Innovations in retail payments and the BIS statistics on payment and settlement systems

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1. Introduction

In 1988 the BIS began to collect statistics on payment and settlement systems for the G10 countries, later expanded to include Hong Kong SAR and Singapore. Starting in 1988 the statistics have been published yearly in the so-called "Red Book" on *Statistics on payment and settlement systems in selected countries*. The latest Red Book was published in March 2008 and contains figures for 2006. It provides general reference statistical information (eg on GDP and population size), and data on retail (or small-value) payment instruments, interbank funds transfer systems, and securities and derivatives trading, clearing and settlement. Data are organised in country tables and summarised in comparative tables. The statistical methodology used to compile the data is given in the back of the report. The methodology for payment instruments and payment systems was changed starting from the 2004 figures and that for the sections relating to securities starting from the 2006 figures.

After the introduction of various electronic money schemes in the mid-1990s, the BIS undertook several surveys of these and other innovations in retail payments. A *Survey of electronic money developments* was published in 2000 and 2001 followed by a *Survey of developments in electronic money and internet and mobile payments* in 2004. This latest survey included data from 95 countries and territories and contained information on electronic money, both card-based products and network- or software-based products, as well as on internet and mobile payments. The survey also briefly reviews a number of policy issues related to electronic money and to internet and mobile payments.

In the next sections this paper will give a brief presentation of the BIS statistics on payment and settlement systems followed by a short description of (relatively) recent innovations in retail payment instruments. It will then look at the way these innovations are captured, and sometimes not captured, in the statistics, before ending with a short section on the potential use of the statistics for conducting research into payments economics.

2. The BIS Statistics on payment and settlement systems

2.1 Overview

The BIS statistics on payment and settlement systems are published yearly in the so-called Red Book. The latest edition of the Red Book was released in March 2008 and contains figures for 2006. Data are organised in 14 country tables (13 countries plus the euro area)

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and summarised in comparative tables. The Red Book provides data on e-money, but not on internet and mobile payments.

2.2   Country tables

The statistical information in the Red Book is organised, for each country, in four sections for a total of 26 tables. The first section contains general information, such as basic statistical data, the settlement media used by non-banks (cash in circulation and transferable deposits) and by banks (transferable balances held at the central bank and at other banks), banknotes and coins issued, and the number and types of institutions offering payment services to non-banks. Two of those tables give information on e-money (the value outstanding and the number of electronic money institutions – more details will follow below).

The next section provides statistics on retail payment instruments: the table on payment card functions and accepting devices contains information on the number and types (cash, debit, credit, etc) of cards issued in the country and the number and types (automated teller machines (ATMs) or point of sale terminals) of terminals located in the country. This is followed by a table with indicators of the use of payment instruments and terminals by non-banks, both in volume and value of transactions. The most important payment instruments are credit transfers, direct debits, payment cards and cheques. These tables contain information on prepaid cards and e-money transactions respectively.

The third section contains information on interbank funds transfer systems. First there is information on the number of participants in the most important interbank funds transfer systems – these include both large-value and retail payment systems. Then there are tables on the payments processed by these systems, both in volume and value of transactions. Here as well are some data on e-money transactions. The last two tables give information on the use of SWIFT, a global provider of secure financial messaging services: the participation in SWIFT by domestic institutions and the SWIFT messages sent to and received by domestic users.

The last section is on securities and derivatives trading, clearing and settlement. It contains 14 tables with information on three topics: exchanges and trading systems, central counterparties (CCPs) or clearing houses, and central securities depositories. This section does not contain information on innovations in retail payments.

2.3   Comparative tables

The comparative tables, with small exceptions in the tables on payment systems and securities, are fully based on the country tables. However, in addition to allowing comparisons between countries, they also contain many new indicators calculated on the basis of the data in the country tables. For example, the table on the use of payment instruments by non-banks contains, in addition to the volume and value of transactions per payment instrument given in the country tables, also data on the relative importance of payment instruments (both in volume and value of transactions), the increase in the volume and the real value of transactions, the number and the value of transactions per inhabitant, the average value per transaction, and the value of transaction as a ratio to GDP. A similar extended range of data is given for payment cards and terminals. Both sets of data give detailed information on e-money payment transactions and cards with an e-money function.

3. Innovations in retail payments

3.1 Overview

Over the last 10 to 15 years a number of innovative products for making retail payments have been developed, taking advantage of technological progress. These new products are accounting for an increasing proportion of the volume and value of both domestic and cross-border retail payments. Broadly speaking, two categories of payment products can be distinguished: electronic money instruments and internet and mobile payments.

3.2 Electronic money

Electronic money (or e-money) products are defined as stored-value or prepaid products in which a record of the funds or value available to a consumer is stored on an electronic device usually in the consumer's possession. The electronic value is purchased by the consumer and is reduced whenever he or she uses the device to make a purchase. E-money products need to be distinguished from so-called access products which typically allow consumers to use electronic means of communication to access otherwise conventional payment services (see next section). Two types of e-money products exist:

(1)   Card-based products, also known as prepaid cards (and often called electronic purse or electronic wallet), are designed for making face-to-face payments of small value (such as at newspaper stands, in bakeries, etc) and for use in vending machines and parking meters. The prepaid value is typically stored in a microprocessor chip embedded in a plastic card. Electronic purses are intended to complement rather than substitute for traditional retail payment instruments such as debit and credit cards. They are, however, in direct competition with coins and (small denomination) banknotes. Prepaid cards are intended to be used as a general, multipurpose means of payment, in contrast to the many existing single-purpose cards (such as those used for public transport) which are not considered e-money.

(2)   Network-based or software-based products use telecommunication networks, such as the internet, to make small-value payments, usually as a substitute for credit cards. Network-based products use specialised software installed on a standard personal computer or laptop for storing the value.

3.3 Internet and mobile payments

The rapid growth in the use of the internet and mobile phones has led to the development of new payment mechanisms capable of exploiting the speed and convenience of these new technologies. Internet payments and mobile payments are defined by the channel through which the instruction to make a payment is entered into the payment system. Though some new payment methods, mostly for use over the internet, were developed (eg PayPal), the large majority of internet and mobile payments makes use of traditional payment instruments (mostly payment cards and credit transfers) that are entered into, and processed through, existing payment systems. Internet payment services are predominantly offered by banks, whereas both banks and non-banks provide the possibility to make mobile payments.

4. Data on electronic money and internet and mobile payments

4.1 Overview

This section will discuss the data available on e-money in both the Red Book and the 2004 Survey and the information on internet and mobile payments from the 2004 Survey.

4.2   Electronic money – Red Book[2,3]

The first statistic concerns outstanding value on e-money storages, which is given in the table on settlement media used by non-banks. This is the value stored on all e-money instruments, and separate figures are given for card-based products and for software- or network-based products. This represents the difference between the value of cash loaded onto an e-money storage and the value spent. Only 6 out of 13 countries report an outstanding value on e-money storages – all of it on card-based products. The largest amount is noted for Italy (EUR 400 million). The other countries (Belgium, France, Germany, the Netherlands and Singapore) are all between EUR 90 and 30 million. The only reference to outstanding value on software- or network-based products is in the table of the euro area with an amount of EUR 10 million.

The next statistic can be found in the table on institutions offering payment services to non-banks. The table gives the number of electronic money institutions, defined as an undertaking or any other legal person other than a bank which issues means of payment in the form of electronic money, and the outstanding value on e-money storages with such institutions. This figure differs from the one in the table mentioned in the paragraph above as it includes both banks and non-banks. Six countries (the above minus Belgium plus Switzerland) report the existence of electronic money institutions (between one and five) and three give the outstanding value (between EUR 14 and 330 million).

The table on payment card functions and accepting devices provides data on the number of cards with an e-money function, with a separate figure for those that have been loaded at least once, and the number of e-money card terminals. The terminals are divided in the number of e-money card loading/unloading terminals and the number of e-money card payment terminals. Some explanation: cards with an e-money function are reloadable multipurpose prepaid cards which can be used at several service providers for a wide range of purchases. Those that have been loaded at least once can be considered as activated. The number of terminals distinguishes between the terminals allowing the transfer of electronic value from an issuer of e-money to the holder of a card with an e-money function and vice versa, and the terminals located at the point of sale permitting the holder of e-money to transfer e-money value from his/her e-money card to the balance of the merchant or other beneficiary. All countries which report on e-money provide some statistics on cards and terminals. While all seven provide the number of cards with an e-money function, only two of them (Belgium and France) give the number of the cards that have ever been activated. The share of activated cards against the total of e-money cards is very different: 28% in Belgium versus 4% in France. With respect to terminals, with the exception of Singapore, all countries report figures for both types of terminals – those for loading/unloading transactions and payment transactions. Singapore only provides the number of terminals for e-money card payment transactions.

For data concerning cards and terminals it is more interesting to look at per capita figures than at absolute numbers. These relative numbers are provided in the comparative tables. Looking at the number of cards with an e-money function per inhabitant, Singapore with 2.69 is far ahead of the other countries. It is followed by the Netherlands with 1.11 and Belgium with 1.02, Germany (0.80) and Switzerland (0.61) are next, and last – with some distance – is Italy with 0.08 cards per inhabitant. Concerning terminals, the differences between countries are especially big for the e-money card loading/unloading terminals: per million

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[2]   Unless otherwise indicated the statistics for the euro area are not included because: (1) there are no details available at the level of the individual countries, only the aggregate amounts for the 15 eurosystem countries; and (2) the euro area only provides 6 of the 26 tables provided by the participating countries.

[3]   All Red Book figures mentioned are for 2006.

inhabitants Belgium has 12,238 terminals, followed by Switzerland with 2,418. The other countries are between 699 and 207, with an average of 1,021 for the reporting countries. For the e-money card payment terminals the highest number is again in Singapore with 19,399 terminals per million inhabitants, followed by the Netherlands with 13,125. The other countries have between 8,399 and 1,298 terminals; the average across all countries is 3,711 terminals.

A very interesting source of information on the use of e-money can be found in the tables on the use of payment instruments and terminals by non-banks, both in volume and value of transactions. These tables provide information on e-money payment transactions and on transactions at e-money card payment and loading/unloading terminals, each time in number and value of transactions. The difference between e-money payment transactions and transactions at e-money card terminals is that the former, in addition to card payments, also includes transactions through other e-money storages. Though data can be provided for both cards and other storages, Italy is the only country that reports transactions with other e-money storage, namely 10.61 million transactions for EUR 620 million. For the number of transactions by cards, after Singapore with 1,691.02 million, the other countries range from 164.65 million in the Netherlands to 18.8 million in Switzerland. With respect to the value of card transactions, Italy leads with EUR 1.64 billion, followed by Singapore with EUR 710 million and Belgium and the Netherlands with both EUR 440 million. The value in the remaining three countries is between EUR 100 and 40 million. The data for the terminals provides only information for the e-money card loading and unloading transactions. (Either no data for the card payment transactions at the terminal is given, or the data given under the payment transactions is repeated.) For loading/unloading, with Singapore providing no data, the highest figures are for Italy and the Netherlands with 27.39 million and 23.74 million transactions respectively. For value Italy reports EUR 5.26 billion, followed by the Netherlands and Belgium with EUR 480 and 460 million respectively. Figures for other countries are much lower.

The last reference to e-money in the Red Book country tables appears in the tables on payments processed by selected interbank funds transfer systems in volume and value of transactions. Unfortunately, only two countries (Belgium and Italy) provide figures for e-money transactions processed by their domestic system.

In the comparative tables some additional information can be found, such as the relative importance of e-money payment transactions vis-à-vis the use of payment instruments by non-banks. In volume, aside from Singapore with a share of 84.2%, no other country has more than 5%. In value terms, except for Singapore with 0.2%, the share in the other countries is too small to be captured by the statistics. Figures for the increase in the number of e-money transactions are diverse: Switzerland and especially Belgium show a decrease in e-money transactions, while the other countries have a small growth, the highest being France with 17.8%. Singapore has around a 4% growth and the Netherlands and Germany are both around 12%. The increase in the real value of e-money payment transactions is big in Italy with 72.4%, small in two countries, and three countries see a small decrease. Singapore is also much ahead in the number of e-money transactions per inhabitant (377.1) compared to the other countries, which lie between 0.3 and 10.1. Another interesting statistic is the average value of an e-money payment transaction: in Italy it is US$ 83.4, in the other countries between US$ 2.5 and 5.7 except Singapore where it is only US$ 0.6 per transaction. The value of e-money transaction per inhabitant is by far the highest in Singapore with US$ 213.7, followed by the other countries ranging from US$ 52.1 in Belgium to US$ 0.8 in France. The last statistic gives the value of the e-money payment transactions as a ratio of GDP: the highest ratio is 0.73 in Singapore, the lowest (in France and Germany) are too small to be significant.

4.3 Electronic money – 2004 Survey

The BIS published surveys on e-money developments in 2000, 2001 and 2004. The latest survey was expanded to also include data on internet and mobile payments (see below). It contains information from 95 countries and territories and, in addition to providing statistical information, also briefly summarises a number of policy issues related to these innovations.

At the end of the 2004 Survey there are two tables on e-money: the first summarises the design features of the e-money products available in the participating countries and territories, the second table provides data on the use of e-money products in the same places. The following figures are provided for each e-money system: number of issuers, number of cards issued (or home PC users), number of merchant terminals (or merchant PCs), amount outstanding, volume of daily (purchase) transactions, value of daily (purchase) transactions, and average value of (purchase) transactions. Though the information is very limited, the Survey is nevertheless very valuable because it provides information on a much wider group of countries/territories than the Red Book.

4.4 Internet and mobile payments – 2004 Survey

The only source of information on internet and mobile payments is the 2004 Survey. It provides information on the traditional payment instruments that are used over the internet and also details of new instruments. As said before, statistical data on internet and mobile use are relatively limited. Some countries only provide information on specific internet and/or mobile payments schemes, whereas other countries also include internet banking (ie access through the internet to "regular" bank accounts).

Like the information on e-money products, the information on internet and mobile payments is summarised in two tables. The first table gives the design features of internet and mobile payments, whereas the second table provides statistical data on internet and mobile payments. The following information is given for each scheme in each of the 95 countries and territories: number of issuers, number of users, number of acceptance points, volume of daily (purchase) transactions, value of daily (purchase) transactions, average value of (purchase) transactions, and market share. However, since a large part of the boxes carries the label "not available", the table does not provide so much statistical information.

5. Capturing retail innovations in payment statistics

It is clear from the previous sections that all innovations in retail payment systems are not, at least in statistics, treated equally. There is a lot of data available with respect to electronic money, but few data exist on the use of internet and mobile payments. There are a number of reasons for this difference in treatment.

Starting with e-money, it is helpful to go back to the early stages of the development of e-money in the middle of the 1990s when central banks studied the potential implications of the introduction of e-money. A BIS study (1996) showed that e-money products could raise a number of policy issues for central banks because of the possible implications for seigniorage revenues and monetary policy.[4] The basis for this concern was the fact that e-money has the

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[4] Other areas of concern to central banks related to the central bank oversight function for payment systems and the banking supervision function for central banks with supervisory responsibilities. In addition policy issues of primary concern to other public authorities (and of interest to central banks) were identified – these related to consumer protection, competition, access, security, money laundering and legal issues.

potential to challenge the predominant role of cash for making small-value payments. The need for a response, therefore, depends largely on the extent to which e-money replaces cash. The report found that, in case the spread of e-money would be moderate – which, so far at least, turns out to be the case – the decline in seigniorage revenues and the accompanying shrinkage in central bank balance sheets would likely be limited. In these circumstances, the only measures that central banks would want to take with respect to the formulation of monetary policy would be to adapt the monetary aggregates to incorporate e-money issued in the domestic currency. This explains why the outstanding value of e-money is included in the tables on settlement media used by non-banks (ie traditional monetary aggregates). Though e-money is typically issued by banks that are normally subject to statistical reporting requirement for monetary statistics, there are also non-bank institutions that issue e-money. For these issuers, which are called e-money institutions, the outstanding value of e-money is given separately in the table on institutions offering payment services to non-banks.

A possible next step, in case e-money would become very popular and lead to a substantial decline in the banknotes and coins in circulation, would have been for central banks to take steps to offset the shrinkage of their balance sheets. One policy option identified in the BIS report would be to expand the coverage of reserve requirements to cover e-money. To date, however, this measure has not yet been introduced by any country.

Turning to the other retail innovations, internet and mobile payments have never provoked such concerns. As mentioned above, these new payment methods make use of traditional payment instruments, mainly payment cards and credit transfers. Such payments are settled through bank accounts, ie these instruments are actually an instruction to debit one account and credit another account. As such they do not replace cash but facilitate the transfer of money between bank accounts. Hence there is no compelling need to collect specific information on these payments. In addition, these new retail payment methods tend to be difficult to classify, being often very similar to already existing payment instruments. Furthermore, adding to the lack of motivation for collecting statistical data, the adoption of these innovations by the general public has so far been limited, with the possible exception of internet banking.

A simple example might clarify this better: when making a payment through internet banking, a consumer is really initiating a traditional credit transfer, albeit using a new access channel, namely the internet. A bank receives many credit transfers, both in paper – though declining considerably over the last years – and in electronic form. The distinction between paper-based and non-paper-based credit transfers is easy to make for the bank executing the payments, and both types of credit transfer are already captured separately in the Red Book statistics. It is arguably more difficult to distinguish between electronic credit transfers: they can be send to the bank by phone (via phone banking), by PC (via internet banking), by computers using dedicated lines and by ATM (through the banks own telecommunication system). It would, of course, be possible to develop different codes for each type of electronic credit transfer, but for the reasons given above there does not seem to be a convincing case for doing so.

6.   The use of payment statistics for research

In addition to the statistics on innovations in retail payment systems covered in this paper, the BIS statistics also contain a number of other data of particular importance for research in the economics of payments, an area where research is carried out on all aspects of payment systems. Examples are data on the credit extended by the central bank, which includes intraday credit, overnight credit and longer-term refinancing operations; the concentration ratio in terms of volume and value, which gives the market share of the five largest senders

of payment messages in each system; and the value of transactions as a percentage of GDP. Other interesting data can easily be calculated using the available figures, for example the turnover ratio, which is the ratio of the value of total payments made to the sum of overnight reserves and intraday credit. This ratio would give an indication of the maximum liquidity needed to settle all payments in the system on a given day. Finally, payment system data can, in principle, also be used to track developments in turnover in financial markets as well as to study the microstructure (eg counterparty relationships) of these markets.

7. Conclusions

The BIS statistics on payment and settlement systems are a valuable source of information for understanding and analysing the use of payment instruments and systems and for detecting and observing new (and old) trends in the payments landscape. Some innovations in retail payments, like e-money, show up in the statistics, other innovations like internet and mobile payments are much harder to capture. The reason for this is that internet and mobile payment methods are to a large extent extensions of traditional instruments which are very much cleared and settled through traditional mechanisms. In fact, very often the only new feature of some of these instruments is the new channels they use to access existing payment arrangements. Anecdotal evidence suggests that, with the exception of internet banking where customers access their bank account over the internet, the adoption of these new payment methods is limited. Where statistics are available, as in the case of e-money, they show only a mixed success. In some countries it is gaining popularity, but in most countries it remains relatively little used.

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