of immigrant inventors.⁵ Yet even within those countries, their geographic concentration tends to be quite extreme. Here, Sweden ranks as number 6 in terms of the net immigration of inventors, with a slightly positive balance of inventors moving in versus inventors moving out. Other Nordic countries are similarly ranked, with Finland slightly ahead of Sweden, and Norway and Denmark slightly behind. Notably, China, India, Canada and the UK are large “net exporters” of inventors, while the U.S. is by far the largest “net importer”. Unlike other countries, Germany displays an interesting pattern with both large inflows and outflows of inventors.

Figure 2 Migration of Inventors, 2000–2010



Notes: Inventors are individuals who have at least one registered patent.

⁵ Here, an inventor is defined as someone who owns at least one patent as documented in the World Intellectual Property Organization (WIPO) database.

In general, high-skilled immigrant sorting and selection differ significantly across source and destination countries, with lower income countries generally showing a positive selection of emigrants.⁶ Also, China and India demonstrate a significantly positive selection of emigrants based on skill, while Russia and Mexico display negative emigrant selection. Immigrant selection, on the other hand, tends to be most positive in high-income destination countries. Despite attracting large numbers of skilled migrants, the U.S. nevertheless forms an interesting exception as the average skill level of immigrants into the U.S. is much lower than that of its natives.

In terms of immigrant and emigrant selection, data used in Kerr et al. (2017) shows that both immigrant and emigrant selection in Sweden became more positive between 1990 and 2010. In the 2010 data, Sweden had sent out about 207,000 emigrants of which about 111,000 (or 54 percent) were high-skilled. On the other hand, Sweden had received a total of 810,000 immigrants, of which 268,000 (or 33 percent) were high-skilled. Indeed, the high-skilled balance from immigration minus emigration remains strongly positive for Sweden. In contrast, Finland has sent out many more high-skilled individuals (78,000) than they have received (31,000). For Norway, on the other hand, the balance is much more favorable with the country receiving 133,000 and sending out 50,000 high-skilled individuals. Finally, Denmark's balance is almost even: 84,000 high-skilled individuals received and 77,000 sent out.

Within each destination country there is also a high level of immigrant concentration into capital cities and other hubs. For high-skilled migration, many of the hubs tend to develop around large university towns, large cities and capital cities that provide jobs for the immigrants as well as their spouses, and other "clusters of knowledge". This phenomenon is described in more detail below as Section 4 summarizes findings related to the agglomeration and high-skilled immigration nexus.

⁶ Selection refers to the skill level of emigrants versus natives in the source countries, or immigrant versus native skill level in the destination countries. Sorting refers to the allocation of emigrants from different parts of the source country skill hierarchy into the destination country skill hierarchy.

4 Agglomeration effects and self-reinforcing cycles

The 2017 paper by Kerr, Kerr, Özden, and Parsons focuses particularly on the relationship between skilled migration and agglomeration. Prominent and frequently used examples of skill clusters include California's Silicon Valley for the tech industry, which hosts about 60 percent of all STEM⁷ workers in the United States, the City of London or New York's Wall Street for finance, and Hollywood for the film industry. The relevant actors and institutions for the agglomeration process vary somewhat depending on the particular case, but most certainly include firms, entrepreneurs, universities and colleges, as well as policy institutions. Even though clusters may begin around a specific industry, the agglomeration of certain actors (e.g. tech firms) may further foster agglomeration of other actors (e.g. lawyers specializing in patent litigation).

Several studies have investigated how immigration reinforces existing agglomerations (for a summary, see Kerr et al., 2017; Jones, 1995; Stephan and Levin, 2001; Wasmer et al., 2007; Stephan, 2010; Weinberg, 2011; Kerr, 2016). The typical observation is that immigrants and industrial agglomeration go hand in hand and, over time, jointly create a self-reinforcing mechanism that may be quite difficult to replicate elsewhere. Many policy-makers are interested in fostering such agglomerations as they clearly create a lot of positive spill-overs for the surrounding area and in many cases for the entire nation. Unfortunately, from a policy-making point of view, there are no easy ways in which a particular policy measure could help in creating new agglomerations in the absence of the forces that have created some of the most successful clusters cited above. There are certainly ways in which policy can hinder cluster development but it is arguably quite unlikely that policy alone could foster e.g. a new tech agglomeration. The key components for cluster development include the supply of skilled labor (whether coming from area colleges and universities or via immigration), supply of capital and other resources, entrepreneurial talent, and, to a lesser extent, demand for the services created by the cluster (as that demand often tends to be more global in nature).

Due to the clustering process, many destination countries for skilled immigrants end up with a high immigrant concentration in specific occupations. For example, immigrants account for some 57 percent of scientists living in Switzerland, 45 percent in Australia, and 38 percent in the U.S. (Franzoni et al., 2012). Similarly, in 2010 in the US, 27 percent of all physicians and surgeons and over 35 percent of current medical residents were foreign-born. Moreover, immigrants accounted for over 35 percent of recent enrolments in STEM fields, with even higher proportions in specific areas like Electrical Engineering (70 percent), Computer Science (63 percent) and Economics (55 percent) as reported by Anderson (2013). These high concentrations in specific fields of education will eventually move down to firms and the overall labor market, making the host country highly dependent on immigrants in some relatively narrow sectors. To date, there does not appear to be much existing research on agglomeration and immigration in Sweden. Some studies have investigated the clustering of multi-national firms in Sweden (e.g. Braunerhjelm and Svensson, 1998; Braunerhjelm and Thulin, 2009), while others have studied the co-location patterns of immigrants (e.g. Rahut and Johansson, 2010), but a complete treatise

⁷ STEM = Science, Technology, Engineering and Mathematics occupations

of high-skilled immigration and firm agglomeration does not appear to be available for Sweden.

5 Policy factors in different countries

Questions linked to immigration are topical around the globe and the political atmosphere regarding these questions is charged. While most countries seem to desire to attract more high-skilled immigrants (and perhaps not that many low-skilled immigrants), there is a vast diversity in immigration policy approaches. Different policy approaches range from the points-based systems used by the UK, Canada and Australia, to the employer-based selection process with annual, national-level quantity caps used in the US. These policy approaches are often more a result of political feasibility rather than the identification of the most “successful” approach for guiding and controlling immigration. The role of non-governmental entities (e.g. universities and firms) is also important in shaping up the quantity and composition of the immigrant flow. Indeed, a significant share of skilled migrants arrive as students and obtain their university degree in the host country. In many cases, they are lured both by high quality education as well as the promise that degree holders are entitled to a work visa after the completion of studies.

To date, there are few studies trying to address the impact of specific immigration policies on the flow of high-skilled immigrants into a country. Recent data collection efforts have now provided researchers with a bank of policy changes to study. For example, the DEMIG POLICY database contains 6,500 policy changes across 45 countries during 1900–2014, and the International Law and Policy Analysis (IMPALA) and Immigration Policies in Comparison (IMPIC) databases are also being developed. IMPALA currently contains 9 countries for the period of 1999–2008, and the IMPIC aims to collect policy data for 33 OECD countries for the period 1980–2010. Even with these data, many research efforts are hampered by the fact that countries do not systematically collect immigration status (and its changes over time) for immigrants when collecting census data, or when processing population register data.

Despite the lack of a perfect policy recipe to attract skilled immigrants, the general rules for countries hoping to attract and retain more skilled individuals are obvious. Firstly, one “needs to let them come”, which means a less restrictive immigration policy at least with respect to skill. Many Nordic countries use somewhat restrictive practices which slow down the ability of firms to hire skilled workers to fill a need. Secondly, one “needs to let them stay”, which means creating clear pathways to permanent residency and possibly citizenship for those arriving on a (perhaps temporary) work visa. In addition, many countries act as educators for foreign students, yet lack a clear plan in terms of retaining these newly qualified individuals upon graduation. Indeed, while lacking good global data, we know that return migration and re-migration are very common, especially among the highest skilled individuals. Therefore, any policy approach should focus not only on the attraction but also on the retention of these skilled immigrants.

In terms of maximizing the probability that already existing skilled migrants remain in the country and realize their full potential on the labor market, the following policy considerations have generally been found to be relevant. Firstly, in many countries the lack of native language skills may be an impediment to being able to fully realize the immigrant skill in the labor market, with Finland and Sweden certainly falling into this category. Would language training solve the problem or is a more wholesale approach of making the

workplace more international a possible solution?⁸ Another policy-related issue is linked to the recognition of foreign education in the host country. A recent OECD study (2016a) pointed out that many high-skilled immigrants to Sweden fail to recognize the benefits of their education. It recommended that the process of degree recognition be accelerated and that more “bridging courses” be made available as that would more readily allow the foreign university degrees to match the requirements of Swedish employers. Policy conclusions will be discussed in more detail in the final part of this study.

Swedish high-skilled immigration policy towards non-EU citizens can be summarized as follows. Since December 2008, work permits no longer require a review of labor market needs. Work permits are issued for a maximum of two years, with the possibility to extend them for another two years. After four years, a permanent residence permit can be granted. Family members of the primary applicant are also able to obtain a work permit. Kahanec and Zimmerman (2010) provide a useful summary of the various policy approaches regarding high-skilled immigration in the comparison countries, some of which use perhaps more restrictive practices than Sweden. Denmark grants residence and work permits if “labor market considerations warrant them”. Work permits are issued for three to four years, and Denmark has previously tested a green card scheme based on a point system, with points allotted for educational attainment, language skills, work experience, “adaptability”, and age. Finland grants residence permits for employees tied to a specific professional field but not to a particular employer. Before a permit is granted, the “needs of the labor market” are evaluated, and the applicant must demonstrate that they can adequately support their own and their family’s needs. Norway introduced an annual quota of 5,000 work permits per year, beyond which labor market needs must be tested for additional work permits. Work permits are issued for up to three years and can be renewed. For permanent residency, the work permit holder must stay in Norway continuously for three years and learn the Norwegian language. For students, time spent at university does not count towards permanent residency requirements.

France also considers “labor market needs” before granting a work permit for a non-EU citizen. Two types of work permits are available. Foreign companies employing a person to work in France can obtain a “temporary secondment”, with a maximum duration of eighteen months and possibility to extend for an additional nine months. Any company hoping to hire a non-EU/EEA worker in France requires a “full work permit”. These permits have no time limit but permit holders must be working in a managerial position or be a high-level professional, and typically have considerable work experience and a university degree. Both types of work permits require a minimum monthly salary level of around 3,800 euro. Similarly, Germany uses a “labor market needs” criterion and only allows work permits connected to a specific job. Initial work permits are temporary and permanent residency is possible only after five years, assuming that the immigrant attends an integration course for language and culture. High-skilled scientists, teachers and researchers qualify for special work permits without a review of labor market needs. Finally, the Netherlands requires a residence permit application to be submitted prior to seeking a work permit. A labor market needs evaluation is required and the initial work permit is tied to a specific employer. Permanent residency is possible after a stay of three years with a work permit.

⁸ A recent Finnish study looked at the impact of new active labor market policies on the integration of immigrants, where language acquisition was one key component.

6 Impact of skilled immigration on receiving countries, and immigrant assimilation

There is now a vast literature on the impact of skilled immigration on the receiving countries (for international review articles see e.g. Kerr and Kerr, 2011; Peri and Sparber, 2011; Docquier et al., 2014; Kerr, 2016). Natives on the labor market are considered to be either substitutes or complements to immigrant labor, depending on technology and skill level. Most studies find either very little effect of high-skilled immigration on natives, or even some positive wage and employment effects, at least for the most highly skilled natives. The few studies that disagree with this consensus view (e.g. Borjas, 2005; Borjas and Doran, 2012) tend to focus on specific settings where there are externally imposed limits on the output and productivity of natives, such as the number of available publication slots in the top mathematics journals that immigrant and native mathematicians compete over. In some studies, high-skilled immigrants are found to increase the average productivity in their host location and also to have positive spill-over effects on the productivity of natives.

There is ample evidence of positive impacts on the innovation and technological advancement of the host countries as a result of skilled immigration (see e.g. Kerr, 2008 for the U.S.; Hunt and Gauthier-Loiselle, 2010 for the U.S.; Kerr and Lincoln, 2010 for the U.S.; Bosetti et al., 2015 for 20 European countries; etc.). Indeed, immigrants are responsible for a disproportionate share of patents, firm start-ups, and innovation in the U.S. and in other key host countries. Much of the work to date has focused on the United States, but we also know increasingly more about the other key host countries, with perhaps the exception of Australia where much research is still lacking.

One area where there is a lack of research is the overall public economic impacts of skilled immigration. Based on the results discussed above, most scholars would argue that skilled immigrants have a positive effect on the tax base and public economy of the host countries (see Kerr and Kerr, 2011, for a large international literature survey). In studies attempting to calculate the fiscal impact of immigration, the direction and size of the fiscal impact varies greatly across host countries and migrant groups, with more skilled groups having significant positive effects on their host countries (see e.g. Dustman and Frattini, 2014 for the UK; Liebig and Mo, 2013 for the OECD countries; Storesletten, 2000 for the U.S., and 2003 for Sweden).⁹

Several recent studies have addressed immigrant assimilation, although mostly from the point of view of low-skilled immigration. In terms of economic impacts on the host country, a rapid assimilation process into the labor market is a key requirement for maximizing the positive impact of skilled immigration. A report by the Migration Policy Institute (MPI 2014) studied immigrants on the Swedish labor market.¹⁰ They found that

⁹ Interestingly, Liebig and Mo (2013) found that immigrant households in Norway create sizeable positive fiscal impacts that are identical to those created by native households. In Sweden and Finland, the positive impacts are much smaller and remain well below those created by natives. These studies look at all households, not just those headed by a high-skilled immigrant. In Sweden, the less positive impacts may be due to the low labor market participation of refugees and other less educated immigrant groups.

¹⁰ The study comprises one of the six country-specific case studies on immigrant assimilation. Other countries surveyed include the Czech Republic, France, Germany, Spain, and the United Kingdom. The case studies are

especially refugees and family reunification immigrants, have very low employment rates, whereas labor immigrants from other EU countries fare much better. The study identified specific factors that make it harder for immigrants to assimilate, including the high minimum wage, small number of available low-skilled jobs, and the strict employment protection laws. Despite these obstacles, after some time in Sweden all groups improve their employment rates, exhibit income growth, and move up in the job skill hierarchy. Similar employment gaps are evident in the other countries covered by the various MPI case studies. In Spain, immigrant cohorts arriving in the 2000s have actually outperformed natives in terms of their employment rates.

A recent study by the OECD (2016) evaluated the assimilation of immigrants in Sweden compared with other OECD countries and also provided a gender or education specific country-by-country analysis with some of the comparison countries used in this report. Table 2 presents the results. Of all the countries compared, Sweden has the lowest immigrant employment rates relative to natives for both men and women. Norway and Germany appear to do the best in utilizing immigrant men on the labor market, while no country does particularly well with immigrant women. When looking at the employment/-population ratio differences between natives and immigrants by skill level, it is striking that Sweden has the largest gaps in almost all skill groups but especially in the low-skill group. This certainly suggests that immigrants could be better utilized on the Swedish labor market than they currently are and this is true for both genders and all education levels.¹¹

Looking at labor market assimilation by skill level, the Migration Policy Institute (2014) report shows that, relative to natives, even migrants with post-secondary education have lower employment rates after 10–15 years of residing in Sweden (85 percent versus 75 percent).¹² The employment gaps are slightly larger for those with secondary education (82 percent versus 70 percent), and those with less than secondary education (65 percent versus 50 percent). The “reason of entry” also clearly matters: employment rates are higher and the pace of assimilation is much faster for those who come as labor migrants, compared with family reunification immigrants and refugees. Finally, all countries in the MPI case studies show vast differences in immigrant employment rates in terms of country of origin: migrants from other EU countries appear to fare well (being about at par with natives), while immigrants from outside of Europe generally lag far behind natives in terms of employment outcomes, most likely due to their lower skill levels.

not directly comparable, due to the availability of data in each country. The country reports can be found online at: <http://www.migrationpolicy.org/programs/labor-market-integration-new-arrivals-europe>

¹¹ It is worth pointing out that some of the findings in the report cast doubt on the OECD Employment Database, as e.g. Finland displays a very small immigrant – native employment gap among men, whereas recent Finnish studies report much larger gaps (Sarvimäki et al., 2014).

¹² For France, the employment rate of tertiary educated migrants after 8 years of stay is about 72 percent. In the UK, tertiary educated natives had an employment rate of 86 percent, while similarly educated immigrants ranged between 81 and 86 percent, depending on arrival cohort. Notably, the 2009 arrival cohort was well below other cohorts, with an employment rate of 75 percent in 2012. In Germany, employment rates were not reported by education level, but male immigrants from EU-15 had higher employment rates (about 82 percent) than natives (79 percent), while female immigrants from the same countries lagged behind German natives (61 percent versus 69 percent).

Table 2 Comparison of Immigrant – Native Employment Rate Gaps by Gender and Skill Level

	Male Employment Rate (%)			Female Employment Rate (%)			Employment / Population Gap		
	Natives	Immigrants	I-N Gap	Natives	Immigrants	I-N Gap	High-Skill	Medium	Low-Skill
Sweden	79	68	-11	77	59	-18	-14	-13	-20
Denmark	76	71	-5	72	57	-15	-12	-12	-11
Finland	70	67	-3	69	55	-14	-9	-8	10
Norway	77	75	-2	75	65	-10	-8	-7	-1
France	68	65	-3	63	51	-12	-13	-12	-6
Germany	78	77	-1	72	60	-12	-12	-4	0
Netherlands	80	70	-10	72	56	-16	-11	-14	-13

Notes: Source is OECD (2016), using data from the OECD Employment Database and the European Labor Force Survey 2008–2014. Data refer to the latest available year for each country.

7 Comparison of immigrant stocks for Sweden and peer countries

Based on the data used in Kerr et al. (2016 and 2017), this section compares Sweden, other Nordic countries, Germany, France, and the Netherlands. The comparison of skilled immigration patterns shows that Sweden attracts more high-skilled movers than it loses via re-emigration and emigration. Sweden particularly attracts skilled female migrants (Figure 3), but also shows a consistently positive migration balance for high-skilled men (Figure 4). The large stocks in France and Germany make these figures harder to interpret for the small Nordic countries, but it is evident that Sweden's high-skilled immigration balance is becoming more positive over time. Denmark and Finland have historically lost more skilled migrants than they have gained, although this is slowly changing. Norway's high-skilled immigration balance is also improving over time.

Figure 3 Migration Balance for High-Skilled Women (NOTE: Balance is calculated as high-skilled non-native women residing in the country minus high-skilled native women residing in other countries)

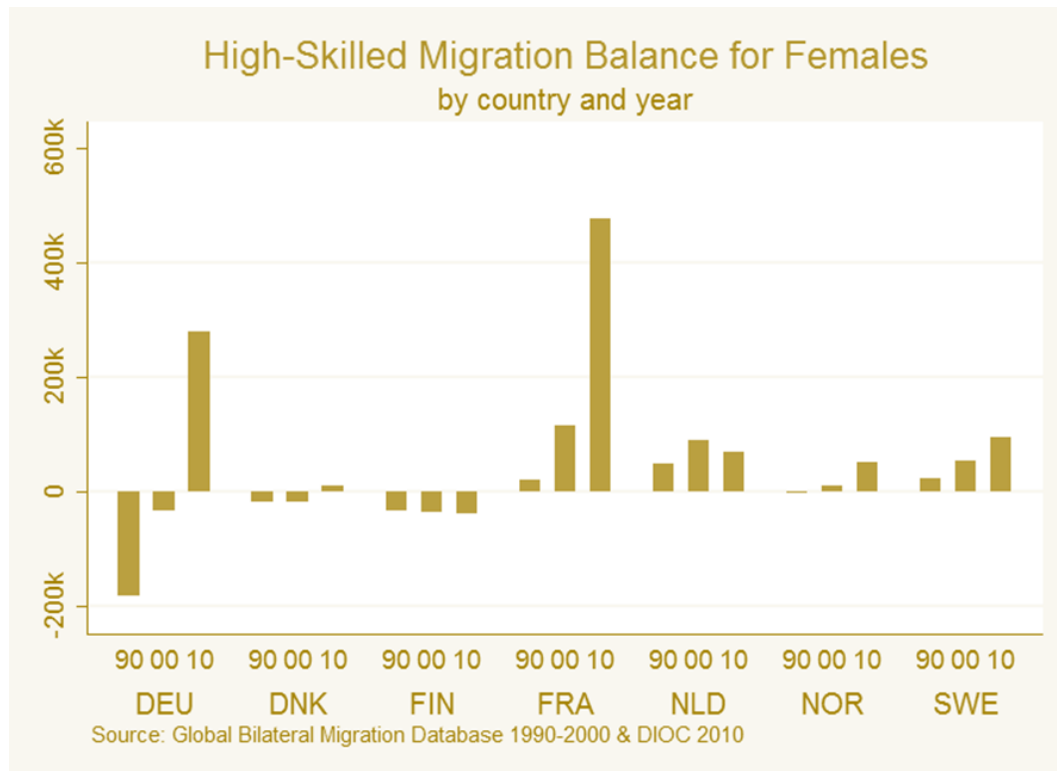
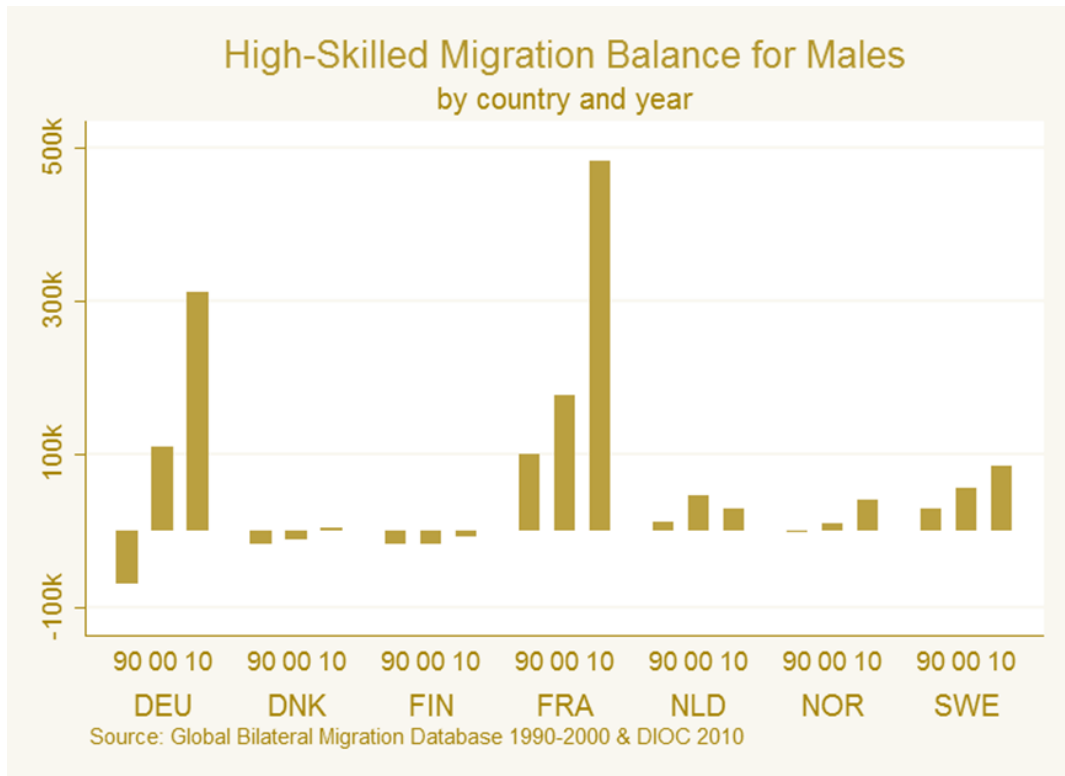


Figure 4 Migration Balance for High-Skilled Men (see note for Figure 3)



Since the countries are of very different sizes, it is useful to look at the net stocks as a percentage of the overall skilled population by gender (Figure 5 & Figure 6).¹³ Here too, almost all the countries studied are improving their migration balance over time, with the exception of the Netherlands. In the most recent year, Sweden is nearly at par with Norway for the net immigration of skilled women, and outperforms all comparison countries for the net immigration of skilled men.

¹³ The population numbers are drawn from the Barro-Lee country database.

Figure 5 Skilled Migration Balance for Women, as percent of Skilled Female Population

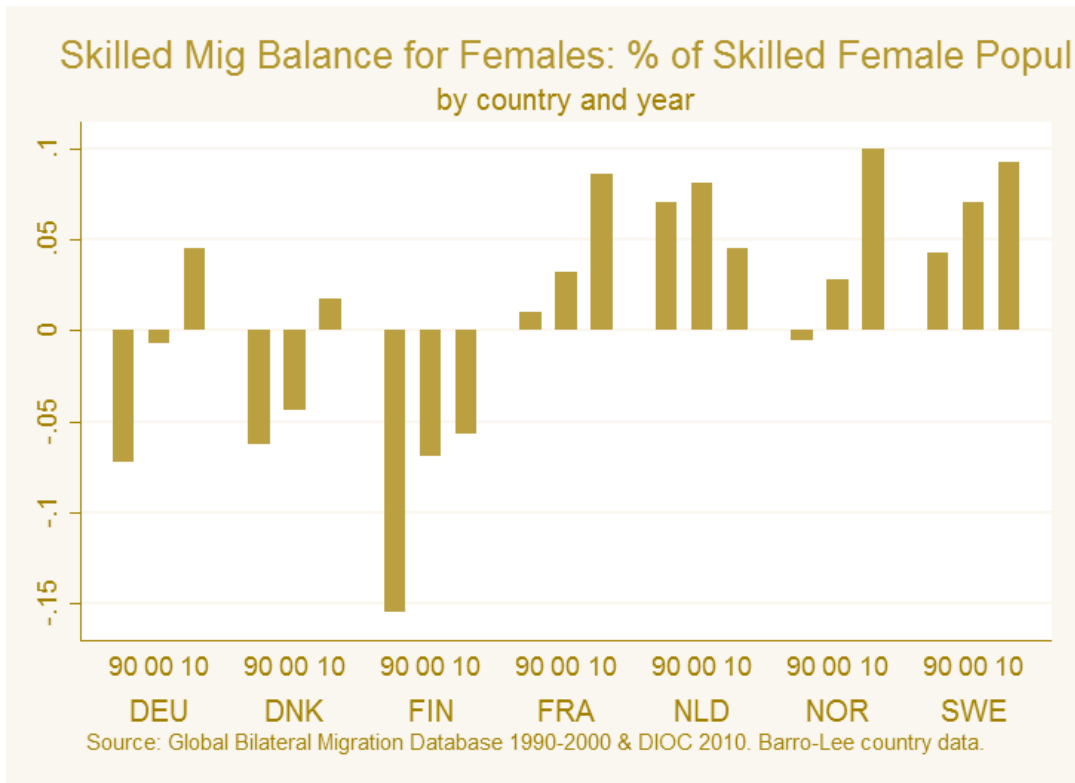
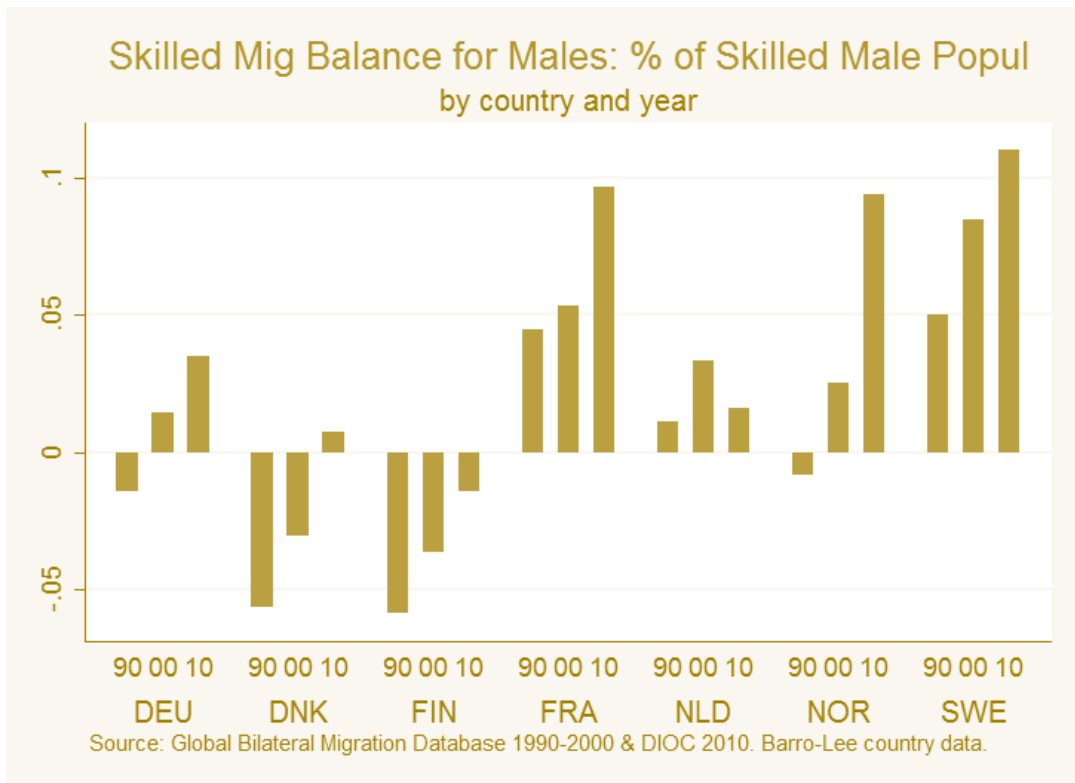


Figure 6 Skilled Migration Balance for Women, as percent of Skilled Female Population



High-skilled individuals as a percentage of the total immigrant pool is one proxy measure for the likely positive benefits a country will enjoy from their overall immigrant population. Figure 7 shows the share of all immigrants who are high-skilled females, and Figure 8 the share of high-skilled men in 1990, 2000 and 2010. By calculating the sum of these two e.g. in 2010 (about 33 percent for Sweden), one can see that the rest of the immigration stock consists of low-skilled individuals and persons with unknown skill level (who likely lack university degrees). Norway and Denmark exhibit a more positively selected (with regard to skill) immigrant pattern than Sweden, while Finland, Germany and the Netherlands experience much less positively selected migrant stocks.

Figure 7 Composition of migrant stock – share of high-skilled women as percent of total stock

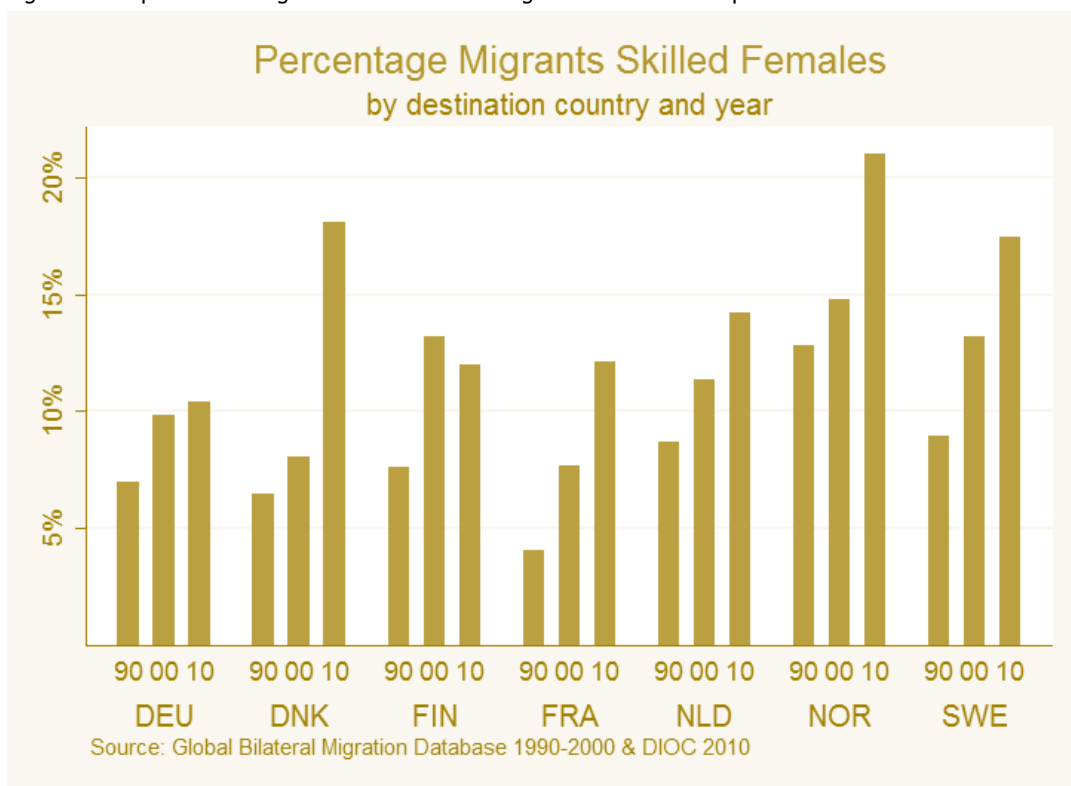
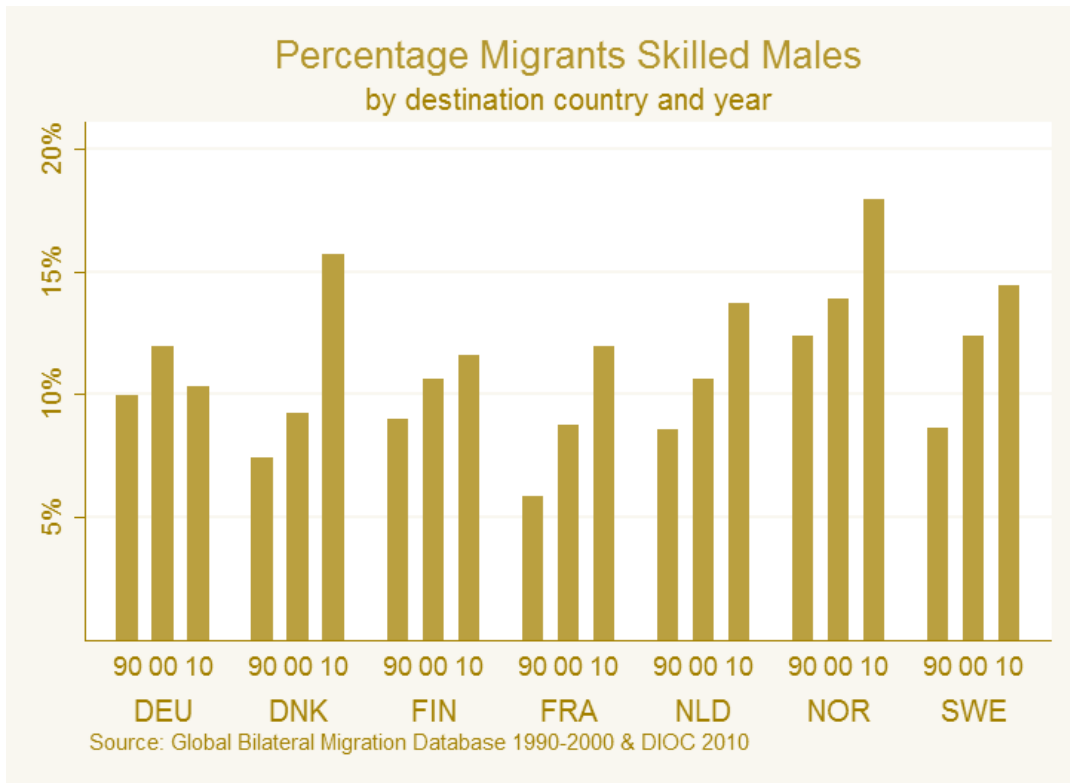
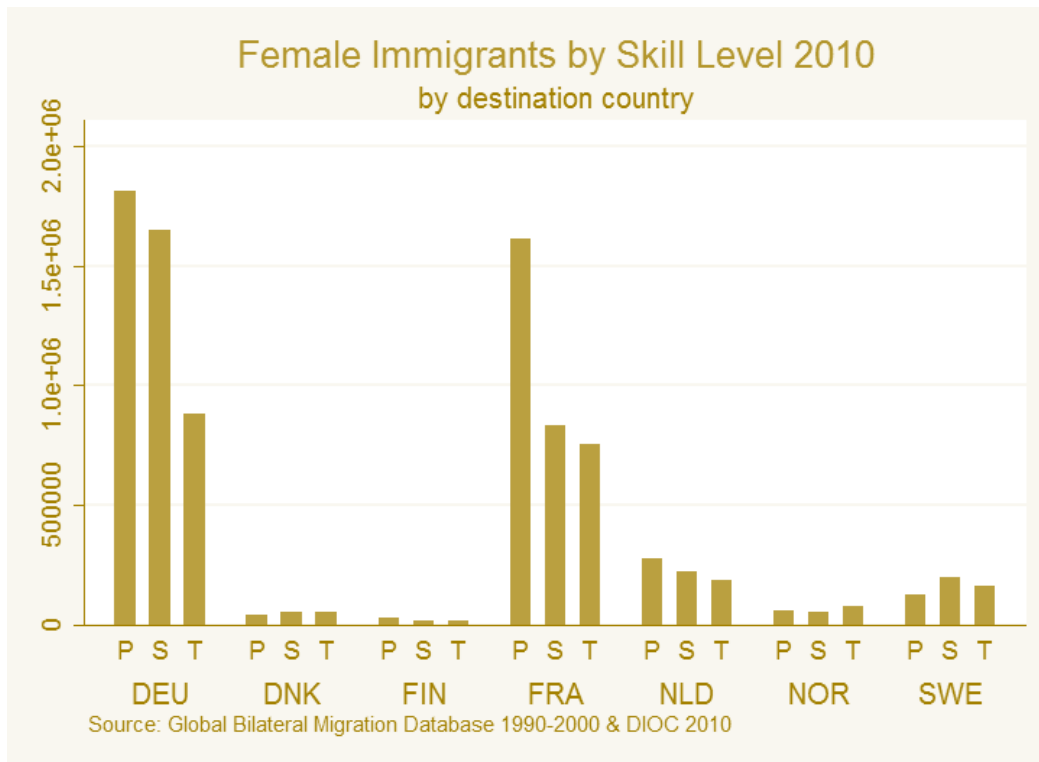


Figure 8 Composition of migrant stock – share of high-skilled men as percent of total stock



To look at the composition of the immigration stock for secondary and primary educated immigrants, Figure 9 and Figure 10 plot for 2010 the total number of immigrants residing in each destination country by gender and skill group, and Figure 11 and Figure 12 the share of each skill group as a percentage of the total immigrant stock residing in the country. Germany and France are again quite dominant in the stock graphs, mostly due to the very large stocks of primary and secondary educated immigrants. Sweden shows a small stock of primary educated female immigrants relative to the secondary and tertiary educated stocks, again with a female immigrant pool that is more skewed towards the high-skill end than in the other countries compared. Figure 11 confirms that Sweden has the lowest share of the total female immigrant pool comprised of primary educated immigrants (under 25 percent), but a large share of the pool formed by secondary educated migrants (over 45 percent), with no other comparison country reaching that level. For male immigrants, Sweden's distribution is similarly peaked at secondary level. Less than 25 percent of all male immigrants in Sweden had only primary education, with nearly all comparison countries reaching shares of 30 percent and above. Finland's male immigrant pool is the least skilled: more than half of male immigrants have primary education only, and about 20 percent have some tertiary education.¹⁴

Figure 9 Stock of Female Immigrants by Skill Level (Primary, Secondary, Tertiary) in 2010



¹⁴ There may be an issue with the register of educational degrees that particularly affects how well Finland's registers are able to capture foreign degrees. This issue is discussed in connection with Table 5.

Figure 10 Stock of Male Immigrants by Skill Level (Primary, Secondary, Tertiary) in 2010

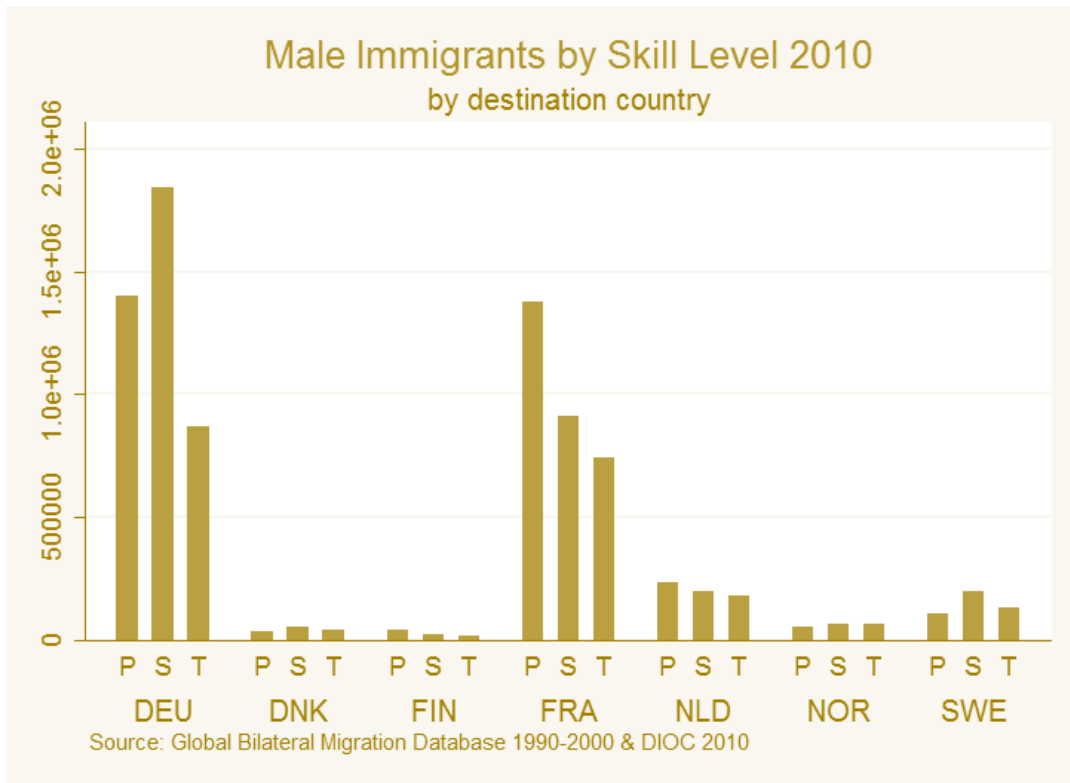


Figure 11 Share of Female Immigrants by Skill Level (Primary, Secondary, Tertiary) in 2010

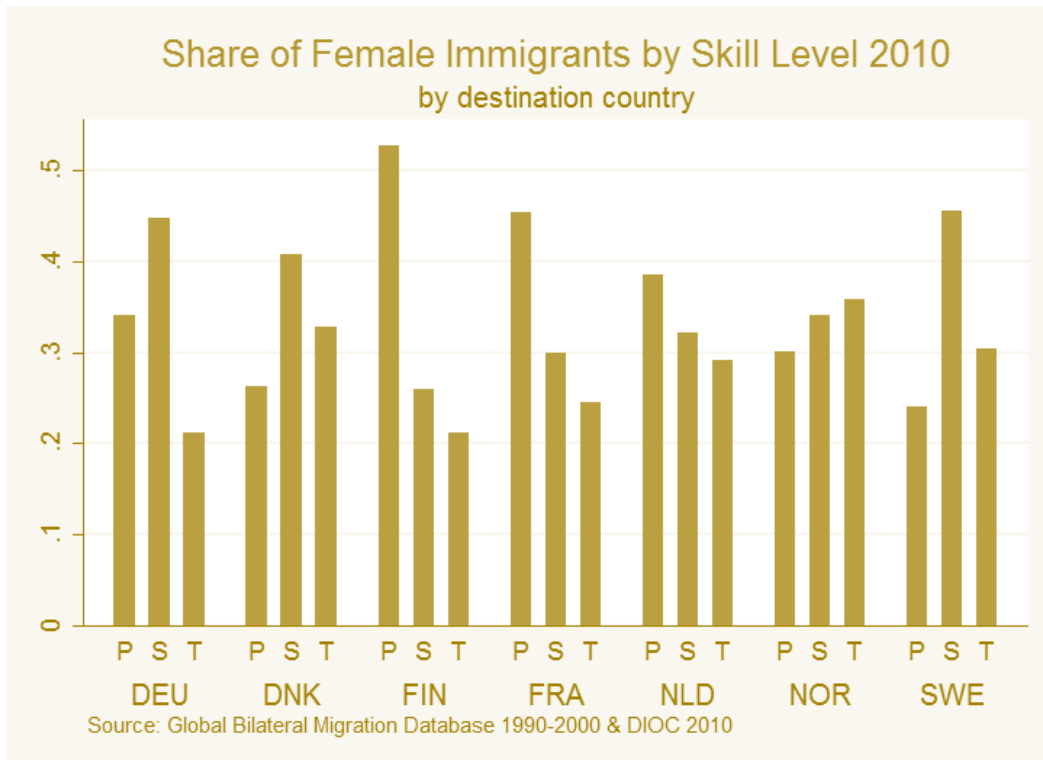
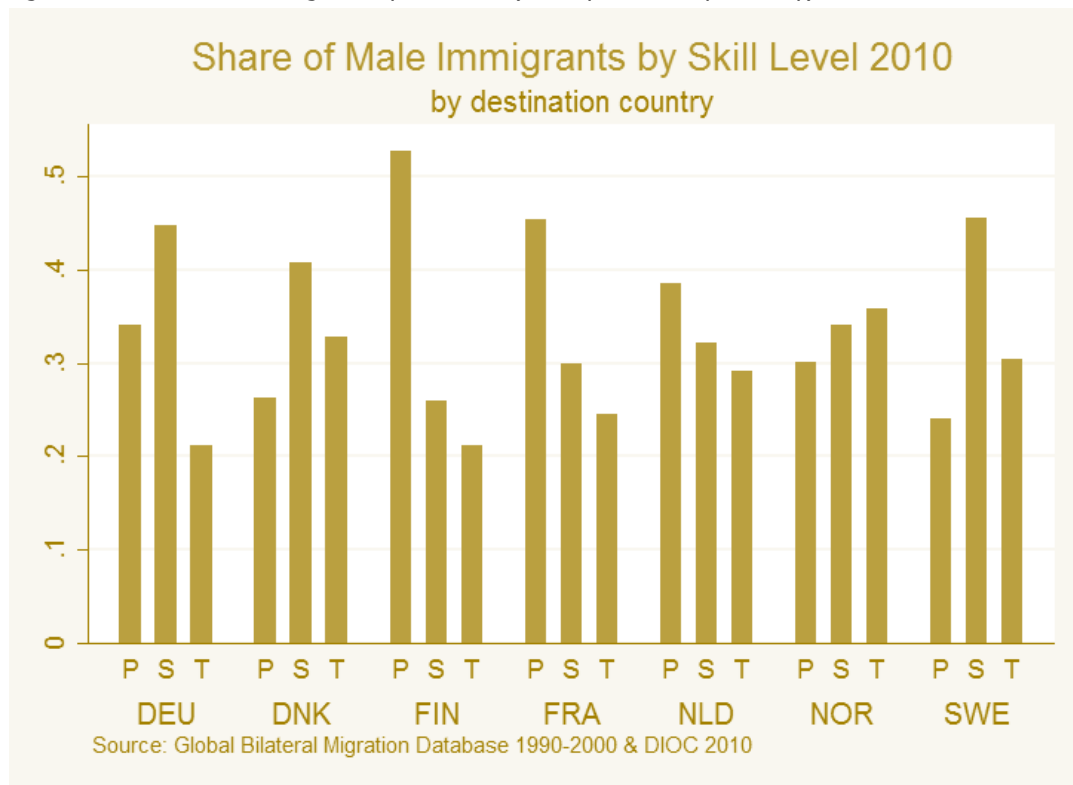


Figure 12 Share of Male Immigrants by Skill Level (Primary, Secondary, Tertiary) in 2010



The source country distribution by gender for 2010 is reported for Sweden and the other countries in the Appendix. The tables list the top-10 source countries and the share having arrived (and resident in the respective destination country) by source country. For Sweden, the top sending countries for skilled men include Iraq (12 percent), Iran (8 percent), and Finland (6 percent). For women, most skilled immigrants in Sweden have arrived from Finland (14 percent), Poland (8 percent), and Iraq (7 percent). While the same pattern of key nearby sending countries is evident for the comparison countries, they each display a rather distinct pattern of source country dominance. For example, Norway receives a lot of skilled immigrants from Sweden and Germany, but also obtains 7 percent of skilled male migrants from the UK and 8 percent of female migrants from Poland. Finland, on the other hand, shows a dependency on Sweden as a sender of skilled male (21 percent) and female (28 percent) immigrants. Finally, France and Germany display very distinct source country patterns that do not correspond to the Nordic countries or to each other.

Table 3 Swedish Population Register Data on Immigrants, Individuals Aged 16 and Over, 2000–15

	2005	2010	2015
Number of Existing Immigrants High-Skilled			
Women	40 040	56 366	70 888
Men	35 510	53 353	67 372
Share of Existing Immigrants High-Skilled (%)			
Women	21,1	23,3	24,9
Men	19,0	20,4	20,4
Flow of New Immigrants High-Skilled			
Women	3 635	5 708	6 719
Men	3 483	5 473	6 876
Share of New Migrants High-Skilled (%)			
Women	18,7	19,1	17,8
Men	17,0	15,8	14,3
Share of Existing Immigrants Low-Skilled (%)			
Women	58,9	57,7	59,3
Men	61,3	58,2	60,6
Share of New Migrants Low-Skilled (%)			
Women	24,5	27,8	39,4
Men	22,7	28,6	43,4
Share of Existing Immigrants Unknown Skill (%)			
Women	19,9	19,0	15,8
Men	19,7	21,4	19,0
Share of New Migrants Unknown Skill (%)			
Women	56,8	53,0	42,8
Men	60,3	55,6	42,3

In contrast to the rather aggregated data used by Kerr et al. (2016 and 2017), the Swedish register data give a more detailed breakdown of the educational attainment of natives and immigrants by gender, and also follow individuals over time (Table 3). When comparing natives and immigrants by level of schooling, at each level of education immigrants living in Sweden contribute positively to the human capital of Sweden (Table 4). The composition of the migrant stock has become progressively more educated from 2005 to 2015: while 21 percent of all existing female immigrants and 19 percent of male migrants had a university degree in 2005, in 2015 the share had increased to 25 percent for women and just under 20 percent for men. On the other hand, looking at the newest inflows of immigrants during 2005–15, the share of skilled individuals in the annual flows is falling over time, especially for male immigrants. The pattern is a little hard to interpret due to the drastically falling share of both existing and new immigrants whose education level is unknown, as well as the inclusion of relatively young individuals (who may yet obtain an education at a later point) in these calculations. At the same time, for the existing immigrants, and even more so for the newly arriving immigrants, the share of those with secondary education or less is also increasing. This is at least in part related to the large inflows of refugees over the 2010–15 time period. Nevertheless, a deeper investigation into this issue seems warranted.

Table 4 Swedish Population Register Data on the Whole Population, Individuals Aged 16 and Over, 2000–15

	2005	2010	2015
Share of Whole Population High-Skilled (%)			
Women	15,9	19,8	23,2
Men	13,5	15,7	17,4
Share of Whole Population Low-Skilled (%)			
Women	69,7	78,2	74,9
Men	76,3	82,0	80,3
Share of Whole Population Unknown Skill (%)			
Women	14,4	2,0	1,9
Men	10,2	2,3	2,4
Immigrant-Population Ratio High-Skilled			
Women	1,3	1,2	1,1
Men	1,4	1,3	1,2

A comparison by age category using the 2015 Swedish register data also shows that immigration alleviates the population aging issue, as the vast majority of the existing immigrants in Sweden are aged 16–50 (76.3 percent) and a significant share are between 16 and 30 (29.8 percent).¹⁵ For the whole population, the corresponding shares are 53.5 percent and 21.9 percent. The newly arriving migrants are even younger than the stock of resident immigrants: 91.7 percent of them are aged 16–50, and 47.5 percent between 16 and 30. Given the highly skewed age structure of the new immigrants to ages 30 and under, their rapid assimilation into the labor market and full utilization of their skills will be key to realizing their positive impact on the Swedish economy.

In sum, Sweden has an immigrant population that is more “positively selected” with respect to skill compared with Germany, France, Finland and the Netherlands, both in terms of male and female immigrants. On the other hand, Denmark and especially Norway have recently received a more educated group of immigrants than Sweden. Also, based on the Swedish register data, the total migration flow to Sweden is rather small at the very top of the skill distribution (i.e. Ph.D. level), only 2.3 percent of the 2015 wave of new immigrants or 2.1 percent of the whole immigrant population in 2015. This latter phenomenon is not untypical compared with other Nordic countries, for example. In the US, on the other hand, about 4 percent of all immigrants have a doctorate/Ph.D. degree.

As noted in the introduction, the key data used in the comparison analysis ends in 2010 and does therefore not include large recent waves of immigration into Sweden and the other countries compared. In general, even the high quality register data available in the Nordic countries will only catch up with the refugee phenomenon with some lag, after asylum decisions have been made and permanent residential locations of the newly arrived persons and families have been established. Moreover, documenting the skill levels of the recent refugee waves is in many cases a slow and tedious process, so any register data are likely to be only a partial representation of the actual human capital inflow that has occurred in the last few years.¹⁶ In general, one should exercise some caution when comparing data from countries that use different approaches in registering educational degrees. For example, Norway has recently begun to impute educational attainment for those with an “unknown level of highest degree”. Such imputation would use e.g. information about occupation and sector of employment, along with data on the person’s age and salary level. Other countries have used surveys to elicit the self-reported level of education, to complement information contained in the register data.¹⁷

¹⁵ The comparison excludes population and immigrants aged under 16.

¹⁶ For example, the Finnish register mostly captures degrees obtained in Finland along with the foreign degree conversions that have been approved by the Ministry of Education, the Ministry of Labour, or the National Research and Development Centre for Welfare and Health (STAKES).

¹⁷ See e.g. the recent survey study in Finland showing that the skill distribution of immigrants looks quite different if one relies on self-reported schooling rather than the register-based information (Sutela and Larja, 2015).

Table 5 Most Recent Comparison Data by Country, Gender, and Skill Level

	Denmark 2016 Register	Netherlands 2014 Register	France 2014 Census	Germany 2016 Microcensus	Norway 2016 Register	Sweden 2015 Register	Finland 2014 Survey	Finland 2014 Register
Panel A: Immigrant Stock by Gender and Education								
Men								
Tertiary	34,6%	25,4%	25,9%	17,1%	37,9%	20,4%	32,6%	20,4%
Secondary	37,1%	38,3%	29,8%	35,0%	32,5%	37,7%	42,4%	23,3%
Primary	22,3%	32,6%			29,6%	22,9%	24,8%	
Unknown	5,8%	3,7%	44,2%	35,4%	N/A	19,0%	0,2%	51,1%
Observations	204 602	1 341 000	921 487	12 739	332 593	330 622	N/A	121 371
Women								
Tertiary	37,8%	26,2%	27,1%	17,1%	45,5%	24,9%	36,2%	26,2%
Secondary	34,3%	38,5%	26,2%	35,0%	25,0%	23,2%	41,3%	27,9%
Primary	22,5%	31,6%			29,5%	23,2%	22,4%	
Unknown	5,7%	3,8%	46,8%	35,4%	N/A	15,8%	0,2%	45,8%
Observations	201 551	1 424 000	980 522	12 739	300 569	284 190	N/A	119 430

Notes: Data are from Statistics Denmark, Statistics Norway, Statistics Finland, Statistics Sweden, INSEE, Statistisches Bundesamt, and Inforservice CBS. Individuals providing assistance to obtain these data are listed in the acknowledgements. Germany does not have data available by gender. Number of observations refers to total number of immigrants in the register, or survey / microcensus where register data was not available. The age group is 16 and older wherever possible, and adult working age population otherwise.

Table 5 shows the most recent data from Sweden and all comparison countries.¹⁸ The exact years vary across the countries, with the latest available data point shown. For example, the Swedish register data run until 2015, but in Finland only until 2014. In this comparison, many countries have not really changed relative to 2010 (e.g. France), while for others the distribution looks distinctly different than from 2010 (e.g. Denmark). The latter may be due to the lack of data harmonization across countries, as the education definitions and included age groups may vary depending on data availability. The large share of those with unknown education is notable in Sweden. In other countries, it is often not possible to distinguish no education from primary education (e.g. France, Germany, and the Finnish register data), while in Norway the imputation process means there is no longer an unknown category. Compared with the 2010 data, it appears that the imputation process has significantly increased the share of the tertiary education group in Norway. While these latest data are interesting for comparison purposes, some caution is warranted in their interpretation due to the lack of consistent definitions and harmonization.

As a final side note, Eurostat collects asylum statistics for the EU-28 member states and these currently run until 2016.¹⁹ Those data do not break applicants down by skill level but give an overall idea of the magnitudes of those flows. For example, Germany received over 400,000 asylum seekers in 2015 and almost 750,000 in 2016. The share of decisions for granting asylum ranges widely across countries, but in 2016 Germany rejected about 40 percent of the applications and granted refugee status to 30 percent of applicants, with humanitarian reasons and subsidiary protection covering the remaining 30 percent of the decisions. Eurostat data for Sweden shows a total of 180,000 applications in 2015–16, with a rejection rate of about 30 percent and refugee status granted to less than 20 percent of applicants in the first instance decisions.²⁰ Finland and France boast a rejection rate of 65 percent in the first instance decisions, while the Netherlands, Denmark and Norway reject about 30–35 percent of the applications. According to Eurostat, the approximate number of applications in 2015–16 by country were as follows: France 145,000, Netherlands 65,000, Finland 40,000, Norway 30,000, and Denmark 25,000. These large inflows will almost certainly have skewed the composition of the immigrant flow towards the less skilled, although for the time being actual data on refugee skill levels remain indeed elusive. The skill and education measurement of refugees, and also immigrants more broadly, would seem like a worthwhile policy goal for the Nordic countries whose register-based population accounting systems do not easily lend themselves to tracking degrees and education obtained prior to entering the country.

¹⁸ The data were obtained from the official statistics or registers for each country, with the help of various collaborators and other contributors, as listed in the notes for Table 5.

¹⁹ See http://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics

²⁰ The rest have been granted a subsidiary protection status or authorization to stay for humanitarian reasons. Some rejected asylum applicants appeal the initial decision, but the number of the appeals is much smaller than the number of rejections. Sweden rejected about 75 percent of the appeals. Sweden's Migrationsverket reports about 190,000 asylum seekers for the same time period.

8 Concluding discussion

To sum up the findings for Sweden, its immigrant population consists of relatively skilled individuals at least when compared with the other countries studied, and Sweden is acquiring more highly-skilled people than it is losing via international migration. Immigrant selection has trended towards more skilled over time in Sweden, although that trend may have been, at least temporarily, broken in 2015–16 with the relatively low-skilled immigrant cohorts arriving. A challenge for Sweden appears to be that the country, relative to other countries, is at the lower end of effectively utilizing its immigrants on the labor market.

It is notable that, over the last decades, the growth of female high-skilled migration has outpaced the male high-skilled migration. Thus, the ability to attract high-skilled female immigrants tends to be a competitive advantage for Sweden. An interesting direction for future work would be to investigate why these high-skilled female migrants decide to come to Sweden and how Sweden can become even more attractive to this group.

While detailed policy recommendations are hard to make, there are many general lessons that can be relevant for countries contemplating strategies for attracting and retaining more skilled workers. The first priority should be work visas, green cards, and other mechanisms for firms to legally hire skilled immigrants. In many cases, a small flow of skilled immigrants into a country is a direct result of restrictive, slow, and tedious practices that hinder the mobility of skilled labor. Sweden has a system of work visas where the applicant is tied to the initial employer for two years and then to the initial profession for another two years, after which they can obtain permanent residency, which allows for full labor market access in a more flexible manner.²¹ While the process, at least in theory, is quite streamlined with no governmental involvement to assess labor shortages it has a reputation of being quite bureaucratic and time-consuming.

The second priority is to retain skilled migrants, including the creation of clear pathways into permanent residency and citizenship. For individuals who have obtained their university degree in the host country, this might involve granting an automatic work visa upon graduation. For example, Singapore provides free university education to foreign students on the condition that they stay and work for a specific number of years, and the Netherlands has created an attractive scheme to retain Ph.D. students after graduation.²²

Sweden currently allows foreign students to stay for six months while looking for work, and upon finding a job these students are then granted a work visa with the usual conditions discussed above. To improve the process of finding work, closer collaboration between universities and firms might be warranted, for example, internships and other ways of connecting students and companies during the period of study. In non-English speaking countries, language can also be a major barrier for international students trying to

²¹ In theory labor migrants can change employer if they reapply for a new permit which can be a time-consuming and uncertain process.

²² Singapore has a "Tuition Grant Scheme", under which non-Singaporean citizens are eligible for free tertiary education if they are willing to sign a 3-year contract with Singapore to work there after their education is complete: <https://tgonline.moe.gov.sg/tgis/normal/index.action>. In the Netherlands, Ph.D. candidates are often employed by their universities, making them eligible for salaries, paying social security compensations, building up a pension, and other benefits: <http://www.hetpnn.nl/en/promoveren/>

find employment. This could be addressed more closely during the course of university studies, especially if the country is providing student assistance or tuition-free education.

Since skilled individuals are highly mobile, and often move back and forth between their source country, host country, and third countries, an additional strategy might be to attract previous emigrants back home. Some countries do this simply by allowing dual citizenship that enables an easy move back home but other strategies such as tax and retirement schemes could also be feasible. Sweden and other Nordic countries now allow dual citizenships but to date schemes relating to taxation and retirement benefits have not been utilized to create more attractive conditions to bring back expatriates.²³ Another more proactive move might involve considering a points-based system for skilled immigration. Studies have found that countries using points-based systems generally have a more positively selected immigrant pool, although this strategy will only work in situations where there is an excess supply of immigrants seeking entry into the country.²⁴

The final goal is to ensure that immigrants already residing in the country or currently arriving are being utilized effectively on the labor market – recognizing that many migrant groups tend to be chronically under-utilized on host country labor markets. These include refugees, foreign students, and women of all skill levels. The reasons for under-utilization vary but generally involve some lack of work authorization. For example, the H1-B program in the U.S. is notorious for allowing families to migrate but denying the spouse (regardless of skill level) the right to work legally.²⁵ Moreover, language requirements may also make it hard for even highly skilled immigrants to fully realize their potential in the host country labor market, especially in countries such as the Nordic ones. Recognizing some of the causal factors in the under-utilization of immigrants and then alleviating them by changing policy, creating better language training opportunities and other means could really boost the positive impact of immigration and integration.

²³ Sweden, Finland and Denmark all have a tax scheme for high-skilled immigrants working in specialised occupations that allows them to pay a reduced flat tax rate for a duration of a few years. But similar schemes have not been used to attract Swedish, Finnish or Danish emigrants back home.

²⁴ Parsons C. and Czaika (2017) *The Gravity of High Skilled Migration Policies*, *Demography* (54) 603–630

²⁵ The Swedish work visa gives family members an automatic right to work and it also treats same-sex couples the same way as couples of opposite gender.

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Appendix

Country distribution of skilled immigrants by gender in 2010

	Men		Women	
	Source	Percent	Source	Percent
Germany	POL	13,5%	POL	16,2%
	USSR-RUS	10,8%	USSR-RUS	15,8%
	TUR	6,0%	USSR-KAZ	7,0%
	ROU	5,7%	USSR-UKR	6,8%
	USSR-KAZ	5,7%	ROU	5,6%
	USSR-UKR	4,2%	TUR	3,3%
	AUT	4,0%	FRA	2,9%
	NLD	3,5%	AUT	2,6%
	FRA	3,2%	USA	2,4%
	ITA	3,2%	CHN	2,2%
Denmark	Source	Percent	Source	Percent
	DEU	9,3%	DEU	8,7%
	GBR	6,1%	SWE	7,9%
	SWE	5,3%	NOR	6,8%
	IRN	5,2%	POL	5,8%
	IRQ	4,9%	KOREA-NS	5,0%
	NOR	4,7%	FYUG-BIH	3,4%
	FYUG-BIH	3,8%	GBR	3,4%
	USA	3,7%	IRN	3,1%
	TUR	3,6%	USA	3,1%
Finland	Source	Percent	Source	Percent
	POL	3,3%	USSR-RUS	2,8%
	SWE	21,3%	SWE	27,9%
	DEU	5,4%	USSR-EST	11,4%
	GBR	4,7%	CHN	7,0%
	CHN	4,7%	DEU	4,5%
	USSR-EST	4,4%	USSR-RUS	4,1%
	USA	3,2%	USA	2,6%
	IRQ	2,6%	POL	2,5%
	IRN	2,3%	THA	2,2%
FRA	2,0%	IND	1,8%	
NGA	2,0%	HUN	1,7%	

	Men		Women	
	Source	Percent	Source	Percent
France	DZA	17,0%	DZA	14,8%
	MAR	12,7%	MAR	9,9%
	TUN	5,6%	DEU	5,5%
	GBR	4,4%	GBR	4,4%
	DEU	4,3%	TUN	4,0%
	BEL	3,1%	BEL	3,4%
	ITA	2,8%	ESP	2,9%
	COD	2,5%	ITA	2,8%
	VNM	2,5%	PRT	2,6%
	ESP	2,3%	POL	2,5%
	Netherlands	IDN	12,7%	SUR
SUR		8,5%	IDN	9,1%
MAR		7,2%	DEU	7,5%
DEU		6,8%	MAR	4,7%
TUR		5,6%	POL	4,5%
GBR		5,3%	BEL	4,3%
BEL		4,1%	TUR	4,2%
IRQ		3,4%	GBR	2,8%
IRN		3,3%	IRN	2,6%
USA		2,5%	USSR-RUS	2,6%
Norway		SWE	9,5%	SWE
	DEU	7,0%	POL	7,7%
	GBR	6,8%	DEU	6,5%
	POL	6,5%	DNK	5,7%
	DNK	5,0%	PHL	5,1%
	USA	4,8%	USSR-RUS	4,7%
	IRN	3,7%	USA	4,6%
	IRQ	3,6%	GBR	3,8%
	FYUG-BIH	2,6%	USSR-LTU	2,7%
	NLD	2,5%	FIN	2,4%

Sweden	Men		Women	
	Source	Percent	Source	Percent
	IRQ	11,7%	FIN	13,7%
	IRN	8,3%	POL	7,6%
	FIN	6,0%	IRQ	7,0%
	DEU	4,8%	IRN	6,6%
	POL	4,7%	DEU	4,8%
	FYUG-BIH	4,3%	FYUG-BIH	3,5%
	GBR	3,9%	USSR-RUS	3,4%
	DNK	3,9%	DNK	3,1%
	NOR	2,8%	CHN	2,9%
	USA	2,7%	NOR	2,9%

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Tillväxtanalys är en analysmyndighet under Näringsdepartementet. På uppdrag av regeringen utvärderar och analyserar vi svensk tillväxtpolitik.

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