



Banknote and coin changeover in Sweden

Summary and evaluation

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Foreword

Over the period 2010–2017, the Riksbank implemented an extensive changeover of banknotes and coins. The aim has been to design an efficient and secure banknote and coin series, with account taken of environmental impact. This report summarises and evaluates the changeover. Its aim is to describe how the changeover was carried out, to check whether the objective was achieved and summarise our experiences for management to help with similar and even larger projects.


The report is primarily aimed at its principals, which is to say the General Council and Executive Board of the Riksbank, and at other central banks wishing to learn from the Riksbank's experiences. It is otherwise aimed at anybody interested in finding out how the changeover turned out.

The evaluation has been made by the Riksbank's Payments Department. The comments and conclusions are the Department's own.

The reports and memoranda upon which the evaluation is based are listed in annex 1 and can be downloaded from the Riksbank's website, www.riksbank.se.

We would like to offer our heartfelt thanks to everybody involved in the changeover and who contributed towards its successful implementation.

Sveriges Riksbank, March 2018


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Reading instructions

The report is divided up into four sections. The first of these describes the bases for the decision to hold a review of the banknote and coin series, the second describes how the changeover was implemented, the third evaluates the changeover and the fourth provides comments and conclusions. There is a summary at the start of the report.

Summary

Start 2008 and conclusion 2017

In 2008, the Riksbank decided to carry out a review of the banknote and coin series. The assignment was to design an efficient and secure banknote and coin series, with account taken of environmental impact. The work was to be carried out in collaboration with the cash market participants and the interests of the general public were to be taken into consideration.

The first step was the withdrawal of the 50-öre coin in 2010. The Riksbank then decided to renew the entire banknote and coin series except for the 10-krona coin. A new 200-krona banknote would be introduced and the issue of the 2-krona coin would be resumed. The banknotes were given a smaller format and new security details. The coins became smaller, lighter and nickel-free. The main theme for the banknote series was cultural figures and Sweden's natural environment, while the theme for the coin series remained Sweden's Head of State.

As a preparatory measure, two older versions of the 50- and 1,000-krona banknotes became invalid at year-end 2013. The changeover was then conducted in two stages. The first stage was initiated in October 2015, when the Riksbank started to issue new 20-, 50-, 200- and 1,000-krona banknotes. The second stage was initiated in October 2016, when the Riksbank began to issue new 100- and 500-krona banknotes, and new 1-, 2- and 5-krona coins. In both stages, the old banknotes and coins were valid for nine months after the new ones had started to be issued. After 30 June 2017, all old banknotes and coins were invalid. In conjunction with the changeover, a comprehensive information campaign was conducted.

A complex project in which the objective was fulfilled

The cash market agents consider that the changeover largely worked well, even though the coin changeover was demanding. The timetable was kept and no serious incidents occurred. A large majority of the general public consider that they were kept well-informed of the changeover. Most were also able to get rid of old banknotes and coins in an easy manner, even if this was more difficult with the coins than with the banknotes. By 31 December 2017, the Riksbank had got 92 per cent of the old banknotes and 52 per cent of the old coins back since the start of the changeover in 2015.

All indications are that the new banknotes have been broadly accepted by the general public. The opposite applies to coins, as many people find it difficult to tell the denominations apart. The handling of the banknotes and coins in technical equipment functions well. The banknotes' safety standards are high and the number of counterfeits is low. The environmental impact of the manufacturing and handling of the new banknotes and coins is lower than that of the old ones. Both the 2-krona coin and the 200-krona banknote have become established denominations.

The value of banknotes and coins in circulation decreased heavily over the period 2012–2017. All indications are that part of the decline is due to banknotes and coins that have become invalid not being replaced by new ones. The 500-krona banknote still dominates the banknote series, at the same time as the proportion of 1,000-krona banknotes has decreased.

The changeover has entailed costs for the trade sector, the banks and the banks' cash-cash handling companies. In the long term, society's costs for cash handling will decrease due to the changeover, primarily due to lower costs for handling coins. The risk of costs due to banknote counterfeiting has decreased.

Our conclusion is that the changeover project has been complex but that its objective has been fulfilled. In our assessment, the project has been implemented in accordance with the assignment. Cooperation between the cash market participants has generally worked well, taking into account the interests of the general public.

Starting points for the changeover

Efficiency and security in focus

The question of a review of the banknote and coin series arose in 2008. At that point, the long-term trend was already that the proportion of gross domestic product (GDP) made up by cash was decreasing, which is to say, it was playing an increasingly minor role in the total economy. However, the amount of cash increased every year, measured in absolute figures. In 2007, the value of banknotes and coins in circulation amounted to SEK 110 billion, comprising of SEK 104 billion in banknotes and SEK 6 billion in coins.¹ Over the ten-year period 1998–2007, the amount of cash had increased by 33 per cent.²

Cash handling was thereby a significant task for both the Riksbank and the cash market's participants. Due to its responsibility for providing the country with banknotes and coins, it was the Riksbank that had the main responsibility for ensuring that cash handling was rational and cost-effective. The Riksbank had already initiated and implemented major changes to streamline handling by allowing the market to take a greater responsibility. On the other hand, the banknotes and coins themselves had not seen a change in their basic design for a long time. Several changes had been suggested, both by the cash market and from within the Riksbank.

Relatively old banknote and coin series

At this point, the banknote series consisted of five denominations – 20, 50, 100, 500 and 1,000 kronor. The latest versions of the 100- and 500-krona banknotes had been introduced in the mid-1980s, the 1,000-krona banknote in 1989 and the 50-krona banknote in 1996. The 20-krona banknote had been introduced in 1992 and was given a smaller format and different shade of colour in 1997. The 100- and 500-krona banknotes had been upgraded with new security features in 2001 and the 50- and 1,000-krona banknotes in 2006.

The coin series also consisted of five denominations – 50-öre and 1-, 2-, 5- and 10-krona. The 1-krona had been in existence since the 1800s and its design had been changed on several occasions. The latest version of the 50-öre coin was introduced in 1992, the 5-krona in 1976 and the 10-krona in 1991. Manufacture of the 2-krona stopped in 1971 and it was no longer used in practice, but was still a valid means of payment.

Reduced role for the Riksbank in cash handling

According to the Sveriges Riksbank Act, the Riksbank is responsible for providing Swedish banknotes and coins. For many years, the Riksbank resolved this by providing banknotes and coins from up to 23 offices around Sweden. In the 1990s, a comprehensive change was made, leading to the market participants taking greater responsibility for practical management and to the Riksbank's operational tasks decreasing.

¹ Annual average.

² This comparison refers to volumes on 31 December of each year.

As a consequence of the changed allocation of responsibility, the Riksbank gradually reduced the number of cash offices to two, one in Mölndal and one in Tumba. These offices were also phased out, with operations being transferred in 2014 to a new office north of Stockholm, which is now the Riksbank's only cash office. This office only handles banknotes. In 2013, coin handling was transferred to a coin depot in Stockholm run by a cash-in-transit service on behalf of the Riksbank. At the start of the 2000s, the Riksbank sold the factory at Tumba that had manufactured banknotes and coins. Since then, the Riksbank has procured banknote and coin suppliers.

According to the policy for cash provision that is currently applicable, the Riksbank shall provide cash to the banks who, in turn, provide cash to companies and the general public. The Riksbank's assignment is restricted to providing banknotes and coins to the banks, destroying worn-out banknotes and coins, storing temporary surpluses of banknotes and coins and redeeming invalid banknotes. The riksbank provides compensation for interest expenses to banks and bank-owned companies storing cash. The distribution and handling of banknotes and coins in society is managed by banks and other market participants without the Riksbank's participation.

The banks collaborate in the handling of banknotes and coins

Consequently, only banks have the right to collect and deposit banknotes and coins at the Riksbank. For this purpose, the five larger banks³ have formed a joint company to conduct depot operations for cash. This company was formerly known as Bankernas Depå AB (BDB). At the start of 2017, BDB was merged with the ATM company Bankomat AB, which now runs both depot operations and ATMs.⁴ When cash is stored in Bankomat's depots, the Riksbank pays interest on the value, known as compensation for interest expenses. This means that cash does not have to be physically deposited at the Riksbank to bear interest. Coins are transported on behalf of Bankomat directly from the Riksbank to the cash-in-transit services' depots and thereafter further into society.

Even if the banks are responsible for the distribution of banknotes and coins, they have no statutory obligation to provide cash. The banks determine themselves the kind of cash service they will offer the public.

The assignment – efficiency, security, environment

In 2008, the Executive Board of the Riksbank passed a resolution to carry out a review of the banknote and coin series. The resolution noted that the basic features of the banknote and coin series had remained unchanged for a long time and that several proposals for changes had been put forth that needed to be treated in one context. Furthermore, it noted that there were no practical problems justifying a completely new banknote and coin series but that this question could nevertheless arise as a consequence of the changes being proposed. The objective was described as to "... develop an efficient, environment-friendly and secure banknote and coin series..."

According to the mission statement, the work would be conducted in the form of a project and in cooperation with participants in the cash market. The interests of the general public would be taken into account. A decision was taken on a project plan, which divided the work into five sub-projects:

³ Danske Bank, Handelsbanken, Nordea, SEB and Swedbank.

⁴ This report uses the name "BDB" for the historical description and "Bankomat" for the situation today.

- Background description.
- Examination of the need for a 50-öre coin.
- Analysis of denominations and their distribution between banknotes and coins.
- Detailed design and implementation.
- Follow-up.

The implementation of the project

Survey of cash usage – the starting point for our work

In 2008, the project submitted a report on cash usage in Sweden. This was intended to provide a starting point for continued work and included observations and statistics shedding light on the use of banknotes and coins, as well as the existing need for change. The most important conclusions were:

- Demand for 500-kronor banknotes had increased and banknotes alone now accounted for more than half of the value of banknotes in circulation. This strong dependence on a single banknote denomination entailed risks for the Riksbank if that banknote should be counterfeited on a larger scale. At the same time, demand for 1,000-krona banknotes had decreased and the banknote was used increasingly rarely for making payments. In the coin series, the 1-krona was strongly dominant as regards the number of coins.
- Wear and tear of 20-krona banknotes had become an increasing problem for the cash market as this impeded counting and authentication. However, the general public was largely satisfied with the quality of banknotes, even if the 20-krona banknote was considered to be of lower quality than the other denominations. Many neighbouring countries no longer had banknotes for amounts below the equivalent of SEK 50, but had switched to coins for lower denominations.
- The banknotes' security features were starting to become obsolete. While the standard remained approximately the same as in neighbouring countries and the number of counterfeits was low, several countries in Europe were planning to upgrade their banknote security.
- Both the 1 and the 5-krona contained nickel, which is unsuitable from an environmental point of view and which can be allergenic. In general, the environmental impact of the banknotes and coins was poorly understood.
- The denominations 2 and 200-krona could streamline cash payments.
- The coins had been unchanged for a long time and buying them in was expensive. Handling the coins was costly as they were large and heavy. The general public and cash market participants no longer considered the 50-öre coin to be needed.

Withdrawal of the 50-öre coin

The continued existence of the 50-öre coin was dealt with as an initial question. The project presented an analysis at the end of 2008. This noted that the 50-öre coin was used increasingly rarely, that two-thirds of the population considered that the coin was unnecessary and that the trade sector and the banks advocated a withdrawal of the coin.

If the 50-öre coin was withdrawn, the 1-krona coin would be the lowest denomination of coin. The physical form of the öre would disappear. However, the concept of 'öre' would

remain as an arithmetical unit and it would remain possible to set prices in öre even after the coin was withdrawn. It would also remain possible to make electronic payments in öre. The final sum would only have to be rounded to the nearest krona when paying in cash. A withdrawal of the coin would thus not affect inflation, as the consumer price index, which forms the basis for calculating inflation, is based on prices that are not rounded off.

After consulting the cash market, the project proposed that the 50-öre coin should cease to be a legal means of payment after 30 September 2010. This date was chosen in consideration of cash usage being lower in the autumn, which would facilitate practical implementation connected with the withdrawal.

In December 2008, the Riksbank submitted a proposal to the Riksdag (the Swedish parliament) requesting that the coin be declared invalid. At the same time, a proposal was submitted concerning amending the legislation concerning rounding off certain amounts in öre. This amendment entailed rounding amounts in öre downwards when the final figures were 1–49 and upwards when the final figures were 50–99. A decision was taken by the Riksdag in March 2009.

The Riksbank reached an agreement with the banks making it possible for the coins to be redeemed in banks until 31 March 2011. During the redemption period, the Riksbank received 111 million coins for a value of SEK 55 million. This corresponded to 28 per cent of the value of the coins in circulation when the coin became invalid on 30 September 2010. A value of SEK 142 million remained unreturned. The old coins were sold by the Riksbank to be melted down for the metal as raw material.

Two new denominations and unchanged boundary between banknotes and coins

Proposal for 2 and 20-krona coins and 200-krona banknote

The project analysed which denominations would be appropriate to include in the new banknote and coin series and how these should be distributed between banknotes and coins. A report was presented in February 2010. This proposed that the banknote series should be complemented by a 200-krona banknote and the coin series with a 20-krona coin, and that the production of 2-krona coins should be resumed. The banknote series was proposed to consist of the denominations 50, 100, 200, 500 and 1,000-kronor and the coin series of the denominations 1, 2, 5, 10 and 20-kronor. The project's assessment was that the new 200 and 2-krona denominations would replace a number of 100-krona banknotes and 1-krona coins by letting many payments be made with one banknote or one coin instead of two. The number of banknotes and coins would thereby be reduced. In addition, if the 500-krona banknote had to be withdrawn due to comprehensive counterfeiting, it would be easier to replace its value if there was a 200-krona banknote. The risks inherent in the 500-krona banknote's dominance would thereby be reduced.

The quality of the 20-krona banknotes in circulation had become increasingly low, creating problems in authentication and mechanical handling. In the project's view, there therefore existed reason to go over to using a coin, which would be more durable and have a longer lifetime. To gain a view of the environmental consequences, a consultancy firm was engaged to perform an investigation comparing the environmental impact of a 20-krona coin and a 20-krona banknote. The result showed that the differences were minor but that the banknote was slightly better. However, the decisive factor for the result was the calculated respective lifetimes of the banknote and coin. The shorter the banknote's lifetime, the more advantageous the coin became. The lifetime of 20-krona banknotes tended to be

increasingly short as they were being handled increasingly carelessly. In light of this, the project concluded that there were no environmental factors arguing against a coin.

1,000-krona banknote retained

Furthermore, the project concluded that the 1,000-krona banknote should be retained, even though it was being used increasingly infrequently. A withdrawal would lead to payments that were previously made using 1,000-krona banknotes would instead be made using 500-krona banknotes, thus further increasing the dominance of the 500-krona banknote. One security aspect was that the 1,000-krona banknote could act as an alternative means of payment for larger-value payments if the electronic payment system were to suffer disruptions. In the project's assessment, the 1,000-krona banknote also played a certain role for cash payments and saving, even if its significance had decreased.

Security, efficiency and new denominations suggested new design

The project noted that the security features in the banknote series were no longer modern and were thus more vulnerable to the risk of counterfeiting. Several neighbouring countries were planning to upgrade their banknotes. This risked leading to Sweden having lower security standards than the surrounding countries. In addition, a number of upgrades of security features had already been made, limiting the possibilities of making further upgrades.

Furthermore, the project noted that smaller and lighter coins could reduce handling costs and environmental impact and reduce the Riksbank's purchasing costs. For environmental and health reasons, the coins should not contain nickel. In the project's opinion, the only coin in the coin series to have a modern design was the 10-krona.

Furthermore, the project noted that the new denominations must fit into the banknote and coin series in such a way as to function in practical handling. This meant that their format, design and security features needed to resemble those of the other denominations.

Decision to renew entire banknote and coin series – the 20-krona banknote remains

Considering the change requirements and the arrival of two new denominations, the project came to the conclusion that the Riksbank should take the step of renewing the entire banknote and coin series, with the exception of the 10-krona coin. Also acting in favour of this was the fact that changeover costs in society would be smaller if many changes were made at the same time, as compared with smaller changes on repeated occasions. The proposal was referred to the cash market participants for consultation. They were largely positive except for the proposal for a 20-krona coin, where opinions were divided. Trade sector organisations opposed the idea of a coin as, in their opinions, this would lead to increased costs and a worsened working environment.

Despite this, the Executive Board of the Riksbank considered that the arguments for a coin weighed more heavily and, in March 2010, took a decision to renew the banknote and coin series in accordance with the project's proposals. At the same time, the decision was taken to submit a proposal to the Riksdag on an amendment of the Sveriges Riksbank Act that would grant the Riksbank the right to issue 2 and 20-krona coins and a 200-krona banknote. The General Council of the Riksbank supported this submission, except for the proposed 20-krona coin. The General Council considered that the 20-krona banknote should be retained. The Riksdag took a decision in June 2010, taking the General Council's line. The coin series would thereby consist of four denominations – 1, 2, 5 and 10 kronor and the banknote series of six denominations – 20, 50, 100, 200, 500 and 1,000 kronor.

The General Council of the Riksbank decides on the design of banknotes and coins

Decisions regarding the design of banknotes and coins are taken by the General Council of the Riksbank in accordance with the Sveriges Riksbank Act. The General Council has appointed a drafting committee tasked with compiling background information for such matters. During the changeover, the group consisted of four members of the General Council and four experts.⁵ Due to its task of preparing all design issues, the group came to play a central role in the design of the new banknotes and coins. The group continues to be known as the 'preparatory group'.

Banknotes and coins designed

Smaller format for the banknotes

As a starting point for the design of the new banknotes, the project identified six factors that were deemed to be decisive for ensuring the security and efficiency of the banknote series:

- Protection against counterfeiting.
- Speed of identification of genuine banknotes.
- Ease of distinguishing between denominations.
- Cost-effectiveness of manufacture and handling.
- Durability.
- Environmental impact.

The project concluded that production and handling would be most efficient if the banknotes were smaller than in the previous banknote series and if the height was the same across all denominations. It was proposed that all banknotes should have a height of 66 millimetres and that there should be a difference in length of seven millimetres between the denominations. The lowest denomination, the 20-krona banknote, would have the format 120 x 66 millimetres, while the highest, the 1,000-krona banknote, would have the format 154 x 66 millimetres.⁶

Banknotes continue to be made of cotton paper

Three types of banknote material were evaluated – cotton paper, polymer and combinations of cotton paper and polymer.⁷ In addition, different methods for improving the banknotes' durability were tested, such as coating or otherwise treating the surfaces. The decisive factor for the choice of method was the security system used by cash-in-transit services and other participants on the cash market to counteract robbery or theft. The system is designed in such a way that banknotes are discoloured by security dye and made unusable if an attempt is made to damage bags or other storage areas in which banknotes are stored. The project had different types of banknote paper tested with the assistance of SSF (the Swedish Theft Prevention Society) and the Swedish National Forensic Centre (NFC), formerly the Swedish National Laboratory of Forensic Science. The results showed that discolouration worked well on banknotes made of cotton paper but significantly less well on polymer banknotes and coated banknotes. Banknote paper that is a combination of cotton paper and polymer also exists, but the project's opinion was that this had not been sufficiently tried and tested.

The proposal was for the banknotes to continue to be manufactured of cotton paper but that a slightly heavier paper should be used to make the banknotes more sustainable.⁸ In addition, the project proposed further strengthening the lowest denominations, 20

⁵ The names are presented in Appendix 3.

⁶ The difference in length between the 20 and 50-krona banknotes became 6 millimetres as, for cost reasons, the Riksbank wished to have the maximum amount of banknotes per sheet when printing.

⁷ Banknotes made of polymer are often referred to as 'plastic banknotes' in everyday speech.

⁸ Weight per unit area increased from 85 to 95 millimetres per square metre.

and 50-kronor, by using the same surface treatment as was used in the earlier 20-krona banknote. This treatment involves the banknotes being coated with a special solution. Later on, a decision was taken to use this treatment in a modified form on all denominations.

Clearer colours on the banknotes

The project considered that the colours and contrasts in the new banknote series should be clearer than in the old series to make it easier to differentiate the denominations. At the same time, the preparatory group considered it would be worth keeping the same colour scale as the old banknote series. The proposal was therefore that the colour scale in the new banknote series should be the same as the old series but that the colours should be clearer. The new 200-krona banknote should be green.

Table 1. Colour scale of the banknote series.

Denomination	Colour
20 kronor	Purple
50 kronor	Yellow/orange
100 kronor	Blue
200 kronor	Green
500 kronor	Red
1,000 kronor	Grey-brown

New alloy in 1 and 2-krona coins and no nickel

As a starting point for the design of the new coins, the project identified five factors that were deemed to be decisive for ensuring the coin series would be efficient, environmentally-friendly and secure:

- Durability.
- Purchasing price.
- Environmental impact and health risks.
- Weight.
- Protection against counterfeiting.

Protection against counterfeiting was ascribed less significance in the evaluation as coins have low value and are very seldom counterfeited.

The project noted that copper/nickel, of which the old 1 and 5-krona coins were manufactured, is a durable and beautiful material but is unsuitable from an environmental and health point of view. Experts at Karolinska Institutet in Stockholm have observed that nickel-containing coins transmit significant amounts of nickel to the skin after only brief contact. Coins containing nickel can therefore trigger a nickel allergy. In addition, Sweden has adopted a national environmental objective entailing a reduction in the use of nickel, as the extraction of nickel has a higher environmental impact than the extraction of many other metals. The project therefore considered that the new coins should not contain nickel.

Three types of coin were evaluated – homogeneous coins, plated coins and bi-metal coins.⁹ The project's proposal was that the lowest denominations, 1 and 2-krona, should be made of copper-plated steel, which is to say steel encased in a thin layer of copper. This is a tried and tested material that is relatively durable, environmentally-friendly and cost-effective. Furthermore, it was proposed that the 5-krona should be made of the same material as the

⁹ Homogeneous coins have the same metal/alloy throughout the coin. Plated coins consist of one metal or alloy as a core and an outer layer of another metal. Bi-metal coins consist of a centre of a certain metal/alloy centre and an outer ring of another metal/alloy.

10-krona, so-called Nordic gold. This is an alloy that consists of 89 per cent copper with small elements of aluminium, zinc and tin, which gives the coins a golden colour. The 10-krona coin would be kept without change.

Smaller and lighter coins – milled to help visually impaired

The size and weight of the coins is significant for their handling costs and environmental impact. The aim was therefore that the new coins should be smaller and lighter than the old ones. In addition, they would have to differ from coins in other countries, above all countries in Sweden's vicinity, to avoid the risk of confusion. The design was fixed after examining other countries' coin series and consulting with cash market participants. If the old coin series were to be replaced with the same value in new coins, the weight of coins in circulation would be reduced by more than half.

Table 2. Size and weight of the coins in the coin series.

Denomination	Diameter mm	Thickness mm	Weight grammes
1 krona	19.50	1.79	3.60
2 kronor	22.50	1.79	4.80
5 kronor	23.75	1.95	6.10
10 kronor (current)	20.50	2.90	6.60

Milled edges on the coins help the visually impaired distinguish the denominations. Following consultation with the Swedish Association of the Visually Impaired, it was proposed that the 1-krona should have a fully milled edge, the 2-krona's edge should have two milled areas and the 5-krona's edge should be smooth. The milling on the 1 and 5-krona coins is the same as in the old coin series. The 10-krona's edge has four milled areas.

The design of the banknotes and coins was presented in a report in March 2011, which formed the basis for a decision by the General Council of the Riksbank in April 2011.

New theme for the banknote series – unchanged for the coin series

Cultural figures, Sweden's natural environment and Sweden's Head of State

Work on the theme and motifs for the banknote series was initiated with a seminar arranged by the preparatory group in 2009.¹⁰ Five possible themes were suggested – cultural/world heritage, cultural figures, the Nobel Prize, Sweden's natural environment and scientific figures.

The general public also had the opportunity to make suggestions for themes and motifs via the Riksbank's website. Just over 500 suggestions were submitted, most of them people. The most common suggestion was Astrid Lindgren, followed by Alfred Nobel and Dag Hammarskjöld.

The preparatory group decided that the theme should take personal portraits as a starting point. The reasons for this were both that personal portraits had proved to be difficult to counterfeit and that there is a long tradition of basing Swedish banknotes on individuals. The theme of nature was considered to be an appropriate complement, as natural and

¹⁰ Those who took part included representatives of the Royal Swedish Academy of Fine Arts, the University College of Arts, Crafts and Design, the Royal Coin Cabinet, the Swedish National Archives, the Swedish Institute, the Royal Swedish Academy of Sciences and the Royal Swedish Academy of Letters, History and Antiquities. Further organisations were invited.

environmental values are associated with Sweden. Two themes were thus proposed for the banknotes, cultural figures and natural/environmental motifs. The lesser coat of arms would be included as a universal heraldic symbol on all denominations.

Following this, the group set five criteria as starting points for the selection of personalities:

- Important cultural efforts for Sweden.
- Most of their active life in the 20th century.
- Popular with the general public and preferably well-known internationally.
- Represent different parts of Sweden.
- Three women and three men.

The preparatory group agreed to propose Ingmar Bergman, Greta Garbo, Dag Hammarskjöld, Astrid Lindgren, Birgit Nilsson and Evert Taube. The natural and environmental motifs would be taken from landscapes linked with these people. Astrid Lindgren was chosen for the 20-krona banknote as this is the banknote with which children can be assumed primarily to come into contact. The allocation among denominations was otherwise governed by a desire to alternate women and men.

Table 3. Motifs in the banknote series.

Denomination	Person	Natural/environmental motif from
20 kronor	Astrid Lindgren	Småland
50 kronor	Evert Taube	Bohuslän
100 kronor	Greta Garbo	Stockholm
200 kronor	Ingmar Bergman	Gotland/Fårö
500 kronor	Birgit Nilsson	Skåne
1,000 kronor	Dag Hammarskjöld	Lapland

Regarding the coins, the preparatory group considered that the Swedish tradition of royal motifs should be retained. Consequently, as before, the theme for the coin series would be Sweden's Head of State.

Theme, motif, colours and format were determined by the General Council in March 2010.

Design of banknote series based on competition

In 2010, the General Council decided that the design of the banknote series should be based on a competition. The aim of this was to obtain a broad basis for decisions. The formal basis for the competition was a project in accordance with the Public Procurement Act. In addition, competition regulations drawn up by the Swedish Association of Architects and approved by the Swedish Association of Designers and the Swedish Artists' Association were applied. The competition brief consisted of submitting proposals for the design of the six banknote denominations with the goal that the winning proposal would form the artistic starting point for the final design of the banknotes. The four members of the General Council in the drafting committee and two art experts acted as jury.¹¹ All participants in the competition would be remunerated, in addition to which the jury would have a prize sum to allocate.¹²

The competition was carried out in two stages – a prequalification and a final round. In the prequalification, architects, designers and artists were invited to register their interest and submit reference material. A total of 46 applications were received, which were assessed

¹¹ The composition of the jury is shown in appendix 3.

¹² The remuneration was SEK 100,000 per participant in the competition and the prize sum was SEK 200,000.

by the drafting committee in consultation with art experts. Eight applicants were selected for participation in the competition. The starting point for their work was a set of guidelines for format, theme, motifs and colours as well as the placement of security features, denomination and so on.

All eight of those selected presented sketches of their proposals for assessment by the jury. Five criteria were set as basis for the assessment – overall artistic concept, practicability, innovation/originality within the traditional framework of Swedish banknotes, composition of text–figures–images and differences between denominations within the framework of the overall concept.

Cultural Journey – the winning banknote entry

The jury selected Cultural Journey (Kulturrestan) by Göran Österlund as winner. Their justification says that “the submission is a tightly cohesive series in which the different banknotes share a common idiom and the interplay of the face and reverse sides is unambiguous and harmonic” and goes on to say that “the overall impression is of a beautiful and user-friendly banknote series based on a fine balance of innovation and Swedish tradition”. The General Council of the Riksbank subsequently decided that Cultural Journey would form the artistic basis for the new banknote series.

The detailed design of the banknotes was made by the design group at banknote manufacturer Crane AB. The group designed all of the graphic and technical details of the banknotes, including security features, carried out the work of engraving and produced the original as basis for printing. This work was carried out in stages in cooperation with the preparatory group. Decisions were successively taken by the General Council using test printings in various stages as a starting point. The entire design of the banknote series was determined at the end of 2013.

The coin series – Sun, Wind and Water

In 2012, the preparatory group produced a programme for the design of the coin series, based on the theme Sweden’s Head of State. The programme was submitted to Mint of Finland, coin supplier to the Riksbank at that point, with a request for design proposals. The company presented proposals from five designers. The preparatory group recommended a proposal by Ernst Nordin, in which the main theme was complemented by a nature theme called Sun, Wind and Water.

Nordin’s theme was expressed via stylised symbols for sun, wind and waves, combined with the King’s portrait on the 1 and 2-krona coins and his monogram on the 5-krona coin. The preparatory group’s justification says that “the proposal constitutes a highly cohesive coin series and the design is of high artistic quality with a distinct graphical character” and goes on to say that “the theme Sun, Wind and Water is an appropriate and apt theme that complements the main theme of the series...”

The General Council decided in August 2014 that the proposal would form the artistic starting point for the new coin series. Before this, test coins were approved by the Royal Court of Sweden. A detailed design of the coins was made by Mint of Finland in consultation with Ernst Nordin.

Agreements signed with rights holders

The winning entry in the competition for the design of the banknotes included a number of photographs, symbols and other images. The copyright protection for artistic and literary work such as these applies for 70 years after the death of the originator and, in most cases,

the copyright protection still stood. Consequently, the Riksbank needed the permission of the rights holders to use the images in question.

The Riksbank was able to conclude copyright agreements with all rights holders except as regards the image of Dag Hammarskjöld on the 1,000-krona banknote. The consequence of this was that a different image of Dag Hammarskjöld was used, which was accepted by the General Council and the designer. The agreements entail that the Riksbank was granted the right to use the images as master in the design of the banknotes and when providing information on the banknotes. For the larger images, the Riksbank issued a one-off payment that was the same for all parties and no remuneration for the smaller images.¹³

All persons depicted on the banknotes had dependants who were still alive. They were contacted as soon as the Riksbank had decided which individuals would be on the banknotes and were continually updated with information on the design work. The Riksbank also established contact with the photographers behind the images used.

Upgraded security system for the banknote series

Four security levels, aimed at different users

Concurrent with the design work, the project worked out a security system for the new banknote series. The aim of this was for the system to consist of many different security features with differing technical designs. In this way, several different types of knowledge and equipment would be needed to counterfeit a banknote in a believable manner. As a starting point, the project divided the security features into four levels, depending on which user they were aimed at.

Table 4. The banknote system's security system.

Level	Primary users	Aids needed for authentication
1	The general public	None
2	Trade sector	Simpler equipment such as magnifiers and ultraviolet light
3	Cash-in-transit companies, banks and the trade sector	Machines with sensors
4	The Riksbank	Special equipment that only the Riksbank has

New security features for the general public

The project deemed that a renewal of the security features aimed at the general public was needed. These are features that, to a certain extent, are also used by cash-in-transit companies, banks and the trade sector. According to the project, two prominent security features would be needed, at least on the higher denominations, to ensure that there were two different ways of identifying a genuine banknote. Both details should be present on the obverse of the banknote to allow them to be easily seen and checked.

The project took stock of the security features available on the market and selected a number for evaluation according to eight criteria:

- Protection against counterfeiting, which is to say the degree of difficulty in imitating the security feature.
- Ease of comprehension, which is to say an intuitive understanding of how the security feature should be checked.
- Ease of communication, which is to say the possibility of explaining simply how the security feature should be checked.

¹³ This remuneration was SEK 85,000. One rights holder requested no remuneration, so the Riksbank's total cost was SEK 510,000.

- Sustainability, which is to say resilience to wear and tear.
- Experience of practical use, which is to say that the security feature is tried and tested.
- Production possibilities, which is to say that the security feature could be printed by several printers to ensure competition.
- Material cost.
- Production cost.

Colour-shifting image and security strip – two new prominent security features

Two features were given top points in the evaluation, the colour-shifting image and the security strip. The colour-shifting image is formed of an optically-variable ink with magnetic qualities printed on the banknote paper. The security strip is a window thread embedded in the banknote paper, previously used, in a different form, in the 1,000-krona banknote.

When designing the security features, the colour-shifting image was given a unique design in each denomination linked to the person on the banknote – a book on the 20-krona banknote, a boat on the 50-krona banknote and so on. The security strip window was given the image of three crowns and the text “KR”. For both features, there should be movement when the banknote is tilted. The colour-shifting image should also change colour. When information materials were designed, the message was “tilt the banknote” to check it is genuine.

The project proposed that all banknote denominations should be equipped with a colour-shifting image and the higher denominations 100, 200, 500 and 1,000-krona with a security strip. For artistic reasons, the assessment was made that one of the security features on each of the two lowest denominations, 20 and 50-krona, would be sufficient.

Most security features kept – new features for the visually impaired

Watermarks, see-through pictures and intaglio printing would be retained on all denominations. All denominations would also have protection against photocopying and scanning. Most of the other security features would also be kept, in several cases after quality improvements. However, the foil strip, which had been a prominent security feature on the old banknotes, would not be needed on the new ones. The banknotes also feature mini- and micro-texts interwoven with the motifs as an extra security feature. The texts are linked to the individuals depicted on the banknotes and are based on suggestions from relatives and commemorative organisations.

The visually impaired may find it difficult to distinguish different banknote denominations. As the difference in size between the denominations had now decreased, this would be even more difficult. The project therefore proposed that the banknotes should include details in the banknote paper that can be felt with a finger and that are unique for each denomination.¹⁴ In the finished banknote series, these details can be found in the intaglio print on the edges of the 50, 100, 200 and 500-krona banknotes. The 20 and 1,000-krona banknotes lack these details and should instead be recognised by the difference in size. These features were designed in consultation with the Swedish Association of the Visually Impaired.

The machine-readable security features were also renewed

To prevent counterfeit banknotes from being used in ATMs, cash systems and other technical equipment, the machine-readable security features also need to be of high quality. These

¹⁴ These features are sometimes ‘tactile markings’.

security features were also changed and modernised in the new banknote series. The features were developed and tested in collaboration with a group of suppliers of technical equipment for cash handling.

The timetable was divided up into two stages

The cash market's wishes – a starting point

After the Riksbank took the decision in 2010 to renew the banknote and coin series, work started on the timetable. For its part, the Riksbank had three starting points:

- The conditions for the general public should be clear.
- Consideration should be taken of the cash market's wishes.
- The changeover should be implemented in as cost-effective a manner as possible.

A consultation was opened with the cash market agents, including BDB Bankernas Depå AB (BDB), the Swedish Bankers' Association, the larger banks, trade sector organisations, cash-in-transit companies and ATM companies, as well as suppliers of technical equipment for cash handling. Several alternatives were discussed. One alternative was to issue all new banknotes and coins simultaneously, another was to issue one denomination at a time at fixed intervals. Another question concerned how long the old banknotes and coins should remain valid – for a certain period or until they were worn out.

The cash market agents wanted the timetable to be adjusted to their circumstances for transportation, storage, counting and other logistics. The Riksbank requested a proposal from the market participants and one was submitted in April 2012. This arrangement involved the banknote changeover being divided into two stages, one for the banknotes supplied by ATMs at that point (the 100 and 500-krona banknotes) and one for the other banknotes. The coin changeover would take place in the same stage as the ATM banknotes. Furthermore, the market participants wanted the old banknotes and coins to become invalid after a relatively short period so that they could avoid having to manage double versions of the banknotes and coins for an extended period.

The banknote series of that time featured two valid versions of the 50 and 1,000-krona banknotes, an older version and a more modern one with new security features. The market participant wanted the older versions to be declared invalid before the changeover started. The idea was that the amount of banknotes would then decrease, as some of the old banknotes would not be exchanged for new banknotes. One further advantage was that there would be two versions fewer to manage once the exchange actually started.

Fewer modifications were made to the proposal in consultation with the market participants. The timetable, which was therefore based on the market's proposals, was adopted by the Executive Board of the Riksbank in May 2012.

Two stages and a preparatory banknote withdrawal

The first stage was to be initiated in October 2015 by the Riksbank starting to issue new 20, 50, 200 and 1,000-krona banknotes. The old 20, 50 and 1,000-krona banknotes would become invalid after 30 June 2016. The second stage would be initiated in October 2016 by the Riksbank beginning to issue new 100 and 500-krona banknotes, and new 1, 2 and 5-krona coins. The old banknotes and coins would become invalid after 30 June 2017. Two older versions of the 50 and 1,000-krona banknotes would become invalid before the start of the first stage.

This meant that, during both the first and second stages, there would be a transition period of nine months in which old and new banknotes and coins would be valid simultaneously. The Riksbank would stop distributing old banknotes and coins after the introduction of the new ones but, during the changeover period, the market participants would be able to reuse old banknotes and coins as long as they were fit for use. The result would be that new banknotes and coins would gradually come into circulation.

The Riksbank was aware that the timetable would lead to complications for the general public in that there would be a number of different dates to keep track of. The need for information activities would be increased. However, the Riksbank considered that the interests of the cash market were more important and that the timetable that the market itself had suggested created the conditions for the smooth implementation of the changeover.

Following a submission from the Riksbank, the Riksdag resolved, in June 2014, that the older versions of the banknotes and coins would become invalid in 2016 and 2017 in accordance with the Riksbank's timetable. The decision meant that all of the banknote and coin versions then valid, except for the 10-krona coin, would become invalid.¹⁵

Decision taken on withdrawal date and redemption periods

The Riksbank then reached an agreement with the Swedish Bankers' Association and Sparbankernas Riksförbund (the national federation of savings banks) on redemption periods in the banks. The aim of this was to provide the general public with an opportunity to get rid of old banknotes and coins, even for a period after they had become invalid.

It would be possible to redeem banknotes that had become invalid in the first stage two months after withdrawal date, which is to say until 31 August 2016. It would be possible to redeem banknotes that had become invalid in the second stage one year after withdrawal date, which is to say until 30 June 2018. It would be possible to redeem coins becoming invalid after 30 June 2017 in banks for two months, which is to say until 31 August 2017.

The reason for the different lengths of the redemption periods was that the banks wanted the redemption period for banknotes following the first stage to be concluded before the introduction of new banknotes started in the second stage. From the Riksbank's point of view, it was more important for the redemption period to be longer after the second stage, as the value of the banknotes affected was greater. The banks also wanted to have a short redemption period for the old coins as coins have a low value and coin handling involves large costs. After the redemption periods at the banks expired, the Riksbank would redeem invalid banknotes for an unlimited time. However, the Riksbank does not redeem invalid coins.

Table 5. Timetable for the banknote and coin changeover.

Stage	Start for introduction of new banknotes/coins	Final date of validity for old banknotes/coins	Final date for redemption in banks of old banknotes/coins
Banknotes 20, 50, 200, 1,000	1 October 2015	30 June 2016	31 August 2016
Banknotes 100, 500	3 October 2016	30 June 2017	30 June 2018
Coins 1,2,5	3 October 2016	30 June 2017	31 August 2017

¹⁵ Commemorative coins and commemorative banknotes were not included and continued to be valid.

Adjustment of technical equipment in good time

Cash handling by cash-in-transit services, banks and the trade sector is largely automated. At the date for the changeover, it was estimated that there were approximately 20,000 units that would need to be adjusted to the new banknotes and coins. Just over half of these were cash-handling systems used by the trade sector. In many cases, this adjustment required on-site technical service, demanding a large input of resources from technical suppliers.

After consultation with suppliers, the Riksbank decided to supply finished banknotes and coins of all denominations ahead of the changeover to give the suppliers time to adjust their equipment. This meant that the Riksbank needed to manufacture smaller amounts of both banknotes and coins before full-scale production could begin. Suppliers were given access to coins three years before the coin changeover was initiated and to banknotes just over one and a half years before the banknote changeover was initiated. The Riksbank accepted the additional costs this would entail.

The suppliers were allowed to borrow banknotes and coins or to bring their equipment to a test centre provided by the Riksbank. In this way, the Riksbank provided banknotes and coins to about thirty technology suppliers in Sweden and abroad.

Large volumes of banknotes and coins would become invalid

On 31 May 2012, when the timetable for the changeover was determined, the value of cash in circulation amounted to SEK 94 billion, divided into just over SEK 88 billion in banknotes and just over SEK 5 billion in coins.¹⁶The withdrawal would include all banknotes and coins except the 10-krona coin, commemorative banknotes and commemorative coins. In numbers, the withdrawal involved 325 million banknotes and 1.6 billion coins. The volumes forming the starting point for the planning of the different stages of the changeover are shown in Table 6–8.

Table 6. Preparatory withdrawal of older 50 and 1,000-krona banknotes, value and number, 31 May 2012.

Denomination	Value, SEK million	Number of banknotes, millions
50	193	4
1,000	15,427	15
Total	15,620	19

Table 7. Withdrawal of banknotes in stage 1, value and number, 31 May 2012.

Denomination	Value, SEK million	Number of banknotes, millions
20	1,695	85
50	1,027	21
1,000	7,640	8
Total	10,362	113

Table 8. Withdrawal of banknotes in stage 2, value and number, 31 May 2012.

Denomination	Value, SEK million	Number of banknotes, millions
100	8,651	87
500	53,111	106
Total	61,763	193

¹⁶ This amount included commemorative coins and commemorative banknotes, as well as banknotes that became invalid in 2005 but which had not been written off and were thereby included in the amount of banknotes.

Table 9. Withdrawal of coins in stage 2, value and number, 31 May 2012.

Denomination	Value, SEK million	Number of coins, millions
1	1,362	1,362
2	8	4
5	1,316	263
Total	2,686	1,629

New banknotes and coins were manufactured and delivered

The banknotes were manufactured in Sweden by Crane AB

At the time of the changeover, the Riksbank had an agreement for the supply of banknotes with Crane AB, a subsidiary of the US company Crane Currency. For supply of the new banknotes, a supplementary agreement was concluded in 2012, which specified prices, volumes and terms of delivery. The banknotes were then manufactured at the company's facility in the Stockholm area.

Initially, in 2013, a smaller run of each banknote denomination was manufactured to be used for quality tests by the Riksbank. The banknotes were also made available for testing by suppliers of technical equipment for cash handling. Following minor corrections, the Riksbank approved the start of full-scale production in 2014. Production took place in stages, denomination by denomination, and the Riksbank checked regularly that paper and printing complied with banknote specifications. The banknotes were delivered in gradual stages about six months before date of issue and underwent delivery checking afterwards.

The technical specifications for the banknotes cover paper, security details and manufacturing tolerances. Work on specifications started in 2011 in collaboration with Crane AB. The first stage in the specification was determined in 2012 and formed a basis for the printing.

The coins were manufactured in the Netherlands by KNM

For the manufacture of coins, the Riksbank had an agreement with the Dutch mint, Koninklijke Nederlandse Munt (KNM). This agreement specified price, volumes and terms of delivery for the new coins. To ensure that the Riksbank would have sufficient volumes in stock for the issue, manufacture was planned in good time ahead of date of issue. Before this, test coins had been manufactured by the Riksbank's previous coin supplier, the Mint of Finland. They had been used for quality control and reconciliation with suppliers of technical equipment.

Full-scale production started in 2015 at KNM's plant in Utrecht. Test coins were regularly sampled from production and used by the Riksbank to check that the coins fulfilled the technical specifications.

In light of the large volumes, storage room was an important issue in planning. The solution was that the coins were delivered successively to a new store in Sweden, obtained by the Riksbank. Transportation by sea from the Netherlands took place continually in 2015 and 2016.

The specification for the coins covers material, thickness, size, thickness of plating and electromagnetic signals/conductivity. The first stage in the specification was determined in 2010 in cooperation with the Mint of Finland and formed the basis for production.

Implementation in collaboration with the cash market

Unchanged division of responsibilities between the Riksbank and the cash market

The Riksbank's starting point was that the allocation of responsibility between the Riksbank and the market participants would not change during the changeover, but remain the same as under normal circumstances. Each participant would take responsibility for administering their area. The reasons for this approach were both a matter of principle on the Riksbank's part that each means of payment must carry its own costs, and that the current allocation of responsibilities worked well. In addition, in the Riksbank's view, central government should not compensate individual participants for additional costs arising due to decisions by an authority, in this case the Riksbank.

As cash handling in society is managed by the market participants, the Riksbank's approach would entail increased costs, above all for the banks and trade sector. Trade sector organisations therefore wished to be compensated by the Riksbank for these increased costs. However, the Riksbank stuck to its approach of not compensating individual participants. One exception was made when the Riksbank procured and funded a packaging solution for the cash-in-transit companies to use for the coins that were to become invalid. This was because the Riksbank wished to ensure that the coins were packed in a uniform and secure manner for transportation to the Riksbank's storage areas. The Riksbank also took on responsibility and costs for informing the general public and cash market of the changeover.

BDB took responsibility for the distribution of banknotes and coins

New banknotes were provided to BDB from the Riksbank's cash offices, where BDB also deposited the old banknotes for destruction. New coins were provided from the Riksbank's coin depot. Old 1, 2 and 5-krona coins were deposited in two storage facilities obtained by the Riksbank.

For the handling of these, BDB engaged the two largest cash-in-transit companies on the market, Loomis and Nokas. A rolling detailed plan was set up to map transportation requirements on a quarterly basis. BDB initially saw a risk that credit costs would increase during the changeover as there was a risk that larger volumes than normal would have to be stored. According to BDB, this did not happen, thanks to a well-designed transportation plan. During the changeover, BDB reduced the number of banknote depots from ten to seven as cash volumes had decreased.

Older 50 and 1,000-krona banknotes withdrawn

The earlier 1,000 and 50-krona banknotes had been upgraded in 2006 and given new security features. However, the banknotes without new security features had continued to be valid. This meant that, at the time of the changeover, there were two valid versions of each banknote. The older versions were withdrawn ahead of the changeover. The aim of this was to facilitate the changeover by decreasing the number of banknotes in circulation by not fully replacing invalid banknotes, in addition to which there would be two fewer banknote versions to manage. The older banknote versions became invalid after 31 December 2013 and could subsequently be redeemed at banks until 28 February 2014.

On 1 January 2013, there were 1,000-krona banknotes in the older version in circulation to a value of SEK 14 billion and older 50-krona banknotes to a value of SEK 0.2 billion. When the banknotes became invalid on 31 December 2013, there remained 1,000-krona banknotes to a value of SEK 3 billion and 50-krona banknotes to a value of SEK 0.1 billion. Consequently, 79 per cent of the 1,000-krona banknotes and 40 per cent of the 50-krona banknotes had been returned, to a value of SEK 11 billion.

The first stage of the changeover was implemented 2015–2016

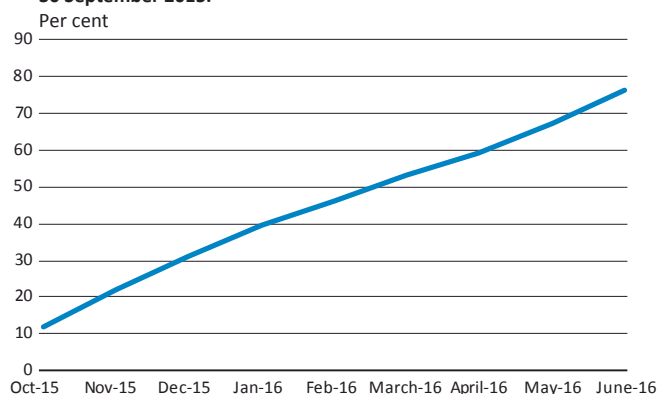
The first stage of the changeover was initiated on 1 October 2015. This was when the Riksbank began to issue new 20, 50, 200 and 1,000-krona banknotes. The 200-krona banknote was a new denomination that had not previously existed in Sweden. At the same time, the Riksbank stopped distributing the old 20, 50 and 1,000 krona banknotes.

One issue that was discussed with the cash market participants was the pace at which the changeover would take place. As the trade sector had no economic incentive to replace the banknotes earlier than necessary, there was a risk that it would peak towards the end of the changeover period. If the flows then became very large, this could lead to logistical problems in the trade sector, the banks and the cash-in-transit companies. By 31 December 2015, only 31 per cent of the value of the old 20, 50 and 1,000-krona banknotes had been returned. The Riksbank therefore decided at the start of 2016 to carry out an extra information campaign to raise awareness among the general public of the invalidity date of 30 June. The campaign was conducted in May–June 2016.

With only a few exceptions, the largest ATM companies, Bankomat and Kontanten, would provide three banknote denominations in their ATMs, the 100, 200 and 500-krona banknotes. Previously, these had only provided 100 and 500-krona banknotes. Both companies started loading their ATMs with 200-krona banknotes as soon as they became available at the start of October 2015. To ensure that no practical problems would arise, this was carried out at a cautious pace over the autumn, so only a smaller number of ATMs contained 200-krona banknotes by the Christmas holidays. This work was concluded in April 2016, by which time more or less all ATMs held 200-krona banknotes.

Of the 20, 50 and 1,000-krona banknotes that were in circulation when the changeover started in October 2015, 76 per cent had been returned by 30 June 2016, which was the last day of validity for the banknotes. By this date, 51 per cent of 20-krona banknotes had been returned, 70 per cent of 50-krona banknotes and 87 per cent of 1,000-krona banknotes. There remained a total value of SEK 1.8 billion that had not been returned. The banknotes could be redeemed at banks until 31 August 2016, after which they could be sent to the Riksbank for redemption. The rate of return is shown in Figure 1.

Figure 1. Proportion of 20, 50 and 1,000-krona banknotes returned since 30 September 2015.



Source: The Riksbank.

The second stage of the changeover was implemented 2016–2017

The second stage was initiated on 3 October 2016. On this date, the Riksbank began to issue new 100 and 500-krona banknotes, and new 1, 2 and 5-krona coins. A valid 2-krona coin was already in existence but manufacture ceased in 1971 and, in practice, the coin was no longer

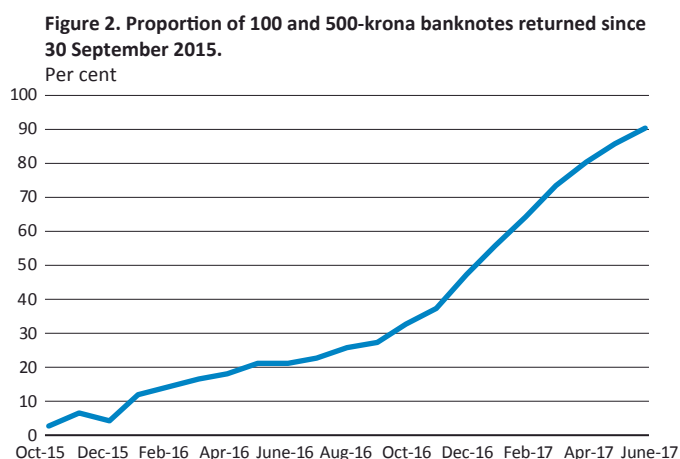
used. The resumption of manufacture was therefore experienced by the general public as the introduction of a new coin denomination.

In accordance with the wishes of BDB, the Riksbank continued to provide old 100 and 500-krona banknotes until the spring of 2017. The reason for this was that BDB wanted to ensure that ATM companies had access to both new and old banknotes over the changeover period. However, the possibility of withdrawing old banknotes was never exploited. The Riksbank ceased to distribute old coins in spring 2016 as there was a surplus of coins on the market.

The distribution of 100 and 500-krona banknotes would mainly take place via ATMs as the larger ATM companies provided both denominations in their ATMs. When the second stage was initiated, the ATMs held older 100 and 500-krona banknotes and new 200-krona banknotes. They started to be loaded with new 100 and 500-krona banknotes as soon as these banknotes became available in October 2016. This was carried out at the fastest pace allowed by the cash-in-transit services' capacity. By the start of 2017, the largest company, Bankomat, and the second largest, Kontanten, had loaded about half of their ATMs. By the start of April 2017, loading was complete and the ATMs contained only new banknotes. At the time of the changeover, Bankomat had about 1,700 ATMs and Kontanten just over 500.

As in the first stage, there was some unease that the changeover would peak towards the end of the changeover period, leading to practical problems for the market participants. Consequently, in the spring of 2017, the Riksbank conducted two information campaigns focusing on the invalidity date of 30 June in an attempt to encourage the general public to redeem their old banknotes and coins in good time.

Of the 100 and 500-krona banknotes that were in circulation when the changeover started in October 2015, 90 percent had been returned by 30 June 2017, which was the last day of validity for the banknotes. By this date, 82 per cent of 100-krona banknotes had been returned and 91 per cent of 500-krona banknotes. There remained a total value of SEK 5.9 billion that had not been returned. The rate of return is shown in Figure 2.



Source: The Riksbank.

The coin changeover – many logistical challenges

The coin changeover involved all older versions of the 1, 2 and 5-krona coins being withdrawn and replaced by new coins. In total, the coin changeover would involve 1.7 billion coins with a value of SEK 2.7 billion. The weight of the coins to become invalid was about 13,000 tonnes. Logistically, the coin changeover was more demanding than the banknote changeover, even though the values were significantly smaller.

According to the Riksbank's investigations, a large part of the coins in circulation were in the hands of the general public – coins that would now become invalid and should be returned to the Riksbank. As very few coins are returned under normal circumstances, the banks, trade sector and cash-in-transit companies did not have the capacity to handle such large amounts of coins as was now being contemplated. Consequently, a decisive question was how the general public could get rid of its coins and how the cash market would be able to manage handling the increased volumes. For its part, the Riksbank would have to create an organisation for receiving, storing and melting down the old coins.

Resources adjusted to rate of return of 50 per cent

One important question concerned how many coins would be returned to the Riksbank. Experiences from previous withdrawals suggested that coins would be returned to a significantly lesser extent than banknotes. Some of the coins that would now become invalid were also very old and had presumably either been worn out or been lost. At the same time, the values and scope of the changeover were greater than ever before, which suggested that more coins would be returned than in previous withdrawals.

The Riksbank assessed that between 30 and 50 per cent of the value of the coins that were in circulation would be returned. Resources were adjusted to the higher level of 50 per cent. In addition, the Riksbank would have to expect that the general public, in conjunction with getting rid of their saved coins, would also return 10-krona coins, even though these would not become invalid.

One further factor for consideration was that the Riksbank would not redeem invalid coins, unlike banknotes. Consequently, the old coins would become worthless once the redemption period at the banks had expired on 31 August 2017. This would place special demands on information from the Riksbank so that the public would not lose out on the coins' value due to a lack of knowledge.

The retail sector's ability to receive coins was limited

A natural way for the public to get rid of coins that are becoming invalid is to spend them. However, automatic cash-handling systems in the retail trade have limited capacities. Many shops therefore faced practical difficulties in accepting such large amounts of coins as was now being envisaged. There could also be economic reasons for the retail sector to restrict how many coins it accepted as handling coins and depositing them with cash-in-transit services and banks entails costs. Neither are shops obliged to accept cash payments but can, for example, choose to only accept card payments.

In autumn 2016, the industry organisation, the Swedish Trade Federation, provided information material to its members to be used when shops wished to restrict coin payments. Two alternatives were suggested: one involving a limit of 25 coins for any one payment, and one in which the shops could decide on any limit themselves. These limits were used by many shops. In addition, investigations by the Riksbank revealed that many parking companies had removed the possibility of paying with coins so as to avoid having to reconstruct their parking meters. Previously, parking fees had often been paid using coins.

The Riksbank placed demands on the banks' cash service

During the planning of the changeover, the banks had promised the Riksbank to help their customers have a smooth banknote and coin changeover. Despite this, several banks had continued to reduce the number of offices handling cash. For the second stage of the changeover to function, it was necessary for the banks to have the capacity to accept both

banknotes and coins from their customers. The retail sector could not handle the large volumes concerned alone, particularly not the coins.

The Riksbank has no formal ability to force the banks to maintain a certain level of cash service. On the other hand, the Riksbank can request information from the banks. Consequently, in spring 2016, the Riksbank requested the major banks' plans for managing the increased cash volumes. These plans showed that the banks' service in the area of cash varied in terms of both fees and number of offices. Some banks had a relatively well-developed branch network, while others only accepted cash at a few branches. Some charged a fee to accept banknotes and coins, others did not. Several discussions were held with the banks, in a few cases with representatives of the Riksbank's Executive Board. There eventually came to be about 850 places in the country for deposits of coins in banks and service boxes. Some banks extended their cash service over the period of the changeover and some abandoned fees. Most banks only accepted deposits of banknotes and coins from their own customers.

To provide the general public with information on where it was possible to get rid of coins, the Riksbank started a special website, "myntkartan.se", with information on places where coins could be redeemed. The website had many visitors and became an important aid, above all for people with larger amounts of coins for redemption.

Some collections carried out for charitable purposes

In 2016, the Riksbank contacted the Swedish Fundraising Council, an umbrella organisation for organisations collecting money for charitable purposes. The Riksbank also made direct contact with some of the larger fundraising organisations. Its aim was to investigate whether the Riksbank could support the collection of coins. A number of collections would be held, but not any major national collection. In response to the organisations' wishes, the Riksbank provided guidance for the practical handling of collected cash.

High pressure on coin handling at the end of the changeover period

As the general public got rid of its old coins, a surplus of coins arose on the cash market. Many shops had a large inflow of old coins that could be reused and waited until the end of the changeover period before ordering new ones. Despite the Riksbank's information campaigns, many private individuals also waited to deposit old coins. The consequences were that flows were very large in the period May–October 2017.

At times, there were queues for ATMs and bank branches. Customers occasionally had to wait for longer than normal for compensation for deposited coins when the cash-in-transit services could not keep up with collection and counting. Complaints were received from the public that it was difficult to get rid of old coins in certain areas as it was so far to the nearest place for deposit. There were also signals that a number of smaller shops had coin shortages as new coins were not being received as change to a sufficient extent.

Pressure from customers on the trade sector and banks gradually eased in July and August, but the banks and cash-in-transit services continued to work over the autumn on handling the coins that had been received. Access to change in the trade sector improved afterwards as greater amounts of the new coins entered into circulation.

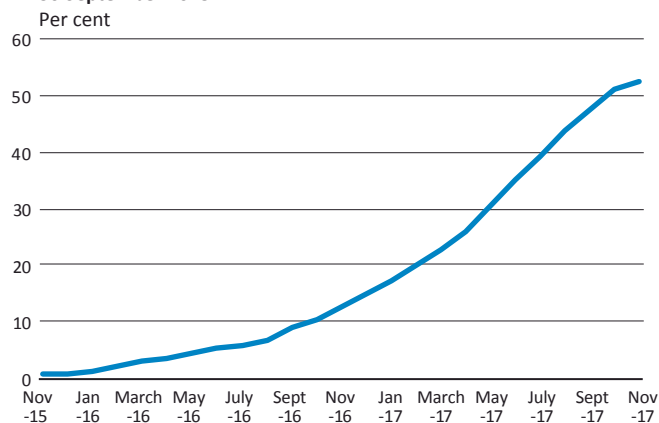
One-third returned by invalidity date – almost half in total

Of the 1, 2 and 5-krona coins in circulation when the changeover started in 2015, only 15 per cent of the value had been returned by 31 December 2016, six months before invalidity date. Consequently, in spring 2017, the Riksbank carried out two information campaigns to raise

public awareness of the changeover, one of which was specifically focused on the old coins. By the coins' final day of validity on 30 June 2017, 35 percent of them had been returned. After this, it was possible to redeem coins at banks until 31 August 2017.

The large volumes resulted in delays at the cash-in-transit companies, meaning that many coins were not deposited at the Riksbank until autumn 2017. The final day for deposit was 30 November. By this point, 52 per cent had been returned since the start of the changeover. The rate of return is shown in Figure 3.

Figure 3. Proportion of 1, 2 and 5-krona coins returned since 30 September 2015.



Source: The Riksbank.

Old coins sold to smelting works

During the planning of the changeover, it became clear that the Riksbank would be receiving large amounts of old coins that could be melted down and recycled for their raw materials. In addition, old coins would start to be received while they were still valid. One important question concerned whether the coins would start to be sold for recycling while they still had a nominal value or whether the Riksbank would put them in storage and wait to sell them at a later point. The choice of sales date was significant for security procedures as invalid coins can be treated as scrap metal.

The project made the assessment that it would be easier to maintain security if the coins were only stored by the Riksbank for a shorter period and if deposit, transportation and recycling were conducted in a closely connected process without delays. The need for storage would also be lessened if the coins only needed to be stored temporarily while waiting to be melted down. The decision was therefore taken in 2014 that the coins should start to be sold as they arrived at the Riksbank, which is to say some coins would be sold while still valid.

Furthermore, the Riksbank decided that the coins would be sold directly to the smelting works instead of via a broker. The reason for this was to allow the Riksbank to retain a certain amount of control over how smelting was conducted and what the recycled metals would be used for. Sale without intermediary would also entail a greater revenue for the Riksbank.

Following an inventory of possible purchasers, six smelting works were invited to submit tenders for the old coins. Agreements were finally signed with two purchasers. As the sale was to be initiated while the coins were still valid, the agreements included detailed regulations over how the coins should be transported, handled and melted down, as well as how the process should be documented. The price was based on the world market price for

the metals included in the coins (copper and nickel) at the date of sale. Deliveries started in mid-2016. After the coins' nominal value expired in autumn 2017, further purchasers were contracted.

Communication initiatives to many different groups

Communication strategy with six main messages

The Riksbank's communication campaign was initiated in 2008 when the plans to change the banknote and coin series were presented. Once it became clear that more or less the entire banknote and coin series would be renewed, a communication strategy was worked out with the focus on six main messages:

- That Sweden would get new banknotes and coins.
- When Sweden would get new banknotes and coins.
- When the older banknotes and coins would become invalid.
- What people should do with soon-to-be invalid banknotes and coins.
- What security features would be on the new banknotes.
- Why this changeover was taking place.

Following this, a communication platform was worked out with communication targets, messages, target groups, approaches and spokespersons. Banks and the trade sector, the media, the general public and groups with special information needs were prioritised. Other target groups included cash-in-transit services, foreign banks, bureaux de change, central banks and the employees of the Riksbank.

"KOLLA PENGARNA!" (check your money) was used as a basic concept. This was graphically illustrated in the form of a blue arrow (in some contexts in other colours).



Larger activities around important dates

Special use was made of certain key dates and activities to draw attention to the changeover and involved greater communication efforts:

- 30 September 2010: Last day to use the 50-öre coin for payment.
- April 2011: Presentation of the persons depicted on the banknotes and coins.
- 31 December 2013: Last day to use the older 50 and 1,000-krona banknotes for payment.
- February 2015: Presentation of the new banknotes and coins.
- 01 October 2015: New 20, 50, 200 and 1,000-krona banknotes start to be issued.
- 30 June 2016: Last day to use the old 20, 50 and 1,000-krona banknotes for payment.
- 03 October 2016: New 100 and 500-krona banknotes and new 1, 2 and 5-krona coins start to be issued.
- 30 June 2017: Last day to use the old 100 and 500-krona banknotes and the old 1, 2 and 5-krona coins for payment.

Many information channels used

A large number of information channels were used to reach the different target groups over the long period in which the changeover was planned and implemented. The following channels were used:

Pamphlets for the general public: On three occasions, the Riksbank produced an information pamphlet for distribution to all Swedish households. The pamphlet produced in 2013 was translated into twelve languages. The pamphlets produced in 2015 and 2016 were translated into thirty languages and were also made available on CD for the visually impaired and in a sign language version for the hearing impaired.

Printed information materials: Printed information materials were produced, primarily for the retail trade and banks. These consisted of posters, stickers and cashier cards.¹⁷ These materials were also distributed to a series of other businesses.

Media: The Riksbank arranged a total of six press conferences and six press meetings. About thirty press releases were published. Several hundred interviews were given in national and local media, for TV, radio, newspapers, trade journals and websites.

Websites: All the information about the changeover was collected on the Riksbank's website, riksbank.se. To facilitate the coin changeover, the Riksbank started a special website, myntkartan.se, in 2016 with information on where coins could be redeemed. When the 50-öre coin was to become invalid in 2010, the Riksbank also launched a special website.

Campaigns: Three larger advertising campaigns were carried out, one in 2016 and two in 2017. The aim of these was to raise awareness among the general public of the invalidity dates for the old banknotes and coins. The campaigns included advertisements on billboards, advertisements in newspapers and films in social media.

Exhibitions and tours: In 2015, the Riksbank arranged exhibitions at six different locations in Sweden with the aim of drawing attention to the changeover. On 1 October 2015 and 3 October 2016, when the new banknotes and coins were brought into circulation, the general public was offered the opportunity to exchange money for the new banknotes and coins at the Riksbank in Stockholm and to see the exhibitions.

Films: A film was produced in 2015 ahead of the introduction of the new banknotes. Further films were regularly produced to be shown on Facebook. Films were also produced in conjunction with the withdrawals in 2010 and 2013.

Study materials: Prior to the launch of the new banknotes, the Riksbank produced study materials that teachers in compulsory school could use as a basis for teaching. In addition, the teachers had the possibility of ordering the information pamphlets, which they did to a large extent.

Social media: A Facebook page, called "Kolla pengarna" (Check Your Money), was started in 2013 in conjunction with the approaching invalidity of the older 50 and 1,000-krona banknotes. These efforts were redoubled when the new banknotes were to be introduced in 2015, at which point Twitter started to be used too.

App: An app was developed that made it possible to scan a new banknote and have the banknote's denomination read aloud and to scan an older banknote and have its invalidity date read aloud. The app also included other information about the changeover in about 30 languages.

Text message function: A text message service was developed to which members of the public could subscribe to receive information on important dates during the changeover.

¹⁷ The term cashier card refers to information materials in a smaller format to be used as an aid by cashiers.

Answering questions: During the changeover, the Riksbank answered thousands of questions from the public and trade sector, received by email, telephone and Facebook.

Information adapted for groups with special information needs

Specially adjusted information was provided for certain groups. This applied to older people, people born abroad, tourists, temporary residents in Sweden, the visually impaired, the deaf and hearing impaired, Swedish citizens resident abroad and people with trustees or suffering from illnesses. The Riksbank contacted associations for the visually impaired and deaf and hearing impaired, and received their assistance in designing suitable information material.

For the visually impaired, a measuring stick was produced that can be used to measure the length of a banknote and thereby determine its denomination. The visually impaired were also aided by the app described above.

Results followed up by surveys

On ten occasions, the Riksbank commissioned surveys of the general public and of bank and retail staff aimed at measuring their awareness of the changeover. Each time, interviews were conducted with 2,000 private individuals, 100 bank employees and 200 retail trade employees. The results were compared with the communication targets and an assessment was made of whether the communication efforts were sufficient or needed to be expanded.

Focus on security and risk management

No losses and maintained confidence were the targets

The target for security was that no losses should arise in the form of lost banknotes and coins and that confidence in the Riksbank's security should be maintained. Security routines were focused on both preventing and reducing damage. Particular demands were placed on the protection of banknote and coin specifications and of new banknotes and coins that the Riksbank had had manufactured but which had not yet been issued.

Lending banknotes and coins to suppliers of technical equipment for cash handling was particularly sensitive, as it meant that suppliers had access to banknotes and coins far ahead of their issue. To ensure secure handling, companies had to apply to borrow banknotes and coins or for permission to visit the Riksbank's test centre, after which they had to sign an agreement committing them to comply with the Riksbank's security requirements. The Riksbank checked the premises used by the companies both ahead of lending and during the period of the loan.

Cooperation was established with the police and risks were continually assessed

Cooperation was established with the police when the changeover entered the implementation phase in 2013. In 2014, the police developed a threat and risk analysis that covered the handling of banknotes at the Riksbank, the banknote supplier Crane AB, BDB and the cash-in-transit companies. This work resulted in recommendations of measures to counteract threats and risks.

The project produced regular risk assessments. A risk analysis was updated at every meeting of the steering group. Action plans were developed to reduce the likelihood of thefts and damage and to manage possible crises.

Cooperation with the cash market in security issues was coordinated in a working group under the framework of the Riksbank's cooperation with the cash market. See the section Project organisation on page 33.

Large increase in redemption of banknotes

Resources had to be increased

The Riksbank redeems invalid banknotes indefinitely for a small fee.¹⁸ However, the Riksbank does not redeem invalid coins.¹⁹ The number of redemption cases started to rise when old 1,000- and 50-krona banknotes could no longer be redeemed at a bank after 28 February 2014. The number continued to increase once the changeover was under way. Public interest in the changeover also led to more people sending in banknotes that had already become invalid some time ago. The volumes in 2015–2017 are shown in the following table:

Table 10. Redemption volumes, 2015–2017.

Year	Number of cases	Disbursed amount, SEK millions
2015	37,504	254
2016	52,024	289
2017	63,723	269

To cope with the volume of cases, staffing was gradually increased. Various forms of system support were developed. For example, since 2015, the general public has been able to register redemption applications directly on the Riksbank website instead of sending in a form.

Payment within 10 days in 95 per cent of cases

Cases with a value under SEK 10,000 made up 95 per cent of the total number. According to Riksbank policy, such cases are to be processed and the amount disbursed within 10 days. Cases relating to higher amounts normally take longer as the Riksbank often has to ask for supporting documentation in order to make an assessment as regards money laundering.

As from 1 June 2017, the Riksbank stopped redeeming banknotes from the retail sector, coin dealers and bureaux de change. The reason was that some companies in this industry continued to accept invalid banknotes and send them to the Riksbank, despite being informed about the withdrawal date a long time ago. It is a company's responsibility not to accept invalid banknotes. Furthermore, the primary aim of the Riksbank's redemption activities is to provide a service to the general public.

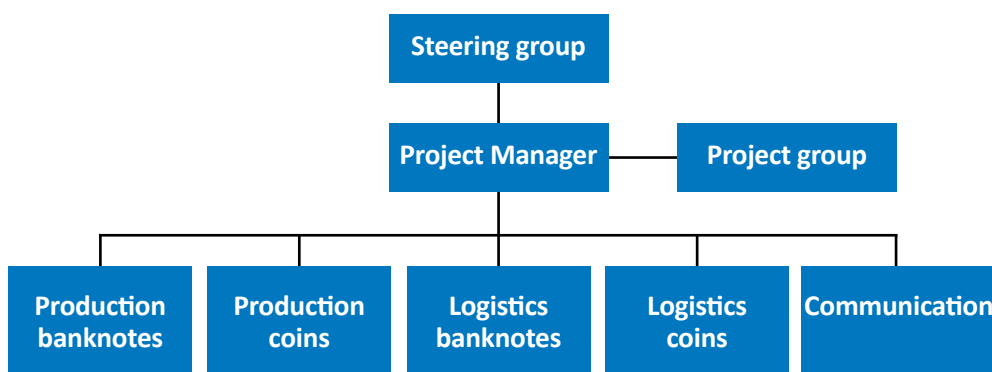
¹⁸ Currently SEK 100 per redemption.

¹⁹ Prior to the changeover, the Riksbank concluded an agreement with the Swedish Bankers' Association and Sparbankernas Riksförbund. According to this agreement, banks would redeem both banknotes and coins that became invalid in 2016 and 2017 for a period after the withdrawal date. See page 20.

Project organisation with a broad network of contacts

Division into five sub-projects

The project organisation was established in 2008 and at the beginning consisted of a steering group, a project manager and a small project group. When the project entered an implementation stage in 2013, it was divided up into five sub-projects and was structured as follows:



The steering group consisted of five (sometimes four) people from various Riksbank departments. The Head of the Payments Department²⁰ chaired the group for most of the project period. Most of the time, the Head of the General Secretariat, the Head of the Corporate Services Department, the Head of the Banknotes and Coins Division and the Head of the Communications Division were also members of the group. The Head of Security was permanently co-opted. The steering group met about 10 times a year and had a total of 99 meetings during the project period.

The project manager and four sub-project managers were from the Payments Department. The Communication sub-project was headed by a person from the Communications Division, where the day-to-day communications work is performed. The project group consisted of the project manager, sub-project managers, Head of Security and a researcher.

The project reported to the Executive Board of the Riksbank and the General Council. Status reports were submitted to them continuously.

Several forms of consultation with the cash market

The Riksbank consults with the cash market in a Cash Handling Advisory Board. Within this board, there is a working group called the “Banknote and Coin Group”. It consists of representatives for the Swedish Bankers’ Association and Sweden’s major banks, the ATM provider Bankomat, the major cash-in-transit companies and sector organisations from the retail industry. The group acted as a reference group in support of the changeover project. On a few occasions, communication officers from the various organisations and suppliers of technical cash handling equipment were also in the group. The group met about four times a year. In addition, the group had regular private meetings with all participants. There was also a special group of communication officers from the cash market during periods when the Riksbank was planning and conducting information campaigns.

Another working group within the Cash Handling Advisory Board discussed security issues. This group largely included the same organisations as were in the Banknotes and Coins Group, along with representatives from the Swedish Police. The group covered security

²⁰ The department’s name as from 1 March 2018. Several organisational changes were made during the project period.

issues related to the changeover. The project also consulted with the Swedish Association for the Visually Impaired, the Swedish Post and Telecom Authority (PTS), the county administrative boards and representatives for voluntary organisations.

Many advisers and consultants

The project hired advisers and consultants for various tasks during the course of its work. Important advisers were banknote and coin experts from other central banks, participants on the cash market and the Riksbank's suppliers of banknotes and coins. Consultants were hired for environmental studies, communication initiatives, legal advice and various types of measurements and checks. A list of suppliers and advisers can be found in Appendix 1.

Evaluation of the project

Combination of own analysers and consultant studies

This section presents an evaluation in four parts: the effects of the changeover on cash volumes; how the banknotes and coins have been received by the general public and the cash market and how they work as regards practical handling; how the changeover has been implemented; and the costs for the changeover. The changeover project formally ended on 30 June 2017, but some working tasks remained to be completed during the second half of 2017. The cut-off point for the evaluation is therefore 31 December 2017.

Some working tasks still need to be completed after 2017. To obtain as accurate a picture as possible of the Riksbank's total costs for the changeover, the account of the costs also included a forecast up until 31 December 2018. Virtually all the tasks associated with the changeover are expected to be completed by then.

The evaluation is partly based on the following studies commissioned by the Riksbank with the help of consultancy companies:

- The general public's knowledge about and attitudes to the changeover and the new banknotes and coins, carried out by Ipsos Public Affairs in August 2017. Just over 1,000 people aged 18 and over were interviewed by telephone.
- The cash market's opinions of the changeover, carried out by JKL in 2017. This study was implemented in the form of interviews with banks and their cash handling companies, the retail sector, ATM companies, cash-in-transit companies and suppliers of technical equipment.
- The environmental impact of the changeover and comparisons of the environmental impact between the new and the old banknote and coin series, carried out by Liljemark Consulting in 2016–2018.
- How the project was conducted, performed in cooperation with MaisOui Consulting in 2017. This study was carried out in the form of interviews with the steering group, the project group, the General Council of the Riksbank and members of the Executive Board of the Riksbank.

When the text talks about, for example, the opinion of the general public or the cash market, it is referring to the studies above. The full reports are available on the Riksbank's website (riksbank.se).

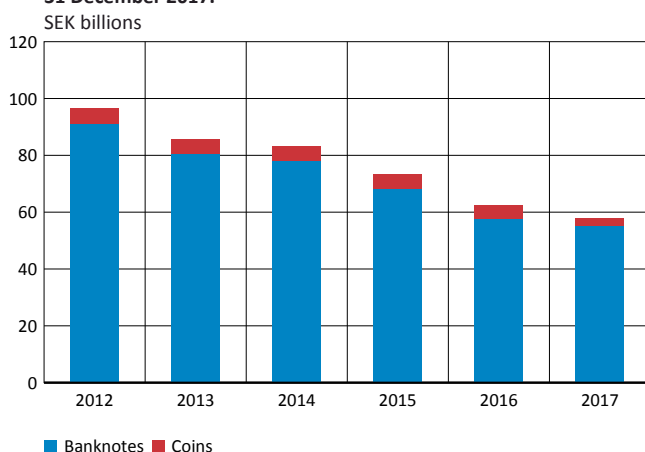
Reduced cash volumes and good return of banknotes and coins

Sharp decrease in cash volume – changeover part of the explanation

The changeover began with the withdrawal of the older versions of the 1,000- and 50-krona banknotes in 2013. It was at that time the general public started to become aware of the changeover and the Riksbank began to see changes in the cash volume that could be attributed to the forthcoming changeover. To obtain a picture of how the cash volume changed during the changeover period, it is therefore best to use 2012 as a starting-point. In the following, the value of banknotes and coins in circulation on 31 December 2012 is compared with the corresponding value on 31 December 2017.

The total value of banknotes and coins in circulation fell during the period by SEK 38 billion, from just over SEK 96 billion to SEK 58 billion. This represents a reduction of 40 per cent. Some of the reduction is probably due to the banknote and coin changeover, in that old banknotes and coins were not replaced by new ones. The highest denomination, the 1,000-krona banknote, had already started to decrease before the changeover, but the reduction was accentuated during the changeover period, when the value fell by SEK 18 billion. The coin volume fell both as a result of only a small percentage of old coins being replaced by new ones and because many 10-krona coins were returned. The full effects of the changeover can probably not be identified until further ahead in the future.

Figure 4. Banknotes and coins in circulation on 31 December 2012 – 31 December 2017.



Source: The Riksbank.

500-krona banknote still the dominant banknote in the series

The value of banknotes in circulation fell during the period by SEK 36 billion, from SEK 91 billion to SEK 55 billion on 31 December 2017. This figure also included invalid banknotes and commemorative banknotes. Discounting these, the banknote volume on 31 December 2017 was just less than SEK 49 billion.

The distribution of banknote denominations changed substantially during the period. The 1,000-krona banknote's share of valid banknotes decreased from 24 to 7 per cent, while the 500-krona banknote's share increased from 63 to 70 per cent. The dominance of the 500-krona banknote may depend on people using it more than other banknotes when they save cash, while 1,000-krona banknotes are also difficult to acquire. Several banks do not supply 1,000-krona banknotes and neither are they available in ATMs. The new 200-krona banknote has become an established denomination and is the second-largest banknote in terms of value.

Table 11. Value of banknotes in circulation in 2012 and 2017 and the distribution of denominations.

Denomination	Value 31 December 2012, SEK millions	Share of valid banknotes 31 December 2012, per cent	Value 31 December 2017, SEK millions	Share of valid banknotes 31 December 2017, per cent
1,000	21,380	24	3,494	7
500	56,655	63	33,943	70
200			6,243	13
100	9,368	10	3,008	6
50	1,244	1	981	2
20	1,742	2	1,014	2
Valid banknotes in total	90,388		48,684	
Invalid banknotes and commemorative banknotes	668		6,531	
Valid and invalid banknotes in total	91,056		55,215	

The figures have been rounded off.

Major reduction in coin volume – 10-krona dominant

The value of coins in circulation fell during the period by SEK 2.6 billion, from SEK 5.4 billion to SEK 2.8 billion. Both the 1- and 5-krona coins decreased considerably. The 10-krona coin also decreased, which was due to many of them being returned in connection with the changeover, despite them not going out of circulation. The value of 10-krona coins has not decreased as much as the value of other denominations, however, resulting in a substantial increase in the 10-krona coin's share of the total coin volume. The coin now makes up three-quarters of the value of coins in circulation. The 2-krona coin has become an established denomination and is approximately as large as the 1-krona coin.

Table 12. Value of coins in circulation in 2012 and 2017 and the distribution of denominations.

Denomination	Value 31 December 2012, SEK millions	Share of circulation coins 31 December 2012, per cent	Value 31 December 2017, SEK millions	Share of circulation coins 31 December 2017, per cent
10	2,562	49	2,101	77
5	1,324	25	333	12
2	8	0	182	7
1	1,375	26	129	5
Total circulation coins	5,269		2,744	
Commemorative coins	116		29	
Total circulation coins and commemorative coins	5,385		2,773	

The figures have been rounded off.

Gradual outflow of new banknotes and coins

The outflow of new banknotes has occurred at a relatively even pace since the changeover started in October 2015. There is a tendency that demand is stabilising a few years after the launch of the new banknotes and coin began. Regarding the new banknotes that were launched in October 2015, the 1,000-, 200-, 50- and 20-krona banknotes, the rate of increase

slowed during the second half of 2017, while it continued to rise sharply for the 500-krona banknote, which was launched in October 2016.

Table 13. Value of new banknotes measured every six months since 31 December 2015, SEK millions.

Denomination	31 Dec 2015	30 June 2016	31 Dec 2016	30 June 2017	31 Dec 2017
1,000	1,073	2,337	3,299	3,510	3,494
500			9,543	28,294	33,943
200	932	4,479	6,513	7,233	6,243
100			1,509	3,100	3,008
50	397	862	988	1,078	981
20	511	893	1,032	1,043	1,014
Total	2,914	8,571	22,884	44,258	48,684

The figures have been rounded off.

The outflow of new coins was relatively small for the first few months after the launch in October 2016, but has since increased significantly during 2017. However, the value of the new coins in circulation on 31 December 2017 is only a fourth of the coins that became invalid. This ratio reflects the fact that many of the coins that became invalid were saved by the general public and were only used shortly before they became invalid. Another explanation could be that it has become increasingly difficult to use coins. Many car park operators have abolished coin payments, for example.

Table 14. Value of new coins measured every six months since 31 December 2015, SEK millions.

Denomination	31 Dec 2016	30 June 2017	31 Dec 2017
5	89	225	333
2	53	118	182
1	40	96	129
Total	182	438	643

The figures have been rounded off.

Many old banknotes and coins were returned

Of the banknotes that became invalid in 2016 and 2017, 92 per cent of their value had been returned by 31 December 2017. Here, the comparison is with 30 September 2015, the day before the changeover began. The degree of return follows the size of the denominations, i.e. the returned value is highest for the 1,000-krona banknote and lowest for the 20-krona banknote. The return is approximately on a par with the Riksbank's expectations. On 31 December 2017, a total value of SEK 5 billion had still not been returned. Invalid 100- and 500-krona banknotes can be redeemed at banks up until 30 June 2018 and thereafter be redeemed by the Riksbank.

Table 15. The value of returned banknotes that became invalid in 2016 and 2017 and the percentage of returned banknotes in relation to 30 September 2015.

Denomination	Returned, SEK millions	Returned, per cent
1,000 kronor	4,607	96
500-krona	48,952	94
100-krona	7,197	85
50-krona	854	79
20-krona	983	59
Total	62,594	92

The figures have been rounded off.

Of the coins that became invalid after 30 June 2017, 52 per cent of the value, compared with 30 September 2015, had been returned by 30 November 2017, the final date for returning coins to the Riksbank. A value of SEK 1.3 billion had still not been returned. The return is higher than the Riksbank's expectations. Invalid coins are not redeemed by the Riksbank.

Table 16. The value of returned coins that became invalid in 2017 and the percentage of returned coins in relation to 30 September 2015.

Denomination	Returned, SEK millions	Returned, per cent
5 kronor	730	55
2 kronor	1	9
1 krona	702	50
Total	1,433	52

The figures have been rounded off.

Well-functioning banknotes and coins but difficult to distinguish between the coins

Most people satisfied with the banknotes but dissatisfied with the coins

An efficient cash system presupposes that the general public feel the banknotes and coins are easy to use. Surveys of the general public and cash market therefore asked questions regarding how people feel about the new denominations and about the design of the new banknotes and coins.

About two-thirds of the general public feel that the new 200-krona banknote is a good idea. Only a tenth feel that the denomination is unnecessary. People's attitude to the 2-krona coin are less positive, however. Only a third feel that it is a good denomination, and just as many think that it is superfluous. A majority are satisfied with the banknote motifs, while most do not have any particular opinion about the coin motifs and are neither satisfied nor dissatisfied.

A large majority feel that it is easy or quite easy to distinguish between the banknote denominations. The opposite is true of the coins. Two-thirds feel that it is quite difficult or very difficult to distinguish between the denominations, with a slight predominance of older people.

Cash market participants are generally satisfied with the banknote and coin designs. Highlighted benefits include the coins being lighter and nickel-free and the banknotes having better security features.

Few counterfeits and efficient practical handling

The police received 231 counterfeit banknotes of the new versions in 2016 and 509 in 2017. The most counterfeited denomination was the 1,000-krona banknote in 2016 and the 200-krona banknote in 2017. The number of counterfeits is approximately two banknotes per million, a very low figure internationally speaking. The counterfeits are generally of poor quality. They are mostly copies of banknotes produced with the help of an ink-jet or laser printer. The few imitations attempted of the new security features have not reproduced the movement visible on the genuine banknotes.

Today's Swedish banknotes are very difficult to counterfeit. To provide effective protection against counterfeiting, however, it is essential that the general public know how to check that a banknote is genuine. Despite the Riksbank's extensive information initiatives, the survey in 2017 indicates that only a small percentage of the general public know how to check the new

security features: the colour-shifting image and the security strip. Most people refer instead to other security features in order to check authenticity.

For safe and efficient cash handling, it must also be possible for cash-in-transit companies, banks and retailers to handle banknotes and coins by machine. Apart from a small number of minor incidents, no practical problems have arisen as regards the mechanically sorting, counting and authentication of banknotes and coins.

Positive environmental impact of the banknote and coin changeover

The aim of the environmental studies has been to describe where in the life cycle the environmental impact from banknotes and coins occurs, how substantial the environmental impact of the changeover is and what differences there are between the environmental impact of the old and the new banknotes and coins. Greenhouse gas emissions, converted into carbon dioxide equivalents, have been used as a measure.

The environmental impact of the banknote changeover includes the production of banknote input materials, transportation, the production and printing of banknotes, circulation in society, and the collection and destruction of old banknotes. The environmental impact from the changeover is primarily from the printing of banknotes and the production of cotton for the banknote paper. Once the banknotes are in circulation, ATMs are responsible for the largest environmental impact due to the consumption of electricity – something which has not changed as a result of the changeover. The environmental impact of the changeover has been calculated at 1,100 tonnes of carbon dioxide equivalents. As the new banknotes are smaller than the old ones, the environmental impact from printing has decreased after the changeover. In addition, the new 200-krona banknote means that fewer banknotes need to be produced. Overall, the environmental impact is estimated to decrease by 40 tonnes of carbon dioxide equivalents per year.

The environmental impact of the coin changeover includes the mining of ore and production of metals, the manufacture and distribution of new coins, collection and transport of old coins, the melting-down of old coins and the production of new alloys from the old coins. The environmental impact of the changeover is estimated at 6,000 tonnes of carbon dioxide equivalents, most of which come from the mining of ore and production of metals for the new coins. As the new coins weigh less than the old ones, and fewer coins need to be produced as a result of the new 2-krona coin, the environmental impact of transport is decreasing after the changeover. The environmental impact of cash-in-transit vehicles is estimated to decrease by 290 tonnes of carbon dioxide equivalents per year. Other environmental benefits include the old coins being melted down and reused in new products, less metal being required to make the new coins and a reduction of nickel exposure in society as a result of the new coins being made from different alloys.

The changeover functioned largely as expected

The logistics and technology functioned successfully as a whole

In response to the question of how one considers the changeover has worked, the participants in the cash market give on average the grade 3.8 on a scale of 1-5, where 5 is the highest and 1 is the lowest grade. All of them state that the outcome was in line with their expectations or exceeded their expectations. Those who consider that it exceeded their expectations say that they had expected the general public to show less understanding and that there might be several serious incidents. Most of the respondents make a positive assessment of how the banknote changeover worked, while the coin changeover is considered more problematic. They say, for instance, that the old coins continued to circulate

in the retail trade for a long time and that a large share of them were thus received only towards the end of the changeover period.

An overwhelming majority consider the process of doing it in stages was good. However, some of the banks say that the changeover was too protracted and that fewer and shorter stages would have entailed less impact on their ordinary operations. Suppliers of technology also say that fewer stages would have reduced the number of adjustments to technical systems and led to cost savings. Bankomat (the ATM company), the cash-in-transit services and some of the banks, on the other hand, consider that they would not have been able to cope with a changeover that was not made in stages.

Most market participants state that the adaptation of technical systems worked well, at the same time as many of them point out that it entailed considerable costs. Technology suppliers state that they had access to a sufficient amount of banknotes and coins from the Riksbank, but that they would have preferred to receive them earlier.

In the survey of the general public, they were asked how easy it had been to get rid of their old banknotes and coins. 85 per cent of the respondents said they had been able to get rid of their old banknotes in a simple and straightforward manner. The corresponding figure for coins is 72 per cent.

Communication measures had a broad impact – the general public was well-informed

The Riksbank carried out several surveys of knowledge among the general public, the banks and the retail trade during the project period. In spring 2016, 80 per cent of the general public knew which banknotes would become invalid in the first stage and 66 per cent could state the approximate date. In spring 2017, 91 per cent knew which banknotes and coins would become invalid in the second state and 83 per cent could state the approximate date. Knowledge among bank and retail trade employees was higher on both occasions. In Ipsos' survey of the general public in 2017, 91 per cent state that they have been very well-informed or fairly well-informed of the changeover.

A large majority of market participants are also satisfied with the Riksbank's information campaigns. They highlight the fact that the information has been available in many different channels and that the Riksbank's website has been clear and easily accessible.

Security work was effective – no serious incidents

All market agents state that the changeover worked well from a security point of view. The number of serious incidents did not increase during the changeover period. Some of the banks point out that they have had people come into bank offices with large volumes of cash, but that this has been resolved without any major security problems arising. A comment from one of the cash-in-transit companies was that security would have been better if the Riksbank had had more places to deposit banknotes and coins, which would have meant that transports were less exposed to risk. The Riksbank has not noted any robberies or other incidents that can be connected to the changeover. There has been no damage to people or property.

Collaboration between cash market participants worked well

Most of the market participants consider that the cooperation with the Riksbank has worked well and that the Riksbank was responsive to their views. A large majority consider they were able to influence the strategy for the changeover and that they received sufficient information early on to be able to plan their operations. However, some are critical and say

that the Riksbank did not take their wishes into account. The Riksbank's project organisation is on the whole satisfied with the cooperation with market participants.

The collaboration between participants in the market, functioned well on the whole, according to the participants themselves. However, some say that those involved have mainly guarded their own interests. The retail trade considers that the banks should have taken greater responsibility for the changeover and that bank offices with cash management should not have been closed down during the course of the changeover. The banks, on the other hand, consider that the retail trade has held onto the old coins in their small-change cash boxes for too long and thus not taken their responsibility.

In response to the question of how confidence in the Riksbank was affected, a majority of market participants responded that it was unchanged or slightly stronger. Those who stated that confidence had strengthened said that they had got to know the Riksbank better during the process and that the Riksbank had listened, communicated and coordinated well. Those who said that their confidence had declined pointed to the Riksbank not being responsive and not contributing the help they had expected. Some considered that a changeover was not necessary and that the Riksbank should therefore have borne a greater share of the costs. This applies, for instance, to several of the banks, who do not see any future for cash.

The Riksbank's project work functioned well

The employees involved in the project consider on the whole that the project work functioned well. They point out that the task was clear, that the steering group was involved and took decisions appropriately and that the Executive Board and General Council of the Riksbank have supported the project. The project manager was focused on the task and cooperated well with both internal and external parties. The communication work, which was carried out by the Riksbank's Communication Division, was coordinated well with other parts of the project. Risks were managed in a good way and potential crises dealt with quickly.

Success factors that were highlighted were that the project had top priority, that the targets and timetables were clear and that the management and competence levels were good. It is further pointed out that there was sufficient time to produce well-founded proposals, that the project was systematic and the working methods characterised by commitment and respect. Further, it is stated that the cooperation with external parties has worked well and that new methods were used to communicate with the general public. The time needed to follow up the sub-contractors' work was underestimated on some occasions, which led to a lack of clarity and additional work. Within the communication project, there was sometimes a shortage of manpower due to other competing communication activities.

The General Council and Executive Board of the Riksbank consider that the project planned and implemented the practical work in a good way and has shown foresight with regard to the problems that could arise. There has been a good mixture of competencies and there has been a stable group working throughout the course of the project with a good project manager. Problems that have arisen have been resolved and there has been perseverance. Management has felt that they were well-informed of developments. One problem has been that the banks have not wanted to contribute as much as the Riksbank wished in helping their customers. It took a long time to get the banks and even the retail trade to manage their share of the changeover, but the changeover nevertheless went smoothly. The information campaigns were good and the Riksbank has used some new methods of communication.

Substantial changeover costs – reduced costs in the long run

Forecast up to the end of 2018 gives the most correct picture

The changeover project began in 2008 and concluded on 30 June 2017. However, there have been work tasks remaining that have been managed by the ordinary line organisation during the second half of 2017. Even after 2017 a number of work tasks remain, primarily the handling and sale of old coins and redemption of invalid banknotes. The handling and sale of the old coins is directly linked to the changeover. The redemption of invalid banknotes, on the other hand, is a regular activity at the Riksbank which can only transitionally be regarded as part of the changeover.

Given this, we have assessed that 31 December 2018 is an appropriate time to follow up to obtain the most correct picture possible of the total cost of the changeover. The aim is that the sale of the old coins will be completed, at the same time as the peak of the redemption of old banknotes should have passed. The account therefore covers both the outcome on 31 December 2017 and a forecast for 31 December 2018. The accounting effect that arises as a result of invalid banknotes and coins not being returned to the Riksbank is dealt with separately.

Riksbank's changeover costs lower than previously assessed

A preliminary assessment of the Riksbank's costs for the changeover was made in 2011, when the timetable was being decided on. Many factors that affected the changeover were not known then, including the purchasing costs for the new banknotes and coins. The assessment landed at SEK 145 million. A forecast was made in 2015, when there was a better factual base and this landed at SEK 223 million. The outcome as at 31 December 2017 was SEK 301 million. The final cost as at 31 December 2018 is calculated at SEK 79 million.

Compared with the assessment in 2011, the overheads and costs for the banknote purchases are higher, while the income from the sale of old coins is lower. The reason for overheads becoming higher is the extra communication measures aimed at the general public in 2016 and 2017, larger volumes of coins to manage than estimated and more redemption cases than expected. The reason for the income from coin sales being lower was that the world market price for the metals included in the coins has fallen since 2011. The cost of purchasing banknotes has increased as a result of the purchases to the Riksbank's stocks now being included in the most recent accounts, which was not the case in 2011. At the same time, it can be noted that the costs for the banknote purchases have become much lower than in the 2015 forecast, due to lower demand for banknotes and that the new banknotes have proved to be more durable than estimated.

The increased costs and the lower income in relation to the assessment in 2011 are compensated by much lower costs for purchasing new coins. The assessment in 2011 did not include any alternative cost for purchasing banknotes and coins if the changeover was not implemented, which is a plus item in the later forecasts. We further calculate that 25 per cent of the new coins purchases will remain in the stocks on 31 December 2018. These are coins that will be used later on in the Riksbank's day-to-day provision of cash. The purchase cost of these coins has been deducted from the changeover cost and is reported as income in the forecast for 2018.

Table 17. The Riksbank's expenditure and income 2008-2018 – earlier assessments and forecasts, outcomes on 31 December 2017 and forecast up to 31 December 2018 (SEK million).

Type of cost/income	Assessment 2011	Forecast 2015	Outcome 31 December 2017	Forecast 31 December 2018
Costs				
Purchase of banknotes	227	398	280	296
Purchase of coins	306	111	112	112
Communication	included in other costs	included in other costs	66	66
Storage and handling of coins	included in other costs	included in other costs	38	45
Other costs	100	98	48	59 ¹
Total expenses	633	607	544	578
Income				
Sale of old coins	-488	-245	-104	-332 ²
Saved expenditure ³	not calculated	-139	-139	-139
Remaining coin stocks ⁴				-28
Net costs	145	223	301	79

1 Includes design of banknotes and coins, redemption of invalid banknotes, security arrangements and transports.

2 The forecast is based on the entire stock of old coins being sold in 2018 at prices and exchange rates that applied in December 2017.

3 Refers to purchases of banknotes and coins if the changeover is not implemented.

4 Purchase costs for remaining stocks of coins after 2018.

Invalid banknotes and coins not returned are written off

Invalid banknotes and coins that are not returned to the Riksbank are written off from the banknote and coin debt on the Riksbank's balance sheet and become an income in the profit and loss account. For banknotes this is done for the year when only a small amount is expected to remain to be redeemed, which is normally ten years after they have become invalid. A small reserve is put aside in the event that banknotes will be redeemed even later. Coins are written off when the Riksbank no longer redeems them. The coins that became invalid after 30 June 2017 are written off as SEK 1.3 billion in 2017.

Reduced costs for Riksbank's cash management

The Riksbank's costs for buying in banknotes and coins depend on the volume of banknotes and coins demanded, the price of the banknotes and coins and their lifetime. The price and lifetime depend on the design of the banknotes and coins and can therefore be affected by the Riksbank. To some extent the Riksbank can also affect how many banknotes and coins are needed, by supplying appropriate denominations.

The purchase cost for the new coins is much lower than was the case for the old coins. The new 1-krona coin costs 80 per cent less and the 5-krona coin costs 60 per cent less. For the banknotes, the price has increased with regard to some denominations and declined for others. In total, the banknote purchases have become somewhat more expensive, due to the new security features, the thicker paper and the new surface treatment. The improved quality of the banknotes means, on the other hand, that they last longer.

In connection with the changeover, two new denominations were introduced, a 200-krona banknote and a 2-krona coin. This means that many payments can be made using fewer banknotes and coins, in that a 2-krona coin can replace two 1-krona coins and a 200-krona banknote can replace two 100-krona notes. All else being equal, this means that fewer banknotes and coins are needed in society.

In total, the changeover means that the Riksbank's purchase costs for banknotes and coins will decline, as a result of lower purchase costs for coins, a longer lifetime for banknotes and a need for fewer banknotes and coins due to the 200-krona and 2-krona denominations.

Changeover costs for retail trade and banks – cost reductions in the long run

The changeover has required major work efforts by the participants in the cash market, primarily the banks and their cash handling companies, the retail trade, cash-in-transit companies, ATM companies and suppliers of technical equipment. The measures concern transports, counting, adjustment of technical equipment, security arrangements and information. The general public has also incurred costs for using banknotes and coins that were to become invalid.

It is not possible to calculate the total cost to society with any reasonable measure of precision, given the very large number of those involved. Moreover, with regard to the cash market participants it is often difficult to distinguish which costs concern day-to-day operations and which have been caused by the changeover. In general, it can be concluded that the costs have ultimately encumbered the retail trade, the banks, the banks' cash handling companies and the general public.

In the long run, the changeover will entail reduced costs for cash management, primarily due to the new coins weighing less than the old ones. In addition, the new denominations of 200-krona and 2-krona contribute to reducing the number of banknotes and coins. On top of this are the savings to which the withdrawal of the 50-öre coin has contributed.

Comments and conclusions

Modern banknote and coin series – difficulties with the coins

The changeover means that Sweden has gained a modern banknote and coin series with a uniform design. A 200-krona banknote and a 2-krona coin have been introduced to make cash handling more efficient. All indications are that the new banknotes have been broadly accepted by the general public. The opposite applies to coins, as many people find it difficult to tell the denominations apart.

The fact that many people have difficulty, at least in the beginning, in distinguishing between the coin denominations is no surprise, as the new coins are much smaller than the old ones. The change in the size and weight of the coins at the same time has the positive effect of reducing handling charges and the effect on the environment. As yet, only a relatively short time has passed since the coins were introduced. It remains to be seen whether opinions on the coins change when people have become used to them. The Riksbank will monitor opinions of the coins.

Better protection against counterfeits and efficient practical handling

The security standard of the new banknotes is in line with the forecast in the world with regard to protection against counterfeiting. The number of counterfeit notes is very low and the counterfeits that have arisen are simple and of poor quality. The fact that the counterfeiters have nevertheless succeeded in getting these banknotes into circulation is thus due to those who have accepted them not paying attention. Our survey indicates that

the general public still has too little knowledge of how to check the new security features. There is reason for the Riksbank to consider further information measures.

The changeover of the technical systems for cash handling was one of the most extensive parts of the changeover and it was pointed out as a key factor from an early stage. It can now be concluded that both the banknotes and coins function well in the technical handling and that there been essentially no incidents that have affected the general public.

A reduction in the environmental impact of the new banknotes and coins

The evaluation shows that the environmental impact of the new banknotes and coins is less than that of the older ones and that the environmental impact arising from the actual changeover will be compensated for within a reasonable time period. The environmental impact of the banknotes is small from a societal perspective, but the impact from the coins is greater. Apart from the annual impact from the coins having declined, the coin changeover also has other positive environmental and health effects, such as old coins being melted down and the metals reused and that the exposure to nickel disappears.

The risk of the 500-krona note dominance has declined

The distribution of value between the banknote and coin denominations has changed in several aspects during the changeover period. The 500-krona banknote still dominates the banknote series. This is a risk factor for the Riksbank if the banknote were to be counterfeited to a large extent. However, the arrival of the 200-krona banknote has created a further opportunity to replace the value of the 500-krona notes if there were an extreme situation whereby these banknotes needed to be withdrawn. The risk entailed in the dominance of the 500-krona note has thus declined.

The changeover went well on the whole for both the general public and the market

Providing the general public with information was an enormous and complicated task, not least given that the changeover proceeded over a long period of time and there were many different dates to keep track of. It is therefore satisfying that a large majority of the general public consider that they were well informed. One consequence of this is that a large volume of old banknotes and coins have been returned to the Riksbank, and with regard to the coins this was a larger volume than expected. Most people have been able to get rid of their old banknotes and coins without any problem. It was not surprising that it was more difficult to get rid of the coins, but nevertheless a large majority say that it was no problem to get rid of them too.

Market participants have taken a large share of the responsibility for the changeover and according to the evaluation they consider that it has largely functioned well, although the coin changeover was demanding. The timetable, which was set back in 2012, has been held. There have been no serious incidents, which indicates that the security work has functioned well for all participants. The cooperation between the Riksbank and participants and between the different participants has on the whole been good and market confidence in the Riksbank's cash management appears to have been maintained.

Lower costs for cash management

The changeover has entailed costs primarily for the banks, the bank's cash handling companies and the retail sector. These are participants who are also dependent on a smoothly-functioning payment system. In the long run, the costs to society of handling banknotes and coins will decline as a result of the changeover, mainly because the costs for managing coins will be lower. Extensive banknote forgeries would entail large costs for society and this risk has now declined.

The Riksbank's costs for cash management will now decline, primarily as a result of lower purchasing costs for coins. The size of the savings would depend on how demand for banknotes and coins develops. The Riksbank's costs for the actual changeover have been lower than estimated.

Reduced use of cash affected the conditions

The changeover was implemented in a situation where the use of cash in society is declining. This affected the conditions in several ways. The banks continued to reduce the number of offices handling cash and an increasing number of shops stopped accepting cash payments. The result of this was that the general public found it more difficult to get rid of their old banknotes and coins than it was expected to be when the changeover was first planned. The ATM company, BDB/Bankomat, and the cash-in-transit companies also had to adapt their operations to the reduced volumes and the Riksbank also implemented changes in its cash management. The strains on all participants thus increased.

This development also led to a discussion of the future role of cash, where some questioned the need to replace the banknotes and coins. However, there are still a lot of people who use cash regularly and the Riksbank assesses that banknotes and coins will remain for a long time to come. The banknote and coin changeover therefore appears to be well motivated even in the light of the reduced use of cash. However, there is reason for the Riksbank to closely follow developments in the use of cash even after the banknote and coin changeover – and this work is already under way.

Purpose of the changeover achieved

The purpose of the changeover was to design an efficient and secure banknote and coin series, with account taken of environmental impact. The changeover was to be implemented in collaboration with the cash market participants and the interests of the general public were to be taken into consideration. Our conclusion of the evaluation is that the project was a complex one but that the purpose has been achieved and the changeover has been implemented in the forms prescribed in the task description.

Appendix 1. Important reports and memorandums

Review of the banknote and coin series. PM 2008-03-07, ref.no. 2008-286-STA.

Plan for a review of the banknote and coin series. PM 13/05/2008, ref.no. 2008-286-STA.

Cash usage in Sweden. PM September 2008, ref.no. 2008-286-ADM. Examination of the need for the 50-öre coin PM November 2008, ref.no. 2008-903-ADM.

Denominations and their allocation among banknotes and coins. PM February 2010, ref.no. 2008-286-ADM.

Formats, materials and colours. PM 10/03/2011, ref.no. 2008-286-ADM.

Security system for the banknote series. PM 10/03/2011, ref.no. 2008-286-ADM (management class "strictly confidential").

Theme and motifs. PM 10/03/2011, ref.no. 2008-286-ADM.

Design competition for Sweden's new banknotes. Jury's decision 2012, ref.no. 2008-286-ADM.

Timetable for the introduction. PM 11/05/2012, ref.no. 2008-286-ADM.

Copyright issues in the banknote series. PM 25/03/2013, ref.no. 2012-543-ADM. Communication initiatives in the banknote and coin changeover. Report 2018, ref.no. 2017-00001.

Evaluation of the banknote and coin changeover from a participant point of view. Report JKL 2017, ref. no. 2017-00001.

Knowledge of and attitudes to new banknotes and coins. Report Ipsos Public Affairs 2017, ref.no. 2017-00001.

The Riksbank's work on the banknote and coin changeover project – evaluation. Report Riksbank and MaisOui Consulting 2017, ref.no. 2017-00001.

Project banknote and coin changeover – costs. PM 2018, ref.no. 2017-00001.

Environmental impact of change to new banknotes. Report Liljemark Consulting 2018, ref.no 2016-00837.

Environmental impact of coin changeover. Report Liljemark Consulting 2018, ref.no 2016-00837.

Appendix 2. Sub-contractors and collaboration partners

Adin family	Hammarskjöld family
Arrandene MFG	Handelsbanken
Architects Sweden	Harriet Brown & Co
Lars Arrhenius/Martina Müntzing	Idevo
Astrid Lindgrens world	Innventia
Bank of England	Ipsos Public Research
Bank of Finland	JKL
Bankernas Depå AB	Karolinska Institutet
Bankomat	Koninklijke Nederlandse Munt KNM
Bergman Center	Konstakademien
Bergman family	Lebronze
Fredrick-Edwin Bertin	Liljemark Consulting
Birgit Nilsson Museum	Peter Linde
Butikerna	Liseberg
Camera Press/Bulls Press	Logent
Ci Tech	Loomis
Hans Cogne/Clara Terne/Lars Sjööblom	Mais Oui Consulting
County Administrative Boards	MEI
Crane Currency	Enar Merkel-Rydberg
Göran Dalhov	Mint of Finland
Danmarks Nationalbank	Nationalmuseum
Danske Bank	NCR
De Nederlandsche Bank	No Picnic
Diabold Nixdorf	Nokas
Elite Security	Nordea
European Central Bank, ECB	Ernst Nordin
European Vending Association	Norges Bank
Finance police	Peter Walléns grafiska
Finansinspektionen	Prime
Forex Bank	Thomas Qvarsebo
Jacob Forsell	Ritator AB/Peter Johansson
Garbo society	Royal Coin Cabinet
Grontmij	Royal Court of Sweden
Claes Grundsten	Royal Opera
Gunnebo	Vladimir A Sagerlund

Saltkråkan	Swedish Post and Telecom Authority (PTS)
Scan Coin	Swisslog
ScanPix	Södertälje Hamn
Schwermetall	Ali Tabatabai/Mads Quistgaard
SEB	Talaris
Setterwalls	Taube archive, Göteborg
SF Bio	Taube family
SICPA	The Swedish Association of the Visually Impaired
Sirje Papp/Vince Reichard	The Swedish National Archives
SMS-teknik	The Swedish Police
Sparbankernas Riksförbund	The Swiss National Bank
SQS	3D Interactive
SSF Stöldskyddsföreningen	TNS Sifo
SSSAB	Unit 4
STF Abisko	United Minds
Stiftelsen Ingmar Bergman	United Nations
Stockholm Design Lab	Universal Music
StrongPoint	Vida Packaging
Svensk Filmindustri	Warner Bros.
Svensk Handel	Warner Chappell Music
Swedbank	West Studios
Swedish Bankers' Association	Wieland
Swedish Fundraising Council, FRII	Annie Winblad Jakubowski
Swedish National Forensic Centre, NFC	Göran Österlund

Appendix 3. Participants in the project

Steering group

Malin Alpen, 2008–2009

Kai Barvèll, 2008–2015

Ann Fridell, 2017

Susanna Grufman, 2015–2016

Anders Hasselblad, 2016–2017

Peter Kvist, chair 2008–2010

Thomas Lundin, co-opted 2013–2017

Ann-Leena Mikiver, 2014–2017

Marianne Olsson, 2010–2017

Christina Wejshammar, chair 2010–2017

Anna-Lena Wretman, 2016

Project group

Therése Gaya, redemption 2016–2017

Mårten Gomer, production banknotes/coins 2008–2017

Anders Hasselblad, logistics banknotes/coins 2015–2017

Peter Henricsson, logistics banknotes 2013–2015

Maria Hesselmar, production banknotes/coins 2013–2015

Leif Jacobsson, project manager 2008–2017

Ulrika Johansson, investigation/communication 2008–2017

Karolina Laurentz, communication 2013

Thomas Lundin, security 2008–2017

Jan Möller, investigation/logistics coins 2013–2017

Tommy Nilsson, logistics banknotes 2016–2017

Tommy Persson, communication 2014–2017

General Council's drafting committee for banknotes and coins

Eva-Lena Bengtsson, Royal Swedish Academy of Fine Arts, 2009–2017

Susanne Eberstein, General Council, 2009–2010

Peter Egardt, General Council, chair 2009–2017

Anders Karlsson, General Council, 2010–2017

Sonia Karlsson, General Council, 2010–2014

Henrik Klackenborg, State Herald of Sweden, 2009–2017

Ebba Lindsö, General Council, 2009–2011

Kjell Nordström, General Council, 2009–2010

Magnus Olausson, Nationalmuseum, 2009–2017

Eva Ramberg, Royal Coin Cabinet, 2015–2017

Allan Widman, General Council, 2011–2014

Ian Wisén, Royal Coin Cabinet 2009–2014

Competition jury for the design of the banknote series

Jordi Arkö, artistic expert

Peter Egardt, General Council, chair

Karin Granqvist, artistic expert

Anders Karlsson, General Council

Sonia Karlsson, General Council

Allan Widman, General Council

Appendix 4. Pictures of banknotes and coins

Earlier banknote series



Winning proposal in the design competition for the new banknote series



The new banknote series



Examples of security features on the banknotes



Security strip
 Vertical strip with three windows. The windows feature images that move and alternate motif between “KR” and a royal crown when you tilt the banknote. Present on the denominations 100, 200, 500 and 1,000 banknotes. The position of the strip may vary somewhat from one banknote to another.

Colour-shifting image
 An image that gradually changes colour between gold and green when you tilt the banknote. The image is connected with the person portrayed on the banknote and also shows the banknote’s denomination. Can be found on all denominations.

Earlier coin series



The new coin series





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