

The use of cash in Sweden

SUB-PROJECT 1

in the review of the banknote and
coin series

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1. Background

The Executive Board of the Riksbank decided in March 2008 to undertake a review of the Swedish banknote and coin series. The objective is to form a banknote and coin series that is suitable from the points of view of efficiency, environment and security. The project description is contained in Appendix 1.

This is the final report of sub-project 1 of the review. The aim is to present factual information about banknotes, coins and the use of cash to serve as a basis for the further work of the project.

Points of view about banknotes and coins will be gratefully received. They may be submitted by e-mail via the Riksbank's website www.riksbank.se, "Notes and coins", or be posted to Sveriges riksbank, SE-103 37 Stockholm, Sweden.

Stockholm, September 2008

Peter Kvist
Chairman of the Steering Group

2. Summary

The amount of cash and payment patterns

Cards and cash are efficient for different types of payments. There are transactions where cash payments will probably always be more attractive than card payments. Payments with banknotes and coins still account for a large proportion of payments.

The amount of banknotes and coins as a percentage of GDP has gradually decreased over the past ten years and was just over 3 per cent in 2006-2007.

Part of this decrease can probably be attributed to the increased use of cards.

In 2007, approximately 1.3 billion card purchases were made, which is almost six times as many as in 1998. The total amount of card purchases has also risen although not to the corresponding extent since the amount per transaction has decreased. Withdrawals from cash dispensers are largely unchanged.

The average size of cash purchases is estimated at around SEK 300. The average card payment was SEK 393 in 2007.

Cash payments are most efficient in terms of social cost for payments of less than around SEK 70 kronor. Cards are preferable for larger amounts. The limit for when it is more efficient to pay in cash is probably decreasing as card transactions become increasingly efficient.

A sizeable proportion of banknotes and coins in circulation is stored or saved. Increased card use therefore only partially affects the amount of cash.

Demand, quality and costs

The general public treats banknotes differently from coins. A considerable volume of coins is saved at home. The Riksbank therefore issues more coins than are needed as means of payment.

The 500-kronor banknote is becoming increasingly important and now accounts for more than half of the value of notes in circulation. Demand for the 1,000-kronor banknote is decreasing.

The quality of 20- and 50-kronor banknotes in circulation is lower than for other denominations, since they are handled with less care and used for a longer period before being returned to the Riksbank for cancellation.

The 1-krona coin is the most common in the coin series. The 10-kronor coin is increasing most quickly.

As a result of competitive tendering, the Riksbank has good cost-efficiency when purchasing banknotes and coins.

Security

The number of counterfeits is low in Sweden and is not a major problem for either the Riksbank or the public.

Experience has shown that the level of security affects the number of counterfeits.

Swedish banknotes now have a security standard which is about the same as in the euro countries, Denmark and Norway.

The euro countries and Denmark are undertaking an upgrade of banknote security over the next few years.

Environmental and health aspects

Previous studies by the Riksbank indicate that banknotes and coins have a limited impact on the environment taking into consideration the extent of cash management. Knowledge about the total environmental impact of banknote and coin management is, however, not complete.

Environmental consequences from the point of view of society as a whole should be clarified in future when planning major changes in banknotes and coins.

There are no indications of health problems in the management and use of banknotes and coins. However, the nickel content of the 1-krona and 5-kronor coins should be borne in mind.

The banknote and coin series

There are studies that attempt to describe a set of banknote denominations that is suitable for a socially efficient currency. According to these theories, the current Swedish series of banknotes and coins lacks some denominations.

The 50-öre coin is regarded as unnecessary by a majority of the public and retail trade organisations.

The 2-kronor coin is still legal tender even though it has not been minted since 1971.

Denmark, Norway and the euro countries do not have banknotes for amounts below around SEK 50.

The public is largely contented with the quality of banknotes. The 20-kronor banknote is, however, rated slightly lower than the other denominations.

The size of Swedish banknotes (height and breadth) is not consistent since the 50-kronor note has a deviant format. The size of coins does not match their amount.

Abbreviations

The following abbreviations are used in the report:

ECB = The European Central Bank

SCB = Statistics Sweden

3. The amount of cash and payment patterns

3.1 Public demand governs the amount of cash

The amount of cash is the aggregate volume of banknotes and coins in circulation. This is governed by public demand. The amount of cash is also referred to by the Riksbank as “banknotes and coins in circulation”.

Distribution to the public takes place via the banks. The amount of cash increases every time a bank collects banknotes and coins from the Riksbank's stock. It decreases when the banks return banknotes and coins to the Riksbank.

Banknotes account for 95% and cash for around 5% of the amount of cash.

3.2 The amount of cash is growing but more slowly than the Swedish economy

The total amount of banknotes and coins in circulation was just over SEK 114 billion at the end of 2007. The nominal amount has risen by SEK 28 billion or 32 per cent in the past ten years.

During the same period, the gross domestic product (GDP) in current prices rose by 50%. The amount of banknotes and coins in circulation as a percentage of GDP has thus decreased slightly. This decrease has occurred gradually since 2001. With the method of calculation used below, the amount of cash was 3.2% in 2007.

Viewed in a longer perspective, the amount of banknotes and coins in circulation has more than halved in relation to GDP. In the 1950s the amount was around 10%.

Developments during the period 1998-2007 are shown in Table 1. The amount of cash has been measured in terms of the M0 concept of money supply, i.e. the total amount of cash less banknotes and coins held by the banks. The annual average has been used as a basis for calculating the percentage of GDP since the amount of cash varies during the year (it is particularly large around the Christmas and New Year holidays).

Table 1. Banknotes and coins (M0), and their percentage of GDP in current prices 1998-2007, SEK billion

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Banknotes and coins 31 Dec	78	87	89	97	96	98	98	100	101	100
GDP current prices	1 987	2 096	2 217	2 288	2 372	2 459	2 573	2 673	2 826	2 982
Banknotes and coins, annual average	72	78	83	86	88	91	92	94	94	95
Percentage of GDP	3.6	3.7	3.7	3.8	3.7	3.7	3.6	3.5	3.3	3.2

Sources: The Riksbank and Statistics Sweden

3.3 Cash is used in direct meetings between buyers and sellers

Most cash payments take place in practice when buyers and sellers meet directly. Large payments between legal entities normally take place electronically. Cash payment means that there is no delay between the conclusion of the deal and payment. Unlike, for example, a card payment, the amount is transferred immediately. Another distinctive feature of cash payments is that they are anonymous and impossible to trace. They can take place at market places where there is no access to any other type of payment instrument.

One disadvantage from the point of view of society is that cash payments are suitable for transactions where the parties want to avoid documentation, for example, to evade tax. Cash management also entails risks of theft, for example.

3.4 Use of cash is on a level with Denmark but higher than in Norway

Sweden has for a long time had a higher proportion of cash in relation to GDP than its Nordic neighbours, although the level is now the same as in Denmark. This level is considerably lower in Norway. Finland's statistics end in 2001 with the transition to euro. At that time, the proportion of cash in Finland was higher than in Norway.

The decline in Norway is due, among other things, to a reduction in the amount of cash at the turn of the millennium when an older 1,000-kronor banknote became invalid and was redeemed. A further explanation may be that Norwegians use cards to a greater extent than Swedes.

Demand for cash has exceeded GDP growth in the euro area since the euro was introduced in 2002. In 2007, the amount of euro banknotes in circulation increased by 7.7 %, compared with a GDP growth rate of just over 4 %. The role of the euro as a reserve currency means that it is in demand outside its own currency area to a greater extent than many national currencies.

In the United States, the monetary base, i.e. banknotes and coins in circulation and other claims on the central bank, has increased at much the same rate as GDP in the past ten years.

Table 2. Banknotes and coins (M0) as a percentage of GDP 1998-2007, in Sweden, Denmark, Finland, Norway. Annual average, per cent

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sweden	3.6	3.7	3.7	3.8	3.7	3.7	3.6	3.5	3.3	3.2
Norway	3.8	3.5	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.2
Finland	2.2	2.3	2.2	1.8						
Denmark	3.0	3.0	2.9	2.9	2.8	2.9	3.0	3.1	3.1	3.1

Sources: The Riksbank, Statistics Sweden, Statistics Denmark, Danmarks Nationalbank, Norges Bank and Finlands Bank

3.5 Big increase in card purchases, withdrawals from cash dispensers constant

The use of bank cards and credit cards has increased sharply in Sweden during the past ten years. In 2007, there were approximately 1.3 billion card purchases, which is almost six times more than in 1998. The total amount of card purchases has also increased, though not to the corresponding extent since the amount per transaction has decreased.

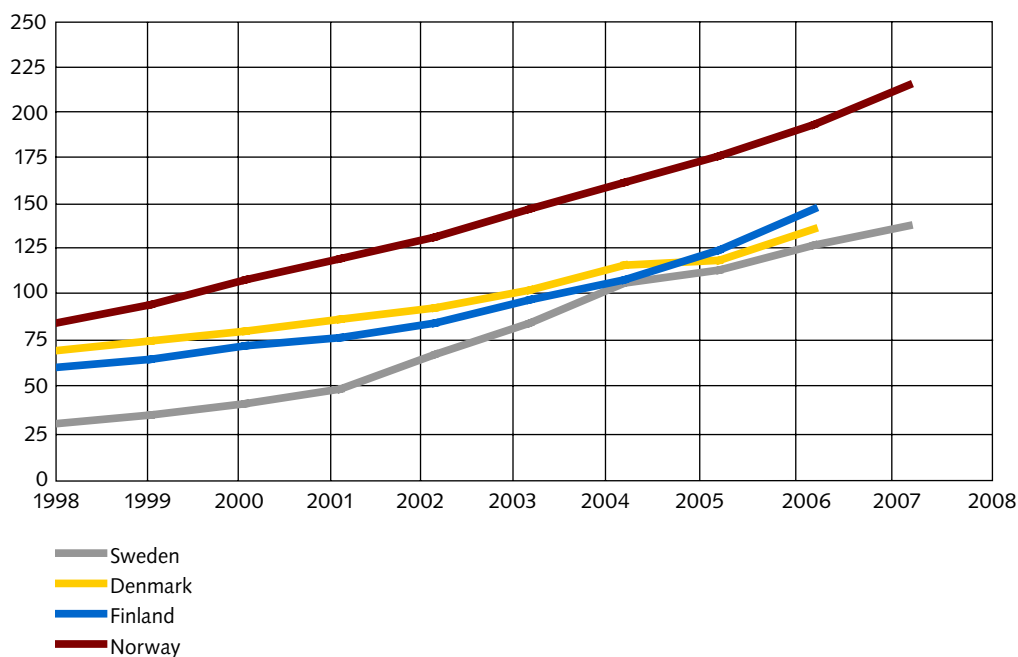
The number of withdrawals from cash dispensers and the amount withdrawn have hardly changed during the same period. The number of withdrawals is rather constant at just under SEK 300 million per year and the total amount withdrawn is around SEK 275 billion per year.

This development is shown in Table 3. The table differentiates between purchases in shops and the total number of card purchases. The latter measure includes card purchases made outside shops, for example in hotels, restaurants and taxis.

Table 3. Withdrawals from cash dispensers and card purchases 1998-2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of cash dispensers	2 485	2 508	2 617	2 567	2 647	2 647	2 701	2 800	2 807	2 793
Withdrawals from cash dispensers, total amount, SEK million	333	310	321	335	321	328	320	316	315	312
Withdrawals from cash dispensers, total amount, SEK million	287 000	257 000	271 000	282 000	269 000	276 000	274 000	275 000	278 000	267 000
Number of card terminals in shops	94 400	106 100	121 300	124 700	142 000	153 100	161 100	176 600	182 600	186 931
Number of card purchases in shops, million	171	227	256	326	464	542	616	755	968	1 184
Total amount of card purchases in shops, SEK million	92 000	127 000	143 000	185 000	211 000	241 000	269 000	299 000	366 000	434 000
Number of card purchases, total, million	213	255	323	403	621	759	955	1 071	1 189	1 323
Total amount of card purchases, SEK million	149 000	174 000	211 000	261 000	365 000	364 000	386 000	414 000	452 000	520 000

Source: The Riksbank

FIGURE 1. Number of card payments per capita in Sweden, Denmark, Finland and Norway 1998 – 2007

Card payments have increased throughout Scandinavia. Sweden has a slightly lower number of card payments per capita than Denmark and Finland and considerably lower than Norway.

3.6 Average cash purchase around SEK 300

The average card purchase was SEK 393 in 2007. This is a reduction of almost 50% in ten years. One explanation is probably improvement in card payment technology. It is now simple and swift instead of, as before, an awkward and time-consuming procedure. Acceptance and interest in paying by card has accordingly increased for lower amounts as well.

The average cash withdrawal from cash dispensers has hardly changed, however, just under SEK 900. Unlike card payments, the machine service is technically about the same as it was ten years ago.

Since cash transactions are not registered in the same way as card transactions, there is no reliable estimate of the development of cash purchases. Statistics on withdrawals from cash dispensers provide some indication, but not an exact picture since cash can change owner a number of times before returning to a cash dispenser.

Still, with the aid of a survey on the general public's payment patterns carried out by the Riksbank in 2006 and statistics on cash dispenser withdrawals and card purchases, a hypothetical amount for an average cash purchase can be calculated.

In the 2006 survey, 47 per cent stated that they used cash for their most recent purchase. The number of cash purchases was 1,189 million. This means that the number of cash purchases can be estimated at 1,054 million.

The same year, Swedes withdrew SEK 278 billion from cash dispensers as well as an unknown amount in shops and from bank branches. If it is assumed that the unknown amount withdrawn in shops and bank branches is 20 per cent of the amount withdrawn from cash dispensers, the total withdrawals will be SEK 334 billion.

This means that an average cash purchase can be estimated at around SEK 300. This statistic coincides well with the result in a study by the Riksbank in 2007 (Bergman, Guibourg och Segendorff: "The Costs of Paying – Private and Social Costs of Cash and Card Payments").

Table 4. Average card purchases and withdrawals from cash dispensers 1998 – 2007, SEK

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Average ATM withdrawals	862	829	844	842	838	841	856	870	883	856
Average card purchases in stores	538	559	559	567	455	445	437	396	378	367
Average card purchases	700	682	653	648	588	480	404	387	380	393

Sources: The Riksbank

3.7 Cash most efficient for small payments

In the study mentioned above, estimates were also made of the total social costs of the use of different payment instruments. On this basis, certain conclusions could then be drawn about cards and cash from the point of view of efficiency.

It was found that it was most cost efficient to pay cash for purchases up to an amount of around SEK 70. Card payments were preferable above this amount.

This study is based on data from 2002. Since then, however, costs for cash management have probably risen more than the costs of card processing, calculated per transaction. Security requirements for transport and in cash dispensers have increased, for example. There is a lot to indicate that the difference in social costs between cards and cash has increased.

This means that the limit for when card payment is preferable from society's point of view is probably below SEK 70 today.

3.8 Part of the amount of cash is a buffer stock

According to an article in the Riksbank's publication *Economic Review* 4/2001 (Andersson/Guibourg: "The use of cash in the Swedish economy"), the actual amount needed for cash transactions in retail transactions is less than ten per cent of the total amount of banknotes and coins in circulation. This is because a considerable part of the amount of cash is used for purposes other than payments.

During 2007, the Swedish banks held on average (according to statistics from Statistics Sweden and the Riksbank) over SEK 12 billion in cash. In addition, considerable amounts were used for change in the retail trade or in store at cash-in-transit companies. Additional cash amounts were saved and kept as reserve cash by individuals and companies. Purchases between individuals, as well as illegal transactions, most often take place in cash.

This part of the amount of cash, which can be regarded as a buffer stock, is not affected by an increase in card purchases.

3.9 Summary

Cards and cash are efficient for different types of payments. There are transactions where cash payment will probably always be more attractive than card payment. Payments with banknotes and coins still account for a large proportion of payments.

The amount of banknotes and coins as a percentage of GDP has gradually decreased during the past ten years and was just over 3 per cent in 2006-2007. Part of this reduction can probably be attributed to increased use of cards.

In 2007, 1.3 billion card purchases were made, which is almost six times as many as in 1998. The total amount of card purchases has also increased, though not to a corresponding extent since the amount per transaction has decreased. Cash withdrawals from cash dispensers have been largely unchanged.

The size of the average cash purchase is estimated at around SEK300. The average card purchase was SEK 393 in 2007.

For payments of small amounts, below around SEK 70, cash is most efficient in terms of social cost. Cards are preferable for payments of larger amounts. The limit for when it is more efficient to pay with cash is probably decreasing as card processing becomes more efficient.

A sizeable fraction of the banknotes and coins in circulation is stored or saved. Increased card use therefore only partly affects the amount of cash.

4. Demand, quality and costs

4.1 Banknotes and coins are treated differently

Banknotes are much the larger component of the amount of cash. The growth in the amount of banknotes in the past ten years has accordingly been almost as large as the growth of the total amount of cash (around 30 %). The amount of coins has grown faster than the amount of cash (around 46 %).

One cause of this difference is probably that the public treat banknotes differently from coins. A survey by the Riksbank in 2000 showed that a majority of Swedes had coins lying idle at home. The amount averaged around SEK 750 per household. This means that considerable volumes of coins are withheld from circulation.

4.2 The increasing importance of the 500-kronor banknote

Demand for banknote denominations has changed quite considerably in the past ten-year period. The most tangible change is that the number of 500-kronor banknotes has increased sharply, by just over 90%. This has happened at the expense of 1,000-kronor banknotes in particular and to some extent 100-kronor banknotes

The domination of the 500-kronor banknote is clearly evident from each denomination's share of the total volume of banknotes. This banknote now accounts for more than half of the amount of banknotes in circulation.

One explanation for the reduction in the number of 1,000-kronor banknotes can be that cash is more seldom taken out at bank branches. A decline in this number coincides with the abolition of wealth tax in 2007.

Table 5. Banknotes in circulation, by amount and number 31 December 1998 and 2007, respectively, rounded

Denomination	Amount 1998 SEK bn	Amount 2007 SEK bn	Number 1998 million units	Number 2007, million units	Change, per cent
1000	41	39	41	39	-5
500	29	55	58	111	+91
100	9	11	94	108	+15
50	1	1	19	27	+42
20	1	2	68	90	+32
10+5 *	0	0	42	39	-7
Totalt	81	108	322	414	+29

*) Banknotes withdrawn from circulation which can still be redeemed. Source: The Riksbank

Table 6. Each banknote denomination's percentage of the total amount and number of banknotes 1998 and 2007, rounded, per cent

Denomination	Percentage of amount 1998	Percentage of amount 2007	Percentage of number 1998	Percentage of number 2007
1000	50	36	13	9
500	35	51	18	27
100	11	10	29	26
50	1	1	6	6
20	2	2	21	22
10+5 *	0	0	13	9

4.3 Lifetime of low denomination banknotes around two years

The relationship between the number of banknotes in circulation and the number of cancelled banknotes provides a measure of the lifetime of a banknote. The calculation in Table 7 is based on statistics from the period 1998-2007 and starts from the median of cancellation volumes.

The lifetime of the 20-, 50- and 100-kronor banknotes is relatively high, around two years. The 100-kronor banknote has a slightly shorter lifetime than the lower denominations, which would indicate that this banknote has the lowest quality. However, the general public considers that the 20- and 50-kronor notes are worst from the point of view of quality, as shown in section 7.2.

One explanation is probably that the 100-kronor banknotes are regularly deposited in banks and thus undergo a quality check. 20- and 50-kronor banknotes often remain in shops and are not deposited until they have become very worn. Another explanation is probably that the general public treats lower denomination banknotes with less care than higher denominations.

The lifetime of the 1,000-kronor banknote deviates markedly from the others. This probably mainly reflects the low velocity of these banknotes.

The picture largely coincides with the lifetime of euro banknotes. The low denominations 5, 10 and 20 euros have the shortest lifetime, on average 1.2 – 1.4 years. The high denomination 500 euro is estimated to have a lifetime of around 20 years. The quality of the low denominations varies between member states depending on when the banknotes are returned to the central bank for processing.

Table 7. Estimated lifetime of Swedish banknotes

Denomination	Lifetime, years
1 000	17.0
500	3.8
100	1.9
50	2.1
20	2.3

Source: The Riksbank

Table 8. Cancelled banknotes 2003-2007, million and percentage distribution

Denomination	2003	2004	2005	2006	2007	Total	Percentage
20	31	36	30	37	28	162	28
50	14	13	11	11	10	59	10
100	45	41	48	50	38	222	39
500	32	13	16	22	17	100	17
1000	3	4	6	8	10	31	5
Total	123	107	111	128	103	574	

Source: The Riksbank

4.4 100 and 20-kronor banknotes the most common cancelled banknotes

During the period from 2003 to 2007, the Riksbank cancelled on average around 115 million banknotes per year. The 100-kronor banknote predominates and accounts for almost 40 % of the volume. It is followed by the 20-kronor banknote at just under 30 %.

The statistics are affected by older versions of the 20-, 100- and 500-kronor banknotes being withdrawn on 1 January 2006. This means that banknotes were cancelled during this period both due to the banknotes being worn and because they were withdrawn.

4.5 1-krona coin the most common coin, 10-kronor coin increasing most

Among the coins, it is the 10-kronor coin that has increased most in number in the past ten years, by around 70 %. In absolute figures, the 1-krona coin is by far the most common, with well over a billion copies. The number of 50-öre coins has decreased due to the withdrawal of silver-coloured 50-öre coins in 2006.

The changes in the past decade are relatively small in relation to each denomination's share of the total volume of coins. However, the dominance of the 1-krona coin has increased and this coin now accounts for 60% of the number of coins in circulation.

Commemorative coins, issued by the Riksbank to commemorate events of national interest, are included in the amount of coins. They are usually minted in higher denominations, for instance, SEK 200 and SEK 2000. The complete coin statistics, including commemorative coins, are shown in Annex 2.

In the period 1998-2007, the Riksbank received 391 million coins for destruction. Of these, 98% were 50-öre coins, substantially the silver-coloured coins that been withdrawn. Unlike worn banknotes, worn coins are returned to the Riksbank to a relatively small extent. The physical lifetime of a coin is estimated by the Riksbank to average 20-25 years.

Table 9. Coins in circulation, by amount and number, 31 December 1998 and 2007 respectively, rounded

Denomination	Amount 1998, SEK bn	Amount 2007, SEK bn	Number 1998, million units	Number 2007, million units	Change, per cent
10	1 444	2 436	144	244	+69
5	901	1 258	180	252	+40
2	9	8	5	4	-20
1	880	1 278	880	1 278	+45
0,50	208	171	416	342	-18
Total	3 442	5 151	1 625	2 119	+30

Source: The Riksbank

Table 10. Each coin denomination's share of the total amount and number, 31 December 1998 and 2007, respectively, rounded, per cent

Denomination	Percentage of amount 1998	Percentage of amount 2007	Percentage of number 1998	Percentage of number 2007
10	42	47	9	11
5	26	24	11	12
2	0	0	0	0
1	26	25	54	60
0,50	6	3	26	16

Source: The Riksbank

4.6 The cost of banknotes and coins is decreasing

The Riksbank's costs for purchase of banknotes and coins have averaged SEK 160 million per year in the past five-year period. Of this total, 40 % is for banknotes and 60 % for coins.

The Riksbank previously operated its own banknote printing press and a mint. Both these operations have now been divested. As a consequence of this, banknote and coin suppliers have been engaged by a competitive tendering process, which has resulted in lower unit costs.

The purchase price of banknotes is now around 30-50 öre per unit. The purchase price for coin is around 30-75 öre per piece with the exception of the 5-kronor coin, which costs around 1.50. The high price of the 5-kronor coin is due to its special design.

Table 11. Purchasing costs for banknotes and coins 2003-2007, SEKm

Year	Banknotes	Coins	Total
2003	131	113	244
2004	64	96	160
2005	88	91	179
2006	6	59	65
2007	33	121	154
Five-year average	64	96	160

Source: The Riksbank

4.7 Summary

The public treats banknotes and coins differently. A considerable volume of coins is saved at home. The Riksbank therefore issues more coins than are needed as a means of payment.

The 500-kronor banknote is increasing in importance and now accounts for more than half of the amount of banknotes in circulation. Demand for 1,000-kronor banknotes is decreasing.

The quality of 20- and 50-kronor banknotes in circulation is lower than the other denominations, depending on their being handled with less care and used for longer before being returned to the Riksbank for cancellation.

The 1-krona coin dominates the coin series. The 10-kronor coin is increasing most quickly.

As a result of competitive tendering, the Riksbank has a high level of cost efficiency for the purchase of banknotes and coins.

5. Security

5.1 Counterfeits have decreased during the first decade of the 21st century

In a ten-year perspective, banknote counterfeiting peaked in 2000 with over 8,000 counterfeit banknotes. The reason for this upswing has not been clarified, though one factor may be that colour photocopiers became commonly available at about that time. Since then the number of counterfeits has declined sharply. In 2006-2007, there were around 1,000 counterfeits a year.

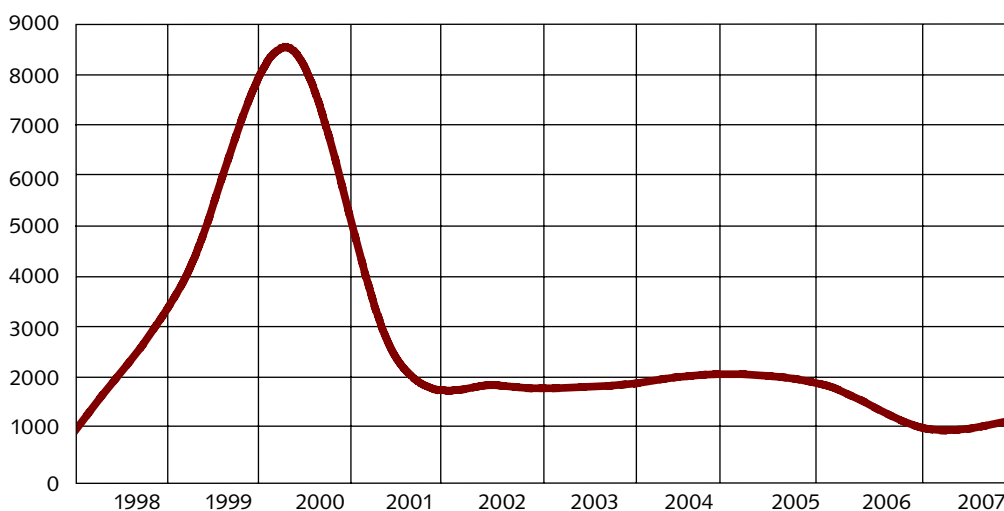
In 2000, the 100-kronor banknote and the 500-kronor banknote accounted for around 90 % of counterfeits. These banknotes were provided with new security features in 2001. These included copying protection, which makes photocopiers reject attempts to copy, as well as holograms and a new security strip. At the same time, the Riksbank carried out an information campaign on banknote security.

In 2006, the 50- och 1,000-kronor banknotes were upgraded in the same way as the 100- and 500-kronor banknotes. The 1,000-kronor banknote was also provided with the new safety feature, a “moving image in the striped band”. Older versions of these banknotes are still valid, however.

Counterfeit coins are uncommon in Sweden. Only a few cases have been reported.

The statistics refer to counterfeits of banknotes and coins in circulation reported to the police.

FIGURE 2. Number of reported counterfeited banknotes 1998-1999



Source: The Riksbank

5.2 Older 50-kronor banknotes are counterfeited most

Today, the older type of 50-kronor banknote without the foil strip is counterfeited most. In the past three years, it has accounted for more than half of the counterfeit banknotes. Only one counterfeit has been reported of the upgraded 50-kronor banknote and none of the upgraded 1,000-kronor banknote.

5.3 Counterfeiting not a major problem in Sweden

During the past ten years, Sweden has not been exposed to any large organised attack by counterfeiters. This is probably due to Sweden, as a result of the size of the currency and the geographical location of the country not being prioritised by gangs of counterfeiters. Another factor may be that Sweden has built up a system for checking the authenticity of banknotes.

Measured as the number of counterfeits in relation to the volume of banknotes, counterfeiting is a minor problem in Sweden. The same applies in Norway and Denmark. It is generally the case that larger countries and currency areas have more serious problems. See comparison in Table 13.

Table 12. Number of reported banknote counterfeits 1996-2007, by denomination, per cent

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	22	4	5	7	17	28	31	16	24	18
500	6	26	21	36	42	12	19	5	14	6
100	60	62	68	53	25	9	5	5	5	3
50	8	7	4	3	12	37	36	64	46	57
20	5	2	2	1	4	13	9	10	11	15

Source: The Riksbank

Table 13. Number of counterfeit banknotes in relation to the amount of banknotes in circulation 2007

Sweden	3 per million
Norge	3 per million
Norway	51 per million
United Kingdom	131 per million

Sources: The Riksbank, Swedish National Laboratory of Forensic Science, Norges Bank, The ECB and Currency News 6/2008.

5.4 The ECB and Denmark are improving security

Swedish banknotes are on a level with euro banknotes from the point of view of security. The number of security features and their quality are substantially the same. The level of security is substantially the same as in Denmark and Norway.

The ECB is preparing a change in euro banknotes that will give them a higher level of security than at present. The basic graphic design is not being changed.

Denmark's current banknote series is from 1997-99 and was upgraded in 2002-2005 with new security features. A new banknote series with new motifs and security features will be introduced from 2009.

Norway's present banknote series is from 1994-2001. All banknotes were upgraded with new security features in 2002-2003.

5.5 Summary

The number of counterfeits is low in Sweden and is not a major problem, either for the Riksbank or for the public.

Experience shows that the level of security affects the number of counterfeits.

Swedish banknotes today have a security standard which is approximately on a level with the euro countries, Denmark and Norway.

The euro countries and Denmark are carrying out an upgrade of banknote security in the next few years

6. Environmental and health aspects

6.1 Cash management given priority from an environmental point of view

An environmental policy was established by the Riksbank's Executive Board in 2008. According to this policy, the Bank shall, as far as is possible and compatible with its tasks, work in a preventive way and contribute to long-term sustainable development.

The policy also requires that measures are undertaken for ongoing improvement in the sphere of the environment. This is to be done by making the use of energy and materials more efficient and by environmentally adapting products where appropriate.

During the spring of 2008, an environmental investigation was carried out at the Riksbank with the aid of external expertise. The aim was to review and document in an integrated way how the Bank's various activities affect the environment. The supply of cash was considered to be one of the activities that had most effect on the environment.

6.2 The Riksbank should take the total environmental impact into account

During the first decade of the 21st century, cash management has been re-organised. The Riksbank's local offices have been reduced to two (Möndal and Tumba). Instead, a network of local depots has been built up run by the banks. This means that other players now bear the operational responsibility for considerable parts of cash management.

The Riksbank's direct impact on the environment due to banknote and coin management is accordingly less than before. However, it is reasonable that the Riksbank as issuer of banknotes and coins makes an assessment of and evaluates the impact on the environment, regardless of which organisation bears the operational responsibility.

The changed organisation of cash management has probably had positive environmental effects. The Swedish Bankers' Association's aim is to be able to reduce transport requirements by around 30 per cent through improved transport logistics.

6.3 Life-cycle analyses indicate a limited environmental impact

In 2000, the Riksbank carried out a life-cycle analysis with the aid of external expertise to survey the environmental impact of the use of banknotes and coins. The results showed that it was the manufacturing process that made the predominant contribution to the impact on the environment. It was also noted that the total environmental impact from the Riksbank's part of the cash management system was relatively low, considering that the system is large and complex and affects large parts of society.

The conclusions from the investigation are considered to be still largely valid. However, the analysis only applied to the part of cash management for which the Riksbank was directly responsible at the time of the study.

6.4 No indications of health problems with Swedish banknotes and coins

The Riksbank has decided to comply with the ECB's standard requirements for banknotes. The paper is almost identical with that used in the euro banknotes, except that the Swedish 20-kronor banknote is coated with dirt-repellent lacquer. Chemicals, security strips, printing ink and other materials for Swedish banknotes are purchased from suppliers approved by the ECB.

Before the euro banknotes were introduced, they were tested by the ECB from the point of view of allergy. It was concluded that hypersensitivity could not be completely excluded. However, in the manufacture of the Swedish banknotes in the past five years, only one case has been referred for investigation from the point of view of allergy. No material is of such a kind that additional safety measures are required during the manufacturing process.

The 1-krona and 5-kronor coins contain around 25 % nickel. For health reasons (and also for cost reasons), attempts are now being made to minimise the nickel component. The quantity of nickel in Swedish coins has, as far as is known, not led to handling or health problems, although efforts should be made to reduce the nickel content.

When procuring banknotes and coins, the Riksbank requires that suppliers are environmentally certified in accordance with ISO14001 or have corresponding systems.

6.5 Summary

Previous studies by the Riksbank indicate that the environmental impact of banknotes and coins is limited, considering the extent of cash management. Knowledge about the total environmental impact of banknote and coin management is, however, incomplete.

Environmental consequences from the point of view of society should be clarified in future in the event of major changes in banknotes and coins.

There are no indications of health problems in the management and use of banknotes and coins. The nickel content of the 1-krona and 5-kronor coins should be borne in mind, however.

7. The banknote and coin series

7.1 Theories about efficient banknote and coin series

There are studies that consider which denominations facilitate an efficient currency. A Belgian study (Leo van Hove: "Optimal Denominations for Coins and Bank Notes: In Defense of the Principle of Least Effort", 2001) has been used by several central banks.

The criteria for an efficient banknote and coin series relate to the number of banknotes and coins involved in a cash payment. The aim is for the general public to use as few banknotes and coins as possible. It should also be easy to calculate which banknotes and coins are needed for a payment.

Most countries now use what is referred to as a binary-decimal-triplet series based on a distribution of denominations according to the principle 1, 2, 5, 10, 20, 50, 100, 200, 500, etc. This applies both to banknotes and coins.

There are also models that try to describe where the threshold should be between coins and banknotes and which denominations should be highest and lowest. The D-Metric model of Payne/Morgan is based on the average daily income in the country as an important parameter. According to this model, the lowest denomination should be the average daily income/5000 and the highest the average daily income x 5. The threshold between banknote and coin should be in the interval between the average daily income/50 and the average daily income/20.

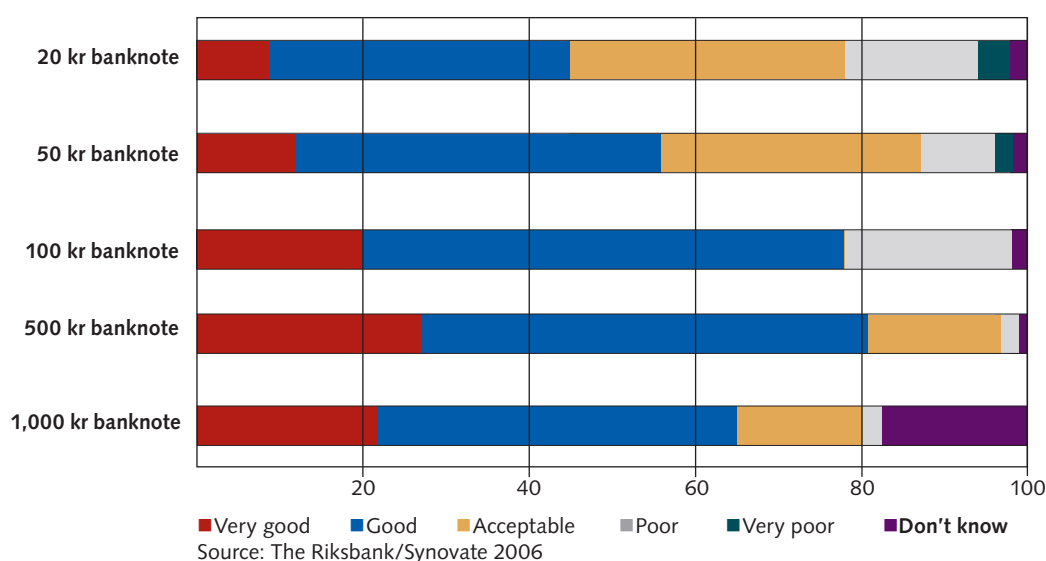
Assuming that the average daily income is SEK 700, this means that the lowest denomination in Sweden should be around 14 öre and the highest 3,500 kronor. The threshold between banknote and coin should be in the interval 14 – 35 kronor. The model is much debated.

7.2 The public do not see any great need for change

At the end of 2006, the Riksbank carried out a survey on the general public's view of banknotes and coins and card and cash payments. This survey consisted of just over 1,000 telephone interviews carried out by the survey company Synovate. The attitude to denominations and the quality of banknotes can be summarised as follows:

- Two-thirds (67%) considered that the 50-öre coin is unnecessary. It was the only coin that was considered unnecessary by more than a few people.
- Just over a tenth thought that the 1,000-kronor banknote was unnecessary. A small group (around five per cent) considered that the 20- and 50-kronor banknotes were unnecessary.
- Every tenth person considered that new coin denominations were needed and just under two of ten considered that new banknote denominations were needed. The most common proposal for new coin denominations was a 20-kronor coin and for a new banknote denomination 200 kronor.
- A substantial majority considered that the quality of banknotes was acceptable, good or very good. Larger denominations were rated more highly than smaller. The 20-kronor banknote was the only denomination where fewer than half considered the quality to be good.
- Two-thirds were negative to replacing the 20-kronor banknote with a coin. Just over a fifth were positive. Nine out of ten were negative to replacing the 50-kronor banknote with a coin.

Figure 3. The view of the general public on the quality of banknotes per cent



7.3 The retail trade would like the 50-öre coin to be withdrawn

In 2007, the Riksbank carried out a survey among those active in cash management and the Swedish Association of the Visually Impaired on needs for change in the banknote and coin series. They were asked about the need for the 50-öre coin and their attitude to replacing the 20-kronor banknote with a coin and to introducing a 200-kronor banknote.

Retail trade organisations, the Swedish Association of the Visually Impaired and some of the cash-in-transit companies considered that the 50-öre coin should be withdrawn since it created handling problems and is only used as small change. The banks differed on this question.

Retail trade organisations were negative to a 20-kronor coin. They considered that it would be preferable to improve the quality of the banknote. If this is not possible, the Swedish Trade Federation thought that consideration should be given to a coin. The banks' views differed and some pointed out that coin handling is labour-intensive and entails heavy work.

The majority of those asked were in principle positive to a 200-kronor banknote.

7.4 Neighbouring countries have a 200-kronor banknote and 20-kronor coins

Norway and Denmark, like Sweden, have five banknote denominations. However, one difference is that these countries have a 200-kronor banknote and a 20-kronor coin. In the euro system, there are seven banknote denominations from 5 up to 500 euro.

The euro system has eight coin denominations, which is explained by the varying wishes of the participating countries at the time of the introduction of the euro in 2002. Some countries (among others, Finland) do not issue the small denominations 1 and 2 cent. Denmark has a 2-kronor coin.

BANKNOTES:

Sweden: 20, 50, 100, 500 and 1,000 kronor.



Euro area: 5, 10, 20, 50, 100, 200, 500 euro.



Denmark: 50, 100, 200, 500, 1,000 kronor.



Norway: 50, 100, 200, 500, 1,000 kronor.



COINS

Sweden; 10, 5, 2 and 1 kronor, 50 öre.



Euro countries: 2 and 1 euro, 50, 20, 10, 5, 2 and 1 cent.



Denmark: 20, 10, 5, 2 and 1 kronor, 50 and 25 öre.

The 25-öre coin will be withdrawn on 1 October 2008.



Norway: 20, 10, 5 and 1 kronor, 50 öre.



7.5 Sweden's banknote series one of the oldest in Europe

The present banknote series was designed in the 1980s. The 500-kronor banknote was introduced in 1985, the 100-kronor banknote in 1986 and the 1,000-kronor banknote in 1989. The 20-kronor banknote was introduced in 1992 and the 50-kronor banknote in 1996. This makes Sweden's banknote series one of the oldest in Europe.

The banknote series now consists of the following denominations and banknotes:

20 krona: The purple 20-kronor banknote, measuring 67 x 120 mm, was introduced in 1997 and is the only valid 20-kronor banknote.

50 kronor: The most recently introduced 50-kronor banknote, with a foil strip and see-through image, was introduced in 2006. The earlier variant without these security features is still valid, i.e. there are two valid 50-kronor banknotes.

100 kronor: The current 100-kronor banknote was introduced in 2001 and is the only valid 100-kronor banknote.

500 kronor: The current 500-kronor banknote was introduced in 2001 and is the only valid 500-kronor banknote.

1,000 kronor: The current 1,000-kronor banknote, with foil strip, see-through picture and a moving image in the striped band, was introduced in 2006. The earlier variant without these security features is still valid, i.e. there are two valid 1,000-kronor banknotes.

7.6 Varying banknote size within set limits

The visually impaired would like there to be clear variations in size between banknote denominations. This is usually solved by banknotes being larger for higher denominations. The principles for this vary between countries.

Swedish banknotes all differ in size although the sequence is not consistent, in particular the 50-kronor banknote deviates from the pattern. Denmark has the same height (72 mm) for all denominations. Norway has a consistent size scale; banknotes increase in both height and width for higher denominations.

The size of banknotes is adapted in practice to the performance of counting machines. One limitation for the most used machines is that the height should be between 60 and 83 mm and the width between 120 and 180 mm. All banknotes in Sweden, Norway, Denmark and the euro system are within these intervals.

Table 14. Banknote sizes in Sweden, Norway and the euro system

Sweden, denominations	Size in mm	Norway, denominations	Size in mm	Euro, denominations	Size in mm
20	120x67				
50	120x77	50	128x60	5	120x62
100	140x72	100	136x65	10	127x67
		200	144x70	20	133x72
500	150x82	500	152x75	50	140x77
1000	160x82	1000	160x80	100	147x82
				200	153x82
				500	160x82

Sources: The Riksbank, The ECB and Norges Bank

7.7 Five valid coin denominations

The coin series now consists of the following denominations and coins (apart from commemorative coins):

The 50-öre coin: The current copper-coloured 50-öre coin was introduced in 1992 and is the only valid 50-öre coin.

1-krona: The current version of the 1-krona coin was introduced in 2001. All 1-krona coins from 1875 and onwards are still legal tender.

2-kronor: All 2-kronor coins issued from 1876 are legal tender. Minting of the 2-kronor coin ceased in 1971.

5-kronor: The latest version of the 5-kronor coin was introduced in 1976. All 5-kronor coins from 1954 and onwards are legal tender.

10-kronor: The latest version of the 10-kronor coin was introduced in 2001. All 10-kronor coins from 1991 and onwards are legal tender.

7.8 The size of coins is not consistent

As for banknotes, the size of coins tends to increase with their denominations. However, this is not the case with the Swedish coin series. The 2-kronor coin is largest, followed by the 5-kronor. The 10-kronor coin and the 50-öre coin are smallest.

Norway and Denmark have central holes in their 1-krona and 5-kronor coins, Denmark also in the 2-kronor coin. This helps the visually impaired.

The metals in all coins in Sweden, Norway, Denmark and the euro system consist of different copper alloys. These are alloys with zinc, nickel, tin or aluminium.

The 1- and 2- euro coins are bimetallic; different alloys are used for the inner and the outer ring. The coins are thus more difficult to counterfeit and easier to distinguish from other denominations.

7.9 Summary

There are studies that attempt to describe appropriate denominations to achieve the most efficient currency for society. According to these theories, the current Swedish banknote and coin series lacks some denominations.

The 50-öre coin is considered unnecessary by a majority of the general public and by retail trade organisations. The 2-kronor coin is valid legal tender despite not having been manufactured since 1971.

Denmark, Norway and the euro countries do not have banknotes below approximately 50 kronor.

The general public is largely satisfied with the quality of banknotes. The 20-kronor banknote is rated slightly less highly than the other denominations.

The size of Swedish banknotes (height and breadth) is not consistent; the 50-kronor banknote deviates in this respect. The size of coins does not correspond to their denominations.

Review of the banknote and coin series – project description

Background

In the area of cash management, questions regarding the design of banknotes and coins and their denominations are constantly under discussion. These questions have been gathered up on several occasions and reported to the Executive Board, most recently in 2004.

The basic features of the Swedish banknote and coin series have remained unchanged over a long period. For financial and practical reasons, the Riksbank has chosen to work on gradual, minor adjustments and improvements.

A number of proposals for changes have arisen since the most recent report to the Board. The Administration Department's (ADM) assessment is that these should not be considered separately, but should instead be considered within the context of a general review.

It is proposed that this review should be carried out in the form of a project as described below. The General Council of the Riksbank was informed on 8 February 2008 and will receive regular information in the course of the project.

Objective and delimitations

The objective of the project is to form a banknote and coin series that is suitable from the points of view of efficiency, environment and security, and the main features of which can endure for at least a five-year period.

There are today no practical problems that motivate a completely new banknote and coin series. The starting point for the project has therefore been that the motifs and other graphic design of the existing banknotes and coins will remain unchanged. However, one cannot rule out the question of a new series of banknotes and/or coins being brought up as a result of the proposed changes.

Within this framework, all aspects will be examined, such as requirements, environment and security, cost and technical design. The effects of the changes on the pattern of payments in general will also be highlighted.

Timetable

The project will start up in March 2008 and is expected to run for 2-3 years, depending on the scope of the changes. The work will be divided up into stages that are reported at regular intervals for successive interim decisions.

The timetable assumes that changes in banknotes and coins, because of their consequences for society, usually take a long time to implement. Some measures may require a decision in the Riksdag (the Swedish parliament).

Initially, a timetable will be drawn up stating at which rate the various issues will be dealt with and which aspects should form a basis for the analysis. Such a plan should be presented to the Executive Board for a decision in spring 2008.

Collaboration and communication

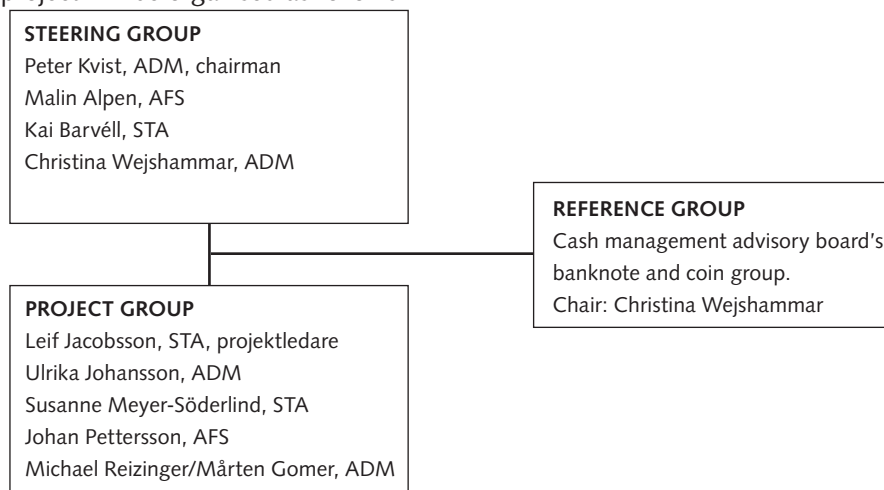
The process shall be open and entail regular external information. The views of the general public shall be taken into account.

The work shall be conducted in cooperation with those active in the field of cash management. There shall also be consultation with other interested parties concerning the design of banknotes and coins.

The Riksbank's own analysis competence will be used as far as possible. Some studies may require external expertise.

Organisation

The project will be organised as follows:



Project budget

The costs of the project will be deducted from ADM's regular budget.

ADM stands for the Riksbank's Administrative Department, which is responsible for cash management.

Statistics on banknotes and coins

Amount of banknotes in circulation on 31 December, SEK million

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 000	40 999	46 791	46 217	48 358	46 920	45 652	45 561	45 496	42 283	38 835
500	29 211	35 006	35 943	40 727	42 046	44 788	45 116	47 235	51 377	55 450
100	9 431	9 702	8 216	10 371	10 025	10 091	9 621	9 586	9 916	10 786
50	955	1 008	1 074	1 096	1 122	1 192	1 207	1 232	1 275	1 338
20	1 355	1 417	1 467	1 504	1 556	1 643	1 639	1 659	1 705	1 802
10	251	233	232	231	230	229	228	228	227	227
5	86	80	80	80	80	80	80	80	79	79
Total	82 288	94 237	93 229	102 367	101 979	103 675	103 452	105 516	106 862	108 517

Each banknote denomination's share of the total banknote amount, per cent

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	50	50	50	47	46	44	44	43	40	36
500	35	37	39	40	41	43	44	45	48	51
100	11	10	9	10	10	10	9	9	9	10
50	1	1	1	1	1	1	1	1	1	1
20	2	2	2	1	2	2	2	2	2	2
10	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0

Annual change in banknote amount, per cent

Denomination	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	14	-1	5	-3	-3	0	0	-7	-8
500	20	3	13	3	7	1	5	9	8
100	3	-15	26	-3	1	-5	0	3	9
50	6	7	2	2	6	1	2	3	5
20	5	4	3	3	6	0	1	3	6
10	-7	0	0	0	0	0	0	0	0
5	-7	0	0	0	0	0	0	-1	0

Number of banknotes in circulation on 31 December, million

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	41	47	46	48	47	46	46	45	42	39
500	58	70	72	81	84	90	90	94	103	111
100	94	97	82	104	100	101	96	96	99	108
50	19	20	21	22	22	24	24	25	26	27
20	68	71	73	75	78	82	82	83	85	90
10	25	23	23	23	23	23	23	23	23	23
5	17	16	16	16	16	16	16	16	16	16
Total	323	344	334	370	371	381	377	382	393	413

Each banknote denomination's share of the total number of banknotes, per cent

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	13	14	14	13	13	12	12	12	11	9
500	18	20	22	22	23	24	24	25	26	27
100	29	28	25	28	27	26	26	25	25	26
50	6	6	6	6	6	6	6	6	6	6
20	21	21	22	20	21	22	22	22	22	22
10	8	7	7	6	6	6	6	6	6	5
5	5	5	5	4	4	4	4	4	4	4

Annual change in the number of banknotes, per cent

Denomination	1999	2000	2001	2002	2003	2004	2005	2006	2007
1000	14	-1	5	-3	-3	0	0	-7	-8
500	20	3	13	3	7	1	5	9	8
100	3	-15	26	-3	1	-5	0	3	9
50	6	7	2	2	6	1	2	3	5
20	5	4	3	3	6	0	1	3	6
10	-7	0	0	0	0	0	0	0	0
5	-7	0	0	0	0	0	0	-1	0

Amount of coins in circulation on 31 December, SEK million

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	1 444	1 561	1 653	1 808	1 921	2 051	2 150	2 218	2 303	2 436
5	901	953	996	1 064	1 113	1 156	1 171	1 183	1 204	1 258
2	9	8	8	8	8	8	8	8	8	8
1	880	938	987	1 052	1 108	1 159	1 195	1 214	1 209	1 278
0,50	208	221	232	248	263	276	288	287	142	171
Total coin (excluding commemorative coins)	3 442	3 681	3 876	4 180	4 413	4 650	4 812	4 910	4 866	5 151
Minnesmynt	538	532	558	564	592	615	630	649	652	656
Total coins (all categories)	3 980	4 213	4 434	4 744	5 005	5 265	5 442	5 559	5 518	5 807

Each coin denomination's share of the total coin amount (excluding commemorative coins), per cent

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	42	42	43	43	44	44	45	45	47	47
5	26	26	26	25	25	25	24	24	25	24
2	0	0	0	0	0	0	0	0	0	0
1	26	25	25	25	25	25	25	25	25	25
0,50	6	6	6	6	6	6	6	6	3	3

Annual change in coin amount, per cent

Denomination	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	8	6	9	6	7	5	3	4	6
5	6	5	7	5	4	1	1	2	4
2	-11	0	0	0	0	0	0	0	0
1	7	5	7	5	5	3	2	0	6
0,50	6	5	7	6	5	4	0	-51	20

Number of coins in circulation on 31 December, million

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	144	156	165	181	192	205	215	222	230	244
5	180	191	199	213	223	231	234	237	241	252
2	5	4	4	4	4	4	4	4	4	4
1	880	938	987	1 052	1 108	1 159	1 195	1 214	1 209	1 278
0,50	416	442	464	496	526	552	576	574	284	342
Total coins (except commemorative coins)	1 625	1 731	1 820	1 946	2 053	2 151	2 224	2 250	1 968	2 119

Each coin denomination's share of the total number of coins (excluding commemorative coins), per cent

Denomination	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	9	9	9	9	9	10	10	10	12	11
5	11	11	11	11	11	11	11	11	12	12
2	0	0	0	0	0	0	0	0	0	0
1	54	54	54	54	54	54	54	54	61	60
0,50	26	26	26	25	26	26	26	26	14	16

Annual change in the number of coins, per cent

Denomination	1999	2000	2001	2002	2003	2004	2005	2006	2007
10	8	6	9	6	7	5	3	4	6
5	6	5	7	5	4	1	1	2	4
2	-11	0	0	0	0	0	0	0	0
1	7	5	7	5	5	3	2	0	6
0,50	6	5	7	6	5	4	0	-51	20

Banknotes and coins in circulation on 31 December

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total amount, SEK million										
on 31 Dec	86 268	98 450	97 663	107 111	106 984	108 940	108 894	111 075	112 380	114 324
Annual change, per cent		14.1	-0.8	9.7	-0.1	1.8	0.0	2.0	1.2	1.7

 Percentage change 1998-2007: 32.5

Source: The Riksbank



Sveriges Riksbank
SE-103 37 Stockholm

Tel +46 8 787 00 00
Fax +46 8 21 05 31
registratorn@riksbank.se
www.riksbank.se