



Riksbank Studies

Cost of payments in Sweden

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Contents

1	Payments are costly	5
2	Concept and the scope of the study	7
2.1	Social versus private cost	7
2.2	Payment instruments and payment situations	8
2.3	Scope of the study	9
3	Social cost of payments	10
3.1	Total social cost	10
3.2	Social unit cost of payment instruments	10
3.3	Social unit cost in different payment situations	16
4	Comparisons	18
4.1	Earlier Swedish cost studies	18
4.2	Comparison between Sweden and Norway	20
5	Conclusion	22
	References	23
	Appendix 1 – End-users' costs	24
	Appendix 2 – Payment service providers' costs and income	32
	Appendix 3 – Methodology	37
	Appendix 4 – Data	42

Riksbank Studies

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Foreword

The Riksbank is Sweden's central bank and a public authority under the Riksdag, the Swedish Parliament. Pursuant to the Sveriges Riksbank Act, the Riksbank shall monitor developments in the payment market and contribute to the ability of the public to make payments.

This study estimates the social cost of payments in Sweden during 2021. The social cost is the time and other resources spent on payments that could have been used for other purposes and therefore constitute a cost to society. The study provides some key insights that are needed when designing policy and strategies for cost-efficient retail payments in Sweden.

The estimates show that paying digitally reduces social costs. Notice, however, that the focus of the study is on costs, not benefits. A complete assessment of the social efficiency of a payment instrument will therefore also need to look at the benefits. Non-digital payment instruments, for instance, may bring benefits in terms of resilience and inclusion.

The study was carried out on behalf of the Retail Payments Council and has benefited greatly from a close cooperation with a reference group from the Retail Payments Council. We are grateful for the contributions from the Swedish Trade Federation and the Swedish Bankers' Association. We are also grateful to the numerous participants in the Swedish payments market who have contributed to this study by responding to surveys and providing data.

Special thanks go to Knut Sandal, Terje Åmås, and Mats Bay Fevolden at Norges Bank. The central bank of Norway is world-renowned for its cost studies of payments. This study has greatly benefited from a close dialogue with our Norwegian colleagues.

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Christina Wejshammar

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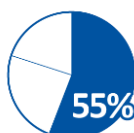
Cost of payments in a nutshell



This study measures the social cost of payments in Sweden. That is the time and other resources used for payments that could have been used for other purposes and therefore are a cost to society.



The total social cost of cash, card, credit transfers and direct debit payments in Sweden is estimated to be SEK 51 billion in 2021. This equals 0.93 per cent of GDP.



Businesses, including the public sector, bear the largest share of the total social cost – 55 per cent – while payment service providers bear 25 per cent and households the remaining 20 per cent.



Across all payment situations, card and Swish payments have the lowest social unit cost, SEK 4.4 per transaction. Cash payments have a relatively high social unit cost of SEK 13.4 per transaction.



For in-store payments, debit cards have the lowest social unit cost, SEK 3.7 per transaction. For online payments, Swish has the lowest social unit cost, SEK 6.0 per transaction.



The estimated social unit cost of payments in Sweden is comparable to the estimated cost in neighbouring countries and seems to have decreased since 2009.



The study only estimates costs. A complete efficiency assessment will also need to look at the benefits. Different payment instruments have different benefits, for instance in terms of resilience and inclusion.

1 Payments are costly

Money and payments are crucial for all economic activity in modern societies. We don't usually think about it, but payments themselves also consume resources. The payer and the payee spend time on making the payment, standing in a queue to withdraw cash, managing the cash register and so on. Banks and other payment service providers (PSPs) must process the payments, the Riksbank has to print banknotes, mint coins and distribute them, IT systems must be set up and so on. The time and resources spent on payments and associated services could have been used for other purposes. Payments therefore constitute a cost to society – the social cost of payments.

The Riksbank shall monitor developments in the payment market and contribute to the ability of the public to make payments. To assess the efficiency of payments, the Riksbank conducts cost studies. Previous cost studies used data from 2002 and 2009.¹ This study is based on data from 2021.

The study was carried out on behalf of the Swedish Retail Payments Council, a stakeholder forum chaired by the Riksbank. The council established a reference group consisting of representatives from its members to support the work on the study.²

We estimate the total social cost of payments in Sweden in 2021 to be SEK 51 billion, or 0.93 per cent of GDP. This estimate is not directly comparable with the estimates in previous Swedish cost studies as it includes new cost elements. However, if we only compare the same costs in 2021 with those included in the 2009 study, we see that total social cost as a percentage of GDP has decreased from 0.68 to 0.54 per cent of GDP.

As in earlier studies, we find that digital payments reduces social costs. The key reason is that digital payments require less manual handling than non-digital payments.

The cost of each digital payment instrument also depends on the payment situation. Card payments, for instance, have significantly lower social unit cost in-store than online. Another example is Swish payments which have significantly lower social unit cost person-to-person than in-store.

Compared with the most recent cost study for Norway, Sweden has higher social cost of payments as per cent of GDP, despite Sweden having lower unit cost per payment for the main payment instruments. The explanation is twofold. First, there are more payments relative to GDP in Sweden than in Norway. Second, Swedes tend to use payment instruments with high social unit costs more frequent than Norwegians.

We would like to highlight that we only estimate the social cost of payments. We do not estimate the social benefits. A complete assessment of the social efficiency of a

¹ See Bergman et al. (2007) and Jansson and Segendorf (2012).

² The reference group included representatives from the Swedish Bankers' Association, the Confederation of Swedish Enterprise, the Swedish Post and Telecom Authority, Visita, the Swedish Trade Federation and Card Payment Sweden.

payment instrument will need to look at the net benefit, that is, social benefit less social cost. Cash payments, for instance, is one of the least cost-efficient instruments. It may nevertheless provide important benefits to society, for instance by making the payment market inclusive and resilient. Similarly, we do not value the benefits to end-users of many payment cards' non-payment related additional services, which however increase the social cost of card payments. Finally, our results do depend on key assumptions, for instance regarding the time cost for end users and the representativeness of our businesses data, see Appendix 3.

The remainder of the study is structured as follows: In Section 2 we explain the concept of social and private cost of payments and describe the main payment instruments used in Sweden. We also explain some typical payment situations and define the scope of the study. In Section 3, we present our results for the total social cost of payments in Sweden in 2021. We also show and compare social unit costs for relevant payment instruments across different payment situations. In Section 4, we compare our results with the previous Riksbank cost studies and a recent study by Norges Bank. Finally, in section 5 we conclude the study with a short summary of our results. Appendix 1 describes the end-users' costs of payments. Appendix 2 focuses on PSPs' costs and revenue. Appendix 3 describes our methodology, including how we have collected our data, calculations, and underlying assumptions. Appendix 4 provides additional numerical data.

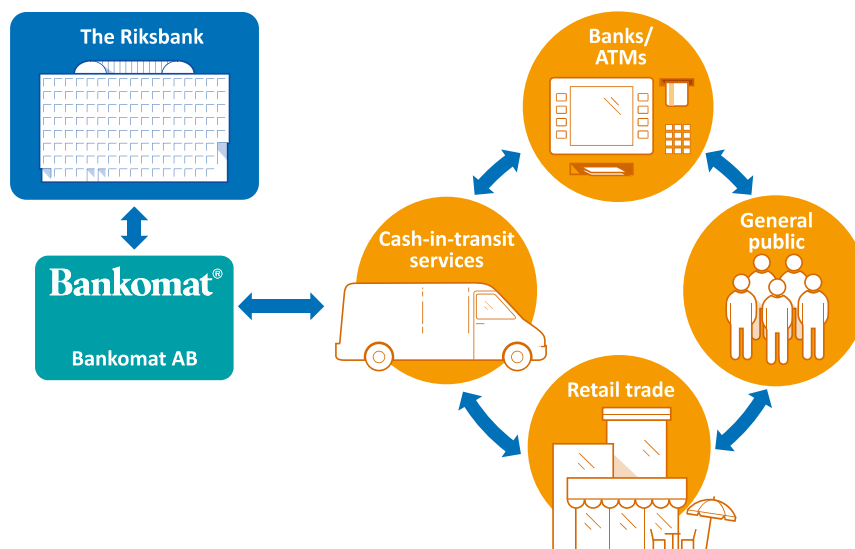
2 Concept and the scope of the study

Payment services are produced in a process that involves different parties. Each step in the process consumes real resources that could have been used for other purposes. The consumption of resources therefore constitutes a cost to society and is called *social cost of payments*. The sum of all parties' social costs is the *total social cost of payments*. The sum of a party's social cost and fees paid to other parties is the party's *private cost*. The payment instruments considered in this study include cash, card payments, credit transfers (including Swish), and direct debits. The study focuses on domestic non-financial payments.

2.1 Social versus private cost

Payment services are produced in a series of steps and involve different parties. Some steps are taken prior to the actual payment. A cash payment, for instance, requires prior steps like cash production, transportation, and cash withdrawals, see Figure 1. Another example is card payments in-store. Such payments require prior production and distribution of cards and card readers. Other steps in the payment process take place during the actual payment, like handing over cash or tapping a card. Finally, there are steps in the payment process taking place after the actual payment, such as businesses depositing cash and card payment clearing and settlement. Each step in the payment process consumes real resources in the form of labour and capital.

Figure 1. Payment process for cash payments



Source: The Riksbank.

The total social cost of payments is calculated by adding the real resources used by all parties in the payment process. In the case of cash in Figure 1, the parties are the Riksbank, the company that handles storage and ATM withdrawals (Bankomat AB), cash in transit companies, businesses, and households. For other payment instruments, different parties are involved. Some examples are firms that produce payment cards, card terminal providers and, firms that handle invoices for payees.

The parties in the payment process may pay fees to other parties in the process. One example is when a bank pays a fee for cash transport services. This fee will not be included in the social cost. However, the fees are included when we calculate the private cost of a party in the payment process in Appendix 1 and 2. Further details on how we have calculated the social and private cost are found in Appendix 1–3.

2.2 Payment instruments and payment situations

A *payment instrument* is a means or procedure used to initiate a payment. Cash is a payment instrument in itself, but payments from a bank account requires a separate payment instrument. We distinguish between the following payment instruments for payments from a bank account:

- *Card payments.* These include both debit and credit card payments. Notice that payments with digital wallets used in Sweden, for example Apple Pay or Google Pay, are card-based payments. When paying with a *debit card*, funds are withdrawn from or reserved in the payer's bank account directly after the payment. With a *credit card*, payments are accumulated over a certain period, normally one month, before the total amount is withdrawn from the payer's account or paid via an invoice at a later stage. In Sweden, all payment cards are licensed by an international card scheme, typically Visa or Mastercard.
- *Credit transfer.* A credit transfer is a movement of funds between accounts initiated by the payer. The payment instruction to the bank can be provided digitally, for instance from the payer's internet bank, or non-digitally, for example in a bank branch. A payment with Swish, the Swedish mobile instant payment application, is also a credit transfer.³
- *Direct debit.* A direct debit is, on the contrary to credit transfers, initiated by the payee. A payment with Autogiro is an example of direct debit.

Payments with cards are usually processed in the card companies' networks and settled on accounts with a commercial bank. In Sweden, both credit transfers and direct debits are processed by Bankgirot, the clearing house owned by the major banks, and settled on accounts with the Riksbank.

³ Swish is a payment instrument that allows users to instantly send and receive money to their bank accounts via their mobile phone. To send money by Swish to others, both the payer and the payee need to be connected to the service provided by their banks.

The *payment situation* describes both the environment around the payment transaction and the parties, or end-users, involved. Examples of environment for the transaction are in-store, online and bill payments. End-users can be persons, businesses, and public sector entities. Some payment instruments may not be available in all payment situations. Cash payments, for instance, are not available for online payments. Similarly, card payments are typically not available for person-to-person payments.

Table 1 provides a list of typical payment situations and the instruments that can normally be used in the respective situation. The table also introduces some abbreviations that we use later in this report.

Table 1. Payment situations and typical payment instruments

Payment situation	Typical payment instruments
Between persons (P2P)	Cash, Swish, account-to-account transfers
Person-to-business (P2B) in-store	Cash, cards, Swish
Person-to-business (P2B) online	Cards, Swish, other credit transfers and direct debit
Person-to-business (P2B) bill payments	Credit transfers, direct debit, cards (recurring)
Between businesses (B2B)	Cards, credit transfers
Businesses to persons (B2P)	Credit transfers

Note. In this study the business category includes businesses and public sector entities. Recurring card payments are payments where the card holder enters the card information once in conjunction with the first purchase and the following payments are made automatically. They are often used for subscription services.

Source: The Riksbank.

2.3 Scope of the study

The study covers the payment situations and instruments presented in Table 1. Our focus is on domestic non-financial payments.⁴ By financial payments, we mean payments related to households' and businesses' loans and securities and payments between financial institutions on their own behalf.

Other payments not covered in the study are reverse card payments, for instance, payments from a business to a card holder following a purchase that the payer returned. Furthermore, we do not cover payments made with specific-purpose cards, for instance gift cards and cards for public transportation. Payments with cheques are also excluded as they are seldom used in Sweden.

Due to data limitations, we have not been able to distinguish between costs related to payments made by businesses and public sector entities. Therefore, the business category also includes public sector entities. Furthermore, we have not been able to fully capture additional costs for some services built on top of other instruments. An example is so-called buy-now pay-later services (BNPL).

⁴ We have also collected data that can be used to calculate the cost of cross border payments, but leave that for a future report.

3 Social cost of payments

Payments consume a significant amount of resources. The total social cost of payments in 2021 was SEK 51 billion – or almost 1 per cent of GDP. Cash payments have higher social unit cost than digital alternatives in all situations where there is a digital alternative. Debit card payments are the most cost-efficient payment instrument for in-store payments, with a social unit cost of SEK 3.7 per payment. Swish payments are most cost-efficient for online payments, with a social unit cost of SEK 6.0 and for person-to-person payments with a social unit cost of SEK 2.8.

3.1 Total social cost

We estimate the total social cost of payments in Sweden 2021 to be SEK 51 billion. This corresponds to 0.93 per cent of GDP.

The bulk of the social cost, 55 per cent, arises in the business sector. The rest is quite evenly distributed between households and PSPs. Table 2 gives more details on the distribution of costs between the three sectors – households, businesses, and PSPs – for various payment instruments.

Table 2. Social cost of main payment instruments – total and by sector

Million SEK and per cent of GDP, respectively, 2021

Payment instrument	Households	Businesses	Payment service providers	Total social cost
Cash	1,263	1,698	1,248	4,210
Card	2,869	8,379	5,835	17,083
Credit transfers	6,035	15,147	4,876	26,057
Direct debit	173	2,512	645	3,330
Total	10,340	27,736	12,604	50,680
Per cent of GDP	0.19	0.51	0.23	0.93

Note. Social cost per sector and total social cost in the society.

Source: The Riksbank.

3.2 Social unit cost of payment instruments

The social unit cost of a payment instrument is the average social cost per payment made with the instrument. We calculate the social unit costs by dividing the estimated social cost in Table 2 with the estimated number of payments in Table 3.

Table 3. Total volume of domestic payments

Million transactions, 2021

Payment instrument	Number	Share
Cash	315	4%
Card	3,903	53%
of which: Debit card	3,360	46%
of which: Credit card	543	7%
Direct debit	470	6%
Credit transfers	2,628	37%
of which: Swish	770	11%
of which: E-invoice	157	2%
of which: Other digital credit transfers	1,646	23%
of which: Paper-based credit transfers	56	1%
Total	7,316	100%

Note. E-invoice is a credit transfer where the invoice is sent directly to the payer's internet bank. Other digital credit transfers consists of account-to-account transfers, Bankgiro and Plusgiro payments and Batch payments. A batch payment is when multiple payments to different recipients are sent through a single payment as opposed to many individual transactions, for example salary payments from an employer to a large number of employees. Paper-based credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone.

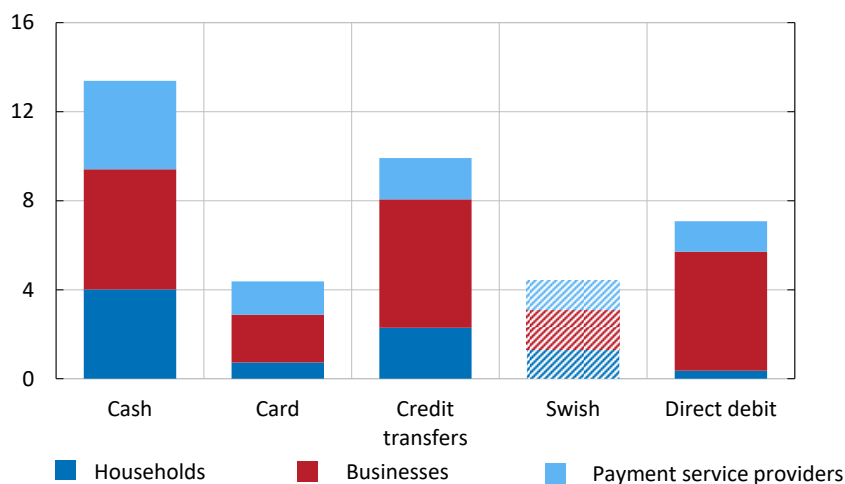
Sources: Getswish AB, Swedish Bankers' Association and the Riksbank.

Figure 2 shows the social unit cost of the main payment instruments and the contribution to the unit cost from the three sectors: households, businesses, and PSPs. See Appendix 4 for underlying data.

Cash payments have the highest social unit cost, SEK 13.4. The cost is relatively evenly distributed among the sectors. Card payments and Swish have the lowest social unit cost, SEK 4.4. In the case of cards, only a small share of the cost comes from the household sector. Credit transfers have a higher social unit cost (SEK 9.9) than direct debit (SEK 7.1). In both cases businesses carry the bulk of the cost.

Figure 2. Social unit cost of main payment instruments

SEK per transaction, 2021



Note. The shaded bar for Swish is a subpart of credit transfers.

Source: The Riksbank.

Social cost of cash payments

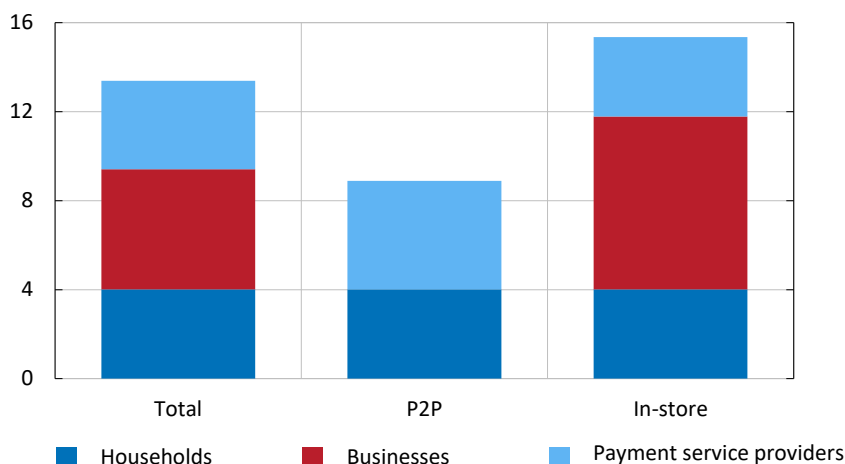
As mentioned above, cash payments have the highest social unit cost among payment instruments.

For households, the social unit cost of cash arises from the time they spend on getting hold of cash and making the payment. If we exclude the time spent by households on traveling to withdraw cash, the social unit cost for the household is halved and the total social unit cost for cash falls to SEK 11.4. However, this is still the highest cost among the main payment instruments. A key reason is that it takes time for a payer to count and hand over cash. Appendix 1 gives more details on how households spend time on different payment instruments.

For businesses and PSPs the high social unit cost of cash is related both to the fact that cash is physical and requires manual work and the fact that the number of cash payments is relatively low. Some of the costs associated with both cash and other payment instruments are fixed and do not vary with the number of payments. Fixed costs mean that there are economies of scale such that the average cost for making a payment falls when the number of payments increases. For businesses there are fixed system costs and fixed costs associated with receiving, counting, and depositing cash. For PSPs, the distributional system includes cash depots, ATMs, transport capacity and security arrangements that cannot easily be scaled up and down in proportion to the quantity of cash. As the number of cash payments have fallen over time, the social unit cost has increased.

Figure 3. Social unit cost of cash payments

SEK per transaction, 2021



Note. For person-to-person payments, we assume that households do not have any time consumption of receiving payments. This might be arguable for P2P cash payments. However, if we include the time cost of the payee, the unit cost of cash payments only increases with SEK 0.25 per transaction.

Source: The Riksbank.

Social unit cost of card payments

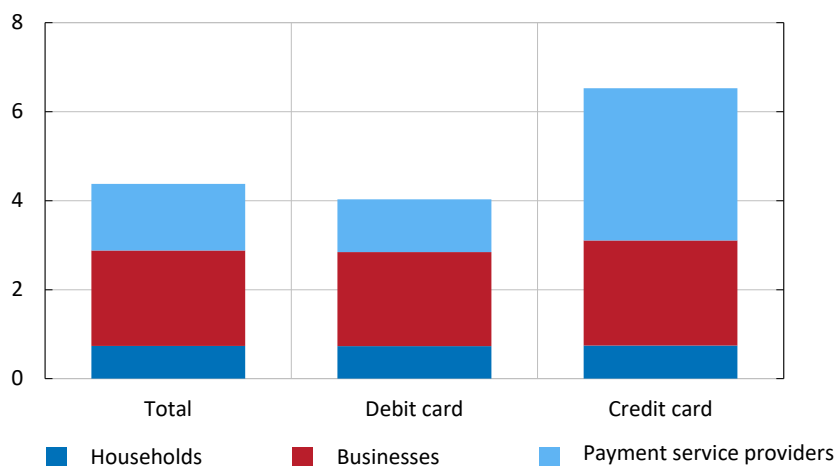
Card payments have the lowest social unit cost among payment instruments. There are several reasons behind this. One reason is economies of scale. Card payment systems, like digital payments in general, have large fixed social costs for IT systems and hardware while the variable costs are low. Therefore, when the number of transactions increases, the social unit cost decrease. Another reason is that households and businesses spend relatively little time on initiating and receiving card payments.

The social unit cost for debit and credit cards differ, as shown in Figure 4. Debit cards have a lower social unit cost of SEK 4.0, compared to SEK 6.5 for credit cards. The higher cost of credit cards is partly due to the fact that there are relatively fewer credit card payments to share the credit card specific fixed cost. However, the cost difference is mainly due to the cost of add-on services that are not a part of the payment itself, such as travel insurances. Some debit cards also provide these services, but they are more widespread for credit cards. As noted above, this study only looks at the cost, not the benefits that these payment services may provide.

Figure 4 also shows that a larger share of social unit cost for debit card payments are borne by the business sector. Credit card payments seem to be the exception to the rule regarding businesses bearing a larger share of the cost. In the case of credit cards most of the cost is borne by the PSPs. A main reason is the add-on services explained above.

Figure 4. Social unit cost of card payments

By type of card, SEK per transaction, 2021



Source: The Riksbank.

Social unit cost of credit transfers and direct debit

Credit transfers have on average a high social unit cost, SEK 9.9, twice the cost of card payments, but lower than cash payments, as shown in Table 4. One reason is that many credit transfers are bill payments, which require more time from businesses for invoicing and reconciliation. Bill payments also require time from households, as it takes time to for example log into the computer, access the internet bank, fill in and send bills, and so on.

The social unit cost of direct debits – Autogiro – is lower, SEK 7.1. The reason for this is the larger degree of automation for direct debit transfers. This means low costs for both the payer and the payee once the direct debit agreement has been set up.⁵

Clearly, costs of credit transfers vary substantially depending on the payment instrument used to initiate the transfer of funds.

⁵ Direct debits may also entail lower costs for businesses as payees as they need to spend less time following up on unpaid invoices, which are more frequent for bills paid by credit transfers. Unfortunately, the data received from businesses did not allow us to divide the costs of these processes on credit transfers and direct debits.

Table 4. Social unit cost of credit transfers and direct debit

SEK per transaction, 2021

Payment instrument		Social unit cost
Direct debit	Direct debit	7.1
Credit transfers	Total	9.9
	E-invoice	9.8
	Swish	4.4
	P2P	2.8
	P2B	6.3
	Return	10.1
	Other digital credit transfers	11.9
	Initiated by households	9.7
	P2P	6.3
	P2B	12.4
	Initiated by businesses	14.2
	B2P	10.4
	B2B	15.7
	Paper-based credit transfers OTC/phone	39.4
	Paper-based credit transfers by post	18.4

Note. Other digital credit transfers and paper-based credit transfers OTC/phone include single account-to-account transfers, Bankgiro and Plusgiro payments. Other digital credit transfers also include batch payments. A batch payment is when multiple payments to different recipients are made through a single payment as opposed to many individual payments. An example of a batch payment is a salary payment from an employer to a large number of employees. Return Swish payments are refunds for purchase returns.

Source: The Riksbank.

As mentioned above, Swish, the instant payment service in Sweden, has the lowest social unit cost of all credit transfer instruments, SEK 4.4 per transaction. Swish payments are particularly efficient for P2P payments with a social unit cost of SEK 2.8. The mobile application for Swish P2P is simple to use and requires little time from the payer, and virtually no time for the payee.

The unit cost for Swish P2B payments is higher, SEK 6.3, reflecting that P2B payments also include businesses' costs. For online purchases, businesses incur costs for e-commerce checkout solutions, such as maintenance and upgrading of necessary hardware and software. The cost for these checkout solutions is, however, not higher for Swish than for card payments. For in-store purchases, businesses incur additional costs due to the time spent by the cashier when the payment is made.

Paper-based credit transfers at a bank office, that is, over the counter (OTC) and via phone have the highest social unit cost of all payment instruments, SEK 39.4 per transaction. Paper-based credit transfers by post also have a relatively high cost, SEK 18.4 per transaction.⁶ The high social unit cost mainly stem from the time it takes

⁶ Paper-based credit transfers by post means that the payment order and information on payments to be initiated are sent by post to the PSP.

for households to initiate these payments. Nevertheless, it is also related to the fact that PSPs need to spend time on manual processing. For businesses, the social cost of these payment instruments is roughly the same as for other credit transfer instruments.

3.3 Social unit cost in different payment situations

In Section 2.2, we provided a list of typical payment situations and the instruments that are normally available. Table 5 shows how the social unit cost differs between payment instruments in four situations where the payment is initiated by a household.

Table 5. Social unit cost in different payment situations

SEK per transaction, 2021

Payment situation	Payment instrument	Social unit cost
P2P payments	Cash	8.9
	Swish	2.8
	Account-to-account transfers	6.3
P2B payments in-store	Cash	15.4
	Swish	7.4
	Debit card	3.7
	Credit card	5.9
P2B payments online	Swish	6.0
	Debit card	8.3
	Credit card	10.4
P2B bill payments	Recurring card payments	2.6
	Direct debit	6.9
	E-invoice	9.6
	Other digital credit transfers	12.4

Note. Card payments also include B2B payments. However, card payments initiated by businesses constitute a negligible part of total card payments and therefore have a minor effect on the results.

Source: The Riksbank.

First, we can observe that cash payments have higher social unit cost than digital alternatives in situations where cash is an available payment instrument. As explained above, this is related to the fact that cash requires more manual work and that there are relatively few cash payments.

Second, we also see that credit card payments have a higher social unit cost than debit card payments both in-store and online. As explained above, this is because credit cards entail higher costs for additional services than debit cards, and is also related to scale effects.

Looking at P2P payment situations, we see that Swish has a significantly lower social unit cost than the other digital alternatives. This is mainly because Swish payments

can be made more quickly than account-to-account transfers. For the same reason, Swish is also the most cost-efficient alternative for P2B online payment situations.

Debit cards are the most cost-efficient alternative for P2B in-store payment situations. This is because these payments can be made faster and they are also more cost-efficient for businesses than Swish.

In P2B bill payment situations, recurring card payments have the lowest social unit cost. From a payer's perspective, recurring direct debit and recurring card payments work in a similar way. However, businesses spend more time and have higher system costs for direct debit compared to recurring card payments. E-invoices, which the payer receives in their internet bank, have a higher social unit cost than direct debit because the payer needs to spend time on reviewing and approving the e-invoice. PSPs also have slightly higher cost for e-invoices than direct debits.

4 Comparisons

Comparing cost studies across time and countries is challenging, since studies tend to differ in methodology and scope. For 2021, the social cost of payments in Sweden is estimated at 0.93 per cent of GDP. The corresponding value for the previous Swedish cost study in 2009 was 0.68 per cent of GDP. However, the 2009 study had a much more limited scope. If we use a similar scope on our data, we find that the social cost of payments in 2021 would be 0.54 per cent of GDP. Hence, the results indicate that the cost in terms of GDP have decreased slightly over time. The result is also in line with the recently estimated social cost in Norway.

4.1 Earlier Swedish cost studies

Two previous cost studies have been carried out for the Swedish payment market. The first one was published in 2007 with data from 2002, and the second one was published in 2012 with data from 2009.⁷

For each study, a broader range of costs have been included and the methodology has improved. While the 2002 study only included P2B payments with cash and cards, the 2009 and the current study also include P2B credit transfers and direct debit. In addition, the current study includes P2P payments, B2B payments and B2P payments. Furthermore, and differently from the 2009 study, the current study includes households' time costs for credit transfers and direct debits. These extensions and methodological improvements make the results more accurate and comprehensive, but at the same time, more difficult to compare with previous studies.

However, if we correct for differences in scope, the results can still be compared. The 2009 study, which only included P2B payments, estimated the social cost of payments to be 0.68 per cent of GDP. The current study estimates the social cost of P2B payments to 0.63 per cent of GDP. If we also remove the households' time costs from the current study, the cost of P2B payments is 0.54 per cent of GDP. Thus, we can conclude that the social cost of P2B payments in Sweden appears to have decreased somewhat over the last decade.

Figure 5 shows the social unit cost of P2B payments for the different studies and the main payment instruments. The increase in the social unit cost for cash payments is striking. This cost has almost tripled since 2002. On the contrary, the social unit cost for card payments has declined from 2009 to 2021.⁸ Part of this decline may reflect

⁷ See Bergman et al. (2007) and Segendorf and Jansson (2012).

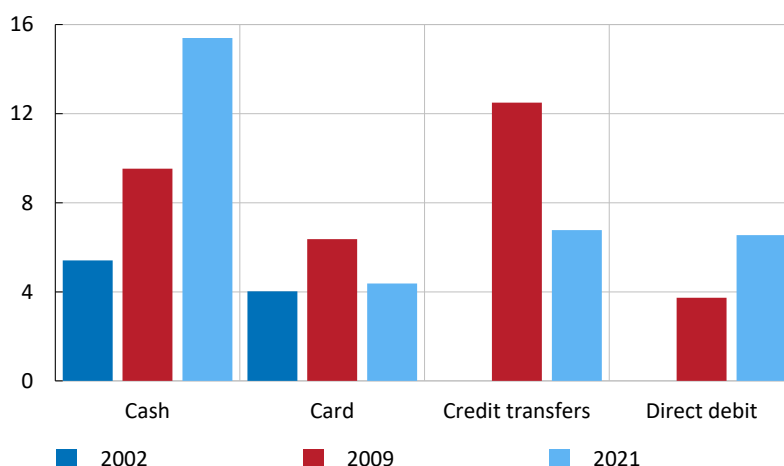
⁸ According to Segendorf and Jansson (2012), the increase in unit cost of card payments from 2002 to 2009 reflects the inclusion of a broader range of costs in the 2009 study.

methodological changes.⁹ Still, the decline is noticeable taking into account card systems’ investments in improving their processing platforms, which during the same period have contributed to increasing the social cost of card payments.¹⁰

The social unit cost of credit transfers has also decreased since 2009. This decline appears to reflect actual cost declines rather than methodological changes. Firstly, new cost-efficient credit transfer instruments, in particular Swish and e-invoices, have contributed to lower unit cost. Secondly, more credit transfers were initiated digitally in 2021 compared to 2009. In addition, the number of credit transfers have increased, something that reduces the unit cost when there are fixed costs.

In contrast, the doubling of the social unit cost of direct debit from 2009 to 2021 seems to be related to methodological changes. Furthermore, we might have overestimated the cost for direct debits in 2021 because we have not been able to properly distinguish the businesses’ costs related to different types of invoices. At the same time, it has been clear for some time that Autogiro will be closed down, which could explain why no cost-optimization has occurred.¹¹

Figure 5. Comparison of social unit costs for person-to-business payments
SEK per transaction



Note. For card payments, B2B payments are also included for the results of the 2021 study. However, card payments initiated by businesses constitute a negligible part of total card payments and therefore have a minor effect on the results. Data for 2002 and 2009 are inflation-adjusted. The data from 2002 only investigated the social cost of cash and card payments.

Sources: Bergman et al. (2007), Segendorf and Jansson (2012) and the Riksbank.

⁹ For instance, in the current study we have excluded costs for cross-border payments, which may partly have been included in the 2009 study.

¹⁰ During the last decade, the international card systems have made investments to e.g. increase the resilience of their processing platform, protect against cyber risks, improve fraud detection, etc. In isolation, these investments have led to higher costs of card payments, while measuring the benefits falls outside the scope of this study.

¹¹ As part of the ongoing transformation of the Swedish payment infrastructure, Autogiro will be replaced by a new bill payment service, see Swedish Bankers’ Association’s webpage (link).

4.2 Comparison between Sweden and Norway

Several countries have published payment cost studies in the last 15 years.¹² The study that is most comparable to ours in terms of methodology and scope is the recent cost study from Norges Bank.¹³

The total social cost for payments is higher in Sweden than in Norway, something that is not surprising given that the Swedish population is almost twice that of Norway. Norges Bank estimated the total social cost of payments to be SEK 23.5 billion – almost SEK 30 billion lower than our result for Sweden.

The estimated total social cost of payments in relation to GDP is lower in Norway than Sweden – 0.79 per cent of GDP compared to 0.93 in Sweden, see Table 6.

Table 6. Total social cost in Norway and Sweden

Country	Observation year	Total number of payments	Total social cost	Social cost as share of GDP
Sweden	2021	7.3 billion	51 billion SEK	0.93 %
Norway	2020	3.2 billion	23.5 billion SEK	0.79 %

Note. We have used the average exchange rate for 2020 to convert the total social cost for Norway to SEK.

Sources: Norges Bank (2022) and the Riksbank.

When we look more into the details and compare the social unit cost for each main payment instruments in Figure 6, some interesting differences appear. While the social unit costs for card payments are fairly similar in both countries, they differ by as much as SEK 5 for cash payments. The social unit cost of cash payments in Sweden amounts to SEK 13.4 while it is SEK 18.8 in Norway. In addition, the cost of direct debit and credit transfer differ between the countries with Norway having higher costs.

In summary, Norway has lower total cost of payments in terms of GDP than Sweden, despite Sweden having lower unit cost per payment. The explanation is twofold. First, there are more payments relative to GDP in Sweden than in Norway.¹⁴ Second, Swedes tend to use payment instruments with high social unit cost more frequent than Norwegians.¹⁵

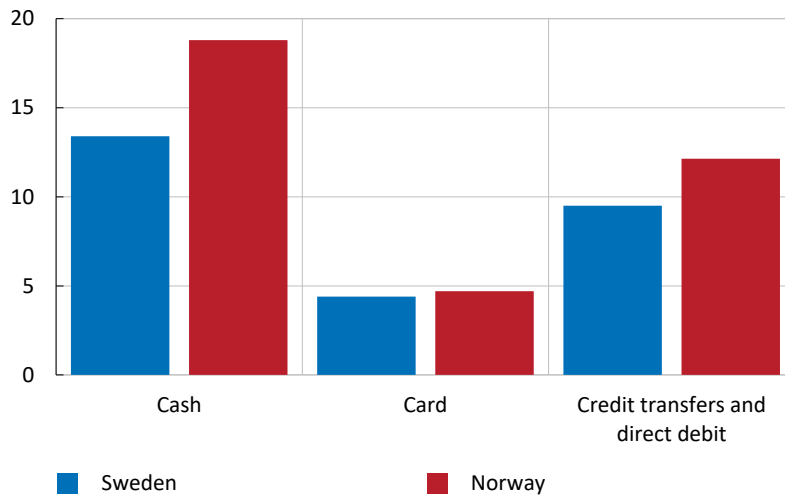
¹² See for example Sintonen and Takala (2022), the Danish Payments Council (2018) and Norges Bank (2022) for studies conducted in our neighbouring countries.

¹³ Norges Bank (2022).

¹⁴ The number of payments relative to GDP (measured in SEK) is 0.0013 in Sweden and 0.0011 in Norway.

¹⁵ The weighted social unit cost is 6.9 SEK in Sweden and 5.4 SEK in Norway. The weights used in this calculation are calculated as the number of payments of each instrument divided by the total number of payments in each country.

Figure 6. Social unit cost of main payment instruments in Sweden and Norway
SEK per transaction



Note. We have used the average exchange rate for 2020 to convert the result from Norges Bank to SEK.

Sources: Norges Bank (2022) and the Riksbank.

5 Conclusion

Payments consume significant resources. In 2021, the social cost of payments in Sweden amounted to SEK 51 billion – almost 1 per cent of GDP. While this is comparable to the cost of payments in Norway, it is still a large amount.

The cost is borne by all three sectors included in this study. However, the cost is not equally divided. More than half of the cost is born by the business sector, while the other half is divided more evenly between the households and the PSPs.

Cash payments have higher social unit cost than digital alternatives. Furthermore, there are differences between digital payment instruments. Credit card payments, for instance, have a higher social unit cost than debit card payments both in-store and online. Swish P2P payments has the lowest social unit cost among all non-recurring digital payments. This means that social costs may be reduced if more cost-efficient payments would replace less cost-efficient payments in the long run.

While the study suggests that costs can be saved, it is important to remember that this study is not a cost-benefit study. Our study estimates the cost of payments, but not the benefits. Cash payments, for instance, is one of the least cost-efficient instruments. It may nevertheless provide important benefits to society, for instance by making the payment market inclusive and resilient. Thus, a move to more cost-efficient payment instruments could at the same time lead to a loss in terms of benefits. This means that we cannot draw conclusions regarding potential efficiency-enhancing policy measures from this study alone. We should also remember that the study is based on a set of assumptions and a limited dataset as described in Appendix 3.

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Appendix 1 – End-users' costs

Households, businesses and the public sector all have costs associated with payments. Households' costs mainly consist of fees paid to banks and the time spent making the actual payment. In total, households spent 7,000 years in 2021 on making payments, or roughly 6 hours per person, in Sweden. For households, card payments have the lowest private unit cost. Time is also a large part of businesses' and the public sector's costs when making payments. In addition, they have costs for the time spent on receiving payments and for the systems involved. The business sector has a total private cost of around SEK 35 billion for making and receiving payments in 2021. Card payments have the lowest private unit cost for businesses in relation to other payments received.

Households spend much time on making payments

Households' private costs associated with payments mainly consist of fees paid to banks and the time spent making the actual payment. While the time spent making a single payment is short, it adds up to a significant value on aggregate. In total, the time spent by the household sector making payments during 2021 adds up to just above 7,000 years, which is roughly equal to 6 hours per person.

There are two main challenges when estimating households' social cost of payments. First, we need to estimate the time spent, and second, the value of this time. In this study, we asked households to complete a questionnaire and estimate the time they spent on various payment-related activities, see Appendix 3 for details.

The value of time spent on payments is the alternative cost for the individual. It is, however, not trivial to decide how to value this time as a cost for the society. In this study, we set the time cost to 75 per cent of mean after tax wage.¹⁶

An alternative would be to assume the value to be 100 per cent of the median after tax wage. This assumption would increase the unit cost of cash payments with SEK 0.63, card payments of SEK 0.22, and credit transfers of SEK 0.86. Note that the median and mean wages in Sweden are very similar, so similar results would be found by assuming 100 per cent of the mean after tax wage. An alternative assumption would be to assume a lower valuation, for example, 50 per cent of the mean after tax wage, or SEK 0.02 per second. With this assumption, the unit cost of cash payments would decrease with SEK 0.67, card payments would decrease with SEK 0.23 and credit transfers with SEK 0.91.

¹⁶ This is in line with the estimates in Goldszmidt et al. (2020).

Table 7 presents the time estimates for different payment situations and instruments. Notably, we see that a card payment is significantly faster than a cash payment in-store. This is not surprising, since consumers most commonly just tap their cards while they need to count the notes and coins and manually hand them over when paying with cash. Often, they also receive change.

It is also worth noting that some card payments are significantly faster than others. The card payments requiring entering the chip into a point of sale (POS) terminal are slower than contactless payments. The development of near field communication (NFC) technology, enabling contactless card payments, has made card payments faster. Based on data from the Norwegian cost study, a contactless card payment takes 8 seconds while a non-contactless payment takes 15 seconds.¹⁷

Card payments online are much slower than in-store payments. They take 54 seconds compared to 12 seconds in-store. Again, this is not surprising since consumers typically just tap their cards in-store while they often need to manually type in their card details when shopping online. Card payments online via digital wallets are less time consuming, however. These services are rarely used in Sweden, but over time we will possibly see faster, and thus cheaper, card payments online.¹⁸

Table 7 also shows that Swish payments online are faster than Swish payments in-store. Swish payments in-store often involve several manual steps such as entering the phone number and amount, while payments online can usually be initiated directly or by scanning a payment-specific generated QR-code.

Another popular way of paying for online purchases is by invoice. We have divided online invoice payments into two steps – the first step is to give information such as your billing address. Households estimate that this step takes 49 seconds. The second step is actually paying the invoice. Table 7 shows that paying by e-invoice is the fastest, 58 seconds, while payments initiated non-digitally, such as via paper-based credit transfers, are much slower, 210 seconds which is 3.5 times longer. The time spent on paying via internet bank or mobile banking applications lies in-between e-invoices and paper-based payments and is estimated to take 129 seconds.

Many invoices are also paid via direct debit or recurring card payments. While the time spent by households on each of those payments is zero, we do include some time for each payment. Specifically, we include time spent on signing up for new direct debits and new recurring card payments, or for cancellation. For direct debits, this is estimated to be 6.9 seconds per payment and for recurring card payments 8.5 seconds.¹⁹

¹⁷ See Norges Bank (2022).

¹⁸ 4 per cent of online payments were made using these services in 2022, according to the Riksbank's survey on payments behaviour of the Swedish population.

¹⁹ We assume that every household make two new agreements and one cancellation every year. We have multiplied the time spent by three and the total number of adult inhabitants in Sweden. Thereafter we have divided it with the number of transactions for recurring card payments and direct debit.

Table 7. Payment time estimates

Seconds and SEK, respectively, 2021

Payment situation	Payment instrument	Seconds	Value in SEK
In-store	Cash	22	0.82
	Card	12	0.45
	Swish	56	2.09
Online	Card	54	2.01
	Swish	20	0.75
	Invoice	49	1.83
Paying bills	E-invoice	58	2.16
	Internet- and mobile bank	129	4.82
	Paper-based	210	7.83

Note. The time estimate for in-store card payments presented in the table refers to the use of a physical card and excludes card payments via, for example, a mobile phone as they only cover around 6 per cent of card payments in-store. Card payments using digital wallets are faster according to the households, 5 seconds, so when wallet card payments are added the time falls from 12 to 11.6 seconds.

Source: The Riksbank.

For all payments, except P2P cash payments, we also include a general bookkeeping cost. Households reported that they spend on average 212 seconds, or three and a half minutes, per month checking bank statements and receipts, which equals 3.16 seconds per transaction. Hence, general bookkeeping costs SEK 0.12 per payment.

The second large part of households' costs associated with payments is fees. The fees they pay are sometimes quite specific. For example, we pay a specific fee for certain credit cards, and for services such as paper-based credit transfers by post. Other fees are less specific. In Sweden, most people pay a monthly fee for a package of banking services. This fee has been allocated to the different payment instruments on the basis of the banks' reporting on incomes from different payment services, see Appendix 2.

Households' social costs are high as a share of total private costs for most payments

Table 8 shows the social cost, fees paid, and the sum of the two, that is the private cost. We can see that the household sector has a total private cost of SEK 15 billion for payments. About 70 per cent of this is social cost – which is mainly time spent – while 30 per cent is fees paid.

For cash payments, the social cost of SEK 1,263 million constitutes the vast majority of households' total private cost for cash, 86 per cent. The share of social cost of total private cost is also relatively large for credit transfers and direct debit. For card payments the share of social cost and fees paid are almost equal.

Table 8. Households' private cost

Million SEK, 2021

Payment instrument	Social cost	Fees paid	Private cost
Cash	1,263	209	1,472
Cards	2,869	3,033	5,903
of which: Debit card	2,464	2,250	4,714
of which: Credit card	406	783	1,189
Direct debit	1,021	420	1,441
Credit transfers	5,187	1,288	6,475
of which: E-invoice	173	253	426
of which: Swish	354	86	440
of which: Other digital credit transfers	4,238	707	4,945
of which: Paper-based credit transfers	422	241	663
Total	10,340	4,951	15,291

Note. Social costs for households mainly include time spent on making payments, but also include costs such as lost cash, cash theft and losses due to card fraud. Fees paid include fees to banks and other PSPs and also households' share of the Riksbank's seigniorage. Other digital credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments. Paper-based credit transfers refer to account-to account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone. The private cost is the sum of the social cost and fees paid.

Source: The Riksbank.

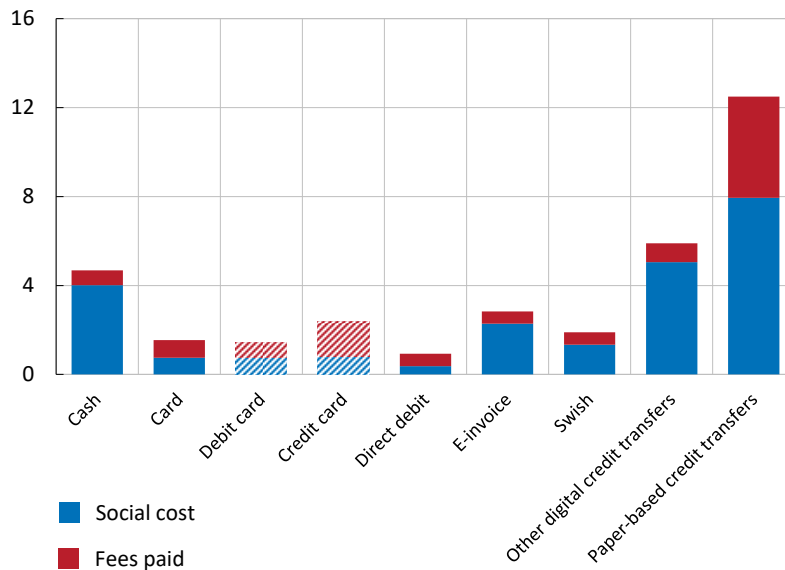
The fact that card payments have a higher share of fees paid is not a result of significantly higher fees than for other payment instruments. It is rather a result of the fact that card payments have a very low social cost, as households spend less time on initiating them. As shown in Figure 7, the private unit cost of card payments is very low, while the unit cost of, for example, cash payments is significantly higher.

Figure 7 also shows that the private unit cost of paper-based credit transfers is very high. This is a result of a very high social cost, almost SEK 8, combined with high fees, above SEK 4. The high social cost in turn is a result of the fact that non-digitally initiated payments, such as paper-based credit transfers by post, take a long time, 210 seconds.

In total, households spent 224 billion seconds making payments in 2021. If we include all payment related activities, the total time spent is 253 billion seconds, equalling 8,000 years or around 7 hours per person and year. The value of this time is estimated to just above SEK 9.4 billion or SEK 900 per person.

Figure 7. Households' private unit cost

SEK per transaction, 2021



Note. Other digital credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments. Paper-based credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone. Shaded bars are breakdowns of the cost of cards.

Source: The Riksbank.

Businesses' private unit cost lowest for card payments

Businesses, including firms, non-government organisations, and public sector entities, have more cost items than the household sector. In addition to time spent making payments, we also include time spent receiving payments. Businesses also have what we call system costs. These can include the costs of hardware such as cash registers and card terminals for physical stores, as well as any other infrastructure needed to receive or make payments, for example checkout solutions and IT systems to accept payments online.

Estimating the social cost of the business sector is challenging for several reasons. First, the sector is very heterogeneous, with firms of different types and sizes and a mix of private and public entities, all factors that influence the costs. Second, as is the case for households, we need to value the time spent on payments and payments-related activities, which for businesses equals labour cost. For the business sector, we have assumed the costs of in-store cashier activities, such as receiving payments, to be SEK 0.06 per second. For all other payment activities, we assume the cost to be SEK 0.09 per second. See Appendix 3 for a detailed description of methodology.

In addition, it is challenging for many firms to accurately answer questions regarding the time they spend on different activities and to estimate different cost allocations. For example, if a firm has an IT system that generates payment files and handles bookkeeping and budgeting, it is difficult for them to estimate how much they should allocate to payments.

We sent out a questionnaire during the spring of 2022 to hundreds of businesses in different sectors. Unfortunately, the response rate was very low. We therefore sent out additional questionnaires that were slightly shorter and only focused on a couple of key questions. However, the response rate was once again very low. Other central banks conducting cost studies have had similar challenges when collection data from businesses. Fortunately, the firms that did respond cover a wide range of sectors, and there are small, medium, and large firms in the sample which makes the results likely to be representative of the sector. In total, 16 firms and 81 public sector entities, the majority of them municipalities, responded. A vast majority of the public sector entities only responded to a very limited version of the survey.

Given that we have limited data, we are unable to distinguish between large and small firms. We are also unable to draw conclusions regarding differences between the private and public sector. That said, the underlying data do suggest that large government agencies seem to have a lower than average private unit cost of payments. This is likely due to the large volume of transactions made by these agencies. At the same time, regions and especially municipalities seem to have a slightly higher unit cost of payments compared to the average in the business sector.

Businesses' social costs are also high as a share of total private costs for most payments

The business sector has a total private cost of around SEK 35 billion for making and receiving payments, see Table 9. In total, most of this, 80 per cent, is social costs, while 20 per cent is fees paid. Most of the private cost of businesses comes from the social cost with regard to payments in cash, credit transfers and direct debit payments. The same applies for debit cards, while for credit cards the fees paid comprise the largest share.

Even though the total private cost of cash is small compared to card payments and credit transfers, the unit cost is higher. Figure 8 shows the businesses' private unit costs for receiving payments, where receiving cash is the most expensive. The figure also shows that card payments have a much lower unit cost than credit transfers. This is because they have much lower social costs, which more than compensates for the higher fees paid for cards than for credit transfers.

Businesses' social cost vary between different payment instruments due to the fact that different cost elements are relevant in different payment situations. Table 10 describes the cost elements included in different payment situations. These are time consumed, system costs, losses or costs related to unpaid invoices, and fees paid. From the businesses' perspective, it is easier to group the cost elements by function. That is, by sales in-store, sales online or via recurrent payments, issuing invoices and receiving the bill payments, and finally, making payments.

Table 9. Businesses' private cost

Million SEK, 2021

Payment instrument	Social cost	Fees paid	Private cost
Cash	1,698	476	2,174
Cards	8,379	4,779	13,159
of which: Debit card	7,096	3,128	10,226
of which: Credit card	1,283	1,650	2,933
Direct debit	2,512	218	2,730
Credit transfers	15,147	2,106	17,252
of which: E-invoice	825	130	954
of which: Swish	1,367	350	1,717
of which: Other digital credit transfers	12,955	1,626	14,581
Total	27,736	7,579	35,314

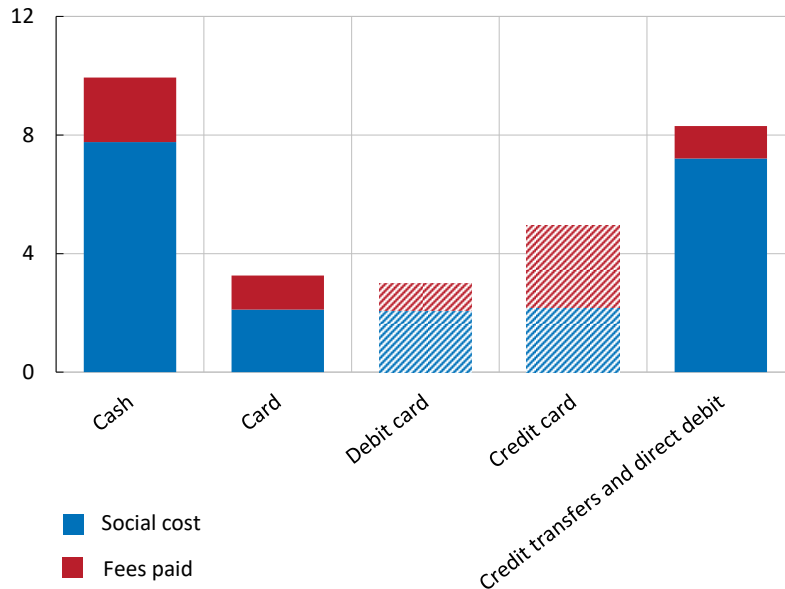
Note. Other digital credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments and batch payments.

Source: The Riksbank.

Losses due to, for example, cash theft or card fraud account for a very limited share of the social unit cost – around 2 per cent. Slightly more stem from costs related to unpaid invoices. Sending reminders and costs for debt collection account for around 10 per cent of the cost of invoicing, see Figure 9.

Figure 8. Businesses' private unit cost of receiving payments

SEK per transaction, 2021



Note. Shaded bars are breakdowns of the cost of cards.

Source: The Riksbank.

Table 10. Overview of cost elements

In-store	Online/Recurring	Invoicing	Making Payments
<p><u>Time consumption</u></p> <ul style="list-style-type: none"> • Receiving payments • Cash handling • Maintenance • Reconciliation • Card fraud <p><u>Systems</u></p> <ul style="list-style-type: none"> • Cash register and safe • POS terminal <p><u>Losses</u></p> <ul style="list-style-type: none"> • Cash theft and losses <p><u>Fees paid</u></p> <ul style="list-style-type: none"> • Fees to PSPs • Seigniorage 	<p><u>Time consumption</u></p> <ul style="list-style-type: none"> • IT-maintenance • IT-development • Reconciliation • Card fraud <p><u>Systems</u></p> <ul style="list-style-type: none"> • IT-systems • Checkout solution <p><u>Fees paid</u></p> <ul style="list-style-type: none"> • Fees to PSPs 	<p><u>Time consumption</u></p> <ul style="list-style-type: none"> • Register new customers • Preparing and sending invoices • Reconciliation <p><u>Systems</u></p> <ul style="list-style-type: none"> • IT-systems • Printing and postage • Cost of invoicing service <p><u>Unpaid invoices</u></p> <ul style="list-style-type: none"> • Reminders • Debt collection <p><u>Fees paid</u></p> <ul style="list-style-type: none"> • Fees to PSPs 	<p><u>Time consumption</u></p> <ul style="list-style-type: none"> • Making manual payments • Preparing and sending payment files • Reconciliation • Card fraud <p><u>Systems</u></p> <ul style="list-style-type: none"> • IT-systems <p><u>Losses</u></p> <ul style="list-style-type: none"> • Card fraud <p><u>Fees paid</u></p> <ul style="list-style-type: none"> • Fees to PSPs

Note. Bold underlined categories constitute the high-level cost elements that are included, and we provide, marked in italics with bullets, some examples for each category of the main costs included.

Source: The Riksbank.

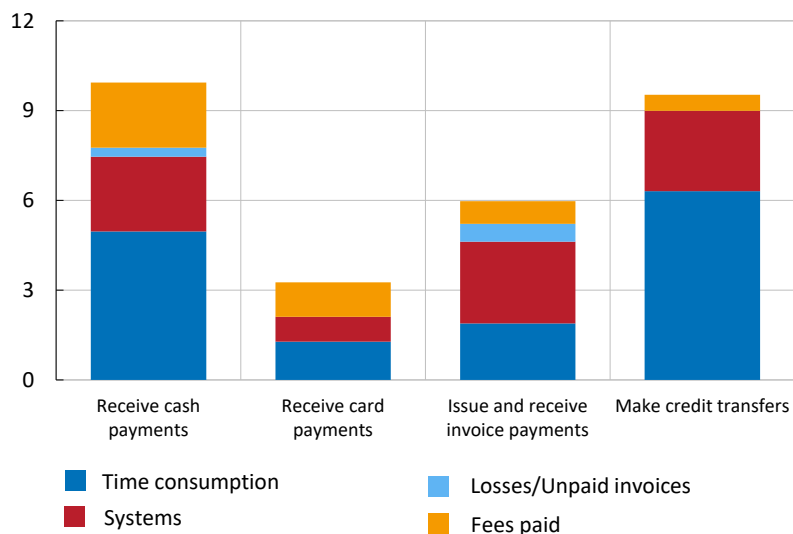
The largest share of social unit cost of receiving cash and card payments is time spent, around 62 per cent, while the system costs are around 36 per cent. Businesses also make payments, especially credit transfers. Time consumption also makes up a large share of the businesses’ cost of making payments, about 70 per cent compared to 30 per cent for system costs.

When it comes to issuing invoices and receiving the payments the time consumption is around 35 per cent, while the system costs are just below 55 per cent.

In Figure 9, we see that the private unit cost of making credit transfer payments is very high. While the unit system cost is comparable to that of receiving credit transfer payments, the time spent is much greater.

Figure 9. Businesses’ private unit cost breakdown

SEK per transaction, 2021



Source: The Riksbank.

Appendix 2 – Payment service providers' costs and income

Payment service providers use resources when they produce payment services for end-users. In terms of payment service providers' private cost, payments with cash, credit cards and credit transfers initiated non-digitally are the least efficient payment instruments. In 2021, payment service providers as a whole had higher costs than income for the payment instruments included in this study. They made losses on cash services, credit transfers and direct debits, while card payments were profitable.

Non-digital payments are less cost-efficient

The most common type of payment service provider (PSP) in Sweden is banks. However, there are also other PSPs, which are engaged in for example cash deposits and withdrawals, card issuing and acquiring.²⁰ In Appendix 3, we explain how we have calculated their costs for different payment instruments.

Table 11 shows the PSPs' total private cost for the different payment instruments in 2021. Around 46 per cent of PSPs' private cost were related to card payments. Almost the same share stems from credit transfers and direct debits. PSPs' private cost linked to cash payments amounted to SEK 1.2 billion, or 10 per cent of total cost.

The table also includes the payment instruments' share of total payments. Compared to the share of costs, this provides an indication of the payment instruments' cost-efficiency in terms of PSPs' use of resources. Payment instruments with a higher cost share than payment share are relatively costly to produce. Cash, credit cards, and paper-based credit transfers are all costly to produce according to this measure.

²⁰ In the EU, PSPs are defined in the revised Payment Service Directive, PSD2. The directive lists the services that require a license as a PSP. These include card payment services on the sides of the payer and payee, called card issuing and card acquiring, respectively.

Table 11. Payment service providers' private cost of payment

Million SEK and per cent, respectively, 2021

Payment instrument	Private cost	Cost share	Payment share
Cash	1,248	10%	4%
Cards	5,835	46%	53%
of which: Debit card	3,977	32%	46%
of which: Credit card	1,858	15%	7%
Direct debit	645	5%	6%
Credit transfers	4,876	39%	37%
of which: Swish	1,021	8%	11%
of which: E-invoice	350	3%	2%
of which: Other digital credit transfers	2,656	21%	23%
of which: Paper-based credit transfers	849	7%	1%
Total	12,604	100%	100%

Note. Other digital credit transfers consists of account-to-account transfers, Bankgiro and Plusgiro payments and Batch payments. Paper-based credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone.

Source: The Riksbank.

PSPs' costs related to cash payments comprise the costs of Loomis, the main cash handling company in Sweden, the costs of Bankomat, which offers ATM services on behalf of the banks, and banks' internal activities that have been allocated to cash services. The Riksbank's costs of providing cash to society are also included.

In general, cash handling entails high costs for PSPs due to the costs of counting, transportation and storage. Security costs are also high, and so are the costs of servicing and maintaining ATMs. With effect from January 2021, new legislation has been introduced that requires the major banks to provide certain cash services in all parts of Sweden. This may have added to PSPs' costs for cash services.

A large share of PSPs' costs for card payments are banks' costs as card issuers. These costs mainly consist of licensing and processing fees paid to Visa and Mastercard. They also include the costs of purchasing cards and of additional services to card holders, which is especially relevant for credit cards. Card issuers' costs also include time spent on handling inquiries from card holders.

PSPs' costs for card payments also include card acquirers' costs.²¹ The latter include the costs of so-called 'full checkout services', which are offered by most card acquirers.²² A large share of card acquirers' costs are fees paid to card issuers, known as interchange fees. In the private costs presented in Table 11, we have excluded interchange fees to avoid double counting.

²¹ A card acquirer is a financial institution that processes card payments on behalf of businesses. The acquirer allows businesses to accept card payments from the card issuers within a card scheme.

²² Full checkout services allow retailers to receive multiple payment instruments across different payment situations based on an agreement with only one service provider.

Finally, a major item of PSPs' costs for credit transfers and direct debit is banks' fees to Bankgirot, the main provider of clearing services in Sweden. Banks' costs for credit transfers also include fees to Getswish, the company behind Swish, and time spent by bank employees on transfers initiated non-digitally, handling customers' inquiries and monitoring transactions.

PSPs cost and income balance

Table 12 shows the PSPs' total income and net revenue, or profit. In 2021, the sector's income more or less balanced its cost from the payment instruments included in the study. This reflects that PSPs incurred losses from cash, credit transfers and direct debits, which in total were only slightly larger than the profit made on card payments.

Table 12. Payment service providers' private cost and income of payment instruments

Million SEK, 2021

Payment instrument	Private cost	Income	Net revenue
Cash	1,248	685	-563
Cards	5,835	7,813	1,978
of which: Debit card	3,977	5,379	1,402
of which: Credit card	1,858	2,433	576
Direct debit	645	472	-174
Credit transfers	4,876	3,560	-1,316
of which: Swish	1,021	770	-251
of which: E-invoice	350	215	-135
of which: Other digital credit transfers	2,656	2,284	-372
of which: Paper-based credit transfers	849	291	-558
Total	12,604	12,529	-75

Note. Other digital credit transfers consists of account-to-account transfers, Bankgirot and Plusgirot payments and batch payments. Paper-based credit transfers refer to account-to-account transfers, Bankgirot and Plusgirot payments initiated manually by post or OTC/phone.

Source: The Riksbank.

We interpret the calculated net revenues in table 12 as follows: Payments using credit transfers and direct debits are mainly services provided by banks. Offering these services helps banks attract deposits from households and businesses. Deposits is a key source of financing for the Swedish banks.

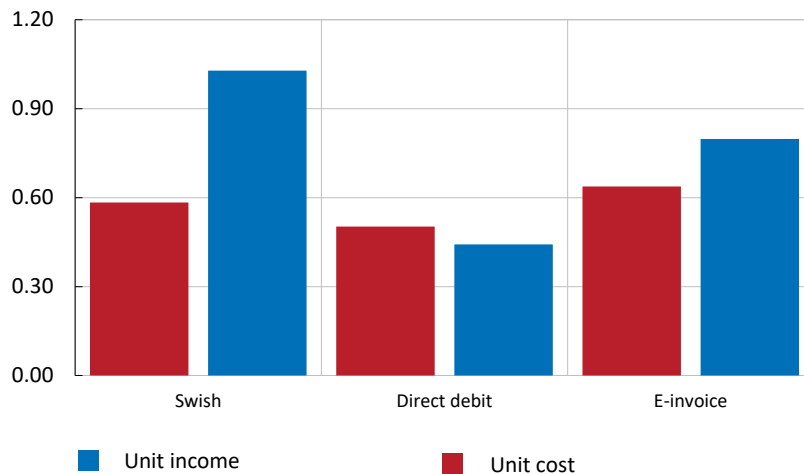
However, the net losses for direct debits and credit transfers based on e-invoices are still remarkable. Both are bill payment instruments where the payees are businesses. Normally, banks will consider charging fees to businesses as payees, to cover their costs on households as payers. For direct debits, though, banks even have a minor net loss on the payee side, see Figure 10.

With Swish, it is slightly different. Although Swish has grown as a P2B payment instrument, the largest share of all Swish payments are still P2P, usually free of charge. As

such, it is less surprising that banks have higher costs than income from Swish payments. For P2B payments, Swish is however profitable for banks, as can be seen in Figure 10.²³

Figure 10. Banks' private unit cost and unit income for incoming payments to businesses

SEK per transaction, 2021



Note. Unit cost and unit income are the banks' average cost and income per transaction for a Swish payment, direct debit and e-invoice when servicing a business for their incoming payments.

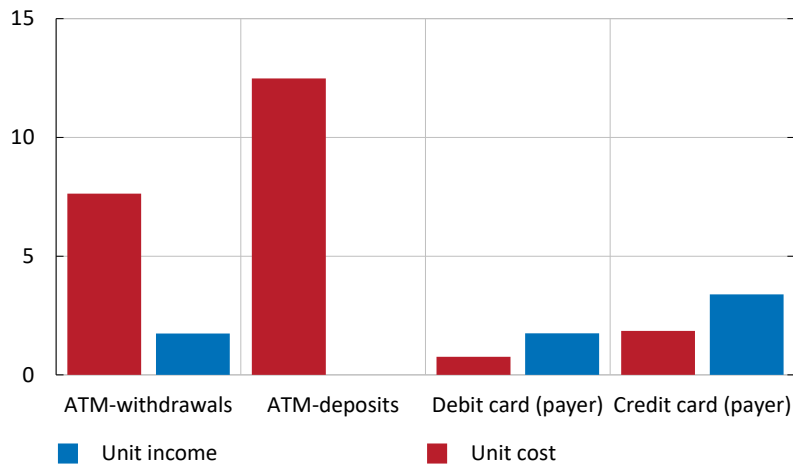
Source: The Riksbank.

For cash services, PSPs' net loss reflects that ATM services are often free of charge, see Figure 11. This is the outcome of a long process. Originally, banks refrained from charging fees for ATM services to encourage customers to change from withdrawing cash in bank branches. Today, very few branches offer cash services, but banks have, so far, stayed away from charging fees for ATM services.

It is likely that we have underestimated PSPs' net revenue for card payments in Table 12. This follows from the assumption that card acquirers' costs are equal to their income, see Appendix 3. Therefore, the entire surplus in Table 12 comes from the issuing side. Figure 11 shows the card issuers' unit fee income and unit fee cost from debit card and credit card payments.

²³ Swish may also have contributed to lowering banks' costs due to its effect on cash usage in society.

Figure 11. Banks' unit cost and unit income for cash services and card payments
SEK per transaction, 2021



Note. Unit income and unit cost are the banks' average cost and income for ATM withdrawals, ATM deposits, debit cards and credit cards per transaction, when servicing the payer.

Source: The Riksbank.

Cards issuers mainly receive income in the form of interchange fees. In the EU, the so-called Interchange Fee Regulation (IFR) was approved in 2015 with the aim of reducing card fees by capping interchange fees.²⁴ Despite the IFR, card issuers in Sweden are still able to earn a profit on card payments. This also holds for domestic payments, where there is no currency conversion income.²⁵

²⁴ See Claussen and Mølgaard Pedersen (2022) for a description of the Interchange Fee Regulation.

²⁵ As explained in Claussen and Mølgaard Pedersen (2022), banks earn currency conversion income from Swedes' card payments abroad. How this affects the costs of cross-border payments will be analysed further in the forthcoming study from the Riksbank on the cost of cross-border payments.

Appendix 3 – Methodology

Data

We have collected data from households, businesses, public sector organisations, banks, and other payment service providers (PSPs). We also included data on the Riksbank's costs for payment-related activities, as well as various data from other public sources.

Households

Our household data was collected through a survey conducted in November 2021. It covered 2,025 persons in the age group 18–84 years. 500 were interviewed by telephone and 1,525 answered the survey online. The survey included questions on how often households use different payment instruments in different payment situations. The households also estimated the time they spent on payments.

Businesses and the public sector

Data for the business and the public sector was collected through questionnaires during spring 2022. The questionnaire covered transaction volumes, time spent on various payment-related activities and fees paid in 2021.

Unfortunately, the response rate was very low. We therefore conducted a second round of questionnaires, slightly shorter and only focused on a couple of key questions. However, the response rate was once again very low for the business sector. In total, 16 firms, 3 government agencies, 7 regions, and 71 municipalities responded. However, the firms that did respond covered a wide range of sectors, and there are small, medium, and large firms in the sample. Thus, we assume the data to be representative for the business sector.

The response rate for the public sector, especially municipalities, was much higher. However, they mostly provided data on the number of transactions. The low number of responses from the business sector and the fact that many public sector entities did not report detailed information about costs of various payment instruments mean that we can not separate between the costs for businesses and public sector entities.

Banks

Banks reported direct costs, that is, cost that they can attribute to a specific payment service. For costs that are more difficult to allocate to specific payment instruments, for instance, cost related to offices, buildings and marketing, they allocated costs according to a method known as Activity Based Costing (ABC). According to the method, the banks allocated costs to different payment services using cost drivers, for example number of payments, payment size or number of accounts.

In total, six major banks in Sweden reported data. They cover 80–90 per cent of the Swedish market in terms of traditional bank services, including payment services.

Other payment service providers

Other PSPs than banks reported mainly the number and value of transactions in addition to incomes from payments. Some of them also reported cost data. They reported the data in different templates designed according to their respective operations. When PSPs did not report cost data, we calculated their contribution to social costs as their income from relevant payment services. Consequently, social costs may be over-estimated, as far as the providers in question earn a profit. However, if we assume a 4 per cent marginal as profit and deduct that from the reported income, it has a minor effect on the cost estimates.

In total, 11 major PSPs on the Swedish market reported data. They consist of credit institutions, card issuers, card acquirers, cash handling companies and payment initiating companies.

Sveriges Riksbank

The Riksbank performs several payment-related operations. These include cash distribution, providing the RIX central settlement system, overseeing the payment infrastructure in Sweden, and analysing the payment market. We have estimated the social costs for those functions and allocated them to the relevant payment instruments.

To calculate the Riksbank's cost for cash payments we use the Riksbank's annual accounts. We include the costs for the cash provision function. In addition, we add a proportional share of the Riksbank's costs for analysis and policy as well as contingency preparedness related to payments.

Other data sources

We have collected data from different public sources. These include GetSwish, the Riksbank's payment statistics, Statistics Sweden, and the Swedish Banker's Association. Moreover, both Visa and Mastercard, the major international card companies, supported with information, which helped us to make certain estimates.

Calculating transaction volumes

To estimate social unit cost for different payments, we need information on the total transaction volumes for the respective instrument. For some of them, there are publicly available data sources. We have used the Riksbank's payment statistics for direct debit, Getswish AB for Swish payments, and the Swedish Bankers' Association for e-invoices. For payment instruments where no public data are available, we have estimated the volumes. See below for a description on how we made the estimates.

Total number of card transactions

To estimate the total transaction volume of card payments, we use the Riksbank's Payment Statistics and Financial Market Statistics.²⁶ We have used underlying data from the Payment Statistics focusing only on domestic card payments.

By comparing the sample in the Payment Statistics with data from the Financial Market Statistics, we conclude that the sample covers approximately 80 per cent of the total amount of deposits from the public. We have then scaled up the total number of card transactions in Sweden by dividing the total number of domestic card payments in the payment statistics by 0.8.

The cost of card payments may be underestimated because the sample mainly consists of large PSPs. Generally, these have lower unit costs due to economies of scale, compared to smaller PSPs. However, we consider the effect to be limited as the large PSPs included in the study cover more than 80 per cent of the card market.

Total number of cash payments – P2P and P2B

From our household survey, we were able to estimate how often households make cash payments P2P and P2B.

To estimate the total number of P2P cash payments, we multiplied the average number of reported cash payments per person P2P in the household survey with the total population in Sweden in the age group 18–84 years.

To estimate the total number of cash transaction P2B in-store, the starting point is the data from the household survey showing that 6 per cent of all P2B in-store payments are cash payments. It is a reasonable assumption that the remaining P2B payments in-store, 94 per cent, were card- and Swish payments. The total number of P2B transactions in-store is thus the total number of Swish- and card payments divided by 0.94, 3,645 million payments. Of these, 6 per cent, 219 million, are cash payments.

Total number of credit transfers

We have estimated the total number of transactions for the following types of credit transfers:

- account-to-account transfers, Bankgiro and Plusgiro payments initiated via internet- or mobile bank,
- paper-based credit transfers OTC or by phone
- paper-based credit transfers by post
- batch payments

²⁶ The Financial markets statistics is produced and published by Statistics Sweden on behalf of the Riksbank.

To estimate the total transaction volume of the listed credit transfers, we use data on transaction volumes reported by the banks and other PSPs participating in the study, as well as deposit data from the Financial Market Statistics.

By comparing the sample in the cost study with data from the Financial Market Statistics, we conclude that the sample has approximately 75 per cent of the total amount of deposits from the public. We have then scaled up the total number of transactions by dividing the reported number by 0.75.

Calculating time costs for households and businesses

To calculate the social cost of payments, we need to convert the time that households and businesses spend on payments and payment-related activities into a monetary value in SEK. In this section we describe how this is done.

Time costs for households

For households, we assume that the monetary value of time spent on payments is 75 per cent of the after tax-mean wage in Sweden in 2020. The 75 per cent adjustment is based on Goldszmidt et al. (2020) who estimated the value of time based on US data. This gives us a yearly value of SEK 236,173 and assuming 1,760 work hours per year, we obtain a time valuation of SEK 0.04 per second.

Time costs for businesses

We use the labour cost as a value of time for businesses. One challenge is that labour costs vary between firms and also between different activities within firms. For in-store cashier activities such as receiving payments, we have assumed the cost of a full-time employee (FTE) to be SEK 400,568 or SEK 0.06 per second. This is based on the mean wage, including social costs, of cashier personnel in 2021.

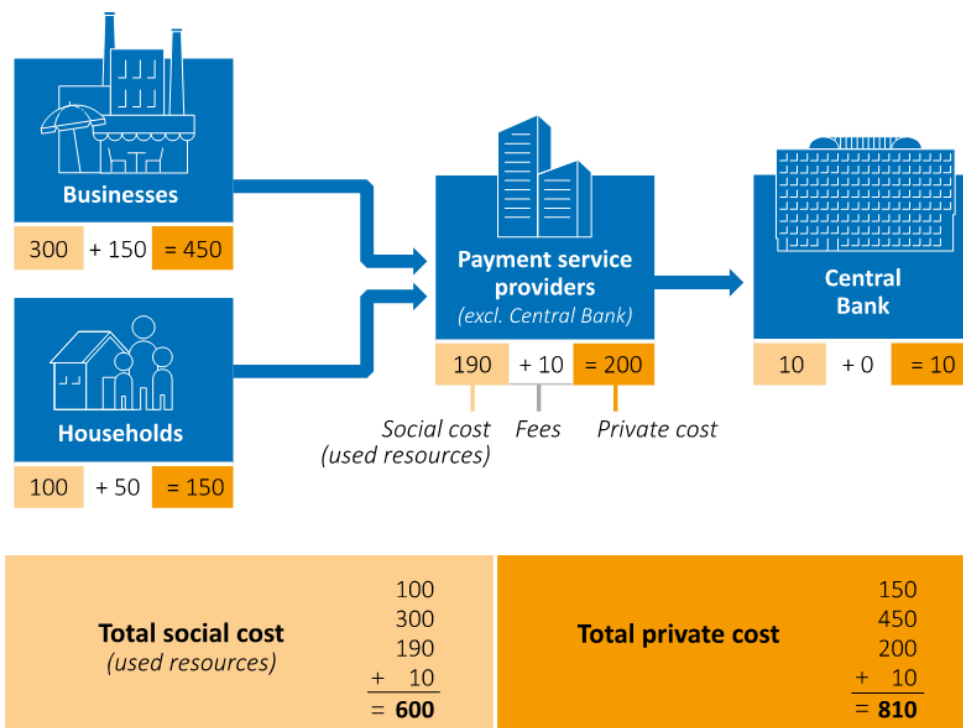
For all other payment activities, we assumed the cost of an FTE to be SEK 585,082 or 0.09 per second. This is based on the mean wage rate for all workers, including social costs.

Calculating the social cost of payments

Total social cost of payments

We calculate the total social cost of payments by adding the resources used by households, businesses and public sector, PSPs, and the Riksbank to produce payments. Fees paid between different parties are not included in the social cost. They are part of the so-called private cost. As shown in Figure 12, including fees paid in the social cost will result in double counting and overestimate the total social cost.

Figure 12. The relationship between social and private cost



Source: The Riksbank.

We have not collected any data for certain parties in the payment chain, such as service providers that process payments, operate card terminals, handle invoices for payees, produce payment cards, print, and send account statements. Instead, we measure the use of resources by these parties by the fee the PSPs and end-users pay to them.

Our study only includes costs linked to the actual payment, not purchase-related costs. Hence, we have not included costs regarding the delivery of goods and services. The same goes for the time spent by the cashier scanning the goods and calculating the amount to be paid. Typically, such purchase-related costs do not differ between different payment instruments. However, we include costs of services that are not a specific part of the payment, but from which the households and businesses cannot opt out. Many credit cards, for instance, include travel insurance and other services. As an integral part of the credit card package, the costs of these services are added to social costs.

Social unit cost of payments

The social unit cost for a payment instrument equals the total social cost for the payment instrument divided by its transaction volume.

Appendix 4 – Data

Table 13. Underlying data to the figures in Section 3

SEK per transaction, 2021

	Households	Businesses	Payment service providers	Total
Figure 2. Social unit cost of main payment instruments				
Cash	4.0	5.4	4.0	13.4
Card	0.7	2.1	1.5	4.4
Credit transfers	2.3	5.8	1.9	9.9
of which: Swish	1.3	1.8	1.3	4.4
Direct debit	0.4	5.3	1.4	7.1
Figure 3. Social unit cost of cash payments				
Total	4.0	5.4	4.0	13.4
P2P	4.0	—	4.9	8.9
In-store	4.0	7.8	3.6	15.4
Figure 4. Social unit cost of card payments				
Total	0.7	2.1	1.5	4.4
Debit card	0.7	2.1	1.2	4.0
Credit card	0.7	2.4	3.4	6.5

Note. For P2P payments in Figure 3, we assume that households do not have any time consumption of receiving payments. This might be arguable for P2P cash payments. However, if we include the time cost of the payee, the unit cost of cash payments only increases with SEK 0.25 per transaction. The difference between the sum of the subparts and the total is due to rounding.

Source: The Riksbank.

Table 14. Underlying data to the figure in Section 4.1

SEK per transaction

	2002	2009	2021
Figure 5. Comparison of social unit costs for person-to-business payments			
Cash	5.4	9.5	15.4
Card	4.0	6.4	4.4
Credit transfers	—	12.5	6.8
Direct debit	—	3.7	6.6

Note. For card payments, B2B payments are also included for the results of the 2021 study. However, card payments initiated by businesses constitute a negligible part of total card payments and therefore have a minor effect on the results. Data for 2002 and 2009 are inflation-adjusted. The data from 2002 only investigated the social cost of cash and card payments.

Sources: Bergman et al. (2007), Segendorf and Jansson (2012) and the Riksbank.

Table 15. Underlying data to the figure in Section 4.2

SEK per transaction

Figure 6. Social unit cost of main payment instruments in Sweden and Norway		
	Sweden (2021)	Norway (2020)
Cash	13.4	18.8
Card	4.4	4.7
Credit transfers and direct debit	9.5	12.1

Note. We have used the average exchange rate for 2020 to convert the social cost for Norway to SEK.

Sources: Norges Bank (2022) and the Riksbank.

Table 16. Underlying data to the figures in Appendix 1 – End-users' costs

SEK per transaction, 2021

	Social cost	Fees paid	Private cost	
Figure 7. Households' private unit cost				
Cash	4.0	0.7	4.7	
Card	0.8	0.8	1.5	
Debit card	0.7	0.7	1.4	
Credit card	0.8	1.6	2.4	
Direct debit	0.4	0.6	0.9	
E-invoice	2.3	0.6	2.8	
Swish	1.3	0.6	1.9	
Other digital credit transfers	5.1	0.8	5.9	
Paper-based credit transfers	7.9	4.5	12.5	
Figure 8. Businesses' private unit cost of receiving payments				
Cash	7.8	2.2	9.9	
Card	2.1	1.1	3.3	
Debit card	2.1	0.9	3.0	
Credit card	2.2	2.7	4.9	
Credit transfers and direct debit	7.2	1.1	8.3	
Figure 9. Businesses' private unit cost breakdown				
	Time consumption	Systems	Losses/ Unpaid invoices	Fees paid
Receive cash payments	5.0	2.5	0.3	2.2
Receive card payments	1.3	0.8	0.0	1.1
Issue and receive invoice payments	1.9	2.7	0.6	0.8
Make credit transfers	6.3	2.7	0.0	0.5

Note. Other digital credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments. Paper-based credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone. The difference between the sum of the subparts and the total is due to rounding.

Source: The Riksbank.

Table 17. Underlying data to the figures in Appendix 2 – Payment service providers' costs and income

SEK per transaction, 2021

	Unit cost	Unit income
Figure 10. Banks' private unit cost and unit income for incoming payments to businesses		
Swish	0.6	1.0
Direct debit	0.5	0.4
E-invoice	0.6	0.8
Figure 11. Banks' unit cost and unit income for cash services and card payments		
ATM-withdrawals	7.6	1.7
ATM-deposits	12.5	0.0
Debit card (payer)	0.8	1.7
Credit card (payer)	1.9	3.4

Note. For Figure 10, unit cost and unit income are the banks' average cost and income per transaction for a Swish payment, direct debit and e-invoice when servicing a business for their incoming payments. For Figure 11, unit income and unit cost are the banks' average cost and income for ATM withdrawals, ATM deposits, debit cards and credit cards per transaction, when servicing the payer.

Source: The Riksbank.

Table 18. Total social unit cost of credit transfers and direct debit by sector
SEK per transaction, 2021

	Households	Businesses	Payment service providers	Total
Direct debit	0.4	5.3	1.4	7.1
Credit transfers total	2.3	5.8	1.9	9.9
E-invoice	2.3	5.3	2.2	9.8
Swish	1.3	1.8	1.3	4.4
P2P	1.5	—	1.3	2.8
P2B	1.1	4.0	1.2	6.3
Return		2.1	8.0	10.1
Other digital credit transfers	2.6	7.7	1.6	11.9
Initiated by households	5.1	2.9	1.7	9.7
P2P	4.9	—	1.4	6.3
P2B	5.2	5.2	2.0	12.4
Initiated by businesses	—	12.7	1.5	14.2
B2P	—	9.0	1.4	10.4
B2B	—	14.2	1.5	15.7
Paper-based credit transfers OTC/phone	7.2	5.9	26.2	39.4
Paper-based credit transfers by post	7.9	5.2	5.2	18.4

Note. Other digital credit transfers and paper-based credit transfers OTC/phone include single account-to-account transfers, Bankgiro and Plusgiro payments. Other digital credit transfers also include batch payments. A batch payment is when multiple payments to different recipients are made through a single payment as opposed to many individual payments. An example of a batch payment is a salary payment from an employer to a large number of employees. Return Swish payments are refunds for purchase returns. The difference between the sum of the subparts and the total is due to rounding.

Source: The Riksbank.

Table 19. Total number of transactions

Millions, 2021

Payment instrument	Number
Cash	315
of which: P2P	96
of which: In store	219
Card	3,903
Credit transfers	2,628
<i>Initiated by households</i>	1,808
of which: Swish	761
of which: P2P	421
of which: P2B	340
of which: E-invoice	155
of which: Other digital credit transfers	839
of which: P2P	380
of which: P2B	459
of which: Paper-based credit transfers	53
<i>Initiated by businesses</i>	820
of which: Swish, return	9
of which: E-invoice	1
of which: Batch	695
of which: Other digital credit transfers	113
of which: B2P	26
of which: B2B	87
of which: Paper-based credit transfers	2
Direct debit	470
of which: P2B	459
of which: B2B	11
Total	7,316

Note. E-invoice is a credit transfer where the invoice is sent directly to the payer's internet bank. Other digital credit transfers consists of account-to-account transfers, Bankgiro and Plusgiro payments. A batch payment is when multiple payments to different recipients are sent through a single payment as opposed to many individual transactions, for example salary payments from an employer to a large number of employees. Paper-based credit transfers refer to account-to-account transfers, Bankgiro and Plusgiro payments initiated manually by post or OTC/phone.

Sources: Getswish AB, Swedish Bankers' Association and the Riksbank.



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