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Correction 14 June 2019
Section 3.2 in the article by Paola Boel has been revised.

Correction 18 June 2019
Small changes on pages 74, 75 and 88 in the article by Kai Barvèll,
Marianne Nessén and Mikael Wendschlag.

Dear readers,

This year's first issue of Sveriges Riksbank Economic Review begins with three articles about important structural changes in the Swedish economy. The first two articles describe and study the significance of the labour market for the Swedish economy. Labour supply and the functioning of the labour market affect price and wage setting, and thus the appropriate stance of monetary policy. The third article discusses the major changes in the payment market from the perspective of history and academic research. Finally, this issue contains a fourth article that describes how the operations of the Riksbank have been organised and how they have changed over the past decades. The four articles are summarised below.

- **Can immigration solve the problem of an ageing population?**

  Åsa Olli Segendorf and Emelie Theobald take up the question of whether immigration can help solve the demographic challenge posed by an ageing population. The answer to this question is complex. Studies show that immigration can help to improve the situation, but this depends on how well their integration into the labour market functions. The authors also discuss the monetary policy consequences of a migration-driven population increase and say that these are largely determined by what extent those born abroad can get jobs.

- **A changed labour market – effects on prices and wages, the Phillips curve and the Beveridge curve**

  Magnus Jonsson and Emelie Theobald analyse why developments in inflation and wages in have been slow in Sweden since the global financial crisis 2008–2009. This article focuses on what role the Swedish labour market may have played in this development. First, the authors present empirical evidence indicating that the labour market has changed since the financial crisis and that this may have affected its functioning. Then they show that, in a macroeconomic model with search and matching frictions, several of these changes tend to lead to lower prices and wages and a lower trade-off between nominal wage increases and unemployment. The results show that the changes in the labour market can be a significant reason for the low rate of inflation since the crisis.

- **Payment systems – history and challenges**

  Paola Boel has written an overview of the payment systems and the important changes taking place in this field, mainly due to technological innovations. One such important change is that cash is playing a less important role and that different forms of real-time payments are taking on greater significance. In the article the author discusses this development and what challenges it entails for the central banks in the light of the historical evolution of payment systems and the insights derived from the literature on the economics of payments.

- **The Riksbank's organisation and operations – a look back through history**

  Kai Barvèll, Marianne Nessén and Mikael Wendschlag describe the work conducted at the Riksbank and how the internal organisation has changed in recent decades. The Riksbank's operations are often described in terms of the monetary policy objective and the task of promoting a safe and efficient payment system. But these are only part of the work done at the bank. This article is an attempt to provide a more comprehensive picture of all of the Riksbank's areas of responsibility.

Read and enjoy!

Jesper Lindé and Marianne Nessén

Contents

Can immigration solve the problem of an aging population?

Åsa Olli Segendorf and Emelie Theobald*

The authors work in the Monetary Policy Department of the Riksbank

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

* We would like to thank Björn Andersson, Jesper Hansson, Stefan Ingves, Jesper Lindé, Pernilla Meyersson and Andreas Westermark for their valuable comments and Calum MacDonald for helping to translate the article into English. The opinions expressed in this article represent are the authors' own and and cannot be regarded as an expression of the Riksbank's view.

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).

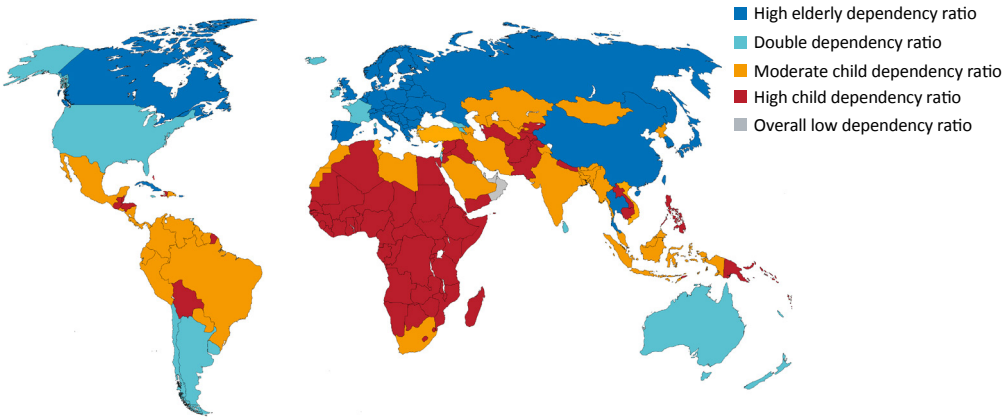
This article opens with a global description of migration and demographics in the world before moving on to examine the situation in Sweden. We review the demographic situation and how it would have appeared in a hypothetical situation with no immigration, the characteristics of immigration over time, 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.

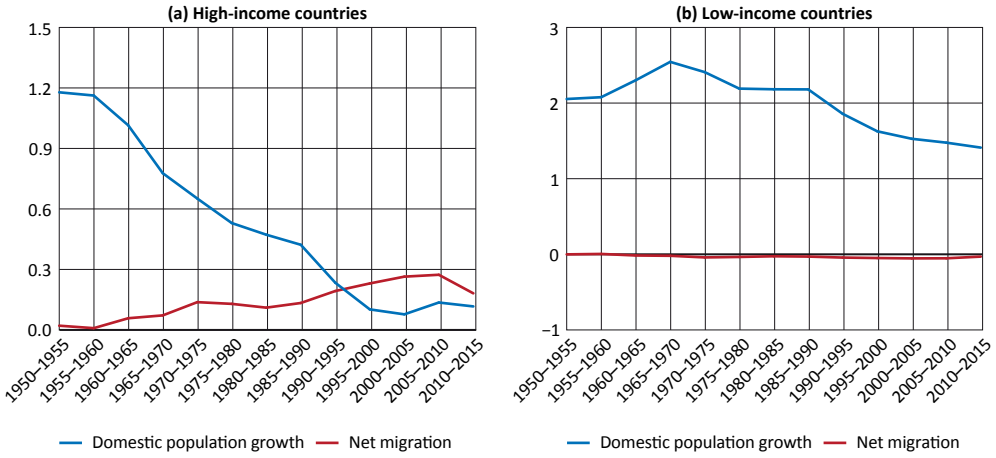
Figure 1. The world by type of dependency ratio, 2017
Dependency ratio



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

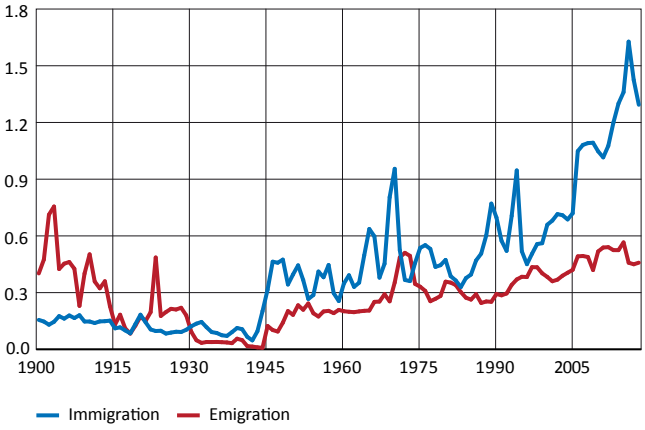
Historically, migration has varied heavily from year to year, but, in Figure 3, we can see that the trend has been successively increased immigration and emigration, with heavily

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

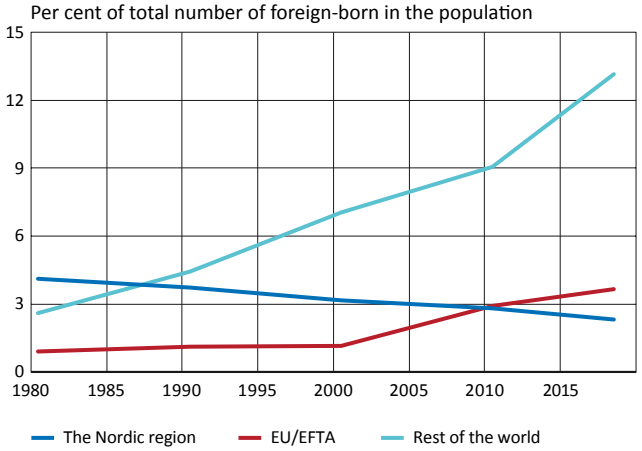


Note. To be counted as an immigrant, a person must have the intention of staying in Sweden for at least one year. To be counted as an emigrant, a person must have the intention of living abroad for at least one year.
Source: Statistics Sweden

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

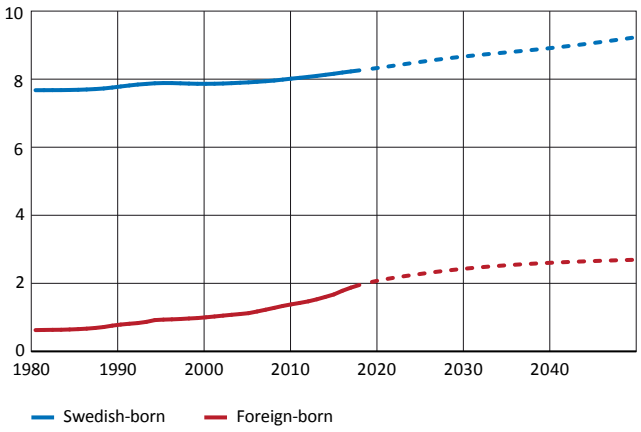
One aspect of immigration of interest for our analysis of economic activity is how many EU citizens come to Sweden in response to labour shortage peaks. However, temporary immigration is largely missed by the official statistics, as Migrationsverket (the Swedish migration agency) does not register rights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

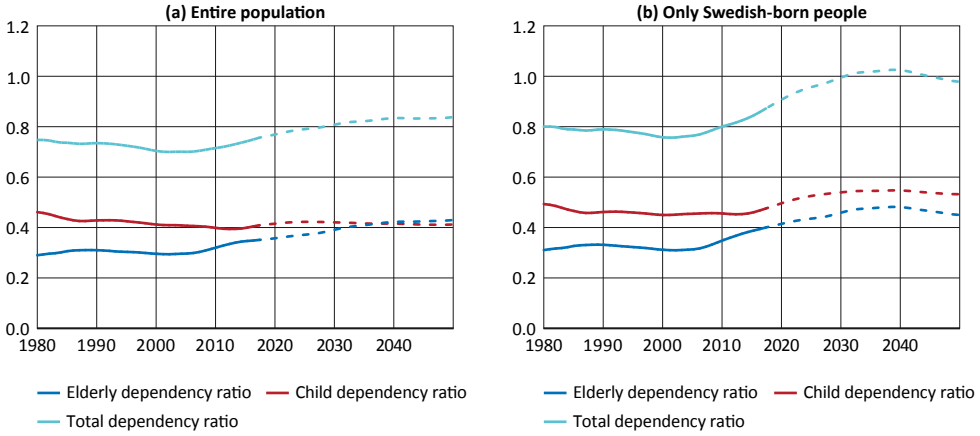
4.1 An increasing proportion of older people is raising the dependency ratio

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.

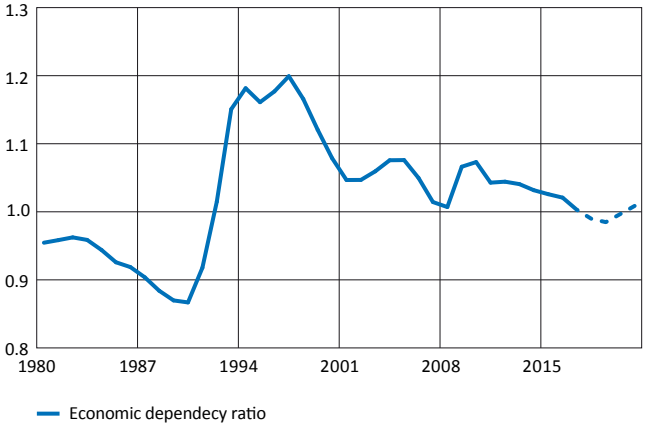
5 By 2050, the proportion aged over 80 years is expected to have grown from about 5 per cent at present to just under 9 per cent of the total population. The group aged 65–79 years is expected to continue to form about 14 per cent of the population.

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.

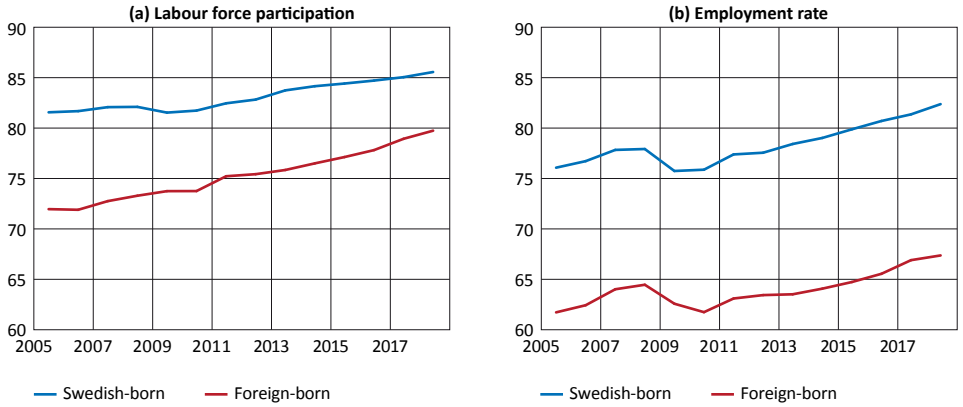
6 Effects of migration on the Swedish labour market

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.

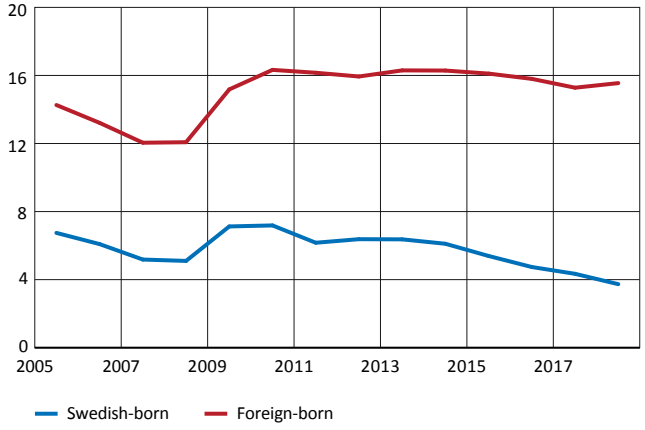
Figure 8. Labour force participation rate and employment rate for Swedish-born and foreign-born persons, 2005–2017
Percentage of population in each group, 16–64 years



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



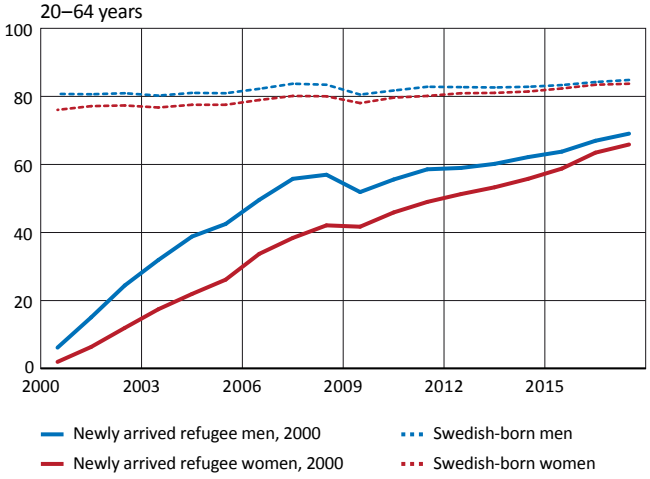
Source: Statistics Sweden (Labour Force Surveys)

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.

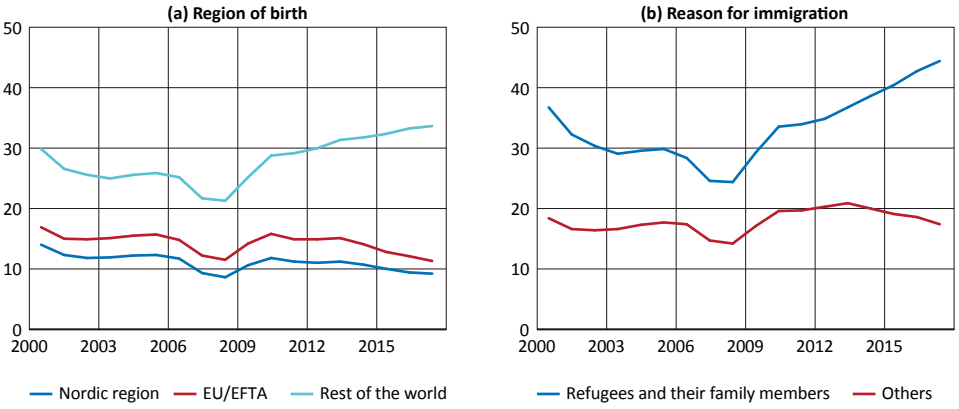
Reasons for immigration play a major role for integration into the labour market. In periods of high labour immigration, such as the 1950s, the 1960s and the first half of the 1970s, the employment situation was very good for foreign-born people. For long periods, the employment rate of foreign-born 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)

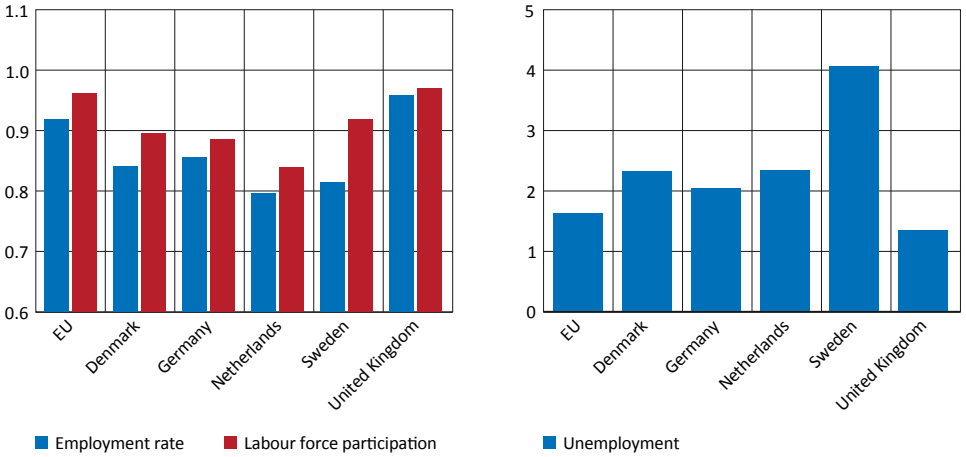
7 Integration from an international perspective

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.

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A changed labour market – effects on prices and wages, the Phillips curve and the Beveridge curve

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In the period after the global financial crisis 2008–2009, price and nominal wage growth have been relatively weak. In addition, some economic relationships have changed: The Phillips curve, i.e. the correlation between nominal wage growth and unemployment, has become flatter while the Beveridge curve, i.e. the correlation between vacancies and unemployment, has shifted outwards. In this article we examine to what extent changes in the Swedish labour market may have contributed to these developments. We first present empirical evidence of various changes in the Swedish labour market. We then show that – in a macroeconomic model with search and matching frictions – several of these changes may have contributed to lower prices and wages as well as a flatter Phillips curve. We also show that the outward shift in the Beveridge curve can only partly be explained by our estimated reduction in the matching efficiency.

1 Introduction

Ten years ago, in the autumn of 2008, the global financial crisis broke out. It started in the United States, but spread quickly to Europe and other parts of the world. The recovery after the crisis has been unexpectedly slow, even if growth rates in recent years have been picking up. From the Riksbank's perspective, it is primarily the relatively weak price and nominal wage growth that have been the surprising factors. Inflation measured in terms of the CPIF has on average been around 0.3 percentage points lower after the crisis and nominal wage growth around 1.1 percentage points lower.[1] Furthermore, economic relationships with implications for monetary policy have changed: The Phillips curve – the correlation between nominal wage growth and unemployment – has become flatter while the Beveridge curve – the correlation between vacancies and unemployment – has shifted outwards.[2]

The economic development after the financial crisis has to large extent been characterised by increased globalisation and digitalisation, encouraging more international trade and greater labour mobility. The demographic development indicates a population structure with more elderly people and at the same time there are extensive migration flows. In addition, a number of economic policy reforms focusing on the labour market have been implemented. All of these factors affect the labour market in some way, but exactly

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1 The period before the financial crisis refers to 2000–2007 and the period after to 2010–2018.

2 The Phillips curve is named after the economist, William Phillips, who, using British data for the period 1861–1957, estimated a negative correlation between nominal wage growth and unemployment. Subsequently, the Phillips curve has been broadened and can now contain a number of different specifications. In this study, however, we use the original specification from Phillips (1958). The Beveridge curve is named after the British economist, William Beveridge, for his commitment to unemployment and matching issues.

how is difficult to know. Nevertheless, empirical estimates and data suggest a number of changes in the labour market after the financial crisis, among others:

(i) Higher labour force participation

(ii) Reduced matching efficiency

(iii) Lower unemployment benefits

(iv) Weaker bargaining power among employees

The aim of this study is to examine to what extent these changes may have contributed to the weak price and wage growth, the flatter Phillips curve and the shift in the Beveridge curve. To do this, we use a macroeconomic model with search and matching frictions. The model is designed to analyse the labour market and its interaction with the rest of the economy. We can therefore use this model to illustrate and quantify how different changes in the labour market affect prices and wages as well as economic relationships such as the Phillips- and Beveridge curves. The model is calibrated to match basic Swedish labour market data.

According to the model, higher labour force participation, lower unemployment benefits and weaker bargaining power lead to both lower prices and wages while reduced matching efficiency leads to higher prices and wages. We therefore, on balance, consider it likely that the changes in the labour market have contributed to lower price and wage outcomes.

It has been widely recognised that the slope of the Phillips curve has changed after the financial crisis and become flatter. Changes in the labour market can be particularly important for this, since both wages and unemployment are determined there. We show that shocks to the labour force participation rate give rise to a negative slope, but that shocks to the bargaining power, unemployment benefits and matching efficiency all lead to a positive slope. Hence, some of the changes in the labour market that we have observed may have contributed to the flatter Phillips curve.

Finally, we show that the Beveridge curve has become steeper and shifted outwards after the financial crisis. Shifts in the Beveridge curve are often explained by permanent changes in matching efficiency. However, according to the model our estimated reduction in matching efficiency after the financial crisis cannot explain the entire shift. A reduction in matching efficiency in line with our estimates can, at most, explain about a third of the shift in the Beveridge curve.

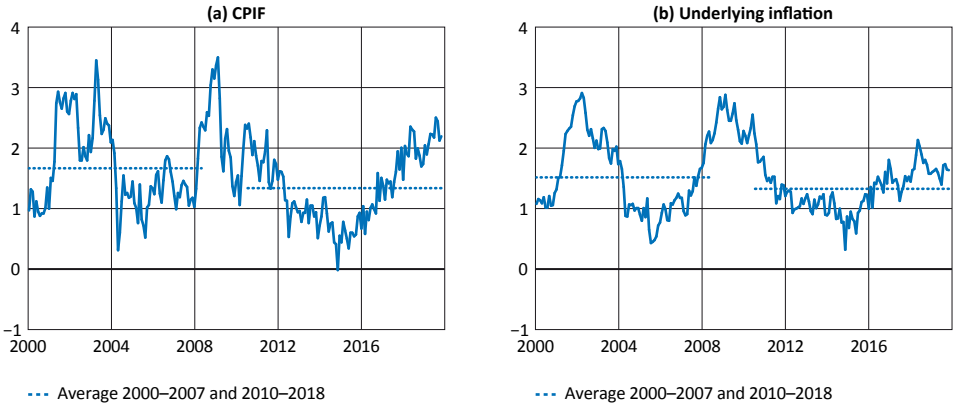
The outline of the article is as follows: Sections 2 and 3 show how prices and wages, the Phillips curve, the Beveridge curve and a number of key labour market variables have changed after the financial crisis. In the fourth and fifth sections, we show how the changes in the labour market may have contributed to lower price and wage growth and a flatter Phillips curve. Section 6 shows that our estimate of the reduction in matching efficiency can only explain a smaller part of the outward shift in the Beveridge curve. The seventh section concludes. A description of the macroeconomic model and the method to estimate the matching efficiency can be found in Appendices A and B.

2 Weak price and wage growth, a flatter Phillips curve and a shift in the Beveridge curve

Price and wage growth have both been weak after the global financial crisis in 2008–2009.[3] Inflation measured in terms of the CPIF has been around 0.3 percentage points lower after the crisis, see Figure 1a. Other measures of inflation also suggest a weak development. Inflation measured as an average of underlying measures has been around 0.2 percentage points lower, see Figure 1b.

3 This is not just a Swedish phenomenon; similar developments have occurred in many other countries, see IMF (2016) and IMF (2017).

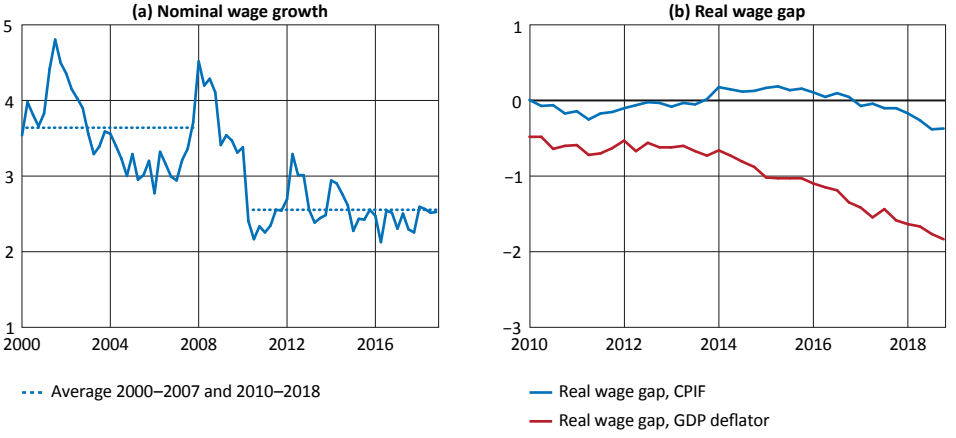
Figure 1. Inflation measured with the CPIF and underlying inflation, before and after the financial crisis
Annual percentage change



Note. Underlying inflation is calculated as an average of the CPIF excluding energy, UND24, Trim85, CPIF excluding energy and perishables, persistence-weighted inflation (CPIFPV), factors from principal component analysis (CPIFPC) and weighted mean inflation (Trim1).
Sources: Statistics Sweden and own calculations

Regarding wages, both nominal and real wages have had a weak development. Figure 2a shows that nominal wage growth has been 1.1 percentage points lower on average after the crisis. The real wage has also been low, but is sensitive to which deflator is used to adjust the nominal wage. We illustrate this by showing two measures in Figure 2b: one where the nominal wage has been adjusted with the CPIF, and one where it has been adjusted with the GDP deflator.[4] Both measures indicate that the real wage has fallen after the financial crisis relative to its trend before the crisis. Adjusted with the CPIF, the real wage has fallen by just under 0.5 per cent while adjusted with the GDP deflator, it has fallen by just under 2 per cent.

Figure 2. Nominal wage growth before and after the financial crisis and the real wage gap after the financial crisis
Annual percentage change and per cent respectively



Note. Wages refer to short-term wages. The real wage gap is calculated as the percentage difference between actual real wages and the trend in real wages prior to the financial crisis.
Sources: National Mediation Office, Statistics Sweden and own calculations

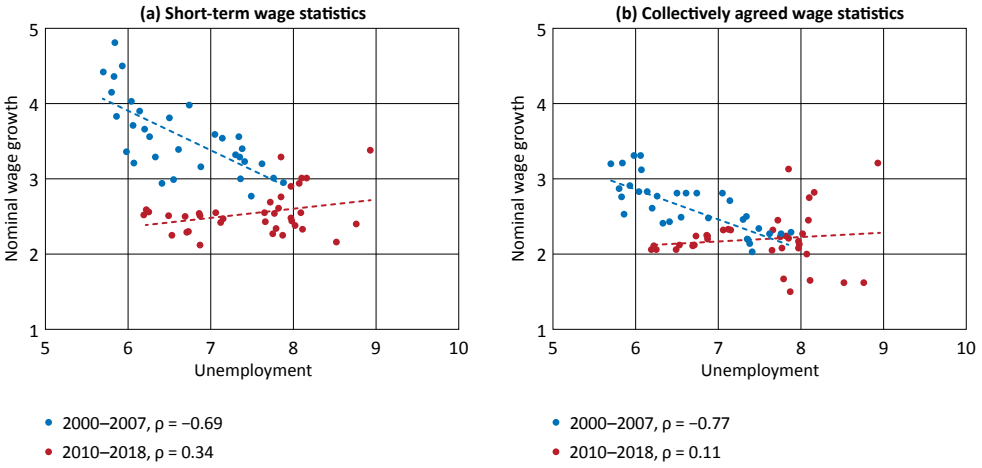
The labour market is of central importance for the Phillips curve, since both wages and unemployment are determined there. A common interpretation of the Phillips curve's negative slope is that falling unemployment leads to a tighter labour market, which makes it more difficult for companies to recruit new employees.[5] This drives up wages and gives

4 The GDP deflator includes prices of domestically produced goods and services. The CPIF includes prices of domestic and imported consumption goods.
5 Labour market tightness is defined as the number of vacancies in relation to the number of unemployed people. On a tighter labour market, it is more difficult for companies to fill their vacancies.

rise to a negative correlation between wages and unemployment, which Phillips (1958) also found in the data. But economic correlations typically vary over time. Several studies have highlighted that the slope of the Phillips curve has changed after the financial crisis.[6] Before the crisis, the slope in most studies was clearly negative, while post crisis it has become flatter and slightly positive.

Figure 3 shows how the slope of the Phillips curve has flattened in Sweden. Prior to the financial crisis, the slope was negative with a slope coefficient of –0.52 and a correlation coefficient of –0.69 when wages are measured by short-term wages. If wages are instead measured by collectively agreed wages, the slope coefficient is –0.40 and the correlation coefficient is –0.77. After the financial crisis, both the slope and the correlation have become slightly positive. The slope coefficient is, depending on the wage measure, 0.14 or 0.06 and the correlation coefficient is 0.34 or 0.11.

Figure 3. The Phillips curve, before and after the financial crisis, estimated with short-term wage statistics and collectively aggreed wage statistics
Annual percentage change and percentage of the labour force



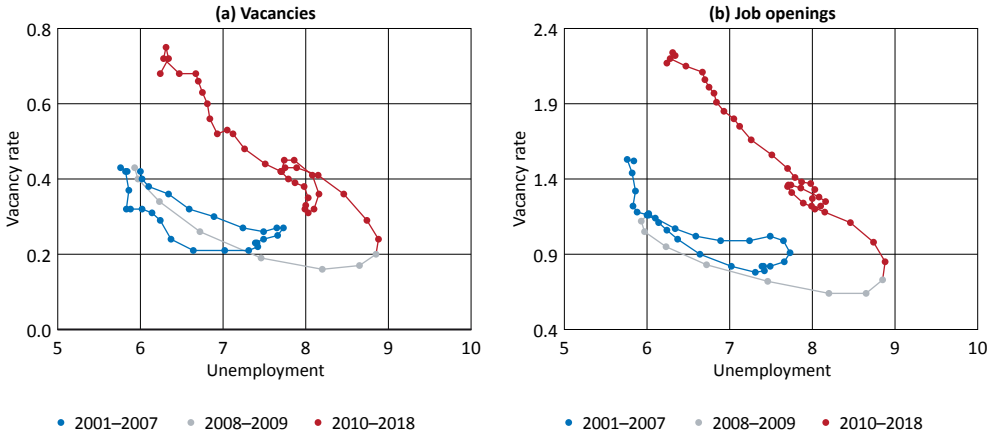
Note. Seasonally adjusted data. Nominal wage growth refers to annual percentage change, unemployment refers to percentage of the labour force, 15–74 years and ρ denotes the correlation coefficient. The blue broken line in Figure 3a shows w = 7.01 – 0.52u and the red broken line w = 1.55 + 0.14u, where w denotes nominal wage growth and u unemployment. In Figure 3b, the blue broken line shows w = 5.31 – 0.40u and the red broken line w = 1.76 + 0.06u.
Sources: National Mediation Office, Statistics Sweden and own calculations

The Beveridge curve shows how well the matching process in the labour market is working. In a labour market where the matching works well, few vacancies are associated with high unemployment and, conversely, many vacancies are associated with low unemployment. This means that the Beveridge curve has a negative slope and that fluctuations in economic activity cause movements along the curve. In economic downturns, the number of vacancies falls while unemployment rises, whereas in economic upturns, the number of vacancies rises while unemployment falls.

The blue line in Figure 4 shows the Beveridge curve before the financial crisis, the grey line shows the curve during the crisis and the red line shows its post-crisis development. In the wake of the financial crisis, there is a clear shift outwards of the Beveridge curve. It is worth noting that the slope of the curve is stable and negative both before and after the financial crisis. Although the slope becomes steeper after the crisis.

6 See for instance Swedish Association of Industrial Employers (2017).

Figure 4. The Beveridge curve, before and after the financial crisis, estimated with vacancies and job openings
Percentage of labour force



Note. Seasonally adjusted data, trend values. The two figures show two different measures of vacancies (labelled 'vacancies' and 'job openings' in the Swedish statistics) as a percentage of the labour force aged 15–74 years. Unemployment refers to the number of unemployed people as a percentage of the labour force aged 15–74 years.
Sources: Statistics Sweden and own calculations

3 The labour market before and after the financial crisis

The development within the information and communication technologies – the digitalisation of the economy – has been rapid in recent years, increasing the scope for automation of more jobs. In the past this has often affected jobs with routine tasks, but nowadays more advanced tasks can also be performed by smart robots.[7] Digitalisation has also accelerated the globalisation process, encouraging increased trade and greater labour mobility as countries become more closely integrated. The Swedish economy is also characterised by a demographic development with a more ageing population as well as extensive migration. In addition, a number of economic policy reforms focusing on the labour market have been implemented. How these developments have affected the labour market is difficult to know, but data and empirical estimates suggest that the labour market has changed in a number of ways after the financial crisis.

3.1 Higher labour force participation after the financial crisis

Labour force participation, i.e. the percentage of the working-age population that is either in work or searching for work, usually varies over the business cycle. However, after the financial crisis labour force participation has shown a more or less steady rising trend, see Figure 5a. The average labour force participation rate has increased from just under 71 per cent prior to the financial crisis to just under 72 per cent afterwards, an increase of around 1.1 per cent. The increase is largely due to high population growth, which, in part, is due to high immigration. A large number of the immigrants have been between 25 and 54 years of age. This is a group with a high labour force participation rate. Other factors that may also have contributed are various economic policy measures that have increased the incentive to work.[8]

7 See for example Roine (2016).
8 The Swedish Fiscal Policy Council (2014) has highlighted the earned income tax credits as an important cause of the increased labour supply as this has incentivised people to look for work. Furthermore, an increased earned income tax credit was introduced for the over-65s, providing them with an incentive to remain in the labour market for longer. See also Swedish Ministry of Finance (2011) and Flodberg and Löf (2017) for a discussion on how various economic policy reforms have affected the labour market.

3.2 Reduced matching efficiency after the financial crisis

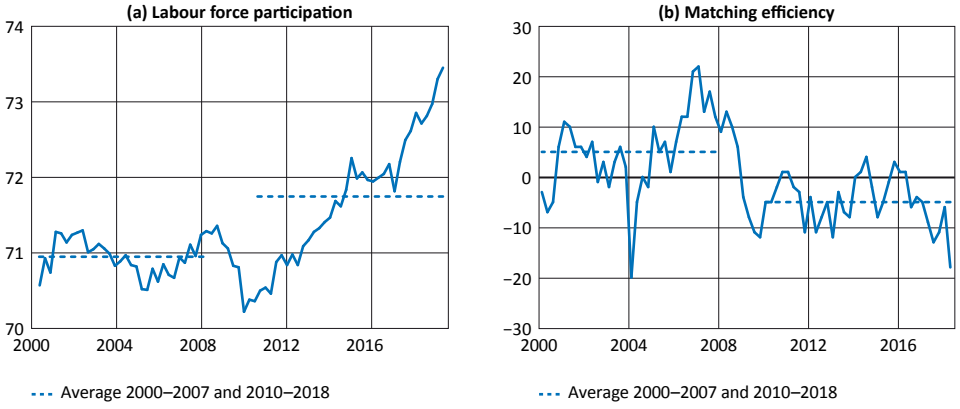
How well the matching between job-seekers and vacancies are working is often measured with what economists call matching efficiency. However, this variable cannot be observed and must therefore be estimated. We use a matching function for this, from which the following expression can be derived,[9]

$$(1) \qquad \ln P_t = \ln \overline{Y} + (1-\alpha)\,\theta_t + \epsilon_t,$$

where P denotes the probability of finding a new job (the job-finding rate), θ the labour market tightness, $\overline{Y}$ the mean of the matching efficiency and ϵ is an independent and normally distributed random variable with zero mean. This variable measures deviations of the matching efficiency from the mean. Figure 5b shows our estimation of the matching efficiency prior to and after the financial crisis. In the wake of the financial crisis, matching efficiency fell sharply and has since become stuck at low levels. On average, it has been just under 10 per cent lower after the financial crisis.

The matching efficiency normally falls in economic downturns. Certain types of skills become outdated while new ones are in demand. For the individual this means that some form of further training is needed. Moreover, a long period of unemployment causes unemployed people to lose their work-related skills, making matching even more difficult. Normally, as the economic activity improves, so too does matching efficiency. But this has not occurred as quickly as expected. Instead, matching efficiency is approximately at the same level as in 2010. One reason for this may be the unusually high immigration numbers in 2015–2016.

Figure 5. Labour force participation and matching efficiency, before and after the financial crisis
Percentage of the population and percentage deviations from the mean



Note. Labour force participation show the number of unemployed and employed as per cent of the population, 15–74 years. Matching efficiency refers to percentage deviations from the mean. A matching efficiency of zero is in line with the historical average.
Sources: Statistics Sweden and own calculations

3.3 Lower unemployment benefits after the financial crisis

The design of tax and benefit systems are important for how well the labour market function, as they affect people's incentive to participate in the labour force and to look for work. The unemployment benefits, measured relative to wages, are an important factor in this context, since it measures the share of income an individual is allowed to maintain if becoming unemployed. From the beginning of the 2000s up until 2018, the unemployment benefits have steadily fallen with the exception of the upturn in 2015–2016, see Figure 6a. On average, the unemployment benefits have been just under 21 per cent lower after the

9 See Appendix B for a derivation and the National Institute of Economic Research (2016) and Håkansson (2014), who use a similar method.

financial crisis. Rising wages are an important factor for this development, although reduced benefit ceilings in the unemployment insurance system and the introduction of earned income tax credits have also played a part, see National Institute of Economic Research (2016). The distinct upturn in 2015–2016 was a result of the government raising the maximum daily allowance and benefit ceiling in the unemployment insurance system.

3.4 Weaker bargaining power after the financial crisis

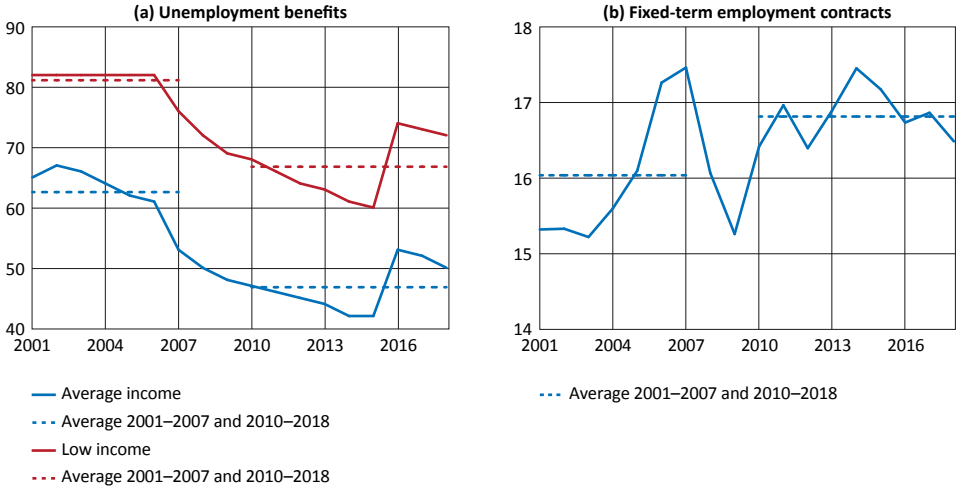
Another important factor regarding the functioning of the labour market is the bargaining power of employees. There are indications that the bargaining power have been weakening for some time. Unionisation has declined by around 15 per cent since the early 2000s.[10] Some of this decline can be explained by the increase of foreign-born people. Employment growth has been strong among those people, but they are joining trade unions in smaller numbers than Swedish-born. It should be noted that a possible problem with using unionisation as an indicator of bargaining power is that the decline does not necessarily lead to a weaker bargaining power of employees, as the proportion of the workforce covered by collective agreements has remained relatively constant.[11]

The proportion of people on fixed-term employment contracts has increased, which can be another indication of weaker bargaining power. People on fixed-term employment contracts often have a weaker foothold in the labour market and probably also a weaker negotiating position. Figure 6b shows that fixed-term employment contracts vary considerably over time, but that they have on average been just under 1 percentage point higher after the financial crisis.

It is difficult to quantify how the bargaining power may have changed. But there are indications that it has weakened as we have argued. In our calculations, we assume a reduction of 1 per cent after the financial crisis.

Figure 6. Unemployment benefits and fixed-term employment contracts, before and after the financial crisis

Percentage of wages and percentage of number of contracts



Note. Unemployment benefits refer to percentage of wages after preliminary tax. Fixed-term employment contracts refer to the number of fixed-term employment contracts as a percentage of total number of employment contracts.
Sources: OECD, Statistics Sweden and own calculations

10 See Kjellberg (2018).

11 See, for instance, Kjellberg (2018) and the article 'Strong economic activity but subdued wage increases' in Monetary Policy Report, July 2017.

4 Changes in the labour market may have contributed to low price and wage growth[12]

The low price and wage growth after the financial crisis is most likely due to a number of different factors. In this section, we study specifically to what extent the observed changes in the labour market after the financial crisis may have contributed to lower prices and wages.

The labour force participation rate has shown a rising trend after the financial crisis and has on average been about 1.1 per cent higher. To calculate by how much this may affect prices and wages, we also need to assess the duration of the increase. Naturally, such assessments are difficult. For example, the Riksbank has systematically underestimated the increase in labour force participation after the financial crisis, which is discussed in Hansson et al. (2018). We take a simple approach to assess the duration, i.e. we assume that the labour market participation rate follows an autoregressive process, see Appendix A for details of the methodology.

Figure 7 shows how an increase in labour force participation by 1.1 per cent affects prices and wages. The duration of the increase is about three years, which is in line with the historical pattern. Initially, inflation decreases by just over 0.7 percentage points, real wages by just under 0.8 per cent and nominal wage growth by around 1.2 percentage points. The results can be understood as follows. Companies have costs in terms of wages to employees and recruitment costs. These costs form the basis for how the companies set their prices.[13] The increase in the labour force participation rate means that there are more job-seekers, which makes it easier for companies to find new skilled workers. Vacancies can be quickly filled, reducing recruitment costs. This allows companies to reduce their prices. As far as employees are concerned, more job-seekers mean tougher competition for jobs and more subdued wage demands. Lower wage costs exert further downward pressure on prices.

Figure 7 shows how a reduction in the unemployment benefits with 21 per cent, i.e. in line with the decline after the financial crisis, affects prices and wages. Inflation falls by just under 0.6 percentage points initially, real wages by just under 0.5 per cent and nominal wage growth by just under 1 percentage point. Lower unemployment benefits make it relatively more costly for an employee to be unemployed compared to be employed, or, in other words, it increases the incentive of employees to accept lower wages. This leads to weaker wage growth and reduces companies' costs. Companies therefore reduce prices and inflation falls.

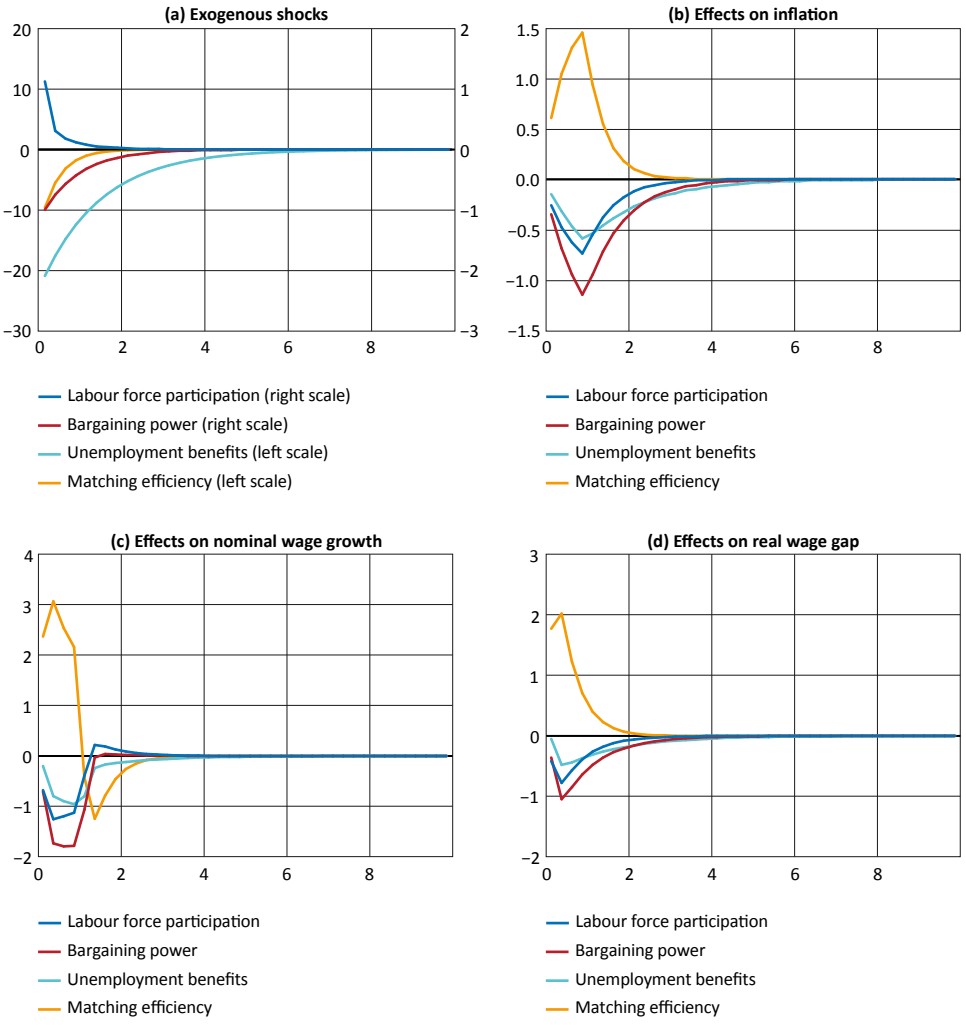
To show how a weakening in employees' bargaining power affects prices and wages, we assume that the bargain power decreases by 1 per cent. Figure 7 shows the results. Initially, inflation falls by just under 1.2 percentage points, real wages by just under 1 per cent and nominal wage growth by around 1.7 percentage points. Hence, a weakening of the bargaining power by 1 per cent, which in percentage terms is relatively small, appears to have relatively large effects on both prices and wages. A weakening in employees' bargaining power reduces the scope for employees to get their wage demands accepted, which leads to lower wages. Companies therefore have lower costs and can adjust their prices downwards.

Three of the four changes in the labour market that we have studied – higher labour force participation, lower unemployment benefits and weaker bargaining power – lead to lower price and wage growth. However, reduced matching efficiency causes prices and wages to rise. If matching efficiency is reduced by 10 per cent, it leads to a rise in inflation of almost 1.5 percentage points, in real wages of around 2 per cent and in nominal wage growth of about 3 percentage points, see Figure 7. Reduced matching efficiency makes it more difficult and costly for companies to employ new staff. Companies therefore increase prices and inflation rises. But despite the fact that reduced matching efficiency drives up prices and wages, the overall assessment is that the changes in the labour market after the financial in total have contributed to the low price and wage outcomes.

12 See Appendix A for a description and calibration of the macroeconomic model.

13 Formally, it is the companies' real marginal cost that affects its pricing, i.e. the cost of producing one more unit of a good.

Figure 7. Effects on inflation, nominal wage growth and the real wage gap of exogenous shocks in the labour market
Per cent



Note. Labour force participation increases initially by 1.1 per cent, unemployment benefits fall by 21 per cent, bargaining power weakens by 1 per cent and matching efficiency reduces by 10 per cent.
Source: Own calculations

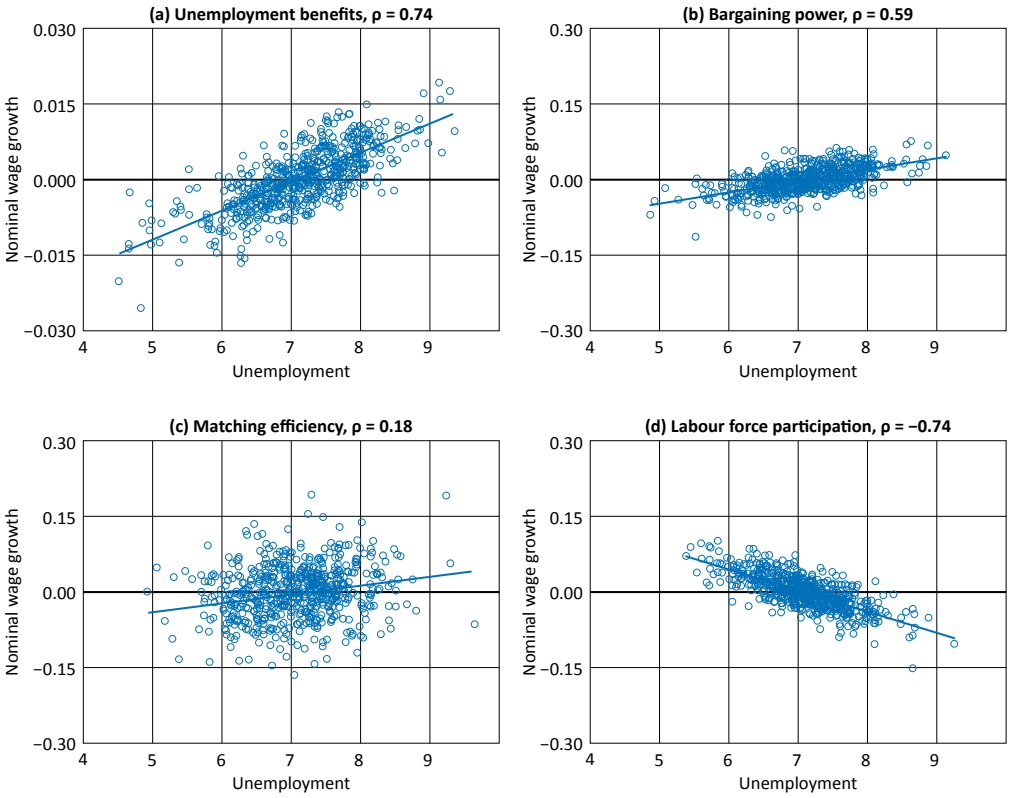
5 Changes in the labour market may also have contributed to a flatter Phillips curve

We have shown in Figure 3 that the slope of the Phillips curve (the correlation between nominal wage growth and unemployment) was clearly negative before the financial crisis, but has become flatter and weakly positive after the crisis. Correlations between economic variables depend in part on the 'exogenous shocks' that an economy is exposed to, by this economists mean unpredictable changes in factors that are unexplained by the model. A possible explanation for the flattening of the Philiips curve may therefore be that the economy has been exposed to shocks that have affected the slope in a flatter direction after the financial crisis. In this context, shocks to the labour market are important, since both wages and unemployment are determined there. In this section we illustrate how shocks to the bargaining power, the unemployment benefits, the matching efficiency and the labour force participation rate may have affected the slope.[14]

14 Exogenous shocks in other parts of the economy can also have contributed to the flatter Phillips curve, but these are not analysed here.

Shocks to the unemployment benefits and the bargaining power affect wages in a similar way. Lower unemployment benefits and weaker bargaining power both lead to a larger surplus for the companies in the wage negotiations. Companies can therefore create more jobs, which leads to lower unemployment while nominal wages decrease. Hence, the correlation between wages and unemployment becomes positive, see Figures 8a and 8b. Shocks to the matching efficiency also lead to a positive correlation, which is illustrated in Figure 8c. When matching efficiency reduces, it becomes more difficult and takes longer to match job-seekers to vacancies, causing unemployment and wages to increase.

Figure 8. The slope of the Phillips curve given various exogenous shocks to the labour market
Annual percentage change and percentage of the labour force



Note. The parameter ρ denotes the correlation between nominal wage growth and unemployment. The blue line represents the following equations (a) $w = -0.04 + 0.01u$, (b) $w = -0.16 + 0.02u$, (c) $w = -0.10 + 0.01u$ and (d) $w = 0.3 - 0.04u$, where w denotes nominal wage growth and u unemployment. Unemployment refers to the percentage of the labour force, 15–74 years.
Source: Own calculations

On the other hand, shocks to the labour force participation lead to a negative correlation between unemployment and nominal wages, see Figure 8d. An increase in labour force participation makes it easier for companies to fill their vacancies. But it nevertheless takes some time to look for and find a new job, which leads to an initial rise in unemployment. At the same time, high labour force participation weakens the bargaining power of employee organisations, which decreases nominal wage growth. The correlation between wages and unemployment therefore becomes negative.

The fact that exogenous shocks affect the correlation between economic variables is a general principle in macroeconomics. One should therefore be cautious to describe correlations between economic variables with rules of thumb. The Phillips curve's negative slope is often interpreted in the following way: Falling unemployment leads to a tighter labour market, which makes it more difficult for companies to recruit new staff. This drives up wages, giving rise to a negative correlation. There is nothing inherently wrong with this reasoning, but it is not a full explanation since it disregards *why* unemployment falls to begin with.

We have shown that the changes in the labour market after the financial crisis can be a factor behind the flatter Phillips curve. The slope can be negative, in line with the common interpretation, when shocks to the labour force participation rate lie behind the fall in unemployment. However, shocks to the unemployment benefits, the bargaining power and the matching efficiency can cause the slope to be positive. Moreover, also technology shocks can imply a positive slope, see Ingves (2019).

6 The reduction in matching efficiency can only explain a smaller part of the outward shift in the Beveridge curve

In this section, we examine to what extent the reduction in matching efficiency after the financial crisis can explain the shift in the Beveridge curve. The Beveridge curve shows how well the matching of job-seekers to vacancies is developing. The more efficient the matching, the faster the outflow from unemployment and the closer to the origin the curve will be. After the financial crisis, the number of vacancies has steadily increased and is currently at historically high levels. At the same time, unemployment has fallen, but not at the same rate as the number of job openings has increased. The weaker correlation between vacancies and unemployment can be interpreted both as a steeper slope of the Beveridge curve, and as a shift outwards. Shifts in the Beveridge curve is often explained by permanent reductions in the matching efficiency.

According to our estimate the matching efficiency has been just under 10 per cent lower after the financial crisis, see Figure 5b. An alternative estimate of the matching efficiency can be based on the relationships in the model. This estimate suggests that the matching efficiency has been just under 14 per cent lower after the financial crisis.[15] In the simulations, we consider both estimates.

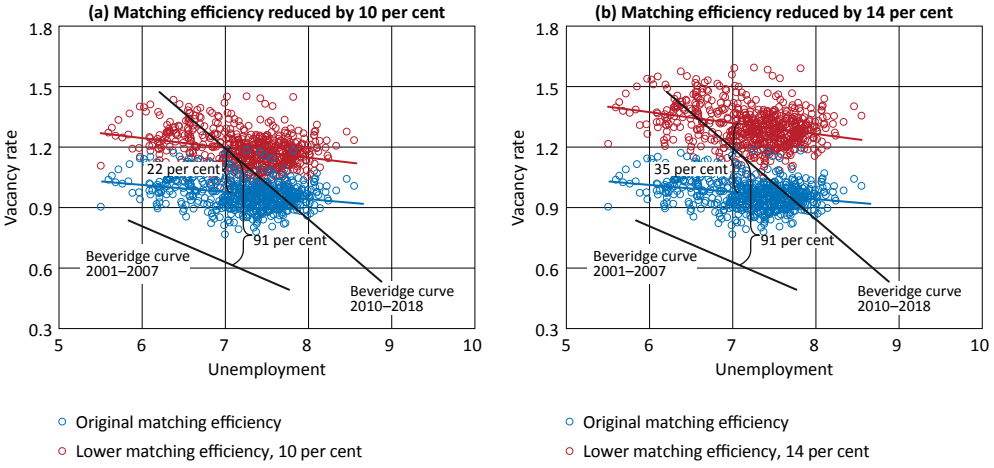
Exogenous shocks are important to explain the slope of the Beveridge curve. However, the focus here is not to explain the steeper slope, but to examine to what extent the outward shift in the Beveridge curve can be explained by our estimates of the matching efficiency. We therefore assume that it is the same demand shocks that have affected the economy before and after the financial crisis.

Figure 9 shows how a permanent reduction in matching efficiency by 10 per cent and 14 per cent shifts the Beveridge curve outwards. The blue dots in Figure 9a show the Beveridge curve from the model when matching efficiency is at the level before the financial crisis. The red dots then show how the Beveridge curve shifts outwards if there is a permanent reduction in matching efficiency by 10 per cent. The two black lines show the Beveridge curve in data before and after the financial crisis. The Beveridge curve has shifted outwards by 91 per cent in data given an unemployment rate of about 7 per cent (the average level between 2000 and 2018). This can be compared to 22 per cent, which is the shift according to the model.

Given our second, model based, estimate of the matching efficiency, i.e. a 14 per cent reduction after the financial crisis, the outward shift in the Beveridge curve is slightly larger at 35 per cent, see Figure 9b. It is clear that also this outward shift is smaller than in the data. Therefore, we conclude that, according to the model, the reduction in matching efficiency can only explain a smaller part of the shift in the Beveridge curve after the financial crisis.

15 In formal terms, the difference in the matching efficiency estimate is due to the fact that, given the model's calibrated parameter values, it is not possible to fully link the reduction in matching efficiency of just under 10 per cent with the increase in the tightness of the labour market observed in the data.

Figure 9. The model's Beveridge curve for different estimates of the matching efficiency and the Beveridge curve in the data, before and after the crisis
Percentage of labour force



Note. The blue and red dots refers to the model's Beveridge curve before and after the financial crisis, respectively. The black lines shows the Beveridge curve in the data before and after the crisis. The vacancy rate is calculated as a percentage of the labour force, 15–74 years. Unemployment is calculated as a percentage of the labour force, 15–74 years.
Source: Own calculations

7 Concluding discussion

Hansson et al. (2018) argue that there is a need to better understand the consequences for monetary policy of changes in supply and more trend-like changes. We share this view and have in this study emphasised how a number of changes in the labour market after the financial crisis may have affected price and wage growth, the Phillips curve and the Beveridge curve.

Changes in the labour market may have contributed to lower price and wage growth. After the global financial crisis of 2008–2009, price and wage growth have been lower than expected. Andersson et al. (2015) discuss a number of factors that may lie be behind the low price growth. Among other factors, they point out that increases in labour supply may have held down companies' costs and by extension also prices.[16] Our results confirm this hypothesis. Increased labour supply in the form of a higher labour force participation rate may have had a dampening effect on prices according to our calculations. We have also shown that lower unemployment benefits and weaker bargaining power may have contributed to lower prices.

The Riksbank has in the Monetary Policy Report pointed to a number of factors related to the labour market as possible explanations for the low wage growth: Higher labour force participation, weaker bargaining power and lower unemployment benefits.[17] Our results confirm that changes in these variables may have contributed to lower wages in both nominal and real terms. The results also suggest that the bargaining power of employees can be especially important. Small percentage changes in the bargaining power have a major impact on wages.

A flatter Phillips curve need not necessarily mean less impact from monetary policy. The Phillips curve has changed and become flatter after the financial crisis. We have shown that this may be due to changes in the labour market. Shocks to the unemployment benefits, the bargaining power and the matching efficiency all give rise to a positive correlation between unemployment and nominal wage growth. If such shocks have become more common or larger after the financial crisis, this may have contributed to the flatter Phillips curve. We

16 However, their main explanations for the low price growth are weak international developments coupled with low energy prices that have held back cost increases. Other causes include a stronger krona and companies having squeezed their margins to a greater extent than previously.
17 See Sveriges Riksbank (2017) where it is also pointed out that wage growth has been affected by a number of different factors such as productivity growth and international competitiveness.

have not formally shown that this is the case, though, but merely illustrated that, in a simple model, these shocks give rise to a positive correlation. Whether or not this has been the case requires a more fundamental analysis in order to identify which shocks that have driven the economic fluctuations before and after the financial crisis.

The fact that the correlation between different economic variables varies over time is not in itself surprising. In a functioning market economy, shocks occur all the time; technology progresses, the demographic composition changes over time and there are shocks in the labour market, to name a few examples. This leads to changes in the supply and demand on different markets. Prices and wages are the market mechanisms that allow supply and demand to meet. This means that the strength of the correlation between different economic variables will depend on which exogenous shocks the economy is exposed to. For a central bank, it may nevertheless be somewhat worrying that it is the slope of Phillips curve that has been changing, since it has a prominent role in monetary policy analysis.

It is therefore important for central banks to understand why the Phillips curve has become flatter, since it can have implications for the impact of monetary policy. If the flatter Phillips curve is due to exogenous shocks, it means that the behaviour of the households and companies have not changed. The functioning of the economy and the impact of monetary policy are therefore unchanged. Changes in the policy rate affect inflation and resource utilisation in the same way as before.

However, the flatter Phillips curve could also be due to different behaviour of households and companies, i.e. the functioning of the economy could have changed. There could in principle be many reasons for this, but a good example is companies' wage-setting. Wages are normally 'sluggish', which means that they are not fully adjusted to changes in labour demand. The slope of the Phillips curve can be interpreted as a measure of how much wages are affected by changes in labour demand (measured in terms of unemployment). The flatter the slope of the curve is, the more sluggish are the wages. Hence, the flatter Phillips curve could be due to more sluggish wages. Lindé and Trabandt (2019) show that when an economy is hit by major negative shocks, as was the case during the financial crisis, companies and unions delay price and wage reductions, which leads to a flatter Phillips curve. If the flatter Phillips curve is due to a change in price and wage-setting behaviour, the impact of monetary policy may also have changed. Considering the full period after the financial crisis, more sluggish prices and wages appear to be a less likely explanation for the flatter curve, since the general view is that increasing globalisation and technological development in recent years, if anything, have made prices and wages more flexible.

Another factor that may affect the slope of the Phillips curve is monetary policy. Assume, for example, that monetary policy, somewhat unlikely, is so successful at stabilising inflation that inflation lies constant on two per cent over time. The correlation between prices and unemployment will in this case be zero, regardless of how unemployment develops. This can also affect the correlation between nominal wage growth and unemployment, which would probably be weakened as the variations in nominal wages would be solely due to variations in real wages, see McLeay and Tenreyro (2018) for a discussion.

Reduced matching efficiency can only explain a smaller part of the shift in the Beveridge curve. The Beveridge curve has shifted outwards after the financial crisis. Our estimates of the reduction in matching efficiency can at best explain about a third of the shift. There are several possible explanations for this. The model does not explicitly consider that the composition of the labour force has changed after the financial crisis, with a relatively large proportion of unemployed people with a weaker position in the labour market due to a low level of education and a weak attachment to the labour market. Another explanation may be measurement problems. The statistics on vacancies are unreliable and may have overestimated the increase in recent years. If this is the case, the outward shift in the Beveridge curve would not have been as large.

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Appendix A. The macroeconomic model with search and matching frictions

This appendix gives a short description of the search and matching model. For a more detailed description, see Foroni et al. (2015 and 2018). The appendix also shows how the model is calibrated to fit some salient features of the Swedish economy.

A.1 Households maximise utility and companies maximise profit

The macroeconomic model consists of households, companies and a central bank. A person in a household can be either employed or unemployed. Employed people work and receive a wage bill while unemployed people receive unemployment benefits. The unemployment benefits, i.e. compensation in relation to the wage, have on average been just under 63 per cent since 2000, which is also the value in the model.

Households maximise utility given a budget constraint and a law of motion for employment. Households can choose between participating and not participating in the labour force. If they choose to participate they get disutility. The key factor determining labour force participation is the households' *willingness* to participate in the labour force. This is intended to capture factors that are not explicitly modelled, for example a high inflow of foreign-born people, large cohorts of young people entering the labour market or various income tax reforms.

We assume that companies cannot fully change their prices in response to shifts in demand. The reasons for this are not formally modelled, but may be due to costs involved in changing prices or agreements with customers that extend over longer periods of time. This is an important assumption as it implies that changes in the central bank's policy rate affect the real interest rate, which in turn affects how households allocate consumption over time. It is also an important assumption for how inflation is determined in the short run. The central factor determining prices is companies' real marginal costs, which in part depend on the real wages. We assume prices are changed once a year on average, which is in line with how often companies in Sweden change their prices.[18]

Companies maximise profits and based on their maximisation problem, a condition can be derived that shows how they choose to advertise new vacancies. According to this condition, the costs of advertising a vacancy are equal to the expected revenue from advertise the vacancy, which depends on the probability of filling a vacancy and the expected revenue from employing another person.

A.2 Search and matching frictions are modelled with a matching function

The labour market is characterised by search- and matching frictions, which means that it is costly for companies to hire new staff and for households to search for new jobs. For companies it can be different types of recruitment costs, for example costs for marketing and training, while for households the costs may involve loss of income during unemployment. This is modelled with a matching function. The function is intended to summarise all the sequences of events associated with a recruitment, i.e. how the recruitment is conducted, how the job-seekers search for new jobs, and so on.[19] In other words, the matching function

18 See Apel et al. (2005).

19 The actual sequence of events that leads to a recruitment is thus not explicitly modelled. In other words, the matching function is not explicitly derived from job-seeker behaviour and therefore lacks so-called micro-foundations. This simplification makes the model more tractable.

captures the idea that it takes a certain period of time to find a new job. We assume the following functional form:

$$(2) \qquad M_t = \Upsilon_t S_t^{\alpha} V_t^{1-\alpha},$$

where M denotes matches, S job-seekers, V vacancies, Υ efficiency in the matching process and the parameter α the job-seekers' share of the matchings.[20] Given a constant matching efficiency, more job-seekers and/or more vacancies lead to more people being employed, i.e. matched. Plenty of job-seekers make it easier for companies to find the right skills and plenty of vacancies make it easier for job-seekers to find a suitable job. Matching efficiency also plays an important role in how many matches (recruitments) are realised. A high matching efficiency leads to a smooth recruitment process and more matches.

Based on the matching function, both the probability of finding a new job, the so-called job-finding rate, $P(\cdot)$, and the probability of filling a vacancy, $Q(\cdot)$, can be derived:

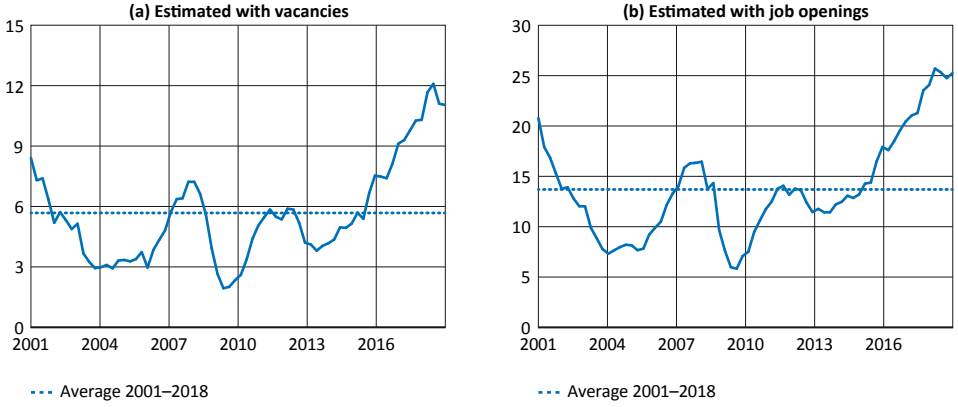
$$(3) \qquad P(\theta_t) = \Upsilon_t \theta_t^{(1-\alpha)}, Q(\theta_t) = \Upsilon_t \theta_t^{(-\alpha)},$$

where θ denotes labour market tightness and is defined as the ratio of vacancies to job-seekers,

$$(4) \qquad \theta_t = \frac{V_t}{S_t}.$$

The labour market tightness plays an important role in search and matching models, since it affects both the job-finding rate and the probability of filling a vacancy. The higher the tightness, the greater the probability of finding a new job and the smaller the probability of filling a vacancy. Tightness in the model is set to the average value of tightness measured by 'vacancies' and 'job openings'. The average since 2001 has been just under 10 per cent, see Figures A1a and A1b.

Figure A1. Labour market tightness calculated with two different estimates of vacancies
Number of vacancies and job openings per unemployed person



Note. Seasonally adjusted data. In Statistics Sweden there are two measures of vacancies, one labelled 'vacancies' and the other 'job openings'. Tightness refers to the ratio of the number of vacancies to the number of unemployed people.
Sources: Statistics Sweden and own calculations

20 In the model there is a distinction between job-seekers and unemployed people, which cannot be observed in the data. Job-seekers in the model include people who, at the beginning of a period, are unemployed and have not yet started to look for a job, while unemployed people are defined as job-seekers minus those who have found a new job (number of new matches). The relevant variable in the matching function is therefore job-seekers.

A.3 Wages are determined through wage bargains

The search and matching frictions imply that there is a surplus to allocate among employees and companies. The surplus consists of the difference between the lowest wage that the employee can accept – which in our model is the compensation received when unemployed – and labour productivity adjusted for the costs of advertising vacancies. The allocation of the surplus is determined in decentralised wage bargains according to the Nash bargaining model, i.e. the surplus is allocated between employees and companies in relation to their bargaining power. Both the employee and the company have an incentive to avoid deadlocked negotiations to save both parties search costs. The Swedish model of employer organisations and employee organisations negotiating new collective agreements is also consistent with the Nash bargaining model.

A.4 The central bank follows a Taylor-rule

The central bank determines the short-term nominal interest rate in the economy, the so-called policy rate. When the central bank sets the policy rate, it follows a simple Taylor-rule.[21] We assume the following rule:

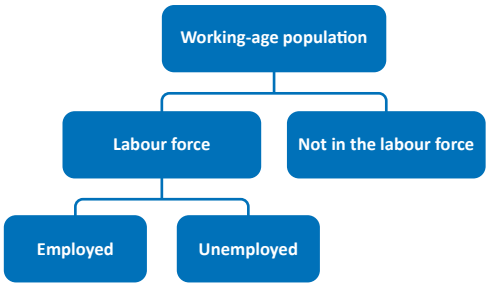
$$R_t = R^* + \alpha\,(\pi_t - \pi^*) + \beta(y_t - y^*), \tag{5}$$

where R denotes the policy rate, R^* the long-run policy rate (an asterisk indicates that it is a long-run steady state value). π inflation, π^* the long-run inflation level, which equals the central bank's inflation target, y resource utilisation and y^* the long-run resource utilisation level. The parameters α and β state by how much the policy rate reacts when inflation deviates from the inflation target and when resource utilisation deviates from its long-run level, respectively. We set these parameters to the standard values from the literature, i.e. $\alpha = 1.5$ and $\beta = 0.125$.

A.5 Employment, unemployment and the labour force in the data and the model

In the Labour Force Survey published by Statistics Sweden, the working-age population, consisting of people aged 15–74 years, is divided into two different groups: those who are in the labour force, and those who are not. Those who are in the labour force are in turn divided into number of employed and number of unemployed people. The various concepts can be described in a tree diagram, see Figure A2.

Figure A2. Description of the notions labour force, employed and unemployed people



21 The Taylor-rule is named after the American economist, John Taylor, see Taylor (1993). It has in practice become a collective term for various monetary policy rules where the central bank determines the short-term nominal interest rate.

The working-age population can also be described in terms of the labour force participation rate, employment rate and unemployment rate. Normally, the labour force participation rate and the employment rate are calculated as percentages of the working-age population while the unemployment rate is calculated as a percentage of the labour force. In the model, however, the employment rate is calculated as a percentage of the labour force and not as a percentage of the population, as the population in the model consists of employed and unemployed people.

The long-run level of unemployment is set at the average for 2000–2018, i.e. just over 7 per cent. This means that the employment rate is set at just under 93 per cent in the model. Labour force participation has since 2000 been just over 71 per cent on average, which is also the value in the model, see Table A1.

A.6 Shocks to the labour market are modelled as exogenous AR(1)-processes

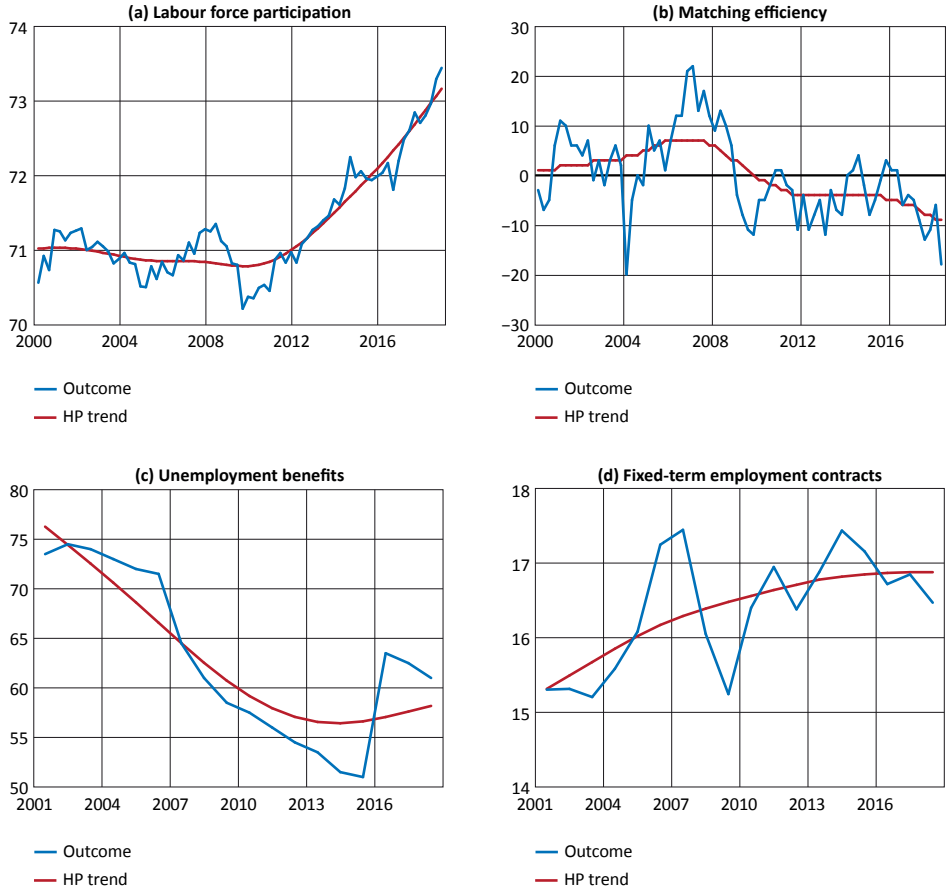
Shocks to the labour market are determined outside the model, i.e. they are exogenous and are not affected by the consumption choices of households, companies' production etc. We assume that labour force participation, matching efficiency, unemployment benefits and bargaining power follow exogenous AR(1)-processes:

$$(6) \qquad ln X_t = \rho \, ln \, X_{t-1} + \epsilon_t^X,$$

where X is a vector containing four variables: labour force participation, matching efficiency, unemployment benefits and bargaining power. The AR(1) coefficient ρ is a vector containing the persistence of each variable and ϵ^X is a vector of independent and identically normal distributed random variables.[22] We estimate the AR(1)-coefficients from trend-adjusted data using an HP-trend, see Figure A3.

22 In formal terms, labour force participation is not an exogenous variable in the model. It is affected to a large extent by the willingness of households to participate in the labour force, which we assume follows an exogenous AR(1) process. To facilitate presentation of the model and description of the mechanisms, we interpret changes in the willingness of households to participate in the labour market as exogenous shocks to labour force participation.

Figure A3. Trends for labour force participation, matching efficiency, unemployment benefits and fixed-term employment contracts
Percentage of the population, percentage deviation from the mean, percentage of wage and percentage of the number of contracts, respectively



Note. Trends are calculated using an HP filter. For the quarterly series (labour force participation and matching efficiency), lambda is equal to 1600, and for the annual series (unemployment benefits and fixed-term employment contracts), lambda is equal to 100.
Sources: OECD, Statistics Sweden and own calculations

Table A1 shows the AR(1)-coefficients and summarises other parameter values calibrated to match Swedish data. Households' preference parameters and job-seekers' share of matches are set in line with Foroni et al. (2015).

Table A1. Calibration of the model's parameters and long-run values

Quantity	Value
Households' time preference (β)	0.99
Households' risk aversion (σ)	1.00
Frisch elasticity (φ)	1.00
Labour force participation ($\bar{L}$)	0.71
Unemployment ($\bar{u}$)	0.07
Unemployment benefits ($b/\bar{w}$)	0.63
Labour market tightness ($\bar{\theta}$)	0.10
Job-finding rate ($\bar{P}$)	0.40
Job-seekers' share of matchings (α)	0.50
Recruitment costs ($K/\bar{q}$)	0.06
Companies' mark-ups ($\epsilon/\epsilon - 1$)	1.20
Price rigidity (δ)	0.75
Interest-rate smoothing in monetary policy rule (ϕ_r)	0.00
Weight on inflation in monetary policy rule (ϕ_π)	1.50
Weight on GDP in monetary policy rule (ϕ_y)	0.12
Public consumption share of GDP	0.20
AR(1) coefficient – labour force participation	0.68
AR(1) coefficient – matching efficiency	0.57
AR(1) coefficient – unemployment benefit	0.84
AR(1) coefficient – bargaining power	0.75

Note. The notations in brackets correspond to those in Foroni et al. (2018).

Appendix B. Estimating matching efficiency

To estimate the matching efficiency, we start from the matching function in Appendix A,

(7) $M_t = \Upsilon_t S_t^{\alpha} V_t^{1-\alpha}$.

By dividing both sides of the function with the number of job-seekers the matching function can be re-written in terms of the job-finding rate, $P(\theta_t)$, and labour market tightness, θ,

(8) $P(\theta_t) = \Upsilon_t \theta_t^{1-\alpha}$.

If we then take the logarithm of the above expression, we obtain the following equation,

(9) $\ln P(\theta_t) = \ln \Upsilon_t + (1-\alpha) \ln \theta_t$.

In equation 9 both the value of α and the matching efficiency, Υ_t, are unknowns. The matching efficiency can therefore not be estimated directly. We estimate the average matching efficiency over the entire period, $\overline{\Upsilon}$, as an intercept and α as a slope coefficient using the method of least squares,

(10) $\ln P(\theta_t) = \ln \overline{\Upsilon} + (1-\alpha) \ln \theta_t + \epsilon_t$,

where ϵ is an error term. By substituting the expression $P(\theta_t)$ for from equation 9 we obtain the following expression,

(11) $\ln \Upsilon_t + (1-\alpha) \ln \theta_t = \ln \overline{\Upsilon} + (1-\alpha) \ln \theta_t + \epsilon_t$,

i.e.,

(12) $\epsilon_t = \ln \Upsilon_t - \ln \overline{\Upsilon}$.

The error term thus measures the (percentage) deviation of the matching efficiency from the average level.

Payment systems – history and challenges

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Payment systems are currently undergoing important changes, mostly because of technological innovations. Such changes include a declining role for cash and a growing prominence of fast payment solutions. In this article, I discuss these developments and the challenges they create for central banks. I do so taking into consideration the historical evolution of payment systems and the insights derived from the literature on the economics of payments.

1 Introduction

A *payment* occurs when one party, the payer, transfers an asset to another party, the payee, for the purpose of discharging a debt incurred by the payer. Or, a payment may consist of the payer's instruction to a third party to make such a transfer.[1] While in principle a payment may be made with any asset, in practice virtually all modern payments involve transfers of debt claims on either a central bank ('outside money' in the form of both currency and deposits) or private banks ('inside money', today almost always in the form of deposits).[2]

A *payment system*, in turn, consists of a set of technologies, laws, and contracts that allow payments to occur and determine when a payment constitutes settlement. Payment systems include currency, checks, credit and debit cards, electronic funds transfers, internet banking, and so on. Developed economies depend critically on the efficient functioning of such systems. On the one hand, by offering debtors low-cost and trustworthy means of settling their debts, payment systems stimulate the use of credit, and thus economic activity more generally. On the other hand, unsafe and inefficient payment systems may hamper the efficient transfer of funds among individuals and economic actors (see Humphrey et al., 2006).

But how did central banks come to assume a position at the heart of payment systems? In the first section of this article, I follow Manning et al. (2009) and Norman et al. (2011) to provide an overview of the historical evolution of payment systems, beginning with the early emergence of money and banking. From these foundations, I briefly discuss the subsequent development of banks, and of payment and settlement systems. I then describe the evolution of central banks in the context of their settlement function. I also touch upon the historical reasons for why central banks have been granted the sole right to issue cash.[3] In the second section of the article, I provide a non-technical review of the segment of the payments economics literature that studies both the optimal provision of payment systems and the government's role in mitigating the fundamental frictions that make such systems essential. I also discuss the interactions between payments, monetary policy and financial stability. In the third section, I review ongoing changes that characterize payment systems nowadays. The last section concludes.

Correction 14 June 2019: Section 3.2 has been revised.

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1 The definition is from Roberds (2008).

2 The vast majority of payments in Sweden involve the transfer of bank deposits by various means.

3 Söderberg (2018) discusses in detail why the Riksbank was given a monopoly role to issue cash in Sweden.

1.1 Payment systems: historical evolution

Payments entail the transfer of value from one agent to another. When two agents exchange goods or services directly, such transfers are achieved by barter. There are, however, considerable frictions involved with barter transfers. Indeed, the Mengerian theory on the origins of money argues that the value of money is derived from the way it eases the friction of a 'double coincidence of wants' that hampers barter trade (Jevons 1875, Menger 1892). Menger's approach builds upon the idea expressed earlier by Jevons that for trade to take place in a barter economy, a consumer needs someone who not only has the desired good but also wants that consumer's good in return. In practice, it rarely occurs that two agents each want each other's good, still less that they have the correct quantities of each good available to be able to agree on the terms of their trade, and then still less that these coincidences materialize at the exact time that both sides of the bargain desire these goods.[4]

But while money has now acted as a mean of payment for a very long time, the documentary evidence suggests that, for a long time, payments among agents in the economy were for the most part limited to simple bilateral relationships – one agent would produce a good, and a consumer would pay for it with some form of money, either commodity or fiat.[5] It required the emergence of banks to create the conditions for the economics of payments to develop in a more sophisticated way.

Modern banks developed from different starting points. For example, bankers of the medieval Middle East engaged not only in money exchange and the granting of loans, but also regularly employed various payment methods. In Europe, even if merchants and bankers would have observed these practices when trading in and with the Muslim territories, there is no direct evidence to suggest that the Middle-Eastern payment instruments were directly adopted (Ashtor, 1973). Rather, in places where a wide variety of coins of different origin was in circulation, such as in thirteenth-century Venice, moneychangers expanded their role of valuing specie to offering payment and other banking services based on the deposits held with them (Kohn 1999, Mueller 1997).[6] Elsewhere, such as in mid-seventeenth century London, the origins of banking could be found among goldsmiths, who developed a similar banking business based on their specialist service of providing safekeeping facilities.

Whether western banks originated as moneychangers or as goldsmiths, merchants could deposit their coins with them in return for a receipt. Transactions could then be conducted either across the moneychangers/goldsmiths' books, or by transfer of the receipts they had issued. In some systems, such as those of continental Europe, account-based payment methods with transfers across accounts of banks tended to predominate. Elsewhere, such as in England (at least until the nineteenth century) or the US, issued notes were prevalent.[7]

By the start of the fourteenth century, Venetian records appear to show that account holders at the same bank could make payments to each other by book-entry transfer. There is no conclusive evidence, however, that these banks routinely accepted claims on each other. By the mid-fourteenth century, in the wake of a number of local bank failures, there were calls in Venice for a public bank to be set up, with the capacity to enable payments to be made without the credit risk that is inherent in commercial bank money. Its development

4 The Mengerian theory is complemented by the so-called Cartelist theory of the origins of money, which is based on the idea that money derives its value from the power and credibility of the issuing authority.

5 Cattle are the first and oldest form of money (9000–6000 B.C.). The first use of cowries, the shells of a mollusc that was widely available in the shallow waters of the Pacific and Indian Oceans, was in China (1200 B.C.). Bronze and copper cowrie imitations were manufactured by China and could be considered some of the earliest forms of metal coins (1000 B.C). For a history of money, see for example Davies (2016).

6 Specie is metallic money in all its forms (gold or silver traditionally).

7 Different payment approaches also reflected the different costs through time of addressing the vulnerabilities that were peculiar to each. With an account-based system, one must authenticate the account holder and keep records of the account holder's creditworthiness. Such a system is vulnerable to identity theft, and costly in record keeping. By contrast, with a store-of-value system (such as one based on issued bank-notes), one must verify the integrity of the store of value that is circulating. Over time, particularly with the technological advances of the twentieth century, the costs of account-based systems have decreased relative to the costs of store-of-value systems (see Kahn and Roberds, 2009).

was more than two centuries in the making and came to fruition only when the public Banco di Rialto was set up in 1587. But elsewhere in the Mediterranean trading area, municipal (so-called *Taula*) banks were set up as early as the start of the fifteenth century – including in Barcelona (in 1401), Genoa (1407) and Valencia (1408). The Taula enabled banks to hold deposits as reserves and to use these to clear interbank payments. However, even when the Banco di Rialto was imitated in other significant European trading cities – such as Amsterdam (1609), Hamburg (1619) and Nurnberg (1621) – the activity of these 'proto-central banks' was limited to local payments.

As for note-based systems, by the 1660s the London goldsmiths were carrying out a banking business in issuing notes against specie deposits, and creating money by issuing further notes to borrowers. The claims that banks accepted on each other were then redeemed on a bilateral basis every few days, with the (net) difference settled in specie. The frequency of settlement was determined by the creditworthiness of the issuer: the more reputable a banker, the longer other bankers were willing to hold his notes (Quinn, 1997).

As economic activity grew, following agricultural and industrial advances in the eighteenth and nineteenth centuries, increasing payments needed to be made over greater distances, and so both volumes and values of interbank obligations increased. In response, the banks' clearing and settlement arrangements became more formalized.[8] For instance, from 1775 onwards, the Bankers' Clearing House in London was settling daily. It was then a short step from settling obligations bilaterally, to doing so multilaterally and by 1841 onwards the Bankers' Clearing House in London started settling on a multilateral basis. The innovation of multilateral settlement further reduced the quantity of the settlement asset needed by participants to meet their net obligations.

A further cost-saving development, above all in note-based systems, was for the clearing-house blue-print to be adopted outside the capital cities. For example, in Canada, ten regional clearinghouses were similarly established between 1887 and 1902, with daily settlement at four main centres. Although such regional arrangements fragmented the pools of liquidity that the banks needed in order to settle their obligations (at least until regional net obligations were forwarded on to the centre), they saved significantly on settlement asset transportation costs.

These transportation costs were particularly acute when the settlement asset was specie or (gold) bullion. Not only was this cumbersome and costly to transport and exchange, but the process of transportation was vulnerable to a variety of operational risks – notably theft. To address the transportation costs, banks innovated by using assets that were convertible into specie and that all banks were willing to accept. By the 1770s, for instance, London's bankers had switched from settling in specie to settling in Bank of England notes. Notes issued by the Bank of England – as opposed to those issued by other London banks – were chosen presumably because of certain advantages uniquely enjoyed by the Bank, notably being the banker to the government.

Whether it was specie/gold or some paper that was (partially/wholly) convertible, a vulnerability to theft remained, however, as long as the settlement asset needed to be physically transported, either bilaterally between banks or to a (central) clearing house. By settling interbank obligations over accounts at a bank, this vulnerability could be eliminated entirely. In the United States, the Second Bank of the United States used its accounts to play an active role in providing inter-regional payment services for the two decades (1816–1836) that its charter was granted. And during the 1820s, Boston banks appointed a single agent for clearing and settling notes in Boston – the Suffolk Bank – which cleared the notes of several New England banks on a multilateral net basis and settled their positions in deposits that they held with it. The Suffolk Bank clearing and settlement arrangements were

8 Clearing is the process of reconciling and confirming payment orders prior to settlement, that is prior to the conclusion of a transaction.

superseded when, in the 1850s, the mutually owned Bank for Mutual Redemption replaced it and continued to perform a similar clearing and settlement function. Meanwhile, on the other side of the Atlantic, deposits at the Bank of England (as opposed to Bank of England notes) were used to effect settlement of the Bankers' Clearing House obligations from 1854 onwards.

This did not imply that one single institution should necessarily become the hub of a country's payment system. In Canada, for instance, regional clearing arrangements were formalized with the set-up (in statute) of a mutual Bankers' Association at the start of the twentieth century. Nevertheless, as technology constraints lessened (and specifically in the case of the Canadian system, as telegraphic communication between different regions became feasible), strong economies of scale emerged pushing for centralization. By 1927, settlement of Canadian banks' obligations was centralized at the Royal Trust Corporation.

Even where one institution did become the centre of a country's payment system, it was not necessarily the case that it would become the central bank. Continuing the Canadian case study, the Royal Trust Corporation was completely unrelated to the Bank of Canada that took over its settlement role when it was set up in 1935. Similarly, in post-Civil War US, a system of mutual clearing houses was set up. In 1913, the Federal Reserve System was established and started providing a unified nationwide interbank settlement system based on telegraphic wire transfers.

In Sweden, the Riksbank's involvement in clearing and settlement seems to have been limited between the mid-1850s and 1901.[9] Instead, the clearing function of the Swedish banking system was performed by two commercial banks. The Stockholms Enskilda Bank was started in 1856 and it immediately began to act as a clearing bank for other note-issuing banks. However, the Skandinaviska Kreditaktiebolaget, a non-issuing bank, largely took over the clearing function in the 1860s, mainly because it offered better terms. In 1897, a new bank law was promulgated that prescribed the monopolization of notes by the Riksbank. The transfer of the Enskilda banknotes to the Riksbank occurred between January 1901 and January 1904 and clearing was taken over by the Riksbank.

1.2 The advent of central banks' currency monopolies

Granting central banks the sole right to issue cash, known as the banknote monopoly, was a political decision taken in most of the Western world in the late nineteenth and early twentieth centuries. As discussed by Eichengreen (2019), monopoly over seigniorage is a source of political power and a valuable help when sovereignty is threatened. The various countries' reasons for introducing such monopolies differed, however, which makes it difficult to address the topic in a comprehensive manner. Thus, I will follow Söderberg (2018) and discuss the cases of the United Kingdom and the United States, the two largest Western economies at the time, as well as the one of Sweden.

The Bank of England was created in 1694 as a privately-owned bank that conducted lending operations with both the state and the general public in London. It also accepted deposits and issued paper banknotes. The second half of the 1810s in the United Kingdom was characterized by financial instability and inflation following the Napoleonic Wars. This led to a national discussion, which continued throughout the 1840s, on how to achieve a stable monetary and financial system. One conclusion of this debate was that inflationary pressures were due to the excessive issuance of banknotes by smaller banks. That is, the Bank of England could not control the quantity of banknotes in circulation and thus was not able to manage the total supply of money. As a consequence, the Bank Charter Act of 1844 heavily restricted the smaller banks' right to issue banknotes so that the Bank of England held the sole legal right to determine the number of banknotes in circulation.

9 Ögren (2006) argues that it is likely that the Riksbank did engage in some clearing activities.

In the United States, on the other hand, after 1836 and the dissolution of the Second Bank of the United States, a bank could be established without the permission of the states, provided that certain fixed capital requirements were met. Specifically, the banknotes issued by banks had to be redeemable against silver and gold and, in addition, banks had to allocate collateral in the form of federal or state bonds. By the mid-nineteenth century, there were over 1,500 private banks issuing banknotes in the United States (Gorton, 2012). These banknotes did not just circulate regionally, but also nationwide, which implied each bank had a large proportion of other banks' banknotes on its balance sheet (Rolnick et al., 1998). The underlying problem was that banknotes issued by different banks were not worth the same. Why? Banks had different risk profiles and several states suspended payments of their debts, thus undermining banks' collateral. The result was a highly impractical system in which traders had to determine how much different banknotes were worth in relative terms.[10] These difficulties, combined with the need to fund the American Civil War, which started in 1861, led to the National Bank Act of 1863 and the implementation of a system with federal, state-backed banknotes. The state banks' right to freely issue banknotes was eliminated and many of them were forced to close. National banks were created instead. These were privately owned banks, which could issue banknotes that were worth the same in all states and were backed by federal government bonds.

In the decades after the introduction of the national banknotes, no fewer than seven financial crises occurred in which bank runs were a central element (Gorton, 2012). The rationale for creating a central bank in the United States, with banknote monopoly, was therefore mainly provided by the need to create a lender of last resort (Wood, 2005). When the Federal Reserve was created in 1913, the decision was also taken to dismantle the national bank system and replace it with government banknotes issued by the Federal Reserve (Weyforth, 1925).

In Sweden, the Riksbank was the only bank for a long time. Banknote-issuing private banks were therefore allowed by the Swedish Riksdag in 1824 in order to promote the development of a banking system in Sweden. These banks accepted deposits from the general public, albeit on a very limited scale. Reasons for this included the limit placed on interest rates by older legislation on usury. Consequently, from the start, issuing banknotes was the private banks' main source of funding (Lilja, 2010). The system was, however, not entirely private. On the contrary, banknotes from the private banks could be redeemed for Riksbank banknotes, namely government banknotes, which could, in turn, be redeemed for precious metals. The relationship between the Riksbank and the private banks thus had strong similarities with an early central bank system. In addition, the banking system was under very strict government regulation. Permission to open a banknote-issuing bank was given by the central government and very restrictively. The legislation was also clearly formulated to limit what we today call moral hazard – banks should be organized like partnerships with unlimited economic responsibility and should not expect any government support in difficult periods (Jonung, 2007).

The profits from the issuance of banknotes, known as seigniorage, played an unusually important role in the debate on banknote monopoly that started in the 1840s in Sweden. The central government stood for a large part of the private banknotes' credibility, thus implying private banks received an indirect government subsidy. Consequently, arguments were made in Riksdag motions from the 1860s that the profit from the issuance of banknotes should belong to the government. Resistance to this argument was mainly justified by the argument that a monopoly would threaten the existence of Swedish banks (Brisman, 1931). The final decision was taken in 1897 and the Riksbank was granted monopoly power in the issuance of banknotes.

10 For example, a ten-dollar banknote issued in one state could be worth USD 9.90 in another state and USD 9.40 in a third (Gorton, 2012).

2 Brief review of the literature

While policy-makers care about the efficiency and stability of payment systems, guidance from economic theory has, until recently, been limited. This is changing – old models abstracted from the mechanism through which payments took place, whereas new models develop internally consistent, general-equilibrium models to analyse the roles of alternative payment instruments and institutions in facilitating trades. These are theories of rational, strategic agents, which explicitly model the underlying transactions of goods or financial assets that generate the use of the payment system.

The existing literature focuses on four key issues. First, it aims at identifying the fundamental frictions that underline the use of payments and settlement arrangements. Second, it investigates who should provide these systems, and what the government's role should be in mitigating the fundamental frictions. Third, it studies how payment systems interact with financial intermediation and macroeconomic policy. Last, it studies how these systems evolve with the ongoing improvements in information technology.[11]

The recent literature in monetary theory argues that *limited enforcement* and *limited information* are the two key micro-economic frictions that explain why some observed payment arrangements are essential to an economy. Limited enforcement refers to a situation where some agents can default on their obligations at little or no cost. Limited information refers to a situation where some agents have no or limited knowledge about other agents' current and/or past actions. In this environment, there may be a role for a central bank (and for regulation) with respect to mitigating some of these frictions through commitment and enforcement technologies. Several studies, however, find that it is not necessarily only a public agent who may fulfil these requirements for the welfare-enhancing provision of a payment system.

Indeed, theory generally suggests that central banks may have a comparative advantage in two main payment system functions. The first is the management of the accounts that participants own and use to settle transactions. Central banks are suited to this role because of their trustworthiness and public policy mandate. The second is the supply of very short-term credit (e.g., intraday credit) to intermediaries to facilitate settlement, or to facilitate the resolution of settlement disruptions. The provision of cheap central bank credit, however, may distort private sector choices by inducing participants to take excessive risks and overuse central bank credit, leading to moral-hazard problems. To deal with this issue, central banks are increasingly requiring collateral for such credit and liquidity and capital constraints can also be imposed.

A central bank may have several other advantages with respect to economies of scope, the commitment not to overissue the asset, to reabsorb the liquidity introduced by intraday needs, and to intervene in times of distress in view of its responsibility for price and financial stability. There are, of course, also examples where central banks have misused their privileged positions.

2.1 Optimal provision of payment systems

Green (2005) and Millard and Saporta (2005) point out several features that can make a central bank the best provider of payment systems, such as its neutrality with respect to financial institutions and its creditworthiness. They also argue that the provision of settlement accounts to banks is a natural extension of a central bank's traditional role as the government's banker. Their arguments are further strengthened if there exist economies of scope in the provision of the settlement asset and other public policy objectives, such as a concern about systemic risk that might not be internalized by private operators.

11 Chiu and Lai (2007) provide an extensive literature review on this topic.

Kahn and Roberds (2002) find that central-bank operated settlement arrangements may offer both potential advantages and disadvantages as compared to private ones. Although confidence in the liabilities of the central bank can sustain trade during crises, that same confidence can undermine the incentives of payment-system participants for mutual monitoring. This is of concern if one believes the public sector is less efficient at monitoring or is less inclined to act based on the information received. Thus, this disadvantage must be weighed when considering the merits of public versus private payment systems.

Mills (2004) studies whether outside money is needed for settlement. He finds this is not to be the case if a strong private enforcement authority exists. He conducts his analysis using a Freeman (1996a) model, who was the first to formulate a framework in which (i) debts are repaid with outside money and (ii) there can arise liquidity problems which create a role for a central bank discount window. Mills argues that outside money is not necessary for settlement in Freeman's environment – if agents have a technology to issue IOUs, and there is an enforcement authority to force debtors to redeem their own IOUs, then no outside money is needed for settlement. In the absence of this strong enforcement authority, however, outside money will be needed.

Green (1999) uses a Freeman (1996b) model to study whether efficiency might require a central bank to participate in the payment system. He finds this depends on the degree to which a central bank can promise reliably and credibly to reabsorb money that it issues to facilitate payments and on whether the commercial law framework governing the operation of a private-sector payment intermediary is enough to warrant agents' use of debt issued by the intermediary as a money-like medium of exchange. The credibility of a central bank's promise about reabsorption evidently depends, in turn, on its governance structure. Moreover, Green comments that it is likely that the institutions of central bank governance necessary for credible participation in the payment system are essentially identical to those necessary for the effective implementation of monetary policy in a narrow sense. Thus, to whatever extent there is a need for a central bank to participate directly in the payment system, this need reinforces the considerations in favour of chartering a politically independent central bank. Moreover, the need for political independence suggests that the central bank would typically be a more appropriate public-sector participant in the payment system than would the treasury or another agency under the immediate control of the government.

2.2 Central banks' currency monopoly

Currency monopoly is a controversial topic. Although significant numbers of economists opposed this development during its early stages (see Smith, 1990), others either favoured it or were indifferent. As monopoly became the norm, the opposition ceased – or did so until the mid-1970s, when Friedrich Hayek succeeded in reopening the debate, if only on a very small scale (see Hayek, 1976). Hayek advocated a system in which private entities would issue their own forms of money. Private monies would then compete among themselves to provide a stable means of exchange.[12]

As discussed by Selgin (2008), Milton Friedman's views on the issue offer a particularly interesting case study. Despite having been a firm supporter of free markets, he at first shared the common view concerning the necessity of official currency monopolies. In *Program for Monetary Stability* (Friedman, 1959), he asked the question 'whether monetary and banking arrangements could be left to the market, subject only to the general rules applying to all other economic activity.' 'Something like a moderately stable monetary framework' he wrote 'seems an essential prerequisite for the effective operation of a private market economy. It is dubious that the market can by itself provide such a framework.

12 Inside money (bank deposits) should not be confused with private money. A system of private money is one in which financial institutions create currencies that compete for acceptance. Cryptocurrencies can be viewed as examples of private monies.

Hence, the function of providing one is an essential governmental function on a par with the provision of a stable legal framework.' He revised his original opinions in light of the renewed interest in the question Hayek's work helped to stimulate. His opposition to banknote currency monopolies remained lukewarm, however, although he ultimately concluded there was, after all, 'no reason currently to prohibit banks or other groups from issuing hand-to-hand currency' (see Friedman and Schwartz, 1986).

The interest in privately-issued monies has been revived by the emergence of cryptocurrencies such as Bitcoin and Ethereum, but the monetary literature on this topic is still in its infancy. Among the few that have addressed this topic, Fernández-Villaverde and Sanches (2016) build an interesting model of competition among privately issued fiat currencies from which they derive three main insights. First, price stability can be consistent with competing private monies. Second, private monies are also subject to self-fulfilling inflationary episodes, even when they are issued by profit-maximizing, long-lived entrepreneurs who care about the future value of their monies. Third, a purely private monetary system does not provide the socially optimum quantity of money. That is, the market fails to provide the right amount of money in ways that it does not fail to provide the right amount of other goods and services.

2.3 Payment systems, financial stability and monetary policy

The efficiency and effective functioning of financial markets are affected by payment systems. For example, the instruments available for making payments, the clearing and settlement facilities to which financial market participants have access and whether there is a large-value transfer system (LVTS), among other things, greatly influence speed, financial risks, reliability and cost of transacting when financial market participants make payments.[13] Payment systems also contribute to integrating financial systems, both domestically and internationally.

On the downside, a payment system is one transmission mechanism through which unsound financial players can jeopardize the stability of the whole financial system, with potentially adverse effects on the real sector as well. As lenders of last resort, and in trying to ensure the stability of the financial system, monetary authorities may be forced to rescue individual banks and segments of the capital market to counter systemic risks to the financial system. The more fully integrated the financial markets and hence normally the more developed the payment system, the greater are the systemic risks that arise, underscoring the need for greater coordination of cross-border prudential measures to contain spillover effects.

Some of these threats may derive from the design and operation of payment systems themselves. Millard and Saporta (2007) identify two principal sources of systemic risk arising from payment and settlement activity: single point of failure risk; and risk arising from strategic interaction between payment system participants. In other words, faced with a prolonged disruption (or frequent disruptions) to the operation of a single provider of payment and settlement services in a particular market, users will be unable to re-route volume readily to an alternative provider. Trades may then remain unsettled for a period, either implying direct losses or creating unintended credit or market exposures.

In terms of monetary policy, central banks need to establish appropriate arrangements for liquidity provision to the banking system in order to effectively exercise control over the quantity and price at which its liabilities are made available. Central banks must therefore pay attention to the mechanisms by which they carry out such operations, ensuring the safety, resilience and efficiency of the payment and settlement systems used to mobilize

13 LVTSs are systems for electronic wire transfers of large sums of money.

collateral assets and distribute funds.[14] By extension, they must take an interest in the payment systems employed by the banking system to carry out its own credit intermediation and thereby transmit monetary policy more widely throughout the economy.

In recent years, there has been a marked shift away from deferred net settlement to real-time gross settlement (RTGS) in large-value payment systems.[15] This implies heightened intraday liquidity demands on payment system participants, which are typically met via the provision of credit by the central bank. Intraday credit is often extended against collateral, but typically at a very low nominal interest rate. Central banks' generous policy with respect to intraday liquidity provision has motivated a series of theoretical studies as to whether it is appropriate for a central bank to adopt different approaches to intraday versus overnight monetary policy.[16]

Millard et al. (2007) argue that the difference reflects a tension between different aspects of the central bank's monetary stability objective: on the one hand, a central bank sets overnight rates to meet its price stability objective; on the other, it may be prepared to inject intraday liquidity into an RTGS payment system at a very low cost to ensure that banks do not have an incentive to delay payments and risk settlement failure (as in Furfine and Stehm, 1998). Williamson (2009) argues that the distinction between intraday and overnight policy action has become blurred.

Changes in payment systems can occur because of reforms or innovation.[17] In that case, there are implications for the monetary-policy decision making process that go beyond the need to consider the impact on the demand for base money. According to Johnson et al. (1998), four different areas of decision making could be affected in this case. First are the *monetary policy target and instrument settings* – for example, the aggregate volume of reserves the central bank should supply for consistency between payment-related demand for reserves and the central bank's desired monetary policy stance; the pricing or the quantity limits in standing central bank credit facilities, and the appropriate relationship between very short-term interbank interest rates (which the central bank directly affects) and other interest rates and financial variables (over which the central bank has less direct influence). Second are the *choice and interpretation of appropriate target or indicator variables* for monetary policy, at least during some transitional period – for example, the relative weights (or reliability as indicators) attached to price and quantity variables (interest rates versus reserve money) while demand for the key operational quantity variable (reserve balances) is shifting. There may be effects on quantity variables at the level of the banking system, as well as at the level of the central bank's balance sheet, to the extent that, for instance, the velocity of transaction balances is altered. Third is the appropriate *design of monetary policy instruments* – for example, the design of reserve requirements or central bank standing credit facilities, or the nature and timing of central bank market operations might need to be adjusted considering payment system reforms or endogenous changes. Fourth, of course, is the *monetary policy transmission mechanism* itself – for example, the efficiency with which central bank changes in the supply of reserves affect interest rates in different markets and hence other economic and financial variables of ultimate interest.

14 Difficulties for monetary policy can arise when inefficiencies and changes in the payment system cause unpredictable shifts in the demand for base money. Examples of such inefficiencies include long delays in processing and settling payments, payment gridlock, frequent breakdowns in payment facilities, large-scale fraud, stoppage in operations and lack of clarity over important legal issues affecting payments, such as bankruptcy laws, legality of documents in contracting and enforceability of contracts and agreements.

15 With deferred settlement systems, final settlement of transfer instructions occurs on a net basis at one or more discrete, pre-specified times during the processing day. With RTGS systems, final settlement of interbank funds transfers occurs on a continuous, transaction-by-transaction basis throughout the processing day.

16 See the proceedings from the 2007 conference on 'Payments and Monetary and Financial Stability' organized by the European Central Bank and the Bank of England.

17 Recent examples of payment innovations are cryptocurrencies such as Bitcoin and the use of blockchain technology for inter/intrabank payments (see Prasad, 2018).

3 Ongoing changes in payment systems

Despite their central role in the economy, payment systems have long been considered only the plumbing of the economy, meaning something essential but boring. Recently, however, they have received more attention, due to the significant technological changes in the industry and associated policy concerns, and possibly simply because of the magnitude of payment activity. In this section, I will touch upon some of the issues of key importance that central banks, and in particular the Riksbank, face nowadays when it comes to payment systems.

3.1 The role of cash

In most Western nations, legal tender status has typically been extended to coins and banknotes, meaning the governments of those countries consider them to be the official money in use. Nowadays, however, money is not just banknotes, but it takes many different forms: debit cards, cheques, and contactless payments using mobile devices, among others. Moreover, in retail situations, it is not uncommon to encounter shopkeepers refusing banknotes. For example, many US and EU retailers refuse to accept $100 and €500 bills respectively and many Swedish shops have dispensed with cash altogether. This can happen because of how the interaction between the legal tender provision and the principle of freedom of contract is governed in those countries.

In Sweden, for example, banknotes and coins issued by the Riksbank are legal tender (see Chapter 5, Article 1 of the Sveriges Riksbank Act). However, a principle of freedom of contract applies in the country which implies contract laws have a higher precedence than banking and payment laws here. In other words, the parties are free to agree on another method of payment than cash, and the provision of legal tender simply establishes a right to pay in cash unless otherwise agreed between the parties. This implies that if a store puts up a sign that it does not accept cash, then a customer has entered a contract or an agreement with that store that it does not accept cash.

Quite similarly, in the United States, section 31 U.S.C. 5103 states: 'United States coins and currency [including Federal Reserve notes and circulating notes of Federal Reserve banks and national banks] are legal tender for all debts, public charges, taxes, and dues.' This means that all United States currency constitutes a valid and legal offer of payment for debts to creditors. There is, however, no Federal rule that a private business, a person, or an organization must accept currency or coins as payment for goods or services. Private businesses are free to develop their own policies on whether to accept cash unless there is a state law stating otherwise.

In the Euro area, the status of euro banknotes and coins as legal tender follows from Article 128 of the 2010 Treaty on the Functioning of the European Union and Council Regulation no. 974/98. Also in 2010, the European Commission issued a recommendation (2010/191/EU of 22 March 2010) on the scope and effects of legal tender of euro banknotes and coins. The recommendation includes a number of guiding principles, including: '1. The acceptance of euro banknotes and coins as means of payments in retail transactions should be the rule. A refusal thereof should be possible only if grounded on reasons related to the "good faith principle" (for example, the retailer has no change available). 2. Large banknotes should be accepted as means of payment in retail transactions unless refusal thereof is grounded on reasons related to the "good faith principle" (for example, the face value of the banknote tendered is disproportionate compared to the amount owed to the creditor of the payment). 3. No surcharges should be imposed on payments with euro banknotes and coins.' Such recommendations are non-binding however and four member states (Germany, Finland, the Netherlands and Ireland) did not endorse them. Indeed, according to these four member states, the principle of contractual freedom can limit legal tender provisions.

In Denmark, instead, the principle of freedom of contract does not supersede the country's so-called *cash rule*, originally passed in 1984. Under such rule, a payee who accepts payment instruments, such as payment cards, must accept cash as payment in connection with staffed sales (section 56 of the Payment Services Act).[18] This means that cash cannot be rejected whenever the retailer is staffed. On the other hand, the payee does not have any obligation to accept cash in connection with online purchases and in unstaffed self-service environments such as unstaffed gas stations. The cash rule applies to both private sector firms and public institutions.

This is an important issue, especially for central banks of countries where the use of cash is declining. In countries like Sweden, for example, where such decline is particularly striking (see Sveriges Riksbank, 2018a), one can easily envisage a near future in which cash will de facto not be accepted. This could be true even if cash were still legal tender, the reason being that cash acceptance is intimately connected with the expectation that it will be valuable in the future. Its value therefore declines if it is accepted less frequently, as shown by Bigoni et al. (2018). Central banks should thus investigate how to react to that possibility and whether cash should be viewed as the ultimate mean of settlement, meaning that it could function even in the event of blackouts or wars. As such, should its acceptance be guaranteed, much like it happens in Denmark? And if that were to be the case, would competition in the payments industry be guaranteed?

Partly as a response to the decline role of cash, several central banks have publicly announced internal efforts to study central bank digital currencies (CBDCs) for either retail payments or wholesale payments, or both. The Riksbank is at the forefront of this debate (see Sveriges Riksbank, 2018b). If implemented, the impact of CBDCs would be significant: banks have traditionally played a central role in supporting payments, so that removing them from the centre of this system could reshape banking and, more broadly, the financial markets. Such potential important consequences are currently the subject of debate among economists (e.g. see Andolfatto 2018, Bech and Garratt 2017, Berentsen and Schar 2018, Bordo and Levin 2017, Cecchetti and Schoenholtz 2017, among others).

3.2 Fast-payment initiatives

An important distinction must be made between wholesale and retail payments. Wholesale payments are high-priority and typically large-value transfers that are made between financial institutions for their own accounts or on behalf of their customers and are usually settled via dedicated interbank settlement systems. Retail payments, instead, are lower-value transactions between individuals, businesses and governments in such forms as cash, cheques, credit transfers, and debit and credit card transactions (see Bech et al., 2017 for an interesting discussion).

The speed of settlement finality has traditionally been very different between the two. Traditional retail payment systems were typically slower, and for some systems, payments were revocable within a certain period. Hence, time-sensitive payments (even lower-value ones) were directed via the interbank payment system because of its ability to credit and debit accounts with real-time finality. Nowadays, however, the speed of retail payments is immediate in some countries thanks to improvements in information and communication technologies (e.g. smartphones and the internet).

In Sweden, **Bankgirot** is a bank-owned clearing organisation and is the central actor in the mediation of retail payments in the country. Several different types of payments and transfers are made through Bankgirot, such as credit transfers, direct debits, suppliers' payments, salary payments, account-to-account transfers, and the clearing of card payments and ATM withdrawals. The mobile payment system **Swish**, which was introduced in 2012,

18 See Danish Payments Council (2018), 'Report on the Role of Cash in Society', for details.

is the first service to use Bankgirot's settlement system for real-time payments. Thus, Swish allows private individuals access to a real-time payment service. Indeed, the typical time between payment initiation and availability of final funds to the payee for a successful payment transaction is one to two seconds.

As for wholesale payments, in recent years there has been a marked shift away from deferred net settlement to real-time gross settlement (RTGS), as discussed in Section 2.3. Many RTGS systems are currently in the process of being renewed or were recently renewed. Reasons for this include technological innovation, the end of technological lifecycles, the emergence of new players and regulatory standards, and the growing prominence of fast-payment initiatives. Overall, key RTGS design parameters are evolving to accommodate more access by non-banks, greater interoperability between payment systems and longer operating hours.

In Sweden, **RIX** is the payment system for large-value payments and the hub of the Swedish financial infrastructure, as RIX deals with payments to and from banks' accounts. Transfers between the accounts held by participants in RIX are made electronically and according to the RTGS principles. The system is owned and operated by Sveriges Riksbank, which can provide credit to RIX participants during the day, what is known as 'intraday credit'. However, credit is only granted against adequate collateral.

In Europe, the ECB launched a new RTGS system in 2018: TARGET Instant Payment Settlement (TIPS). As settlement in **TIPS** takes place in central bank money, participation in TIPS depends on being eligible to access such funds. TIPS currently only settles payment transfers in euro. However, in case of demand other currencies could be supported as well.

TARGET2-Securites (T2S) is also an RTGS platform on which securities and payments can be transferred simultaneously between investors across Europe, using harmonized rules and practices. T2S thus lays the foundations for a single market for securities settlement and contributes to achieving greater integration of Europe's financial markets. Banks pay for securities on the platform using the account they have with their central bank, so the money used to settle transactions is central bank money. As a result, transaction risk is greatly reduced.

These developments bring to the forefront two fundamental issues: the optimal role of central bank money in the payments chain and the access policy for RGTS systems. First, while most payments are eventually settled in central bank money, how much of these flows should be settled on a gross basis using central bank money as opposed to commercial bank money is open to debate. Second, direct access to RTGS systems has typically been limited to entities such as banks. Over the years, however, demand for access has increased from new entrants into the payments business and this trend is expected to continue (see Bech et al., 2017). Potential changes to access criteria bring up competition and financial stability considerations for central banks. On the one hand, limiting access to RTGS systems to banks could unduly favour these entities over others and potentially limit innovation in the market for payments. On the other hand, if access is extended to wider entities such as non-banks, central banks and regulatory authorities will have to consider how to guarantee equal opportunities for all players in aspects such as regulatory and supervisory frameworks and reserve requirements. In addition, wider access could have an impact on the overall resilience of the RTGS system. On the one hand, new entrants could be detrimental to system resilience if they are not as strictly supervised as banks. On the other hand, wider access could also have a positive impact on the overall stability of payment systems if the central bank strengthens the monitoring of new players as a necessary condition of their access to the RTGS system.

4 Concluding remarks

Payment systems are currently undergoing important changes, mostly because of technological innovations. Such changes include a declining role for cash and a growing prominence of fast-payment solutions, both of which create new challenges for central banks. For example, should cash be viewed as the ultimate mean of settlement and should its acceptance be guaranteed by law? If so, how do we guarantee competition in the payment system sector? And who should have access to real time gross settlement (RTGS) platforms given the new players in the field? In order to understand the best role of central banks in this new environment, we must first understand how money and payment systems in general came to acquire the role they have today and what the literature in this field can teach us.

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The Riksbank's organisation and operations – a look back through history

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The Riksbank's operations are usually described in terms of the monetary policy objective of price stability and promoting a safe and efficient payment system. However, these are just a few of all the operations conducted at the bank. In this article, we provide a broader description of the work carried out at the Riksbank, and how the internal organisation has been changed and adapted in recent decades, in line with the changes in the bank's task and surrounding conditions. The article also provides a history of how the Riksbank has been organised since it was founded in 1668. Through this, we wish to provide an overall depiction of how the various policy areas have been put into practice in the actual operations, and analyse the factors that have influenced the Riksbank's organisation in recent decades.

1 Introduction

The Riksbank's tasks are usually expressed, in brief, as it is worded in the Sveriges Riksbank Act from 1999. It is stated therein that the Riksbank shall maintain price stability and promote a safe and efficient payment system. Descriptions of how these tasks are put into practice in the daily operations are few, and mentions of all the other operations that the Riksbank and its approximate 350 employees work with on a daily basis are even rarer. This article is an attempt to provide such a comprehensive portrayal of all the Riksbank's spheres of responsibility, and of how the operations have been conducted and organised in recent decades to the present time. Focusing on the bank's internal organisation, the article describes how the Riksbank's operations have changed in line with changes in the bank's task and role – from the broad and comprehensive task of credit and foreign exchange control, and a fixed exchange rate in the 1970s, to today's task of price stability and financial stability. Although the Riksbank's operations and organisation have changed as its tasks have changed, a number of elements have endured for a long time, ever since the bank was founded in 1668. In the introductory section of the article, the early organisation and operations are described, and how this has left its mark on subsequent developments. Looking back through history, it is also possible to explain to some extent changes in the Riksbank's organisation and operations based on external and internal events and processes that have had a direct or indirect impact on the bank.

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The question as to how a central bank should best organise its operations to fulfil its objectives is always pertinent, but perhaps more so now than in a long time. Financial markets are undergoing major change, not least in the field of payments, which could affect the type of organisation and operations needed by central banks. Also, in Sweden, a parliamentary inquiry has been under way for a few years on potential changes to the Riksbank's tasks, which could of course also affect how the daily operations should be run. The main purpose of the article, however, is to provide interested readers with an insight into how work at the Riksbank has been organised and changed in recent decades.

In the article, we wish to add some new knowledge by describing how the Riksbank has worked internally with its tasks, and by describing and attempting to put all the operations and tasks with which the bank works on a daily basis into concrete terms. The article also emphasises, more than previous studies, the scope that the Riksbank has, and must have, to interpret and reinterpret its role and its tasks in some respects and at certain times. Institutional frameworks provide the bank's managers with a certain degree of such scope, but our study also points to the importance of individuals to such reinterpretation.

There are relatively few studies on the Riksbank's daily operations and internal organisation, particularly beyond the field of economic history research. An explanation for this could of course be that the question as to how well the Riksbank has succeeded with its main objectives of maintaining price stability and an efficient payment system is not necessarily affected by how the operations are organised within the bank. If we are only interested in these operational objectives, this could be a reasonable assumption. In the three external evaluations of the Riksbank performed by international authorities on monetary policy and central banks, these main objectives have been in focus too (see Giavazzi and Mishkin 2006, Goodhart and Rochet 2011, and Goodfriend and King 2016). However, as mentioned above, in that case a large part of the bank's other operations and areas of responsibility are overlooked, which could lead to a lack of understanding of what the Riksbank and other central banks do. And, since focus on the price stability objective is largely built on, and reinforced by, academic understanding of what central banks do, there is an obvious risk of neglecting or underestimating the challenges in putting these kinds of objective into practice. Like in all other organisations, it is reasonable to assume that the ability of even a central bank to attain its operational objectives is dependent on how the operations are conducted and organised, who carries out the work and how the bank is managed.

The article is primarily based on materials from the Riksbank's archives. For the organisational changes, documents such as the Riksbank's rules of procedures, instructions, annual reports and registers have been important sources. These have also clarified the operations for which the Riksbank is responsible and how daily work has been conducted for each of these areas of responsibility. For explanations of organisational changes, internal inquiries and reports have also provided important information, which has been possible to supplement and validate with the experience and recollection of one of the authors in particular following a long career at the Riksbank. For the description of the external events and processes that have affected the Riksbank's operations and organisation in a longer-term historical perspective and from the 1970s onwards, the article has relied on earlier research which, in different ways, describes Swedish economic and monetary policy history.

In his accounts of the Riksbank's inception and early history, Brisman (1918, 1931) writes about the Riksbank's internal organisation and operations. These sources form the basis of the article's account of the Riksbank's early history, which we describe in section 3. Also, Wetterberg (2009), which is largely based on Brisman, raises interesting aspects of the bank's operations and organisation in a historical perspective. In three collections of essays recently published by the Riksbank, there are also a number of articles describing the operations of

the Riksbank (and other central banks) from angles of interest to us, see Edvinsson et al. (2010, 2014 and 2018).[1, 2]

This introduction is followed by a section on terms that are used and have been used to describe the Riksbank's operations. The terminology discussion is not exhaustive, but underscores how, for instance, the meaning and interpretation of terms such as 'monetary policy' have changed over time. A section then follows on the Riksbank's development since it was founded in 1668 until the end of the 1960s. After that comes a section with a more detailed account of the Riksbank's organisation and functions during the period 1970–2019, which makes up the main part of the article. Thematic sections on how monetary policy is conducted, how a safe and efficient payment system is promoted, and how the Riksbank works internationally then follow, as well as a comparison of the Riksbank today with what it was like in 1976 and 1999, respectively, when the new order was introduced for the Executive Board. The article ends with a brief summary of our observations.

2 The Riksbank's functions – a categorisation

The Riksbank thus conducts many different types of operations. Describing them has necessitated some kind of categorisation, which of course is not straightforward. Some types of operations can be 'booked' under several different operational objectives, and it is not always clear how one certain activity within the bank is linked to others, or to a clear operational objective.

Few researchers are of course spared from making this type of decision, and here we content ourselves with clarifying that the categorisation of the internal operations has been based on our materials about and from the Riksbank, and that we are aware that the breakdown does not fully reflect the breakdown that has existed in the practical everyday work within the Riksbank. The categorisation and identification of the functions are, as already mentioned, based on our interpretation of the Riksbank's formal tasks in law, rules of procedure and other formal sources, and different categorisation is possible.

The functions we have identified for the entire period are: (1) credit regulation; (2) foreign exchange regulation; (3) price stability; (4) open market operations; (5) foreign exchange operations; (6) currency reserve management; (7) payment systems; (8), cash provision; (9) analyses, reports and statistics; (10) financial stability; and (11) international work. The areas (3) and (10) differ from the others in the sense that these are objectives at which the Riksbank's entire operations are aimed, while the other functions are instruments used to attain these two objectives. Area (9) – analyses, reports and statistics – is for instance conducted to attain the price stability and financial stability objectives (among others). An important point to mention in this context is that we have noted that many of these operations have remained 'on paper' throughout all or large parts of the studied period. However, with our focus on the internal organisation and daily work, we have been able to see how prioritisation between these operations has changed over time. Some functions, such as those concerning credit and foreign exchange regulation, disappeared entirely during the studied period, while other areas, such as the international operations, have continually increased in scope. In Table A1 in the appendix, we have attempted to link the operational categories above to the departments that during 1974–2018 have held responsibility for the

1 See in particular Fregert's study of the Riksbank's balance sheet since 1668, Fregert (2014).

2 There are also articles on the operations published by the Riksbank. However, as a rule, these are about parts of the operations. Daltung and Ericson (2004) describe the Riksbank's work with cash provision from the 1980s and onwards, which is an important piece of history for understanding the Riksbank's organisational changes since. The monetary policy drafting process, and how the Executive Board makes monetary policy decisions, is described in Hallsten and Tägtström (2009) and Nyman and Söderström (2016). How Executive Board members have voted on the repo rate between 1999 and 2009 is described in Ekici (2009), and continuous updates are available in an Excel file on the Riksbank's website. Georgsson, Vredin and Åsberg Sommar (2015) discuss what the mandate of central banks, and of the Riksbank, has been and how it has changed in a historical perspective. Persson (2018) describes the 350-year history of the Riksbank using modern institutional economics as a starting point.

operations, and in the main text we attempt to describe the 'prioritisation' of each function over time.

As regards terms describing the Riksbank's operations, it is interesting to note that even the most common terms used today to describe what the Riksbank – and other central banks – work with and aim for, have generally been very vague and varying. Also, over time, the meaning of many terms has changed. For example, the term 'monetary policy' is linked today to operations for achieving price stability. The understanding of this term was different a few decades ago. In the so-called credit policy inquiry in 1982, for example, 'monetary policy' was understood to be an element of 'credit policy' which, at that time, was described as one of the Riksbank's two main tasks along with exchange-rate policy (SOU 1982:52, p. 10). The term 'credit policy' itself had many objectives other than price stability at the beginning of the 1980s, as shown not least in the directive that formed the basis of the inquiry itself. According to the directive, the task of the credit policy inquiry was to investigate the extent to which credit policy had contributed to attaining the objectives 'full employment, high growth, a low rate of inflation, balanced international payments, regional balance and a fair distribution of income' and 'to facilitate housing construction, finance the state budget deficit, promote certain regional policy objectives or facilitate the operations of small and medium-sized enterprises'.[3]

The meaning of the term 'central bank' has also varied. In the inquiry preceding the Sveriges Riksbank Act from 1988, 'The Riksbank and the National Debt Office', there is a discussion on what a central bank is and how its operations and areas of responsibility are to be described (see SOU 1986:22). The inquirers actually find that a definition must be based on what the bank does – that is to say, its operations and tasks. The question of operations and organisation will thus be central also in the question as to what a central bank is. These inquirers too discuss the term 'monetary policy', and conclude that entities other than a central bank can also be considered to conduct it, depending on how the term is defined. If for instance the purchase and sale of government securities and other securities is encompassed by the term, the present National Debt Office, for example, can be considered to conduct monetary policy along with the Riksbank.[4]

The 1988 Sveriges Riksbank Act listed the Riksbank's main tasks: (1) provision of banknotes and coins, (2) following developments on the currency and credit markets, (3) taking requisite monetary policy and foreign exchange policy measures, (4) managing the gold and foreign exchange reserves, (5) serving as the bank of the government, and (6) serving as the bank of banks. In our categorisation, these operations have been somewhat rehashed based on how the Riksbank's internal organisation has been. Matters of principle pertaining to the bank's role as the bank of the government and of banks were addressed, until the credit deregulation at the end of the 1980s, by for instance the Credit Policy Department, which also held overall responsibility internally for all matters pertaining to credit regulation. It ought to be clarified in this context that, even though the government and its agencies have the right to hold an account with the Riksbank, this possibility has hardly not been used since 1984. The banks have been able to offer a better service, and neither has the Riksbank worked to promote the government and its agencies holding accounts with the Riksbank. Besides the principles regarding central banks' political independence and public finances, there are operational reasons for why the state should not hold accounts with the Riksbank. Because the state, including the National Debt Office, does not hold funds overnight at the Riksbank, the latter's market operations are facilitated, because consideration need not be given to any movements in such accounts in order to calculate the state of liquidity in the payment system.[5]

3 Quote from the directive, as reproduced in SOU (1986:22), page 9.

4 The discussion also concerns the overarching question of what a central bank is and which tasks it has, see SOU (1986:22), pages 59–63.

5 For a description of the Riksbank's operational framework for the implementation of monetary policy, and how, using market operations, liquidity is supplied to or withdrawn from the banking system, see Nessén et al. (2011).

The term 'credit policy' ceased being used at the end of the 1980s at the same time that the above-mentioned objectives started to be considered far too comprehensive to achieve. Instead, 'monetary policy' came to be used, and then in a much broader sense than previously. Less than two decades after the 1982 credit policy inquiry, the government found for example (prop. 1997/98:40), with the Riksbank's concurrence, that 'exchange-rate policy can be seen as part of monetary policy' (see Sveriges Riksbank 2001). Thus, until the new millennium, operations such as foreign exchange operations were encompassed in the term 'monetary policy', but as such operations became increasingly uncommon, the term 'monetary policy' came to have the meaning it has today, which emphasizes actions taken to change interest rates.

Important inquiries in the 1970s, 1980s and 1990s in the Riksbank's areas
As of the end of the 1970s, a number of inquiries were launched that reviewed the credit markets' functioning, the Riksbank, National Debt Office, etc. The reason was that the strongly regulated credit market that had emerged after the Second World War was exhibiting tremendous internal tension and inefficiency, and an overhaul was unavoidable. The most important inquiries include "More effective credit policy" (SOU 1982:52), "Review of foreign exchange regulation" (SOU 1985:52), "The Riksbank and the National Debt Office" (SOU 1986:22), and "The Riksbank and price stability" (SOU 1993:20).

There are more operations whose meaning and scope have changed over time, such as work on financial stability, the international operations, cash handling and the Riksbank's communication, which we will discuss further on in this article.

One important type of operation for which the Riksbank is responsible in different ways is that which is conducted during financial crises. Ever since the trade war in Europe in 1772–1773, the Riksbank has, in difficult conditions, intervened as an important entity in managing crises in the banking system. The role of lender of last resort has also come to be considered internationally as an obvious part of a central bank's tasks. At the Riksbank, however, that operation has never taken the form of a permanent internal crisis organisation, but has been shaped depending on the specific circumstances surrounding each individual crisis, and on the other entities that have been part of managing it. Because our focus is on daily work at the Riksbank, we have therefore chosen to not include the Riksbank's organisation during various financial crises. However, this does not mean to say that such a study would not be of interest.[6]

3 The Riksbank's organisation and operations in a longer historical perspective

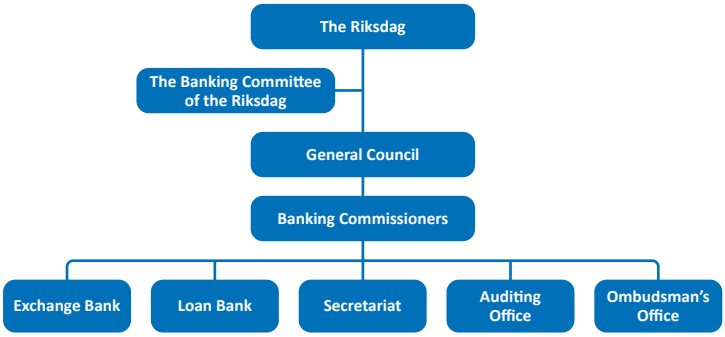
In this section, we briefly describe the Riksbank's early history to show that parts of the organisational and institutional structure of the bank today date all the way back to the 17th and 18th centuries. At the same time, looking back through history shows that the balance of power between the government/king, the banking committee of the Riksdag, the general council of the Riksbank and the bank's management has varied over the Riksbank's long history, and that these conditions have shaped the bank's goals and operations.

When, in 1668, the Estates of the Realm ('Riksens ständer') decided to take over the charter of Palmstruch's bank Stockholms Banco from 1656, a decision was also made to largely take over the wound-up bank's business model and organisational structure. Riksens

6 For a description of the Riksbank's measures during the latest financial crisis, see for example Johansson et al. (2018) and the references therein.

Ständers Bank was thus divided up into two business areas, in part an exchange bank, in part a loan bank, as well as a secretariat (see Figure 1). The 'new' bank thus continued as a commercial bank which, although owned by the state, was also run for a profit. The organisational separation into an exchange and a loan bank was done to strengthen the confidence of customers and the owners in the bank. The funds of depositors in the exchange bank were thus not to be used in the operations of the loan bank. On deposits in the loan bank, interest was paid, while accounts in the exchange bank did not pay interest, but offered the possibility of withdrawing the funds at any time, in the currency and denomination in which they had been deposited (Fregert 2014, Wetterberg 2009).

Figure 1. Riksens Ständers Bank, organisation in 1718



Source: The Riksbank

In the exchange arm of the bank, exchange services were offered for both the general public and business proprietors. There was a great need for this type of service because there was a plethora of different coins in the Swedish economy, of silver and gold as well as copper, minted both in Sweden and in other countries. In the loan arm of the bank, deposit and lending operations were conducted, whereby both small- and large-scale customers could deposit saved funds or take out loans against different types of collateral (such as objects in precious metals, chattels, real estate or a guarantor).

The original charter had been granted by Karl X Gustav of Sweden in the 1650s to promote trade and counteract profiteering, but also to promote price stability. The operational objectives for the bank's activities were to offer depositing and lending, and do so at a profit and with small credit losses, and to ensure that the exchange bank, at which withdrawals and exchanging could be carried out on demand, could always pay out what the bank's customers were entitled to (Brisman 1918). In the following centuries the bank succeeded relatively well with these undertakings, even though on several occasions it had to suspend depositing or lending or both, and limit the services of the exchange bank.

The management of Riksens Ständers Bank

As early as when Palmstruch ran Stockholms Banco, the state (that is to say, the king) had great interests in the bank, not least as a source of income. More than half of Stockholm Banco's profit was to be paid to the crown and to the City of Stockholm, and to look after these interests the king appointed a superintendent and several banking commissioners, who were placed in the bank's internal organisation.

When the Riksdag took over the bank in 1668, no new superintendent was appointed, although the number of commissioners was increased and the banking committee of the Riksdag was established, which was the first permanent parliamentary committee in the history of Sweden, and a forerunner of today's Riksdag Committee on Finance. A substantial part of the bank's profits was still to be paid into the treasury. Also, the bank soon became

a major lender to the crown, mainly for financing the wars at the end of the 17th century and beginning of the 18th century. This function as 'bank of the state' can be considered to be one of the first central-bank-like functions that the Riksbank assumed, albeit reluctantly. However, the institutional independence in relation to the king enabled, at least to some extent, obtaining interest and repayment instalments on these loans, even though in practice it was not possible to treat the king like any old customer.[7]

At the beginning of the 18th century, the daily operations were managed under the joint management of 21 banking commissioners (see Figure 1).[8] A governor, in today's sense, did not exist. Rather, operational decisions were taken jointly by the banking commissioners (Wetterberg 2009). They were appointed by the general council of the bank, whose members were appointed by the three estates of the Riksdag which, together, had taken over the bank – the nobility, the clergy and the burghers. The estate of the land-owning peasants had, when the bank was taken over, declined to participate in controlling it, and would not do so until the year 1800.

The general council consisted first of two, then three members from each of the nobility, burghers and clergy, and came to form the actual management of the bank, even though the charter and the banking regulation had bestowed upon the general council more the function of a board of directors. Changes in the regulation of the bank and its operations were decided by the Riksdags (parliaments) which, until the abolition of the Riksdag of the Estates in 1866, convened at three-to-five-year intervals.

3.1 Issuing banknotes gains momentum, and the branch network is extended

The Riksbank's issuance of banknotes gained momentum quite early on in the bank's history, despite the formal ban since the spectacular collapse of Stockholms Banco in 1663–1664. From the 1670s, more and more banknote-like means of payments emerged, such as assignments, transport bills and bank receipts (see Wetterberg 2009 for a description of these banknote substitutes), and during the so-called Age of Liberty in the mid-18th century, banknotes made their breakthrough as the primary means of payment in the Swedish economy. The advantages with banknotes in trade and transactions, compared with the increasingly larger and more cumbersome copper coins, had been the reason for Palmstruch's highly successful introduction of banknotes in 1661, and when the memory of the crisis faded (almost a hundred years later), demand resurfaced for the paper-light means of payment.

The Riksbank's internal organisation remained relatively unchanged until the beginning of the 19th century. However, the bank grew in size, from 43 employees in 1721 to 163 in 1765, which was a reason for why the organisational structure, which was rather vaguely devised from the outset, became increasingly sluggish and inefficient (Wetterberg 2009).

Competition with the National Debt Office, which also issued banknotes and financed the crown, was so fierce at the end of the 18th century that the Riksbank came close to being wound up. The decision to start withdrawing the banknotes of the National Debt Office as of 1800 was probably crucial for the Riksbank to be able to continue its operations (Brisman 1931). Slowly, the Riksbank took over the debt office's banknote issuance and lending, through the privately-publicly owned, but Riksbank-controlled, National Discount

7 The Riksbank (or Riksdag) managed to resist Gustav III when he requested financing for his war against Russia in 1788. However, the king managed to persuade the Riksdag to arrange financing through setting up the National Debt Office in 1789, which in turn financed the loan by issuing its own banknotes and coins. This led to the use of two state-issued currencies in Sweden. At the beginning of the 19th century, some of the banknotes issued by the National Debt Office were redeemed, but it took until 1858 for riksdaler riksgälds, as they were known, to be entirely abolished.

8 How the banking commissioners were placed in the organisation became less clear in the following centuries. Today, they can be compared with senior advisors. The title banking commissioner lived on into the 1990s, and at that time corresponded in terms of seniority to the position of department head.

Office (Riksdiskonten), even though the latter's banknotes remained in circulation and were accepted as a means of payment until the currency reform of 1858.[9]

In the 19th century, competition with the National Debt Office was replaced by competition with new types of private bank; initially the discounters in the 1810s, then from the 1820s the savings banks and the private banknote-issuing commercial banks, branch banks from the 1850s and then the limited-liability company banks in the second half of the 19th century. Like the Riksbank, these banks offered deposit and lending services, but were not as limited as the Riksbank in their business models and organisation.[10] The Riksbank started out as a Stockholm-based bank, while the rest of the country was gradually covered by the other types of banks. As the banking system spread across Sweden, however, the Riksdag saw a need to expand the Riksbank's branch network to cover the whole of Sweden. Despite resistance from the bank council ('bankofullmäktige'), in 1824 a branch was opened in each of Gothenburg and Malmö. Between 1872 and 1910, Riksbank branches were also established in all of the county towns of that time (23) and in Sundsvall and Norrköping. These branches could offer certain deposit and lending services and were responsible for the local supply of payment means, but were otherwise kept on a tight rein by the bank council. The types of loan offered far into the 20th century included fishing-equipment loans, agricultural loans, closed-end loans and mortgages.[11] The branches also bought and sold the premium bonds of the National Debt Office, monitored and paid out winnings on them, and also formed bond consortia for interested parties. When the branches engaged in managing loans in this manner, each branch had its own board, which included the head of the branch, but which was otherwise politically appointed.

When the Riksbank finally gained the monopoly in banknote issuance through the Sveriges Riksbank Act of 1897, the regional branches were given a clearer mandate for a time to supply the economy and society with the means of payment demanded.[12] However, because of the strong growth of the private banking system at the beginning of the 20th century, managing means of payment would soon largely be done by the commercial banks, savings banks and the state post office savings bank. The Riksbank branches would instead serve as banknote and coin repositories for the regional economy and places where the banks' could deposit/take out their surplus/deficit means of payment.

3.2 Towards a modern central bank

In the second half of the 19th century, several of the functions that are associated with central banks today gradually emerged, such as being the sole issuer of means of payment, the bank of banks, lender of last resort and crisis manager. Most of the activities that we also consider to be specific to central banks, such as interest-rate adjustments, changes in money supply and open market operations, were also developed around the turn of the century. The central bank's distinct role and operations emerged both as a consequence of critical events, such as the financial crises at the end of the 19th century, and the sharp expansion of the private banking system. The reforms of the state apparatus and the breakthrough of parliamentarism also contributed to forming the Riksbank's new role.

The question of giving the Riksbank the monopoly on issuing banknotes was addressed recurrently in the Riksdag from the 1870s and onwards. It was not until the 1897 Sveriges Riksbank Act that the issue was resolved. The Riksbank was given the exclusive right to issue

9 Initially, debt office banknotes (riksdaler riksgälds) were exchanged for riksdaler banco notes at two-thirds of the value, but the exchange rate was then changed to 1 1/2 riksdaler riksgäld for one riksdaler banco.

10 The law, in the form of the Commercial Code from 1734, set a limit of 6 per cent on what the Riksbank could charge in interest. The Riksdag still made decisions on interest-rate changes, which made for slow adaptation to changed economic conditions.

11 A kind of state loan was also administered, the settlement loan, which could amount to a maximum of SEK 10,000. They were needs-tested and given to young couples who planned to set up a home, or to single parents.

12 The Riksbank became responsible for banknote issuance by law, although the government retained the right to mint coins. This was changed in 1986 when the Riksbank was given the responsibility for issuing both banknotes and coins, which is unusual in an international perspective.

banknotes, and the private banknotes had to be redeemed by 1903 at the latest. Issuing coins remained a government monopoly, and this continued to be the case until 1986.[13]

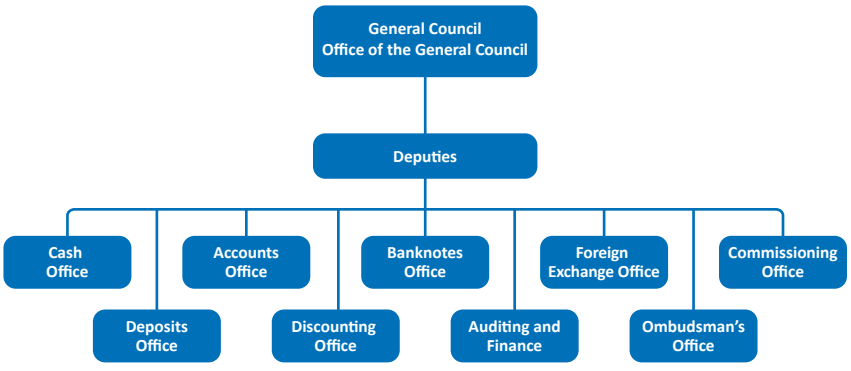
With the Riksbank's monopoly on banknotes, all of the private banks had to switch over to a deposit-based funding model (the banknote issuance of the private banks having previously served as a means of obtaining funding). Because of these changes, the Riksbank's function as a clearing centre developed, while at the same time the need to offer an exchange service for different domestic banknotes disappeared. The clearing function, in which the banks and other entities could manage the payments and transactions between them, had been developed under private auspices from the mid-19th century. Also, the Riksbank had to some extent had a clearing function previously through administrating the various banknote substitutes, although over the years this management had become increasingly complex in terms of administration, particularly compared with the new banks. Under the management of the future governor of the Riksbank, Karl Langenskiöld, Skandinaviska kreditaktiebolaget (founded in 1864) built up its successful business model. This was founded on the very process of offering clearing to other banks, by accepting their banknotes (particularly those of the smaller banks) in return for issuing liquidity loans to them.

New form of management

The rapid developments in the banking system in the second half of the 19th century, and the heightened competition, required reforms of the Riksbank's operations and organisation. The relatively indistinct organisation and management structure had given rise to a large and cumbersome administration, outdated procedures and ambiguous decision paths, which paved the way for new entities. In the 1860s, however, a number of changes were made to address these shortcomings (see Figure 2).

In 1860, the general council was extended to include a deputy for the internal administration, Albert Wilhelm Björck, who was responsible for the daily operations of the bank. It could be said that, through this position, the Riksbank gained its first governor.[14] While the mandate and sphere of responsibility of this position remained relatively unspecific in the formal sense, in practice the Riksbank gained for the first time an internal decision-making hierarchy with one manager at the top.

Figure 2. The Riksbank's organisation in 1863



Source: The Riksbank

13 See Söderberg (2018) for a discussion of the banknote monopoly in a historical and international perspective.
14 See Table A2 in the Appendix for a list of governors of the Riksbank and chairs of the general council since 1858.

A number of organisational units were merged and the number of employees was reduced, from around 120 in 1860 to around 70 in 1875 (Wetterberg 2009). When the Riksdag of the Estates was abolished in 1866, the bank changed names from Riksens Ständers Bank to Sveriges Riksbank.

In the final decades of the 19th century, the Riksbank gradually started actively attempting to influence liquidity, lending and interest-rate levels using changes in setting the interest rate, purchasing currency bills and other active management of the bank's reserves of foreign currency and precious metals (Wetterberg 2009, p. 215). These activities can be seen as early attempts by the Riksbank to help manage the crises and economic downturns that occurred in the 1870s, 1880s and 1890s, and soon, this became a more or less permanent feature of the bank's operations.

At the turn of the century, the Riksbank was given responsibility for managing the country's gold and currency reserve, which comes under the responsibility of central banks in most countries today. Already since the beginning in 1668, the Riksbank had managed a reserve of precious metals, banknotes and securities, although so had the National Debt Office and the privately owned commercial banks. Through the Act of 1897, the Riksbank was given full responsibility for managing the Swedish foreign exchange and precious metal reserves. The gold reserve was also needed, in accordance with the main rule of the gold standard, in order to stand prepared at any time to enable holders of banknotes to exchange them for physical gold. The foreign exchange reserves largely consisted of German Reichmarks in the form of treasury bills, because Germany had become an increasingly important trade partner for Sweden during the late industrialisation period, and there was a great need for redeeming payments in German currency.

The gold standard, which in 1855 replaced the prior silver standard, would endure as Sweden's exchange-rate system until the 1930s, with the exception of a few years' interruption, and was important in setting the direction of the Riksbank's operations and organisation throughout this long period of time. In other words, the operations became focused on keeping the value of the Swedish currency stable in relation to gold. This was achieved by controlling banknote issuance and overall liquidity in the economy, and also by buying and selling gold and other countries' currencies on international markets. The stock of banknotes was linked to the holding of metal, that is to say, an outflow of gold gave fewer banknotes in circulation, and vice versa. The difficulty presented by transporting physical precious metals between countries was also quickly resolved through employing intra-bank lending in gold-standard countries.

3.3 The commercial banking operations are wound up

After just over 230 years of operation, the greatest reform of both the Riksbank's task and its organisation came when in 1897, the Riksdag, after decades of deliberations, decided on a new Sveriges Riksbank Act. Through the new Act, the Riksbank, as described above, gained the monopoly over banknote issuance. At the same time, the bank was obliged to wind up most of its commercial banking operations focusing on the general public.[15]

Commercial banking operations were now transferred entirely to the private banks, which were obliged to wind up their own banknote issuance, hold an account with the Riksbank, and deposit some of their liquidity there. The accounts bore interest, and by adjusting this interest rate, the Riksbank could influence the banks' interest-rate setting. Thus, at this point, we can discern the embryo of today's interest rate steering system (read more in Sellin 2018).

The Riksbank's responsibility for serving as the lender of last resort was not formulated in the Act of 1897, but when the bank managed many of the banking and financial crises

15 Some kinds of loans and other services were also offered after the Act of 1897, actually up until the latter part of the 20th century.

that struck Sweden at the end of the 19th and beginning of the 20th centuries, by serving as guarantor, creditor or both, this central-bank function was also established.

Management

The Sveriges Riksbank Act of 1897 gave the government greater influence over the Riksbank, in that the chairman of the general council was to be appointed by the government, and not the Riksdag (parliament), as was previously the case. Through the new Act, the general council gained seven members, one of whom was the governor of the Riksbank (see SFS1897:27).

The governor of the Riksbank, who was then known as the first deputy, was, like before the 1897 Act, on the general council as the vice chair. The banking committee of Riksdag dealt with recruiting for the position, which meant that appointment was affected by the balance of power in the Riksdag, but also that it was based on relevant subject knowledge and experience from the sphere of banking. The first deputy was ultimately responsible for the Riksbank's operations, even though this responsibility and his powers were still relatively vaguely worded in the law.

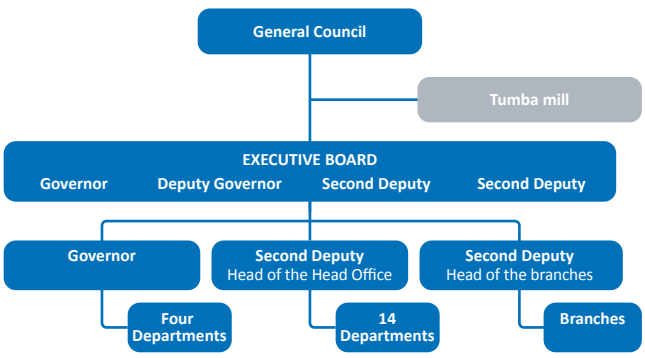
An important channel between the general council and the bank's daily operations was the office of the general council, which was headed by the bank secretary, who was also a key person in the daily management of the bank's operations. Besides the office of the general council, the bank secretary also headed the ombudsman's office, which had the task, among others, of verifying the Riksbank's loan collateral.

3.4 New Sveriges Riksbank Act in 1934 and increased political influence

A new Sveriges Riksbank Act came in 1934. On paper, it was mainly an update of the Act of 1897, and did not lead to any substantial formal changes to the Riksbank or its operations. In practice, however, the government's influence over the Riksbank would increase, particularly as of the Second World War.

Like under the former Act, the government had the right to appoint the chair (and deputy) of the general council of the Riksbank, and the Riksdag had the right to appoint six ordinary members (plus deputies). One of these members was nominated to the position of governor of the Riksbank, and was hence appointed by the Riksdag. The appointment of the governor of the Riksbank was dealt with through the banking committee of the Riksdag following negotiations between the parties in the two chambers of the Riksdag.

Figure 3. The Riksbank's organisation in 1935



Source: The Riksbank

The chairman of the general council led the meetings, but did not have stronger voting rights than anyone else. As a rule, it was the governor of the Riksbank who set the agenda and the topics to be addressed by the meeting, although he did not hold more than one vote in the general council either. All members of the general council had a term of office that was the same as that of the Riksdag, an order that was established as early as when Riksens Ständers Bank was founded in 1668. The common terms of office probably facilitated the coordination of monetary policy and fiscal policy that would exist for the next half century or so.

An increasingly regulated credit and foreign exchange market

The Sveriges Riksbank Act of 1934 (SFS 1934:437) would last over fifty years which, bearing in mind its strong resemblance to the Act of 1897, could be interpreted as a very long period of unchanged governance and regulation of the Riksbank. That was not the case, however. In connection with the Second World War, a number of emergency powers acts were put in place that strongly limited the Swedish banking and financial system, such as the Currency Act (SFS 1939:350). These acts prescribed that the Riksbank implement these restrictions, which would endure in more or less restrictive form right up until the deregulation of the 1980s. There were a number of reasons for why the emergency powers acts were maintained after the war. Perhaps the most important was the altered view of the role of the state in relation to the market. The Great Depression of the 1930s convinced many decision-makers of the need to control the most severe fluctuations of the economic cycle, and that to this end, both fiscal and monetary policy needed to be coordinated. And, in order to limit volatility of financial markets, a need was seen for various types of regulation.

To start with, foreign exchange regulation was conducted by the Foreign Exchange Office, which was under the Ministry of Finance. The Foreign Exchange Office operated between 1940 and 1957 and thus had the task of administering the foreign exchange regulation that was introduced during the war. In 1957, this responsibility was transferred to the Riksbank, where a Foreign Exchange Board and an Exchange Control Department were then established.[16]

Foreign exchange regulation was conducted by 'mutual understanding' with the commercial banks, and mutual understanding was also attained in the introduction of interest-rate caps, liquidity ratios, bond loans and reserve ratios (introduced during the years 1951–1952) which would subsequently be reworked into legal requirements (see Larsson and Söderberg 2017). These different forms of regulation, which were to promote financial stability and accommodate fiscal policy, were administered by the Riksbank.

This strict 'regulation regime' would persist until the beginning of the 1980s, when the legal restrictions on banks and markets were gradually eased or entirely eliminated. An interesting aspect is that the entire imposition of regulation in the 1950s, and large parts of the deregulation of the 1980s, occurred without changes to the Sveriges Riksbank Act. It was not until the beginning of the 1980s that work on a new Sveriges Riksbank Act commenced.

The Riksbank's management structure

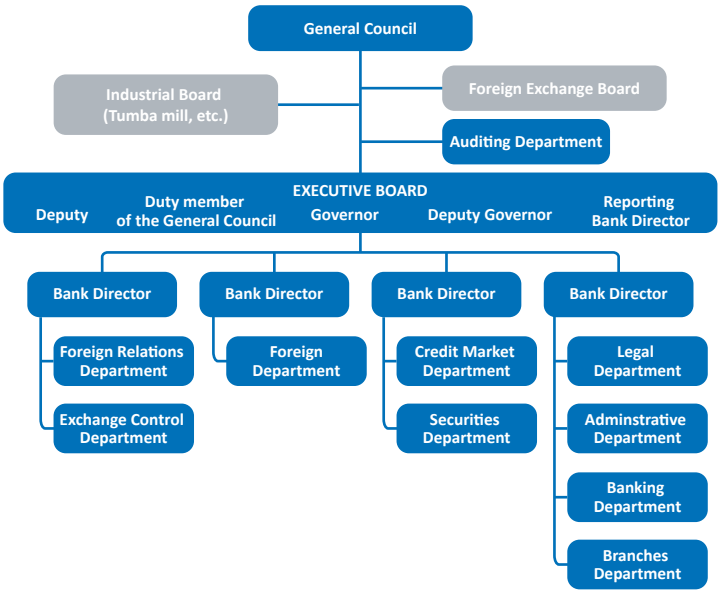
In 1939, the Riksbank had an executive board consisting of the governor of the Riksbank (Ivar Rooth, who subsequently became the head of the International Monetary Fund), a deputy governor, a deputy for the branch offices and a deputy for the head office (see Figure 3). Tumba paper mill, which since 1755 had printed the Riksbank's banknotes, was a subsidiary of the bank and was beyond of the sphere of responsibility of the executive board, and was managed by two inspectors appointed by the general council.

At the beginning of the 1950s, the title of 'bank director' was introduced. To start with, there were three, but at the end of the decade this number was increased to four (see

16 Note that the Exchange Control Department was thus a regulatory department, and it was abolished when foreign exchange regulations ended. Operations on the foreign exchange market were run by the Foreign Department.

Figure 4). The bank directors could be responsible for up to four departments, but on the Executive Board they had the right to vote only on matters that concerned their own area. The General Council was still highly involved in the running of the bank. When, at the end of the 1950s, the Riksbank took over the duties of the Foreign Exchange Office, major changes to the internal organisation followed. Taking over the Foreign Exchange Office's duties and responsibility for the Foreign Exchange Board, which issued rules and decided on permits for foreign exchange transactions, also prompted a sharp increase in the number of employees. Executing foreign exchange regulation became one of the Riksbank's more important activities because it was to underpin the fixed exchange-rate regime, and also complement credit regulation.

Figure 4. The Riksbank's organisation in 1961



Source: The Riksbank

Measured in terms of employee numbers, the Riksbank grew sharply from the mid-1950s to the beginning of the 1970s, from a total of around 480 employees in 1955 to around 800 in 1970, half of whom worked at the local branches. Work at the head office was conducted in nine departments, with the Banking Department and the Exchange Control Department being the largest in terms of staff numbers. In Figure 4 one can also see the Credit Market Department and the Securities Department, departments that would become increasingly important in the following decades. The organisational structure as it was in 1961 lasted for more than a decade, with only small changes.[17]

4 The Riksbank's operations and organisation since the 1970s

This section describes in relative detail how the Riksbank's internal organisation has changed since the mid-1970s, before so-called deregulation, until today. The main focus is on how the policy-related operations have been organised. This means that the more administrative operations, including audit, HR, IT, security staff and property maintenance are not discussed

17 For example, responsibility for the Foreign Relations Department was transferred from the bank director who was responsible for the Exchange Control Department, to the bank director who was responsible for the Foreign Department.

to the same extent. The policy-related operations include, as we have mentioned before, far more than those usually mentioned in descriptions of the Riksbank's work and tasks.

Some operations have lasted but taken on a new form during the almost five decades that we study here. One example of this is the central-bank clearing between the banks, which has gone from being settlement between intrabank receivables and liabilities at the Riksbank, with physical presence of the banks' officials, to IT-based clearing in the Riksbank's payment system, RIX. Other operations have disappeared entirely, such as the implementation of the foreign exchange and credit regulations, which were wound up in the 1980s. Some policy areas, such as promoting a safe and efficient payment system (financial stability) have been developed considerably since the mid-1990s and now constitute one of the bank's core functions. The Riksbank had worked to promote financial stability beforehand too, but then it was through various regulations regarding the credit market and foreign exchange market. A new feature in the 1990s was that the Riksbank commenced more systematic analysis of stability on the financial markets and at the major Swedish banks.

Following this chronological review of the Riksbank's organisational change since the 1970s we add a couple of thematic sections to the story.

4.1 Organisational review in 1974

A substantial organisational review was carried out in 1974, probably partly because a new governor, Krister Wickman, had taken over after Per Åsbrink who had been governor of the Riksbank for a full 18 years between 1955 and 1973. The organisational review, which led to changes in 1976, had two primary purposes: to improve the Riksbank's conditions for carrying out its duties, and to increase opportunities for employees to feel a sense of work satisfaction. Another reason was that the new Riksbank building at Brunkebergstorg was to be completed at the beginning of 1976, and there was a need to adapt space planning as far as possible to the future organisation. Another purpose of the inquiry was to modernise the bank, and it also brought up which issues the management of the bank (called the Executive Board) should focus on. The latter included the need to increase the Riksbank's analytical and investigative capacity, and build up better administrative and organisational capacity.

The Executive Board at that time consisted of the governor of the Riksbank, deputy governor of the Riksbank and (one of) the four Riksbank directors (that title having been changed from bank director in 1975). The Executive Board also included the deputy who was a General Council member belonging to the political majority, and who had been appointed by the General Council to be an Executive Board member for the General Council's entire term of office. There was also a duty deputy who alternated between the different political affiliations. Besides running the bank, the Executive Board had the task of preparing matters on which the General Council was to decide.

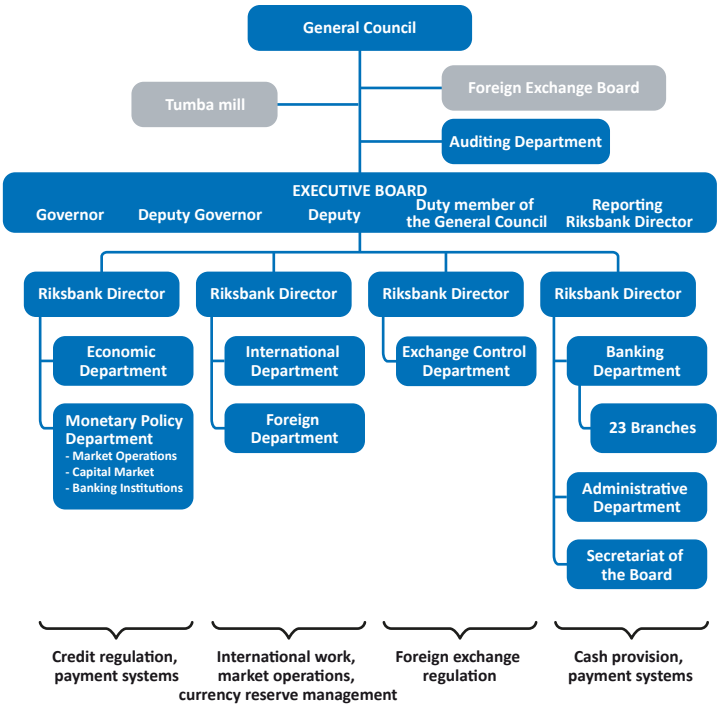
In the inquiry on the organisational structure, the proposal was made to switch to a system where the duty deputy came from the political minority, instead of having a duty deputy that alternated between the political majority and minority in the General Council, thus also only participating for short periods of time. The purpose of the change was to promote a more efficient way of putting proposals before the General Council – proposals prepared with both a deputy belonging to the political majority, and a duty deputy from the political minority. That way, the Executive Board could assume, with a certain degree of certainty, that the General Council would approve submitted proposals.

The inquiry also determined that there was a need to substantially increase resources in the economic policy arm of the bank's field of work.[18] It mainly consisted of planning, coordination and information regarding the credit and foreign-exchange policy operations, economic analysis and analysis of the balance of payments, and production of statistics.

18 It was as a result of this inquiry that the Riksbank started to recruit academics with PhDs.

The inquiry therefore proposed that an economics department be established, that would take over the tasks of the Credit Market department, which were of a more general nature. It was also proposed that the Securities Department, which managed the Riksbank's bond operations, should change names to Market Operations group and be transferred to the Credit Market department which, at the same time, changed name to the Monetary Policy department (see Figure 5).

Figure 5. The Riksbank's organisation in 1976



Note. The Riksbank director who was responsible for the Exchange Control Department was the reporting clerk in the Foreign Exchange Board. The English translations of department names have been taken from an annual report in 1976.
Source: The Riksbank

The inquiry also proposed that a new department, called the Banking Department, should take over all tasks within the field of means of payment and lending activities. For the Administrative Department, no major changes to the organisation were proposed, although greater initiatives were suggested, especially in terms of personnel policy and organisational matters. Initiatives were to be taken in the areas of promotion and salary, and personnel development. One purpose of this was so that the Riksbank could hire and retain qualified employees, who were coveted on the private market.

In the Exchange Control Department, only certain organisational changes were proposed. However, the big question was how to manage the increased inflow of foreign-exchange requests, which had occurred on the back of the internationalisation of the Swedish economy. These requests, which numbered around 40,000 each year, concerned permits to invest abroad, credits and other commercial and financial transactions, as well as the international transactions of private individuals, including the purchase of travel currency over a certain amount. The number of cases had in the preceding four years increased by 13 per cent annually on average. Besides additional resources to the department the introduction of an integrated ADP system was proposed for register entry, granting permits,

controls and statistics.[19] The foreign exchange statistics included compilations of granted and rejected applications for permits, permit utilisation, and so on. These were to be used for the control operations in the Exchange Control Department. Together with other foreign exchange-related information, such as foreign exchange notifications of transfers not subject to an authorisation obligation, they would also provide better input for the analysis of the balance of payments to be performed by the new Economics Department.

The proposal for a new departmental organisation, entailing a small reduction in the number of departments, would reinforce and rationalise the organisation, such that each department had its natural boundaries and was justified as an organisational unit by the significance and scope of its duties and staffing. Thereby, the inquiry believed that there should be improved conditions for the departments to function as relatively autonomous working units, to which decisions could be delegated to a greater extent. At the same time, it was to create greater scope for three of the four bank directors, who were responsible for several departments, to engage in more externally oriented and policy- and planning focused initiatives, rather than on routine and managerial tasks.

In conclusion, the inquiry proposed an inquiry on the branch offices, with a focus on creating larger regional offices, which would take over the tasks of the branch offices, and also that there should be branches that only worked with cash handling. It is interesting to note that there was also a requirement for the inquiry and its proposals to entail that all employees at the branch offices could continue to work either at the head office or at branches located across Sweden.

4.2 The Riksbank's organisation around 1980

The extensive credit and foreign exchange regulation established after the Second World War continued to characterise the Riksbank's operations, although a number of substantial changes would follow in the next ten years, as a consequence of the gradual lifting of the state control of financial markets.

Around 1980, the Executive Board of the Riksbank consisted of the governor of the Riksbank, the deputy governor of the Riksbank, two deputies from the General Council and a Riksbank director who was the reporting clerk. The directors informed the governor of the Riksbank of each function, and brought up questions and information for discussion with other functions. To refer back to the categorisation of the operations described in section 2, we can determine that the areas of responsibility of the Riksbank directors corresponded to the functions foreign exchange regulation, credit regulation and payment systems, international operations, market operations and foreign exchange management, and cash provision (see Figure 5).

The fixed exchange-rate policy was managed partly through the interventions of the Foreign Department on the foreign exchange market, and partly through the control exerted over the foreign exchange activities of companies and private individuals during the period when foreign exchange regulation was still in force. The questions dealt with by the Executive Board pertained to the daily operations, recruitment and administrative matters. The Riksbank director (who was also chief legal counsel) who was responsible for the Banking department and the branch offices, etc. was also responsible for the Administration department and the ADP department, and for administration relating to the work and decisions of the Executive Board (the Secretariat of the Executive Board).

The branch offices and regional offices

At the beginning of the 1980s, the Riksbank still ran the offices across Sweden that had been established a century before.[20] The existence of these branches had been discussed

19 ADP stands for automatic data processing.

20 One change however was that the office in Mariestad was moved to Skövde in 1971.

since the 1940s and developments on the banking market had reduced the need for them. Nonetheless, the staff of these branches made up more than half of the Riksbank's workforce. In 1980, the branches had 559 employees, compared with 552 employees at the head office (see Sveriges Riksbank 1981). Thus, from a cost perspective, the branches constituted a large item, and in the 1980s and even more so in the 1990s, this would be seen as problematic from an efficiency point of view. The fact that it took time to wind up the branches can partly be explained by the fact that the Sveriges Riksbank Act required a decision by the Riksdag to make such an organisational change, and also the question was probably not high on the political agenda. Also, the Riksbank's operations were not charged to the state budget, but were self-financing.

Execution of foreign exchange controls

Execution of foreign exchange regulation was one of the Riksbank's more important activities because it underpinned the fixed exchange-rate regime, and also complemented credit regulation. To some extent, work with foreign exchange regulation was separate from the rest of the Riksbank's organisation in that decisions regarding foreign exchange matters, in terms of both permit cases and individual applications to exchange currency, were taken by the Foreign Exchange Board. While this was headed by the deputy governor of the Riksbank, its members were otherwise elected by the political parties of the Riksdag. It thus consisted of politicians from the Riksdag or government, but also of representatives of the federation of Swedish industry (Industriförbundet), the Swedish Bankers' Association and the trade union movement. The decisions of the Foreign Exchange Board were executed by the Foreign Exchange Executive Committee, which was subordinate to the board and also separate from the rest of the Riksbank in organisational terms.

The large banks were registered as 'foreign exchange banks' at the Riksbank. This meant that they were required to offer foreign exchange-related services to other financial and non-financial companies. However, the services required the Riksbank's approval. Foreign exchange regulation focused on financial transactions, and foreign exchange permits were thus not required for direct export and import payments. Responsibility for processing all applications, spanning everything from the international investments of large industrial companies, to summer holiday funds in foreign currency of private individuals, rested with the Foreign Exchange Board. Applications for exemptions from the regulation amounted to thousands of cases, but it was only the largest ones that were decided directly by the foreign exchange board. Other transactions were dealt with by the Exchange Control Department, or in more complex cases by the Foreign Exchange Executive Committee.

The controls relating to foreign exchange, as well as the credit policy regulations, were increasingly called into question at the beginning of the 1980s. Internationalisation of the financial markets for capital, currencies and investments put greater pressure on the Riksbank's ability to swiftly process the banks' and companies' applications for permits regarding cross-border investments, property purchases, borrowings and export financing. This work was resource-intensive, and at the beginning of the 1980s the Exchange Control Department was one of the largest departments, consisting of around 80 people, and with just over 100 people at most. The department was divided into three licence groups that were responsible for different types of foreign exchange regulation matters. There was also a control group, a statistics group and a general group in the department. The statistics group dealt with statistics regarding granted permits and rejected applications broken down into different categories, licence utilisation, and so on. The statistics were used as an aid in both granting permits and for the control activities, and also formed some of the input for statistics on the balance of payments, which were compiled and analysed by the economics department.

At the end of the 1980s, the boundaries between the international and domestic capital market had largely been erased – a development that was both explained and fuelled by

phasing out of foreign exchange controls. Over time, this had become less and less effective, one reason being that large companies had established operations abroad too, which meant that they could largely make the financial arrangements they wanted to without regulation affecting them. Ending foreign exchange regulation was initiated by a decision by the General Council of the Riksbank in 1986 and was essentially completed three years later.

When the Exchange Control Department was closed in 1989, the part of the statistics linked to the balance of payments statistics was transferred to the Economics Department for a short period of time before the Balance of Payments Department was formed, taking over both the compilation and the analysis that were deemed necessary for monetary policy (see Figure 6).

Credit regulation dismantled

Credit regulation was also gradually dismantled in the 1980s. An important change came in the late autumn of 1985 when the cap on the banks' lending was lifted, although other changes to the game rules were also of great significance, not least to the Riksbank's own operations.

A domestic capital market had been created at the beginning of 1980 when new types of short government securities were issued, while at the same time banks were permitted to issue their own bonds. Gradually, both banks and insurance companies were permitted to start trading in the large depositories of government securities that they had previously been obliged to hold under the so-called reserve ratio rule.[21] For the Riksbank, the new market and internationalisation of the Swedish financial market presented an opportunity to work more actively than before with market operations in Swedish securities.

After Bengt Dennis took over as governor in 1982, a Capital Markets Department was created through splitting off the Capital Markets group and Market Operations group from the Monetary Policy Department, which was instead given responsibility for banking institution matters. The Market Operations group took over execution of market operations on the emerging domestic capital market. A better link was thus created between these operations and credit regulation matters, permits, and so forth.

Through the new Capital Markets Department, the Riksbank carried out open market operations in order to affect interest rates, and the supply and price of the Swedish krona and government securities, in a way that would make the monetary policy objectives consistent with the credit policy restrictions, which still applied for the Swedish banks. However, already two years later, in 1984, the department was closed down in favour of a Securities Department, which was responsible for market operations, and a Credit Market Department which was responsible for the remaining credit regulation of the time. The order still applied whereby the Foreign Department was responsible for foreign exchange transactions, while the Credit Market Department and Securities Department operated exclusively in domestic markets.

4.3 Organisation after the 1988 Sveriges Riksbank Act

A new Sveriges Riksbank Act came into force in 1989, which combined much of the legislation regarding the Riksbank, monetary policy and matters regarding means of payment into one and the same legal text (see SOU 1986:22 and SFS 1988:1835). However, much of the content of the 1934 Sveriges Riksbank Act remained in the new Act, albeit with modernised language. Interestingly, it was not until the Act of 1988 that the Riksbank is formally mentioned as the central bank of Sweden. The Act also reinforced the role of the governor of the Riksbank, who was given a clearer mandate to determine the administration

21 The reserve ratio rule required commercial banks to purchase government bonds.

of the bank's operations. The term of office was also extended from three to five years so as not to coincide with the political cycle.

Through the new Act, the government's influence over the Riksbank and monetary policy was both diminished and enhanced. On the one hand, the government lost its right, held since 1897, to appoint the chair of the General Council. On the other hand the practice, established the 1940s, was formalised whereby the government was to be informed prior to the Riksbank making important monetary policy decisions (§ 42, SFS 1988:1385).

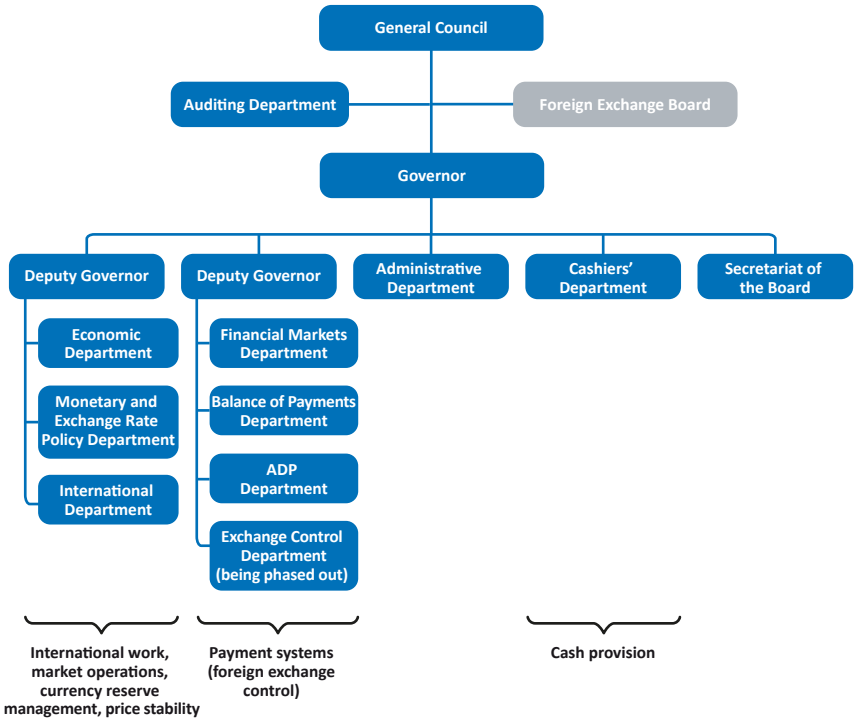
With the new Act, all members of the General Council were nominated by the Riksdag. The General Council now elected a chairman and a governor of the Riksbank from within its number. Like before, the deputy governor was appointed by the General Council on the proposal of the governor of the Riksbank. The Act did not establish how many deputy governors could be appointed, and soon after the Act came into force, two deputy governors were appointed instead of the traditional one.

The number of members of the General Council was increased from seven to eight, with all votes carrying equal weight. This could have created problems in the event of very even voting, although this does not appear to have occurred very often under the Act of 1988. A new feature was also that the Riksbank, and not the Riksdag, had the right to make decisions on the Swedish exchange rate system, that is to say, how or whether the value of the Swedish krona should be pegged to the value of another currency or other currencies.

New organisation around 1990

When this new Sveriges Riksbank Act came into force a substantial reorganisation was carried out in which almost all operations were subordinated to new organisational units, while at the same time the number of departments increased though several secretariats being made into departments instead (see Figure 6).

Figure 6. The Riksbank's organisation in 1990



Source: The Riksbank

A major change was that the Monetary and Exchange Rate Policy Department was formed in 1989 through the department taking over responsibility for foreign exchange operations and management of the currency reserve from the Foreign Department, and responsibility for the market operations on the growing domestic money market from the Securities Department. That way, the functions that could affect liquidity, and hence also the value of the Swedish krona, were brought together into one and the same department. The Foreign Department and Securities Department were closed down.

One of the deputy governors was given responsibility for the Monetary and Exchange Rate Policy Department, the Economics Department and the International Secretariat. The Economics Department was responsible for producing, and disseminating internally, analyses of economic development and the balance of payments, and for inflation forecasts, which the Riksbank had started to perform after the 1974 inquiry into the organisation. The department was also given responsibility for the financial market statistics produced by the bank.

In 1984, the International Department had been replaced by the much smaller International Secretariat, which had the main task of processing cases regarding the international collaborations of Sweden and the Riksbank. The background to this change was that, at the beginning of the 1980s, the boundaries between national economies and markets started to be erased and an internationally interlinked financial and monetary system started to be developed. A growing number of the Riksbank's functions were affected by developments in other countries, and it no longer seemed evident to give the International Department responsibility for all matters of an international nature. In many areas, the generalist knowledge possessed by the department no longer sufficed either, and it was discussed internally that it might be better for the policy departments to address themselves the matters that fell within their respective specialist areas. These discussions led to the department being converted into a smaller secretariat, and transferring the majority of the department's areas of responsibility to other departments. For more about the international operations, see section 7.

The second deputy governor was responsible for a newly formed Financial Markets Department, the Balance of Payments Department, the ADP department and the Exchange Control Department, which was in the process of being dismantled following the abolition of foreign exchange regulation in 1989. The Credit Market Department was no longer needed either when credit regulation had been largely phased out. The remaining issue controls were taken over by the Financial Market Department, which also compiled and analysed credit market statistics. The issue controls were removed entirely after 1992, and instead the Financial Market Department was tasked with analysing and monitoring both national and international payment systems. This can be seen as an initial step towards greater focus on the field of financial stability. The Financial Market Department was also responsible for analyses of the financial markets, and took over responsibility for the foreign accounts unit from the Foreign Department. The foreign accounts unit was responsible for the Riksbank's payments to and from abroad, as well as the transactions that were caused by the Riksbank's interventions on the foreign exchange market and transactions connected with management of the currency reserve (back office functions).

The governor of the Riksbank was responsible for the Secretariat of the Executive Board, the Administration department, the Cashiers' department and the regional offices. The governor's responsibility for the bank's daily operations, with sole right to make decisions on the matters raised at Executive Board meetings, as well as greater delegation to the department heads (which we write more about below), led to the Executive Board becoming less significant as a decision-making body. At the end of the 1990s, this led to abolishing the previously periodic Executive Board meetings.

4.4 Organisational changes in the 1990s

In the first half of the 1990s, some minor organisational changes were made. The balance of payments statistics were put together with the financial market statistics and were placed in a new department, the Financial Statistics Department. The Balance of Payments Department was closed down. The accounting group in the Administration department became a department in its own right. A planning and budgeting secretariat was created, and in 1993 also an Information secretariat. Now, around twenty five years later, this function – information and communication – has grown tremendously in importance, which we return to in section 8 below.

In 1994 Urban Bäckström took over as governor, which would have a major impact on the Riksbank in many respects. The efficiency of the bank's operations began to be enhanced, and decision-making was delegated down through the organisation, something quite new for the Riksbank's lower management and employees. The reform efforts initiated by Bäckström continued during the terms of office of Lars Heikensten and Stefan Ingves as Riksbank governors, and can be said to have infused the operations for more than 20 years.

Previously, the department heads had always been able to escalate matters to the management of the bank (the governor or deputy governors) for decisions. This was now set to change, such that the department heads themselves could decide also on major issues that would have previously been escalated to the management of the bank for a decision. The background to this was that the management of the bank, quite rightly, found that their knowledge of some matters did not suffice to make decisions – the experts were in the departments. To start with, there was a degree of uncertainty among the department heads about the new order, and many were afraid of coming into direct conflict with the management of the bank in the event of them making a decision that was not quite right. In order to empower the department heads in their decision-making and get them to really believe that the management of the bank could also live with some decisions not being entirely in line with their own wishes, a number of management seminars were carried out.

Efficiency enhancement commenced in 1995, when the HK-95 project was initiated, which had an explicit goal of reducing the number of employees at the head office by 10 per cent (around 40 people) within a year. The decision, which could be described as somewhat of a shock for employees at the head office, had the effect of creating a strong sense of crisis awareness in the bank and that it was time to step up the pace.

The efficiency measures went by the motto, 'The Riksbank shall not do things with public funding that others can do just as well or better'. This motto still applies today. The management found it very important, for the sake of its credibility, that the Riksbank – which is a central government organisation and which itself decides on its budget (unlike other authorities that come under the government) – assumed budget restrictions at least as stringent as those of other central government administration bodies.

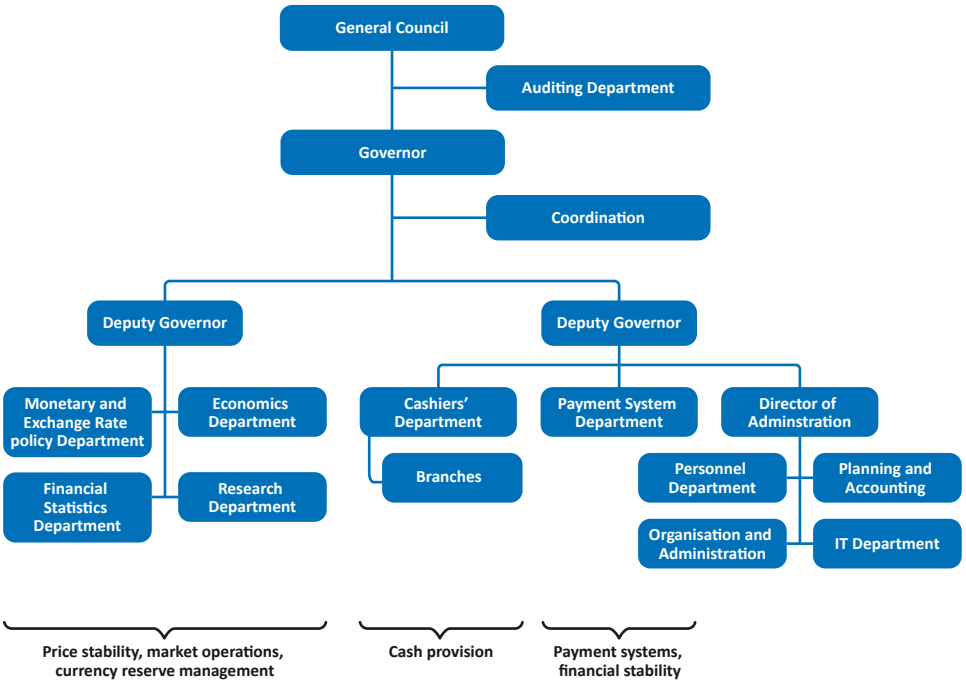
The Executive Board is phased out

In July 1997, a new managerial structure was introduced, while at the same time the Executive Board was phased out (see Figure 7).[22] The new structure was based on the assumption of most decisions being taken in the line organisation with far-reaching delegation. At that time, there were 11 departments and three coordinating secretariats (the Executive Board Secretariat, the International Secretariat and the Information Secretariat). As a complement, there were also some joint discussion and decision forums. In the governor's decision-making group, the governor made decisions on proposals for the General Council regarding for instance the policy rate, certain policy decisions, guidelines for strategic plans, large investments, and so on. In the Riksbank's management group, the governor, the two

22 In 1996 the executive board consisted of the governor, the two deputy governors, the administration director and 12 heads of departments or secretariats.

deputy governors and the administration director, as well as the department heads, discussed common issues. There were also subject-focused decision-making and drafting groups, as well as a manager forum for joint discussions and information for all of the bank's managers.[23]

Figure 7. The Riksbank's organisation in 1997



Note. In Coordination was included the Secretariat of the Board, the International Secretariat and the Information Secretariat.
Source: The Riksbank

The largest efficiency enhancements would affect mainly the administrative elements, which came to be sharply reduced by many operations such as office services, cleaning and monitoring being procured externally. The Riksbank's cash handling also continued to undergo efficiencies through reductions in the number of branches and, at the end of the decade, an inquiry led to much of the operations being placed in a wholly owned subsidiary of the Riksbank. The incorporation of cash handling was decided in 1998, as was the closure of the remaining branches, see section 6.2 below and Sveriges Riksbank (2006) for more information. In 2002, Tumba Bruk and the Swedish Mint were sold, which meant that production of notes and coins would take place outside of the bank thenceforth.[24] In 2003, Statistics Sweden was tasked with compiling the financial market statistics that the Riksbank had produced internally. A few years later, in 2007, the same change was made in regard to the balance of payments statistics.

The number of employees had, as previously mentioned, also continually been reduced in the 1990s, and in 2000 the Riksbank had around 470 employees (see Sveriges Riksbank 2001). The reduction from over a thousand people twenty years previously was mainly due to the reduced number of branches, while the workforce of the head office had largely been unchanged. However, over the coming years, the number of employees at the head

23 The drafting groups included, for example, the international drafting group (internationella beredningsgruppen IBG), the monetary policy drafting group (penningpolitiska beredningsgruppen PBG) and the administrative drafting group (administrativa beredningsgruppen ABG). The abbreviation PBG is still used today in connection with various meetings during the monetary policy drafting process.

24 Managing coins was taken over by the Riksbank from the Ministry of Finance in 1986. The Riksbank sold the coin operations to the Finnish Mint in 2002.

office also started to decrease, one reason being a decision of principle to cut the workforce by 10 per cent over three years (see Sveriges Riksbank 2004). In 2018, approximately 350 people worked at the Riksbank.

4.5 New Sveriges Riksbank Act in 1999

In the new Sveriges Riksbank Act that came into force in 1999, it was established that the objective of monetary policy is price stability.[25] The new Sveriges Riksbank Act also brought substantial changes to the Riksbank's management structure. Until the end of 1998, the General Council of the Riksbank was the bank's highest decision-making body. The political composition of the General Council reflected then, and still reflects today, the political composition of the Riksdag. The most important change was the transfer of the General Council's decision-making power over all operations, with a few exceptions, to a newly created Executive Board.[26] The General Council was extended to include 11 members, with terms of office that continued to follow that of the Riksdag. The term of office of the governor of the Riksbank was further extended from five to six years and the same term of office also applied for the other five members of the Executive Board.[27] Through the legislative reform in 1999, the General Council's duties were limited, whereby the most important tasks were recruiting members for the Executive Board, including the position of governor, and also following and evaluating the Executive Board members' execution of their duty. The General Council of the Riksbank still also had the task of deciding on the design of new banknotes and coins, and submitting proposals to the Riksdag regarding how the Riksbank's financial result should be managed. Under the new Act, the Executive Board's decisions on changes to interest rates and open market operations became the Riksbank's most important policy activities. The Executive Board members also became jointly responsible for running the organisation. Through the 1999 Act, the new Executive Board became closely linked to the daily operations, just like the Executive Board prior to the Act of 1988.

The transfer of most of the decision-making from the General Council to the new six-person Executive Board naturally prompted a number of questions for the Riksbank, particularly within the Executive Board. This concerned, for instance, agreement between members on how they would work and cooperate, and distribute any areas of responsibility between themselves.[28] The first Executive Board, appointed in 1998, was given its areas of responsibility by the General Council (see Sveriges Riksbank 1998): research and statistics; payment system matters; means-of-payment matters; international matters and internal and external communication; and monetary and foreign exchange policy.[29, 30] The governor of the Riksbank had no direct drafting or departmental responsibility, apart from over the Secretariat of the Board, which served as a kind of staff function. Discussions regarding how work should be organised have continued, naturally affected by experience from the work, and the fact that new members have been elected onto the Executive Board.

25 In a formal sense it was not a new Act, but substantial amendments to the Sveriges Riksbank Act of 1988 (1988:1385). The amendments were implemented through SFS (1998:1405), SFS (1998:1412) and SFS (1998:1413). As at February 2019, over 60 amendments had been made to the Act of 1988.

26 As explained in previous sections, there was an executive board until the early 1900s. However, this consisted partly of members of the general council appointed by the Riksdag or, until 1988, by the government.

27 The first set of executive board members had different terms of office, of one to six years, so that new nominations would not come all at once thereafter, see table A2 in the appendix. In 2008 the Act was amended so that the terms of office are either five or six years (see SFS 2008:239).

28 In the press release from 17 December 1998 which announced the six members of the new executive board, the work areas of the members were specified, see Sveriges Riksbank (1998).

29 The latter entailed a deputy governor leading the work on preparing proposals for monetary policy decisions, to be decided on by the executive board. However, it was not always the first deputy governor who had this task.

30 In terms of Figure 7, the departments reporting obligation was broken down as follows: The Research Department and the Financial Statistics Department; the Payment System Department; the Cashiers Department and the Internal Audit Department; the Communication Department and the International Department (included in the Coordination Unit); the Monetary and Exchange Rate Policy Department and the Economics Department; and the Secretariat of the Board and the administration director.

New organisation in 2000

In May 2000 the General Council decided on a reorganisation following a proposal from the Executive Board. The purpose was to create a more efficient organisation with clear areas of responsibility and a strong focus on the bank's objectives and tasks. The bank's previous 16 departments were slimmed down to 11.[31] The Financial Statistics Department was closed down and three new departments focusing on the Riksbank's two primary objectives were formed.

- The Monetary Policy Department (the former Economics Department) was given responsibility for monetary policy analysis, which is the foundation for fulfilling the price stability objective. The department was also once more given responsibility for the balance of payments statistics.
- The Financial Stability Department (the former Payment System Department) was given responsibility for analysing the stability of the financial system, which is the foundation for fulfilling the objective regarding a safe and efficient payment system. The department was also given responsibility for the financial markets statistics.
- The Market Operations Department (formerly the Monetary and Exchange Rate Policy Department) was given responsibility for carrying out the monetary and foreign exchange policy operations and for the tools required for this. The activities of the department supported both of the main objectives. The department also took over responsibility for the RIX system (from the closed-down Payment System Department) and for cash provision. This was considered to be most appropriate as it was an entirely operational department, experienced in working in relation to the banks.

The newly formed Administration Department brought together the former units administrative staff, HR Department, the Organisational and Administration Department and the Planning and accounting Department.

The organisation was kept unchanged until 2004 when three smaller departments, the International Department, the Information Department and the Secretariat of the Board became secretariats instead, while at the same time a new department was formed, the General Secretariat. At the same time, the Research Department was assimilated into the Monetary Policy Department, although it retained its own operational and budgetary responsibility. At the same time, the Risk Control Department became a group in the Financial Stability Department in the hope of generating synergies, as both departments worked with risk-related matters. When the incorporation of cash handling was halted in the same year, parts of cash handling went to the Market Operations Department. The structure of having seven departments is still in place today, and changes since 2004 have more or less occurred within this structure.

Change to the fields of responsibility of the Executive Board members

In terms of the fields of responsibility of the Executive Board members, it gradually came to light that there were problems in the management structure that had been introduced when the new Executive Board took up office. One was that the department heads naturally became subject to an information requirement and suggestions for measures from all of the Executive Board members, especially regarding the policy areas monetary policy and financial stability, while at the same time all department heads had a deputy governor as immediate manager. Another was that members of the Executive Board, possibly unintentionally, refrained from engaging in various matters beyond their immediate sphere of responsibility, and hence ended up making decisions on matters into which they did not have sufficient insight. This led to the fields of responsibility of the Executive Board

31 The former secretariats of the bank had changed names to departments in 1998.

members, from January 2005, changing from concerning specific departments to specific functions, which were in turn were dealt with by different departments, but with the Executive Board members chairing various drafting groups.[32]

Over time, however, this management structure also came under criticism. It had emerged that this breakdown made joint drafting, and hence making decisions, difficult. It was also considered that there was a tendency whereby the member who had operational responsibility for a certain specialist area also had the greatest influence over the policy decisions concerning that area, something that did not square with the Executive Board being jointly responsible for all decisions. Another point of contention was that the distribution of the areas of responsibility was considered uneven; for example, the monetary policy specialist area was considered 'more important' and more prestigious than other areas.

New management model from 2007

The discussions ended in a decision being made that the Executive Board members, from 2007, would no longer have any direct managerial responsibility for the internal operations or drafting of policy matters. The Executive Board also decided that the governor would be responsible for following up on the work of the departments, and also bear managerial responsibility for the department heads.

The department heads were given the responsibility of heading the daily work and drafting the matters the Executive Board wanted investigated. Department-wide matters and internal case briefing was dealt with in the Management Group, which had been formed a few years previously and which consisted of all department heads, apart from the head of internal audit.[33] The head of the General Secretariat became, and still is, the chair of the Management Group and, at Executive Board meetings, reports on the important matters that have been discussed and decisions that each department head has made or intends to make. It should be noted that the Management Group does not make any decisions; this is done by each department head.

As part of further improving efficiency in the bank's operations, a number of decisions were taken in 2007. Production and publication of the balance of payment statistics was procured from Statistics Sweden. The production and publication of financial market statistics had been transferred to Statistics Sweden in 2003 already. The Riksbank found that Statistics Sweden was better equipped to carry out the tasks than the Riksbank, and that confidence in the Riksbank would not be harmed by it no longer producing the statistics. However, the Riksbank is still responsible for the content and quality of the statistics.

Reorganisation in 2007

A new reorganisation was carried out in 2007, and in the Market Operations Department (which changed name to the Asset Management Department), all units were gathered that worked with asset management with a view to increasing focus on this activity as well as the RIX payment system. Some units were transferred to other Departments. The Cash Provision unit was transferred from the Asset Management Department to the Administration Department, bringing it closer to the security function, transport and monitoring and the premises unit. The work initiated in 2008 on replacing banknotes and coin series took nine years, and would place heavy demands on the department. The monetary and foreign exchange policy operations were transferred to the Monetary Policy Department. The purpose was to bring the department closer to the markets used to influence interest rates.

32 Examples that can be mentioned are drafting groups for consultation matters, financial risks in managing the foreign currency reserve, shocks in the financial system, and foreign exchange and monetary policy.

33 The composition and tasks of the Management Group are regulated in the instructions for the Riksbank, which are decided by the Executive Board (for further discussion see section 4.7). Today, also the head of Communication is a member of the Management Group. According to the instructions, the head of internal audit, the chief legal counsel, the HR manager and the chief risk officer have the right to attend the Management Group's meetings to the extent they consider necessary.

The Monetary Policy Department was also given main responsibility for all analysis of interest rates and exchange rates. Responsibility for the analysis of equity and credit markets was transferred to the Financial Stability Department, as was responsibility for market structure matters, which form a natural part of the analysis of the financial infrastructure. The business support and payment service unit (back office) was transferred from the Administration Department to the Asset Management Department. A new office service centre within the Administration Department was established.

4.6 The Riksbank's organisation from 2014

The latest major reorganisation took place in 2014. One of several purposes of this reorganisation was to emphasize the significance of, and put more management attention on, payment matters, asset management and the Riksbank's balance sheet. Like before, the bank was organised into seven departments, four of which operated within the bank's main functions: price stability, financial stability, asset management and payment systems including cash handling (see Figure 8). The analysis of the Swedish and international economic developments and parts of financial markets would, like before, be dealt with by the Monetary Policy Department and the Financial Stability Department. With a view to improving the bank's ability to quickly understand the performance of, and be able to act on, financial markets, all operational activities that trade on and monitor financial markets were gathered into a new department, the Markets Department. In order to put a greater emphasis on payment matters and the bank's task of being responsible for Sweden's supply of banknotes and coins and the payment system, a separate department was also created for these activities – the Payments System and Cash department (later changed to the Payments Department).

The organisational changes also entailed some internal reallocation of activities between departments, and name changes for some departments and units. At the same time that cash handling was transferred from the Administration department, it changed names to the Corporate Services Department. The department also took over responsibility for the bank's IT operations, most of which had been outsourced in 2013.

Figure 8. Organisation of the Riksbank's operations in 2019

Note. In the General Secretariat is included the Executive Board Secretariat, the Communications Division and the Risk Division.
Source: The Riksbank

4.7 The Riksbank's management and organisation in 2019

The Sveriges Riksbank Act from 1999 implied an essentially new form of management for the Riksbank. Until 1998, the general council of the Riksbank had been the bank's highest decision-making body, in all matters – from decisions on setting interest rates to

various internal administrative matters. Through the new Act, the General Council of the Riksbank changed to having more of a control function, while the Executive Board took over responsibility for monetary policy and other policy-related decisions, as well as the daily running of the bank.

Most of the focus of the new Sveriges Riksbank Act was however on how monetary policy decisions should be taken, and was silent on for example how the operations should be managed. Instead, this has been devised internally at the Riksbank – a process that has taken time, as evidenced by the account above. The most important steering documents in this respect are the rules of procedure, on which the General Council decides, and the instructions, on which the Executive Board decides.[34]

The General Council's tasks

The members of the General Council of the Riksbank are eleven in number and are appointed by the Riksdag. The composition of the General Council reflects the political composition of the Riksdag. The General Council meets around ten times a year. The tasks of the General Council that are usually in focus are the appointment of the Executive Board members and deciding on their terms of remuneration and employment. However, the General Council also has other tasks:

- The General Council adopts the Riksbank's rules of procedure, the document that sets forth the Riksbank's overall organisation and regulates certain managerial and decision-making matters. The rules of procedure specify for instance the tasks of the General Council, the tasks of the Executive Board, how the Executive Board makes decisions (including how the chairman of the Executive Board has the casting vote, which is not stated in the Sveriges Riksbank Act), the departmental structure at the Riksbank, and how auditing at the Riksbank is to be organised. The rules of procedure are periodically reviewed.
- The General Council decides on the design of banknotes and coins. For example, the General Council decided on the appearance of the new coins and banknotes in April 2011.
- The General Council submits proposals to the Riksdag regarding the allocation of the net income of the Riksbank. Decisions regarding the appropriation of profits, and on discharging the General Council and the Executive Board from liability, are taken by the Riksdag.
- The General Council shall regularly monitor the Riksbank's activities and how the Executive Board manages its business. The Sveriges Riksbank Act also sets forth that, at the Riksbank, there shall be an audit function that is managed by the General Council and which shall be focused on matters that are within the areas of responsibility of the General Council. The Act does not specify what is meant by 'within the areas of responsibility of the General Council'. These are set out more clearly in the rules of procedure which reflect the stipulations of the Sveriges Riksbank Act, and also add that the General Council has a control function, and that the General Council shall monitor the operations of the Riksbank (see section 3 of the rules of procedure). The General Council is given administrative support by the General Secretariat.
- The General Council may present opinions within its field of competence on issues officially referred to the Riksbank for consideration (see Chapter 2, section 4 of the Sveriges Riksbank Act). In consultation with the Executive Board, the General Council may present proposals to the Riksdag and the government regarding statutory

34 The rules of procedure and the instructions are amended from time to time. The latest versions are available on the Riksbank's webpage.

amendments or other measures in its sphere of responsibility. (See Chapter 4, section 1).

- The Chairperson and Vice Chairperson submit a report on the General Council's work to the Riksdag Committee on Finance. This usually takes place twice a year.

The Executive Board's tasks

According to the Instrument of Government, the Riksbank is managed by an Executive Board, which is appointed by the General Council. According to the Sveriges Riksbank Act, the Executive Board of the Riksbank shall consist of six members with terms of office of five or six years. The General Council appoints the Chairman of the Executive Board, who shall, at the same time, be Governor of the Riksbank, and at least one Vice Chairman, who shall, at the same time, be First Deputy Governor of the Riksbank. The Executive Board:

- has, according to the rules of procedure 'responsibility for all the Riksbank's activities, that is monetary policy, the payments system and financial stability, as well as for the bank's administration' (see section 5 of the rules of procedure). According to the rules of procedure, the Executive Board decides on the Instructions for Sveriges Riksbank. The latter is a document that regulates in more detail how the organisation is organised and managed. For instance, the instructions set out how the internal body of regulations is devised; which decisions within monetary policy, financial stability, asset management, payment matters, international matters and overall governance are taken by the Executive Board; the areas of responsibility of the Governor of the Riksbank, the Deputy Governors of the Riksbank, the Management Group, the department heads and other managers; administrative regulations regarding for example register entry and documentation. An appendix to the instructions sets out the areas of responsibility of the various departments. The instructions are periodically reviewed.
- makes decisions, according to section 6 of the instructions, on inter alia
  - monetary and foreign exchange policy. According to a decision by the Executive Board, six monetary policy meetings are usually held each year;
  - significant matters in the sphere of financial stability;
  - important positions of principle regarding the management of the Riksbank's financial assets;
  - important positions of principle regarding payment matters;
  - general management and aims for the bank's operations.

The Executive Board is responsible for the operations and makes decisions collectively (see Chapter 9, section 1a of the Sveriges Riksbank Act and section 6 of the rules of procedure). At the same time, the rules of procedure set forth that the Governor of the Riksbank leads and monitors both the day-to-day and long-term operations of the Riksbank (section 10 of the rules of procedure). Section 5 of the Instructions state that 'the Executive Board directs the Riksbank's operations, which entails responsibility for the aims, development and efficiency of these operations.'

The role of the Management Group

According to the instructions, the Management Group shall, amongst other things, compile input for decision-making regarding the overall focus of the Riksbank's operations and strategy for decisions by the Executive Board; prepare proposals for the Riksbank's overall business plan and budget, annual report and annual accounts and organisational change, draft rules, common processes and overarching organisational matters; consult in department-wide important matters of principle or significant matters of principle; and serve

as a crisis management group. The Management Group is chaired by the head of the General Secretariat and meets once a week.

5 Implementation of monetary policy

Since it was founded, the Riksbank has had the task of promoting price stability. Through history, this task has been interpreted in different ways, and has been given higher or lower priority among other operational objectives. An important question has for instance been whether this objective should be interpreted as an inflation target (internal price stability) or an exchange-rate target (external price stability). Over long periods of time, Sweden has had a fixed exchange rate system that has been linked to copper, silver, gold or to another currency or a group of other currencies, see Table 1 for a compilation covering the period since the Second World War. Until 1992, it was for instance found that 'the primary objective of monetary policy is to maintain a fixed exchange rate against a trade-weighted basket of foreign currencies' (see for example Sveriges Riksbank 1990). From 1993, the Riksbank has interpreted the price stability objective in terms of an inflation target (see Sveriges Riksbank 1993).

Depending on whether the objective is interpreted as a price stability target or an exchange-rate target, the daily operations can be organised slightly differently with different sets of activities. In times of prioritising 'external' price stability in the form of a stable exchange rate, the Riksbank has for example had to work with foreign exchange operations and different types of foreign exchange controls, which were however abolished at the end of the 1980s. In such times, the Riksbank conducted different types of foreign exchange operations, purchase or sale of foreign currency for Swedish kronor, either in spot or forward transactions, with the purpose of maintaining the fixed exchange rate and the external price stability.[35] Also, the 'interest-rate weapon' was used to protect the value of the Swedish krona. In the 1980s, however, inflation was a problem that was difficult to master for Sweden, but also for the Riksbank, as it was still expected to work to promote low inflation and low unemployment, perform credit and foreign exchange controls, support economic development and maintain the fixed exchange rate. Four devaluations were carried out between 1977 and 1982 to make the Swedish krona cheaper and restore the competitiveness of the Swedish exports industry. Decisions regarding the devaluations were formally decided by the general council, but were initiated by the governments formed after the elections in 1976 and 1982 (see for example Feldt 1983).

35 A spot transaction is settled after two days, while a forward transaction is settled after more than two days from the contract date.

Table 1. Sweden's monetary regimes since the Second World War

	Date	Note
Fixed exchange rate		
Member of Bretton Woods	31 August 1951–19 March 1973	The Bretton Woods system was an international currency arrangement with fixed exchange rates versus the US-dollar. It broke down in the early 1970's. See further in Bohlin (2010).
Member of the currency snake	19 March 1973 – 29 August 1977	The currency snake was a multilateral arrangement between western European currencies. Within this arrangement the krona was devalued by 3 per cent in October 1976, 6 per cent in April 1977, 10 per cent in August 1977 in connection with withdrawal.
Currency basket	29 August 1977 – 17 May 1991	The currency basket was a unilateral arrangement versus a basket of European and other currencies. Within this arrangement the krona was devalued by 10 per cent in September 1981, 6 per cent in October 1982.
ECU basket	17 May 1991 – 19 November 1992	The ECU basket was a unilateral arrangement versus a basket of the currencies of the members of the European Monetary System. See Lindberg and Lindenius (1991).
Floating exchange rate	As of 19 November 1992	
Inflation target		See Sveriges Riksbank (1993), the press release announcing the new inflation target.

Following the fall of the fixed exchange rate regime in November 1992, the Riksbank reinterpreted its task into primarily promoting internal price stability (see Sveriges Riksbank 1993). It gave itself two years to reach the target of an average price increase of 2 per cent – a target that was also fulfilled. Out of the many objectives that had steered the Riksbank's operations previously – influencing growth, employment, a fixed exchange rate, foreign exchange control, and so on – not much was left.

A few years later, reforms to the Sveriges Riksbank Act commenced in order to increase the bank's political independence in accordance with the terms regarding full monetary integration within the EU, as undertaken in the Maastricht Treaty from 1993. For the central banks, this mainly implied strengthened institutional and political independence. In the 1999 Sveriges Riksbank Act, this was implemented, as we have mentioned above, by transferring decision-making power from the General Council to the new Executive Board. The new Act also formulated price stability as the Riksbank's explicit operational objective. In the preparatory works for the 1999 Act, it is mentioned that monetary policy shall take into account factors such as employment and productivity without diverging from the priority of price stability.

After the crisis of the 1990s, the previously important functions foreign exchange and credit policy had disappeared, and instead the monetary policy became influential in attaining the price stability objective. The most important instrument for this work was the Executive Board's decisions on interest-rate changes and open market operations in Swedish kronor. Adding to this was also the publication of various analyses and forecasts regarding inflation development in the medium to long term. Hence, the analytical work that forms the basis for decisions regarding policy rates, open market operations and inflation forecasts belongs to monetary policy.

The monetary policy operations, as we understand them today, were also conducted to some extent before the Monetary and Exchange Rate Policy Department was created in 1989

when the operations on the domestic market were put together with the operations on the foreign exchange market. The Economics Department (which changed names in 2000 to the Monetary Policy Department) worked with analyses of the economy and the factors that the Riksbank's policies could – and should – influence, such as inflation, growth, unemployment, current account and foreign exchange movements. The Monetary and Exchange Rate Policy Department then carried out market operations as needed.

Enhanced analyses and forecasts, and greater openness

At a relatively early stage, the Riksbank headed towards greater transparency, one reason for which was to tackle the credibility problems that had struck the bank after the currency crisis at the beginning of the 1990s. Through the 1999 Sveriges Riksbank Act, publishing reports, analyses and Executive Board meeting minutes became formally important to the review and evaluation of the Riksbank's operations (see also section 8). They also became important policy instruments because they provided market participants with the Riksbank's view of present and future economic and financial development. Also, the Riksbank started to publish the Inflation Report in the mid-1990s (which changed names to the Monetary Policy Report in 2007).

In support of this, an increasing number of people with an advanced academic education, including economists with PhDs, were appointed. This followed an international pattern whereby a growing number of academics within economics were recruited for the central banks (Wendschlag 2018).[36] In the 1990s, a growing number of central banks also created their own research departments, in which non-directed but central-bank-relevant research was to be conducted. This was also the case for the Riksbank which, in 1997, started to build up a research department to conduct independent research that was of interest and relevance to the Riksbank. The department was to be a resource for other policy departments for advanced analyses and model development. However, it soon mainly became a highly attractive research environment for researchers in macroeconomics and econometrics, both in Sweden and internationally. The department contributed to the 'academisation' of the Riksbank as a workplace, and to boosting analytical capabilities. Several researchers have also advanced at the bank into prominent positions.

6 The promotion of a safe and efficient payment system

The Sveriges Riksbank Act formulates the Riksbank's task as 'promoting a safe and efficient payment system' and hence working to promote financial stability. The wording of the law can be considered fairly open to interpretation, which was probably also the purpose.

Banking operations lead to different kinds of risk. This is the case both in the relationship between banks and customers, and between banks. Risks between banks can however grow very large and be a case of pure credit risk, that can arise in connection with banks settling transactions between each other. The payment system also comprises cash, and when the current Sveriges Riksbank Act was written at the end of the 1990s, reinterpretation had started of the Riksbank's responsibility for cash provision.

Financial stability has actually always been part of the Riksbank's field of activity and also had great significance during the era of regulation. However, work with financial stability matters took on a different structure from the mid-1990s with a more active and focused way of acting on the part of the Riksbank. It is the policy area which, over the past few decades, has developed most. The focus on stability issues, both in terms of efficiency and

36 Out of just over 350 people who worked at the Riksbank in 2018, around 70 hold PhDs.

risk in the financial system and cash provision, was initiated by Urban Bäckström, who was governor of the Riksbank from 1994 to 2002.[37]

Work on financial stability was allocated to the Payment System Department in the 1990s (see Figure 7). The reason for this was that crises in the financial system are manifested such that if a bank cannot honour its obligations, this causes problems in Sweden's central payment system, RIX, which also encompasses so-called central-bank clearing (see below). The department was tasked with building up and developing the Riksbank's knowledge about risks in the payment system with the objective that the Riksbank would regularly issue reports on the state of the financial system.

6.1 The Riksbank's payment system (RIX)

There are several electronic payment systems in Sweden, and the most important is the Riksbank's payment system, RIX, which processes large payments between banks and certain other entities. In 2018 the average daily turnover in RIX was approximately SEK 485 billion (see Sveriges Riksbank 2019). Sweden's gross domestic product (GDP) in 2018 was SEK 4,791 billion, which means that turnover in RIX in one day equalled 10 per cent of the value of Sweden's overall production during one year. RIX is primarily used for banks to settle their financial dealings without a credit risk arising. To this end, the banks each hold an account with the Riksbank. In that the Riksbank is the central bank and owned by the state, which has powers of taxation, the Riksbank cannot, by definition, default. The funds that the banks hold in their accounts with the Riksbank therefore do not carry any credit risk.

When the banks settle their dealings, the term 'central bank clearing' is often used. Before the electronic RIX system was created in the mid-1980s, representatives from the banks came to the Riksbank daily, bringing with them an envelope for each of the other banks that participated in the clearing. The envelope contained the receivables, including receivables in the form of overdrafts that the bank concerned had from each of the other banks. These envelopes were submitted to the Riksbank, which sorted them so that each bank, when clearing was completed, was given the envelopes with claims that other banks had on the bank in question. At the same time, the receivables were entered by the Riksbank in the respective accounts of the banks. If a bank did not have sufficient money in an account, it could borrow from the Riksbank. When RIX was created, the banks agreed to no longer meet to exchange receivables through swapping physical papers; rather, the information would be provided electronically.

Until the beginning of the 1990s, if the banks did not have sufficient funds in their accounts at the Riksbank, they could borrow from the Riksbank on an unsecured basis. However, in connection with the financial turmoil at the beginning of the 1990s, in which a couple of banks collapsed, the Riksbank decided to demand full collateral with a certain margin in order for the banks to obtain loans from the Riksbank.[38]

For many years, central bank clearing had been dealt with by the Banking Department, to which the Accounting Office belonged. One of the tasks of the latter was to manage the actual entries that were made into the banks' accounts at the Riksbank. In 1991 the Accounting Office became a department in its own right, maintaining responsibility for RIX and the Riksbank's accounting. In order to increase focus on stability matters, in 1995 the Accounting Department changed names to the Payment System Department. At the same time, the link was established, which the bank continues to make, between responsibility for the payment system and financial stability. Accounting matters were transferred to a

37 As newly appointed Secretary of State in the Ministry of Finance, Urban Bäckström found out that a Swedish bank was about to collapse. Bäckström wondered, quite rightly, how this could happen without any government authority having noticed beforehand what was happening. It was against that background that the Riksbank started to allocate major resources to stability matters.

38 It was not until 1999 that the law stated that the Riksbank could only extend loans against collateral (SFS 1998:1414). The Riksbank began requiring collateral when extending loans before this became the law.

newly appointed group for accounting matters in the Administration Department. The new department was, as mentioned above, tasked with building up and developing the Riksbank's knowledge about risks in the payment system.

It took just over two years before the Riksbank published its first stability report in 1997. The Financial Stability Report is now published twice a year, and describes the Riksbank's assessment of the Swedish financial markets' – and especially the large banks' – stability and risk (see for example Sveriges Riksbank 2018). The Riksbank was the first central bank in the world to publish reports that include opinions on the theme of financial stability. Initially, the Riksbank was subjected to a number of questions and also critical comments from other central banks when it published its first stability report. The questions were mainly about how the Riksbank would act in a situation in which it believed a Swedish bank was in major difficulty – would it dare to say so in that case? Today, we can see that the Riksbank's pioneering activities were highly successful, and many central banks now publish stability reports. Also, once in a while the Riksbank has criticised named banks in its reports.

Building up an entirely new activity must understandably take a certain amount of time, and it is natural that the optimal organisation is not found straight away. The department initially had access to the resources that it considered it needed and could manage, at a time when other departments were under constraints in terms of resources due to the cutbacks at the head office caused by the HK-95 project.

In 1999 the payment system department had around 35 employees, which can be compared with 2018 when a little under 70 people worked in the Financial Stability Department. The department had two initial main tasks: One was to promote financial stability, and this work included overseeing the various payment and settlement systems that existed in Sweden. Also, it was to be responsible for the operation and development of the RIX system.

From 2000, on the suggestion of the Payment System Department, RIX was transferred to the Market Operations Department – an operational department that still had responsibility for executing the Riksbank's market operations. At the same time, the Payment System Department changed names to the Financial Stability Department. The reason for the transfer was that the department did not find it appropriate to have responsibility for the operation and development of RIX, and responsibility for overseeing the system at the same time.

Since 2000, the Financial Stability Department has gradually changed in line with developments in knowledge regarding financial stability matters, and changed needs. New groups have been added, and the responsibility of some groups has changed. The financial crisis of 2008–2009 put even more focus on stability matters and the need to enhance the tools needed by the Riksbank to promote a safe and efficient payments system.

6.2 The Riksbank's cash handling

Through the 1897 Sveriges Riksbank Act, the Riksbank gained, as we mentioned above, the monopoly on banknote issuance. In the second half of the 19th century in particular, Riksbank branches were established in all of the 23 county towns of the time and they would mainly come to deal with cash provision, but also a number of government loans and the sale of premium bonds.

Changes in the branch structure and efficiencies in the operations commenced in the 1980s, when a few branches were closed down and banknote depositories were established instead, also in locations where there had not been a branch previously. In 1982 there were 24 branches (including the head office in Stockholm) and 1 depository with 632 full-time employees, in 1987 there were 11 branches and 3 depositories with 540 full-time employees, in 1993 there were 19 branches, no depositories and 443 full-time employees and in 1997 there were 11 branches, 8 depositories and 300 full-time employees (see Sveriges Riksbank 1998).

The cash-related activities had, as we mentioned briefly in section 4 above, come to be viewed increasingly from a cost angle, and less from a 'public good' angle. The endeavour from the mid-1990s to sharply enhance the efficiency of the Riksbank would also affect how cash provision was organised, and regional branches were closed down. Also, a decision was made to privatise the majority of cash handling.

One main reason for privatising it was primarily to streamline the two separate functions that the Riksbank had for cash handling. The first function, ensuring that cash was available around the country, is a practical activity that bears much resemblance to the production operations of private companies. It was considered that there were lots of synergies associated with this activity and services on the cash market other than those that the Riksbank considered was its task to offer. By transferring the operations to a company with a clear profitability target, they could be made more efficient and more focused on business development in the cash market. This ought therefore to lead to a reduction in the costs of cash handling of both the Riksbank and the private sector, and hence a socioeconomic gain.

Incorporation would also enable a work environment for employees that was more stimulating and that offered greater advancement. The second function of the Riksbank – being the authority for cash provision – could also be streamlined. By reducing the resources needed to resolve practical problems reminiscent of those involved in business finances, the Riksbank was able to concentrate on performing its task of promoting a safe and efficient payment system as the cash provision authority.

In that spirit, at the end of 1998 the general council decided that a wholly owned limited company, Pengar i Sverige AB (PSAB), would be formed, which would be responsible for all the cash handing operations with which the Riksbank had worked thus far, apart from a small part that could be considered central-bank-specific. The latter was about ensuring that banknotes and coins were produced and that they were of good quality, and storing banknotes and coins and destroying bad banknotes.

The purpose of transferring the operations into a company, besides so that it could bear its own costs and be more efficient, was to illuminate the actual cost of cash handing, which had been impossible to distinguish thus far. The intention was to make the company profitable, and then have the larger banks take it over and run it. However, the company was never profitable and the banks were not interested in taking it over, and already in 2005 both PSAB and Svensk Kontantförsörjning AB were wound up. The latter had been formed in 2002, and one of its purposes had been to take over some of the more central-bank-specific parts of PSAB's operations and work with attempting to sell all or parts of PSAB.

The remaining cash handling was assimilated back into the Riksbank and went to the Market Operations Department, which still had responsibility for the central-bank-specific part of cash handling.[39] In 2007, as we mentioned above, responsibility for cash handling was transferred to the Administration Department, and in 2014 to the newly formed Payment and Cash Department (which is now called the Payments Department).

7 The Riksbank's international operations

The Riksbank's contacts with foreign central banks and organisations have undergone drastic development in the past few decades. At the end of the 1960s, for example, authorisation was required from the head of the Foreign Department if an official was to call a Nordic central bank for any matter, and, with few exceptions, it was the governor or deputy governor who represented the Riksbank internationally.[40] Today, officials themselves

39 At the time it was about designing and purchasing banknotes and coins, storage as well as supervision of the privatised cash handling.

40 If somebody needed to make a call to a central bank outside of the Nordic region, the matter had to be raised with the deputy governor.

decide whether they need to contact a counterpart in another country, and most Riksbank employees have recurring international contacts as they conduct their work today.

The main reason for this is that an increasing amount of negotiations and decisions regarding new or amended policies or regulations of banking operations and financial markets are taken internationally, and Sweden must normally follow such decisions. While as early as in the 1950s there were indeed a number of organisations – the IMF, World Bank, some OECD committees and so on – in which the Riksbank negotiated with other countries to influence international solutions, there has been a prominent shift towards seeking international agreements, which then set the frameworks for Sweden and the Riksbank. International work has also led to a sharp improvement in language skills and knowledge about the technical issues under discussion, which is a natural necessity in the ability to influence decisions.

Sweden's development in the last few decades in this respect resembles that in most other countries. The international cooperation between central banks can be linked to the major negotiations after the First World War, in which the central banks participated as technical experts in the delegations of the participating countries. Early formalisation of the central banks' cooperation came in 1931 with the Bank for International Settlements, of which Sweden, represented by the Riksbank, was a founding country. Also, the governor of the Riksbank was Sweden's representative on the board of the International Monetary Fund (a UN organisation) when Sweden joined in 1951, and the G10 in 1961.

In the influential Basel Committee on Banking Supervision, Sweden is represented by both the Riksbank and Finansinspektionen. The committee was formed in 1974 as a relatively informal group for officials in the G10 to discuss and inform each other of issues related to banking regulation and supervision in their own country. The best practice regulations gradually published by the committee in these matters were soon implemented in national legislation worldwide, making the committee one of the most important banking regulation and supervision forums today too. Governor Stefan Ingves was chairman of the Basel Committee from 2011 to 2019.[41]

Although international engagements were long reserved for the Riksbank's highest officials, an international organisation for these kinds of activities was established at an early stage. In the same year that the G10 was formed in 1961, the Foreign Relations Department was formed, which was given responsibility for coordinating and preparing the Riksbank's international work. In 1976 the department changed names to the International Department (see Figures 4 and 5). This department came to serve as the hub for the Riksbank's international engagements, and largely handled all general international groups and meetings. When the Swedish government started to borrow money on the international capital market, the International Department was initially involved as advisor to the Swedish National Debt Office. The Riksbank provided advice on and analysis of the tenders submitted by foreign consortia, because the National Debt Office had not had the time to build up its expertise in the area.

The International Department was divided into a foreign exchange policy group that mainly dealt with matters regarding Sweden's membership in the International Monetary Fund and in the World Bank, and a group for economic cooperation that concerned the OECD's field of work. The department also dealt with matters that came under the Nordic Council in its Nordic Financial Committee group, which prepared various financial and economic matters. It can be noted that matters regarding currencies and exchange rates were entirely dealt with by the Foreign Department, and certain general economics meetings

41 Ingves was elected chairman of the Basel Committee in 2011, and was then given the customary three-year term of office. In 2014 he was re-elected for three more years. He then served in practice as chairman until a replacement was appointed in March 2019.

within the bounds of the OECD for example were managed by the head of the Economics Department or equivalent.

Staff of the International Department were mainly generalists and not specialists in the issues to be covered, even though many exceptions can be found, such as institutional matters regarding the International Monetary Fund and the World Bank. The department prepared input for the international meetings of the governors of the Riksbank, and proximity to these people also led to them being engaged in some purely domestic matters. The department also prepared all matters regarding the International Monetary Fund and the World Bank for the Ministry of Finance and the Ministry for Foreign Affairs. It was also responsible for Sweden's coordination in these matters, which is only the case for the International Monetary Fund today. It also prepared certain international lending matters, such as the monetary fund's lending to countries in economic crisis, and matters regarding capital contributions in international development banks. At times, on a rotating schedule, it was also responsible for the Nordic coordination in monetary fund matters and later on in the Baltic-Nordic coordination. The department was also responsible at the time for the instructions sent to the countries' executive director on the board of the International Monetary Fund.

After Sweden joined the EU in 1995, a growing number of the Riksbank's officials would work with inquiries, information and negotiations regarding Sweden's potential membership of the European Monetary Union (EMU) and affiliation with the euro area. Riksbank officials took part in a great number of working groups in Brussels and Frankfurt when the technical and practical design of the currency union was in preparation, together with representatives from the Ministry of Finance and other expert authorities. The Riksbank also became a member of the European System of Central Banks (ESCB) and of the European Monetary Institute (EMI), the forerunner of the European Central Bank (ECB).

From the mid-1990s, the number of international committees and working groups grew sharply at the Riksbank, and specialists would take over a growing proportion of international efforts. The International Department shrunk in size. In the 1970s and 1980s, around 20 people at most worked in the department. It was a secretariat within the General Secretariat before finally being closed down in 2009, and responsibility for coordinating international matters was transferred to the Financial Stability Department. This was because it was considered that the Riksbank's best opportunities for international influence lay in the field of financial stability, for which the Riksbank was at the forefront from an early stage in that it was first to issue reports on risk in the financial system.

Developments in international work in the past 50 years have of course been affected by globalisation. At the Riksbank, international efforts have gone from being under strict management control to being delegated, albeit based on jointly established policies and guidelines. At the same time, in the main groups of the large organisations, the Riksbank was still represented by the Executive Board with specialist support and meeting preparations from the officials. The officials, for their part, participate in a completely different way than before in international working groups beneath the main groups.[42] Everything is coordinated within a number of Riksbank forums in which both the Executive Board and the officials concerned participate. The Nordic cooperation has become Nordic-Baltic and has been sharply limited, compared with the 1980s, to coordinated presence in global organisations such as the IMF. In turn, work with the ECB and EU has expanded considerably.

42 Examples are BIS/G10, Financial Stability Board (FSB), different groups in the European Central Bank (ECB), the EU, the European Systemic Risk Board (ESRB), Eurostat, IMF, OECD, Nordic-Baltic cooperation, Euroclear, etc.

8 The Riksbank in the years 1976, 1999 and 2019 – a comparison

In section 4 we have described how the Riksbank has developed in the past almost 50 years. 1976 was a significant year, when the Riksbank underwent an extensive reorganisation and started to be modernised. While foreign exchange and credit regulation were indeed still fully in force and dominated the Riksbank's operations, steps were taken towards more analytical units, unlike the more supervisory approach resulting from regulation. 1999 was an even more revolutionary year. A new Sveriges Riksbank Act came into force and gave the Riksbank clear objectives, independence and a completely new form of management. Modernisation of the organisation continued and it became increasingly focused on the functions price stability and financial stability. Today, in 2019, new areas are receiving more attention due to changes in the world at large. Examples are operations on financial markets, and on the payment market.

1976 compared with 2019

When comparing the Riksbank's organisation of 1976 and 2019, there are several similarities. The Riksbank is still an authority that comes under the Riksdag, there is an Executive Board and relatively few departments and functions, if we equate the Riksbank directors of the 1970s with today's department heads (cf. Figure 5 and 8). However, there are major differences. In the 1970s, two members of the General Council were included in the Executive Board besides the governor, deputy governor and the Riksbank director who was the reporting clerk. Everybody apart from the Riksbank director was politically appointed. Today's Executive Board, appointed by the General Council, runs the Riksbank's operations independently. The operations are also completely different. In the 1970s, management was conducted through different kinds of regulation. Today, the Riksbank works instead with different kinds of market-steering operations. In the 1970s, domestic and foreign matters were often dealt with separately from each other today, they are integrated within each policy area.

1999 compared with 2019 increased focus on transparency and communication

20 years have now passed since the 1999 Sveriges Riksbank Act came into force a reform that gave the Riksbank clear objectives and independence for making decisions. In practice, the independence means that the Riksbank's operations may not be governed or influenced by either political leaders in the Riksdag or government, or by other authorities or elements of central government. Naturally, with increased independence came the need for increased openness and transparency, and a lot has happened in this field since 1999.

The gradual journey to a more open central bank had however already begun, after the Swedish financial crisis at the beginning of the 1990s (see Meyersson and Mikiver 2018). Confidence in the Riksbank was low after the autumn of 1992 when the interest rate was hiked to 500 per cent and the fixed exchange rate regime collapsed. For the Riksbank, it was a case of having to recreate confidence in the bank, which was seen as a very closed organisation. The Riksbank therefore gradually started to open up and, in a different way than before, published material produced by employees. During this period, the Riksbank published more and more of the input prepared ahead of, in particular, the interest rate decisions. Publishing the Riksbank's analyses of and forecasts for financial markets and economic development would have tremendous significance.

The Riksbank's increased level of independence in 1999 placed further demands on transparency. With statutory independence for the Riksbank, changes also came that opened up for democratic insight and evaluation. In the Sveriges Riksbank Act, this is expressed in that: The Riksbank shall submit a written report on monetary policy to the

Riksdag Committee on Finance at least twice a year. Furthermore, the Executive Board of the Riksbank is obliged to submit each year an account and report to the Riksdag, the Swedish National Audit Office and the General Council of the Riksbank on conducted monetary policy and how the Riksbank has promoted a safe and efficient payment system.

The increased independence was accompanied by new kinds of evaluation and external control. External control of the Riksbank comes in several forms. Twice a year, the Riksdag Committee on Finance has two open hearings with the Executive Board regarding current monetary policy, and how the bank views future activities. The Committee also conducts an annual evaluation of monetary policy. The Parliamentary Auditors conduct an annual audit of the Riksbank's balance sheet. Once every five years since 2005, the Riksdag has allowed international experts to evaluate monetary policy and work with financial stability in the preceding five years.

In the past 25 years, the Riksbank has gradually enabled external parties to follow, inspect and evaluate the central bank's activities. The Riksbank is considered to be one of the most open central banks in the world. For example, since 1999 the Executive Board has been publishing minutes from the monetary policy meetings, and these have come to be increasingly detailed. The purpose has been to make it easier for the Riksbank's principals to hold the Riksbank to account, and also to provide financial markets with information that is as clear as possible about the Riksbank's positions on and interpretations of economic development. Likewise, the press releases published in connection with the monetary policy meetings have come to contain an increasing volume of information, for instance whether reservations have been entered.

In line with the heightened transparency, growing demands have been placed on the communication capabilities of the organisation. In the 1990s there were a handful of professional communicators employed at the Riksbank, and much of the art of expression was attended to by the experts or executive board members themselves. In 2006 the Riksbank made a number of decisions to make the communication itself clearer and more open. The Information Department, which had previously been a relatively traditional department focusing on the production of publications, was reorganised into a secretariat under the General Secretariat. Several economists from the specialist departments were recruited, and the Information secretariat commenced work on becoming more integrated into the rest of the bank's operations. For example, a communications officer was appointed for each department, and the communicators gained increasing influence over the final wording of texts and messages. In order to address the sometimes complicated and cryptic language used in the Riksbank's speeches, reports and other texts, in 2007 a plain language project commenced for all of the Riksbank's employees. These efforts bore fruit, and the Plain Swedish Crystal award was bestowed upon the Riksbank in 2009.

9 Concluding comments

Since it was founded in 1668, the Riksbank has been an authority that comes under the Riksdag. The Riksbank's activities are governed by the 1999 Sveriges Riksbank Act, which sets forth that the Riksbank is the central bank of Sweden, with responsibility for Sweden's monetary policy. However, the Riksbank also conducts other activities that naturally ensue from its role of central bank, primarily as the bank of banks. In this article we have studied how the Riksbank's various functions, management and internal organisation have changed over time, with a focus on developments in the past 50 years.

A clear trend in the Riksbank's organisational development is the progression towards fewer and fewer employees and organisational units. At the same time, a growing number of academics have been recruited, and a greater emphasis has been put on qualified research and analytical work. Since the current Sveriges Riksbank Act came into force in 1999, further

reorganisations have taken place with a view to improving the efficiency of the internal operations and adapting them to changes abroad, such as developments in the European Monetary Union and the increasing interconnectedness of the global financial system. Cash handling has been fundamentally altered. We can note that changes in the Riksbank's operations and its organisation have not clearly coincided with the major institutional changes to the Riksbank's remit and tasks. The Sveriges Riksbank Acts and amendments thereto have, in other words, not always been decisive in how the bank has worked, or which functions have been prioritised. Rather, it has often been changes abroad, such as increasingly integrated financial markets, and people who have served in the Riksbank's management, that have led to changes in the bank's organisation.

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Appendix

Table A1. The Riksbank's areas of operation and organisation 1974–2018

	(1) Credit policy and regulation	(2) Foreign exchange controls	(3) Price stability	(4) Open market operations	(5) Foreign exchange operations	(6) Currency reserve management	(7) Payment systems	(8) Cash provision	(9) Analyses, reports and statistics RX	BP	FM	FS[1]	(10) Financial stability	(11) International work
1974	Credit Market Department	Exchange Control Department	Credit Market Department	Securities Department	Foreign Department	Foreign Department		Branches Department	Exchange Control Department	CMD[2]				International Department
1975														
1976	Monetary Policy Department		Economic Department	Monetary Policy Department			Banking Department	Banking Department		Economic Department				
1977														
1978														
1979														
1980														
1981														
1982				Capital Markets Department										
1983													Monetary Policy Department	International Secretariat/General Secretariat[3]
1984	Credit Market Department			Securities Department			Banking Department	Cashiers' Department			Credit Markets Department			
1985														
1986														
1987														
1988														
1989	No activity	No activity		Monetary and Exchange Rate Policy Department	Monetary and Exchange Rate Policy Department	Monetary and Exchange Rate Policy Department	Accounting Department	Branches (23 in 1985, 11 in 1995)	Economic Department	Balance of Payments Department	Financial Markets Department	Financial Markets Department	Financial Markets Department	
1990														
1991														
1992														
1993														
1994														
1995							Payment System Department		Payment System Department	Financial Statistics Department		Payment System Department	Payment System Department	
1996														
1997														
1998														
1999														
2000			Monetary Policy Department	Market Operations Department	Market Operations Department	Market Operations Department	Market Operations Department	Market Operations Department	Market Operations Department	Monetary Policy Department	Financial Stability Department	Financial Stability Department	Financial Stability Department	
2001														
2002								PSAB						
2003														
2004								SKAB						
2005														
2006														
2007				Monetary Policy Department	Monetary Policy Department	Asset Management Department	Asset Management Department	Administration Department	Monetary Policy Department	Statistics Sweden	Statistics Sweden			
2008														
2009														
2010														
2011														
2012														
2013														
2014				Markets Department	Markets Department	Markets Department	Cash and Payment Systems Department (now Payments Department)	Cash and Payment Systems Department (now Payments Department)						Financial Stability Department
2015														
2016														
2017														
2018														

1. RX, interest and exchange rate markets. BP, balance of payments. FM, financial market. FS, financial stability.
2. Credit Market Department.
3. From the mid 1990's all policy departments began to work internationally (see Section 7).

Table A2. Governors[1] of the Riksbank and chairmen of the general council since 1858

	Governors of the Riksbank	Chairmen of the General Council
1858		1858–1860 Carl Bertil Lilliehöök
1859		
1860		
1861		1860–1864 Adolf Fredrik Nils Gyldenstolpe
1862		
1863	1863–1868 Albert Wilhelm Björk (potentially from 1860)	
1864		1864–1865 Carl Gustaf Lagercrantz
1865		
1866		1865–1867 Carl Magnus Casimir Lewenhaupt
1867		
1868		1867–1872 Olof Fåhræus
1869		
1870	1870–1883 Alfred Wilhelm Dufwa	
1871		
1872		1872–1885 Carl Magnus Casimir Lewenhaupt
1873		
1874		
1875		
1876		
1877		
1878		
1879		
1880		
1881		
1882		
1883	1883–1901 Johan Wolter Arnberg	
1884		
1885		1885–1886 Pehr J von Ehrenheim
1886		1886–1890 Carl Magnus Casimir Lewenhaupt
1887		
1888		
1889		
1890		1890–1908 Pehr J von Ehrenheim
1891		
1892		
1893		
1894		
1895		
1896		
1897		

	Governors of the Riksbank	Chairmen of the General Council
1898	1883–1901 Johan Wolter Arnberg	1890–1908 Pehr J von Ehrenheim
1899		
1900		
1901	1901–1912 Bror Karl Johan Langenskiöld	
1902		
1903		
1904		
1905		
1906		
1907		
1908		1908–1909 Reinhold Skarin
1909		
1910		1909–1917 Sixten von Friesen
1911		
1912	1912–1929 Victor Moll	
1913		
1914		
1915		
1916		
1917		1917–1941 Adolf af Jochnick
1918		
1919		
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929	1929–1948 Ivar Rooth	
1930		
1931		
1932		
1933		
1934		
1935		
1936		
1937		

	Governors of the Riksbank	Chairmen of the General Council
1938	1929–1948 Ivar Rooth	
1939		
1940		
1941		1941–1948 Dag Hammarskjöld
1942		
1943		
1944		
1945		
1946		
1947		
1948	1948–1951 Klas Böök	1948–1956 Conrad Jonsson
1949		
1950		
1951	1951–1955 Mats Lemne	
1952		
1953		
1954		
1955	1955–1973 Per Åsbrink	
1956		1956–1957 Per Eckerberg
1957		1957–1964 Per Edvin Skiöld
1958		
1959		
1960		
1961		
1962		
1963		
1964		1964–1967 Krister Wickman
1965		
1966		
1967		1967–1970 Kjell-Olof Feldt
1968		
1969		
1970		1970–1973 John Ericsson
1971		
1972		
1973	1973–1976 Krister Wickman	
1974		1974–1976 Pierre Vinde (appointed 26/08/1974)
1975		
1976	1976–1979 Carl-Henrik Nordlander	
1977		

	Governors of the Riksbank	Chairmen of the General Council
1978		1976–1982 Torsten Bengtsson
1979	1979–1982 Lars Wohlin	
1980		
1981		
1982	1982–1992 Bengt Dennis	1982–1985 Gunnar Sträng
1983		
1984		
1985		1985–1990 Erik Åsbrink
1986		
1987		
1988		
1989		
1990		1990–1991 Per Borg
1991		1991–1994 Staffan Burenstam Linder
1992		
1993	1993–2002 Urban Bäckström	
1994		1994–1998 Kjell-Olof Feldt
1995		
1996		
1997		
1998		1998–2002 Sven Hulterström
1999		
2000		
2001		
2002		2002–2006 Jan Bergqvist
2003	2003–2005 Lars Heikensten	
2004		
2005		
2006	2006– Stefan Ingves (appointed until 31/12/2022)	2006–2014 Johan Gernandt
2007		
2008		
2009		
2010		
2011		
2012		
2013		
2014		2014– Susanne Eberstein (term of office until new election following the general election in 2022)
2015		
2016		
2017		
2018		

1. Until 1949 formally called 'first deputy' (Wetterberg 2009)

Executive Board members since 1999

The current Sveriges Riksbank Act has been in place for two decades, and 18 people have served as Executive Board members. Several members have served for more than one term of office, which was initially six years, but can now be five or six years. When the first Executive Board was elected, however, the terms of office were divided up between one and six years, and the idea at the time was that one member would be replaced each year. However, this has not been the case. Even though several members have been elected for more than one term, several have opted to leave the Executive Board during their current term of office, including two governors of the Riksbank.

Table A3. Members of the Executive Board of the Riksbank 1999–2019

		Term(s) of office	Title	Note
1	Urban Bäckström	1 Jan 1999–31 Dec 2004	Governor of the Riksbank	Left 31 Dec 2002
2	Lars Heikensten	1 Jan 1999–31 Dec 2003, appointed Governor of the Riksbank for the period 1 Jan 2003–31 Dec 2008	First Deputy Governor of the Riksbank, Governor of the Riksbank from 2003	Left 31 Dec 2005
3	Eva Srejber	1 Jan 1999 – 31 Dec 2002, 1 Jan 2003 – 31 Dec 2008	First Deputy Governor of the Riksbank from 1 Jan 2003	Left 29 March 2007
4	Villy Bergström	1 Jan 1999–31 Dec 2001, 1 Jan 2002–31 Dec 2007	Deputy Governor of the Riksbank	Left 31 Dec 2005
5	Kerstin Hessius	1 Jan 1999–31 Dec 2000	Deputy Governor of the Riksbank	
6	Lars Nyberg	1 Jan 1999–31 Dec 1999, 1 Jan 2000–31 Dec 2005, 1 Jan 2006–31 Dec 2011	Deputy Governor of the Riksbank	
7	Kristina Persson	1 May 2001–30 Apr 2007	Deputy Governor of the Riksbank	
8	Irma Rosenberg	1 Jan 2003–31 Dec 2008	First Deputy Governor of the Riksbank from 25 April 2007	
9	**Stefan Ingves**	1 Jan 2006–31 Dec 2011, 1 Jan 2012–31 Dec 2017, 1 Jan 2018–31 Dec 2022	Governor of the Riksbank	
10	Svante Öberg	1 Jan 2006–31 Dec 2011	First Deputy Governor of the Riksbank from 30 Jan 2009	
11	Barbro Wickman-Parak	21 May 2007–20 May 2013	Deputy Governor of the Riksbank	
12	Lars E O Svensson	21 May 2007–20 May 2013	Deputy Governor of the Riksbank	
13	Karolina Ekholm	15 March 2009–14 March 2015	Deputy Governor of the Riksbank	Left 10 Oct 2014
14	**Kerstin af Jochnick**	1 Jan 2012–31 Dec 2017, 1 Jan 2018–31 Dec 2023	First Deputy Governor of the Riksbank	
15	**Per Jansson**	1 Jan 2012–31 Dec 2016, 1 Jan 2017–31 Dec 2021	Deputy Governor of the Riksbank	First member to be appointed for a 5-year term of office
16	**Martin Flodén**	22 May 2013–21 May 2018, 22 May 2018–21 May 2024	Deputy Governor of the Riksbank	
17	**Cecilia Skingsley**	22 May 2013–21 May 2019, 22 May 2019–21 May 2025	Deputy Governor of the Riksbank	
18	**Henry Ohlsson**	12 Jan 2015–12 Jan 2021	Deputy Governor of the Riksbank	

Note: Current Executive Board members are in bold.
Source: The Riksbank

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