

these assumptions the transport cost are estimated to be ISK [CONFIDENTIAL] million for the year 1997.

- *Insurance*

The insurance cost is estimated to be ISK [CONFIDENTIAL] million¹⁰ for the whole banking system. This is for the currency inside the branch and in the ATMs, and for the transportation of money.

- *ATMs*

Banks do not seem to have significant costs related to the loss of interest on their liquidity holdings. This is so because every day after the closing, they deposit all remaining liquidity at the central bank, without any loss and risk.

The only significant liquidity holdings of banks are located in 165¹¹ ATMs all over Iceland. The average amount of currency stored in an Automatic Teller Machine is ISK 2 million.

We compute the interest forgone at the rate of time deposit (5,1% in 1997), in order to be consistent with the rate used to compute consumers' interest forgone. Therefore the cost of interest forgone for cash held in ATMs amounts to about 37 million for the whole banking system.

The cost of operating ATMs includes other components, as well. The cost of maintenance and wages related to the machines, the depreciation and the cost per transaction of the Banks' Data Centre. Actually customers do not pay anything for cash withdrawals, but in most cases they withdraw funds from a machine of another bank. Let us assume, for instance, that a customer withdraws some money from an ATM of one of the 26 savings banks. In such a case the customers' bank has to pay ISK [CONFIDENTIAL] to the savings bank and the latter then has to pay ISK [CONFIDENTIAL] to the RB Data Centre (for the clearing and settlement) and ISK [CONFIDENTIAL] to the Savings Banks' Data

¹⁰ This data comes from estimates of the one commercial bank.

¹¹ Data relative to January 1998.

Centre for the statement. So this transaction will have cost the two banks together [CONFIDENTIAL] krónur.

On average, there are more than three thousand withdrawals per month from an ATM. Every ATM costs the bank ISK [CONFIDENTIAL] thousand per month¹². This figure includes cost of maintenance, wages, cost of the Bank's Data Centre, interest of investment, depreciation, forgone interest on cash and other costs.

Table 6: Cash-related Costs for Banks

	Million ISK
Handling cost	
Transport	
Insurance	
ATMs	
Total	694,5

Sources: Own calculations based of data from one savings bank and one commercial bank relative to 1997.

[SOME FIGURES REMOVED FOR CONFIDENTIALITY]

Merchants

- *Handling*

Cash payments involve a big handling cost in retail business. Merchants have to sort notes and coins, count currency many times, dispose of enough change and empty cash register regularly. Additionally, at the end of the day they have to recount cash, register it, prepare everything for the bank and go there to deposit it. Even if they do not go to the bank every day, they have to do it regularly in order to avoid risks and interest losses. All these tasks take time, and, therefore, are expensive.

On the merchant side, the cost of running cash is constituted by the time spent to close one day sales, preparing everything for the bank and have it ready for the bookkeeping. According to the Trade Federation Association of Iceland, cash

¹² Data from a commercial bank, December 1998.

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handling takes minimum half an hour every day, without taking into account the time spent in trips to the bank. According to the Retailers Association of Iceland, in most cases the money is taken daily to the bank. In a typical store, the cashiers deliver money, cheques, card-slips, etc. with a counting sheet to the merchant. He then checks it and prepares a deposit sheet for the bank. To do this and to drop the moneybag at the bank will not take much less than one hour daily. Of course, this time varies from one merchant to another, depending on the number of cash registers (=counting/checking) and amount of cash received.

In Iceland there are ten thousand merchants and certainly most of them have small business. Furthermore, cash transactions represent only a small part of their business. Therefore, we assume that, on average, they do not go to the bank every day, but only twice a week. This is assumed to take half an hour. In addition, every day they spend another half-hour to achieve all other tasks needed to prepare the cash for the bank¹³. Given that the average hourly-salary is ISK 510,2¹⁴, the cost of handling cash for the retail category is about ISK 900 million.

2.4 Consumers

Normally consumers perceive currency as for free, because they have no fixed and visible cost related to it. Actually this is not true. The cost of cash for consumers is related to the need to carry cash and to the security risk of making trips to the bank. Furthermore, there is a cost of not having the right change available every time they need it, as in the case of parking meters or vending machines. However, even if these costs are quite important in daily life, it is very difficult to give them a monetary value. We have not attempted to do so.

¹³ A study conducted on German supermarkets estimates the time needed for handling cash to 50 minutes per day (Tengelmann, 1993). An APACS survey states that in the UK the cash handling in small and medium sized stores takes between two and nine hours per week whereas the time needed to deposit cash at the bank is 30-60 minutes per day (Jones, P., 1995, "Push or pull?", *European Card Review*, November/December). Finally, estimates for Belgian food stores are of the order of half an hour to three hours and a half per day.

¹⁴ *Verstunarmannafelag Reykjavíkur* (Merchants' Association, Reykjavik), December 1998.

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- *Interest forgone*

Another and more evident kind of cost for consumers is the interest forgone on cash holdings. Consumers loose interest by holding cash. This is in fact an opportunity cost. The opportunity cost of holding cash corresponds to the interest forgone that consumers would earn keeping money on a banking account or buying time deposit. In order to measure the amount of these interest losses we assume that, if consumers had no need for cash holdings, they would invest in time deposit, which are quite liquid. The time deposit's rate in 1997 was 5,1%. Following this assumption and, taking into account that consumers hold more than 85% of total currency put in circulation by the central bank¹⁵, consumers' losses are about ISK 259 million.

This cost borne by the consumers is also an income for the central bank. As a result, this amount is shown as a revenue of the Central Bank.

¹⁵ Banks and other financial institutions hold the remaining currency. This is on average the 12.5%, (BIS, 1995).

3. ICELAND: COSTS AND REVENUES OF A CARD BASED PAYMENT SYSTEM

3.1 Introduction: some background information

The first Visa credit card appeared in Iceland in 1981. It was an off-line charge card issued by the National Bank of Iceland. In 1983 Visa Iceland was founded by a consortium of three commercial banks and two state banks. It became a Visa group member that began to develop the Icelandic card-payment market. When the main commercial banks joined Europay Iceland in 1982, the remaining five (three due to merge), and 13 saving banks decided to join Visa. From 1988, all banks became members of both Visa and Europay. In 1990 the Eftpos system was introduced for the electronic data capture.

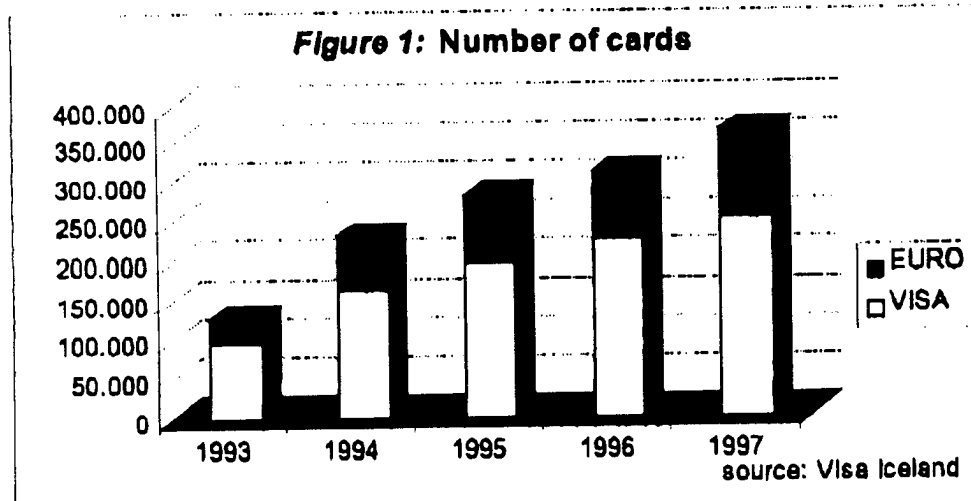
The use of cards in Iceland has experienced a rapid diffusion in recent years. Both debit and credit cards are used for purchases of very small amounts as well.

In 1997 there were 368.342 cards for a population of 270.000 inhabitants. Two major companies, Visa and Europay dominate the card industry. They operate as consortia owned by banks. To give an idea of the scale of card industry, the total turnover of credit cards in Iceland of both Visa and Europay is estimated to be ISK 94 billion in 1998¹⁶. As depicted in Figure 1, Visa alone has more than the 70% percent of the card market. Last year, the monetary value of only Visa credit cards transactions amounted to ISK 62 billion. The monetary value of debit cards transactions totalled 48,8 billion, increasing by 28,9% since 1996¹⁷.

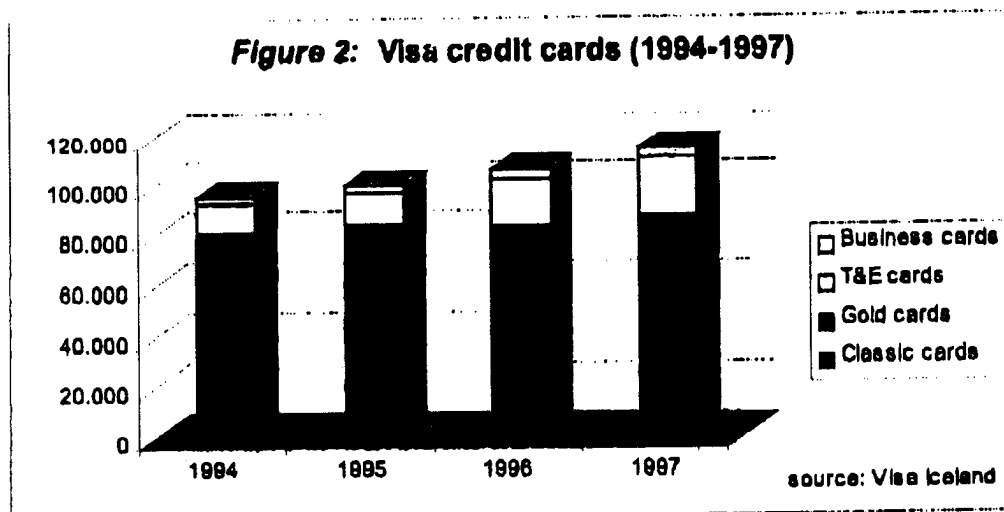
¹⁶ Central Bank of Iceland, *Annual Report 1997*, p.53, 1998.

¹⁷ Data from Visa Iceland, 1998.

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Visa Iceland offers several products to meet the needs of every kind of customer. It is also trying to expand the merchant network and to offer new services through the same card. The marketing strategy of Visa is mainly working to reinforce the Icelanders' close identification with the Visa brand. In his fifteen years of life, the consortium launched six kinds of cards. For private individuals Visa offers the Classic Card, the Gold Card, the Travel and Entertainment card (T&E) as well as a travel card for youth market (Farkort). The business sector has even been segmented with separate premier business card, Gold and Silver (Figure 2).

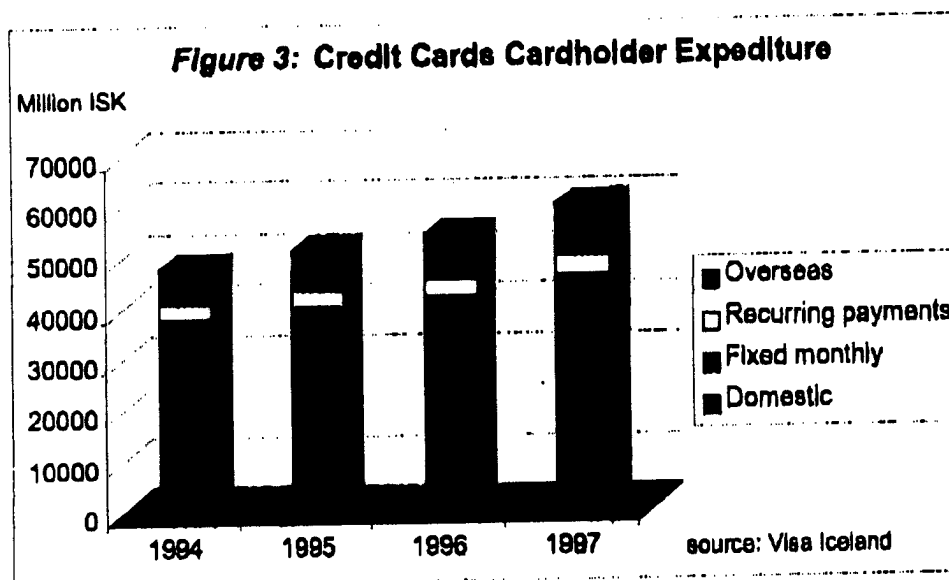


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Cards can be used not only for retail payments, but also for several other purposes. For instance, "fixed payments", "spread payments" and "easy payments". *Spread* payments are used for high amounts instead of revolving credit, as for instance household appliances. *Easy* payments are alike, but for lower amounts.

Moreover there are "bonations payments" for good causes, "telephone payments" and "split payments" for bill distributions. Services offered by Visa are not only the cash disbursements, but also travel insurance, emergency services, VIP-programmes, special bargain offers, payment of bills and taxes. In Figure 3 we can see the main usage of Visa cards.

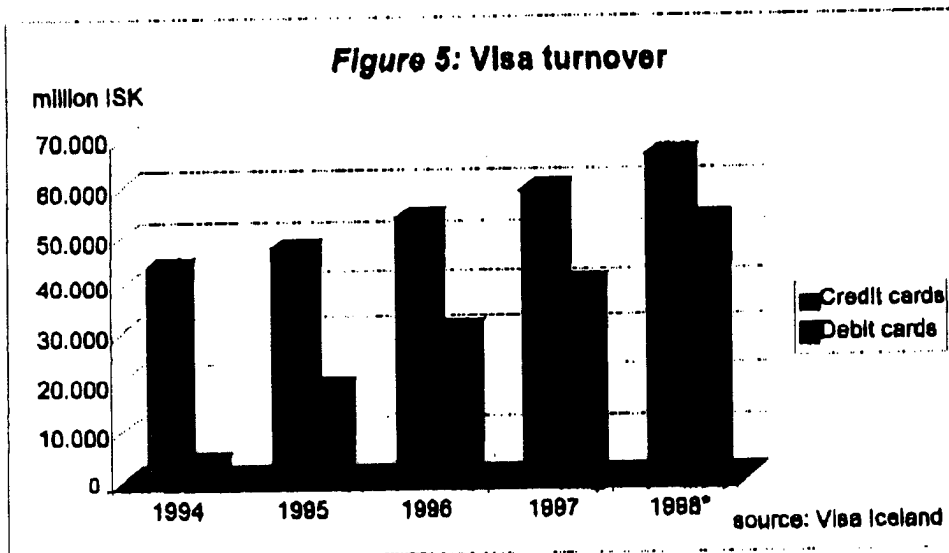
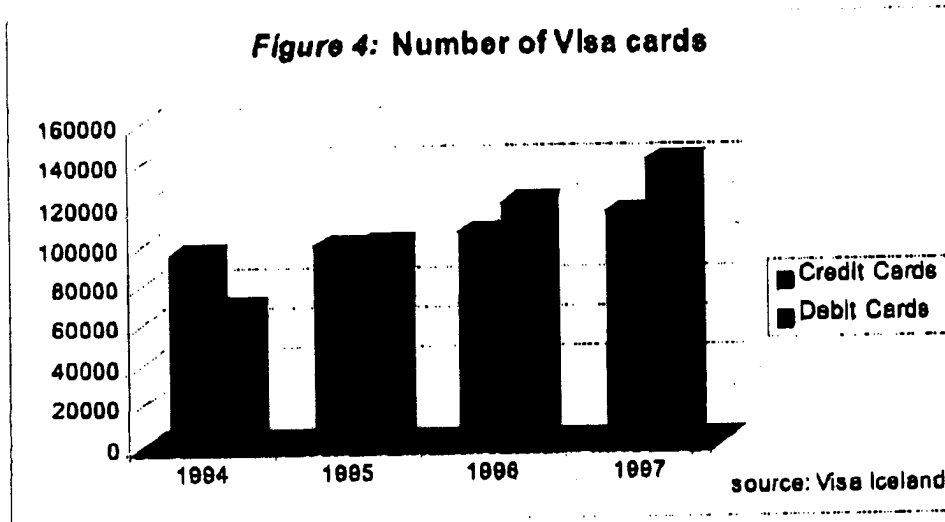


Electron is the last Visa product introduced on the Icelandic market. It was launched in 1993 and is an on-line POS and ATM debit card. This one, together with Maestro¹⁸ has been very successful in accelerating the trend away from cash and cheques towards electronic payments. Figures 4, 5 and 6 show very clearly this rapid increase in popularity of debit cards. Since debit cards immediately deduct payments from a bank account, they represent an increasingly popular electronic payment option for consumers. More than 150.000 debit cards were issued in the first three years (see

¹⁸ Maestro is the Europay debit card; it was also launched on 1993.

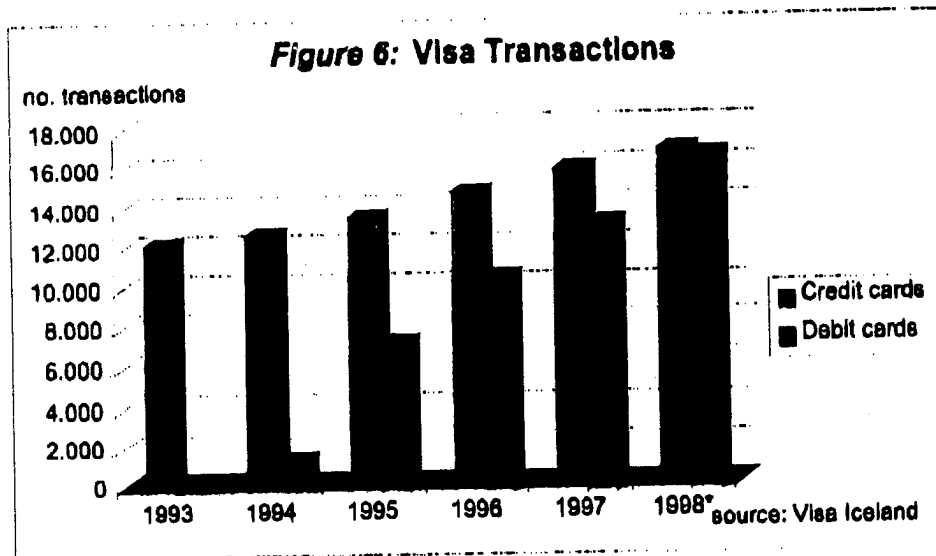
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Figure 4, section 1, Part 1). As a result, cheque transactions dropped sharply from three million a month to only 600.000.



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* Estimates.

At this moment, Visa Iceland and Europay are exploring new ways to increase the already high card use. In order to do so, the two companies are working on their next product: an electronic purse in a multi-applications chip card. This is likely to stimulate the use of cards even more to the detriment of cash.

In section 5 (part 1) we presented a flow chart of the card payments flow. It is useful to keep this flow chart in mind when analysing the different cost components in the use of cards. A card payment involves four different parties:

- The *consumer* who uses the card instead of cash or any other payment instruments.
- The *merchant* who accepts the card transaction via the manual or electronic equipment and later on receives the money from his bank.
- The *bank*, which issues the cards, keeps all relations with cardholders, and guarantees the payment.
- The *Card Company*, which runs the processing, the network and gives the authorisation.

We now analyse the costs and revenues of all the parties involved.

3.2 Bank Card Companies

Normally the Card Company acts as an intermediary between the issuer, who deals with the cardholders and, the acquirer, who deals with the merchants. As a small country, Iceland has a simplified structure: Visa is also the acquirer and Europay is at the same time acquirer and issuer.

◆ *Issuer*

On the issuer side, the debit and the credit cards follow slightly different procedures. The typical process to obtain a *Visa credit card* is the following: customers apply for a card and obtain it, Visa then buys the plastic card and provides it to the bank. The latter, acting as the issuer, put its inscriptions on the card, decides about the expense limit and takes all arrangement with the cardholder. Differently, Europay issues its credit cards directly and therefore is also responsible for the collection and for all relations with customers. In the Europay case, banks operate only as intermediaries in the sense that people apply in the bank for a MasterCard; the bank then sends the request to Europay for the decision.

Concerning *debit cards*, the cycle is similar. Some change has occurred since last August, however. Banks now buy plastic cards directly from the same provider in the US and receive all cardholder fees. Therefore, for debit cards, the Card Company simply guarantees the transmission network for the transaction via the POS network and, when needed, gives the authorisation. In this study we do not consider this change, as our most recent annual data refer to 1997.

Both card companies act as a joint card service centre, provide cards to their customers and run the system operations. They decide when an authorisation is needed, that is to say, when the transaction must be on-line or not. In case of fraud the Card Company intervenes, not the bank.

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◆ *Acquirer*

The Card Company deals directly with the acquiring merchant, i.e., the Card Company has contractual agreements with merchants resulting in the acceptance of cards. It decides about the pricing, and it takes care of the marketing and the promotion. Finally, the acquirer provides authorisation services to its merchants.

Credit card transactions are either electronic (*Eftpos*), via a POS terminal, or manual (*paper-based*). Debit card transactions are exclusively electronic as they are directly deducted from the current account. At this moment, most of the transactions are Eftpos. From its beginning in 1990, Visa is running the Eftpos network for both Visa and Europay transactions¹⁹. Icelandic department stores and petrol companies do not operate their own retailer payment system.

Eftpos transactions are not necessarily on-line. Transactions remain off-line (i.e. there is no connection with the POS-department) when payments are smaller than ISK 5.000 in the case of debit cards and, ISK 10.000 in the case of credit cards. Payments exceeding these amounts are on-line. On average, on-line transactions represent 13% of the total. Within off-line transactions there are some random authorisations, whose share is 2/10 for debit cards and 3/10 for credit cards. In addition, every time the POS/ECR²⁰ terminal recognises a foreign card, the terminal is connected automatically to the Visa network for an authorisation. The same happens for 40.000 special debit cards (the total of debit cards in 1997 was 207.000) belonging to persons at risk, i.e. those persons who have experienced bankruptcy, or who encountered problems with the law etc²¹. Thus, on average, the total of on-line transactions amounts to 40% for both credit and debit cards.

¹⁹ This is because Visa started its activity in Iceland before Europay. So, for banks and for Europay as well, it was more convenient to use only one transfer system.

²⁰ Electronic Cash Register. It is a terminal alternative to the POS one.

²¹ Differently, for credit cards if the applicant shows some risks either the card is refused or someone gives a guarantee for the cardholder. In this second case all transactions over ISK 100.000 will be on-line.

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We now analyse the *costs* and *revenues* of card companies.

- *POS department*

A part of card companies' costs originate in the POS department (see Table 7). This department is run separately from other Visa departments, as it provides a service for the whole card industry. Principal expenses of the POS department are wages²², the network and the software costs, technical costs and others. All these costs amounted to [CONFIDENTIAL] million in 1997. About half of these costs is paid for by the banks and the rest by Visa and Europay²³.

The POS department also includes costs of the Banks' Data Centre services. This Centre deals not only with the clearing and settlement, but also with the technical transmission of data²⁴. Visa (not the banks) pays the Banks' Data Centre, for both debit and credit cards transactions²⁵. This cost amounted to ISK [CONFIDENTIAL] million for the first nine-month of 1998 and [CONFIDENTIAL] million for 1997. As one can see in Table 7, the cost of the POS department almost doubled between 1994 and 1998, while the number of Eftpos transactions trebled. This implies a substantial decrease in the per-transaction processing cost and suggests that the network processing of electronic card transactions can be characterised by some scale economies.

Table 7: Cost of the POS Department

	1994	1995	1996	1997	1998 ^{***}
Total cost*					
Transactions number	12.764.942	22.737.208	28.537.508	33.333.542	36.900.000
Cost per transaction**					

*Million ISK. ** ISK. *** Estimate. Source: Visa Iceland.

[SOME FIGURES REMOVED FOR CONFIDENTIALITY]

²² The POS department consists of seven people full-time plus some more people only during the summer.

²³ Europay reimburses the POS department 11,3% and Visa 34,3%.

²⁴ Every transaction go trough the Banks' Data Centre, also those within the same bank.

²⁵ This is because Visa runs the POS network.

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- *Cost of the plastic*

Other costs for the card industry are the cost of the plastic used in cards. This cost depends on the type of card but it also varies with the size of the order. In Table 8 one can see the cost for each type of card. The cost of debit cards is very low compared with the average cost of credit cards. The main reason is that all the debit cards are all the same, whereas there are many different types of credit cards. As a result, there are larger economies of scale in debit cards production than in the production of credit cards.

Table 8: Cost of plastic card (VISA)

Credit card: Type of card	Cost in ISK
Classic	
T&E	
Premier	
Business Silver	
Business Gold	
T&E Classic + Iceland Air	
Premier + Iceland Air	
<hr/>	
Debit card	

Source: Visa Iceland. Data refer to October 1998.

[FIGURES REMOVED FOR CONFIDENTIALITY]

- *Other costs*

The Card Company bears the cost of *marketing, of personnel* and other *miscellaneous* expenses. Finally, we have to take into account the *fees* that Visa pays to Visa International and that Europay pays to Europay International. Those service fees are daily, quarterly and annual.

- *Revenues*

Visa and Europay earn revenues from the merchants and the consumers-cardholders. They receive the fixed fee paid once directly from the cardholders, and all the merchants' fees. At a later stage these revenues are redistributed between the card companies and the banks through the *interchange*.

3.3 Commercial Banks

Banks issue most of the Icelandic credit and debit cards that are based on current accounts. They deal directly with the collection and other relations with cardholders. In particular, banks give customers services and information, approve card applications, set spending limits, obtain guarantees if needed, and collect outstanding balances.

- *Costs*

The banks' expenses related to credit cards include *personnel*, *interest forgone* and other *operational costs*. We ignore the exact cost items related to debit cards because their operations are closely linked to the operation of current accounts. It appears to be very difficult to separate the two cost items. For this reason we assume that banks have similar costs for the operation of credit and debit cards, apart from the *interest forgone*.

Since August 1998 banks also pay the plastic for debit cards, but not for credit cards. In our estimate this item is neglected not only because it does not affect our cost analysis, but also because our more recent figures refer to 1997.

In the following table we can see the detail of costs borne by banks related to cards.

Table 9: Banks' Costs

Items	Million ISK
Personnel	
Interest forgone	
Other operating costs	
Total	

[FIGURES REMOVED FOR CONFIDENTIALITY]

- *Revenues*

On the revenue side, banks collect income coming from *annual fees* of credit and debit cards, from *reminder fees* and *statement fees*.

A purchase with credit cards implies a credit to the customer, generally, until the end of the month, with a consequent interest gain for the bank. Actually, for credit cards banks have at the same time a cost (when the bank have to reimburse the Card Company before to get the money from customers) and a revenue linked to interest. The revenue is generally higher than the cost.

Before 1995, banks received all cardholders' fees and the card companies received all merchants fee. Since 1995, fees are split for the interchange. Banks transfer [CONFIDENTIAL] of their fee income from cardholders to the card companies and the card companies transfer [CONFIDENTIAL] of their fee revenue from merchants to banks.

3.4 Merchants

Almost every retailer in Iceland accepts credit or debit cards, also for very little expenses. The shift towards cards was very fast mostly for debit cards. Initially, merchants manifested a strong opposition. Retailers perceived this new means of payment, imposed by banks, as very expensive. But the demand from cardholders was so strong that most merchants decided to accept debit cards too.

Icelandic merchants have the advantage of profiting from low fees, compared to those of other small countries, but also compared with the fees applied in large countries²⁶. There are several reasons for these low fees in Iceland.

First, in contrast to other countries, where merchants are reimbursed on a weekly basis, Icelandic merchants are paid by their bank on a monthly basis. Secondly, the merchants' union exerted a strong pressure for lower fees. Thirdly, the generalised use of cards allowed the acquirer to benefit from economies of scale and consequently to lower the fees. Fourthly, the risk of fraud is relatively low in Iceland. This makes it

²⁶ Martin, R., 1995, *Cards International*, July 20.

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possible for a large share of transactions to be off-line and, consequently, less expensive.

- *Merchant Fees*

- ◆ *Credit cards*

For credit cards, there are large differences in the monthly fees merchants pay. These fees depend on the categories of stores and on the kind of equipment held by the merchant²⁷ (see Table 10). Merchants with POS terminals have lower monthly fees because of an explicit policy of Visa and Europay aiming at completing the substitution of the old manual equipment.

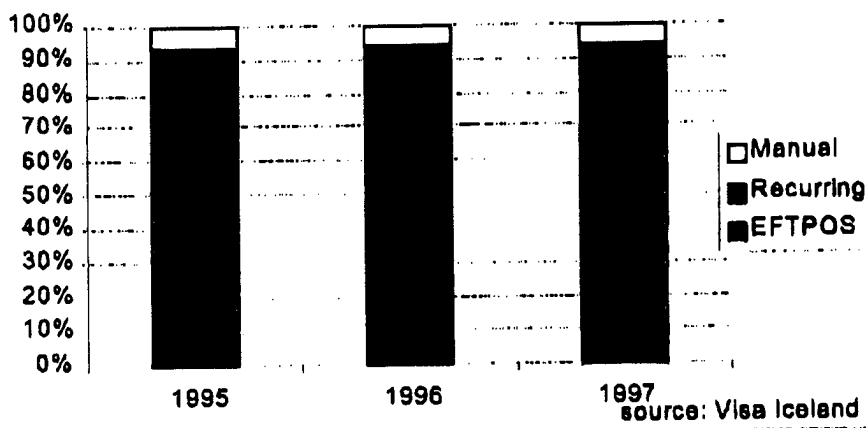
Table 10: Visa Merchant fees

Card	Transaction	Merchant category	Fee	Average fee
Credit	Paper-based	All		
	Eftpos	Big supermarkets – Oil companies		
		Food stores All except food stores		
Debit	Eftpos	Big supermarkets – Oil companies All Others		

Source: Visa Iceland.

[FIGURES REMOVED FOR CONFIDENTIALITY]

Figure 7: Domestic number of transactions (shares)



²⁷ Different retail sectors have different fees, for instance in 1995 small merchants had a fee of [CONFIDENTIAL], hotels of [CONFIDENTIAL], car rentals of [CONFIDENTIAL], restaurants of [CONFIDENTIAL], petrol stations of [CONFIDENTIAL] and supermarkets of [CONFIDENTIAL]. So the monthly variability depend on the relative share of transactions in each kind of store.

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At present, *paper-based* transactions, i.e. those done by means of a manual equipment, represent only a small part (around 5%) of total turnover (see Figure 7). The merchants using manual equipment normally have very small activities and pay a fee amounting to [CONFIDENTIAL]²⁸ of the transaction's volume. These merchants have to deposit caution money of 15.000 króna for the manual equipment, which will be given back when they decide to replace it with an electronic terminal. We do not take the latter cost into account. Visa and Europay supply all the paper needed for this equipment for free.

The merchants using *electronic transactions* (Eflpos) can be classified in three categories with different fees (see also Table 11):

1. All shops in general except food stores;
2. Food stores;
3. Large supermarkets and oil companies.

Table 11: Merchant fees (% volume)

	1990	1991	1992	1993	1994	1995	1996	1997	1998*
Average merchant fee for credit card ²⁹									
Merchant fee for debit card ³⁰									

* Estimate. Source: Visa Iceland.

[FIGURES REMOVED FOR CONFIDENTIALITY]

The fees are based on the volume of the transaction. The different fees are shown in Table 10. On average it amounts to [CONFIDENTIAL] for the three categories. Within the three categories we have to make a distinction between merchants with a POS equipment, and those with an ECR one. The two terminals, whose number is still increasing as shown in Figure 8, are used for both credit and debit cards.

²⁸ Before 1996 their transaction fee was [CONFIDENTIAL].

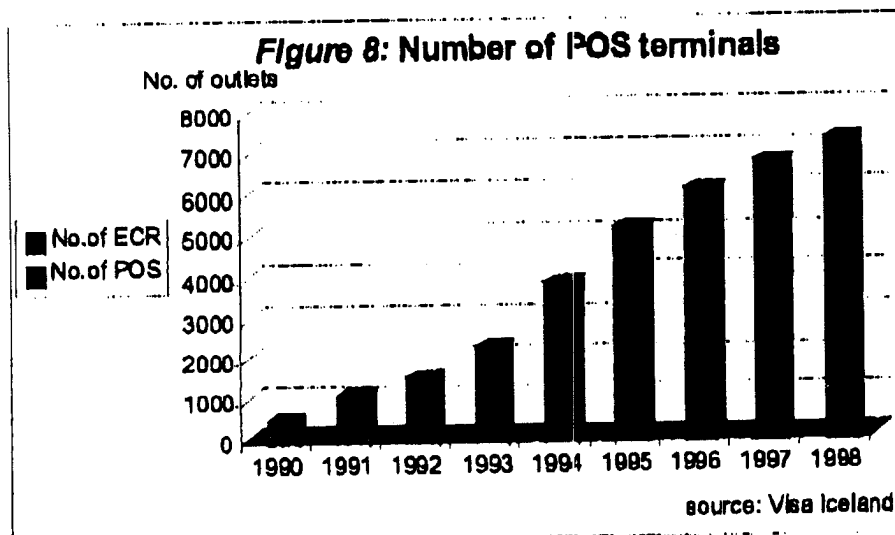
²⁹ The fee calculated as a percentage of the transaction amount and it results from the average between fees for POS and for ECR terminal.

Those are service fees for Visa. Fees for Europay are almost 10 % higher.

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Most merchants have a POS terminal, which is rented from Visa and paid for on a monthly basis. Merchants can choose between five different models of POS terminals, which differ mostly by the type of printer. The price varies from ISK [CONFIDENTIAL] to ISK [CONFIDENTIAL] per month, but it is free during the first month. In 1997, the average rent was ISK [CONFIDENTIAL]. At this moment there are 6300 POS terminals in Iceland (see Figure 8 and Table 12).



Merchants belonging to the third category - large supermarkets and oil companies -, normally have an ECR terminal, which is linked to a large software system. Card payments are only a small part of this system, which is also used to make orders, purchases and so on. These software systems are generally obtained from software houses, independently from Visa. However, Visa - the POS department - provides technical support to make the terminal card-compatible and to run through a first testing period³⁰. Merchants provided with ECR terminal pay a lower fee as can be seen in Figure 9 [OMITTED ON CONFIDENTIALITY GROUNDS].

³⁰ Those are service fees for Visa. Fees for Europay are almost 5 % higher.

³¹ The stores' software house pays the card company for this service about 50.000 krónur only once.

Table 12: POS terminals rent

	1990	1991	1992	1993	1994	1995	1996	1997
Number of POS terminals ³²	387	966	1.347	1.376	2.799	4.614	5.337	6.110
Average rent per month ³³								

[SOME FIGURES REMOVED FOR CONFIDENTIALITY]

◆ *Debit cards.*

All debit card transactions are electronic; their fee is volume-based. For supermarkets, large food stores and oil companies the fees are between [CONFIDENTIAL] and [CONFIDENTIAL]. These categories of stores together represent 20 percent of merchants and about 50 percent of the total volume of transactions. For the other stores, representing 80 % of all merchants and 50 % of total turnover, the fee is between [CONFIDENTIAL] and [CONFIDENTIAL]. In January 1998, the average merchant fee for debit cards was [CONFIDENTIAL] of the transaction's volume and it has been quite stable since 1993 (see Table 11). Table 10 summarises all merchants' fees for debit and credit cards while Figure 9 (OMITTED ON CONFIDENTIALITY GROUNDS) represents the evolution of Visa merchant fees³⁴. We notice that, while the fee for ECR transactions decreased during the last nine years, the fee for POS transactions increased during the same period.

Credit and debit cards can also be used to pay taxes and utility bills. As a result, besides retailers, there are some special merchants such as the *Government*, the *Electricity Company* and other utility companies. The government has to pay Visa for the rent of POS terminals (ISK [CONFIDENTIAL] per month) and a service fee, which is fixed per transaction (see appendix, Table A3).

³² These numbers corresponds at the number of POS terminals for which a rent is paid. But as merchants don't have to pay for the first month, the numbers here reported don't correspond exactly at the existing number of POS terminals, which is a little higher.

³³ These values are an average of the rent price of the five models.

³⁴ These rates apply to Visa. Europay's merchant fees are 10% higher for credit cards and 5% higher for debit cards.

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The Electricity Company pays [CONFIDENTIAL] of the transaction volume with a minimum of ISK [CONFIDENTIAL] and a maximum of ISK [CONFIDENTIAL]. During the last few years, the average per transaction was [CONFIDENTIAL].

- *Paper*

Another cost for merchants, even if less evident, is the cost of the paper used for the terminals. This is estimated to be ISK [CONFIDENTIAL] million for the year 1998 and [CONFIDENTIAL] for the year 1997.

- *Telecommunications*

Retailers bear the cost of telecommunications. These costs only arise for on-line transactions. The cost of each telephone call is ISK 3,32 plus VAT (24,5%).

Adding up all these merchant's costs we arrive at a total of ISK 1,6 billion.

3.5 Cardholders

- *Fees*

Cardholders pay two kinds of fees for credit cards. The first one is a fixed fee paid once at the time the card is obtained, the second one is an *annual fee*. These fees depend on the type of card, and also on whether it is the first or the second one attached to the current account. Tables A1 and A2 in appendix show the exact fees' amount and the number of cards of Visa Iceland. In 1997, the average annual fee for all cards was ISK [CONFIDENTIAL]. There is also a transaction fee for every withdrawal at an ATM. We will neglect this withdrawal fee because cash withdrawal is not part of the cost of a cards based payment system.

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For *debit cards* there is a fixed, *annual fee* of ISK [CONFIDENTIAL] and a *fixed fee per-transaction* of ISK [CONFIDENTIAL]³⁵, independently of the transaction's amount.

Cardholders also have to pay banks a *statement fee* and, if they do not pay their bill in ten days, a *reminder fee*.

- *Interest forgone*

To be cardholder presumes that the consumer is account holder as well. As it is well known, money kept on a current account yields very low or zero interest rates. In Iceland the interest rate on a typical current account is 0,45%. Therefore, similarly as we did in the case of the cash payment system, we assume that consumers face an interest loss. This is because they are obliged to keep their money on a current account in order to use their card instead of, for example, buying time deposits. The difference between the effective interest income and what they would earn investing the same money in time deposits amounts to about 400 million. Like the *interest forgone* in the cash payment system, this consumers' cost is an opportunity cost.

Adding up all these different costs, we arrive at a total cost for consumers (cardholders) of **more than ISK 1 billion**.

As mentioned earlier, the fees paid by cardholders represent a revenue for the banks and for the card companies. Similarly, the *interest forgone* constitutes an income for commercial banks. Therefore the part of the costs borne by the consumers is compensated by revenues for the banks and card companies. It follows that these costs are transfers within the payments system and do not affect the total cost of operating the card system.

³⁵ Only one bank imposes a transaction fee of ISK [CONFIDENTIAL].

4. BELGIUM: COSTS AND REVENUES OF A CASH PAYMENT SYSTEM

4.1 The National Bank of Belgium

The stock of currency in circulation in Belgium amounted to BF 500 billion in 1998. The share of currency in the total money stock is decreasing, even though cash remains a popular instrument. It still accounts for the 75 to 80% of all transaction³⁶, i.e. around four billion transactions³⁷. Thus, Belgium is one of the countries in the EU with the most intense use of cash. In 1991 notes and coins in circulation in Belgium amounted to almost Ecu 1000 per capita. Only Germany, the Netherlands and Spain had higher ratios of currency per capita³⁸. Of the total amount of currency in circulation 60% is used by consumers for transaction purposes, while the remaining 40% is used for hoarding purposes³⁹.

Table 13: Currency in circulation (million BF)

	1995	1996	1997	1998
Coins	19.709,0	21.867,4	22.709,2	23.305,8
Notes	445.836,7	464.675,4	478.638,0	482.920,0
Total Currency	465.545,7	486.542,8	501.347,2	506.225,8
% of GDP	5,78	5,86	5,74	5,58

Source: National Bank of Belgium and Monnaie Royale de Belgique.

As we can see in Table 13, during last four years the amount of both notes and coins has increased slightly every year⁴⁰. However this increase has not kept up with the increase in GDP. As a result the stock of currency is decreasing as a percentage of GDP. This outcome could reflect the influence exerted by the large retailers and the banking sector in their strategies to encourage electronic payments⁴¹.

³⁶ Leo Van Hove, 1997, 'Op naar de "cashless society"?' in *Economisch en Sociaal Tijdschrift*, pp.35-82, 59.51.

³⁷ Association Belge des Banques (ABB), 1998.

³⁸ The Boston Consulting Group, *European Money Handling System*, 1993

³⁹ Ibidem.

⁴⁰ This table also includes the amount of currency hold by the financial institutions.

⁴¹ Banque Nationale de Belgique, "Rapport 1998".

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While the value of notes has increased, Table 14 shows that the number of the notes in circulation was reduced from 334,8 million in 1997 to 330,9 million in 1998, i.e. a decline of 1,2 percent. This movement has been due chiefly to the substitution of notes of BF 2.000 and BF 200 for smaller denominations.

Table 14: Number of notes (millions)

Notes	1995	1996	1997	1998
10.000 BF	20,6	22,5	22,0	23,0
5.000 BF	0,2	-	-	-
2.000 BF	62,1	67,3	79,6	77,8
1.000 BF	86,2	75,0	68,6	65,7
500 BF	27,0	27,2	28,6	29,4
200 BF	-	24,5	28,0	30,0
100 BF	150,4	109,0	108,0	105,0
Total	346,5	325,5	334,8	330,9

Source: National Bank of Belgium.

While banknotes are issued by the National Bank (NBB), coins are produced by a special institution, the *Monnaie Royale de Belgique*, a branch of the Ministry of Finance. However, the coins are put into circulation by the NBB on behalf of the Ministry of Finance. At the end of 1998, the number of coins in circulation amounted to 23,3 billion (an increase of 2,6 % with respect to the previous year). 1998 was also the last year of production of Belgian francs. Since the start of 1999 the *Monnaie Royale* has started minting Euro-coins.

Banks make daily transfers of currency from and to the National Bank. Notes returned to the NBB are checked and sorted. Special machines, able to verify the authenticity and the degree of deterioration, process on average between 40.000 and 70.000 notes per hour. These machines also count, make the packaging and finally destroy the bad notes. In 1995 the amount of notes withdrawn from circulation was 10,6% of the total. In 1996 it was a high 25,6% because of the replacement of the 100-BF and 1.000-BF denominations with higher denomination notes.

In Table 15 we show the frequency in the return of notes at the National Bank, i.e. the average number of times a certain denomination is returned to the National Bank during the year. This frequency has increased continuously between 1980 and 1994

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(from 1,4 to 3 times a year). Conversely, during last years it has been stable and depends very much on the denomination: it is more frequent for smaller denominations.

Table 15: Return frequency of notes

	1992	1993	1994	1995	1996
10.000 BF	-	4,1	3,0	2,5	2,2
5.000 BF	2,0	1,7	2,6	-	-
2.000 BF	-	-	3,9	4,1	4,0
1.000 BF	4,9	5,2	5,1	4,9	4,9
500 BF	1,8	1,9	1,9	2,1	2,2
200 BF	-	-	-	-	1,1
100 BF	1,5	1,5	1,6	1,7	1,8
Average	2,7	2,8	3,0	3,0	3,0

Source: National Bank of Belgium.

Like the notes, the coins are returned to the National Bank where they are checked and sorted. The coins damaged and withdrawn from circulation are returned to the Monnaie Royale.

The lifetime of notes is, in most cases, between two and three years, also depending on the denomination. In Table 16 we show the average duration of each note during the last few years. We observe that the duration is quite stable. The average lifetime of coins is more difficult to estimate. The only thing we know for sure is that a coin remains in circulation at least ten years. The 20-francs coins struck in 1982, as well as the 50-cents struck in 1952 are still in circulation. On the other hand it is widely known that a significant part of the coins are lost or have disappeared abroad⁴².

Table 16: Lifetime of notes (number of months)

	End 1993	End 1994	End 1995
10.000 BF	26	27	27
5.000 BF	25	25	26
2.000 BF	34	34	34
1.000 BF	-	-	-
500 BF	66	70	-
100 BF	-	-	-

Source: National Bank of Belgium.

⁴² De Nederlandsche Bank, Annual Report 1997.

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According to a study conducted by a Belgian bank, 10,70% of notes and 0,72% of coins are held by the financial institutions. Merchants hold 53,52% of notes and 16,16% of coins, while another 2,33% and 1,80% are held respectively by coin-processors and by vending machines. The general public holds 35,78% of notes of which 26,61% is used for transaction purposes while 9,17% is hoarded. The public also holds 79% of coins but of this share, only 16,16% is used for transaction purposes while the rest is hoarded.

Costs

- The cost of producing a bank note in Belgium is on average BF 3⁴³. This cost includes preliminary work (such as engraving and drawing), raw materials (ink and paper), the printing and the finishing (quality control, cutting and packaging). The unit cost varies according to the kind of note: it increases for large denominations and decreases for small ones. There are two main reasons for this, which have to do with the level of security (higher for large denominations) and economies of scale (which are higher for smaller denominations because of larger production).

We estimate that every year about 122 million of new bank-notes come in circulation, so that the total production cost of notes is BF 366 million.

As mentioned earlier, the Ministry of Finance is responsible for the production of coins. In the following table we show the unit cost of production of the different coins. In 1998 the total production cost of coins amounted to BF 250 million and 210 million new coins were minted.

⁴³ Note that the unit cost of producing notes in Netherlands is 0,25 NLG (4,58 BF), that is a unit cost 1,5 higher than in Belgium. In addition, in the Netherlands the notes in circulation have an amount of almost the double of notes in Belgium, nevertheless the number of notes is approximately the same (394 million in the Netherlands *versus* 331 in Belgium). In 1997 in the two countries the same number of new notes were produced.

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Table 17: Cost of Coins

	Metal	Mint	Wages	Various	Deprec.	Package	Total
0,50 BF	0,432	0,283	0,153	0,192	0,013	0,066	1,139
1 BF	0,050	0,272	0,153	0,314	0,013	0,066	0,676
5 BF	0,513	0,429	0,153	0,293	0,013	0,066	1,467
20 BF	0,774	0,638	0,153	0,159	0,013	0,066	1,803
50 BF	1,701	1,050	0,153	0,192	0,013	0,066	3,175

Source: Ministry of Finance. Data 1997.

- The handling cost for the National Bank, that is, the wage costs of the personnel involved in the handling of cash is assessed at BF 750 million a year⁴⁴. This amount includes the cost of putting into circulation of notes, taking delivery of deposits, sorting out, counting, and stocking. The number of people dealing with the actual processing (sorting out and counting) has dropped during the last fifteen years thanks to a strong automation. However, the activities of putting into circulation and taking delivery of currency remain mainly manual.
- The depreciation cost of the processing machines (for counting, sorting out, and destruction) amounts to BF 30 million a year. The Bank's personnel looks after the maintenance of those machines⁴⁵.
- The National Bank has also some transport costs. The Bank takes care of the transport of banknotes inside its network: headquarter, outlets and branches, representation offices. The transport of coins is outsourced to private companies. The total transport cost amounts to BF 50 million per year. This amount includes the cost of personnel, security, depreciation of the rolling stock, insurance, and external services. The transport between the Bank and the financial institutions is made by private companies and is payable by the financial institutions.
- Finally there are security costs. Those are due to the 100 guards working at the National Bank (the cost is estimated at BF 300,7 million per year). In addition, 25% of the yearly depreciation of the buildings of the NBB is related to the investment in security features. This amounts to BF 148 million.

In Table 18 we can see summarised all the costs of the National Bank.

⁴⁴ National Bank of Belgium, 1999.

⁴⁵ Their wage cost is already included in the handling cost.

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Revenues

- The note and coin issue is a source of revenue for the National Bank. Since the currency does not yield interests to its holder, the NBB and the Treasury can invest this money in interest earning assets. On the other hand, these revenues are a cost for financial institutions, and for merchants and consumers.

In Table 18 we show the profit and loss account of the NBB. The profits of the NBB (sometimes called seigniorage) are substantial, amounting to BF 12,4 billion for 1998.

Table 18: Costs and Revenues of the National Bank of Belgium (million BF)

		1998
Costs	Production of notes	366
	Production of coins	250
	Handling	750
	Machines	30
	Distribution & Transport	50
	Security	448,57
	Total Costs	1894,57
Revenue	Interest earned	14337,31
Total		-12442,74

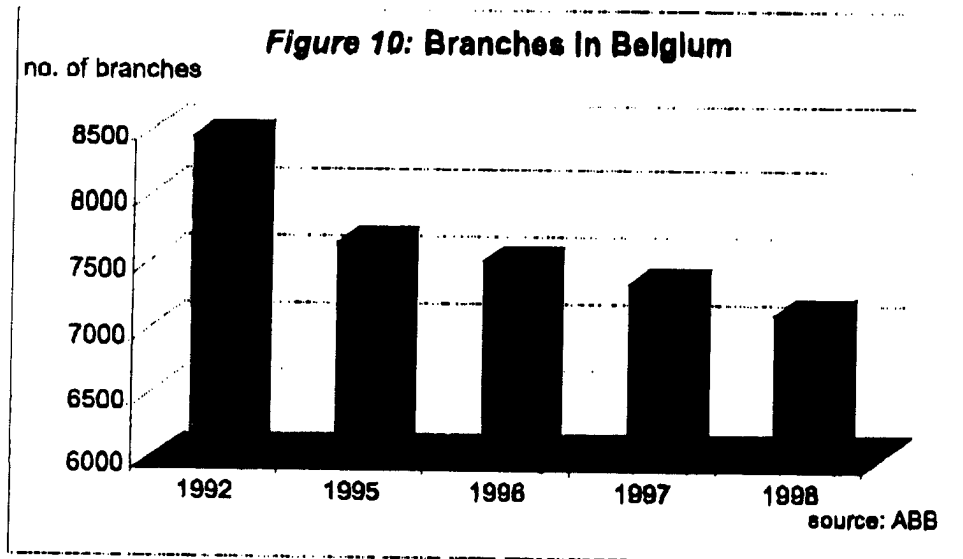
4.2 Commercial Banks⁴⁶

Costs

1. Every time a banking operation involves currency, there is a handling cost associated to it as the money has to be counted, stocked, registered in the cash outflow, then transported from one safe place to another. Finally, it has to be protected and stored. This handling cost is defined as the wage cost of the personnel dealing with cash.

⁴⁶ The data presented in this section are extrapolations to the whole banking sector of internal data graciously provided by a private bank. This bank has a share of about [CONFIDENTIAL] of the Belgian banking market.

The total cost of handling cash in Belgium amounted to BF [CONFIDENTIAL] billion in 1998. This cost has decreased from the previous year by about 700 million because of the reduced number of branches (see Figure 10). More than 90% of the handling cost of cash is located in the branches. Among the personnel manipulating the currency, about 40% deals with coins. The remaining 60% deals for one half with notes and another half with foreign currencies. Among the different operations at the counter, the most expensive one is certainly the trading of foreign currency. The cost per transaction (personnel cost) amounts to BF [CONFIDENTIAL]. The cost of transfers at the counter amounts to BF [CONFIDENTIAL] per transaction, while money withdrawals cost BF [CONFIDENTIAL] per transaction.



- The transport cost is very high in Belgium. Following several attacks to the money transports between 1997 and 1998, the transport escorted by the police has been made compulsory for 'inter-city' trips⁷. This decision seems to have a positive effect, since attacks have decreased substantially. On the other hand banks' costs related to the transport have increased. In particular, between 1996 and 1997 transport cost increased by 43% due to the presence of an additional person for every trip (at this moment there are three people instead of two). As a result, total cost of transport increased from [CONFIDENTIAL] million in 1996 to

[CONFIDENTIAL]⁴⁶ in 1998. Nonetheless this increase does not fully reflect the 43% increase in personnel cost because many banks were obliged to substantially diminish the frequency of trips, as a result of the persistent strikes of transport companies in 1997 and 1998.

3. More than the other participants in the payments system the banking sector faces the security issue. As a consequence, it undertakes the heaviest investments in that field. In order to compute the cost of security in the branches, we compare the total building cost with the cost of the same building without any security device. We assume that the extra cost is the cost of security. We consider three-quarters of security costs as devoted to cash and one-quarter to non-cash (cards). The security costs refer to electronic safety (alarm equipment), physical security (for example night safes, security of the counter, special glass-doors, external reinforced windows, etc.) and extra security (controlling device at the entrance). All this involves an expenditure of BF [CONFIDENTIAL] million for a branch with seven working people. Such an investment has an average duration of ten years, which implies a yearly cost of BF [CONFIDENTIAL] million considering a constant depreciation rate.

The riskiness of the currency also involves insurance costs. This is estimated to be about BF [CONFIDENTIAL] million a year for all the branches. This figure only includes insurance of material damages and loss of notes in the branches caused by robbery or fire etc⁴⁷.

Since in Belgium there are 7129 branches, the total amount spent on insurance and security is BF [CONFIDENTIAL] billion. Like the handling cost, this cost has been decreasing lately, not because of an effective lower expenditure, but because the number of branches is decreasing: from 1995 to 1998 more than 500 branches have been closed.

4. The fraud related to currency was BF [CONFIDENTIAL] million in 1997 and BF [CONFIDENTIAL] million in 1998. Those losses refer to the number of false

⁴⁷ Decision taken by the Ministry of the Interior.

⁴⁸ Whom BF 110 million for the *Gendarmerie*. They charge BF 25.000 for escorting an amount of 50 million, i.e. 1-BF for every 2.000-BF banknote.

⁴⁹ The fraud on currency in circulation is not included here.

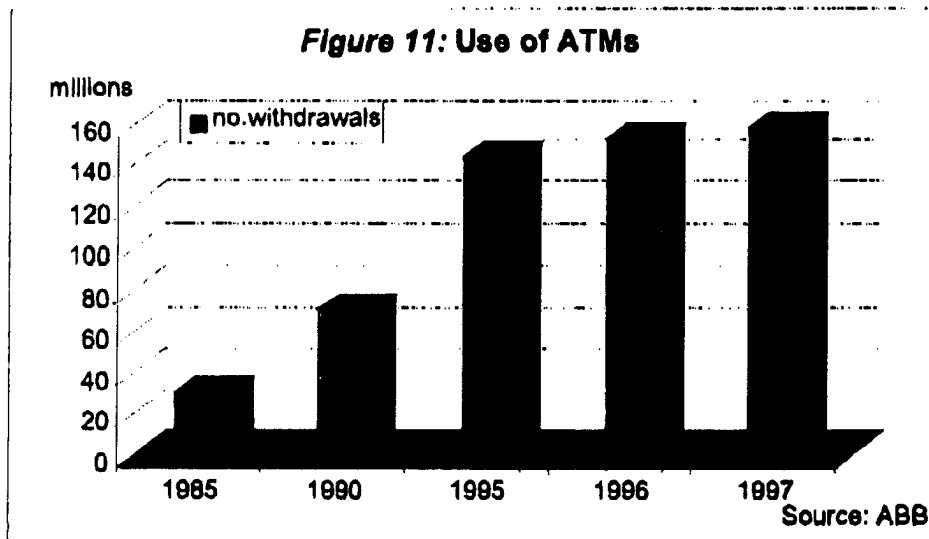
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notes arriving at the banks. Most of the fraud is related to foreign currencies (54% of the fraud cost in 1997 and 72% in 1998).

5. As far as the cost of ATMs is concerned, we have to distinguish between the ATMs operated directly by the banks, and those operated by Banksys.

For private ATMs operated by the banks there is the yearly investment and maintenance cost amounting to BF [CONFIDENTIAL] per machine. For all ATMs operated by banks, this adds up to almost BF [CONFIDENTIAL] million, which constitutes the most important cost component.



In addition, there is the personnel cost associated with the reloading of the ATMs. This item varies widely from one bank to another. Some banks load high amounts of currency in the machines and refill them only once they are empty. For security reasons, however, other banks prefer to reload the machines more frequently with smaller amounts. In this second case, the machines are never empty and have an average stored amount of one to two million francs. This leads to higher personnel costs as well as higher interest *forgone* on the currency stored. Given the Belgian experiences of frequent hold-ups on currency transportation and

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attacks to ATMs, it appears that a majority of banks follows this second procedure.

Since we lack information on the exact distribution we assume that all the banks follow this procedure. On average every ATM is loaded two or three times a week and this task takes fifteen minutes. With those assumptions, the total expenditure for Belgian banks for the reloading of the ATMs is BF [CONFIDENTIAL] million. The average loaded amount ranges from BF 1,6 million to a maximum of 2 million.

Another cost is for insurance, which amounted to [CONFIDENTIAL] million for all Belgian banks. This item includes the insurance for automatic deposits.

The fraud related to ATMs is negligible.

The interest forgone on money stored in ATMs is also an important cost item. Using the assumptions about the average stock of currency in storage we arrive at BF 195 million of forgone interest.

One should also take into account the machines for automatic deposit, which have the opposite function with respect to ATMs. Automatic deposits are used by the customers, notably the merchants, to deposit money without any involvement of the branch's personnel. Therefore, these deposit machines do not lead to personnel cost or interest forgone. The only cost is the investment (BF [CONFIDENTIAL] a machine on yearly basis) and the insurance. Since, according to our estimates, there are 980 automatic deposit machines the total investment cost is BF [CONFIDENTIAL] million. The cost of insurance is already included in the figure concerning ATMs.

We present these different cost items in Table 19. The total cost of operating ATMs by banks amounts to BF 1,2 billion.

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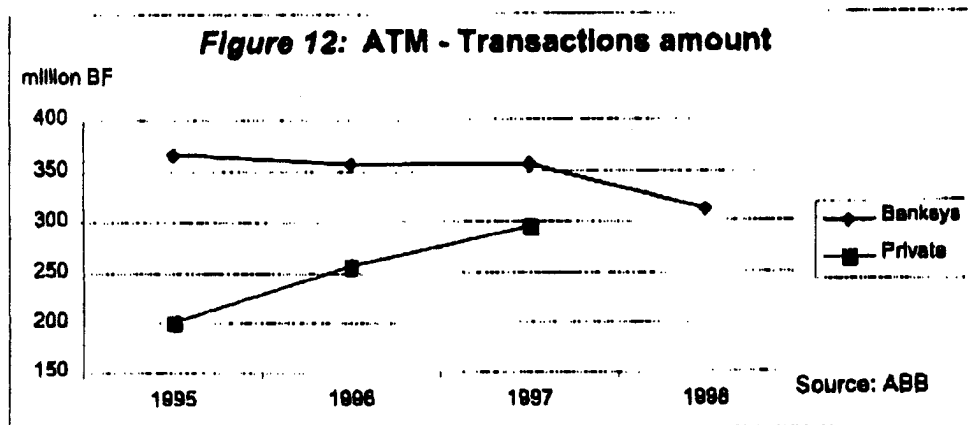
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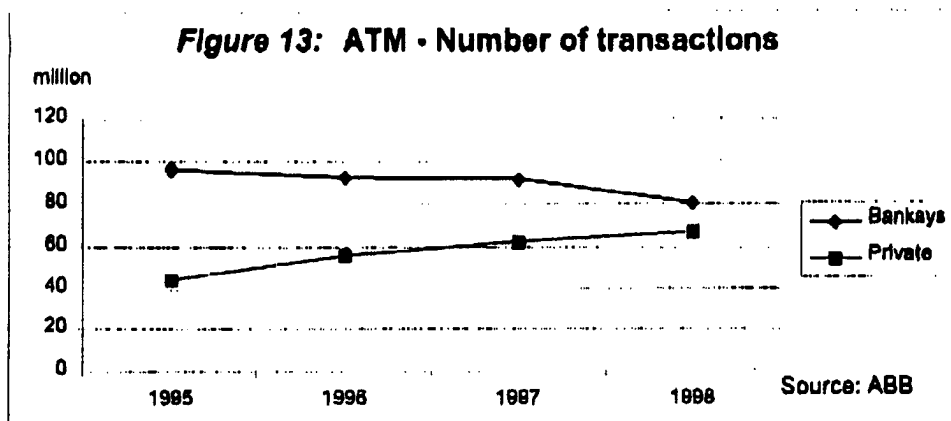
Table 19: Cost of private ATMs (BF)

	1996	1997	1998
Investment			
Personnel			
Insurance			
Interest forgone	118.750.050	153.309.600	195.321.000
Automatic deposit			
Total			

[SOME FIGURES REMOVED FOR CONFIDENTIALITY]

The ATMs of Banksys are located in the bank branches but have a separate management with respect to those owned directly by the banks. In Belgium there are about 1130 Banksys' ATMs. Initially, these ATMs formed the majority but as Figures 12 and 13 show, during last five years, their number has remained stationary while the bank operated ATMs are expanding very fast.





The banks' costs for these ATMs consist of two parts. One is the wage cost of the personnel reloading the machines. The other is the remuneration paid to Banksys. The personnel cost amounts to BF [CONFIDENTIAL] million. This cost is higher than the personnel cost of the bank operated ATMs ([CONFIDENTIAL] million). The annual cost of reloading an ATM operated by the banks is BF [CONFIDENTIAL], while it is BF [CONFIDENTIAL] for a Banksys' ATM. The reason is that the number of withdrawals in Banksys ATMs is very high⁵⁰ with an average of 225 withdrawals a day against 47 for bank operated ATMs⁵¹.

The second cost, the remuneration to Banksys, amounted to [CONFIDENTIAL] million⁵² in 1998. Each bank pays a variable fee to Banksys for every transaction done by its customers. The tariff structure is a function of the size of the withdrawal.

In order to offset this cost, the banks have started to charge a fee to consumers for withdrawals from Banksys ATMs starting from 1998. (We will give more detail in the section devoted to commercial banks' revenues).

6. Finally, we have to consider the interest forgone on the part of liquidity in the safes and in the ATMs. A bank study (1998) [NAMED SOURCE REMOVED]

⁵⁰ This is because all consumers with a BC/MC card can access to Banksys ATMs while private ones are open only to customers of the same bank.

⁵¹ Data 1997, from ABB (1998).

FOR CONFIDENTIALITY] estimates this liquidity to be 10% of the total currency in circulation. In order to compute the interest forgone we use the overnight interest rate (2,53% in early 1999 and 3,55% in 1998). Thus, the total interest forgone amounts to BF 1,8 billion.

Table 20: Costs and Revenues of Commercial Banks (million BF)

		1998
Costs	1 Handling	
	2 Transport	
	3 Insurance and security	
	4 Fraud	
	5 ATMs	
	6 Interest forgone	1840,30
Total Costs		
Revenues	Fee on ATM withdrawals	
Total		

[FIGURES REMOVED FOR CONFIDENTIALITY]

Revenues

The only revenue the commercial banks receive from cash is a fee on ATM withdrawals. Traditionally the withdrawal of liquidity from automatic teller machines has been free in Belgium, but the amount of money taken from those machines has been increasing every year, as well as the number of withdrawals (see Figure 11). For this reason, the banks promote the use of their own (and cheaper) ATMs to their customers. In order to do so, most banks will now charge BF [CONFIDENTIAL] for every withdrawal from a Banksys ATM while keeping withdrawals from their own ATMs free of charge.

The revenue from this fee amounts to BF [CONFIDENTIAL] million.

⁵² This cost is related to the cash system but comes at the same time from the issuer functions of the banks, according to which they receive a positive interchange from POS transactions but pay a negative one on cash transactions, i.e. ATM withdrawals.

4.3 Banksys

Banksys has two different activities in Belgium, i.e. the operation of the ATM and of the POS networks. Both activities are based on the use of debit cards, however, with two completely different purposes. The first one makes the use of cash easier, while the second one promotes the cashless way of making payments. For that reason we split the costs and revenues of Banksys. Here we consider the cost of ATMs. This should be considered as part of the cash payments system.

Costs

- We estimate Banksys invested BF [CONFIDENTIAL] million in new machines in 1998. Most of this investment cost is made to replace existing ATMs. (Note that one new machine costs approximately BF [CONFIDENTIAL]).
- The cost of operating the ATMs is estimated to be BF [CONFIDENTIAL] million. This amount includes IT development and exploitation, the cost of the network, the cost of installation and of technical support, the cost of the CEC⁵³, the supervision and the marketing.

Revenues

As seen in the section about commercial banks' costs, the banks pay Banksys for the ATM activity⁵⁴ in the form of a fee for every ATM transaction. We refer to the commercial banks' section for more detail on this fee.

- Banksys has some other revenues from the maintenance of its teller machines. This is estimated to be BF [CONFIDENTIAL] million.

Despite those revenues, the ATM activity is a source of losses for Banksys. This loss amounted to BF [CONFIDENTIAL] million in 1998.

⁵³ The Centre for automated inter-banking clearing and settlement depending from the National Bank.

Table 21: Costs and Revenues of Banksys (million BF)

		1998
Costs	Investment	
	Operating costs	
	<i>Total Costs</i>	
Revenues	Bank fees	
	Maintenance	
	<i>Total Revenues</i>	
Total		

[FIGURES REMOVED FOR CONFIDENTIALITY]

4.4 Merchants

Costs

- Merchants incur an handling cost. This is related to the time spent in checking, counting, providing the right change, re-counting, emptying the cash-register, preparing the bookkeeping, and finally going to the bank to deposit the takings. These are repetitive, labour intensive and daily tasks. According to a Belgian merchant association [NAMED SOURCE REMOVED FOR CONFIDENTIALITY] it takes a medium-sized shopkeeper more or less one hour and a half a day to accomplish these tasks. In the case of big department stores it is not possible to estimate the time spent only in counting, packaging and preparing the bookkeeping. In this category of shops all these activities are centralised and carried out in a special office⁵⁴ that performs also other tasks. As a consequence, the time spent in dealing with cash is difficult to account for. It is reasonable to assume that these task activities take longer than in small and medium-sized shops. With regard to the transportation of money to the banks, the large department stores also follow a

⁵⁴ At the contrary of the POS activity where Banksys pays a fee to the banks.

⁵⁵ Normally in these offices there are one or two people working full time.

different procedure. As they usually collect large amounts of currency, they subcontract transportation to specialised transport companies.

We will assume that the time needed to manipulate cash for the commercial sector is one hour and a half. In the case of small and medium-sized shops this time also includes the time spent in bringing the cash to the bank. In the case of big department stores, however this is time spent only for the handling in the shop, while the transport will be accounted for as a separate cost item.

We estimate the total cost of manipulating cash as follows. The average gross salary of a cashier is BF 659 per hour. We multiply this hourly wage cost by the number of hours (1,5 x number of days). With 152.700 points of sale⁶⁶, the annual cost of handling cash amounted to BF 46,4 billion in 1998.

- A second kind of cost refers only to department stores, and is related to the transport of cash. Once the money is taken away from the counters, it is stored into the safes. Then, once or twice a week (depending on the amount of cash accumulated) the transport company brings it to the local branch of the National Bank or to a cash centre. In such a case, the store not only incurs an interest loss on the currency for some days, but it also has the extra-cost of transport. According to a study carried out by the one of the major Belgian retailing groups [NAMED SOURCE REMOVED FOR CONFIDENTIALITY], stores using an external transport company find it less expensive to make only one trip per week, leaving the cash six days inside the safes - with a correspondingly higher interest loss -, instead of making two trips losing less interests.

Each trip involves three members of personnel of the transport staff or alternatively, two persons and an "intelligent box". Each trip costs BF 4.000 to 6.000. Not all the large department stores resort to specialised companies for the transport of money. However, in order to simplify the analysis we assume that all the stores belonging to this category use external transport companies, but only once a week. As we can see in Table 22, this cost represented BF 940 million in 1998.

⁶⁶ Ministry of Labour, 1998.

- Finally there is a third cost for the retailers, i.e. the interest forgone on the cash. The retailers hold 53,5% of the notes and 20,3% of the coins in circulation. As a result, we estimate the interest forgone to be BF 7.239 million (using the interest rate on three-month time deposits (2,75% in 1998)).

The merchants do not earn any kind of income from cash transactions.

Table 22: Merchant costs (million BF)

Costs	1998
Handling	46440,0
Transport	942,5
Interest forgone	7239,0
Total	54621,5

4.5 Consumers

Costs

The consumers bear two kinds of costs. (Note that we have not attempted to quantify the benefits - in terms of utility - the consumers realise from the use of cash).

- First, the consumers forego the interest on the stock of cash they hold. Since the consumers hold 37,77% (35,8% of notes and 79% of coins) percent of the currency in circulation for transaction purposes, they have an opportunity cost, which we compute as the amount of currency held, multiplied by the interest rate on three-months time deposits (2,75% in 1998). The cost for the consumers is, therefore, BF 5,26 billion. This consumer's cost constitutes part of the revenue of the Central Bank.
- Secondly, there is a cost related to the money withdrawals from ATMs. This cost is small compared to the interest forgone.

There are three different networks of teller machines in Belgium: the one of Banksys, the network of the banks and, finally the Postomat. We will neglect the Postomat ATMs, as they constitute a small fraction of the total (2,5%)⁵⁷.

Since 1998, the banks impose a charge on withdrawals at Banksys' ATMs (BF [CONFIDENTIAL] per withdrawal). The main purpose has been to make the customers aware of the cost of providing cash and stimulate the use of their own network. Some banks, mostly the smallest ones, also have a fee of BF [CONFIDENTIAL] for their own ATMs, but this is not the case of the majority of commercial banks. Therefore in this study we assume all the withdrawals from these ATMs are free of charge. In total, the consumer-cardholders spent BF [CONFIDENTIAL] million on ATM withdrawals in 1998.

An important factor to point out is that the consumers are not always aware of the existence of these fees. These, in fact, are not charged at the time of the withdrawal, but are cumulated and charged at the end of the year. Despite this fee of transparent pricing, the number of withdrawals from Banksys ATMs decreased from [CONFIDENTIAL] to [CONFIDENTIAL] million in 1998 (with a stationary number of machines), while they increased from [CONFIDENTIAL] to [CONFIDENTIAL] million from bank operated ATMs (with 816 more machines).

Table 23: Consumers costs (million BF)

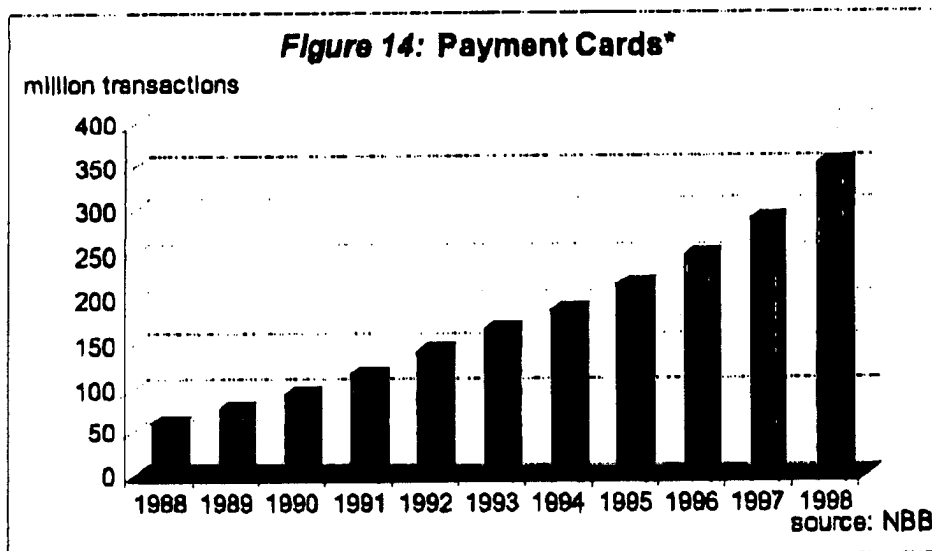
Costs	1996	1997	1998
Interests forgone	4612,56	5737,57	
Fixed fee for ATM withdrawal	0	0	
Total			5501,01

[SOME FIGURES REMOVED FOR CONFIDENTIALITY]

⁵⁷ Similarly, in the case of the cashless society we will not consider Postchèque debit cards (see section 5.1.1).

5. BELGIUM: COSTS AND REVENUES OF A CARD BASED PAYMENT SYSTEM

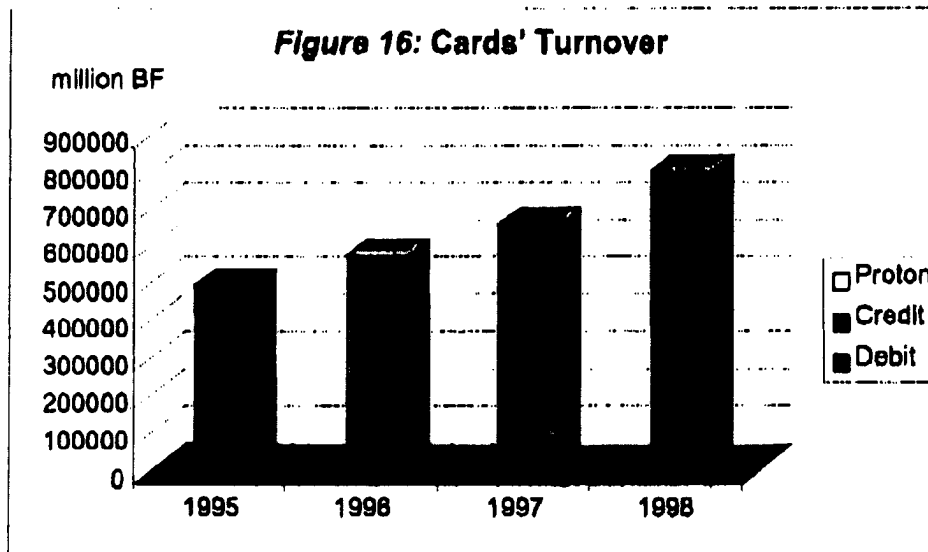
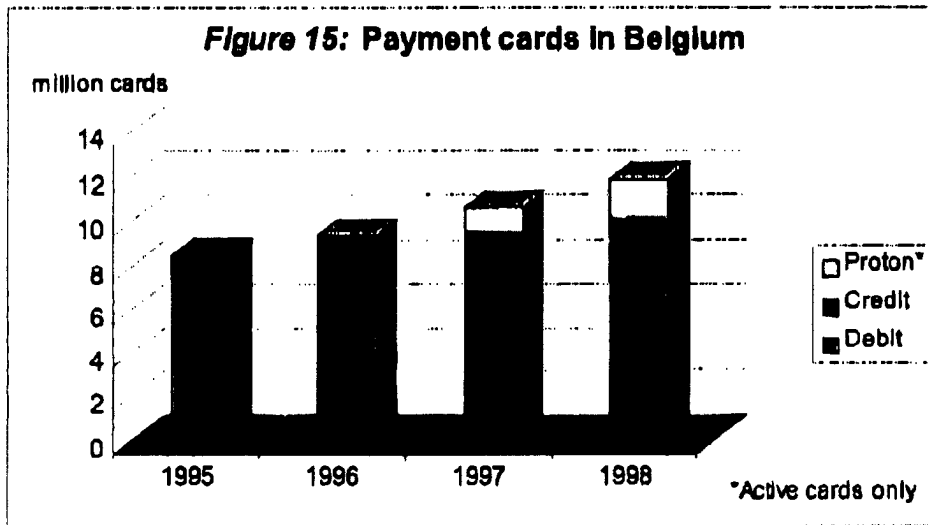
During last few years the banking system has applied a lot of effort to promote electronic payments. As Figure 14 shows, they may have had some success. Since the beginning of the 1990s, the number of payments by means of debit cards almost quadrupled. The number of transactions amounted to almost 300 million in 1998⁵⁸.



*Cards with a debit function, with a credit function, company cards and prepaid cards.

The debit card is, without any doubt, the most popular cashless instrument for inland transactions. Nevertheless, the popularity of the other two kinds of cards, credit and Proton, is increasing. In 1998, the domestic payments by credit cards done by Belgians rose by 12,5%, while the transactions with Proton increased from 10 to 28 million.

⁵⁸ Source: Banksys.



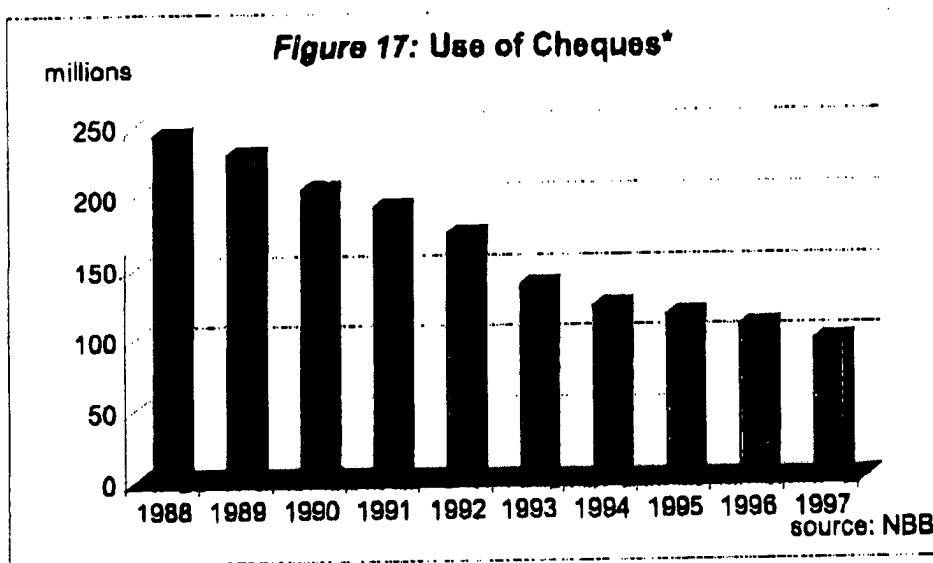
During the same period, the use of cheques decreased by 6 million (12,3%)⁵⁹. Over the period 1990 and 1998, payments by cheques have decreased by more than 56%⁶⁰ (see Figure 17).

⁵⁹ This figure takes into account only inter-banking transactions.

⁶⁰ ABB, 1999, "Tendance des paiements en 1998: forte augmentation des paiements électroniques". <http://www.abb-bvb/fr/prcsa/199902.html>.

NON-CONFIDENTIAL VERSION

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* Unpaid cheques and postal drafts included.

There are two separate networks for card transactions in Belgium: one for debit and Proton cards, and the other, for credit cards.

Banksys is the company operating the debit and Proton bankcards. It is owned by the Belgian banks. Bank Card Company (BCC) operates the credit cards both for VISA and Eurocard-Mastercard. It is also owned by the Belgian banks⁶¹.

In the following paragraphs we analyse the operations of these two companies in detail. Finally we consider the costs and benefits of all the agents involved in the card transaction.

5.1 Banksys

Banksys runs the Bancontact/Mister Cash and the Proton network, i.e. it deals with debit and Proton cards for the Belgian banking sector. Banksys' main functions are the clearing, the securing and guaranteeing of all electronic payments. With such a role, Banksys occupies a key position in the relationship between the banks, retailers, petrol companies and the final customers, i.e. private consumers. Banksys offers to the retailers the electronic funds transfer, and to the consumers the opportunity of

⁶¹ American Express and Diners Club, have their own networks.

paying for groceries, withdrawing money and paying for petrol whenever and wherever they want, without any need of cash.

The starting idea is to give the cardholders access to their bank accounts outside the banks' opening hours. This implies the ability to recognise the cardholder, and to clear and register the transaction. These operations are accomplished by means of an authorisation system in real time (on-line). More specifically, the transactions consist in reading and verifying the information related to the card, the PIN number⁶² for the identification of the cardholder, the line of credit available, the terminal and the bank account associated to the cardholder. Furthermore, all this information concerning the transaction is recorded in the Banksys computers for a later treatment, notably for the clearing. All the operations are recorded and transmitted to the CEC⁶³ of the National Bank. The CEC carries out the exchange of the accounting operations among the different institutions concerned and proceeds to the clearing.

Banksys has additional functions. Every C-ZAM terminal (the Banksys' electronic payment terminal) is designed, programmed, marketed, installed and maintained by Banksys itself. Finally, Banksys edits the bankcard PIN-codes which are a guarantee for safe transactions, allowing the identification of the cardholder.

The first steps towards retail payments by means of debit card should be traced back to 1977 and 1978, when two bank groups launched the networks of Mister Cash and Bancontact cash dispensers. Later on, payment terminals were installed in service stations and then in hyper- and supermarkets. In 1987, the two networks, Mister Cash and Bancontact, were made compatible in order to meet business and customer demands and, in 1989, they merged into a single company, Banksys, resulting in the creation of a single network. The two former brands were brought together under a same logo.

In 1995, Banksys launched Proton, an electronic purse card for small expenditure. Proton is already used by more than 3 million users in Belgium. Fifteen countries outside Belgium have acquired the licence.

⁶² Personal Identification Number, that is the secret code.

⁶³ Centre d'Echange et de Compensation.

Banksys' shareholders consist of most of the Belgian banks (almost 50) that participate in the Bancontact-Mister Cash (BC-MC) network. The financing of Banksys is regulated according to a complex tariff system for the different kinds of services provided by Banksys to the banks, i.e. ATM withdrawals, POS transactions and Proton loads. For the first function, every bank contributes with a fixed amount of BF [CONFIDENTIAL] million per year and pays a charge per transaction. For Proton, the procedure is similar: every bank pays BF [CONFIDENTIAL] per year and also a fee for every Proton load. At the same time the banks receive [CONFIDENTIAL] of the transaction value on Proton transactions.

For POS operations Banksys pays the banks (BF [CONFIDENTIAL] for every payment done by their consumers).

5.1.1 Debit Cards

The main debit card network in Belgium is BC-MC and consists of about 7,8 million cards.

BC-MC payments are managed by Banksys and cleared via the CEC. Commercial banks are the issuers of the cards. On the acquiring side, Banksys is the biggest acquirer for debit cards, but not the only one. Some banks are also acquirers for OLTB cards⁶⁴. These are also BC-MC cards but with a technical difference. In the case of Banksys cards, the cardholder's bank transmits the current account situation at fixed intervals (on average once a day, weekend excluded)⁶⁵. In the case of OLTB cards, every time the cardholder makes a transaction, the terminal is connected directly with the cardholder's bank. In that case Banksys - which always processes the transaction - is updated in real time about the cardholder's account balance. As a result, all possibilities of exceeding the ceiling are excluded and the transaction is more secure.

In this study we will not distinguish between the two cards, and in order to simplify the analysis we will consider Banksys as the general acquirer. In any case, all debit card transactions are electronic and on-line since the amount is directly charged on the bank account.

⁶⁴ On Line To the Bank. Those constitute about 25% of all debit cards.

⁶⁵ That should avoid exceeding the expense limit, even if it still can happen.

Debit card payments are mostly used for medium and small expenses. One-third of the transactions has a value of less than BF 1.000 and another third has a value between BF 1.000 and BF 2.000⁶⁶. The average value of the transactions is BF 2200 in large retailing, BF 3200 in small retailing and BF 1100 in service stations.

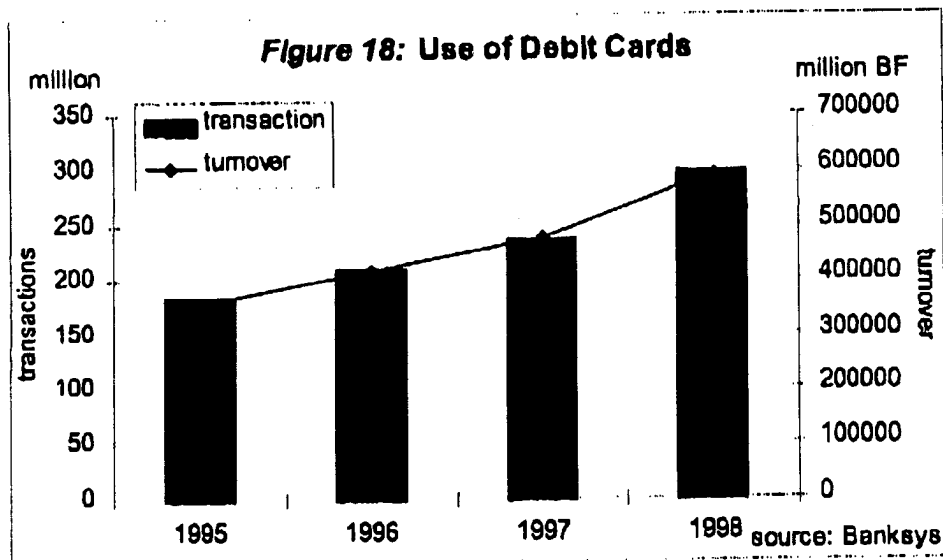


Figure 18 shows the evolution of the number and the value of debit card transactions since 1995. Note that the increase in 1998 was unusually high (+26%). This increase was due to special factors. First the coins' shortage caused by the several strikes of the transfer of funds companies at the beginning of 1997. Second, there was the suppression of the BF 5 commission on debit card transactions in large stores and supermarkets. But after a big jump in 1998, in 1999 they are expected to have an annual increase on 10%.

Proton

The Proton card is a chip card which stores Belgian francs that the consumers can spend whenever they want, all the information concerning the cardholder being on the chip. To pay there is no need of a PIN and there is no connection with the banking account. After every transaction the balance of the card decrease. In other words, all

⁶⁶ Source: ABB, 1997.