

The Effect of Least-cost Routing on Merchant Payment Costs

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Abstract

The RBA supports all merchants being able to choose the card network used to process debit transactions – a functionality known as least-cost routing (LCR) – with the aim of increasing competition and reducing the cost of accepting card payments. This article presents the RBA's first estimates of the effects of LCR on a merchant's cost of accepting debit card payments. Using merchant-level data, we estimate that the cost of accepting debit card transactions is nearly 20 per cent lower for merchants that have LCR turned on compared with those with LCR turned off, though the results differ across merchant size and choice of pricing plans. Once LCR for online and mobile wallet payments is widely available and taken up by merchants, the potential cost savings are likely to be even larger.

Introduction

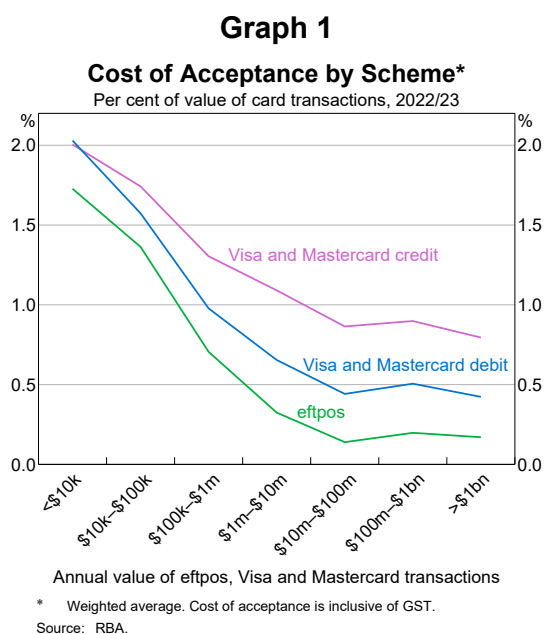
Debit cards are the single most used payment method by Australians, accounting for half of the total number of consumer payments in 2022. Whenever a consumer uses their card to make a payment, the merchant is charged a fee. These fees vary and can add up to be a significant cost to the merchant and, ultimately, the consumer if those costs are passed on.

To help reduce the cost of accepting card payments, the RBA is encouraging greater uptake of least-cost routing (LCR) – a function that allows the merchant to choose which card network processes debit card transactions. This should create greater competition between the networks and lead to savings for both merchants and consumers.

This article aims to fill a gap by presenting the RBA's first modelled estimates of the effects of LCR on a merchant's cost of accepting debit card payments. First, it describes the current fee structure for debit card transactions, before explaining how LCR works to lower these fees for merchants by giving them greater choice. The article then describes the data and methodology used to conduct our research into determining the cost savings of LCR. It concludes with a discussion of the results and associated policy implications.

Current fee structure for card payments

The cost for a merchant to accept a card payment can vary widely, from below 0.2 per cent to over 2 per cent of the transaction value (Graph 1). This is the merchant's 'cost of acceptance', which refers to the percentage fee merchants pay to their payment service provider (PSP) for a card transaction.^[1] These costs include both transaction-based fees and fixed fees.



The transaction-based fees are made up of:

- **Interchange fees** – wholesale fees set by card networks (eftpos, Visa, Mastercard) that are paid from the merchant's PSP to the cardholder's financial institution (issuer) on every transaction. These fees can vary based on factors like the type of card, whether it is an online or in-person transaction, the value of the transaction and the

size of the merchant. For example, cards that provide rewards to the cardholder (such as 'gold' or 'platinum' credit cards) have higher interchange fees.

- **Scheme fees** – wholesale fees payable separately by both PSPs and issuers to card networks for the services they provide (often charged on a per-transaction basis).
- **PSP margin** – additional fees levied on merchants by their PSP, including to cover the PSP's cost of providing card acceptance services to merchants.

Other fees include monthly or annual fees, terminal rental fees or joining fees.^[2]

An individual merchant's cost of acceptance is influenced by a range of factors, with the main ones being:

- **Size.** Large merchants typically have lower costs of acceptance. Their greater bargaining power allows them to negotiate lower fees. They can also spread any fixed costs over more transactions.
- **Payments mix.** Card transactions incur different costs depending on whether they are debit or credit, whether they are in-person or online, and whether they are processed through eftpos or an international card network (Visa/Mastercard).
- **PSP.** Each provider can charge different rates and may offer a different package of services.
- **Pricing plan.** PSPs offer merchants 'fixed', 'blended' and 'unblended' pricing plans for their payment services (Table 1):
 - *Fixed plans* are simple plans that charge one single rate for all transactions.
 - *Blended plans* have some transaction types 'blended together' at one price, such as one rate for all Visa (debit and credit) transactions, one rate for all Mastercard (debit and credit) transactions, and a different rate for all eftpos transactions.
 - *Unblended plans* (also called 'interchange plus' or 'interchange plus plus' plans) are typically the cheapest (Graph 2). These plans charge merchants the wholesale cost of each transaction plus the PSP's margin,

Table 1: Examples of Pricing Plan Types and Related Costs of Acceptance^(a)

Plan type	Fee charged by PSP Per cent				
	eftpos	Visa debit	Visa credit	Mastercard debit	Mastercard credit
Fixed	1.4	1.4	1.4	1.4	1.4
Blended ^(b)	0.4	1.1	1.1	1.1	1.1
Unblended	0.22	0.45	0.99	0.47	0.97

(a) These rates are indicative only.

(b) This example presents only one type of blended plan. Other blended plans are available with different rates blended together. For example, a separate Visa/Mastercard credit rate and Visa/Mastercard debit rate.

Source: RBA.

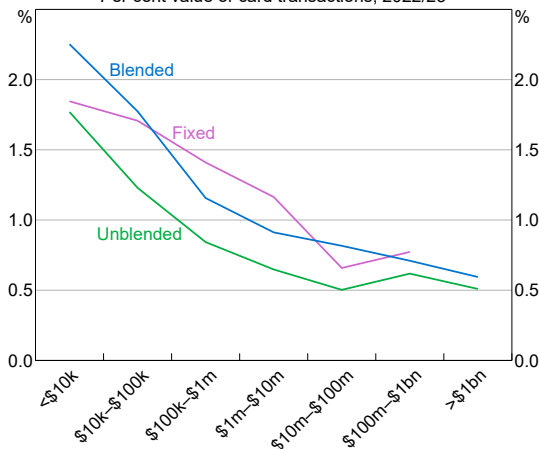
meaning merchants pay a different rate for each transaction, depending on factors such as the card type (e.g. credit or debit), transaction type (e.g. in-person or online) and card network (eftpos, Visa or Mastercard).

payment at any given merchant may be different depending on the network that processes it.

In Australia, domestically issued debit cards are typically ‘dual-network’ debit cards. These cards allow transactions to be processed through either eftpos or one of the international debit networks (most commonly Visa or Mastercard). Contactless card payments made with dual-network debit cards default to using the international debit network, due to rules set by the international networks. Payments processed through the international networks are more expensive on average, though this at least partially reflects compositional differences in the transactions processed by each network, as well as the pricing practices of PSPs (Graph 1). Since 95 per cent of in-person card payments were contactless in 2022, this means that most debit card payments route by default to the (typically) more expensive international network.

Graph 2

Cost of Acceptance by Pricing Plan*
Per cent value of card transactions, 2022/23



Annual value of eftpos, Visa and Mastercard transactions

* Weighted average. Cost of acceptance is inclusive of GST.

Source: RBA.

A merchant’s cost of acceptance for a specific payment is set by their PSP, but can vary depending on the card network (eftpos, Visa, Mastercard) that processes the transaction. Different card networks set different interchange fees and scheme fees that apply to the transactions they process, with these costs ultimately passed on to merchants by PSPs. PSPs may also add different margins on transactions of different networks. This means that the cost of a

Least-cost routing

LCR allows merchants to choose how contactless debit payments are routed and thereby can directly reduce a merchant’s payment costs. This functionality also increases competitive pressure between the debit networks, providing greater incentives for the networks to lower the wholesale fees that are ultimately paid by merchants.

There are two primary models for how LCR works in practice:^[3]

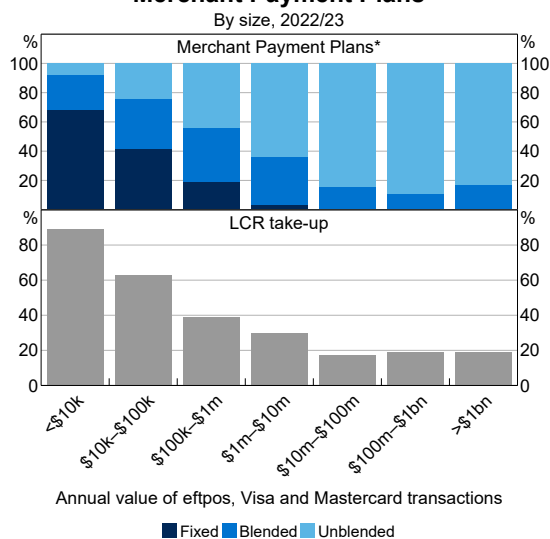
1. **The binary model** – where all relevant transactions are routed to the merchant’s (or PSP’s) chosen network.
2. **The threshold model** – where payments are routed to eftpos if the transaction size is above a certain dollar value (because eftpos is usually priced in cents), with smaller payments routed to Visa or Mastercard (because they are usually priced in percentage terms).

Whether a merchant has LCR enabled depends on their own choices and the choices of their PSP – PSPs can either enable LCR for merchants or let merchants themselves decide whether to enable LCR. We would expect the level of knowledge that a merchant has about the costs of different card networks to affect their chosen routing preference.

In 2022/23, just over a half of merchants had LCR enabled, despite LCR being available to approximately 99 per cent of merchants by June 2023 (RBA 2023).^[4] Small merchants are more likely to have LCR turned on, particularly those with less than \$1 million in annual card transactions (Graph 3). Higher take-up among smaller merchants may be due to their higher use of fixed pricing plans (which increasingly have LCR enabled automatically): 95 per cent of merchants with fixed plans in 2022/23 had LCR turned on, compared with just 54 per cent of merchants on blended plans and only 15 per cent on unblended plans (Graph 4).

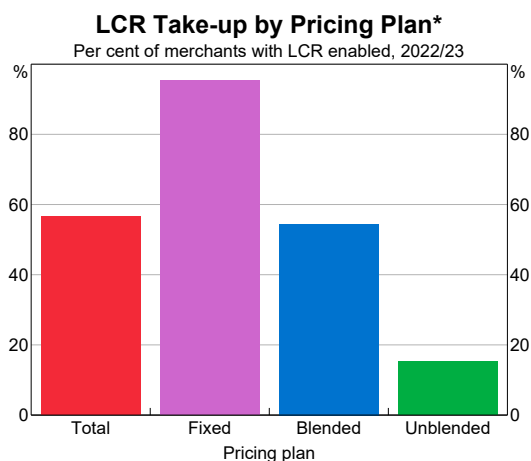
The Reserve Bank’s Payments System Board has responsibility for promoting the stability, efficiency and competitiveness of Australia’s payments system. Given the high share of payments made using cards in Australia, the RBA views merchants’ card payment costs as a key indicator of efficiency and competition in the payments system. Accordingly, the Board has strongly supported the continued issuance of dual-network debit cards and the provision of LCR functionality. The Board has taken action to encourage the availability and uptake of LCR by setting expectations that PSPs offer and promote LCR. This includes expectations to make LCR available for online and mobile wallet transactions, which is still being developed and rolled out.^[5]

Graph 3
Merchant Payment Plans



* A small number of merchants using 'other' pricing plans have been excluded from this graph.
Source: RBA.

Graph 4



* Uses merchant level data collected by the RBA for 2022/23.
Source: RBA.

Measuring the effect of LCR on merchant costs

To support the Board's goal to encourage uptake of LCR, we conducted research on the benefits and cost savings of LCR to merchants.

Data and methodology

To investigate the relationship between LCR and merchant payment costs we used annual merchant-level data collected by the RBA for 2022/23, which included a flag for whether each merchant had LCR enabled. Our data are cross-sectional: we only observe merchants at a point in time. The 2022/23 data included 860,000 merchants and captured \$630 billion worth of card transactions. The data provide anonymised information about each specific merchant, such as the number and value of transactions they processed in the year, their industry, their PSP, and the fees they paid to accept different types of card payments. The data also indicate whether a merchant was on a fixed, blended or unblended pricing plan. However, the data do not identify differences within these plan types, such as the specific rates blended together for different types of blended plans or the services included as a part of the pricing plans. The data also do not distinguish between in-person and online payments.

For our analysis, we used a subset of the data that excludes merchants with PSPs that do not offer both 'LCR-on' and 'LCR-off' plans. We also conducted some data cleaning to remove merchants with missing or implausible data.^[6] The reduced sample includes eight PSPs and about 525,000 merchants, 29 per cent of which had LCR enabled. These data cover approximately two-thirds of the debit card market in Australia.

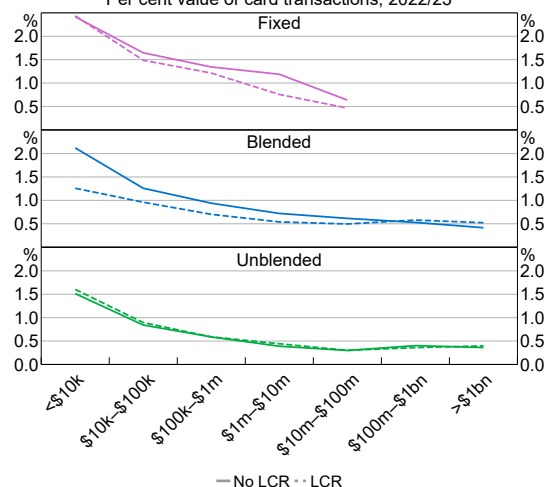
In 2022/23, LCR was primarily available in the in-person environment, with limited availability for online transactions and no availability for mobile wallet transactions. Therefore, our analysis is principally an analysis of the effect of in-person LCR on merchant payment costs. Given around 40 per cent of debit transactions are made via mobile wallets and around 25 per cent online, once LCR for these types of payments is available, the potential costs savings would be even larger.^[7]

Simple analysis

We found that in 2022/23 merchants with LCR turned on had a marginally *higher* cost of acceptance for debit cards on average than those with LCR turned off (0.56 per cent versus 0.52 per cent). This is counterintuitive because LCR is expected to reduce the cost of acceptance for merchants. However, this result likely reflects that LCR enablement is correlated with other merchant characteristics that affect the cost of acceptance. Indeed, we found that merchants with LCR were more likely to be small merchants, more likely to be on fixed plans, and more likely to be with certain PSPs that cost more on average. As such, these other merchant characteristics are likely to have pushed the average cost higher, rather than LCR being the driving factor.

The difference in the average cost of acceptance for merchants with and without LCR varied depending on the type of pricing plan a merchant had and the size of a merchant. Having LCR enabled was associated with a lower cost of acceptance for merchants of most sizes when they were on blended and fixed plans, although the cost difference varied by merchant size (Graph 5). There was minimal difference in the average cost of acceptance faced by merchants on unblended plans with and without LCR.

Graph 5
Debit Cost of Acceptance by Pricing Plan*
Per cent value of card transactions, 2022/23



* Weighted average. Cost of acceptance is inclusive of GST. Excludes payment service providers that do not offer both LCR-on and LCR-off plans.

Source: RBA.

It is difficult to draw strong conclusions about the impact of LCR on merchant costs from these simple comparisons. Merchants with and without LCR have different characteristics, which likely influence their costs of acceptance. The size of any 'LCR effect' may also depend on these various merchant-level characteristics. Accordingly, we used a more formal econometric analysis to account for these factors.

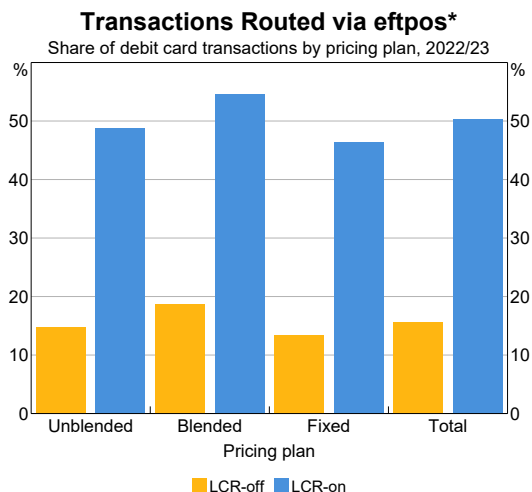
Regression analysis

Regression analysis allows us to compare the cost of acceptance of merchants with LCR-on and merchants with LCR-off, while holding their other characteristics constant. Our main model estimates the relationship between a merchants' cost of acceptance, their size (annual debit card transaction value), their pricing plan, their PSP, whether they can be considered a high-risk merchant, and whether they had LCR enabled.^[8] The model specifications are described in Appendix A and the regression results are in Appendix B.

The nature of regression analysis means that we cannot necessarily imply causation for our results, but there are plausible causal channels. By having LCR enabled, more transactions should route via the lower-cost debit card network (generally eftpos), thereby reducing merchants' payment costs. There is evidence in the data that this causal channel is working. The share of transactions routed via eftpos is significantly higher for merchants with LCR enabled than for those without it enabled – for all pricing plans (Graph 6). On average, merchants with LCR enabled route 50 per cent of their debit card transactions through eftpos, compared with only 14 per cent for those without LCR enabled.

Our regression results would not be causal if merchants with LCR enabled had unobserved characteristics that are correlated with their payment costs. For example, merchants with LCR enabled could be more likely to have a higher share of in-person transactions, which typically cost less than online transactions. This higher share of in-person transactions may reduce their cost of acceptance, irrespective of LCR. Given the richness of our data, we think there are few characteristics not accounted for in our models that would

Graph 6



* A small number of merchants using 'other' pricing plans have been excluded from this graph. Merchants with payment service providers that do not offer both LCR-on and LCR-off plans were excluded.

Source: RBA.

materially affect merchants' cost of acceptance, but we cannot definitively rule out that possibility.

Aggregate effect of LCR

Our results suggest that enabling LCR is associated with a lower cost of accepting debit card payments. On average, in 2022/23 merchants with LCR enabled were estimated to have a cost of acceptance that was 19 per cent lower than other similar merchants. This means that if a merchant without LCR enabled had a cost of acceptance of 1 per cent, our results imply that a similar merchant with LCR enabled would (on average) have a cost of acceptance of 0.81 per cent. In dollar terms, our result implies that the median-sized merchant, with about \$110,000 in annual debit card transactions, would save around \$310 per year from LCR. The average-sized merchant with \$675,000 in annual debit card transactions would save around \$1,150 per year (see Appendix C for calculations).

These results are consistent with our expectation that LCR should reduce merchant payment costs.

Table 2: Pass-through of LCR
By plan type

Pass-through	Unblended	Blended – separate eftpos rate	Blended – single debit rate	Fixed
PSP debit rate	Different debit rates for each transaction (separate eftpos/Visa/Mastercard rates)	Multiple debit rates, including a separate eftpos debit rate	Uniform debit rate for eftpos/Visa/Mastercard transactions	Uniform debit rate for all card transactions
Pass-through of LCR	Direct – transactions route to lowest cost rate (generally eftpos)	Direct – transactions route to lowest cost rate (generally eftpos)	Indirect – PSPs may pass through lower wholesale costs by lowering the uniform debit rate	Indirect – PSPs may pass through lower wholesale costs by lowering the uniform debit rate

Source: RBA.

Effect of LCR on merchants with different pricing plans

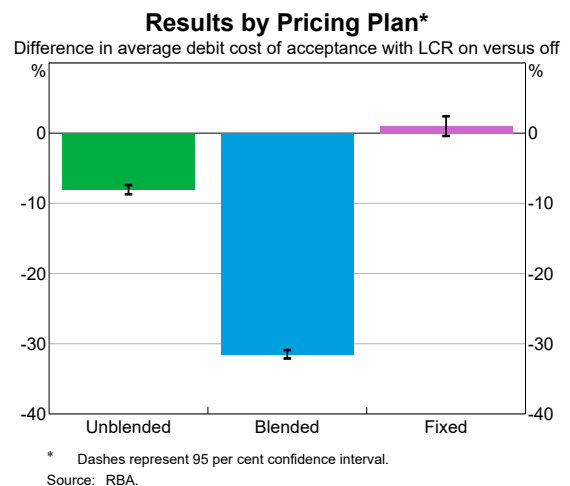
The effect of LCR on a merchant’s cost of accepting debit card payments may differ depending on their chosen pricing plan (Table 2). This is because each plan type offers different levels of blending between network and card types, which influences how lower wholesale costs from LCR flow through to each merchant’s payment costs. The pass-through is more direct for merchants on unblended plans, as the wholesale cost of each transaction is passed directly through to the merchant (plus the PSP’s margin). For merchants on fixed and blended plans, the potential pass-through is less direct. Some merchants on blended plans have a single Visa/Mastercard rate for credit and debit card payments, and a separate eftpos rate. Many of these merchants could save money in the first instance if more of their debit card transactions attracted the typically cheaper eftpos rate. For merchants on fixed plans, and blended plans with a combined debit rate for eftpos/Visa/Mastercard, to get the full benefit from LCR, their PSP needs to pass on the wholesale cost savings by lowering the per-transaction rates of their plans.

To investigate how LCR influences merchants’ payment costs by pricing plan type, we extended the model to differentiate the impact of LCR depending on the chosen pricing plan (see Appendix A).

The results show that, for 2022/23, merchants with LCR enabled had lower costs of accepting debit card payments if they were on an unblended or

blended plan, but not if they were on a fixed plan. On average, having LCR enabled was associated with an 8 per cent lower cost of acceptance for those on unblended plans and a 32 per cent lower cost of acceptance for those on blended plans (Graph 7). Having LCR enabled on a fixed plan did not appear to have a significant impact, on average, on a merchant’s cost of acceptance. However, this varied depending on a merchant’s PSP; merchants with three of the seven PSPs that offer fixed plans with and without LCR were estimated to have lower costs of acceptance from LCR.

Graph 7



One potential reason that merchants on blended plans appear to be able to get larger savings from LCR is that the gap between the average eftpos rate and the average Visa/Mastercard debit rate is relatively large for these types of plans (Table 3). This gap may be high because, as noted above, some

Table 3: Average Debit Card Rates, 2022/23^(a)

Per cent value of debit card transactions

Plan type	eftpos Per cent	Visa/Mastercard Per cent	Difference ^(b) Percentage points
Unblended – LCR on	0.25	0.61	0.36
Unblended – LCR off	0.20	0.42	0.22
Blended – LCR on	0.39	0.87	0.49
Blended – LCR off	0.35	0.89	0.54

(a) Excludes merchants that have not accepted both eftpos and Visa/Mastercard debit transactions within the year. Note: compositional differences account for some difference in the rates. Visa/Mastercard rates are more likely to include international and online transactions, which generally have higher wholesale costs.

(b) Differences are calculated using unrounded estimates.

Source: RBA.

blended rates for Visa and Mastercard also include more expensive credit card transactions. This means that as transactions route through eftpos due to LCR, the marginal saving on each transaction is higher for merchants on blended plans.

Theoretically, the savings from LCR could be reduced if PSPs set their blended Visa/Mastercard rates on LCR plans higher to account for the fact that a larger proportion of their Visa/Mastercard transactions will be credit, rather than debit, due to more debit transactions being routed to eftpos. However, we found minimal evidence of this as the eftpos and Visa/Mastercard rates are relatively consistent between LCR-on and LCR-off merchants on blended plans on average (Table 3).

The lack of estimated cost savings from LCR for merchants on fixed plans is not what we expected. On the face of it, it suggests that at least some PSPs have not fully passed on the cost savings from LCR to merchants on fixed plans. However, we would caution against reading too much into this result for several reasons, including:

- In 2022/23, an overwhelming share of merchants on fixed plans had LCR enabled. The small number of LCR-off merchants may have had special characteristics that affected their cost of acceptance that the model cannot account for.
- Other services provided by PSPs beyond card transaction processing are increasingly being included in fixed plans, which may raise the cost of these plans (all else equal). Bundled services may be more common for LCR-on plans

because they are ‘newer’, and the bundling of services has become more common in recent years, thereby making LCR-on plans look more expensive than LCR-off plans.

- PSPs may have to compete on the headline price of fixed plans, regardless of whether LCR is enabled, since LCR does not *directly* affect the merchant on these plans. This may lead to LCR-on and LCR-off fixed plans being similarly priced for a given level of bundled services.

In our dataset, we cannot observe the same merchants through time to see if the introduction of LCR has reduced the cost of their fixed plan, nor can we observe the differences in bundled services between different plans at the same PSP or across time. These limitations in our dataset make it difficult to draw strong conclusions about the effects of LCR for merchants on fixed plans.

Table 4: Merchant Size Buckets

2022/23

Size	Minimum annual debit card transactions	Maximum annual debit card transactions	Number of merchants
Micro	\$0	\$100,000	253,000
Small	\$100,000	\$1,000,000	223,000
Medium	\$1,000,000	\$10,000,000	46,000
Large	\$10,000,000	–	3,400

Source: RBA.

Effect of LCR on merchants of different size

The descriptive statistics presented above suggest that the effect on merchants’ costs of acceptance from having LCR enabled may vary depending on the size of a merchant. To investigate this, four versions of the model were estimated with samples based on merchant size. We divided the sample into four broad merchant size buckets based on annual debit card transaction values (Table 4).

The results of these regressions suggest that LCR-enabled merchants with between \$100,000 and \$10 million in annual debit card payments have lower payment costs than similar-sized merchants without LCR enabled (Graph 8). The smallest LCR-enabled merchants, with under \$100,000 in annual debit card payments, are also estimated to have lower payment costs than similar-sized merchants without LCR, but to a lesser extent. The cost differences for LCR-enabled merchants are less clear for large merchants with over \$10 million in annual debit card transactions.

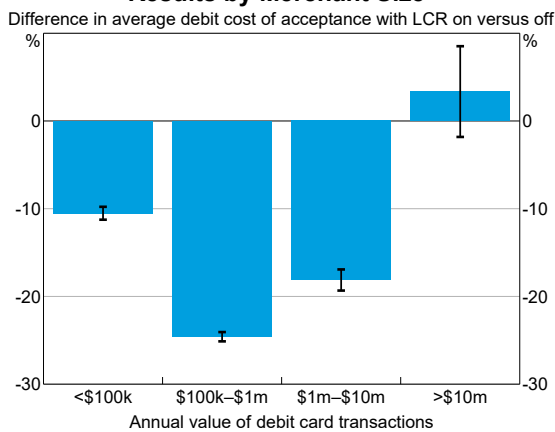
It is not entirely clear why small merchants have higher suggested savings from LCR. It is not explained by the gap between the observed eftpos and international network rates, which are largely consistent by merchant size, or by a greater relative share of transactions having shifted to eftpos from the international networks, as this is also largely consistent by merchant size. Certain types of merchants – particularly very large merchants and those that the networks may consider to be ‘strategic’ – may qualify for lower interchange fees. This may explain the estimated limited impact of LCR for large merchants since their strategic Visa/Mastercard debit rates may be cheaper than their eftpos rate. If the difference in cost between eftpos and these strategic Visa/Mastercard rates are minimal, the potential savings from LCR would also be minimal.

Implications

The results presented in this analysis suggest that LCR reduces merchant payment costs on average. This supports the case for further LCR take-up by merchants and the rollout of LCR for online and mobile wallet transactions, which should further increase the cost savings from LCR. Our results imply that there is room for further reductions in payment costs through higher LCR take-up among merchants on unblended and blended plans; these merchants are estimated to save significantly from LCR, but have relatively low LCR uptake. Increased LCR take-up by smaller merchants, particularly those with under \$10 million in annual debit card payments, could also reduce debit card payment costs.

Graph 8

Results by Merchant Size*



* Dashes represent 95 per cent confidence interval.

Source: RBA.

Conclusion

This article introduces new estimates for the potential cost savings for merchants from enabling LCR. We estimate that on average LCR is associated with a nearly 20 per cent lower cost of acceptance for debit card transactions, with potential cost savings being largest for small merchants and those on plans that blend together prices for different card types. The results presented primarily capture the savings from LCR for in-person transactions using physical cards, given the limited availability of LCR for online and mobile wallet payments. As LCR

becomes more readily available for these types of transactions, the potential savings should be higher given they account for a significant and growing share of debit card payments. Due to the nature of regression analysis, our results are not necessarily causal, but the evidence supporting the causal channel – by which LCR routes debit payments through the generally lower cost network (eftpos) – is consistent with our overall assessment that on average, LCR reduces merchant payment costs.

Appendix A: Regression specifications

We constructed regression models to formally assess the association between LCR and merchants' costs of acceptance. A log-log model was chosen for this analysis as it more accurately maps the non-linear relationship between cost of acceptance and merchant size. It also makes the results easy to interpret, because the coefficient on an explanatory variable can be interpreted as a percentage effect.

We run the following regression:

$$\begin{aligned} \log(COA_i) = & \beta_0[\log(SIZE_i)] + \beta_1[\log(SIZE_i) \times FIXED_i] + \beta_2[\log(SIZE_i) \times BLENDED_i] \\ & + \beta_3[LCR_i] + \beta_4[FIXED_i] + \beta_5[BLENDED_i] + \beta_6[HIGHRISK_i] + \beta_7[HIGHRISK_i \times FIXED_i] \\ & + \beta_8[HIGHRISK_i \times BLENDED_i] + \beta_{9to15}[PROVIDER2to8_i] + \beta_{16to22}[PROVIDER2to8_i \times FIXED_i] \\ & + \beta_{23to29}[PROVIDER2to8_i \times BLENDED_i] + Constant + \varepsilon_i \end{aligned}$$

where:

- COA_i – cost of acceptance for the i^{th} merchant's debit card transactions.

Explanatory variables for the i^{th} merchant:

- $SIZE_i$ – a merchant's size based on annual debit card transaction value (representing merchant size)
- LCR_i – indicator variable equal to 1 if a merchant has LCR enabled
- $FIXED_i$ – indicator variable equal to 1 if a merchant has a fixed pricing plan
- $BLENDED_i$ – indicator variable equal to 1 if a merchant has a blended pricing plan
- $HIGH RISK_i$ – indicator variable equal to 1 if a merchant is in a high-risk industry
- $PROVIDER$ – several indicator variables for each PSP in the sample.

Interaction terms:

- $\log(SIZE) \times FIXED_i$ – to capture the additional impact of merchant size on merchants with fixed plans
- $\log(SIZE) \times BLENDED_i$ – to capture the additional impact of merchant size on merchants with blended plans
- $HIGH RISK \times FIXED_i$ – to capture the additional impact of a merchant being high risk when on a fixed plan
- $HIGH RISK \times BLENDED_i$ – to capture the additional impact of a merchant being high risk when on a blended plan
- $PROVIDER \times FIXED_i$ – to capture the additional impact of a merchant with a specific PSP when on a fixed plan

- $PROVIDER \times BLENDED_i$ – to capture the additional impact of a merchant with a specific PSP when on a blended plan.

For each indicator variable with more than two possible outcomes, one dummy must be excluded to prevent perfect multicollinearity. For the pricing plan indicators, the unblended pricing plan was excluded. A specific PSP was also excluded (Provider 1 for simplicity). As a result, the base merchant was on an unblended plan with the excluded PSP.

The listed explanatory variables were chosen as we expected that they each would affect a merchant's cost of acceptance. Each explanatory variable was also interacted with each pricing plan indicator variable. This was done to account for our assumptions that:

1. the relationship between merchant size and cost of acceptance is heterogenous between pricing plans
2. a merchant being considered high risk has a different impact on their cost of acceptance depending on their pricing plan
3. the difference in average cost of acceptance for merchants with each PSP from the base PSP differs by pricing plan.

By controlling for these variables, the model should draw out the effect of LCR abstracting from these other influences on the cost of acceptance.

We also extended the model to identify whether LCR influences merchants' costs of acceptance differently depending on what pricing plan they use:

$$\begin{aligned} \log(COA_i) = & \beta_0[\log(SIZE_i)] + \beta_1[\log(SIZE_i) \times FIXED_i] + \beta_2[\log(SIZE_i) \times BLENDED_i] \\ & + \beta_3[LCR_i] + \beta_4[FIXED_i] + \beta_5[BLENDED_i] + \beta_6[HIGHRISK_i] + \beta_7[HIGHRISK_i \times FIXED_i] \\ & + \beta_8[HIGHRISK_i \times BLENDED_i] + \beta_{9to15}[PROVIDER2to8_i] + \beta_{16to22}[PROVIDER2to8_i \times FIXED_i] \\ & + \beta_{23to29}[PROVIDER2to8_i \times BLENDED_i] + \beta_{30}[LCR_i \times FIXED_i] + \beta_{31}[LCR_i \times BLENDED_i] + Constant + \epsilon_i \end{aligned}$$

This specification was identical to the base model but with two additional interaction terms:

- $LCR \times FIXED$ – to capture the additional impact of LCR on merchants with fixed plans
- $LCR \times BLENDED$ – to capture the additional impact of LCR on merchants with blended plans.

Appendix B: Regression results

Table B1: Regression Results^(a)

Regression outputs – 2022/23

Variable	Base Log(COA)	By pricing plan Log(COA)	Size 1 Log(COA)	Size 2 Log(COA)	Size 3 Log(COA)	Size 4 Log(COA)
Log(SIZE)	-0.17*** (0.000528)	-0.17*** (0.000529)	-0.16*** (0.001328)	-0.13*** (0.00204)	-0.25*** (0.004783)	0.04*** (0.012113)
Log(SIZE) × FIXED	0.03*** (0.001293)	0.04*** (0.001292)	0.02*** (0.002432)	0.05*** (0.0056)	-0.10** (0.033628)	-0.14 (0.296324)
Log(SIZE) × BLENDED	0.02*** (0.000888)	0.02*** (0.00089)	-0.01*** (0.002186)	0.03*** (0.003217)	0.11*** (0.009504)	-0.02 (0.034316)
LCR	-0.19*** (0.002181)	-0.08*** (0.003434)	-0.11*** (0.003747)	-0.25*** (0.002698)	-0.18*** (0.006145)	0.03 (0.02638)
FIXED	0.50*** (0.014655)	0.26*** (0.016313)	0.49*** (0.025146)	0.43*** (0.068805)	2.05*** (0.490886)	3.20 (4.879848)
BLENDED	0.05*** (0.012471)	-0.004 (0.012471)	0.33*** (0.024196)	-0.18*** (0.04188)	-1.22*** (0.139624)	1.30* (0.575068)
HIGH RISK	0.04*** (0.003452)	0.04*** (0.003442)	0.12*** (0.005611)	-0.03*** (0.00463)	-0.08*** (0.008792)	0.002 (0.034492)
HIGH RISK × FIXED	-0.03*** (0.008266)	-0.03*** (0.008239)	-0.09*** (0.010705)	-0.01 (0.014721)	0.12*** (0.093745)	N/A
HIGH RISK × BLENDED	-0.01 (0.006277)	-0.01 (0.006256)	0.03** (0.009792)	0.01 (0.00845)	-0.02*** (0.018266)	0.14*** (0.119091)
PAYMENT SERVICE PROVIDER 2	-0.07*** (0.00238)	-0.07*** (0.002373)	-0.21*** (0.003858)	0.02*** (0.003027)	0.06*** (0.007413)	0.56*** (0.030011)
PAYMENT SERVICE PROVIDER 3	0.36*** (0.005114)	0.26*** (0.005638)	-0.17*** (0.011051)	0.52*** (0.005872)	0.61*** (0.011794)	1.32*** (0.093553)
PAYMENT SERVICE PROVIDER 4	-0.14*** (0.004216)	-0.17*** (0.00424)	-0.34*** (0.005759)	0.08*** (0.006794)	0.32*** (0.017203)	1.19*** (0.056349)
PAYMENT SERVICE PROVIDER 5	0.69*** (0.022393)	0.68*** (0.022319)	0.10 (0.060776)	0.62*** (0.037247)	0.88*** (0.037918)	1.31*** (0.048266)
PAYMENT SERVICE PROVIDER 6	0.05*** (0.007915)	0.13*** (0.007994)	0.11*** (0.013196)	0.09*** (0.010769)	-0.14*** (0.021264)	-0.75*** (0.132727)
PAYMENT SERVICE PROVIDER 7	-0.23*** (0.004201)	-0.24*** (0.004194)	0.08*** (0.009375)	-0.32*** (0.005433)	-0.22*** (0.008027)	0.11*** (0.024707)
PAYMENT SERVICE PROVIDER 8	0.20*** (0.003555)	0.17*** (0.003613)	0.13*** (0.005824)	0.21*** (0.004492)	0.35*** (0.010763)	0.96*** (0.035131)
PAYMENT SERVICE PROVIDER 2 × FIXED	0.06*** (0.005801)	0.08*** (0.005835)	0.20*** (0.007903)	-0.05*** (0.008774)	0.29*** (0.055483)	N/A
PAYMENT SERVICE PROVIDER 3 × FIXED	-0.35*** (0.007509)	-0.19*** (0.00793)	0.14*** (0.013241)	-0.43*** (0.010653)	0.01 (0.044984)	-0.86 (0.542545)
PAYMENT SERVICE PROVIDER 4 × FIXED	0.21*** (0.014202)	0.36*** (0.01473)	0.32*** (0.024625)	-0.02 (0.017264)	0.38*** (0.055766)	-0.87* (0.365052)
PAYMENT SERVICE PROVIDER 5 × FIXED	-0.56*** (0.127519)	-0.50*** (0.12711)	-0.14 (0.171758)	-0.18 (0.223167)	N/A	N/A

Variable	Base Log(COA)	By pricing plan Log(COA)	Size 1 Log(COA)	Size 2 Log(COA)	Size 3 Log(COA)	Size 4 Log(COA)
PAYMENT SERVICE PROVIDER 6 × FIXED	-0.79*** (0.0186)	-0.86*** (0.01858)	-0.92*** (0.02598)	-0.71* (0.027773)	-0.18 (0.096974)	N/A
PAYMENT SERVICE PROVIDER 7 × FIXED	-0.18*** (0.02588)	0.002 (0.026404)	-0.66*** (0.050274)	-0.03 (0.029227)	0.20** (0.078334)	N/A
PAYMENT SERVICE PROVIDER 8 × FIXED	0.49*** (0.007384)	-0.03** (0.009162)	-0.06*** (0.010785)	-0.30*** (0.010171)	-0.05 (0.06656)	N/A
PAYMENT SERVICE PROVIDER 2 × BLENDED	-0.02** (0.008051)	-0.01 (0.008029)	0.02 (0.012546)	0.01 (0.011725)	-0.25*** (0.0204)	-0.67 (0.088172)
PAYMENT SERVICE PROVIDER 3 × BLENDED	-0.17*** (0.008393)	-0.03*** (0.008904)	0.02 (0.015425)	-0.07*** (0.011222)	-0.002 (0.01955)	-0.57** (0.190699)
PAYMENT SERVICE PROVIDER 4 × BLENDED	0.51*** (0.010486)	0.55*** (0.010476)	0.68*** (0.016921)	0.31*** (0.01429)	0.16*** (0.033916)	-0.11 (0.150019)
PAYMENT SERVICE PROVIDER 5 × BLENDED	-0.65*** (0.095821)	-0.62*** (0.095504)	-0.58*** (0.160966)	-0.34*** (0.170678)	-0.58** (0.225724)	-0.78** (0.245962)
PAYMENT SERVICE PROVIDER 6 × BLENDED	N/A	N/A	N/A	N/A	N/A	N/A
PAYMENT SERVICE PROVIDER 7 × BLENDED	0.49*** (0.007925)	0.51 (0.007916)	0.15*** (0.014386)	0.60*** (0.011069)	0.50*** (0.017477)	0.08 (0.081719)
PAYMENT SERVICE PROVIDER 8 × BLENDED	0.07*** (0.008096)	0.15*** (0.008217)	0.12*** (0.013199)	0.10*** (0.011146)	-0.01 (0.020962)	-0.30*** (0.088843)
LCR × FIXED	-	0.09*** (0.007741)	-	-	-	-
LCR × BLENDED	-	-0.23*** (0.004607)	-	-	-	-
Constant	1.57*** (0.006495)	1.59*** (0.006492)	1.54*** (0.013629)	1.01*** (0.025865)	2.68*** (0.069495)	-2.59*** (0.204332)
Observations	525,770	525,770	253,146	223,008	46,266	3,350
Adjusted R ²	0.45	0.45	0.31	0.37	0.38	0.49

(a) ' ' if $p < 1$, ' ' if $p < 0.1$, '**' if $p < 0.05$, '***' if $p < 0.01$, '****' if $p < 0.001$. Standard errors are reported in brackets.

Source: RBA.

Appendix C: Merchant savings from LCR

Table C1: Data for Savings Calculation

Savings	Mean (average) merchant	Median merchant
Annual debit card transactions	\$676,723	\$109,285
Cost of acceptance	0.90%	1.51%
Estimated percentage savings from LCR	19%	19%
Savings from LCR	\$1,154	\$313

Source: RBA.

Calculation formulas:*

$$\text{Current Merchant Fees} = \text{Annual debit transactions} \times \text{Cost of Acceptance}$$

$$\text{Reduced Cost of Acceptance} = \text{Cost of Acceptance} \times (1 - \text{Estimated percentage Savings from LCR})$$

$$\text{Reduced Merchant Fees} = \text{Annual debit transactions} \times \text{Reduced Cost of Acceptance}$$

$$\text{Annual dollar savings from LCR} = \text{Current Merchant Fees} - \text{Reduced Merchant Fees}$$

Mean merchant example:*

$$\text{Current Merchant Fees} = \$676,723 \times 0.0090 = \$6,073$$

$$\text{Reduced Cost of Acceptance} = 0.90\% \times (1 - 0.19) = 0.73\%$$

$$\text{Reduced Merchant Fees} = \$676,723 \times 0.0073 = \$4,919$$

$$\text{Annual dollar savings from LCR} = \$6,073 - \$4,919 = \$1,154$$

* Figures are calculated using unrounded numbers.

Endnotes

- [*] The authors are from Payments Policy Department. They would like to thank Troy Gill, Nicholas Prokhovnik, Robert Gao and Anirudh Yadav for their contributions in preparing this article.
- [1] A 'payment service provider' is an organisation that provides card acceptance services to merchants, such as acquirers and payment facilitators. Examples include banks and fintechs.
- [2] For more background, see Gill, Holland and Wiley 2022.
- [3] A third version of LCR known as dynamic routing is offered by some PSPs, but with limited availability. Dynamic routing assesses the cost of routing to different networks for each individual transaction and then routes to the lowest cost network.
- [4] The RBA receives LCR reporting data from acquirers on LCR availability and take-up every six months to monitor progress on the Board's LCR expectations.
- [5] For further information, see Connolly (2023).
- [6] Inactive merchants, identified as those with less than 20 transactions or with zero transaction value for the year, were excluded. We also removed the 2 per cent of merchants with an implausible cost of acceptance, such as a cost of acceptance above 100 per cent or below zero per cent. Merchants with missing data for their LCR status and pricing plan were also excluded.
- [7] Mobile wallet and online transactions are not mutually exclusive. For example, some mobile wallet transactions are also online transactions.
- [8] A merchant is considered high risk if they are in an industry that has a high rate of fraud and/or refunds. We also ran regressions controlling for merchant industry that gave broadly consistent results. Results are available on request.

References

Connolly E (2023), 'The Shift to Electronic Payments – Some Policy Issues', Speech to AFR Banking Summit, Sydney, 28 March.

Gill T, C Holland and G Wiley (2022), 'The Cost of Card Payments for Merchants', *RBA Bulletin*, September.

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