Can immigration solve the problem of an aging population?

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The Swedish population is getting older on average and it has been discussed whether immigration could ease the pressure of an ageing population on public finances. The answer to this question is complex. Studies show that immigration has the potential to contribute to the solution, but whether it actually does depends on how well the integration on the labour market works and on the degree to which foreign-born persons can find work. Immigration to Sweden is more often justified on humanitarian rather than labour-market related grounds, which, in itself, needs not be an obstacle to improved integration, but which does make demands of integration policy. In this article, we shed light both on what economic studies have to say on the matter and on the situation in Sweden. Over the short term, monetary policy is primarily affected by the variations in resource utilisation that follow from immigration. In the longer term, the effect on monetary policy will depend on the extent to which foreign-born persons are able to find work.

1 Introduction

The world population is becoming ever older but the effects of an ageing population on a country's demography differ strongly between low and high-income countries. In high-income countries, an ageing population entails a growing proportion of elderly people. In contrast, for low-income countries, which, on average, have younger populations, an ageing population primarily implies that the proportion of individuals of working age increases. At the same time, migration flows in the world are large, and increased immigration from low-income countries is contributing to lowering the average age in the high-income countries. One relevant question is therefore whether one of the high-income countries' major challenges – supporting an ageing population – can partly be solved by immigration. A review of the relevant literature shows that the answer to this question is complex. Studies show that the potential for immigration to contribute to the solution is there, but whether it actually does so depends on how well integration works on the labour market. If it works better than today, immigration may contribute more towards increasing growth in both the short and long term.

For a long time, Sweden has had positive net migration – which is to say that more people have moved here than have left the country and, at present – almost 20 per cent of the population are foreign-born. The high net migration is probably a result of Sweden, compared with other countries, having liberal rules for labour immigration, historically having had generous rules for family reunification and, above all, having accepted many asylum seekers in recent years. So has this facilitated the support of an ageing population? Unfortunately, the results of most of the studies made in Sweden are disheartening. Until

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the 1980s, incomes were redistributed from foreign-born to Swedish-born persons, but, as labour immigration has turned into refugee immigration, the employment situation of foreign-born persons has gradually worsened. Since the mid-1990s, immigration has instead been a net cost for public finances (see, for example, Ruist 2018). However, this change was not unavoidable: different macroeconomic studies reviewed in this article show that immigration has the potential to increase GDP per capita in the recipient country. This result stands regardless of the level of education an individual has at the time of migration. One decisive factor, however, is the extent to which those immigrating are able to find work.

There are many aspects to the issue of immigration. In this article, we focus on the macroeconomic effects of immigration. In the analysis we only examine averages, which is, of course, a simplification of the reality. Foreign-born people are an highly heterogeneous group and there are large differences between different individuals' situations on the labour market. Several sectors in Sweden are currently being carried by foreign-born workers. These include a large part of healthcare and care of the elderly, hotels and restaurants, and transport. At the same time, a large proportion of foreign-born persons lack a firm footing on the labour market, which is worrying from both a socio-economic and humanitarian perspective (see Gottfries 2010).

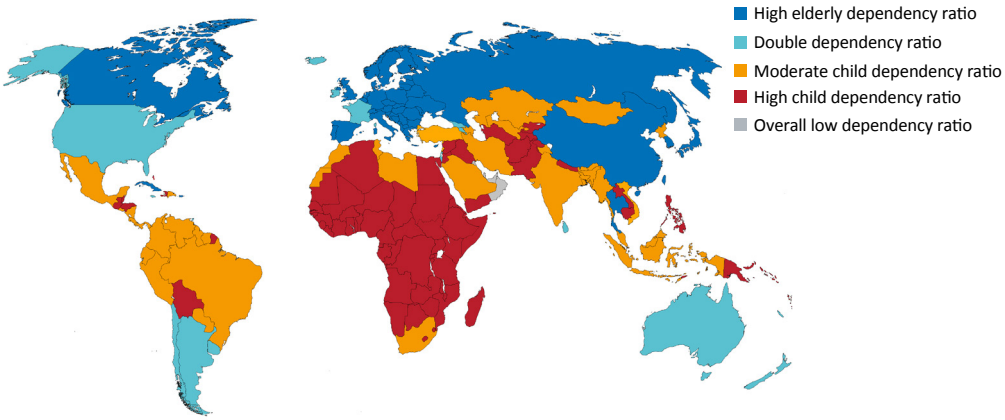
This article opens with a global description of migration and demographics in the world before moving on to examine the situation in Sweden. We review the demographic situation and how it would have appeared in a hypothetical situation with no immigration, the characteristics of immigration over time, and the macroeconomic effects that can be expected from immigration, based on various research results. Following this, we describe integration on the Swedish labour market, compare it with other countries, and finally describe how immigration affects public finances. The article, which combines a summary of previous research with current statistics, is intended as a research overview of immigration's macroeconomic effects on Sweden today.

2 Demographics and migration around the world

Between 2000 and 2017, the world's population increased by 1.4 billion people, which corresponds to an increase of 1.1 per cent per year. At the same time, the world's population is ageing and the proportion of people aged over 65 amounted to 9 per cent in 2018, an increase of 4 percentage points since 1960 (see United Nations 2017a).

The effect an ageing population has on a country depends on the age structure of the country. By calculating the dependency ratio – which is to say the number of children and elderly people, respectively, in relation to the working-age population – it is possible to compare different countries' age structures. In general, the child dependency ratio is high in low-income countries, at the same time as the elderly dependency ratio is high in high-income countries, as can be seen in Figure 1. For low-income countries, whose populations are thus largely made up of young people, an ageing population means that the proportion of individuals of working age increases. In high-income countries, on the other hand, an ageing population means that the proportion of elderly people increases.

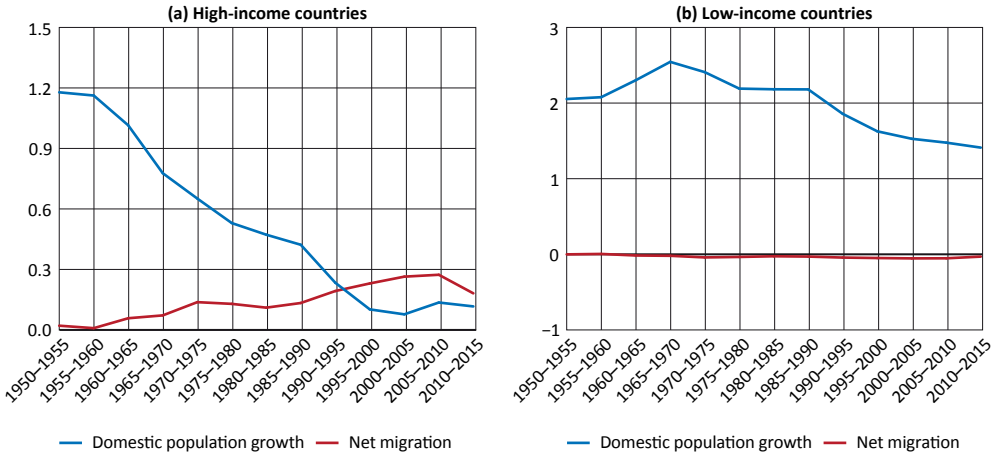
Figure 1. The world by type of dependency ratio, 2017
Dependency ratio



Note. The dependency ratio is the number of people under age 15 or ages 65 and older divided by the number in the working-age group (ages 15 to 64). High elderly dependency ratio denotes a child dependency ratio of lower than 0.29 combined with an elderly dependency ratio higher than or equal to 0.15. Double dependency ratio denotes a child dependency ratio of between 0.29 and 0.45 combined with an elderly dependency ratio higher than or equal to 0.15. Moderate dependency ratio denotes a child dependency ratio of between 0.29 and 0.45 combined with an elderly dependency ratio of less than 0.15. High child dependency ratio denotes a child dependency ratio of over 0.45 combined with an elderly dependency ratio of less than 0.15. Overall low dependency ratio denotes a child dependency ratio of less than 0.29 and an elderly dependency ratio of less than 0.5.
Source: United Nations

As the population of high income countries has become older, immigration has become increasingly important for population growth. Since the 1990s, net migration – the difference between the immigrations to and emigrations from a country – has been the main explanation for population growth in high income countries, see Figure 2. This means that migrants today make up almost 12 per cent of the total population of high income countries (see United Nations 2017b).

Figure 2. Domestic population growth and net migration in high- and low-income countries, 1950–2015
Per cent of the population



Note. Net migration refers to the difference between immigrants and emigrants. Domestic population growth refers to the difference between the number being born and the number dying. As populations are smaller in high-income countries in comparison with low-income countries, the net migration *as a proportion of population* is higher in high-income countries in comparison to low-income countries.
Source: United Nations

3 Immigration to Sweden

3.1 Immigration has increased since the Second World War

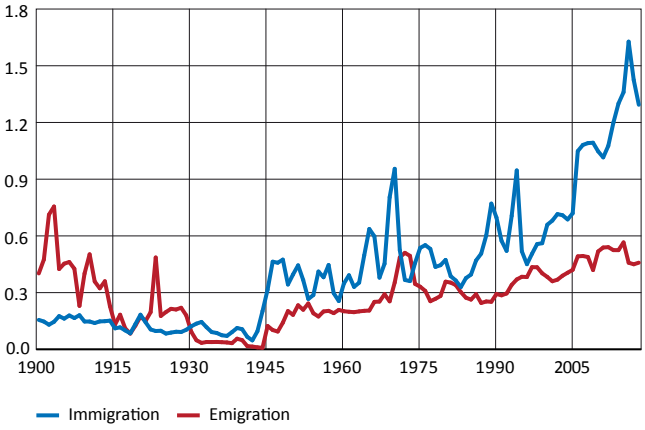
Historically, migration has varied heavily from year to year, but, in Figure 3, we can see that the trend has been successively increased immigration and emigration, with heavily

increasing immigration over recent decades. In the 1930s, Sweden moved from mainly being a country of emigrants to being a country of immigrants, among other things due to re-immigration from North America. During and after the Second World War, Sweden received war refugees from Europe, but, following this, immigration came to be dominated by labour immigration. Initially, most of these immigrants came from the Nordic countries, particularly from Finland, but, over time, migration from countries outside Europe also increased.

From the mid-1970s, immigration gradually changed. The recession that followed the oil crisis reduced the need for labour immigration and it became less attractive to migrate to Sweden. A larger part of immigration was justified by humanitarian grounds, and the immigrants therefore came from other regions and countries than before, including Latin America and Iran. Since the mid-1980s, the proportion of individuals in Sweden born outside the EU has increased, which is related to an increased refugee immigration.[1]

In 1989, almost 25,000 individuals immigrated, partly due to shortened waiting times and special treatment for those with long waiting times. As a result, the number of applications for asylum increased, which, in turn, led to harder regulations later that same year.[2] For a couple of years, refugee immigration was slightly lower, before the Yugoslav Wars caused a large influx to Sweden on humanitarian grounds. The number of foreign-born as a proportion of the total population increased during this period, as a consequence of increasing numbers remaining in the country.

Figure 3. Immigration and emigration as a proportion of the population, 1900–2018
Per cent

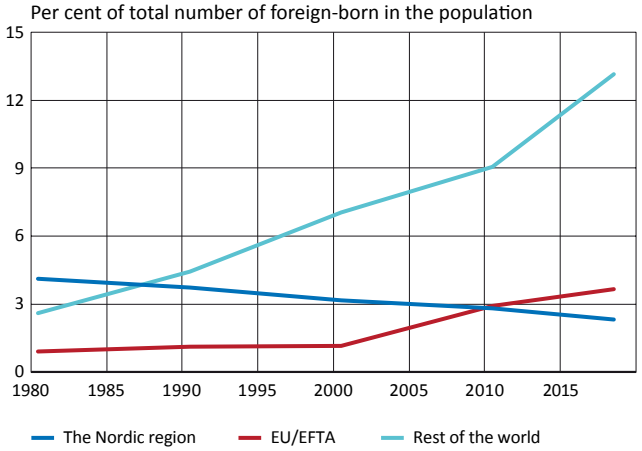


Note. To be counted as an immigrant, a person must have the intention of staying in Sweden for at least one year. To be counted as an emigrant, a person must have the intention of living abroad for at least one year.
Source: Statistics Sweden

From the mid-1990s, immigration has been dominated by refugees and their family members, primarily from the former Yugoslavia, the Middle East and Somalia.[3] Figure 4 shows that, since Sweden joined the European Economic Area (EEA) and later the EU, immigration from other EU countries has increased heavily and during the early 2000s, there was an increase in the proportion of the Swedish population born outside Sweden but within the EU. However, the increase of foreign-born in the population is still mainly driven by people from the rest of the world, which is to say countries outside the EU.

1 Refugee immigration is here used as a generic term for immigration that is not directly related to labour immigration, for example refugees, persons in need of protection and family members to refugees or persons in need of protection.
2 Between 1990 and 1994, there were 197,000 persons who sought asylum in Sweden, which can be compared with about 42,000 over the entire 1980s.
3 Refugee here refers to persons granted residence permits as refugees, as being eligible for subsidiary protection, or as otherwise being in need of protection, as well as persons previously granted residence permits on equivalent grounds under the previous Aliens Act.

Figure 4. Foreign-born people in Sweden by region of birth, 1980–2017
Per cent of total number of foreign-born in the population



Note. The Nordic region refers to the Nordic region excluding Sweden and the EU/EFTA refers to the EU/EFTA excluding the Nordic region.
Sources: Statistics Sweden and the Riksbank

3.2 Labour immigrants emigrate more frequently

Immigration consists of both those who settle in the recipient country and those who are in the country for a shorter period for a specific reason, for example to work. As different kinds of immigration have different immigration and emigration patterns, they contribute to aggregated net migration in different ways. Table 1 shows immigration and emigration, as well as net migration, for various regions.

The differences in immigration and emigration patterns for different regions are partly due to varying motives for immigration. The main reasons for immigration from the Nordic region and EU countries is to work or to live with family members. As the motivation often is to work and not to settle, emigration is relatively high among these groups, which leads to low net migration. For the rest of the world, the main reasons behind immigration are seeking refuge or being a family member to someone who has sought refuge. As relatively few refugees and their family members emigrate, these groups make a large contribution to net migration, in comparison with other groups. This means that the majority of those settling in Sweden are refugees and their family members. As more are immigrating to Sweden at present than are emigrating, net migration is positive.

Table 1. Total immigration, emigration and net migration, 2004–2017
Thousands and per cent of total net migration

Country of birth	Immigration, thousands	Emigration, thousands	Net migration, thousands	Net migration, per cent of *total* net migration
Nordic region	156.5	115.2	41.3	3.9
EU	346.0	124.8	221.3	20.9
Other countries	1,124.6	242.0	882.6	83.5
Total	1,888.8	831.9	1,056.9	100.0

Note. The Nordic region refers to the Nordic region excluding Sweden, and the EU refers to the EU excluding the Nordic region. To be counted as an emigrant in Statistics Sweden's statistics requires a person to inform Skatteverket (the Swedish tax agency) of their intention to settle abroad for at least 12 months. Not all emigrants inform the agency of their plans to move, which leads to some uncertainty over the statistics for emigration.
Source: Statistics Sweden

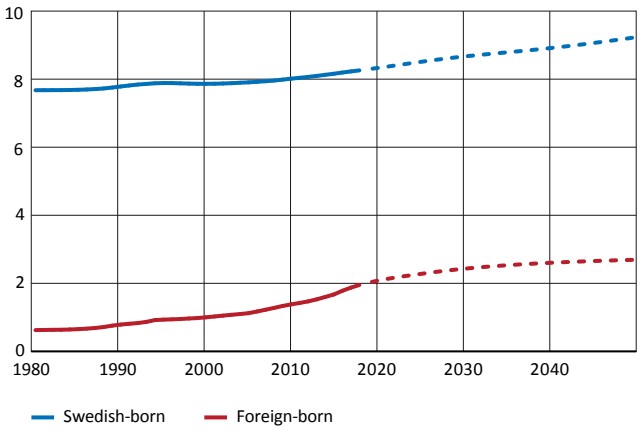
One aspect of immigration of interest for our analysis of economic activity is how many EU citizens come to Sweden in response to labour shortage peaks. However, temporary immigration is largely missed by the official statistics, as Migrationsverket (the Swedish migration agency) does not register rights of residence for EU citizens. If the supply of labour

on the Swedish labour market is greater than measured by the official statistics, the actual shortage on the labour market may be lower than various traditional indicators indicate. The total number of people working in Sweden without being registered as residents is unknown as it is difficult to measure. Information received by the authorities suggests, however, that in 2017 about 28,000 people are directly or indirectly reported as working in Sweden without being registered as residents. In total, these individuals correspond to about 0.6 per cent of the 5 million of the population registered as residents who are in employment (see National Institute of Economic Research 2017).

4 Demographic developments in Sweden in the period ahead

Sweden has one of the fastest growing populations in the western world. At the start of 2017, Sweden's population passed 10 million people and, according to Statistics Sweden's population forecast from 2019, the population of Sweden will increase by just over 17 per cent by 2050, from 10.2 million to 11.9 million. Population growth over the next few years will largely be driven by immigration, as can be seen in Figure 5. In the 1990s, foreign-born made up about 10 per cent of the population. At the end of 2018, this proportion had increased to almost 19 per cent and Statistics Sweden calculates that, by 2050, almost 23 per cent of Sweden's population will have been born abroad.

Figure 5. Population growth, 1980–2050
Millions



Note. The broken line represents a projection.
Source: Statistics Sweden

In addition to the population being expected to increase, there will also be unusually large changes in its age composition. At the end of 2018, almost one in five people in Sweden was over the age of 65 and, by the year 2050, almost one person in four is expected to be 65 or older. The increase of the proportion of older people will primarily be driven by an increase in those aged over 80.

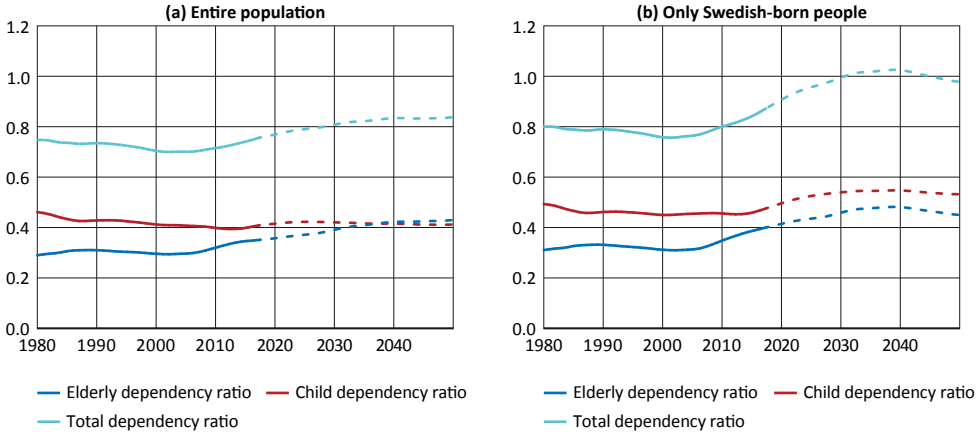
4.1 An increasing proportion of older people is raising the dependency ratio

The age composition of the population has consequences for public finances. A larger proportion of children and older people increases public expenditure as children and older people belong to the groups that are in greatest need of public services such as healthcare, schools and social care. The dependency ratio denotes the number of children and elderly

in relation to the number of individuals of working age.[4] A low ratio means a population composition that is beneficial for public finances.

Between 1980 and 2005, the dependency ratio decreased in Sweden. Since then, it has increased and, according to Statistics Sweden's population forecast, it will have a rising trend throughout the rest of the century, as shown by the broken lines in Figure 6a.

Figure 6. Development of the dependency ratio, 1980–2050
Proportion of working-age population



Note. The child dependency ratio is calculated by dividing the number of people in the age group 0–19 years by the number of people of working age, 20–64 years. The elderly dependency ratio is the number of people aged 65 or older divided by the number of people of working age. The total dependency ratio is the number of people aged 0–19 plus the number of people aged 65 or over, divided by the number of people of working age. The broken line represents projections.
Sources: Statistics Sweden and the Riksbank

In 2005, there were 70 young and elderly people for every 100 individuals of working age. By 2050, there are instead expected to be just over 80. At the same time, the need for healthcare, care of the elderly, and public sector staff will also increase as the proportion of older people, both born in Sweden and born abroad, increases. As public expenditure will thereby be higher, due to there being more elderly people, those who are of working age will have a higher dependency burden. The elderly dependency ratio, which is to say the number of individuals over the age of 65 in relation to the number aged 20–64, is expected to increase from the current 0.35 to 0.43 by 2050. The increase is being driven by an increase in the proportion of people aged over 80 years in relation to the working-age population, from 0.09 to 0.16 by 2050.[5] The child dependency ratio, wich is to say the number of individuals in the age 0–19 in relation to the working age population, will also increase slightly over the next decade, before decreasing again.

4.2 Without foreign-born people, the dependency ratio could have been substantially higher

From an economic point of view, foreign-born people as a group has a favourable age structure. Just over 70 per cent of the foreign-born population is of working age, which can be compared with 54 per cent of the domestic population. The dependency ratio among foreign-born people is thus significantly lower than it is among Swedish-born people and it may therefore be conceivable that a continued influx of immigrants will also hold down the dependency ratio in the future. If the dependency ratio is calculated only for the population born in Sweden, as in Figure 6b, the total dependency ratio would exceed 1 by

4 In this article children refers to persons in the age of 0–19 years and elderly to persons over 65 years. Working age is defined as 20–64 years of age.

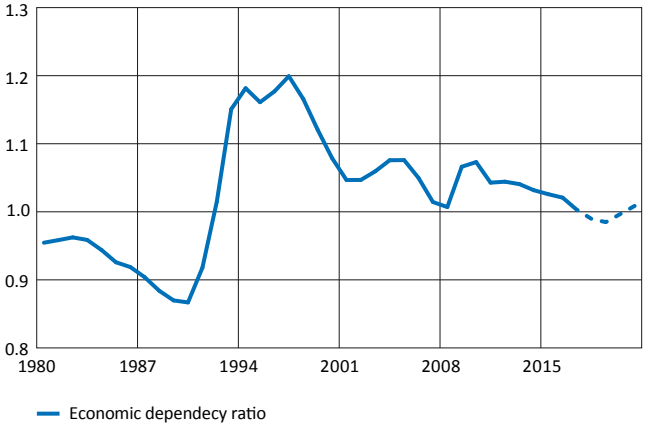
5 By 2050, the proportion aged over 80 years is expected to have grown from about 5 per cent at present to just under 9 per cent of the total population. The group aged 65–79 years is expected to continue to form about 14 per cent of the population.

2030, meaning that children and elderly people together would outnumber the working-age population. The high dependency ratio for those born in Sweden illustrates that, without immigration, the situation could have been problematic, not only from a demographic and humanistic perspective, but also from a socio-economic one. Several important sectors in Sweden are currently being carried by foreign-born workers. These include a large part of healthcare and care of the elderly, hotels and restaurants, and transport. Without immigration, Sweden's labour force would be significantly diminished, which would affect not only the above mentioned sectors, but the entire economy.

Ultimately, however, it is not possible to continually regenerate the population by immigration on Swedish levels. Apart from the immigrants themselves becoming older, life expectancy is also increasing every year. So balancing both increasing life expectancy and an older population would require very high levels of immigration to compensate for the age-related factors (see Heleniak and Sanchez Gassen 2016).

The dependency ratio does not tell us everything about society's ability to support an ageing population. An increased proportion of the working-age population only reduces the dependency burden if the employment rate is high among working-age people. The dependency ratio as calculated above may therefore be misleading. A fairer measure of the dependency burden is therefore the number out of work in relation to the number in work, a so-called *economic* dependency ratio. Since the 2000s, the economic dependency ratio has fallen, but remains on significantly higher levels than prior to the crisis of the 1990s, as Figure 7 shows. The economic dependency ratio is higher than the demographic dependency ratio, which is partly due to employment rate among foreign-born people being lower than it is among Swedish-born people.

Figure 7. Economic dependency ratio, 1980–2021
Number out of work as a proportion of number in employment



Note. The broken line refers to the Riksbank's forecast in April 2019.
Sources: Statistics Sweden and the Riksbank

5 Macroeconomic effects of immigration

5.1 Macroeconomic effects on the labour market

Increased immigration leads to an increased labour force that, in turn, may lead to potential GDP increasing in the longer run.[6] There may therefore be great economic advantages in immigration, in addition to purely humanitarian reasons. How much actual GDP increases

6 Potential GDP is defined as the level of production that could be achieved if we had normal resource utilisation of the production factors, labour and capital available at present. Among other things, potential GDP is used in comparison with actual GDP to assess resource utilisation in the economy. Potential GDP cannot be observed but is the result of an assessment. Both potential GDP and the view of resource utilisation are important in the analysis of stabilisation and structural policy.

depends on the age and educational profile of the immigrant population in comparison with the population in the recipient country and the extent to which the immigrants can find work. Among foreign-born people, unemployment in Sweden has been at a relatively stable level of around 16 per cent in recent years, partly because the influx to the labour force has increased heavily. The high unemployment rate is mainly a consequence of it taking a long time for those who have immigrated to find work. It takes an average of 15–20 years for the majority of those immigrating as refugees to be able to support themselves (see Ruist (2018) and Forslund (2017)). Instead, approximately one-third have gained their main income from some form of economic social security system for a large part of the time, for example from labour market measures or social assistance. As it takes time for immigrants to become established on the labour market, equilibrium unemployment is expected to rise in conjunction with increased immigration.

The factors that play the greatest role in the probability of finding work are how long the immigrant has been in the country, as well as age upon arrival, level of education and region of birth (see, for example, Olli Segendorf and Teljosuo 2011). One explanation for why it takes time for foreign-born persons to find work in Sweden is that many of those immigrating to Sweden lack the human capital needed to find work. The concept of human capital includes all factors affecting a person's capabilities, such as education, language skills and working experience, but also an understanding of how society functions in various respects. In some cases, human capital can be weakened when a person migrates. For example, education or training from another country may be less useful in Sweden. Insufficient skills in the Swedish language are another factor that may delay entry into the labour market as it takes time to learn a new language, while knowledge of Swedish is highly valued by Swedish employers. There is also research showing that foreign-born persons face discrimination in recruitment (see Rooth and Ekberg 2003). However, it is possible that employment and recruitment patterns improve for foreign-born persons if a larger part of the immigrating population comes from the same area, as social contacts and networks are important in recruitment.[7]

5.2 Macroeconomic effects on wages

An increased supply of labour primarily affects relative wages for groups on the labour market who resemble the immigrating group, due to their more direct competition with each other. The lower average levels of education among foreign-born people thereby primarily mean that wages for low-qualified labour come under pressure. At the same time, positive wage and employment effects can arise for more qualified workers as their relatively higher levels of qualification now allow them to take on more complex working tasks. See, among others, Engdahl (2016) and Jaumotte et al. (2016).

This result is confirmed theoretically by Dustmann, Frattini and Preston (2013), who find positive wage effects in a general equilibrium model with different types of labour. They are able to show that more immigrants from the same group leads to wages falling in this group, but rising for others. If, on the other hand, the composition of immigrants is the same as in the domestic population, average wages are not affected at all.[8] In their empirical investigation of how immigration has affected wages in the United Kingdom over the period

7 The housing market is heavily segregated in Sweden and there exist so-called ethnic enclaves, areas in which many people have the same ethnicity. Enclaves can help individuals to build a network and find work, but they may also limit the network and the size of the labour market. The likelihood of finding work increases in proportion to the size of the enclave, which also has a positive effect on incomes. An investigation by Edin et al. (2003) shows that, above all, it is those with a low level of education that move to and settle in ethnic enclaves. It is also those with a low level of education that obtain the greatest benefit from living in an enclave. The quality of the network is important. The value of living near compatriots depends on their characteristics. If many are working, this may spread, but if many are claiming social allowances, this may also spread, as Fredriksson and Åslund (2005) show. Edin et al. (2009) demonstrate the importance of good role models in a network: the presence of highly educated compatriots in the neighbourhood is good for foreign-born children's grades at compulsory school.

8 At least not in the longer term, as capital increases to a proportion corresponding to the increase in the labour supply.

1997–2005, this result was confirmed by the observation that wage effects differ among income groups. Immigration leads to higher wages for workers with incomes above the 40th percentile, while wages fall for workers below the 20th percentile. The effects on average wages are faintly positive.[9]

Ottaviano and Peri (2012) also report a similar pattern. They investigate the effects of migration on wages in the United States over the period 1990–2006 and find that the effects of increased immigration are weakly positive for workers born in the United States, regardless of level of education, where wages increased by a total of about 1 per cent over the entire period. However, for foreign-born workers who immigrated before 1990, wages fell by just over 6 per cent. This means that the increased supply of labour primarily affects relative wages for workers with similar characteristics to those who have immigrated.

In Sweden, there are similar patterns according to Engdahl (2016) and Forslund et al. (2017). Engdahl (2016) finds that immigration has contributed to short-term wage development becoming slightly weaker for Swedish-born workers with characteristics resembling those of foreign-born workers, in which the inflow of immigrants has been relatively comprehensive.[10] Engdahl also compares his results with results for other countries and shows that the effects in Sweden are lower than in the United States and Canada, for example, but on the same level as those in Norway. Forslund et al. (2017) shows that immigrants more frequently have low-paid jobs compared to Swedish-born workers. As those immigrating also have a lower employment rate compare to Swedish-born workers, the income gaps become even wider if those outside the labour market are included.

5.3 Macroeconomic effects on productivity

The fact that human capital differs between those immigrating and the domestic population implies that immigration, over the short term, lowers the average productivity of the economy. In the longer term, however, immigration may have a positive effect on productivity, among other things, due to the exposure of the existing population to new concepts and ideas (see Borjas 2014). Immigration can, for example, affect companies' production technology to better utilise a changed labour supply. There is a link between immigration and the number of patent applications, which, in turn, could have a positive effect on productivity in the economy. Hunt and Gauthier-Loiselle (2010), Kerr and Lincoln (2010) and Parotta et al. (2014) show, among other things, that highly-educated immigrants lead to more patents.

Immigration also has a positive effect on productivity if the immigrating labour acts as a complement in the production of goods and services (see Jaumotte et al. 2016). It is also possible that parts of the existing population will undergo further training or become specialists in their profession to avoid the increased competition on the labour market that immigration can entail.

Education may be the most important factor for raising productivity in the labour force. Engdahl (2016) demonstrates that there has been a great increase in the proportion of foreign-born in the population that only have compulsory school educations. Of those in the labour force with around 20 years working experience, the increase over the period 1985–2010 amounts to over 20 percentage points. The proportion of foreign-born with long post-secondary educations also increased over the period. The foreign-born population have, nonetheless, on average, a lower level of education than the Swedish-born population and the average effect of immigration on Swedish productivity is therefore likely to be negative.

Eriksson (2010) demonstrates that, in many countries, the length of a compulsory school education is significantly shorter than Swedish compulsory school and the quality of

9 Percentiles split a group of observations into 100 equal parts and rank these. The 10th percentile means the value below (above) which 10 (90) per cent of the observations may be found.

10 An increase of 10 per cent in the proportion of immigrants within a group with similar education and experience entails a fall in monthly wages of about 0.3 per cent. It is worth noting that the effects on wages are primarily driven by migrants with Nordic backgrounds. Migration from other countries has no statistically significant effect on wages.

the education may also vary greatly, which means that the actual differences in education may be greater than the statistics show. Flood and Ruist (2015) demonstrated that just over 35 per cent of the foreign-born population displayed insufficient skills in both reading comprehension and mathematics, while the corresponding figure for the Swedish-born population was about 5 per cent. According to the analysis of PIAAC data for mathematics, this seemed, on average, also to apply to highly-educated persons from common immigration regions in the Middle East and Africa, whose results, on average, were lower than the average result for Swedish-born with a low level of education and on the same level as those with a low level of education from North America and western Europe (see OECD 2016).

5.4 Macroeconomic effects on GDP

Immigration raises the economy's total production potential as the number of persons in the labour force increases. However, this does not necessarily mean an increase of GDP *per capita*. Depending on the composition of immigrants, immigration can lead to both an increase and a decrease of GDP per capita. An increasing population means increasing investment requirements in schools, housing and the business sector's capital stock. A more heterogeneous population creates possibilities for innovation and trade via new networks. However, refugee immigrants' contribution to production are initially limited, at the same time as immigration implies that total production is spread across more people, as the population is increasing. Consequently, refugee immigration, at least initially, leads to a fall in GDP per capita.

How immigration affects GDP per capita in the longer term is more uncertain. In a study from the IMF, Jaumotte et al. (2016) find that immigration, in the long term, increases GDP per capita in the group of high-income economies they studied, and that both high- and low-productivity immigrants can increase labour productivity in the recipient country. According to their study, the effect arises both via an increase of potential labour and via increased productivity. Productivity is primarily affected by immigrants acting as a complement to the existing labour force. The study indicates that the gains from immigration are broadly distributed in the economy in such a way that an increase in the proportion of immigrants benefits average per capita incomes among both the 10 per cent who earn the least and the 10 per cent who earn the most. However, the IMF points out that the results are sensitive to country-specific factors such as type of immigration (labour versus refugee and family member immigration), how the labour market functions, how much flexibility there is and, also, the degree to which immigrants can easily accept the work offered by the domestic labour market. The Swedish situation is worrying as Swedish immigration mainly consists of refugee and family member immigration and the Swedish labour market benefits those with permanent positions, which means that the interchangeability of jobs is low. Calmfors et al. (2017) demonstrated that most employees have permanent positions. But more uncertain fixed-term contracts are very common among marginalised groups such as young people, foreign-born people and those with low levels of education. All in all, immigration that largely consists of persons who are already facing difficulty in finding work, combined with high thresholds for the labour market, will probably contribute towards lower GDP per capita in the longer term too. However, this could be changed if integration on the labour market is improved.

Lewis and Swanell (2018) demonstrate that migration flows are higher to countries with higher expected GDP growth and that those who immigrate come from countries with lower expected GDP growth. If expected GDP growth plays a large part for migration, this could, to an extent, explain the relationship between increased immigration and positive GDP per capita in the IMF's study above. Those migrating may quite simply decide to move to countries with high growth in the hope that they can benefit from and make a positive contribution to that growth. We cannot answer the question of causality on the basis of these studies.

Smith and Thoenissens (2018) also find that the relationship between immigrants' human capital and the human capital of the existing population is significant for migration's effects on the variation of GDP per capita. Theoretically, they show that when the average immigrant has a higher level of skills than the recipient country's inhabitants, a migration shock has a positive effect on GDP per capita, but that these effects are marginal if those migrating have similar human capital to the recipient country's inhabitants.

There are also studies showing that immigration has positive effects on exports and internationalisation. Hatzigeorgiou and Lodenfalk (2016) study this and find support for the thesis that Swedish companies may increase trade by employing foreign-born people with higher educations. Several other studies have also found a positive and statistically significant relationship between migration and foreign trade in goods. See, for example, Gould (1994), Head and Ries (1998), White (2007), and Partridge and Furtan (2008).

5.5 Macroeconomic effects on inflation

Increased refugee immigration affects the Swedish economy in several different ways. Greater public investment is required in the short term, for example in housing and education for the newly arrived refugees, which increases the aggregated demand in the economy. In a few years' time, a larger population also potentially implies a larger labour force and increased employment and production. But how inflation, and thereby monetary policy, is affected depends greatly on the development of the labour market in the longer term (see Sveriges Riksbank 2015).

Cortes (2008) and Frattini (2008) study the effects of migration on prices in the United States, Israel and United Kingdom. Increased migration seems to lead to a fall in prices in services sectors with a high proportion of employees in low-wage jobs. In the United States, an increase by 10 per cent of the proportion of immigrants with low levels of education entails a fall in prices of 2 per cent in sectors with a high proportion of immigrants. Frattini (2008) found similar effects in the United Kingdom.

The effect on inflation in both the short and long terms depends on the extent to which those immigrating find work, which can be seen in Table 2.

Table 2. Probable empirical macroeconomic effects for different reasons of immigration

	Effect	
	Refugee immigration	**Labour immigration**
Employment rate	Decreasing as more people without jobs enter the population.	Increasing as labour immigrants work to a greater extent than native-borns.
Unemployment	Increasing as there are badly matched skills on the labour market.	Decreasing as the labour force is increasing with people who are in work.
GDP	Increasing due to both private and public consumption. In the long run, the potential in the economy increases.	Increasing. The economy's production capacity rises in both the short and longer run.
GDP per capita	Decreasing as employment is increasing less than the population.	Increasing (probably) as there is a greater proportion of the population in work.
GDP per working age person	Decreasing (more than GDP per capita) as many are reaching working age but not working.	Increasing (more than GDP per capita) as many are reaching working age and have jobs.
Productivity	Depends on how high productivity is for foreign-born workers in relation to Swedish-born workers. But is probably decreasing due to immigrants' relatively lower levels of education.	Depends on how high productivity is for foreign-born workers in relation to Swedish-born workers.
Public finances	Negative effects due to low employment.	Positive effects due to high employment.
Wages	Empirical evidence shows that the effect on wages of the native population are small. There are studies that show both positive and (small) negative effects.	The direct effect on wages could be negative when more are competing for jobs. But labour immigrants may have higher productivity than Swedish-born workers and push up average wages in the long run.
Inflationary pressures	Increasing in the short term as immigration is pushing up demand without affecting supply as much. In the longer run, it depends on integration in the labour market.	The labour supply increases, wage pressures become lower, which reduces inflationary pressures. However, in the short run, capacity limitations due to the capital stock being fixed could counteract this.
GDP gap (short term)	Increasing as the increase in GDP is largely demand-driven.	Decreasing as potential GDP is increasing faster than actual GDP.

Note. Until 1980, Sweden had a large proportion of labour immigration. From 1980 to today, immigration has mainly consisted of refugees and their family members.

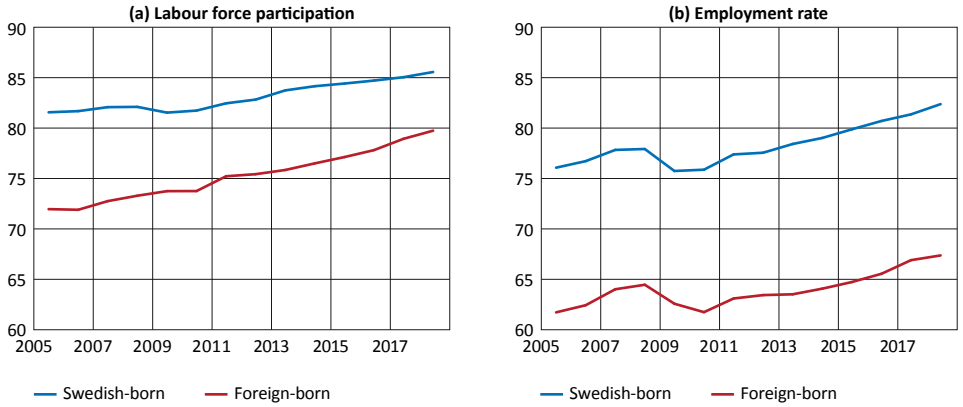
6 Effects of migration on the Swedish labour market

As we pointed out above, integration into the labour market is the key to understanding the macroeconomic effects of immigration. High employment is fundamental if Sweden is to be able to cope with the large public undertakings entailed by a developed welfare state. This is becoming even more important as the population ages and there are more elderly people in relation to the working-age population. Without foreign-born workers, the Swedish labour market would fail in many ways because a large part of those employed are people who have immigrated to Sweden. It is important to bear this in mind when shortcomings in integration are discussed.

Much on the Swedish labour market is functioning well, and has done so for a long period of time. Employment is high due to the high labour supply and Sweden has a remarkably high labour force participation rate among women and elderly people from an international

perspective.[11] At the same time, there are wide differences between different groups on the labour market, not least between those born in Sweden and those born abroad. Figure 8 shows that the labour force participation rate and the employment rate are generally lower for foreign-born people compared to Swedish-born people, but there has been a rising trend for both Swedish and foreign-born people since 2005 and the increase has been greater for foreign-born. The lower labour force participation rate among foreign-born people is primarily due to the lower participation by foreign-born women. This is also largely connected to education as it is primarily people with low levels of education who fail to find employment.

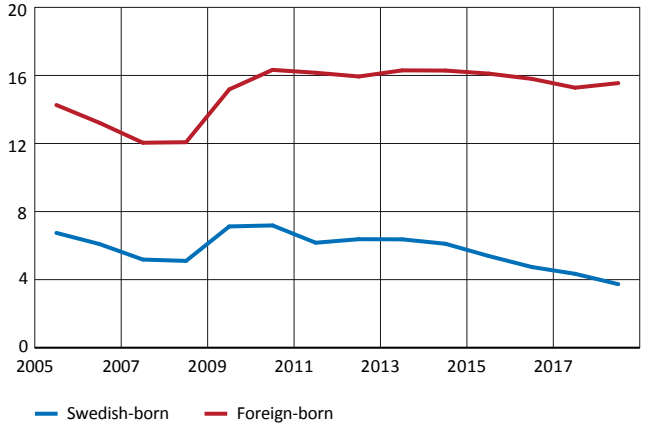
Figure 8. Labour force participation rate and employment rate for Swedish-born and foreign-born persons, 2005–2017
Percentage of population in each group, 16–64 years



Source: Statistics Sweden (Labour Force Surveys)

Unemployment among those born abroad is strikingly higher than it is among those born in Sweden. Figure 9 shows that unemployment has not fallen for foreign-born people, as it has for Swedish-born people, which means that the gap between foreign-born and Swedish-born has increased. One important explanation for unemployment not having fallen among foreign-born people is that the labour force has steadily increased. Unemployment measures the gap between the labour force participation rate and the employment rate. High unemployment therefore indicate either a low employment rate or a high labour force participation rate.

Figure 9. Unemployment among Swedish-born and foreign-born persons, 2005–2018
Percentage of labour force in each group, 16–64 years



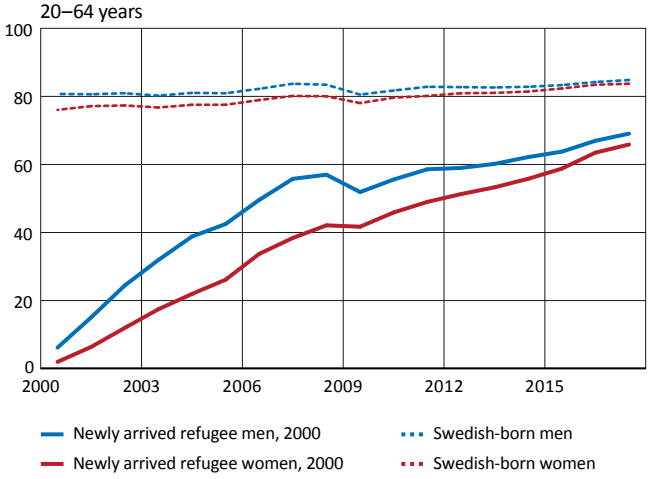
Source: Statistics Sweden (Labour Force Surveys)

11 These positive factors apply regardless of whether studies have taken place in the last year or the last decade. The high labour force participation rate among elderly people and women is largely a consequence of the institutional choices made in Sweden, including easily accessible and economically moderate childcare and a tax and pension system that gives an incentive to work longer.

One explanation for the high unemployment among foreign-born people is that it takes time for new arrived immigrants to find work, as we discussed in more depth in section 5.1. Register-based statistics show that, among people received by a municipality in the year 2000, just over one in ten was in employment by the end of 2001 (see Figure 10).[12] The proportion in employment then increases over time. Men are employed to a greater extent than women, and, after six years, just under half of the men were employed. For women immigrating in 2000, it took over ten years for half to be in employment. Even though a higher proportion of men are employed, the gender gap tends to narrow over time. By the end of 2017, which is to say 17 years after they moved to a municipality, the proportion of men and women in employment was 69 and 66 per cent respectively. The same year, the employment rate for Swedish-born was 85 per cent for men and 84 per cent for women.

Figure 10. Employment for refugees received by municipalities arriving in 2000, and the employment rate among Swedish-born persons, 2000–2017

Percentage of Swedish-born and refugees received by municipalities, 20–64 years



Source: Statistics Sweden (Register-based labour market statistics)

One explanation proposed for the large differences in employment between Swedish-born and foreign-born persons concerns the low differentiation of wages in Sweden compared with most other countries.[13] In Sweden, the lowest wages are relatively high, compared with other countries, which tends to make it more difficult for groups with weak ties to the labour market to enter.

Although differentiation of wages has been largely unchanged over the last fifteen years, income inequality has become significantly greater over the last 20 years. One important reason for this is that incomes for those without work have not developed at the same rate as wages for those in work and today the lowest wages are significantly higher than the incomes provided by the unemployment insurance fund, income support and the student

12 Register data has a time lag of a couple of years, so this information only runs up to 2017. The advantage of register data is that it exists for the entire population and can therefore be divided up into sub-groups. Those in employment are here measured using registerbased labour market statistics (RAMS), which are used to describe employment in Sweden. In RAMS, all persons registered as resident in Sweden on 31 December are given an employment status as either in employment or not in employment. To be classified as in employment, the person must have a wage income above an estimated limit value, or must have declared active business activities in the current year. Information on wage incomes and the period to which this income refers is collected from statements of earnings held by Skatteverket (the Swedish tax agency).

13 The relationship between the 10th and 90th percentiles are a measure of how large the differentiation of wages is in a country, which is to say how many low wages make up a high wage. In countries with a high ratio, the difference between high and low wages is large. In countries with a low ratio, the differentiation of wages is small. According to this measure, Sweden is among the countries with the lowest differentiation of wages. A high ratio needs not mean that those with low wages earn little, but may also be due to those with high wages earning a lot. As an alternative to how large the differentiation of wages is in a country, low wages can be compared with average wages. Measured in this way too, Sweden is among the countries with the lowest differentiation of wages.

finance system (see Eriksson et al. 2017). The increased income disparities between those working and those not working mean that the incentive to work is today relatively strong. At the same time, the lack of unskilled jobs is obvious and Sweden is the EU country with the lowest share of jobs that require no education or only a basic one.[14] Knowledge and qualifications therefore have greater importance for the possibility of finding work in Sweden than in most other countries, and the significance of these factors has increased over time.

The ease with which foreign-born people are able to become integrated on the labour market varies in tandem with economic activity. The integration on the labour market have gone easier for immigrants arriving in an economic upswing than it has for those arriving in a recession (see, for instance, Åslund and Rooth 2007). Those arriving in a recession also have lower incomes for up to ten years after arrival. In contrast, those arriving in recent years, during the economic upswing, have become integrated on the labour market faster than before.

Ruist (2018) shows that the rate of integration over the last twenty-year period, measured as the proportion employed after a certain time, has been stable if country of birth is taken into account. This despite potentially aggravating factors such as large parts of employment in the manufacturing industry having left Sweden and the portion of the total foreign-born working age population having more than tripled. Hence, the increasing proportion of the foreign-born population and the growing labour force have not made integration into the labour market significantly more difficult.

Hammarstedt and Palme (2012) show that there is an increased spread in average income between groups, depending on where they were born. The groups who managed well in the first generation managed even better in the second generation. The opposite pattern existed for groups who managed less well, who had even worse incomes in the second generation. Hammarstedt and Palme (2012) and Rooth and Ekberg (2003) show that this is due to a high intergenerational transfer of human capital, which is to say that children to well-educated immigrants succeeded even better than their parents.

It should be noted, however, that *foreign-born* is a very high level of aggregation, particularly considering that the labour market outcome differs greatly between sub-groups. For example, Ruist (2018) shows that employment in successful immigrant groups at single points in time is 40 percentage points higher than in the least successful, and that the difference is often as great as 20 percentage points, even after more than 15 years in the country. Forslund et al. (2017) show that newly arrived immigrants have significantly lower employment rates than comparable Swedish-born people, but that there are also significant differences within the various groups. People from Bosnia and Herzegovina climb particularly quickly and reach their long-term employment level in relation to Swedish-born groups, after only five years in Sweden. For groups from Iran and the Horn of Africa, a gradual improvement in employment takes place over a long period. There are also great differences in unemployment depending on from where people have immigrated, as can be seen in Figure 11. Those coming from countries outside the EU or EFTA have much higher unemployment than other groups.[15] The higher unemployment rate is largely due to the fact that the majority of those coming from these countries are refugees or family members of refugees.

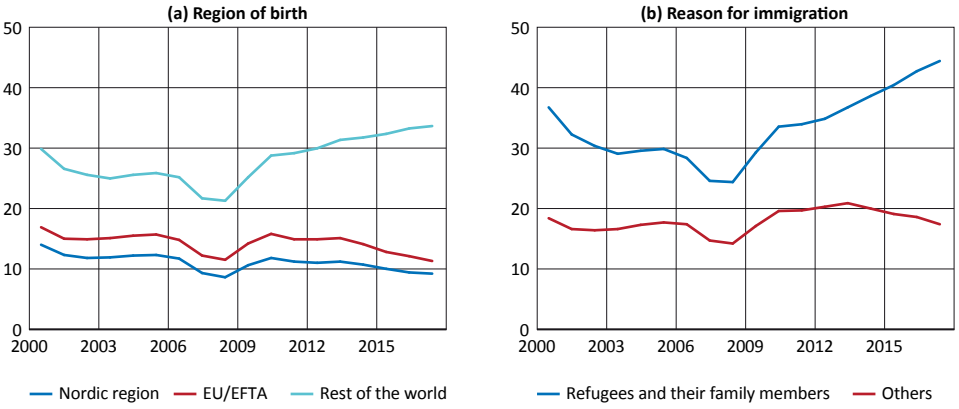
Reasons for immigration play a major role for integration into the labour market. In periods of high labour immigration, such as the 1950s, the 1960s and the first half of the 1970s, the employment situation was very good for foreign-born people. For long periods, the employment rate of foreign-born exceeded that for Swedish-born, which can primarily be explained by foreign-born women having a much higher employment rate than Swedish-

14 The international system ISCO-08 is used to classify the qualifications needed for various jobs. In total, there are 436 different groupings divided among ten main groups. The main groups are primarily separated by requirements for education and specialisation. The groups with the lowest qualifications include professions usually described as unskilled jobs. Examples of jobs classified as unskilled include advertising distributors, hand packers and kitchen assistants. This does not necessarily mean that the jobs themselves are easy to perform, but that entry requirements are relatively low.

15 In the labour force surveys, it is not possible to divide up groups by birth region, so register data is used here.

born women. As immigration has shifted to primarily consist of refugees and their family members, the employment rate has fallen and is now below that for Swedish-born, see Figure 8.

Figure 11. Registered unemployed by birth region and reason for immigration, 2000–2017
Per cent of the population in each group, 20–64 years



Note. The Nordic region refers to the Nordic region excluding Sweden and the EU/EFTA refers to the EU/EFTA excluding the Nordic region.
Source: Statistics Sweden (Register-based labour market statistics)

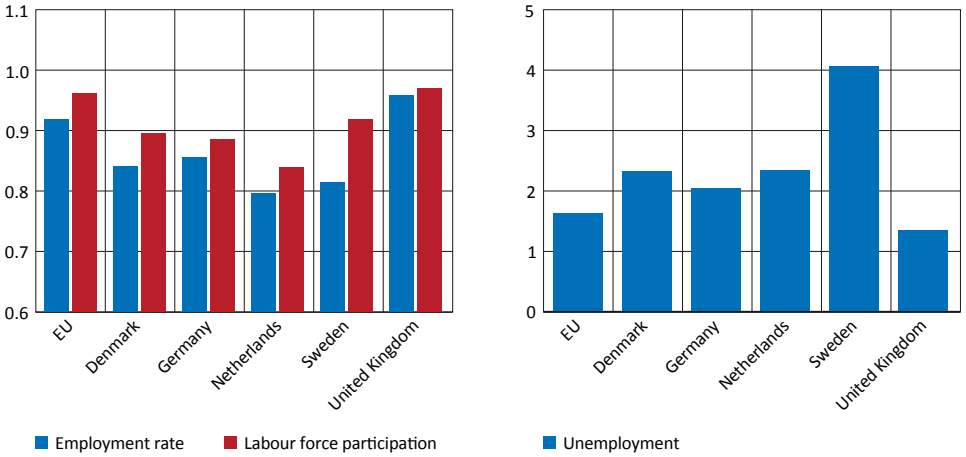
7 Integration from an international perspective

The labour market situations of natives and foreign-born people also differ in other countries. The international comparisons in this article are only aimed at providing an overview of similarities and differences. Those interested can read more in Joyce (2017) and the article 'Foreign born people and integration in the Swedish labour market' in National Institute of Economic Research (2018), for example.

The most relevant measures to look at in an international comparison of labour force participation, employment and unemployment are the ratios between the outcomes of foreign-born and natives in the country. These ratios take account of differences in regulations from country to country and therefore only capture the differences among groups *within* each country. Figure 12a shows that the ratios for labour force participation and employment rate between natives and foreign-born are below one – which is to say the level indicating equal levels – in all countries. Together with the Netherlands, Sweden lies in the lower part of the scale, with a lower employment rate for natives. There are many differences between the various countries in the comparison, including how many immigrate, whether they immigrate to work or as refugees, and how integration policy has been designed in the different countries. But, considering how the immigration varies between various countries, the differences in labour force participation and employment may seem surprisingly small. There are also similarities. For example, Sweden, Denmark, the Netherlands and Germany have received many refugees recently and are examples of welfare states with relatively heavily regulated labour markets.

The unemployment ratio varies considerably between different countries, as shown in Figure 12b. In the UK, unemployment among foreign-born people is 1.3 times higher than among native-born people, while the corresponding figure in Sweden is 4.1. Higher unemployment is not always entirely negative, but is also a sign that people out of work are at the disposal of the labour market and are actively looking for work. An alternative to unemployment can be to remain permanently outside the labour market.

Figure 12. Difference between foreign- and native-born people in labour force participation, employment and unemployment, in Sweden and abroad, 2017
Ratio between foreign- and native-born people, 20–64 years



Note. A value of over 1 implies a higher value for foreign-born in comparison with native-born persons. Employment rate and labour force participation refer to percentage of population, 20–64 years. Unemployment refers to a percentage of the labour force, 20-64 years.
Source: Eurostat

As we discussed earlier, integration into the labour market plays a major role in the way immigration affects economic growth. However, the development of GDP per capita may depend on many factors. In a discussion, Hassler (2018) and Walentin (2018) point out that insufficient integration has held growth back, but also that the low growth in Sweden over the last decade is primarily due to global factors, as growth in larger parts of the western world has been low. Walentin's point is illustrated by Table 3, which compares GDP per capita in different countries and shows that Sweden's growth has been good in comparison with other comparable countries, despite comprehensive immigration.

Table 3. Average change in percentage of foreign-born in the population and real GDP growth per capita, 2007–2017
Average annual percentage change

	People born abroad as percentage of population	Real GDP growth per capita	Real GDP growth per capita, 15–64 years
Finland	4.96	0.07	0.67
Denmark	8.16	0.12	0.42
France	11.77	0.37	0.79
United Kingdom	11.97	0.48	0.80
United States	12.88	0.64	0.80
Sweden	15.12	0.86	1.26
Germany	13.19	1.36	1.50

Sources: OECD, World Bank and the Riksbank

8 Can immigration facilitate the support of an ageing population?

Could immigration provide a means to facilitate the future support of an ageing population? According to most of the studies made of the effects of recent decades' immigration, refugee immigration is not the solution. The critical factor behind these results is foreign-born workers' lack of ties to the labour market.[16]

At the start of the 1970s, when labour immigration was high, public finances, on an aggregated level, were redistributed from foreign-born people to Swedish-born people. Later, when the percentage of labour immigrants was lower, the redistribution moved in the other direction, as demonstrated by Ekberg (2009). Since then, migration has made up a net cost for public finances and can be expected to be a cost for a long time to come, as the immigrants we have in the country today and those we are expected to receive in the period ahead belong to groups with a weak connection to the labour market. However, immigration to Sweden today is more often justified on humanitarian rather than labour-market related grounds, which, in itself, needs not be an obstacle to improved integration, but which does make demands of integration policy. This means that the regulatory frameworks and their application that affects the integration process will play a large role going forward.

Storesletten (2000) investigates how public finances in the United States are affected by immigration. By using a calibrated OLG model that explicitly takes consideration of the differences between the productivity and demographics of natives and foreign-born people, he investigates whether increased immigration could solve the challenges of an ageing population. Storesletten finds that this is possible with an increased inflow of immigrants with medium or high knowledge levels and a favourable age composition. Such an inflow would entail a public finance revenue.

In a later study, Ekberg (2009) asks the same question of Sweden, which is to say whether immigration is a means to facilitate the future support of an ageing population. Ekberg, however, concludes that the answer is no, unless the employment rate of foreign-born people is improved.[17] The study shows that immigration means that the public sector, until about 1980, annually redistributed incomes on the aggregated level from foreign-born to Swedish-born. As immigrants' employment situation worsened in the 1990s, immigration shifted to become a net cost, which is to say an income redistribution from Swedish-born to foreign-born, which amounted to an annual cost of 1.5–2 per cent of GDP in the second half of the 1990s.

The most recent calculation of the effect of immigration on the public finances can be found in a report by Ruist (2018). Ruist uses data from up until 2015 to calculate refugees' net contribution to public sector finances as a function of age and number of years since immigration. The results show that refugee immigration is a public finance cost for Sweden, both in the short and long terms. The cost is greatest in the first years after immigration. The overwhelming portion of the deficit arises on the revenue side, and is a direct effect of the low employment rate of refugees and their close relatives.[18] The average refugee immigrant subsequently, for a limited period, makes a positive net contribution to public finances, but this contribution is not big enough to cover the initial deficit plus the deficit that arises from retirement age onwards. Ruist also forecasts future incomes from and costs for the refugees arriving in Sweden today. The level of uncertainty in the calculations is high, but the results indicate that the net redistribution via public finances to an average refugee over their entire lifetime in Sweden averages SEK 74,000 per year. As a comparison, the redistribution to an average refugee in 2015 was about SEK 60,000.

16 For a more in-depth analysis and more comprehensive review of the literature, see Flood and Ruist 2015, Ruist 2018 and Ekberg 2009, among others.

17 Aldén and Hammarstedt (2016) also arrive at the same conclusion.

18 There are also increased costs for, among other things, social allowance, housing allowance and the judicial system, but, in kronor terms, these are lower amounts than the lost revenues from employment.

It is important to note that the estimates reported in this section do not reflect any comprehensive measure of the effects of immigration on public finances. This is because the results described below do not take consideration of possible dynamic effects, for example that immigration is necessary to maintain the workforce we have to day. Furthermore, it is self-evident that there are other important reasons for immigration than economic ones.

9 Conclusions

The question asked by this article is whether immigration can facilitate the support of an ageing population. The article sheds light on a number of areas in order to answer this fundamental question. We show that the population of Sweden is ageing, on average, and that immigration has contributed towards regenerating the population. The increase in employment in recent years has largely been driven by foreign-born persons finding work, and foreign-born workers are a very important and integrated part of the Swedish labour market. However, at the same time, our review of studies of the economic effects of refugee immigration on Sweden shows that GDP per capita and public finances will not be improved sufficiently to compensate for an ageing population.

But this is no law of nature. The review of literature on the macroeconomic effects shows that immigration can potentially give large growth gains, among other things, since immigration means there are more people who can contribute to production. The main reason that immigration does not improve GDP per capita and the public finances today is that those arriving in Sweden cannot start working to the extent that would be needed. A positive contribution to the public finances therefore presupposes that integration into the labour market is improved markedly.

The problems of labour market integration are largely limited to persons with low qualifications. Studies also show that qualifications and abilities have a greater significance for the possibility of finding work in Sweden than in most other countries, as Sweden has few unskilled jobs and high minimum wages. Labour market problems are also passed down to later generations, meaning that integration issues do not solve themselves.

So what do an ageing population and immigration mean for monetary policy? The ageing population means that public expenditure rises as the need for care of the elderly and healthcare increases.[19] Immigration also affects public finances, how much mainly depends on how well integration works. If integration functions less well, immigration increases public consumption more in the short term, as it takes longer for newly arrived immigrants to find work and they need economic support and training during this time. Increased public spending increase the demand in the economy. If the integration works poorly, the potential labour force, that immigrants represent will not be sufficient to cover the higher demand. The result could therefore be increased resource utilisation and increased inflationary pressures, and the central bank may need to raise the interest rate to cool the economy down. On the other hand, if the integration functions well, immigration might increase the economy's potential over the short term. The wheels of the economy can then spin faster without inflationary pressures increasing altogether too rapidly.

The longer term effects on monetary policy also depend on how well integration into the labour market works. With poorer integration, growth does not increase as it should and long-term unemployment becomes higher than necessary. To fund this, public expenditure needs to be higher. Such a development thus has a double impact on the public finances, with both an ageing population and insufficient integration. If the integration works well, however, immigration has positive effects on the country's economy and might help reduce

19 In addition to the effect on public finances, an aging population also has effects on other relationships in the economy that are linked to saving and the labour supply, which can have consequences for monetary policy itself. These relationships are, however, beyond the scope of this article.

the pressure on public finances. It is important that all decision-makers and institutions take a stance on this and strive to ensure that Sweden is able to make use of the benefits of well-functioning immigration, in addition to the purely humanitarian grounds for this.

References

Aldén, Lina and Mats Hammarstedt (2016), 'Flyktinginvandring – Sysselsättning, förvärvsinkomster och offentliga finanser' [Refugee immigration – Employment, earned income and public finances], Report 2016:1 *Studier i finanspolitik*, Finanspolitiska rådet (Swedish fiscal policy council).

Åslund, Olof and Dan-Olof Rooth (2007), 'Do When and Where Matter?: Initial Labor Market Conditions and Immigrant Earnings', *Economic Journal*, vol. 117, no. 518, pp. 422–448.

Borjas, George (2014), '*Immigration Economics',* 1st edition Harvard: Harvard University Press.

Calmfors, Lars, Petter Danielsson, Ann-Sofie Kolm, Tuomas Pekkarinen och Per Skedinger (2017), 'Arbetsmarknadsekonomisk rapport – Tudelningarna på arbetsmarknaden' [Labour market report – Divisions on the labour market], Swedish Labour Policy Council (AER).

Cortes, Patricia (2008), 'The Effect of Low-skilled Immigration on US Prices: Evidence from CPI Data', *Journal of Political Economy,* vol. 116, no. 3, pp. 381–422.

Dustmann, Christian, Tommaso Frattini and P. Preston (2013), 'The Effect of Immigration along the Distribution of Wages', *Review of Economic Studies,* vol. 80, no. 1, pp. 145–173.

Edin, Per-Anders, Peter Fredriksson and Olof Åslund (2003), 'Ethnic Enclaves and the Economic Success of Immigrants – Evidence from a Natural Experiment', *The Quarterly Journal of Economics,* vol. 118, no.1, pp. 329–357.

Edin, Per-Anders, Peter Fredriksson, Hans Grönqvist och Olof Åslund (2009), 'Peers, neighborhoods and immigrant student achievement – evidence from a placement policy', Rapport 2009:20, IFAU.

Ekberg, Jan (2009), 'Invandringen och de offentliga finanserna' [Immigration and public finances], Report to Expert Group on Public Economics (ESO) 2006:3, Swedish Ministry of Finance.

Engdahl, Mattias (2016), 'Invandringens arbetsmarknadseffekter' [The labour market effects of immigration], Report 2016:11, IFAU – The Institute for Evaluation of Labour Market and Education Policy.

Eriksson, Stefan (2010), 'Utrikes födda på den svenska arbetsmarknaden' [Foreign-born people in the Swedish labour market], Appendix 4 to Långtidsutredningen 2011, SOU 2010:88.

Eriksson, Stefan, Lena Hensvik och Oskar Nordström Skans (2017), 'Den svenska arbetsmarknaden och dess utmaningar' [The Swedish labour market and its challenges], Rapport 2017:5, IFAU.

Flood, Lennart and Joakim Ruist (2015), 'Migration, en åldrande befolkning och offentliga finanser' [Migration, an ageing population and public finances], Appendix 6 of Långtidsutredningen [Long-Term Survey of the Swedish Economy] 2015, SOU 2015:95, Swedish Ministry of Finance.

Forslund, Anders, Linus Liljeberg and Olof Åslund (2017), 'Labour market entry of non-labour migrants – Swedish evidence', Report 2017:15, IFAU – The Institute for Evaluation of Labour Market and Education Policy.

Frattini, Tommaso (2008), 'Immigration and Prices in the UK', mimeo, Centre for Research and Analysis of Migration (CreAM), University College London.

Fredriksson, Peter och Olof Åslund (2005), 'Ethnic enclaves and welfare cultures – quasi-experimental evidence?', Working paper 2005:8, IFAU.

Gottfries, Nils (2010), 'Fungerar den svenska lönebildningen?' [Does Swedish wage formation work?], appendix 5 of Långtidsutredningen [Long-Term Survey of the Swedish Economy] 2011, SOU 2011:11, *Att skapa arbeten – löner, anställningsskydd och konkurrens* [Creating jobs – wages, employment protection and competition], SOU 2010:93.

Gould, David M. (1994), 'Immigrant Links to the Home Country: Empirical Implications for U.S. bilateral trade flows'*, The Review of Economics and Statistics,* vol. 76, no. 2, pp. 302–316.

Hammarstedt, Mats and Mårten Palme (2012), 'Human capital transmission and the earning of second-generation immigrants in Sweden', *IZA Journal of Migration,* vol. 1, no. 4.

Hassler, John (2018), 'John Hassler: Tillväxten per capita är och blir historiskt låg' [John Hassler: Growth per capita is and will remain historically low], *DI Debatt*, 21 January 2018.

Hatzigeorgiou, Andreas and Magnus Lodenfalk (2016), 'Migrants' Influence on Firm-level Exports', *Journal of Industry, Competition and Trade*, vol. 16, no. 4, pp. 477–497.

Head, Keith and John Reis (1998), 'Immigration and trade creation: Econometric Evidence from Canada', *Canadian Journal of Economics,* vol. 31, no. 1, pp. 47–62.

Heleniak, Timothy and Nora Sanchez Gassen (2016) 'Scenarios for 2015–2080: The impact of migration on population and ageing' Nordic Council of Ministers, p. 4, Nordregio.

Hunt, Jennifer and Marjolaine Gauthier-Loiselle (2010) 'How Much Does Immigration Boost Innovation?', *American Economic Journal: Macroecnomics,* vol. 2, no. 2, pp. 31–56.

Jaumotte, Florence, Ksenia Koloskova and Sweta C. Saxena (2016), 'Impact of migration on income levels in advanced economies', Spillover Notes 8, International Monetary Fund (IMF).

Joyce, Patric (2017) 'Inspiration for integration – an ESO report on labour market policy for new arrivals in five countries', Report to Expert Group on Public Economics (ESO) 2017:7, Swedish Ministry of Finance.

Kerr, William R. and William F. Lincoln (2010), 'The Supply Side of Innovation: H-1B Visa Reforms and U.S. Ethnic Innovation', *Journal of Labor Economics, 2010,* vol. 28, no.1, pp. 473–508.

Lewis, John and Matt Swannell (2018),'The Macroeconomic Determinants of Migration', Staff working paper no. 759, Bank of England.

National Institute of Economic Research (2017), 'Wage Formation Report 2017', National Institute of Economic Research.

National Institute of Economic Research (2018), 'Wage Formation Report 2018', National Institute of Economic Research.

OECD (2016), 'Skills Matter: Further Results from the Survey of Adult Skills', OECD Skills Studies, OECD.

Olli Segendorf, Åsa and Tommi Teljosuo (2011), 'Sysselsättning för invandrare – en ESO-rapport om arbetsmarknadsintegration' [Employment for immigrants – an ESO report on labour market integration], Report to Expert Group on Public Economics (ESO) 2011:5, Swedish Ministry of Finance.

Ottaviano, Gianmarco I. P. and Giovanni Peri (2012), 'Rethinking the Effect of Immigration on Wages', *Journal of the European Economic Association,* vol. 10, no. 1, pp. 152–197.

Parrotta, Pierpaolo, Dario Pozzoli, Mariola Pytlikova (2014), 'The Nexus between Labor Diversity and Firm Innovation' *Journal of Population Economics*, Springer; European Society for Population Economics, vol. 27, no. 2, pp. 303–364.

Partridge, Jamie and Harley Furtan (2008),'Immigration Wave Effects on Canada's Trade Flows', *Canadian Public Policy,* vol. 34, no. 2, pp. 193–214.

Rooth, Dan-Olof and Jan Ekberg (2003), 'Unemployment and earnings for second generation immigrants in Sweden. Ethnic background and parent composition', *Journal of Population Economics*, vol. 16, no. 4, pp. 787–814.

Ruist, Joakim (2018), 'Tid för integration – En ESO-rapport om flyktingars bakgrund och arbets-marknadsetablering' [Time for integration – An ESO report on refugees' background and labour market establishment], Report to Expert Group on Public Economics (ESO) 2018:3, Swedish Ministry of Finance.

Smith, Christie and Christoph Thoenissen (2018), 'Migration and Business Cycle Dynamics', Discussion paper 2018/07, Reserve Bank of New Zealand.

Storesletten, Kjetil (2000), 'Sustaining Fiscal Policy Through Immigration', *Journal of Political Economy*, vol. 108, no. 2, pp. 300–323.

Sveriges Riksbank (2015), 'Uncertain effects of increased immigration on the labour market', article in Monetary Policy Report, December.

United Nations Department of Economic and Social Affairs, Population Division (2017a), 'World Population Prospects: The 2017 Revision' (https://population.un.org/wpp/).

United Nations Department of Economic and Social Affairs, Population Division (2017b), 'International Migration Report', ST/ESA/SER.A/403.

Walentin, Karl (2018), 'Karl Walentin: Tillväxten är god jämfört med andra' [Karl Walentin: Growth is good compared with others], *DI Debatt*, 1 February 2018.

White, Roger (2007), 'Immigrant-trade Links, Transplanted Home Bias and Network Effects'.