

PAYMENT COSTS IN AUSTRALIA

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1. Introduction

This paper reports the results of the study of the costs of various payment methods undertaken by the Reserve Bank of Australia as part of its 2007/08 review of the payments system reforms.

The central aim of the study is to provide comprehensive estimates of the underlying resource costs associated with different methods of payment. The study does not attempt to measure the benefits associated with various payment methods, nor the profitability of institutions providing payment services.

The resource costs of providing various payment services have been an important consideration through the reform process. At an early stage in its deliberations, the Payments System Board was concerned that, due to a variety of practices and restrictions, the relative resource costs associated with the credit card and EFTPOS systems were not being reflected in the relative prices that consumers faced when deciding between these payment instruments. The result, in the Board's view, was a less efficient payments system than might otherwise have been the case. The Board has also been interested in the costs of cash payments, particularly given the extensive use of cash in the economy and the potential substitutability of cash and electronic methods of payment.

The study builds on earlier work by the Reserve Bank and the Australian Competition and Consumer Commission published in 2000 examining the costs incurred by financial institutions in providing EFTPOS and credit card transactions, and cash withdrawal services through ATMs.¹ The study extends this earlier work in a number of directions. In particular it:

- examines a broader range of payment methods, including costs of payments made by cash, scheme debit, cheque, direct entry and BPAY;
- examines the costs not just of financial institutions, but also other participants in the payments system, including merchants;
- provides greater detail on the costs that financial institutions incur in the EFTPOS and credit card systems; and
- provides estimates of how the costs of payment vary with the size of the payment.

The study has been undertaken in close co-operation with financial institutions and merchants, which provided data to the Reserve Bank using reporting templates developed in consultation with industry. Industry liaison included initial meetings to gauge available information, a formal consultation round on drafts of the study approach and survey materials, and extensive contact with respondents during and after the data submission period to promote consistency in the data collected.

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¹ *Reserve Bank of Australia and Australian Competition and Consumer Commission (2000).*

The key findings of the study are as follows.

- The annual costs incurred by financial institutions and merchants for payments made by individuals amount to at least \$8½ billion, or around 0.8 per cent of GDP. The costs associated with cash payments account for almost half of this total, with cash being used for nearly three quarters of all payments by individuals. The costs of providing accounts to facilitate payment are also considerable; these amount to around a quarter of total payment costs.
- Cash appears to be the lowest cost payment method for the small transaction sizes for which it is commonly used. An important cost advantage is that cash payments are quicker to process than other payment methods. The cost of a cash payment rises with the value of the transaction so that cash becomes more costly than EFTPOS for payments of moderate value.
- Credit card payments are more costly than EFTPOS payments for both financial institutions and merchants. As well as confirming earlier findings in Australia on the relative costs to financial institutions of credit card and EFTPOS payments, the study provides a more detailed breakdown on the higher relative costs of credit cards across account overheads and payment functionality, and the additional costs for credit functionality and reward programs.
- For payment methods not used at the point of sale, the direct entry system has the lowest cost, followed by BPAY and credit cards. Cheques are a relatively expensive payment method, either when used at the point of sale or not at the point of sale.
- The inclusion of estimates of consumer costs does not change the relative cost ranking of the payment methods observed from the combined costs of financial institutions and merchants. In particular, information from a survey of households suggests that consumer costs of cash payments are not as high as estimated in some other studies.

The rest of the paper is structured as follows. Section 2 outlines the cost concepts of interest and the approach taken to measure them. Section 3 presents detailed estimates of the payment costs of financial institutions for the various payment methods, with Section 4 covering detailed estimates of costs for merchants. Section 5 steps away from the formal survey data to present some illustrative estimates of consumer costs. Section 6 then aggregates resource costs across financial institutions, merchants and consumers to present estimates of the average resource costs, across the economy, for each payment method. With some assumptions, Section 7 presents estimates of how costs of the different payment methods vary with transaction size. Section 8 concludes.

2. Measuring Costs

2.1 Cost concepts

Measuring the costs associated with making payments is far from straightforward. There are many different cost concepts, and participants in the payments system face significant challenges in accurately identifying all the costs associated with a payment, and allocating costs across the various payment methods.

In principle, this study is attempting to measure the *long-run incremental resource cost* of each payment method. This is the additional resource cost incurred in the long run if a substantial number of extra payments were made using a particular payment method. These costs include those incurred in putting in place the additional infrastructure that would be needed to make a substantial number of extra payments, as well as the costs associated with making payments once the infrastructure is in place.² Typically, these costs would be significantly higher than the marginal cost of making an extra payment through the existing infrastructure.

In practice, measuring the long-run incremental resource cost of payment methods is difficult. Not only does one need to measure the incremental costs associated with additional payments in the short run, but also those infrastructure costs which might be fixed in the short run but variable in the long run. Given the practical difficulties involved with this forward-looking concept, the approach taken here is to measure the *average cost* of different payment methods. In many situations, average cost is likely to be a reasonable indication of the long-run incremental resource cost, although some caveats are discussed later in the paper.

In measuring costs, the study separately identifies those costs incurred in establishing and operating an account from which payments can be made, and those costs incurred in making transactions on that account. It also attempts to measure the average cost associated with transactions of various sizes.³ It does not, however, seek to quantify cost variations arising within each form of payment method as a result of factors such as merchant size and location.

An important issue in studies of this kind is the distinction between the resource costs involved in the payments process and transfers between various parties in the payments system.

Resource costs are incurred when scarce economic resources are used – examples include the costs of communications technology, producing cash and issuing cards. For this paper, data on resource costs have primarily been gathered directly from the participants in the payments process that incur these costs, although in some areas, fees paid by participants in the study have been used as a proxy for the underlying resource costs of parties not directly covered by the study. Careful attention has been paid to avoid double counting. For example, when presenting aggregate measures of resource costs, the costs incurred by financial institutions in providing card acquiring services for merchants have been included, but not the fees that merchants pay for these services. These fees have, however, been included in merchants' estimates of their own costs of accepting various payment methods.

In contrast, *transfers* are defined as payments (either explicit or implicit) between various parties in the system that net out when aggregate costs are calculated. In some cases, these transfers can have a significant effect on various parties' estimates of their own costs of providing payment services and on their incentives to use particular payment methods, although they do not represent a cost to the system as a whole. Interchange fees are one example. In the credit card system, these fees are a cost to the acquiring financial institution, but revenue to the issuing institution, with the net effect being zero. Similarly the cost of interest foregone on cash holdings

2 *Long-run incremental cost and other cost concepts are discussed in more detail in Australian Competition and Consumer Commission (1997), Commonwealth Competitive Neutrality Complaints Office (1998) and Jamison (2006).*

3 *Estimates of how costs vary with the size of payments are also presented in recent studies by ten Raa and Shestalova (2004), Brits and Winder (2005), National Bank of Belgium (2006) and Bergman, Guibourg and Segendorf (2007). Typically, earlier studies only present estimates of average cost.*

represents a transfer from the private to the public sector, although not a cost to society as whole. In presenting the results below the various resource costs and transfers in the payments system are separately identified.

The scope and approach of this study differ in a number of ways to some previous studies of payment costs internationally and in Australia. Firstly, few studies have been able to collect their own original source data on payment costs because of its proprietary nature – many studies have therefore had to rely on a mixture of original and published data, including fee information, as a proxy for costs.⁴ This study has collected data directly from financial institutions, merchants and, for costs of currency production, the Reserve Bank. Secondly, this study presents estimates of a wide range of costs of payments for financial institutions and merchants to facilitate a broad analysis of policy and other questions. For particular reasons, many previous studies of payment costs have tended to concentrate solely on the costs to financial institutions or merchants, or focus on narrower concepts such as marginal costs, sometimes in conjunction with consideration of the different benefits of payment methods.⁵ Thirdly, this study covers a wider range of payment methods – including those not at the point of sale – than in most earlier studies, which typically focus solely on point-of-sale payments.⁶ Finally, because assumptions made to estimate consumer costs can substantially affect conclusions about the relative costs of different payment instruments, the current study draws on survey data to inform assumptions about the consumer costs of cash.⁷

2.2 The collection of cost data

The approach taken by this study has been to collect data directly from the main participants in the payments system. This includes financial institutions, merchants and, for costs of currency production, the Reserve Bank. In most cases, data were collected by way of standardised reporting forms, developed in conjunction with industry participants. Where payment-related services were provided to reporting entities by firms that were not included in the survey, it has been assumed that the price paid for these services by reporting entities is a reasonable estimate of the costs of providing the service. For example, the resource costs of transporting cash to and from merchants by armoured car companies was not directly measured; instead the payment by merchants for this service was measured. This approach is consistent with a competitive marketplace, and is a practical way of collecting a wide range of costs in a timely manner.

The resource costs that consumers incur in making payments are also considered in this study, although not directly measured. The main resource cost for consumers is the time it takes to make payments. Measuring the value of this time poses a number of significant challenges and, consistent with other studies, the measures presented rely heavily upon assumptions. In

4 Broader studies of payment costs that collect original source costs data include, for example, Brits and Winder (2005), National Bank of Belgium (2006), and Bergman, Guibourg and Segendorf (2007).

5 Studies with a narrower sectoral focus include Gresvik and Øwre (2003), which compares costs and income for financial institutions in Norway, and Food Marketing Institute (2000), which analyses merchant costs in the United States. Studies that focus on marginal payment costs net of benefits include Garcia Swartz, Hahn and Layne-Farrar (2006) for the United States, and Simes, Lancy and Harper (2006) for Australia.

6 For example, ten Raa and Shestalova (2004) concentrate on point-of-sale payments, while De Grauwe, Buyst and Rinaldi (2000) focus solely on the costs of cash and card payments.

7 For example, estimates of consumer costs are influential in the results of Garcia Swartz, Hahn and Layne-Farrar (2006) and Simes, Lancy and Harper (2006).

addition to the value of their time, consumers face explicit charges by financial institutions (and in some cases merchants) for payment services. These charges are not measured in this study, as the costs of providing the underlying services are captured in the data provided by financial institutions and merchants.

The structure of the reporting forms used in this study was developed by the Reserve Bank with the assistance of a consulting firm with considerable payments system experience. Before the forms were finalised, the Reserve Bank held meetings with key participants and engaged in a formal round of consultation on the proposed study approach and drafts of the survey materials. Feedback was sought on areas including: the consistency of treatment of costs across payment instruments; suitability of cost categories; clarity of definitions; the suitability of methods proposed for the allocation of common costs; and the ability of respondents to provide reliable data in the timeframe outlined. The reporting forms sought, for each relevant payment method, data on the total costs incurred at key stages of the payment process. Financial institutions were also asked to report separately the overhead costs related to establishing and maintaining transaction and credit card accounts for individuals, and the direct costs of making payments from these accounts. Most studies of payment costs do not account for the costs of establishing and running these accounts and, if captured, these costs are typically included in the cost of the payment process, resulting in some blurring of overhead and payment-specific costs.⁸ The costs of establishing and maintaining business transaction and credit card accounts are not captured in this study.

The final reporting forms were distributed to a number of financial institutions and merchants in March 2007. Details of the reporting forms are provided in Appendix A. To minimise reporting burden, respondents were given flexibility in selecting the period for which they reported costs, with financial institutions typically providing data for their 2005/06 financial year and merchants providing data for slightly more recent periods.

The estimates reported below are based on responses received from nine financial institutions (including ATM operators) and twelve merchants. In addition, data on costs of cash production were obtained from the Reserve Bank and for the Royal Australian Mint. Among both financial institutions and merchants a larger group was invited to participate, but a number of organisations declined, citing competing demands on their time or insufficiently detailed internal reporting systems.

The banks participating in the study reported nearly 20 million outstanding personal transaction accounts and 9 million personal credit card accounts, respectively covering around three quarters of these accounts in Australia. The merchants in the sample include seven retailers which predominantly accept payments at the point of sale, and five 'billers' which predominantly receive payments not at the point of sale.⁹ The retailers are mainly large organisations operating supermarkets, department stores and other general retailers. Over the one year sample period

8 For example, payment cost estimates presented in Gresvik and Øivre (2003) include financial institutions' account maintenance costs, and Brits and Winder (2005) include overhead costs for product development, statement production and head office management.

9 Data were also collected from two additional 'billers', although these were excluded from the final results, given that the data provided were either incomplete or were heavily influenced by business payments. The data provided were, however, useful in guiding analysis in various areas.

the respondent retailers reported sales totalling \$83 billion, around two fifths of the value of retail sales in Australia over 2006. The five 'billers' predominantly operate in the areas of telecommunications, utilities and financial services, where the data mainly reflect household payments. Together with data on non-point-of-sale payments provided by two retailers, the sample covered bill payments totalling almost \$20 billion.¹⁰ The sample is therefore representative of a large share of payment activity in Australia. More information on the payment activity captured in the sample is provided in Appendix B.

The individual responses received were subjected to rigorous checking, comprising examination of internal consistency, benchmarking against responses from other participants and, where possible, comparison with other sources.¹¹ Outlier observations were queried, directly resulting, in most cases, in the institution submitting revised data or providing information for the Reserve Bank to adjust the data. In a rare number of cases – where the data supplied remained very different from that provided by other participants and where no clear explanation was available – data have been omitted from the final calculations.¹²

In a number of the tables reporting results, the weighted-average and median outcomes are both shown, as there is significant variation across reporting entities in some cost categories. Weighted-average *total* costs for each payment method are calculated by adding together the weighted-average costs for each sub-category. For each payment method, the weights are the number of transactions for each respondent. The columns reporting medians do not necessarily add up as they show the median response for each cost category.

The data collected reflect payments that occurred over the reporting period. Therefore, the average cost estimates in Sections 3 to 6 relate to payments of different average size for each payment method, with cash payments having the smallest average size and cheque payments the largest average size. A comparison of costs across common payment sizes for the main point-of-sale payment methods is presented in Section 7.

It is important that the cost estimates presented below be viewed as providing a guide to the average and relative costs of various types of payment instruments, rather than as definitive estimates of these costs. Both the reporting institutions and the Reserve Bank have had to make a number of assumptions in developing these estimates, and in some cases institutions have had difficulty allocating costs across the various payment instruments and in allocating costs among the various categories for a given payment instrument. The estimates presented for financial institution and merchant payment costs are based on a large share of payment activity in Australia, but inevitably there is variation in costs across individual financial institutions and merchants. Notwithstanding these qualifications, the results reported below provide a broad indication of the costs involved in the Australian payments system.

¹⁰ *Non-point-of-sale data from retailers covered finance payments made by cheque and BPAY. While we are unaware of any solid publicly available estimates of the number and size of overall household bill payments, information from the 2003/04 Household Expenditure Survey suggests that household expenditure on telecommunications, utilities and insurance during that period was around \$40 billion (see ABS 2006b).*

¹¹ *These included the Reserve Bank's Retail Payments Statistics and cost information from 2005/06 provided to the Bank for calculating the benchmarks for interchange fees in the EFTPOS and credit card systems.*

¹² *These exclusions had minimal effect on the key findings.*

3. Financial Institution Costs

This section presents estimates of the costs incurred by financial institutions in providing the various payment methods. The cost estimates are reported in two parts. The first is the overhead costs related to establishing and maintaining transaction and credit card accounts for individuals. The second is the costs that are specific to transactions using particular payment instruments – namely credit cards, EFTPOS, scheme debit, cash, cheques, direct entry and BPAY.

3.1 Account overhead costs – all payment methods

Most payments involve access, at some point, to an account – either a credit card account or a transaction account. There are overhead costs of establishing and maintaining these accounts, which are not particularly sensitive to the number of transactions made using the account. These costs include those for systems and information technology (IT) (including internet and phone banking), product development and marketing, application processing and general customer service and account management. Financial institutions were asked to report these costs separately from the costs incurred when payments are made. Most institutions were able to do so, although some found it difficult to separate some overhead costs from those directly attributable to specific payment products. For example, a number of institutions found it difficult to separate customer service costs for general account maintenance (such as address changes) from customer service costs for credit card fraud and disputes management. In some cases, various assumptions were required to be made, although these assumptions do not affect the broad results.

According to the data reported by financial institutions, the overhead costs of operating a credit card account are higher than those for a transaction account (Table 1). For a credit card account, the reported weighted-average cost is \$109 per year, compared with \$77 per year for a transaction account. A large share of the difference is accounted for by the higher product development and marketing costs associated with credit card accounts; IT overhead costs are also higher.

The data also indicate that more transactions are made on an average transaction account than on an average credit card account; the total number of debits and credits on a transaction account averages 160 per year, compared with around 130 on a credit card account. Dividing overhead costs by the number of transactions gives estimates of the average overhead cost per transaction, which are significantly lower for transaction accounts (\$0.48) than for credit card accounts (\$0.82).

In addition to the overhead costs of running accounts, financial institutions incur costs when payments are made using those accounts. In the following sections these costs are examined for each of the payment methods.

Table 1: Financial Institution Issuer Costs of Account Overheads
\$ per annum per account

	Credit card accounts		Transaction accounts	
	Weighted average	Median	Weighted average	Median
TOTAL COSTS	109	113	77	86
<i>of which:</i>				
Product development and marketing	21	20	5	8
Systems and IT ^(a)	27	23	14	15
Application processing and set-up	16	19	13	8
General customer service	9	19	17	15
General account management	10	7	7	1
Other	26	16	21	16
<i>Memo items:</i>				
Annual transactions per account				
Total debits	118	106	125	128
Total credits	15	15	35	35

(a) Includes systems and IT overheads and the costs of internet and phone banking not directly allocated to BPAY and direct credit payments.

Note: The columns reporting medians do not add up as they show the median response for each cost category.

3.2 Direct payment costs – credit card, EFTPOS and scheme debit

For card payments, financial institutions incur costs on both the issuing and acquiring side. Some of these costs are for services provided by third parties while others are for services provided by the institution itself. Both types of costs are included in the results reported below.

3.2.1 Credit card and EFTPOS

The specific costs incurred by financial institutions in providing credit card, EFTPOS and scheme debit payments are presented in Table 2. For the credit card issuer, the table groups costs into three sub-categories covering the payment function, the credit function and reward programs. The classification of costs in this way, however, is not straightforward, requiring assumptions regarding which costs are relevant to the pure payment function, and which are related to the other functions. For example, the approach taken here is to assume that the cost of credit collection and write-offs is related to the credit function, rather than the payment function.¹³

The results confirm other findings that transactions through the credit card system are more costly for financial institutions than transactions through the EFTPOS system. Taking account of both issuer and acquirer costs, the weighted-average cost of a credit card transaction of average size is \$2.38 compared to \$0.22 for an EFTPOS transaction of average size (these figures exclude interchange fees). For credit cards, the average transaction size is \$132, while for EFTPOS it is \$59.

¹³ The reverse assumption could be justified on the grounds that the very nature of the product means that credit is extended when the payment is made.

Table 2: Financial Institution Direct Costs for Credit Card, EFTPOS and Scheme Debit Payments

\$ per average transaction for each payment method

	Credit card		EFTPOS		Scheme debit ^(a)
	Weighted average	Median ^(b)	Weighted average	Median ^(b)	Weighted average
TOTAL COSTS (excluding interchange fees)	2.38	–	0.22	–	0.46
<i>of which:</i>					
ISSUER	2.19	2.12	0.11	0.07	0.29
<i>of which:</i>					
Payment function	0.40	0.37	0.11	0.07	0.29
<i>of which:</i>					
Authorisation and transaction processing ^(c)	0.08	0.04	0.05	0.04	0.06
Scheme fees	0.11	0.13	–	–	0.08
Fraud and fraud prevention ^(c)	0.11	0.10	0.01	0.00	0.05
Cost of capital (excl. credit risks)	0.05	0.07	0.01	0.01	0.01
Other	0.04	0.04	0.04	0.02	0.08
Credit function	1.13	1.20	–	–	–
<i>of which:</i>					
Credit collections and write-offs	0.64	0.64	–	–	–
Cost of capital (credit risks)	0.19	0.21	–	–	–
<i>Interest-free period (transfer to cardholders)^(d)</i>	<i>0.30</i>	<i>0.28</i>	<i>–</i>	<i>–</i>	<i>–</i>
Cardholder rewards	0.65	0.59	–	–	–
<i>of which:</i>					
Cardholder reward programs (operating costs)	0.04	0.04	–	–	–
<i>Cardholder rewards (transfer to cardholders)^(d)</i>	<i>0.62</i>	<i>0.56</i>	<i>–</i>	<i>–</i>	<i>–</i>
ACQUIRER	0.19	0.18	0.11	0.10	0.18
<i>of which:</i>					
Payment function	0.19	0.18	0.11	0.10	0.18
TOTAL RESOURCE COSTS	1.46	–	0.22	–	0.46
TOTAL PAYMENT FUNCTION RESOURCE COSTS	0.59	–	0.22	–	0.46

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Table 2: Financial Institution Direct Costs for Credit Card, EFTPOS and Scheme Debit Payments

\$ per average transaction for each payment method

	Credit card		EFTPOS		Scheme debit ^(a)
	Weighted average	Median ^(b)	Weighted average	Median ^(b)	Weighted average
<i>Interchange fees</i>					
Paid by the issuer to the acquirer ^(c)	–	–	0.18	0.20	–
Paid by the acquirer to the issuer	0.69	0.63	–	–	0.39
<i>Acquirers' cost of delayed settlement of funds</i>	0.02	0.03	0.00	0.01	0.01
Issuer total costs including transfers to acquirers	2.19	2.12	0.29	0.26	0.29
Acquirer total costs including transfers to issuers^(f)	0.89	0.91	0.12	0.11	0.57
<i>Memo items:</i>					
Average transaction size (\$) ^(g)	132		59		81
Payment resource cost (% of average transaction size)	0.45		0.37		0.58

(a) Median not reported owing to small sample.

(b) Median totals are not calculated as the samples for issuer and acquirer costs are different.

(c) Excluding scheme fees.

(d) Transfers to cardholders excluded from resource cost calculations.

(e) Fees reflect that the reporting period was typically prior to the implementation of the EFTPOS Interchange Standard which lowered EFTPOS interchange fees to \$0.04 - \$0.05.

(f) Excludes transfers to merchants (i.e. EFTPOS rebates).

(g) Average reported transaction size for card issuers. Reported acquiring data has an average credit card, EFTPOS and scheme debit transaction size of \$124, \$58 and \$81 respectively.

Note: The columns reporting medians do not add up as they show the median response for each cost category.

This higher cost for credit card transactions is accounted for by three broad factors: the cost of providing the credit function on credit cards; the costs associated with reward schemes on credit cards; and differences in the costs directly related to the payment functionality.

According to the data provided, the average cost of the credit function for credit cards is \$1.13 (on a \$132 transaction). This cost includes the cost of credit collections and write-offs (\$0.64), the cost of capital (\$0.19) and the cost of funding the interest-free period (\$0.30).¹⁴ The last of these costs is a transfer to cardholders, rather than a resource cost for the payments system as a whole.¹⁵

In terms of reward schemes, the average cost on a \$132 transaction is around \$0.65. This includes the administrative cost of running the scheme (\$0.04) and the cost of the rewards themselves (\$0.62). Again, the second of these costs is a transfer to cardholders, rather than a resource cost for the system as a whole.

¹⁴ The costs associated with revolving credit are not included in this study.

¹⁵ Arguably, credit write-offs could also be considered a transfer to delinquent borrowers, although the credit collection process unambiguously incurs resource costs.

Excluding transfers, the total resource cost of the average transaction processed through the credit card system is \$1.46, considerably higher than the cost for a transaction processed through the EFTPOS system (\$0.22). In turn, excluding resource costs of the credit function and reward programs to focus on payment functionality, the results suggest that credit card payments remain more costly, albeit to a lesser extent; the weighted-average payment function cost for credit cards is \$0.59 compared to \$0.22 for EFTPOS. The higher average payment function cost of credit card transactions is largely associated with higher costs on the issuing side. These higher costs include:

- scheme fees, which, in part, reflect the additional costs of maintaining an international payments infrastructure and branding;¹⁶
- fraud losses, prevention and investigation, reflecting the practice of authorising credit card transactions by signature and the use of credit cards in situations in which the card is not present;¹⁷ and
- the higher cost of capital employed to cover higher operational risks.

In most cases, the results reported by the various participating institutions are broadly consistent with one another. One exception is the cost of capital, where estimates of the relevant cost differ significantly across institutions. This partly reflects differences in the methodology used to calculate this cost. During the consultation period, most banks indicated a strong desire to see this cost included in the study, however many do not directly estimate the cost of capital for individual payment methods. Notwithstanding the difficulties, all banks that did report the cost of capital for both credit cards and EFTPOS reported higher figures for credit cards.

The overall results are broadly consistent with those reported in the Joint Study.¹⁸ In particular, they confirm that a payment through the credit card system is, on average, more costly for financial institutions than a payment through the EFTPOS system. The more detailed approach of the current study, however, allows a better understanding of the differences in these costs, as the costs allocated to the ‘other’ category are much lower than in the Joint Study, and costs of establishing and running accounts, the credit function and reward programs are separately identified. This allows the differences in the resource costs associated with the payment function to be better identified.

Previous studies of payment costs also strongly support the finding that credit card payments are more costly to financial institutions than are EFTPOS payments. This finding is common to all payment cost studies of which we are aware, although there is considerable variation in the estimated cost differential, reflecting different approaches and assumptions across studies on which costs to include, particularly for credit cards.¹⁹

As discussed in Section 2, the cost estimates reported above are for the transactions that actually occurred over the reporting period, with the average size of a credit card transaction more

¹⁶ For EFTPOS payments, the Australian Payments Clearing Association incurs costs in operating the clearing stream, but these costs – as proxied by fees – are negligible on a per transaction basis.

¹⁷ Analogous to credit write-offs, the amount lost through fraud could arguably be considered a transfer to fraudsters, though fraud prevention and detection unambiguously incur resource costs.

¹⁸ Reserve Bank of Australia and Australian Competition and Consumer Commission (2000).

¹⁹ See, for example, Bergman, Guibourg and Segendorf (2007), Brits and Winder (2005), Garcia Swartz, Hahn and Layne-Farrar (2006), National Bank of Belgium (2006) and Simes, Lancy and Harper (2006).

than double the average size of an EFTPOS transaction. For transactions through the EFTPOS system, the resource costs are largely invariant with respect to the value of the transaction, while for credit cards some costs are likely to be related to the value of the transaction. In particular, the costs of fraud and capital might all be expected to increase as the value of transactions rises, as might the costs related to credit collections. This issue is discussed in more detail in Section 7.

3.2.2 *Scheme debit*

Only a subset of respondent financial institutions was able to provide data on the cost of scheme debit transactions. From those that did report, the weighted-average *total* cost of a scheme debit transaction (excluding interchange fees) (\$0.46) is lower than for a credit card transaction, largely because scheme debit issuers do not typically make transfers to consumers associated with loyalty programs, and do not incur credit function costs. The lower cost is also influenced by the lower average transaction size for scheme debit transactions because, as mentioned, some costs of credit card payments are likely to rise with the value of the transaction. The cost of a scheme debit transaction is, however, above that of an EFTPOS transaction because of many of the additional card issuer costs common to credit card payments, including costs associated with scheme processing and fraud and fraud prevention.

3.3 Direct payment costs – cash

Obtaining estimates of the total costs of financial institutions in providing and receiving cash is difficult as costs are incurred at numerous stages of the process, and allocating branch costs to specific functions is far from straightforward. Given the difficulties involved, financial institutions were consulted extensively about how best to collect relevant data. Reflecting this consultation, the Reserve Bank sought data on the costs associated with cash withdrawals through ATMs and EFTPOS cash-outs, and branch costs associated with both cash withdrawals and deposits by individuals and businesses.²⁰

3.3.1 *Methods of cash withdrawal and deposit*

Financial institutions provided data on cash withdrawals and deposits by individuals and by businesses.

For individuals, the data indicate that withdrawals through ATMs account for nearly 80 per cent of the number of withdrawals and more than half of the value of cash withdrawn, with the average size of an ATM withdrawal around \$175 (Table 3).

EFTPOS cash-outs comprise around one in six withdrawals by number, but their relatively small average size means that they account for only 3 per cent of the value of withdrawals. In contrast, over-the-counter withdrawals by individuals are relatively infrequent, but tend to be for high values, averaging over \$2 000 per withdrawal. The data reported to the Bank also suggest that the average size of cash deposits by individuals is quite large at over \$1 300. In part, this is explained by some large bills (e.g. loan repayments) being paid in cash over the counter at

²⁰ *Cash deposits and withdrawals can also be made at banks' agencies, most notably Australia Post, but the costs of these transactions are outside the scope of the study. Data collected for this study suggest that agency withdrawals comprise substantially less than 1 per cent of the total number of cash withdrawals.*

Table 3: Methods of Cash Withdrawal

Annual, survey respondent data

	Number		Value		Average value
	Millions	% of total	\$ billions	% of total	\$
ATM withdrawals ^(a)	706	79	123	55	174
EFTPOS cash-out ^(b)	138	16	8	3	56
Branch withdrawals ^(c)	46	5	92	41	2 013
Total withdrawals by individuals	890	100	222	100	
Business branch withdrawals	31	–	96	–	3 139
<i>Memo items:</i>					
Deposits ^(d)	158	–	457	–	2 900
<i>of which:</i>					
Personal	68	43	90	20	1 318
Business	89	57	367	80	4 103

(a) Data for ATM owners/acquirers.

(b) Data for card issuers.

(c) Includes all personal cash withdrawals and is not limited to withdrawals from transaction accounts.

(d) Includes cash deposits to transaction accounts and other over-the-counter cash payments to financial institutions.

a branch, and the fact that some institutions indicated difficulties in separately identifying cash and cheque deposits.²¹

Not surprisingly, the average size of a cash withdrawal by business customers, at over \$3 000, is much higher than that for individuals, and the number of withdrawals is much lower. On the deposit side, business cash deposits were greater in number and, in particular, in value than personal cash deposits. These relativities reflect the general cash payment process, of individuals withdrawing cash to spend at businesses, which then deposit these aggregated amounts back into financial institutions.

3.3.2 Costs of cash withdrawals through ATMs and EFTPOS

The costs incurred by institutions in providing ATM withdrawals are largely borne by the ATM owner, although costs are also incurred by the transaction acquirer and the issuer of the card used to withdraw cash. In some cases, these are the same institution, but in other cases, they are separate parties. In the data presented below the costs of ATM owners and acquirers are reported jointly.

The results suggest that the weighted-average cost of an ATM cash withdrawal (excluding interchange fees) is \$0.86, with the ATM owner/acquirer incurring the bulk of these costs (Table 4).²² Of the total cost, around \$0.75 can be considered resource costs, with the remainder effectively being a transfer between the ATM owner and the public sector, by way of foregone

²¹ Given this difficulty, the actual number and value of branch cash transactions is likely to be somewhat overstated.

²² For ATM owner/acquirer cost categories that are also relevant for non-cash transactions (e.g. balance enquiries, account transfers), 'per transaction' costs have been estimated by dividing through by the total number of ATM transactions. Card issuer costs primarily reflect costs of ATM withdrawals made using a debit card. An allowance has been made for issuer costs of credit card cash advances, which reflects the cost of the payment function for these transactions. If the costs of credit functions are included, the weighted-average card issuer cost is \$0.04 higher.

interest on the cash held in the ATM (float costs). Of the resource costs, the major costs are those associated with cash handling and storage and with deploying and maintaining ATMs. For some ATM owners, off-site rental costs are also significant.

Table 4: Financial Institution Costs of ATM Cash Withdrawals
\$ per withdrawal

	Weighted average	Median ^(a)
TOTAL COSTS (excluding interchange fees)	0.86	–
<i>of which:</i>		
ATM OWNER/ACQUIRER^(b)	0.74	0.85
<i>of which:</i>		
ATM owner equipment	0.18	0.19
Cash handling and storage	0.14	0.14
ATM owner centre management	0.09	0.05
Authorisation and transaction processing	0.05	0.07
Site rental: on-site ^(c)	0.03	0.00
Site rental: off-site ^(c)	0.09	0.08
Cost of capital	0.02	0.02
Fraud, theft and insurance	0.01	0.01
Other	0.02	0.02
<i>Float (transfer to Government)^(d)</i>	<i>0.11</i>	<i>0.14</i>
CARD ISSUER	0.12	0.09
TOTAL RESOURCE COSTS	0.75	–
<i>Interchange fees</i>		
<i>Paid by the issuer to the ATM owner/acquirer^(e)</i>		<i>~ 1.00</i>

(a) Median totals are not calculated as the samples for ATM owner/acquirer and card issuer costs are different.

(b) ATM owner/acquirer costs of cash handling and storage, float, and fraud, theft and insurance are divided by the number of cash withdrawals. All other ATM owner/acquirer cost categories are divided by the total number of ATM transactions.

(c) Site rental costs are divided by the total number of transactions (i.e. transactions across both on-site and off-site ATMs). Dividing on-site and off-site ATM rental costs separately by proxies for on-site and off-site transactions respectively suggests a per transaction rental cost differential between on-site and off-site ATMs that is broadly comparable to that presented in the Table.

(d) Transfer to Government excluded from resource cost calculations.

(e) Indicative interchange fee for cash withdrawals only.

The estimate of ATM owner/acquirer costs (\$0.74 per withdrawal) is higher than that from the Joint Study (\$0.49). In part, this is because the current measure is more comprehensive, capturing costs of on-site rental and the cost of capital. However, costs in a range of areas do appear to have increased over recent years. These include the costs of cash handling (\$0.04 higher on the average transaction), off-site rental costs (\$0.06 higher) and float (\$0.06 higher) – reflecting, in part, higher average transaction values.

For cash withdrawn through the EFTPOS system, the costs incurred by financial institutions depend upon whether the withdrawal is a stand-alone transaction, or is undertaken as part of an EFTPOS purchase transaction that would typically have occurred regardless of whether cash was withdrawn.

In the former case, a reasonable estimate of the cost to financial institutions is \$0.22, the figure reported in Section 3.2 for the sum of the resource costs incurred by issuers and acquirers for an EFTPOS purchase transaction. It is important to note, however, that this figure is not directly comparable to the cost of ATM withdrawals reported above, as it excludes the cash handling costs, which in the case of EFTPOS cash-outs are incurred by merchants (see Section 4.1 below). In the more common case in which cash is withdrawn as part of a transaction that would have taken place regardless, the incremental costs of an EFTPOS cash withdrawal for financial institutions can be thought of as close to zero.²³

3.3.3 *Costs of cash withdrawals and deposits through branches*

Obtaining estimates of the cost of cash withdrawals and deposits through a branch requires the allocation of branch costs – including, for example, rent and staff – across different functions. While this poses considerable challenges, most banks were able to make reasonable estimates of these costs, although in some cases they reported difficulties fully separating branch costs relating to cash transactions from those relating to non-cash transactions.

According to the data provided, the average cost of a branch cash transaction (including both deposits and withdrawals) was \$3.70 (Table 5), with the average size of a transaction approximately \$2 750. Of this total cost, around \$0.30 represents a transfer to the public sector, due to the interest foregone on holding cash; the remainder of the costs can be treated as resource costs.²⁴ Staff costs for processing cash transactions (mainly over the counter) account for about half of the total resource costs, with branch rental costs and the branch technology costs also being significant.²⁵ There are also substantial costs incurred at the wholesale level, including the costs of moving cash to and from branches and centralised cash storage centres.²⁶

Separate cost data were not collected for deposits and withdrawals, and it is not clear whether, or how, costs differ across these two types of transactions. It is also difficult to determine exactly how the cost of a cash transaction at a branch varies with the size of the transaction. A reasonable first approximation is that the costs increase with the size of the transaction, perhaps in a linear fashion (at least after some point). According to the data reported above, the average resource cost of a cash transaction at a branch was equivalent to 0.14 per cent of the average value withdrawn.

23 *This assumes that in most instances the act of obtaining cash is incidental to the EFTPOS purchase. An alternative treatment of costs for combined EFTPOS purchase/cash-outs is to apportion costs to the cash withdrawal component using the ratio of the relative values of the cash-out and purchase components of the transaction. Using this approach, for each cash withdrawal through the EFTPOS system – incorporating both cash-out only and purchase/cash-outs – financial institutions incurred, on average, resource costs of around \$0.13.*

24 *Interest foregone, or 'float', costs for wholesale stocks of cash held by banks (i.e. Verified Cash Holdings held in Approved Cash Centres) were only included to the extent that they were not covered by payments from the Reserve Bank for interest foregone on these holdings.*

25 *Some banks allocated the cost of branch rent to activities based on the number of transactions undertaken. This methodology may over-allocate rental costs to cash (and cheque) transactions and under-allocate rent to other branch activities such as lending, financial planning and general account management and customer service.*

26 *The cost category 'wholesale cash handling and storage' includes costs to financial institutions for fraud, theft, counterfeiting and related insurance costs. At the branch level, costs for fraud, theft and related insurance are included in the cost category 'other branch costs'. While there was wide variation, costs for fraud, theft and related insurance were typically a low share of these cost categories.*

Table 5: Financial Institution Costs of Branch Cash Transactions

\$ per branch cash transaction

	Weighted average	Median
TOTAL COSTS	3.70	3.49
<i>of which:</i>		
Transaction processing	1.77	1.44
Rent	0.57	0.58
Technology (equipment, systems and software)	0.35	0.43
Wholesale cash handling and storage (excl. ATMs)	0.39	0.26
Cost of capital	0.09	0.08
Other branch costs	0.23	0.27
<i>Float (transfer to Government)^(a)</i>	<i>0.30</i>	<i>0.25</i>
TOTAL RESOURCE COSTS	3.40	3.27

(a) Transfer to Government excluded from resource cost calculations.

3.3.4 Costs of coin and note production

The cost of a cash payment includes public sector costs associated with currency production. Unlike other payment methods, where the means of payment is produced by private financial institutions, cash is produced by the public sector; notes are produced by the Reserve Bank, through its wholly owned subsidiary, Note Printing Australia, and coins are produced by the Royal Australian Mint.

The relevant costs are those associated with the currency production process, including materials, equipment and staff, as well as related functions such as distribution, storage and security, research and development and note fitness testing and counterfeit prevention.

There are two broad approaches to estimating these costs on a per cash payment basis. One is to simply sum the relevant annual costs incurred by the Reserve Bank (including Note Printing Australia) and the Royal Australian Mint, and divide by an estimate of the annual number of cash payments undertaken. The second approach is to divide the cost of producing a note or coin by an estimate of the number of times the note or coin is used during its life. Both approaches pose difficulties given that the number of cash transactions and the average number of times a coin or note is used are not measured. Nevertheless on reasonable estimates, the average currency production cost per cash transaction is likely to be around \$0.01. Brits and Winder (2005) found that costs of currency production in the Netherlands also averaged around \$0.01 per payment. Data presented in Williams and Anderson (2007) show that note production costs in a number of countries range from the Australian dollar equivalent of around \$0.05 to \$0.30. Even at the high end of the range, a note only needs to be used around 25 times for costs to average around \$0.01 a payment.

3.3.5 Summary

The data presented above can be put together to obtain an estimate of the average cost that financial institutions (including the public sector) incur for each cash transaction in the economy. The main difficulty is that, unlike the case for electronic transactions, data are not readily available on the number of cash transactions in the economy. The approach taken here is to

use information from *Household Payment Patterns in Australia*,²⁷ and in particular, a survey of how individuals make payments conducted by Roy Morgan Research on behalf of the Reserve Bank.²⁸ Based on this survey, it is estimated that the number of cash payments made in Australia per year is currently around 8½ billion. Further details, including the significant qualifications that surround this estimate, are provided in Appendix C.

To obtain the average cost of a cash payment, estimates of financial institutions' aggregate costs of cash withdrawals and deposits were divided by the estimated number of cash transactions.

The total cost of ATM withdrawals was estimated by multiplying the weighted-average cost per withdrawal (from Table 4) by the total number of ATM withdrawals in Australia. For EFTPOS, the total cost was estimated as the product of the financial institution cost per cash-out only transaction from Table 2 (\$0.22) and the total number of EFTPOS cash-out only transactions in Australia; as discussed above, the additional cost of withdrawing cash when combined with an EFTPOS purchase transaction is assumed to be zero.²⁹ For branch costs, scaling up the responses received is more difficult, as information on the number of branch cash withdrawals and deposits in Australia is not available. Given the lack of relevant data, the approach taken here has been to scale up the number of branch cash transactions provided by participants in the study by 10 per cent. This appears reasonable given that the reporting institutions are likely to account for the bulk of branch cash transactions in Australia.³⁰

Based on these assumptions, it is estimated that financial institutions in Australia incurred costs of around \$0.20 for the average size cash transaction (Table 6).³¹ Of this, around \$0.02 is a transfer to the public sector, with the remainder being resource costs. The cost of cash withdrawals and deposits in bank branches comprise nearly 60 per cent of these resource costs, with the cost of ATM withdrawals accounting for the bulk of the remaining costs. The cost of producing notes and coins is very small compared to these other costs. On a per withdrawal basis, withdrawing cash through branches is costly, although the cost as a share of the value withdrawn is lower than for the other methods, reflecting the much higher average value of an over-the-counter withdrawal.

27 See Reserve Bank of Australia (in this volume).

28 These are data collected for the Consumer Financial Transactions Diary Project (as described in detail in Appendix A of *Household Payment Patterns in Australia*).

29 The number of ATM withdrawals and EFTPOS cash-out only transactions were obtained from the Reserve Bank's Retail Payments Statistics.

30 Data collected for the Retail Payments Statistics indicate that the study's sample of banks represents more than 90 per cent of total over-the-counter cash withdrawals made using debit cards. On the other hand, APRA data shows that the stock of deposits held by surveyed institutions comprises around 80 per cent of total household and business deposits at deposit-taking institutions. Arguably, however, the surveyed banks may have a higher proportion of total cash transactions than their deposit share suggests (for example, total financial institution deposits includes those of banks that only allow electronic deposits and withdrawals). Further, for the reason that surveyed institutions have had difficulty identifying costs and transaction numbers related solely to cash transactions in branches it would not seem prudent to scale up their costs to reflect their share of deposits. On balance, a scaling factor of 110 per cent was chosen.

31 This is the total cost for ATM withdrawals, EFTPOS cash-outs, over-the-counter withdrawals and cash deposits divided by the number of cash payments in the economy.

Table 6: Financial Institution Direct Costs of Cash Payments

	Average resource cost		Per cash payment in the economy ^(a)	Share of total resource cost
	Per withdrawal	Per cent of withdrawal value		
		\$		
TOTAL COSTS			0.20	
<i>of which:</i>				
ATM withdrawals	0.75	0.43	0.07	42
EFTPOS cash-out ^(b)	0.01	0.03	0.00	0
Branch costs (withdrawals and deposits)	3.40 ^(c)	0.12 ^(c)	0.10	58
Float (transfer to Government) ^(d)			0.02	
TOTAL RESOURCE COSTS	–	–	0.18	100
<i>Memo items:</i>				
Cost of currency production			0.01	
No. of cash payments		8.4 billion		
Average value of ATM withdrawal		\$174		
Average value of EFTPOS cash-out ^(e)		\$56		
Average value of branch cash transaction		\$2 758		

(a) Estimated as the annual aggregate costs for each category divided by the estimated total number of cash transactions in the economy per year.

(b) Aggregate cost of EFTPOS cash-out only transactions divided by all EFTPOS cash-out transactions comprising cash-out only and combined purchase/cash-out transactions.

(c) Cost per branch cash transaction, including withdrawals and deposits.

(d) Transfer to Government excluded from resource cost calculations.

(e) For card issuers. Weighted average of the value of cash-out only transactions and the cash-out component of combined purchase/cash-out transactions.

3.4 Direct payment costs – cheques, direct entry and BPAY

Estimates of the average cost that financial institutions incur for a cheque, BPAY and direct entry payment are presented in Table 7. These estimates cover the costs of both the ‘paying’ and the ‘collecting’ institution.³²

The results suggest that cheques are the most costly payment method, with financial institutions incurring costs of \$4.22 for each cheque payment. The cost to the collecting institution of receiving cheques is particularly high, reflecting the manual processing of cheque deposits. Processing involves significant staff and branch costs, particularly for cheques deposited over the counter. Costs incurred by the collecting institution include transporting cheques to the cheque processing centre, amount encoding, capture of individual cheque information including validation to enable creation of electronic files, taking electronic images of the physical instrument, sorting and batching cheques and sending cheques to the paying institution – costs not relevant for the electronic payment methods of BPAY and direct entry.

³² Some costs, mainly overheads, are common to both the paying and collecting institution roles. For each payment instrument, these common costs are aggregated across institutions and divided by half the total number of paying and collecting institution transactions. This treatment, which effectively assumes that participating financial institutions form a closed sample, avoids double counting of transactions.

Table 7: Financial Institution Direct Costs for Cheque, BPAY and Direct Entry Payments

\$ per average transaction for each payment method

	Cheque ^(a)			BPAY			Direct entry			
	Weighted average	Median	Weighted average	Median	Weighted average	Median	Direct debit		Direct credit	
							Weighted average	Median	Weighted average	Median
TOTAL COSTS (excluding interchange fees)	4.22	4.30	0.51	0.52	0.10	0.11	0.08	0.08	0.08	0.08
<i>of which:</i>										
Overheads	1.13	1.15	0.16	0.09	0.04	0.03	0.04	0.03	0.04	0.03
Processing	0.40	0.48	0.13	0.07	0.03	0.02	0.03	0.02	0.03	0.02
Exceptions	0.22	0.26	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Cost of capital	0.12	0.09	0.04	0.02	0.01	0.00	0.01	0.00	0.01	0.00
Cheque production	0.08	0.10	-	-	-	-	-	-	-	-
Receipt of deposits	2.27	2.02	-	-	-	-	-	-	-	-
Marketing	-	-	0.02	0.01	-	-	-	-	-	-
Scheme fees	-	-	0.10	0.11	-	-	-	-	-	-
Set-up and servicing	-	-	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
TOTAL RESOURCE COSTS	4.22	4.30	0.51	0.52	0.10	0.11	0.08	0.08	0.08	0.08
Internet and phone banking costs	-	-	0.17	0.10	-	-	-	-	0.07 ^(b)	0.08 ^(b)
<i>Interchange fees</i>										
Paid by the receiving institution to the paying institution	-	-	0.40	0.44	-	-	-	-	-	-
<i>Memo items:</i>										
Average transaction size	3 159		597		4 008		4 781			

(a) Estimates exclude a major financial institution that was unable to report data for all cost categories and provided total cost data that was an extreme outlier compared to other institutions.

(b) Applies only to direct credits made using internet banking.

The cost of an average BPAY payment is significantly lower than that of a cheque payment. The main estimated direct costs of a BPAY payment are in three areas: scheme fees, processing and overheads. Fees paid by financial institutions to BPAY, averaging around \$0.10 per transaction, reflect the costs of managing the BPAY scheme, including branding, maintaining and operating the central BPAY processor, maintaining links with financial institutions, and managing biller codes and the payment validation process. On the payer institution side, processing costs incurred cover the steps of validating the payment instruction against biller files supplied by the central processor, confirming funds are available, debiting the account, issuing a receipt and sending batch files to the central processor. On the biller institution side, they cover the costs of creating and delivering payment files to each of the institution's billers, and crediting and reconciling the biller's account.

The average cost of a direct entry payment to financial institutions is considerably lower than both BPAY and cheques at around \$0.10.³³ Direct entry is a bilateral system, unlike BPAY, so there are no resource costs associated with operating a scheme.³⁴ Processing costs are also lower for direct entry than BPAY, reflecting lower processing requirements for recurring payments such as direct debits or payroll direct credits. Overhead costs are also reported to be lower for direct entry, consistent with relatively less information on payments being provided to merchants for a direct entry transaction than for BPAY. Some of the reported cost differences also potentially reflect that, as direct entry is a mature system, more costs are likely to be fully written off or mixed with other functions than the costs of the newer BPAY system.

For BPAY and direct entry, in addition to the direct costs of making payments, there is a case to include some of the overhead costs associated with telephone and internet banking services. These platforms are required to make a BPAY payment. Internet banking can also be used to initiate direct credits, although direct entry payments can be made through other methods. Estimating the relevant costs, however, is not straightforward. One approach is to allocate a share of the relevant overhead cost to the payment method, based on the share of internet and phone banking 'actions' that are payments by that method. On this basis, around 15 per cent of total transaction account internet and phone banking costs would be allocated to BPAY, and 10 per cent of transaction account internet banking costs would be allocated to direct credit.³⁵ Including these costs adds around \$0.10 to a BPAY payment and \$0.08 to direct credits that are initiated via internet banking.³⁶ The inclusion of these costs does not make any difference to the relative cost ranking of payment methods.

³³ Direct entry payments are defined here as interbank transfers passing through the Bulk Electronic Clearing System (BECS). Intra-bank transfers were not captured in the study but presumably are of lower cost than interbank transfers. There is very little difference in cost to financial institutions of direct debit payments (initiated by the recipient of the payment) and direct credit payments (initiated by the payer), though direct debit payments have slightly higher costs associated with merchant servicing and exceptions.

³⁴ The Australian Payments Clearing Association incurs costs in operating the clearing streams for direct entry and cheque payments but these costs – as proxied by fees – are negligible on a per transaction basis.

³⁵ The study focuses on the cost of making BPAY payments from a transaction account, which account for the overwhelming majority of BPAY payments. If incorporating the costs of a BPAY payment from a credit card account, some portion of internet and phone banking costs for credit card accounts would also need to be allocated, which would increase the cost of the average payment.

³⁶ Given variation in reported internet and phone banking costs, with one observation having a strong influence on the weighted average, the median is cited here as more representative. These estimates are likely to provide an upper bound, as internet and phone banking costs are only allocated across measured 'actions' – some institutions could not report all 'actions' using internet and phone banking, while balance enquiries using internet banking are inherently difficult to measure.

Of the payment methods, the financial institution cost estimates that differ most from previous estimates in Australia are for cheques. The estimate here (\$4.22) is considerably above the estimate of marginal cost (\$0.16) in Simes, Lancy and Harper (2006) and the estimate of total cost (\$1.60-\$1.75) in Department of Communications, Information Technology and the Arts (2006). In those papers, however, costs are not measured directly, but based on publicly available information such as consumer bank fees. While for this study financial institutions faced numerous challenges in gathering data for cheques, and the cost estimates presented could potentially be an overestimate, it is clear that the average costs to financial institutions of cheque payments are considerably higher than other payment methods.

4. Merchant Costs

This section presents estimates of the average costs to merchants and billers of the various payment instruments.³⁷ Separate results are presented for merchants for whom payments mainly occur at the point of sale and for merchants for which payments predominantly occur remotely. This latter group includes, for example, utilities that routinely bill their customers.

4.1 Point-of-sale payments

The focus here is on payment methods used at the point of sale, namely cash, credit cards, EFTPOS and cheques. The main results are summarised in Table 8.

A notable feature of the results is the importance of ‘tender time’ (the time taken to process a payment at the check-out) in merchants’ estimates of their own costs in accepting the various payment methods. A number of merchants with high turnover have supplied the Reserve Bank with formal estimates of tender time by payment method drawn from time and motion studies.³⁸ These data show that the average time taken to process a cash transaction (at around 20 to 25 seconds) is lower than that for EFTPOS (around 35 to 40 seconds) and credit cards and scheme debit (around 45 to 50 seconds), with cheque payments taking longer still (around 90 seconds, but with a much wider range reported than other payment methods).

This ranking is consistent with the findings of international studies, and has a significant bearing on the relative resource costs of accepting payment methods for merchants included in this study.³⁹ For example, using typical wage rates in the retail industry, a 30 second saving in tender time could save a merchant around \$0.17 per transaction. For other merchants, particularly small businesses, tender time may be less important as a driver of costs. This is particularly so in environments in which queues at the check-out are atypical, and where the time taken for the payment to be processed can be used by the merchant to develop a stronger relationship with the customer. In our sample, some merchants with lower turnover estimated payment costs on the basis of informal estimates of tender time which were much closer across payment methods than those based on time and motion studies.

³⁷ In a handful of areas this covers costs typically, but not always, borne by the merchant and biller sector. For example, costs of card acquiring such as point-of-sale (POS) devices are not included as a cost to merchants, as only a minority of merchants acquire their own EFTPOS transactions. Rather, this is captured as a financial institution cost.

³⁸ Tender time is measured from the time the customer is informed of the transaction amount to the time the payment is consummated (i.e. when the cashier delivers the receipt and/or change to the customer).

³⁹ See, for example, Brits and Winder (2005) and Food Marketing Institute (2000).

For the merchants who provided data to the Reserve Bank, cash payments had the lowest weighted-average cost, primarily reflecting the lower tender time. The weighted-average cost of a cash transaction to merchants was reported to be \$0.25, of which about half is accounted for by tender time, with the remainder being largely related to costs associated with cash deliveries, cash register pick-up and back-office processing.⁴⁰ There was, however, considerable variation in the cost estimates provided, as evidenced by the higher median. Merchants with lower turnover typically reported higher cash costs, primarily reflecting longer estimated tender times. The average size of cash payments across the sample of merchants is \$19.

The weighted-average cost to merchants of the average EFTPOS transaction, at \$0.34, is a little higher than that for the average cash transaction. This is due to the longer average tender time, with other payment-related costs being lower than for cash transactions. Due to the timing of the study, the fees that merchants currently pay financial institutions for acquiring are underestimated, as some of the data reported to the Reserve Bank covers the period prior to the change in EFTPOS interchange fees in November 2006, while others cover the period after the change in interchange fees.

Of the three electronic payment methods, merchants reported the highest cost for credit cards. The main factor here is the higher merchant service fees, reflecting the higher interchange fees in the credit card system. With the average credit card transaction at the point of sale for reporting merchants equal to \$68 (which is significantly below that for the economy as a whole), fees paid to financial institutions (mainly merchant service fees) averaged \$0.54 per transaction. Abstracting from these fees, credit card payments were still considered to be the most expensive, largely due to the longer tender time.

A limited number of merchants also supplied the Bank with cost data for scheme debit transactions. Excluding merchant service fees, the cost to merchants were broadly the same as for credit cards. These data are not reported here due to the small sample size involved.

The estimates in Table 8 also confirm that cheques are the most expensive payment method for the reporting merchants, with the average cost to the merchant of accepting a cheque payment being more than \$3. This high cost reflects the time taken to process a cheque payment at the point of sale, costs associated with cheque verification and authorisation services, and higher back-office processing costs.

A number of the costs reported in Table 8 are for services provided to merchants by financial institutions, with the costs that these institutions incur in providing these services reported in Section 3.2. In addition, some costs are transfers, such as float costs. Abstracting from these costs – to focus just on those resource costs typically incurred directly by merchants – the ranking in the cost of the various payment instruments remains unchanged.

The discussion above has focused on the cost of an average size transaction for each payment method. As a *percentage* of the average payment made with each payment method, however, the relative costs look quite different. In particular, the resource cost to merchants for a cash transaction of average size is around 1.3 per cent of the value of the transaction. This is above that for EFTPOS (around 0.4 per cent), credit cards (0.6 per cent) and even cheques (0.9 per

⁴⁰ *Costs of theft – commonly referred to as ‘shrinkage’ – are included in other costs, and make up around 1 per cent of total resource costs of cash. Cash handling costs will also reflect any cost of providing cash-out through the EFTPOS system. Any cost, however, is likely to be small, with potential for the cash-out provision to actually reduce cash handling costs in some circumstances.*

Table 8: Merchant Costs for Credit Card, EFTPOS, Cash and Cheque Payments

\$ per average transaction for each payment method

	Credit card		EFTPOS		Cash		Cheque	
	Weighted average	Median	Weighted average	Median	Weighted average	Median	Weighted average	Median
TOTAL COSTS	0.95	0.95	0.34	0.36	0.25	0.41	3.37	2.66
<i>of which:</i>								
Tender time	0.31	0.32	0.24	0.23	0.13	0.16	1.14	0.99
Other point-of-sale	0.07	0.02	0.06	0.02	0.05	0.07	1.61	1.14
Back-office processing	0.01	0.01	0.01	0.01	0.02	0.02	0.19	0.21
Other	0.01	0.00	0.00	0.00	0.04	0.06	0.20	0.27
<i>Fees paid to financial institutions^(a)</i>	<i>0.54</i>	<i>0.57</i>	<i>0.02</i>	<i>0.02</i>	<i>–</i>	<i>–</i>	<i>0.16</i>	<i>0.11</i>
<i>Other transfers</i>	<i>0.01</i>	<i>0.00</i>	<i>0.01</i>	<i>0.00</i>	<i>0.01</i>	<i>0.00</i>	<i>0.08</i>	<i>0.05</i>
TOTAL RESOURCE COSTS^(b)	0.40	0.40	0.31	0.34	0.24	0.40	3.14	2.54
<i>Memo items:</i>								
Average transaction size (\$)	68		73		19		357	
Resource cost (% of average transaction size)	0.59		0.43		1.29		0.88	

(a) A minority of merchants acquire their own EFTPOS transactions. In this case, acquiring costs are a resource cost incurred directly by the merchant, covering POS devices, communication link and switching services. The costs presented in this paper, however, are based on the common arrangement of financial institutions providing the acquiring service.

(b) Excluding fees paid to financial institutions and other transfers.

cent). This reflects the different average transaction size of each of the payment instruments. How these costs might vary with the size of payments is discussed in Section 7.

4.2 Non-point-of-sale payments

This section examines merchants' costs of accepting bill payments. It covers only those bill payments made 'remotely' – by credit card (phone or internet), cheque (by mail), direct debit and BPAY. For cheques, resource cost estimates include fees paid by merchants to third parties for lockbox services (i.e. for collecting and reconciling cheque payments) as these costs have not been separately collected from financial institutions.⁴¹ The results are summarised in Table 9.

In terms of total costs to the merchant for the average transaction size observed over the sample period, credit cards are the most expensive payment method, followed by BPAY and cheques, while direct debit payments have the lowest cost.⁴² These relativities partly reflect the fees paid by billers to financial institutions. These fees are highest for credit card payments (\$1.55 on average), and include the merchant service fee and any fees paid to the acquirer for leasing of equipment. Billers also pay fees to financial institutions for BPAY payments (\$0.54 on average). Fees paid to financial institutions for cheques and direct debit are significantly lower, at \$0.01 and \$0.05 respectively, although for cheques this is an under representation; fees charged by financial institutions for lockbox services – serving as a proxy for the underlying resource cost – cover the fees that the financial institution would typically charge for cheque deposits.⁴³

Focusing solely on resource costs incurred directly by billers, the relativities across instruments are somewhat different, with cheques becoming the most costly instrument, followed by credit cards, direct debit and finally BPAY. The bulk of cheque costs lie in the 'back-office' category, which covers reconciliation, deposit preparation and cheque deposit. Where applicable, lockbox fees are also included in this category. There was considerable variation in cheque costs, with larger billers tending to report lower costs, suggesting some scale advantages in cheque processing.

For credit cards, the bulk of the biller's costs lie in 'overheads' and 'back-office'. These categories mainly reflect the cost of the biller either operating a bill payment platform to accept credit card payments or paying fees to a third-party credit card payment processor.⁴⁴ Unlike cheques, once the payment has been received the costs of processing are relatively low.

A point of interest is the difference in the resource costs of direct debit (\$0.18) and BPAY (\$0.03). Discussions with billers indicate that, fees aside, BPAY is viewed as a low-cost instrument, partly reflecting low back-office processing costs as BPAY provides additional functionality assisting in reconciliation of payments. In comparison, direct debit payments can be quite costly, particularly in setting up and in processing when the payment is rejected due to lack of funds.

41 Although financial institutions were not asked to provide costs associated with lockbox services it is possible that some related costs have been included in financial institution data provided for cheques.

42 The resource costs of accepting a cheque or a credit card payment not at the point of sale are significantly lower than the costs presented for payments at the point of sale in Section 4.1 because of the difference in tender time costs. However, total credit card costs not at the point of sale are higher than at the point of sale because the larger average payment size results in a larger fee being paid, since fees payable are ad valorem.

43 Also, although cheque dishonours typically incur fees for billers, some billers recover these fees from customers and therefore did not report them as a cost.

44 A minority of billers surveyed also accept credit card payments over the counter, but the share of these transactions in the sample is negligible.

Table 9: Biller Costs for Credit Card, Cheque, BPAY and Direct Debit Payments

\$ per average transaction for each payment method

	Credit card		Cheque		BPAY		Direct debit	
	Weighted average	Median	Weighted average	Median	Weighted average	Median	Weighted average	Median
TOTAL COSTS	1.76	2.21	0.52	0.74	0.57	0.58	0.24	0.24
<i>of which:</i>								
Overheads	0.08	0.02	–	–	0.00	0.00	0.04	0.02
Back-office	0.13	0.21	0.49	0.56	0.02	0.01	0.14	0.14
Exceptions	0.01	0.00	0.02	0.00	0.00	0.00	0.01	0.00
Cost of capital	–	–	–	–	–	–	–	–
<i>Fees paid to financial institutions</i>	1.55	2.00	0.01	0.00	0.54	0.54	0.05	0.05
TOTAL RESOURCE COSTS^(a)	0.21	0.21	0.51	0.69	0.03	0.04	0.18	0.15
<i>Memo items:</i>								
Average transaction size (\$)	146		1 098		136		106	
Resource cost (% of average transaction size)	0.14		0.05		0.02		0.17	

(a) Excluding fees paid to financial institutions.

The discussion above has focused on the cost of each payment method for an average transaction size by each payment method. As a *percentage* of the average payment for each payment method, the cost of cheque payments is second lowest, reflecting the much higher average size of a cheque bill payment (over \$1 000 compared to between \$100 and \$150 for the other payment methods). The resource costs to billers of these payment methods are fairly invariant to the value of the transaction.

5. Consumer Costs

The main resource cost directly incurred by consumers is the cost of their time to make payments. Consumers also incur charges by financial institutions (and in some cases merchants) for payment services, although these are not considered here given that the cost of providing these services is measured elsewhere in this study.

The various estimates in the literature of costs to consumers in making payments are heavily dependent on assumptions about time associated with these payments and the value of that time.⁴⁵ As such, estimates in this area are quite different in nature to those for the resource costs incurred by financial institutions and merchants, where direct measurement is practical. Notwithstanding the difficulties, this section presents some estimates of the time involved in the use of different payment instruments and the value of consumer time. These suggest some previous estimates of consumer costs have been overstated.⁴⁶

The time involved in the use of a payment instrument includes not only the time taken to make the payment but also the time taken for other related activities. An obvious example of these other activities is obtaining cash from an ATM to make cash payments. But there are also time costs associated with the use of payment instruments other than cash. Examples include: the time associated with checking credit card statements for fraudulent or mistaken activity; the time involved in reconciling credit card and debit card account statements; and the time spent paying credit card bills and speaking with customer service representatives about account-related queries.⁴⁷

Of these various time costs, the easiest to measure is tender time – the time spent at the check-out while the payment is being processed. The estimates below draw on the tender times discussed in Section 4.1, which showed that the fastest processing times are for cash payments, followed by EFTPOS, credit cards and cheques.

Obtaining estimates of the other time costs is more difficult. For ATM withdrawals, Garcia Swartz, Hahn and Layne-Farrar (2006) assume, for example, that it takes US consumers an average of four minutes to travel to an ATM and a further minute to withdraw cash from the ATM, an assumption also employed for Australian consumers in Simes, Lancy and Harper (2006). In contrast, Bergman, Guibourg and Segendorf (2007) use an average travel time of one

45 See, for example, Garcia Swartz, Hahn and Layne-Farrar (2006) for the United States, and Simes, Lancy and Harper (2006) and DCITA (2006) for Australia.

46 It is important to note that these consumer costs are internalised and considered by consumers when they make decisions about which payment instrument to use.

47 Some previous studies, such as Garcia Swartz, Hahn and Layne-Farrar (2006) and Simes, Lancy and Harper (2006) also include the cost of consumer time spent queuing at the point of sale. This cost is an externality arising from the payment which is greatest for payment instruments with a relatively long tender time. However, this cost is internalised by some merchants through measures such as the use of a greater number of check-outs during peak periods, and provision of cash-only registers.

minute for Swedish consumers and an estimate by the Swedish Bankers Association that the average ATM transaction takes 50 seconds from the time of inserting a card to receiving the cash, card and receipt.

These estimates of the time taken to make an ATM withdrawal assume that each ATM withdrawal requires a special trip. In many cases, however, consumers withdraw cash when passing an ATM on the way to another activity, so that travel time is likely to be small, or non-existent. This issue was explored in the survey conducted by Roy Morgan Research as part of the Reserve Bank’s *Household Payment Patterns in Australia* study. In particular, individuals were asked to indicate whether they considered the ATM withdrawal to be a ‘special trip’. The results indicated that only one third of survey participants made a specific trip to obtain cash, with the others viewing the cash withdrawal as part of another activity.

On the basis that it takes 50 seconds at the ATM to withdraw cash, and the average ATM withdrawal supports eight cash payments, the average time per cash payment associated with obtaining cash is estimated to be between 9 and 16 seconds (Table 10).⁴⁸ The higher estimate is obtained by assuming that one third of all ATM withdrawals incur travel time of four minutes and the other two thirds of withdrawals incur no travel time; the lower estimate is obtained by assuming that one third of all ATM withdrawals incur travel time of one minute with no travel time for the remaining withdrawals.

There are no formal estimates of the time taken to perform the other payment-related activities mentioned above. For transactions from credit card and transaction accounts, it is assumed that each transaction takes 5 seconds for consumers to reconcile. To the extent that consumers reconcile their statement against their receipts, the time taken would be considerably higher. In addition, for credit card accounts, it is assumed that it takes, on average, 2 minutes to pay a monthly credit card bill. The average number of transactions on a credit card is around 9 per month, so the bill payment time adds an additional 13 seconds per payment to the estimate of the time per credit card transaction.

The various time estimates discussed above are collected in Table 10 to provide an estimate of the total consumer time per transaction. As can be seen, the rankings in the table primarily reflect the tender time and the addition of the other time estimates does not change this ranking.

Table 10: Consumer Time – Point-of-sale Payments
Seconds per transaction

	Credit card	EFTPOS	Cash	Cheque
Tender time	45	35	20	90
ATM withdrawal time	–	–	9 - 16	–
Statement reconciliation	5	5	1	5
Bill payment	13	–	–	–
TOTAL	63	40	30 - 37	95

⁴⁸ The average of eight cash payments per ATM withdrawal is estimated using the results of the survey of individuals conducted by Roy Morgan Research. This is the mean number of transactions per ATM withdrawal for respondents who only used ATMs in the sample period. It is important to note that the survey supports the contention that consumers who make more cash payments have higher ATM withdrawal amounts. That is, people display apparently rational behaviour whereby they anticipate their cash needs and adjust their withdrawals accordingly.

With the time estimates in hand, the next issue is how to value this time. This is a contentious issue. Some previous studies on payment instrument costs have valued time at the average wage rate. As Leclerc, Schmitt and Dubé (1995) make clear, however, time is not always like money. Their experiments suggest that the implicit value of time varies significantly with the context and that, because time cannot be saved for later, there are likely to be very many periods in a day where the value of time to a consumer is very low – periods when consumers may well undertake mundane but quick tasks such as withdrawing cash from an ATM, checking their credit card statement for fraudulent activity, or paying their credit card bill. Another reason not to value time at the average wage rate is the fact that many people are already fully employed or are on a salary and could not practically work an additional hour for pay at their notional wage rate. Their opportunity cost of time will, therefore, be below the wage rate. Becker (1965) mentions this when noting that he obtains an estimate of the value of consumer time spent commuting at approximately 40 per cent of the average wage rate. An additional reason to consider that any time spent travelling to an ATM is not completely wasted is that this time can be used for other activities, such as listening to music, talking to friends, or getting exercise. Given these considerations, it is more appropriate to value consumer time associated with payment instruments at below the average wage rate. In the absence of any further guide, a value of half the average wage rate of around \$25 per hour was used.⁴⁹

Multiplying the time estimates in Table 10 by \$12.50 per hour provides estimates of the value of consumer time involved in the use of different payment instruments. For cash, using the midpoint of the range, this yields an estimate of \$0.12 per cash transaction. For EFTPOS the estimate is \$0.14, for credit cards it is \$0.22, and \$0.33 for cheques. Consumer costs included in Table 11 in the following section are based on these calculations.

These results obviously need to be interpreted with considerable caution given the complexities involved and the inevitably judgemental nature of the assumptions. As will be seen below, however, these estimates do not fundamentally alter the ranking of the resource costs of the different payment instruments.

6. Overall Resource Costs

This section draws together information presented in Sections 3, 4 and 5 in two ways. Firstly, estimates of the average resource costs of each payment method for transactions observed over the sample period are presented. Secondly, these cost estimates are combined with information on the number of payments to calculate estimates of aggregate resource costs of payments by individuals.

6.1 Average cost of payments

Before presenting results of the combined average payment costs across various sectors of the economy, it is worth drawing attention to a number of issues.

The first is the treatment of overhead costs – those incurred in establishing and maintaining accounts. These costs are significant relative to the costs that are actually incurred when payments

⁴⁹ This is calculated from Australian Bureau of Statistics data as average weekly earnings divided by actual hours worked for 2006 (see ABS 2006a, 2006c). Strictly speaking, the after-tax wage rate may be more relevant but given the nature of the exercise such precision is considered unwarranted.

are made (with the exception of cash payments) and are separately identified in the results below. The approach taken has been to divide the total annual overhead costs associated with accounts of a given type by the number of transactions, comprising debits and credits, on that account over the year in order to obtain an estimate of the average overhead cost per transaction.

The second is the fact that the average transaction size captured in the data provided by merchants is smaller than the average transaction size across the economy as a whole. This means that strictly the costs of merchants and the financial institutions reported earlier should not be added together, particularly if costs vary significantly with the size of payment. However, as discussed in the following section, merchants' costs are unlikely to vary very much over the size of the transaction being considered and, as a result, are added here to financial institution costs. Similar considerations apply to consumer costs.

The third is the treatment of credit cards. Our focus here is on the resource costs associated with the payment function. While the payment and credit function are inextricably linked by the nature of the product, the credit function represents an additional service of credit cards not offered by other payment methods. Focusing on the payment function allows comparisons of costs across payment methods on the basis of common functionality. Nonetheless, credit function costs – and the costs of operating reward schemes – remain resource costs associated with the payment that, on a broader view, are relevant when considering the total costs of payments by credit cards. These additional costs are presented separately.

The fourth issue to consider when interpreting the results is the precision of the estimates. While every effort has been made to promote accuracy, precise estimation of payment costs is a challenging task. Difficulties include that many costs are common to a number of different payment methods, requiring assumptions for these costs to be allocated. In addition, to calculate costs of cash payments, assumptions are required about the number of cash payments. Notwithstanding these challenges, the data collected are broadly consistent across respondents, and the findings presented show a clear ranking of costs among payment methods that is robust to reasonable variations in the assumptions. These results should, however, be interpreted as providing a guide to the general orders of magnitude, rather than precise estimates.

These caveats aside, the estimates of the overall resource costs for point-of-sale payments presented in Table 11 show a clear ranking of costs. The lowest costs are for cash payments, followed by EFTPOS, credit cards and, considerably higher again, cheques. This ranking is unaffected by the exclusion of financial institution costs relating to account overheads or non-payment credit card functions, or the inclusion of consumer costs.⁵⁰ The ranking is largely determined by the costs that financial institutions incur in providing the various payment instruments. The reasons for these differences were discussed in Section 3.

The extent to which the resource cost of an average size credit card payment exceeds that for cash and EFTPOS depends on the basis of comparison. Focusing only on 'production costs'

⁵⁰ *Financial institutions' overhead costs for cash transactions are calculated by estimating the weighted-average overhead cost for each type of cash withdrawal (ATM debit card, ATM credit card, over-the-counter, EFTPOS cash-out), multiplying these unit overhead costs by the relevant number of economy-wide withdrawals, and dividing the total of these costs by the estimated number of cash payments in the economy. A simple alternative, dividing the overhead cost for an ATM withdrawal (\$0.48 – the same as for other payments on a transaction account) by an estimate of the average number of payments made with the cash withdrawn (eight) produces a similar estimate of \$0.06.*

Table 11: Resource Costs – Point-of-sale Payments

\$ per average size transaction by each payment method, weighted-average costs

	Credit card	EFTPOS	Cash	Cheque
TOTAL PRODUCTION COST	2.68	1.01	0.49	7.84
<i>of which:</i>				
Financial Institution^(a)	2.28	0.70	0.23	4.70
Account overheads	0.82	0.48	0.05	0.48
Direct payment costs	0.59	0.22	0.18	4.22
Credit and other functions ^(b)	0.87			
Merchant^(a)	0.40	0.31	0.24	3.14
Public Sector			0.01	
TOTAL PAYMENT PRODUCTION COST^(c)	0.99	0.53	0.44	7.36
Consumer costs	0.22	0.14	0.12^(d)	0.33
TOTAL PAYMENT COST (including consumer costs)	1.21	0.67	0.55	7.69

(a) Sectoral breakdowns include some third-party processor costs, as outlined in Sections 3 and 4.

(b) Includes costs of credit collections and write-offs, cost of capital covering credit risk and the operating costs of rewards programs.

(c) Excludes financial institution costs of account overheads and credit and other functions.

(d) Based on a time of 33.5 seconds for each cash payment (the midpoint from Table 10).

Note: The average transaction sizes from the sample are: credit card (\$132 for financial institutions and \$68 for merchants); EFTPOS (\$59 for financial institutions and \$73 for merchants); cash (\$19 for merchants); and cheque (\$3 159 for payer financial institutions and \$357 for merchants).

of the payment function – the average costs per payment incurred by financial institutions and merchants and, for cash, the public sector – the estimated cost for a credit card payment is \$0.99, compared with \$0.53 for EFTPOS and \$0.44 for cash. When including costs of account overheads and the extra features of credit cards not directly related to the payment function, the average cost for a credit card payment is estimated to be \$2.68, compared with \$1.01 for EFTPOS and \$0.49 for cash.

While the estimated average resource costs of cash and EFTPOS payments are considerably below credit cards on all measures, there is less difference between costs for cash and EFTPOS payments. For production costs directly related to the payment, cash payment costs are estimated to be around \$0.10 lower, mainly reflecting the shorter tender time at the point of sale for cash payments. The cost differential is broadly maintained when incorporating estimates of consumer costs, as although consumers use less time paying by cash than EFTPOS, this is roughly offset by the time cost associated with cash withdrawals. When considering broad ‘production costs’, cash payment costs are estimated to be around \$0.50 lower, reflecting lower account overhead costs because, as explained in Section 3, on average, each cash withdrawal supports a number of payments.⁵¹

⁵¹ This result reflects the assumptions made for the allocation of account overheads; that is, dividing total overhead costs by the total number of debits and credits and, for cash, dividing this per withdrawal overhead cost by the average number of payments per withdrawal. Different assumptions might produce different results.

The key aggregate findings are broadly supported by comparing the rankings of costs across payment types for individual financial institutions and merchants. For all individual financial institutions, among non-cash point-of-sale payments, cheques are the highest cost payment method, and costs of credit cards are above those for EFTPOS payments. Calculating cash payment costs per institution requires assumptions to be made about the number of cash payments supported by each institution. Using each institution's costs of ATM withdrawals divided by an average of eight payments as a proxy, cash payments are lower cost than EFTPOS for all but one institution.

For each of the merchants who provided data cheques are the most costly payment instrument, and credit cards are consistently ranked as more (or in one case, equally) costly than EFTPOS. Reflecting the discussion in Section 4.1, however, the relative ranking of costs between card and cash payments varies with merchant type. High turnover respondents, such as supermarkets, reported that cash payments are lower cost than EFTPOS and credit card payments. For department store type retailers, however, EFTPOS and credit card payments were reported to be lower cost than cash, reflecting that these retailers typically considered there to be relatively little difference in tender time across these payment methods.

Most studies of payment costs find similar relative rankings between the resource costs of point-of-sale payment methods at payment sizes for which they are commonly used. In particular, the conclusion that EFTPOS is less costly than credit cards is very widely found, but findings on the relative costs of cash and credit card payments are more mixed, often reflecting assumptions around consumer costs and the payment size used as a basis for comparison.

Studies comparable to the approach taken here, such as Brits and Winder (2005) and National Bank of Belgium (2006), find that for average size transactions, and focusing only on 'production costs', cash payments use less resources than debit card payments (i.e. EFTPOS) which, in turn, use significantly less resources than credit card payments. Bergman, Guibourg and Segendorf (2007), which focuses only on variable costs of payments and includes consumer costs, estimates that, for average transaction sizes for each payment method, debit card payments are the least costly from society's perspective, while cash and credit card payments use broadly similar amount of resources.

Less directly comparable are papers such as Garcia Swartz, Hahn and Layne-Farrar (2006) and Simes, Lancy and Harper (2006) which present marginal payment costs for payments of various common sizes – as opposed to the average of each payment method – and also use various assumptions about consumer benefits to reach conclusions about net social costs. Focusing solely on the estimates of costs presented, debit card payments are found to be the lowest cost payment method. Cash payments are found to be lower cost than credit cards for payments of low value – the payments for which cash is most commonly used – though credit card payments are found to be lower cost than cash for higher value payments.

Estimates of the average resource costs of non-point-of-sale payments are presented in Table 12. As with Table 11, the most robustly estimated costs are the 'production costs' incurred by financial institutions and merchants. Broadly defined, there is a clear tiering of costs, with the lowest costs for direct debit payments, followed by BPAY, credit cards and then cheques. Again, account overheads and the extra features of credit cards add significantly to the average cost of

a credit card payment. For ‘production costs’ of the payment function, the relative cost ranking of payment methods remains, although the combined resource costs to financial institutions and merchants for BPAY and credit card payments are much closer together. As with point-of-sale payment instruments, much of the cost difference between payment methods reflects financial institution costs.

Table 12: Resource Costs – Non-point-of-sale Payments
\$ per average size transaction by each payment method, weighted-average costs

	Credit card	Cheque	BPAY	Direct debit
TOTAL PRODUCTION COST	2.49	5.21	1.01	0.77
<i>of which:</i>				
Financial Institution^(a)	2.28	4.70	0.98	0.58
Account overheads	0.82	0.48	0.48	0.48
Direct payment costs	0.59	4.22	0.51	0.10
Credit and other functions ^(b)	0.87			
Merchant^(a)	0.21	0.51	0.03	0.18
TOTAL PAYMENT PRODUCTION COST^(c)	0.80	4.73	0.53	0.29
Consumer costs	~ 0.48	~ 0.43	~ 0.43	~ 0.23
TOTAL PAYMENT COST (including consumer costs)	~ 1.28	~ 5.17	~ 0.97	~ 0.51

(a) Sectoral breakdowns include some third-party processor costs, as outlined in Sections 3 and 4.

(b) Includes costs of credit collections and write-offs, cost of capital covering credit risk and the operating costs of rewards programs.

(c) Excludes financial institution account overheads and credit and other functions.

Note: The average transaction sizes from the sample are: credit card (\$132 for financial institutions and \$146 for merchants); cheque (\$3 159 for payer financial institutions and \$1 098 for merchants); direct debit (\$4 008 for financial institutions and \$106 for merchants); and BPAY (\$597 for payer financial institutions and \$136 for merchants).

In addition, some illustrative estimates of resource costs incurred by consumers for non-point-of-sale payments are included in the broader cost estimates. These costs are difficult to measure and were not discussed in Section 5, which focused on the consumer costs of payments at the point of sale. In order to include these costs, a variety of simple assumptions have been required. These include:

- the consumer’s transaction time is equivalent across credit card, cheque and BPAY payments at 2 minutes, while direct debit payments are faster at one minute;⁵²
- statement reconciliation takes 5 seconds per payment for each payment method;
- the time taken to pay the credit card account is the same as in Section 5; and
- additional costs of the various channels by which these payments could be made (telephone, mail, internet) are assumed to be broadly equivalent and are not included.

While undoubtedly different assumptions could have been made, the broad ranking of costs for non-point-of-sale payments in Table 12 appears robust to plausible alternatives.

⁵² These are simplifying assumptions. For direct debit payments, some individuals will only incur the time cost related to the initial set-up of the direct debit. For others there may be additional time costs associated with disputed transactions and/or for periodically checking that sufficient funds are available in their account.

6.2 Estimates of aggregate costs

The focus of the above discussion has been on the average cost of payments actually made in the economy. These estimates can be combined with estimates of the number of transactions for each payment instrument to provide a measure of the overall cost to the economy of payments.⁵³

The results presented below are for the cost of payments made by individuals, rather than businesses. This reflects the nature of the data collected as part of this study. In particular, data were not collected on the overhead costs that financial institutions incur in developing and maintaining business transaction and credit card accounts, or the costs that businesses incur in making payments or in receiving payments from other businesses.⁵⁴ In considering credit card costs, we focus narrowly on payment function costs, though resource costs of the credit function and the operation of reward programs could also be included.

Information on the number of economy-wide payments by individuals for most payment instruments was obtained from the Reserve Bank's *Retail Payments Statistics*. The number of cash payments was derived using information from the Roy Morgan Research survey of the use of payment instruments (see Appendix C), while the number of direct entry payments was calculated using estimates collected as part of this study.⁵⁵

The results are presented in Table 13. In total, the annual resource cost to financial institutions and merchants in providing payment services to individuals (including public sector costs of currency production) is estimated to be at least \$8½ billion, or 0.8 per cent of GDP.⁵⁶ This is broadly similar to findings in overseas studies. For example, studies in the Netherlands, Belgium and Sweden found that payments at the point of sale used between 0.40 per cent and 0.74 per cent of GDP; broader studies of payment costs have typically found a relatively higher use of resources.⁵⁷ Total consumer costs are estimated to add a further \$1.6 billion, although given the value of leisure time is not included in GDP, these costs are not compared to GDP.

Three aspects of these estimates stand out.

The first is that the aggregate resource costs of cash payments are significant, accounting for nearly half of total costs. While the average cost of cash payments appears to be quite low, the large number of cash payments means that the total cost of cash payments is significant. As detailed in *Household Payment Patterns in Australia*, cash payments make up around 70 per cent of the number of payments by individuals in the economy.

53 Estimating economy-wide payment costs using estimates from the sample implicitly assumes that all merchants consider tender time to be a payment cost.

54 The potential to capture financial institution overhead costs for business accounts was explored in consultation but indications from financial institutions were that widening the scope would be overly burdensome in the time frame required.

55 The respective number of direct debit and direct credit payments by individuals is not known, with only the total number of direct entry payments by individuals collected as part of the study. For simplicity, although many direct credit payments by individuals are to other persons, not merchants, it is assumed that both direct debit and direct credit payments incur merchant resources of \$0.18 per transaction (see Table 9). This assumption has negligible effect on the aggregate payment costs identified in Table 13.

56 Including resource costs associated with the credit function and operating reward programs, the estimated cost is \$9.5 billion, or 0.9 per cent of GDP.

57 Studies of payment costs at the point of sale were Brits and Winder (2005), National Bank of Belgium (2006) and Bergman, Guibourg and Segendorf (2007). In a broader study, Humphrey, Pulley and Vesala (2000) estimated that payments in the United States used up to 3 per cent of GDP.

Table 13: Economy-wide Resource Costs of Payments by Individuals

Payment method	Production and acceptance			Total	Consumers	Estimated no. of payments ^(a)
	Financial institutions		Merchants			
	Account overheads ^(b)	Direct costs	Total			
			\$billions	% of GDP	\$billions	Billions
Cash	0.4	1.6 ^(c)	2.0	3.9	0.4	8.0
Credit card ^(d)	0.9	0.7 ^(e)	1.6	2.1	0.2	1.2
EFTPOS	0.5	0.2	0.8	1.2	0.1	1.1
Scheme debit	0.1	0.1	0.2	0.2	0.0	0.2
Cheque	0.1	0.6	0.7	0.1 ^(f)	0.1	0.1
Direct entry ^(g)	0.1	0.0	0.2	0.1	0.0	0.3
BPAY	0.1	0.1	0.2	0.0	0.0	0.2
TOTAL	2.3	3.3	5.5	8.5	0.8	11.0

(a) Personal transactions only, except BPAY which includes all BPAY payments from transaction accounts. The number of cash transactions excludes the estimated number of cash payments by businesses.

(b) Includes account overhead costs related to the payment function only. For each payment instrument, this is calculated by multiplying the average account overhead cost per debit and credit on the account by the number of economy-wide payments.

(c) Includes costs to the public sector of currency production.

(d) Assumes that 84 per cent of credit card transactions are at the point of sale, and 16 per cent are not at the point of sale. This reflects the relative shares for credit card transactions acquired in Australia.

(e) Costs of the payment function only. The resource costs associated with the credit function and operating reward programs are around an additional \$1 billion.

(f) Assumes all cheque payments are not at the point of sale.

(g) Includes reported direct debit and direct credit costs for financial institutions. For merchants, the reported cost of direct debit transactions is assumed to also apply to direct credits.

The second is that for financial institutions the overhead costs of establishing and running transaction and credit card accounts comprise a significant share (around two fifths) of the total costs they incur in providing payment services to individuals. These overhead costs are much less likely to vary with the number of payment made than the direct costs incurred in the payment process.

And the third is that financial institutions' resource costs are significantly larger, in aggregate, than merchants' resource costs. This mainly reflects the costs to financial institutions of account overheads (\$2.3 billion), as aggregate costs directly related to payments are only slightly higher for financial institutions (\$3.3 billion) than for merchants (\$3.0 billion). Including account overheads, financial institutions incur more resource costs than merchants for all payment instruments, though the difference is small for cash payments. The finding that merchants bear a relatively higher share of resource costs for cash payments than electronic payment methods has also been observed in international studies.⁵⁸

7. The Influence of Payment Size

As has been noted a number of times, the results presented above are for the average cost of payments actually made over the reporting period, with significant variation in the average size of these payments across payment instruments. While these estimates are helpful in understanding the costs currently incurred in the payments system, it is also useful to understand how costs vary across payment methods for transactions of a given size. This comparison is particularly relevant in analysing the effects on total payments system costs of transactions moving from one payment method to another. This section presents estimates of costs across common payment sizes for the point-of-sale payment methods that are the main focus of the study – cash, credit cards and EFTPOS.

Obtaining estimates of the costs for standardised transaction values requires assumptions about how costs vary with the size of the payment. To provide some guidance as to appropriate assumptions, the Reserve Bank sought input from industry as part of the data collection exercise, specifically asking reporting institutions whether costs varied with the number and/or value of the payment. Based on the responses and discussions with industry participants, costs have been either assumed to be invariant to the value of the transaction, or to vary with the value of the transaction. Given that these assumptions require significant judgement, the estimates presented below should be viewed as illustrative rather than definitive.

The cost estimates focus on 'production costs' – resource costs incurred by financial institutions, merchants and, for cash, the public sector – although the broad conclusions are robust to the inclusion of consumer costs. In estimating the costs of the different payment methods, the various transfers – principally interchange fees and seigniorage – have been excluded from the calculations. The overhead costs of establishing and maintaining transaction accounts have also been excluded.

⁵⁸ See, for example, *Brits and Winder (2005)* and *Bergman, Guibourg and Segendorf (2007)*.

7.1 Cash

The results reported in Section 4 indicated that the average resource cost of a cash transaction of a reporting merchant is \$0.24, with the average transaction size equal to \$19. Of this total cost, \$0.13 is for tender time. The time taken to process a specific cash transaction at a check-out is likely to depend upon a range of factors, including the particular combination of notes and coins offered by the customer. Very large cash payments (say \$1 000) are likely to take longer than small payments, although for most of the transactions for which cash is actually used, it is assumed that the average tender time is invariant to the size of the transaction (i.e. fixed).⁵⁹ For the other cash-related costs incurred by merchants, it is assumed that \$0.06 is invariant to the size of the transaction, while the remainder varies with the size of the transaction, the latter mainly relating to the costs of cash handling both within the store and externally through armoured car companies.⁶⁰ Given these assumptions, from the merchants' perspective cash transactions involve a fixed cost of \$0.20, with the costs increasing by \$0.02 for an extra \$10 of value. Currency production costs are assumed to be fixed, and add \$0.01 to the cost of each cash purchase.

Developing estimates of how financial institution costs of cash vary with the size of the transaction is more difficult, partly because of the various ways customers withdraw cash. Given the complexities, the approach explored here is to focus on the cost of cash withdrawals (i.e. deposit costs of financial institutions are excluded). Further, the focus is on typical behaviour by assuming that cash is exclusively supplied through ATMs, and examining costs over small value payments. Two different assumptions are employed for the treatment of costs.

The first is to assume that the cost of supplying cash through ATMs is solely a function of the size of the cash transaction; an implication of this assumption is that it costs significantly less to supply the cash for a \$1 transaction than it does for a \$100 transaction. This assumption would obviously be invalid if individuals went to an ATM before every cash transaction, given that a number of the costs of an ATM transaction are invariant to the size of the transaction. But the usual practice for most people is to take out an amount of cash and to use that cash for multiple transactions. Given that, on average, the resource cost to financial institutions of an ATM withdrawal is around \$0.75, and the average amount withdrawn is around \$175, this approach yields a cost estimate of \$0.04 for every \$10 withdrawn.

The second approach is to assume that all resource costs are spread equally across the eight payments that are, on average, made with the cash withdrawn.⁶¹ Based on this assumption, financial institutions face an average cost of around \$0.09 for each cash purchase.

Both approaches have their limitations in representing financial institution ATM withdrawal costs. While the first approach has some appeal in characterising these costs for small payments, it is likely to significantly overestimate the cost of large cash payments. It effectively assumes

⁵⁹ According to the survey of individuals conducted by Roy Morgan Research, 96 per cent of cash transactions in Australia are under \$100 in value.

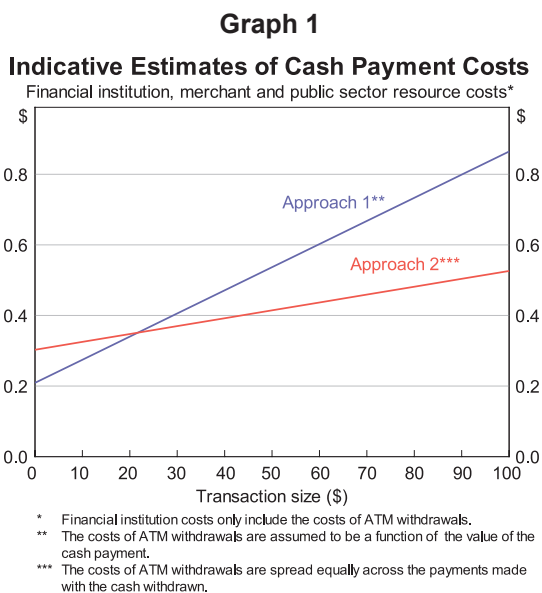
⁶⁰ The merchant cost categories that are assumed to vary with transaction value are cost of capital, and 50 per cent of the following: register pick-up and delivery; deposit preparation; armoured truck; shrinkage, theft and counterfeit notes; and insurance.

⁶¹ This is estimated from the survey of individuals conducted by Roy Morgan Research. For those individuals only making ATM withdrawals (i.e. no other types of withdrawals), the average number of cash transactions made per ATM withdrawal was eight.

that an individual withdraws cash from the ATM – and the financial institution incurs \$0.75 of resource costs – for each \$175 payment whereas, in practice, an individual facing a prospective large cash payment would be likely to increase the size of their cash withdrawal. The second approach may be a better indication of the costs of larger payments, but with no allowance for costs to vary with value, it is likely to provide a lower bound. It effectively assumes that a \$175 payment attracts the same fixed costs as a \$1 payment, on the rationale that, on average, each withdrawal from an ATM supports a mixture of eight payments.

Putting this all together, the first measure of cash payment costs has fixed costs of \$0.21 per cash transaction (\$0.20 for merchants and \$0.01 in public sector costs) and incremental costs

of \$0.07 for each \$10 spent. The second measure has fixed costs of \$0.31 per cash transaction (as for the first measure plus \$0.09 in financial institution costs) and incremental costs of \$0.02 (merchant variable costs) for each \$10 spent (Graph 1). These costs would be somewhat higher if financial institution branch costs were included, as financial institutions incur costs of accepting payment proceeds as deposits and in providing over-the-counter cash withdrawals. These additional costs explain why the estimates of typical financial institution withdrawal costs presented here are below estimates of average financial institution cash payment costs presented earlier.



7.2 Cards

There is considerable difference in the extent to which payment costs for EFTPOS and credit card payments vary with the value of the payment.

Almost all EFTPOS costs are invariant to the value of the transaction. The average resource cost of an EFTPOS transaction of a reporting merchant is \$0.31 (for an average transaction size of \$73), almost all of which is assumed to be fixed. Financial institution costs are also largely invariant to the size of the transaction, with the exception of cost of capital and fraud. EFTPOS costs incurred by financial institutions are therefore assumed to consist of \$0.19 in fixed costs for each transaction and incremental costs that round to \$0.00 for each \$10 EFTPOS purchase. Putting this all together, EFTPOS transactions are assumed to have fixed costs of \$0.49 for each EFTPOS transaction, and incremental costs of significantly less than \$0.01 for each \$10 spent.

For credit cards, costs are more variable with the size of the payment, reflecting some specific financial institution costs. The average resource cost of a credit card transaction of a reporting point-of-sale merchant is \$0.40 (for an average transaction size of \$68) and, as for EFTPOS, this

is assumed to be almost wholly invariant to the value of the payment. For financial institutions, however, card issuer costs associated with the payment function – fraud (including fraud-related scheme fees), cost of capital (excluding credit risk) and net chargeback write-offs – are assumed to fully vary with the value of the payment.⁶² Reflecting these assumptions, the payment function costs of credit card payments incurred by financial institutions are assumed to consist of \$0.39 in fixed costs for each transaction and incremental costs of \$0.01 for each \$10 credit card purchase.

The additional costs incurred by financial institutions for credit card payments associated with the credit function and cardholder rewards costs also vary substantially with the value of the payment; all of the costs of credit collections and write-offs and cost of capital (credit risks), and half of the costs of operating cardholder rewards programs are assumed to vary with the value of the payment. Additional credit card payment costs related to the credit function and cardholder rewards are therefore estimated to consist of \$0.02 in fixed costs for each transaction and incremental costs of \$0.06 for each \$10 credit card purchase.

Adding together merchant and financial institution costs, the payment function for credit card transactions has fixed costs of \$0.78 for each credit card transaction, and incremental costs of \$0.02 for each \$10 spent. When both the credit and cardholder rewards functions are incorporated, credit card transactions have fixed costs of \$0.80 for each credit card transaction, and incremental costs of \$0.08 for each \$10 spent. Since a larger share of credit card costs vary with value than for EFTPOS transactions, the additional cost associated with credit card payments over EFTPOS rises with the value of the payment (Graph 2).

7.3 Summary

A comparison of these illustrative costs highlights the finding suggested by the average cost data: cash is the lowest cost payment method for low-value payments. For example, for payments of \$10, the resource costs of a ‘typical’ cash payment – funded through an ATM withdrawal – are estimated to be between \$0.28 and \$0.33, compared with \$0.50 for payments made by EFTPOS (Table 14). Estimated credit card resource costs for \$10 payments are significantly higher, ranging between \$0.80 and \$0.88, depending on which costs are included.

⁶² In addition, card acquirer costs that are assumed to fully vary with value, both for credit card and EFTPOS payments, are monitoring, collections and write-offs, fraud, and cost of capital.

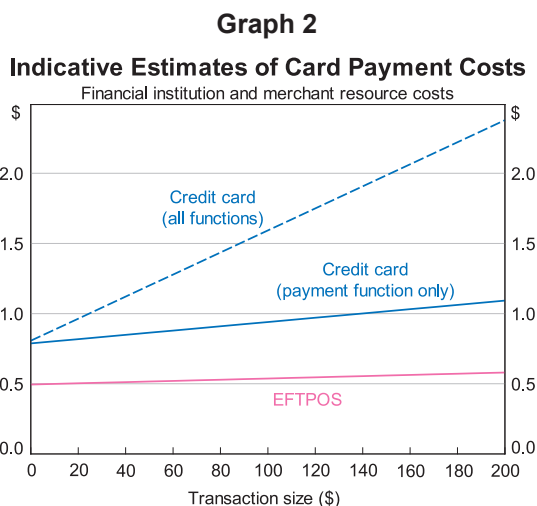


Table 14: Indicative Estimates of Point-of-sale Payment Costs
\$ per transaction, production resource costs only

Transaction size	Credit card		EFTPOS	Cash	
	Payment function only	All functions		Approach 1 ^(a)	Approach 2
\$10	0.80	0.88	0.50	0.28	0.33
\$20	0.82	0.96	0.50	0.35	0.35
\$50	0.86	1.20	0.52	0.54	0.42
\$100	0.94	1.59	0.54	0.87	0.53
\$200	1.10	2.39	0.59	na	0.75
\$500	1.57	4.76	0.73	na	1.42

(a) Cash estimates under Approach 1 are only presented for payments up to \$100 reflecting that the underlying assumption is more appropriate for small value payments.

For payments of around \$50 and above, however, it appears that the cost of cash payment exceeds that of EFTPOS payment (particularly if an allowance is made for financial institution branch costs). This reflects the fact that the cost of a cash payment rises more sharply with the size of the transaction than is the case for an EFTPOS payment.

The costs of credit card payments are higher than EFTPOS at all payment sizes, even when considering only the costs associated with the payment function. This reflects that costs that are invariant to the value of the payment – such as tender time – are lower for EFTPOS than credit cards, as are costs that vary with the value of the payment – such as fraud and cost of capital. As the value of the payment rises, the relative costs of a credit card payment increase.

This cost structure means that the average cost of credit card payments is also considerably higher than the average cost of cash payments at low-payment values. If considering only payment function costs, however, the cost difference between credit card and cash payments narrows as payment size rises. Depending on the assumptions, costs are not dissimilar for payment sizes ranging from around \$100 to around \$500. If considering credit card costs relating to the credit function and reward programs, however, credit cards remain more costly than cash payments, even for high-value payments.

These findings are broadly in line with the limited number of international studies of payment costs that examine this issue in detail, even though there is some divergence in approaches used in the literature. For example, Brits and Winder (2005), National Bank of Belgium (2006) and Bergman, Guibourg and Segendorf (2007) all conclude that cash payments involve the lowest resource costs for low transaction values, but higher costs than EFTPOS for higher transaction amounts.⁶³ For the two of these studies that assume credit card costs vary with the payment value, credit cards are found to be more costly than cash at all payment sizes.

⁶³ These studies largely focus on variable costs of payments and allow some costs to vary with the value of payments. While Brits and Winder and the National Bank of Belgium only include costs for financial institutions and merchants, Bergman et al also includes consumer costs. The point at which EFTPOS and cash payments costs were found to be equivalent was typically lower than the range found in this study, at a little under AUD20 when converted at current exchange rates. The estimated 'break-even' points should be treated with caution, however, given the imprecise nature of the exercise and different assumptions and methodologies in each study. For example, the studies' focus on variable costs is different to this study which includes fixed costs.

8. Concluding Remarks

This paper has presented comprehensive estimates of the resource costs involved in making payments by individuals. The majority of these costs are incurred by financial institutions, but significant costs are also incurred by merchants and, to a lesser extent, by individuals themselves. In aggregate, the costs incurred by financial institutions and merchants for payments by individuals are the equivalent of at least 0.8 per cent of GDP. The total costs involved in the payments system as a whole would be higher still, given that business-to-business payments are not covered in this study.

In terms of the average cost of point-of-sale payments actually made, the ranking of the various payment instruments is reasonably clear, with cash being the lowest cost, followed closely by EFTPOS, with more of a gap to credit cards and then cheques. The cost of cash payments, however, increases with the value of the transaction, so that for larger payments, EFTPOS payments have lower cost.

For all transaction sizes, credit card payments are more costly than for EFTPOS payments. This not only reflects the higher costs associated with the extension of credit and the operation of reward schemes, but also higher fraud costs, scheme fees and the higher capital costs associated with operational risk. Credit card payments, on average, also take longer for merchants to process than do EFTPOS payments.

While cash is a relatively low-cost payment instrument for the bulk of transactions for which it is used, a significant share of the total costs of the payments system arise from cash payments. This reflects the fact that cash remains the predominant payment instrument in the economy, accounting for around 70 per cent of all payments by individuals.

As noted at the outset, for practical purposes the primary focus of this paper has been on the *average* cost of transactions made using the various payment methods. This measure of costs provides a reasonable indication of the long-run incremental resource cost of a payment method – the additional resource costs that would be incurred in the long term if a substantial number of extra payments used the method. A couple of caveats, however, are warranted.

The first is that the estimates of average costs reflect a mixture of costs that are fixed and variable in the short run. Where there is surplus capacity in a payment system, the incremental cost of additional payments in that system over the short run is likely to be below the estimates presented in the paper, given the economies of scale of utilising the existing infrastructure more intensively.

The second is that assessing the extent to which average costs might change in the long run as the volume of payments changes is difficult and has not been attempted in this paper. To the extent that long-run economies of scale exist, they might be expected to be stronger in the electronic systems than the cash system. Notwithstanding this, with the possible exception of cash and EFTPOS – which currently have broadly similar costs for a range of payment values – any long-run economies of scale are unlikely to be so strong as to overturn the broad cost rankings presented in this paper, at least not based on current technology.

Finally, costs are only one aspect of an assessment of the efficiency of the payments system; increased use of the lowest-cost payment system does not necessarily promote efficiency of the overall system. The benefits offered by various payment systems are also important to consider, as is the speed and degree of innovation over time. The Payments System Board will consider these issues, along with the detailed cost data presented in this paper as part of its review. The Reserve Bank thanks all financial institutions and merchants that have participated in the study, and welcomes comments on the estimates presented and the broad conclusions drawn in this paper.

Appendix A: Cost Study Templates

The full sets of cost study templates and explanatory notes distributed to financial institutions and merchants are available at <http://www.rba.gov.au/PaymentsSystem/Reforms/RevCardPaySys/Pdf/PSRConference2007/index.html>. Respondents were asked to complete templates for payment methods relevant to them.

For *financial institutions*, the survey templates were in two broad groups; the first captured overhead costs of personal accounts used to facilitate payments, and the second captured costs more directly related to each payment method. The structure of the templates is shown in Table A1, with each box representing a separate template.

The overhead cost template captured the predominantly common costs associated with account set-up and maintenance, with costs captured separately for transaction accounts and credit card accounts.

Data on costs more directly related to the payment method were gathered through an individual cost template for each of cards (credit cards, EFTPOS and scheme debit), cheques, direct entry and BPAY, and two templates for cash to capture costs associated both with branches and ATMs. Each template had cost categories applicable to the various stages of initiating, accepting and exchanging value in a transaction. For these templates, respondents reported on the basis of costs and transactions across all customer classes.

For *merchants*, there were individual templates for each of cash, cards, cheque, direct debit and BPAY (Table A2). In addition, there was a template for costs of receiving payments through agency arrangements. Where possible, respondents were asked to provide costs and transaction information on personal payments as opposed to information on payments by large commercial entities.

Table A1: Financial Institution Cost Templates Structure

Cash	Cheque	BPAY	Direct entry	EFTPOS	Scheme debit	Credit cards
Account Set-up, Overheads and Maintenance Template <i>for Payer's Transaction Account</i>						
for Payer's Credit Card Account						
1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management	1) Systems and IT; 2) Product development and marketing; 3) Application processing and set-up; 4) Receipt and processing of credits to account (excluding OTC deposits); 5) Internet banking; 6) Phone banking; 7) Statement production and distribution; 8) General customer service; 9) General account management
Direct Costs of Payments						
Cash template* 1) Wholesale cash handling and storage 2) Branch/OTC withdrawals and deposits 3) Cost of capital 4) Cost of ATM withdrawals (relevant costs from 'Cards - Issuers' template) 5) Cost of EFTPOS cash-outs (relevant costs from 'Cards - Issuers' and Cards - Acquirers' templates)	ATMs – Owners and Acquirers template <i>Owners</i> 1) Owner centre management 2) Signing up new ATM sites 3) Cash handling and storage 4) Site rental 5) Float 6) Owner equipment 7) Authorisation and transaction processing 8) Fraud and theft 9) Insurance 10) Cost of capital <i>Acquirers</i> 11) Acquirer centre management 12) Acquirer equipment 13) Authorisation and transaction processing 14) Fees 15) Cost of capital	Cheque template <i>Common costs</i> 1) Cheque overheads 2) Cost of capital <i>Payer institution</i> 3) Cheque production and distribution 4) Processing 5) Exceptions <i>Collecting institution</i> 6) Receipt of cheque deposits 7) Processing 8) Exceptions	BPAY template <i>Common costs</i> 1) BPAY overheads 2) BPAY fees 3) Cost of capital <i>Bill payer institution</i> 4) Specific overheads 5) Processing costs 6) Fees <i>Bill institution</i> 7) Biller set-up costs 8) Specific overheads 9) Processing costs 10) Fees	Direct entry template <i>Common costs</i> 1) Direct entry overheads 2) Fraud 3) Cost of capital <i>Direct debit</i> 4) User servicing 5) Customer servicing	Cards – Issuers template 1) Card production and delivery; 2) Authorisation processing; 3) Transaction processing; 4) Cardholder reward programs; 5) Disputes; 6) Net chargeback write-offs; 7) Fraud; 8) Credit collections and write-offs; 9) Cost of funds; 10) Cost of capital; 11) Interchange fees (ATM and EFTPOS); 12) Other fees	Cards – Acquirers template 1) Acquirer centre management; 2) Application processing; 3) Merchant servicing (equipment); 4) Authorisation and transaction processing; 5) Merchant servicing (non-equipment); 6) Monitoring, collections and write-offs; 7) Disputes; 8) Fraud; 9) Cost of funds; 10) Cost of capital; 11) Interchange fees (credit card and scheme debit); 12) Other fees

* Calculations for costs of cash payments incorporate costs from other templates as noted.

Table A2: Merchant Cost Templates Structure

Cash	Cards	Cheque	Direct debit	BPAY	Agency
<p>Cash template</p> <ol style="list-style-type: none"> 1) Point of sale 2) Back-office processing 3) Deposit and cash deliveries 4) Cash theft/losses 	<p>Cards template (credit cards, EFTPOS, scheme debit)</p> <ol style="list-style-type: none"> 1) Point of sale 2) Back-office processing 3) Net write-offs 4) Account management 	<p>Cheque template</p> <ol style="list-style-type: none"> 1) Point of sale/Receipt of cheque 2) Back-office processing 3) Deposit 4) Exceptions processing and write-offs 	<p>Direct debit template</p> <ol style="list-style-type: none"> 1) Overheads 2) Back-office processing 3) Direct debit set-up and maintenance 4) Exceptions processing and write-offs 	<p>BPAY template</p> <ol style="list-style-type: none"> 1) Overheads 2) Back-office processing 3) Fees 4) Exceptions processing 	<p>Agency payments</p> <ol style="list-style-type: none"> 1) Overheads 2) Back-office processing 3) Agency fees

Appendix B: Payment Activity in the Sample

Nine *financial institutions* (including ATM operators) provided information. Summary details on the use of *transaction accounts* at these institutions are provided in Table B1. ATM withdrawals and EFTPOS transactions typically account for around 60 per cent of the total number of debits to these accounts. Around 20 per cent of debits are in the form of electronic transfers through the direct entry and BPAY networks, or intrabank transfers, with these transfers of high average value. In total, the average number of debits per year (125) was significantly higher than the number of credits (35). Around two thirds of these credits are through the direct entry system, while cash and cheque deposits are relatively infrequent but of high average value.

Table B1: Average Activity on Personal Transaction Accounts^(a)
Annual

	Number		Average value (\$)	
	Weighted average ^(b)	Median	Weighted average	Median
Credits	35	35	1 187	1 344
<i>of which:</i>				
Cash	2	2	1 189	837
Cheque	2	2	6 875	4 633
Direct entry	24	24	838	947
Other transfers	7	7	936	1 699
Other	1	3	289	299
Debits	125	128	271	322
<i>of which:</i>				
Cash	31	30	235	213
<i>Over-the-counter</i>	1	2	1 578	972
ATM	30	29	170	172
<i>Other</i>	0	0	285	361
EFTPOS	43	41	64	67
<i>Purchase only</i>	37	34	58	59
<i>Purchase and cash-out</i>	6	6	96	98
<i>Cash-out only</i>	1	0	76	80
Scheme debit ^(c)	9	12	87	86
Cheque	4	4	1 385	1 400
Direct entry	11	10	505	466
BPAY	6	5	600	581
Other transfers	7	5	1 090	956
Other	23	25	74	4

(a) Includes all outstanding personal transaction accounts recorded in the sample, including inactive accounts.

(b) Weighted-average totals do not equal the sum of the components as not all respondents provided data for each category.

(c) Only for those banks that issued scheme debit cards.

The average value of payments from a *credit card account*, and the average amount repaid, was around \$15 000 per annum (Table B2). Credit card holders made, on average, slightly more than one credit card repayment per month (15 per year). Although electronic methods of payment (BPAY and credit transfers) were popular for paying credit card bills, cash and cheque payments still accounted for one fifth of repayments by number. Most debits to credit card accounts were purchases, though fees and interest charged to card holders (the bulk of the ‘other’ category) are not insignificant.

Table B2: Average Activity on Personal Credit Card Accounts^(a)
Annual

	Number		Average value (\$)	
	Weighted average ^(b)	Median	Weighted average	Median
Credits	15	15	1 016	906
<i>of which:</i>				
Cash	2	3	1 355	579
Cheque	1	1	1 653	1 606
Other transfers	4	8	1 317	831
BPAY	4	3	718	856
Other	2	2	659	386
Debits	118	106	126	121
<i>of which:</i>				
Purchases	104	93	125	125
Cash advances	3	3	308	296
BPAY	1	1	345	307
Other transfers	1	1	472	1 009
Other	15	13	37	32

(a) Includes all outstanding personal credit card accounts.

(b) Weighted-average totals do not equal the sum of the components as not all respondents provided data for each category.

For *merchants*, the cost estimates are drawn from a sample of twelve respondents. Estimates for costs of *point-of-sale* payments are based on a sample of seven large retailers, including supermarkets, department stores and other general retailers. Given the size of the largest contributors, the data are highly reflective of supermarket activity.

Over the one year sample period the respondent merchants reported almost 2.4 billion point-of-sale transactions at an average size of \$35 (Table B3). Of the total transactions at these merchants, around 70 per cent were in cash by number, and 36 per cent by value. The average size of a cash transaction was \$19, significantly lower than for EFTPOS (\$73) and credit cards (\$68). Among electronic payment methods, EFTPOS was used more frequently than credit cards, with scheme debit payments much less common. Cheques were used quite infrequently in point-of-sale retail environments, but the average value was relatively high (\$374).

These results are broadly comparable with those from the Roy Morgan Research survey conducted on the use of payment instruments. In particular, the share of cash payments among these payment instruments in the sample closely correspond with the equivalent shares by number (70 per cent) and value (38 per cent). The mix of card payments in the sample is a

little more skewed towards EFTPOS than credit cards in both number and value, reflecting the relatively heavier use of EFTPOS in supermarkets than in the broader economy.

Table B3: Payments at Point of Sale

	Number	Value	Average value	Share of total	
	Million	\$ million	\$	Number	Value
				%	%
Cash	1 614	30 094	19	68	36
Credit card and scheme debit ^(a)	339	22 642	67	14	27
EFTPOS ^(b)	414	30 146	73	17	36
Cheque	2	904	374	0	1
TOTAL	2 369	83 788	35	100	100

(a) The average value of credit card transactions is \$68.

(b) Includes EFTPOS cash-outs.

Estimates of the costs of *non-point-of-sale* payments draw on data from seven organisations with involvement in household bill payments (including five ‘billers’ and two retailers which provided data on loan repayments). BPAY was the most commonly used method, by number, in our sample, accounting for 45 per cent of non-point-of-sale payments (Table B4). This was followed by credit card payments (including direct debits from credit card accounts) which accounted for 34 per cent of the number of payments. The remainder were split between direct debits from a transaction account and cheque payments. The average size payment was between \$100 and \$150 for all payment methods except cheques, which had an average value of \$1 098, probably reflecting the effect of some large corporate bill payments. As a result, cheque payments accounted for the largest share of the value of bill payments in our sample.

Table B4: Payments at Non Point of Sale

	Number	Value	Average value	Share of total	
	Million	\$ million	\$	Number	Value
				%	%
Credit card	30	4 412	146	34	22
<i>of which: direct debit</i>	8	516	66	9	3
Cheque	8	8 872	1 098	9	45
Direct debit	10	1 041	106	11	5
BPAY	40	5 487	137	45	28
TOTAL	88	19 812	224	100	100

Appendix C: Estimating the Economy-wide Number of Cash Transactions

Although data are regularly collected on the number and value of non-cash payments, similar data are not readily available for cash payments. After cash has been withdrawn from financial institutions it is difficult to track how it is used and to know how many individual payments the cash withdrawal supports. Given the lack of existing information on cash payments, the Reserve Bank commissioned Roy Morgan Research to conduct a survey of how individuals pay for goods and services. As part of this survey, 662 participants aged 18 years and over recorded all payments made over a two-week period.⁶⁴

According to the survey, the average number of cash payments made each week by individuals aged 18 and over was 9½.⁶⁵ Scaling this number up to reflect the population aged 18 and over yields an estimate of about 7.4 billion cash payments annually (Table C1). In obtaining an estimate of the total number of cash transactions, two adjustments were made to this number.

The first was to take account of cash transactions made by those aged under 18 years. In particular, it was assumed that no cash transactions were made by those aged 8 years and under, and persons aged 9 to 18 years made, on average, half the number of cash transactions of those aged 18 and over. This adjustment adds about 0.6 billion to the estimated number of cash transactions. As a result, the estimated total number of cash payments by individuals was around 8 billion.

Table C1: Estimate of the Number of Cash Transactions

	Number of cash transactions Billions
Survey participants (grossed up to adult population)	7.4
<i>Plus</i>	
Adjustment for cash transactions made by those aged under 18	0.6
Estimate of cash transactions by individuals	8.0
<i>Plus</i>	
Estimate of cash transactions made by business sector	0.4
Estimate of total cash transactions in the economy	8.4

The second adjustment was to take account of business-to-business payments made in cash, as these were not captured in the survey of individuals. The total number of cash transactions was required to determine the average cost to financial institutions of a cash payment – reported financial institution costs of cash transactions covered those by individuals and businesses. Unfortunately, there is little data available on the use of cash for business payments. Many

⁶⁴ The details and results of this survey are presented in Household Payment Patterns in Australia.

⁶⁵ This is adjusted for survey fatigue.

businesses are, however, likely to make little use of cash for payments, given the widespread use of direct entry, cheques and credit cards. In the absence of data, the number of cash payments made by individuals is increased by 5 per cent to account for business cash payments, although it needs to be recognised that this approach is subject to more than the usual degree of uncertainty.⁶⁶

Given these adjustments, the total number of cash transactions is estimated to be 8.4 billion. This estimate is broadly in line with Department of Communications, Information Technology and the Arts (2006) which estimated that there were 8.8 billion cash transactions in 2004. That study used the number of cash withdrawals and an estimate of the number of cash payments per withdrawal to gauge the number of cash transactions.

⁶⁶ For the roughly 2 million actively trading businesses in Australia in June 2006 (see ABS 2007), this assumption implies an average number of cash transactions of nearly four per week.

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