

Merchants' Costs of Accepting Means of Payment: Is Cash the Least Costly?

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- *Merchants face a variety of costs and benefits from accepting different payment methods.*
- *A Bank of Canada survey of more than 500 merchants revealed that merchants find cash the least costly payment method, compared with debit and credit cards.*
- *Using the survey results and other sources, this article investigates the perception that cash is the least costly by calculating the variable costs of accepting a transaction.*
- *The findings reported here show that debit cards are actually the cheapest for our base-case scenario, which assumes a transaction value of \$36.50. A sensitivity analysis provides the transaction values for which cash is less expensive than debit cards.*
- *Although the survey results are not statistically representative at a national level, they provide insight into the costs to merchants of accepting various methods of retail payment. Further work on both costs and benefits could help policy-makers better understand the determinants of retail payment efficiency.*

Most merchants in Canada give consumers the option of paying for the goods and services they provide by cash, debit card, or credit card. In a competitive sales environment, merchants may feel compelled to meet consumer demand for payment options. On the other hand, some merchants may find that accepting various payment methods can have a positive impact on their sales and on the efficiency of their operations. When merchants provide greater payment choice, consumers can decide which payment method to use, depending on their preferences and perceptions of the costs and incentives associated with each.¹ By accommodating consumer choice, however, merchants are subject to costs and benefits that are unique to each payment method. Many of these costs, such as the transaction fees applied to card payments, are explicit to the merchant, while others, such as the labour costs associated with handling cash, are less obvious.

Understanding the costs and benefits of different means of payment is of interest to the Bank of Canada, since the Bank is the country's monetary authority responsible for issuing bank notes and for meeting Canadians' demand for cash. Ideally, the Bank would like to assess the efficiency of cash relative to other payment methods from the perspective of all participants in the payments system, which includes consumers, merchants, financial institutions, and the Bank itself. As a step towards meeting this ambitious objective, the Bank has chosen to focus on the cost implications of retail payments to merchants. The merchants' perspective is particularly important

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1. A discussion of retail payments in Canada and the results of a survey on consumer payment habits and perceptions is provided in Taylor (2006).

because the costs they incur from accepting payments are significant not only to their own businesses, but also to the overall costs of retail payments to society. Recent media articles have highlighted merchants' concerns about the costs of retail payments, and various research has indicated that they pay more for retail payments than any other participant in the payments system.² Thus, examining the costs to merchants is an important contribution to understanding the overall efficiency of retail payments.

Most merchants perceive cash as the least costly form of payment and, in comparison, find debit cards only moderately costly and credit cards the most costly.

Accounting for the costs and, to a greater extent, the benefits of retail payments to merchants is no easy task. Data on merchant fees and labour costs, which vary significantly by merchant, are not readily accessible, nor is the actual value derived from the benefits of retail payments, since it is difficult to measure. One method of obtaining information is through surveys. In 2006, the Bank of Canada commissioned a survey of over 500 merchants on their accepted means of payment. Along with questions on payment preference and perceptions of risk and reliability, merchants were asked how costly they find cash, debit cards, and credit cards. They were also asked to report on some of their actual costs. A key finding of the survey is that most merchants perceive cash as the least costly form of payment and, in comparison, find debit cards only moderately costly and credit cards the most costly.³

The perception that cash is the least costly for merchants deserves closer examination, for at least two reasons. First, it is possible that merchants in the survey underestimate the full costs of accepting cash, since they may overlook the labour and other costs

associated with handling cash. Second, perceptions and actual costs could vary by type of merchant. Larger merchants, for instance, might prefer card payments over cash because of the efficiencies that can be derived from electronic card processing. They may believe that this efficiency is a return on the investment in the technology necessary to accept card payments. Smaller merchants, however, may find the set-up costs of card processing too costly to their business, and may prefer cash over cards.

In this article, we investigate merchants' perception that cash is the least costly means of payment by calculating the variable costs per transaction involved in accepting payments, using the survey results and other sources. In addition, we perform a sensitivity analysis by varying the transaction value and show that cash and credit cards become more expensive as the value of the transaction increases. We then estimate threshold transaction values for which cash is cheaper than debit cards for three different debit card fees.

Retail Payment Methods: The Costs and Benefits to Merchants

Merchants face a variety of costs and benefits from accepting cash, debit cards, and credit cards. These costs may be fixed or variable (i.e., depend on the value or volume of transactions), and they may be clearly expressed as fees or, less explicitly, as labour costs. The benefits are not as easy to quantify, but merchants generally value payment methods that are efficient, reliable, and secure, and that will generate sales.

Cash payments

When payments are made by cash, funds are settled and received during the transaction. Merchants may thus view the liquidity of cash as a benefit because the funds are immediately at their disposal. However, cash exposes the merchant to the risk of theft, robbery, and counterfeiting, as well as the risk of human error during the exchange. Security measures (e.g., surveillance cameras and security guards), secure storage (vaults and cash registers), and investment in counterfeit-detection training are necessary fixed costs associated with cash.

The costs associated with handling cash also make it the most labour-intensive form of payment, since it requires time to prepare cash registers, reconcile cash payments at the end of the day, and prepare deposits.⁴

2. For an example of a media article, see Mark Anderson, "Retail Council Leads Charge against Mounting Credit Card Fees," *Ottawa Citizen*, 24 September 2008. For examples of academic research, see the Literature Cited section on p. 23.

3. More information on the survey questions and results are provided in Arango and Taylor (2008). An executive summary of the survey results can also be found on the Bank's website at <<http://www.bankofcanada.ca>> under "Bank Notes/Survey results."

4. In recent years, technology has increased the automation of cash-handling and reconciliation procedures.

Smaller merchants may have their employees deliver cash deposits to the financial institution, while larger merchants often require armoured transportation services to make deposits on their behalf. In addition to labour costs, financial institutions charge fees for cash deposits, cash withdrawals, and coin ordering. These fees are set by the merchant's financial institution according to the package of services provided. Merchants may also wait a few days before making cash deposits at their financial institution, and it may be one to two business days before their account is credited. They therefore incur an opportunity cost from not earning interest on their cash holdings in registers and vaults or while it is in transit.

Card payments

Unlike with cash payments, merchants require payment-processing services from a financial institution or a third party when they accept debit cards or credit cards. (In this role, the financial institution or third party is known as an "acquirer.") Merchants often rent point-of-sale (POS) terminals from an acquirer and pay for maintenance and upgrades, although some of the larger retail chains, such as department stores, own POS terminals and customized software. In addition to the fixed costs related to POS terminals, merchants pay a monthly fee for the communication lines used to connect to the card networks.

In terms of variable costs, merchants incur a set fee for every debit card transaction and a percentage fee for every credit card transaction. The credit card fee, known as the merchant's discount rate, is applied to the total value of the transaction. In addition to the discount rate, some merchants pay a flat transaction fee and face a minimum monthly charge if their credit card fees do not reach a certain threshold.

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Card-payment finality takes place by means of a clearing and settlement process. With debit cards, authorization via the customer's personal identification number (PIN) ensures that the consumer has sufficient funds available at the time of sale. The funds are

debited from the customer's account in real time and transferred to the merchant, usually by the next business day. In the case of fraudulent activity, the card issuer usually absorbs the loss, since authorization relies more on the technology than on the merchant.

Compared with cash and debit cards, credit cards offer the least payment finality because of the consumer's deferred payment advantage and limited liability against fraud. Though merchants receive funds within one to two business days, consumers have a certain number of days to dispute a credit card transaction, whether because of an unresolved dispute with the merchant or because of a fraudulent claim (i.e., the card was used without the cardholder's consent). In these cases, the transaction will be reversed through a chargeback, the value of which is deducted from the merchant's account by the acquirer while the dispute is under review. Merchants have a limited number of days to provide information in their defence (i.e., to prove that they followed proper procedures). These chargebacks can be costly to merchants, who are charged for the process and risk losing the transaction funds.

Despite the costs of card payments, merchants may benefit from the increased efficiency of electronic processing, since less labour is required for card payments than for cash. In fact, debit cards can actually help merchants reduce the costs of holding cash through the cash-back option, which allows consumers to withdraw cash at the point of sale. The main advantage of accepting card payments, however, is that it gives consumers access to credit or their bank account, enabling them to make purchases that might not have occurred otherwise. Satisfying consumer demand for payment options and using loyalty or reward programs along with card payments is especially important when the merchant is operating in a competitive environment. In fact, as more merchants accept a particular payment method, consumer use of the method will increase as well, which can further enhance the opportunity for sales.

Survey Methodology and Results

The objectives of the Bank of Canada's 2006 survey of merchants on their accepted means of payment were (i) to consider how merchants perceive retail payments, (ii) to estimate the share of transactions represented by each payment method, and (iii) to assess the costs of accepting different retail payment methods. The research firm that conducted the survey held

telephone interviews with more than 500 merchants across Canada between March and May 2006. The merchant representatives were senior employees familiar with the payment methods accepted.

Although the sample is relatively small, it was stratified by firm size (number of employees), region, and subsector to reflect the diversity of the retail sector. The structure of the merchant's business (i.e., chain, franchise, or independent stores) was also considered. Because most merchants in Canada operate as independent small businesses, roughly half of the sample consisted of small merchants. As well, three-quarters of the businesses surveyed are independently owned and operated.⁵ The survey included a variety of subsectors (e.g., gas stations, grocery stores, restaurants, and general merchandise stores), but excluded merchants who did not have a physical store and were hypothetically unable to accept all three payment methods (cash, debit cards, and credit cards). Merchants who only sell goods and services over the Internet, for example, were excluded from the survey. It should be noted that the overall margin of error is relatively high, at +/- 4.4 per cent, with 95 per cent confidence. Generalizations made for a particular size, region, or subsector are subject to even greater error. The refusal rate was 46 per cent, which is not unusual for this type of survey.

Table 1 shows that the typical retail outlet represented by the survey median has annual sales of \$625,000 and consists of only one POS terminal and eight employees. Table 2 shows the corresponding results at a firm level, where merchants reported on all outlets combined. The much larger dispersion (standard deviations) at the firm level reflects the fact that even though the retail sector is characterized by small independent merchants, a large share of aggregate retail sales is dominated by merchants with large-scale operations. A breakdown of annual sales by

Table 1
Merchant Characteristics per Outlet (2005 figures)

Per outlet	Median	Mean	Standard deviation
Total annual sales (thousands \$)	625	2,661	5,949
Number of employees	8	21	30
Point-of-sale terminals	1	3	3

5. Independent merchants represented 55 per cent of retail activity in 2006 (Statistics Canada 2008); 72 per cent of merchants have fewer than 10 employees (Retail Council of Canada 2004).

Table 2
Merchant Characteristics for All Outlets (2005 figures)

All outlets	Median	Mean	Standard deviation
Total annual sales (thousands \$)	896	10,100	50,200
Cash (%)	25	29	23
Debit card (%)	30	28	16
Credit card (%)	30	33	21
Number of employees	10	1,477	8,739
Point-of-sale terminals	2	228	2,481

Note: The breakdown of annual sales by payment method excludes the results for cheques and self-labelled credit cards. The median results on payment method shares do not sum to 100 per cent because they are independently calculated for each payment method.

payment method shows that cash, debit card, and credit card transactions are evenly represented.

The survey results show that acceptance of cash, debit cards, and credit cards is fairly high, since 89 per cent of respondents accept all three. The smallest merchants (measured by number of employees or by sales volume) are the least likely to accept card payments. Of those who do not accept debit cards, 52 per cent indicate set-up and processing costs as the main barriers. Merchants who do not accept credit cards cite lack of consumer demand (29 per cent) and costs (16 per cent) as the main barriers. Interestingly, acceptance of debit cards is practically uniform across subsectors, but credit card acceptance varies by subsector. Cash acceptance is close to 100 per cent.

*Merchant preferences are influenced
by their perceptions of cost,
reliability, and risk.*

When asked which payment method they prefer their customers to use most often, 53 per cent of respondents said debit cards. In comparison, 39 per cent favoured cash, and only 5 per cent favoured credit cards. Presumably, merchant preferences are influenced by their perceptions of cost, reliability, and risk.⁶ Compared with other payment methods, debit cards are rated as the least risky (42 per cent rate debit

6. Merchants were asked for their perception of reliability in terms of the ease and dependability of processing a transaction, and of risk in terms of counterfeiting, theft, or fraud.

cards as “not at all risky”). Cash is seen as the least costly (63 per cent rate cash as “not at all costly”) and the most reliable (67 per cent rate cash as “totally reliable”). In contrast, credit cards are seen as the most costly (24 per cent rate credit cards as “very costly”) and the least reliable.

Based on the costs reported in the survey, merchants pay around \$40 a month (per terminal) for their banking and payment-processing services, which may include cash services, card processing, terminal leasing, and other related services.⁷ Merchants who receive payment-processing services from a third-party payment processor, and not a financial institution, pay around \$35 a month (per terminal). The median fee per transaction for debit cards in the survey is 12 cents, and the median discount rate for credit cards is 2 per cent of the value of the transaction (Table 3).^{8,9}

Table 3
Transaction Fees

	Median	Lowest quartile	Highest quartile
Debit card fee (\$)	0.12	0.07	0.25
Credit card fee (%)	2.00	1.75	2.50

The Variable Costs of Accepting Retail Payments

To make a per transaction comparison of the costs to merchants of accepting the three retail payment methods, we calculate the variable costs of accepting cash, debit cards, and credit cards for a transaction value of \$36.50, which is the median value of cash transactions reported in the survey.

While the survey data provided valuable input into these calculations, we rely on additional sources of information to calculate the variable costs. To gather

7. Among those who accept credit and/or debit cards, approximately half said that they lease their POS equipment, and 24 per cent said they own the equipment; the rest either did not know or did not respond.

8. We find that the survey results on debit card fees may be higher than the anecdotal information available on the Internet. For example, merchants may receive lower rates if they belong to a trade association.

9. The results reported for credit card rates are based on an average credit card discount rate calculated for each merchant, judging by the credit cards they accept at their stores.

more data on the costs of processing cash, for example, we interviewed 35 respondents as a follow-up to the survey. It was also difficult to obtain survey data on fixed costs, which explains why we are unable to include set-up, overhead, and equipment costs in the calculations. We exclude as well the cost of using armoured vehicles for cash transportation (again, owing to lack of data). Lastly, we assume that the cashier wage applies to all labour costs, even though a bookkeeper’s wage could be more appropriate for some of the back-office duties.

Given the information available, our variable-cost calculations account for the following items (see Arango and Taylor [2008] for more detail):

1. The labour cost of tender time.¹⁰
2. The labour cost of cash reconciliation, deposit preparation, and deposit delivery to the bank, based on the follow-up interviews.¹¹
3. Cash-deposit and coin-ordering fees, taken from the brochure of a major commercial bank at the time of the survey (data on the frequency and value of making deposits and coin orders are based on the follow-up interviews).
4. The per transaction fees for processing debit and credit card payments, as provided by the median survey results.
5. The cost of cash theft and of losses as a result of counterfeiting.¹²
6. The cost of a credit card chargeback, which is derived from Garcia-Swartz, Hahn, and Layne-Farrar (2006).
7. The opportunity cost of funds in transit, or float, based on short-term interest rates. For

10. Estimates of tender time are taken from the Dutch National Bank (Working Group on Costs of POS Payment Products 2004) as 19 seconds for cash, 26 seconds for debit cards, and 28 seconds for credit cards. These results are similar to those of a proprietary study done for the United States in 2005. Note that the tender time for cash is probably the most variable, and that tender time can change with new technology, such as contactless debit or credit cards.

11. According to the median results of the 35 follow-up interviews, a merchant takes 24 seconds per transaction to prepare and reconcile cash payments. Faster merchants can take as little as 12 seconds.

12. A survey conducted by Ipsos Reid in 2008 finds that 35 per cent of merchants face an employee theft once a year and 23 per cent face a robbery. Losses from bank note counterfeiting are calculated as the annual average value of counterfeit passes in 2004–06 divided by average total cash sales in the same period. It excludes the cost of counterfeit-detection training.

cash, we consider the time it takes for the financial institution to credit the merchant's account and the average time total cash sales remain in the store before being deposited at a financial institution.¹³

Credit cards stand out as the most costly overall because of the relatively high processing fee.

As reported in Table 4, the cost calculations reveal that, for a transaction value of \$36.50, debit card payments have the lowest variable costs, at 19 cents, followed by cash (25 cents), and credit cards (82 cents). Debit cards are the cheapest because the flat transaction fee is relatively low, while cash is more expensive because of the labour costs and the deposit fees (accounting for nearly 70 per cent of total cash costs). Credit cards stand out as the most costly overall because of the relatively high processing fee.

It is important to note that these calculations represent a base-case scenario that is dependent on various assumptions. In some other countries, debit card fees are based on a percentage of the transaction value

Table 4
Merchants' Variable Costs per Transaction

Cost item	Base case for a \$36.50 transaction		
	Cash	Debit	Credit
Tender time	0.051	0.070	0.080
Deposit-reconciliation time	0.033	-	-
Deposit-preparation time	0.033	-	-
Deposit time at the bank	0.025	-	-
Payment-processing fee	-	0.120	0.730
Cash-deposit fee	0.078	-	-
Coin ordering	0.006	-	-
Theft/counterfeit risk	0.025	-	-
Chargeback	-	-	0.016
Float	0.006	0.001	0.001
Total	\$0.25	\$0.19	\$0.82

13. Merchants in the survey differ as to how frequently they deposit cash at their financial institution. Only 18 per cent of merchants deposit cash on a daily basis; 27 per cent deposit once a week, and 22 per cent twice a week. Larger merchants, measured either by sales or by transaction volume, deposit cash more frequently. However, merchants with a higher number of terminals to manage and reconcile tend to deposit cash less frequently.

rather than a flat transaction fee. Our results could change if this fee structure were implemented in Canada.¹⁴

Why Merchants Might Think Cash Is the Cheapest

At a transaction value of \$36.50, our results based on variable costs seem to contradict the perception by merchants that cash is the cheapest method of payment. However, the ranking of payment methods by perceived costs can vary by merchant type, for the following reasons.

First, our calculations depend on the value of the transaction, as the results of the next section will show. Using the same survey, Arango and Taylor (2008) show that merchants who have lower average transaction values view cash as significantly less costly than debit cards and credit cards.

Second, since the back-office costs of cash are not priced explicitly, merchants—particularly those operating on a smaller scale—may not recognize the full costs of handling cash. Arango and Taylor (2008) find that, even though cash is consistently seen as the least costly of the three payment methods, merchants with higher annual sales, especially those in the highest sales category, view cash as more costly than those with lower annual sales (Chart 1a). The opposite is observed for debit cards, while no clear pattern is observed for credit cards. Similarly, Chart 1b suggests that larger chain stores tend to view cash as more costly than independent and franchise outlets (although this finding was not proven significant in previous research). Chart 1c shows how different sub-sectors also view cash as less costly than other means of payment.

Third, Arango and Taylor (2008) show that merchants with lower transaction volumes tend to have higher fees per transaction for both debit and credit cards, suggesting that larger merchants receive a discount for their higher volumes. Not surprisingly, smaller merchants view cash as relatively less costly. To illustrate, suppose the merchant's debit card fee is higher than the 12-cent median provided for in the calculations. With a fee of 25 cents, which corresponds to the result for the highest quartile in the survey, the cost of

14. In a recent press release, the Canadian Federation of Independent Businesses expressed concern about converting debit card fees to a percentage of the transaction value. The press release is available at <<http://www.cfib.ca/research/businfo/pdf/DIN0708.pdf>>.

Chart 1a
Merchants' Perceptions of the Costs of Payment Methods by Annual Sales

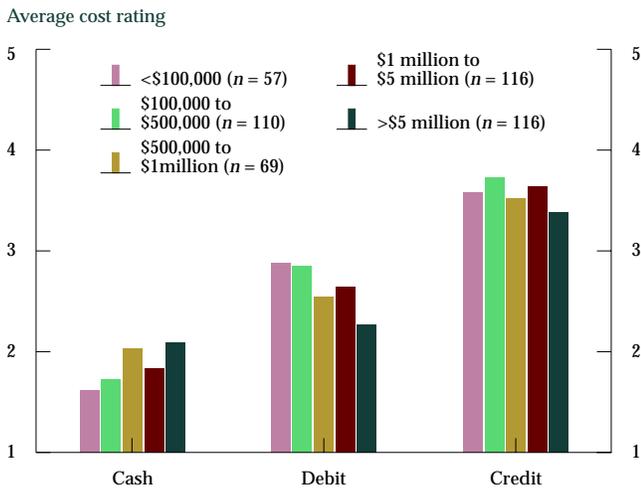
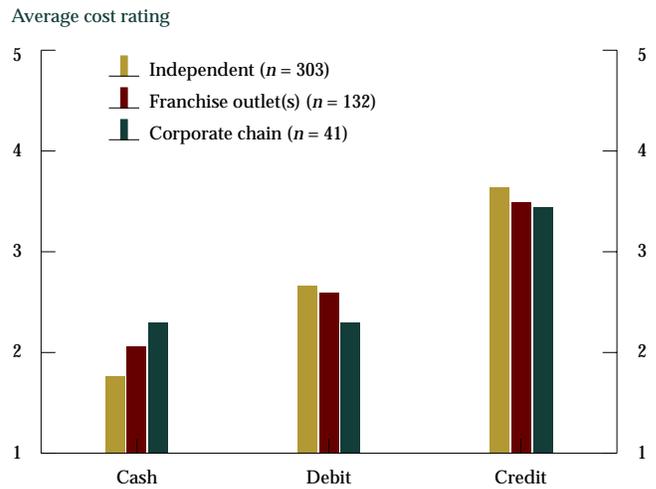
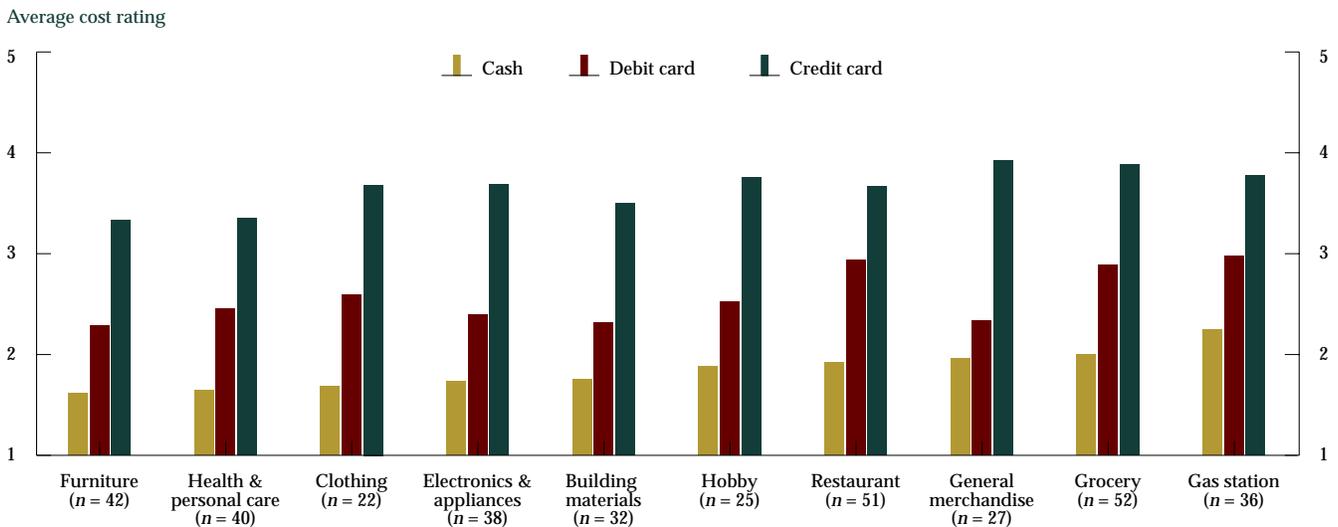


Chart 1b
Merchants' Perceptions of the Costs of Payment Methods by Business Structure



Note: Respondents were asked to rate how costly they find cash, debit cards, and credit cards on a scale of 1 to 5, where 1 represents “not at all costly” and 5 represents “very costly.” Not all observations from the sample are included.

Chart 1c
Merchants' Perceptions of the Costs of Payment Methods by Subsector



Note: Respondents were asked to rate how costly they find cash, debit cards, and credit cards on a scale of 1 to 5, where 1 represents “not at all costly” and 5 represents “very costly.” Not all subsectors are included.

a debit card transaction would add up to 32 cents, which is more expensive than cash.

Lastly, merchants may perceive cash as cheaper because of the higher fixed costs associated with electronic payments, which are not included in our calculations of variable costs. This may apply to smaller merchants, who would find the fixed costs per transaction more expensive, given their lower transaction volumes.

When Is Cash the Least Costly to Merchants?

Many of the costs described above vary by transaction value. To identify the thresholds at which cash may be the least costly to merchants, we perform a sensitivity analysis by varying transaction values and card fees. For cash, we assume that all cost items increase with the transaction value, except tender time, deposit time at the bank, and coin ordering. For debit cards, only the opportunity cost of funds availability would increase with the transaction value. For credit cards, all cost items, except tender time, would increase with the transaction value.

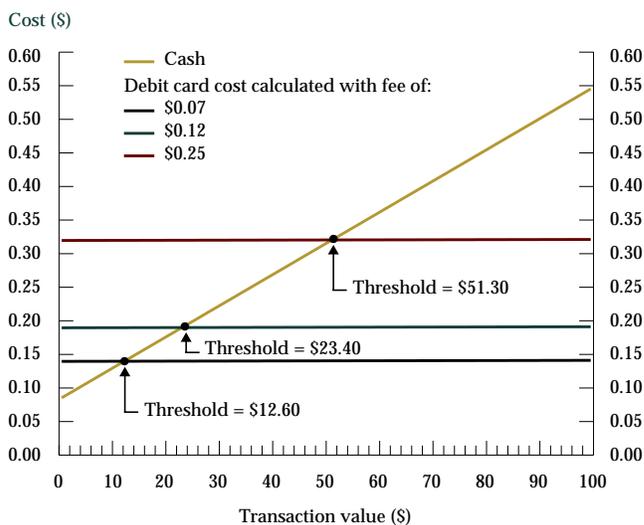
Given these assumptions, our calculations suggest that cash is cheaper than credit cards for all transaction values, even when considering a lower credit card rate of 1.75 per cent, which is the lowest quartile rate in the survey. Cash is cheaper than debit cards for transactions that are below \$12.60 for merchants who pay debit card fees as low as 7 cents; below \$23.40 for merchants who pay 12-cent debit card fees; and below \$51.30 for merchants who pay debit card fees as high as 25 cents. In other words, the cost of cash increases with the transaction value, and the threshold values between cash and debit increase as debit card fees rise. Chart 2 graphs the variable costs of cash and debit cards according to the transaction value and different debit card fees.

Comparison with Other Studies

The cost of retail payments has been estimated for the United States (Garcia-Swartz, Hahn, and Layne-Farrar 2006), Australia (Schwartz et al. 2007), Belgium (National Bank of Belgium 2005), the Netherlands (Working Group on Costs of POS Payment Products 2004), and Sweden (Bergman, Guibourg, and Segendorf 2007). Many of these studies also estimate threshold transaction values between the variable costs of cash and debit cards. It is difficult to directly compare

Chart 2

Threshold Transaction Values for the Cost of Cash vs. the Cost of Debit Cards



Note: The variable costs of debit cards, which include the debit card fee, the cost of the float, and the tender time, are calculated separately for debit card fees of \$0.07, \$0.12, and \$0.25.

their estimates to ours, however. First, these studies estimate the costs of each payment method to merchants, consumers, financial institutions, and the central bank (the Dutch and Belgian studies exclude consumers). By adding up the participants' costs, net of transfers, they calculate the total costs of retail payments to society.¹⁵ Second, these studies differ by their methodologies and country-specific attributes, such as the rates of payment-method usage and the average transaction values upon which the estimations are based.¹⁶

Nonetheless, the threshold transaction values of the variable costs of cash and debit cards for Sweden, the Netherlands, and Belgium range from Can\$12 to \$17.¹⁷ These estimates are not much higher than our threshold transaction value of \$12.60 for merchants who pay relatively low debit card rates. The fact that merchant costs represent the largest share of total costs (i.e., merchants pay more for retail payments than any other participant) in all of the studies helps to explain why our results appear to be similar.

15. To avoid double-counting, social-cost estimates do not include the fees that one party will pay to another.

16. See Koivuniemi and Kempainen (2007) for a review of different studies of retail payment costs.

17. Based on the average annual exchange rate for the year to which the estimates correspond.

Conclusion

The 2006 survey commissioned by the Bank of Canada, while not statistically representative of the immensely diverse retail sector at a national level, does provide insight into the costs of different payment methods to merchants. This study suggests that the costs of accepting different payment methods vary significantly by merchant and transaction value. Small stores with lower average transaction values perceive cash as less costly than card payments mainly because: (i) the back-office costs of cash are relatively low; (ii) the fixed costs of card payments are relatively high; and (iii) they are more likely to face higher fees per transaction for processing card payments.

We find that debit cards are the least costly payment method for a broad cross-section of merchants because of the relatively low debit card fees per transaction. This suggests that as debit card use in Canada continues to grow, many merchants could benefit. However, the survey reports that small merchants still perceive cash as the least costly payment method and prefer cash to electronic payments at the point of sale. These findings suggest that further work on the total costs and benefits to merchants of accepting various payment methods is important for policy-makers to have a better understanding of the efficiency of retail payments systems.

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