Testing Interchange Fee Models Using The Australian Experience

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ABSTRACT: The paper attempts to estimate the effects of the RBA's intervention on the "two sided price" of credit cards in Australia. Two previous works have attempted to look at the effects of the RBA's intervention (Chang et al. 2005 and CRA International 2008). However, those works look only at parts of the "two sided price" and contain a number of errors that bias their results. There is significant ongoing interest in the Australian experience. A thorough review of the effects of the RBA's intervention on each of the parties and price elements would be interesting to many readers that follow payment card and two-sided market issues.

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1.   Introduction

Recent antitrust scholarship concerning "two sided" markets has begun to examine "two sided prices", particularly in the context of payment cards.[1] Such prices may be defined in a variety of ways, but typically refer to the net payments made by the purchasers on both sides of the "two sided" market summed together. There is no agreement in the literature yet as to how such prices should be defined (i.e., on a per transaction, per dollar of purchase value or per account basis) or as to what elements should be included (i.e., transaction specific fees only or any fees associated with the relationship).[2] One question which remains unresolved in the payment cards context is whether changing the allocation between the two sides through the interchange fee can affect the total price or only the quantity purchased.[3] In particular, Rochet (2003) has suggested that with respect to payment cards, issuing bank profits may increase as interchange fees increase.[4] The experience in Australia bears on this question, as the Reserve Bank of Australia ("RBA") intervened in payment card markets in 2003 to reduce interchange fees, increase the transparency of pricing and eliminate a variety of restrictions, including no surcharging rules and limitations on entry by non-banks. That intervention provides an

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1. For background on competing viewpoints on the antitrust issues involving payment cards, interchange fees and two sided markets, see Benjamin Klein, Andres Lerner, Kevin Murphy and Lacey Plache, "Competition in Two-Sided Markets: The Antitrust Economics of Payment Card Interchange Fees," 73 Antitrust Law Journal (2006); and Alan Frankel and Allan Shampine, "The Economic Effects of Interchange Fees," 73 Antitrust Law Journal (2006).

2. For example, Eric Emch and T. Scott Thompson, "Market Definition and Market Power in Payment Card Networks," 5 Review of Network Economics 1 (2006) use price per transaction, as do Renata Hesse and Joshua Soven, "Defining Relevant Product Markets in Electronic Payment Network Antitrust Cases," 73 Antitrust Law Journal (2006). The Reserve Bank of Australia has examined cardholder fees on a per account basis as well as on volume bases. Bank and network fees themselves are often set as a percent of payment volume, but may contain fixed elements as well. See, for example, RBA, Reform of Australia's Payment System, Issues for the 2007/08 Review, May 2007, ¶ 96 and RBA, Payments System Board Annual Report, 2009, Graph 10 and Table 5.

3. The RBA defines interchange fees as follows: "*In credit card networks, interchange fees are agreed jointly by financial institutions which are members of the card schemes, and are paid to the card issuer by the merchant's financial institution. These fees are seen as a means by which the merchant contributes to the issuer's costs.*" Reserve Bank of Australia / Australian Competition and Consumer Commission, Debit and Credit Card Schemes in Australia: A Study of Interchange Fees and Access, October 2000, p. iii.

4. Jean-Charles Rochet, "The Theory of Interchange Fees: A Synthesis of Recent Contributions," 2 Review of Network Economics 2 (2003) at 102 ("This assumption implies that an increase in the interchange fee a (which decreases issuers' costs) has a positive impact on buyers' demand for card payments (since p^B decreases) and also on issuers' margins. Therefore issuers' profit increases with a."). See also European Commission, Competition DG, Interim Report I: Payment Cards, Sector Inquiry Under Article 17 Regulation 1/2003 on Retail Banking 45 (April 12, 2006) at vi ("The empirical evidence [in Europe] shows that if the interchange fee increases by 1 Euro only 25 cents are passed on to consumers in lower fees."); and Howard Chang, David Evans and Daniel Garcia-Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," 4 Review of Network Economics (2005) at 334-335 ("As in other markets, the extent to which the loss in revenue from merchants will get passed on to cardholders depends on the degree of competition among card issuers. Given that card issuing in Australia is relatively concentrated we would not expect full pass through, at least in the short run. … Empirical studies tend to find less than 100 percent pass through more frequently than greater than 100 percent pass through; the greater-than-100-percent pass through rate appears to happen in the empirical tax incidence literature and the empirical effects are confounded with the sticky-price issue discussed below. Thus, we would expect less than 100 percent pass-through as an empirical matter."). Internal citations omitted.

opportunity to study the effects of a mandated change in interchange rates and other rules on the "two sided price".

This paper outlines the available data on changes in the "two sided price" for personal credit cards in Australia, defined as the sum of the net costs to merchants and cardholders, before and after the RBA's intervention.[5] The price elements considered are 1) bank fees to cardholders, 2) rewards programs to cardholders, 3) interest rates to cardholders, and 4) bank fees to merchants.[6] For each price element, this paper discusses the available data and estimates the effects of the RBA's intervention relative to predicted values absent the RBA's intervention. The paper then sums the estimated changes in each price element to estimate the effect of the RBA's intervention on the "two sided price".

2.   Data

This paper draws primarily on data published by the RBA. Most of the data series available from the RBA have series breaks. In the RBA's own analyses, the RBA sometimes uses the series as reported, but adjusts series prior to 2002 for a change in reporting.[7] Prior to 2002, direct entry and checks data were sourced from the Australian Payments Clearing Association ("APCA") while cards data were collected by the RBA as part of the Transactions Card Statistics Collection. In 2001, the RBA broadened the coverage of its collection to all retail payment instruments and all providers of retail payment services. This is the Retail Payments Statistics ("RPS") Collection, which began providing data from January 2002. For that series break, the RBA uses historical growth rates to estimate data in the previous collection (the APCA and RBA) at the levels of the current collection (the RPS).[8] This paper will do the same.

This paper also reports on results published by Chang et al. (2005) based on proprietary Visa data.[9] Those data are not publicly available and so are not subject to independent verification or analysis.

3.   Price Elements

Each of the four price elements is discussed below. For each element, the net effect of the intervention is estimated. Different sensitivity estimates are then discussed.

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5. The Reserve Bank of Australia's reforms to rules went into effect January 1, 2003. The new interchange fees went into effect October 31, 2003. For a more detailed chronology, see Reserve Bank of Australia, Payments System Board Annual Report 2003.
6. The price to merchants may also include chargebacks (instances where the merchant does not receive payment for a transaction). However, public data on the incidence of chargebacks are not available for Australia and the author is not aware of any significant changes in chargeback rules in Australia since the RBA's intervention.
7. See, for example, RBA, Payments System Board Annual Report, 2009, Graphs 5 and 6 presenting unadjusted payment card series starting in 2004. The author understands that any series breaks in these graphs are considered small relative to the 2002 break.
8. See, for example, RBA, Payments System Board Annual Report, 2009, Graphs 3 and 4.
9. Howard Chang, David Evans and Daniel Garcia-Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," 4 Review of Network Economics (2005).

3.1 Bank Fees to Cardholders

The first price element considered is bank fees to cardholders. RBA Series F6 reports on domestic bank fee income from households from credit cards. Those fees "comprise mainly annual fees, but also include late payment, over-limit, cash advance and foreign-currency conversion fees."[10] The data "are collected from 18 banks operating in Australia, covering over 90 per cent of total banking sector assets. … All fees are net of rebates and other concessions granted." The data are reported on an annual basis.

Cardholder Fees[11]

1997	$134,794,186
1998	$169,029,043
1999	$217,337,113
2000	$290,779,895
2001	$343,072,290
2002	$428,742,085
2003	$599,846,518
2004	$761,482,671
2005	$898,658,116
2006	$1,089,215,083
2007	$1,198,574,321
2008	$1,332,297,624

These fees cover fees for all household credit cards, including bank-issued American Express cards. Commercial credit card and scheme debit card fees and American Express and Diners Club fees (except for bank-issued cards) are not included.

As discussed above, there is no agreement in the literature as to how the price to cardholders should be measured, i.e., what cardholder fees should be divided by.[12] The RPS data reported by the RBA in their "additional credit card statistics" include personal credit card purchase transactions, transaction value and number of accounts defined in a relatively consistent

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10. RBA, Notes to Tables.
11. There is a break in the fee survey data in 1998 owing to mergers and acquisition activity, which broadened the coverage of the survey. However, the RBA estimates that the greater coverage increased total bank fees in 1998 by less than 5%.
12. A separate question is whether it is appropriate to look at all fees. As a practical matter, the fee data are not broken out by type of fee. As a matter of theory, it has been suggested that issuers may adjust to changes in interchange fees on any of the margins available, whether the fees are transaction specific or otherwise. For example, the increase in the level and frequency of annual fees in Australia is often attributed to the RBA's intervention. Similarly, recent increases in a broad range of cardholder fees in the U.S. are often attributed to new restrictions on interest rates and on the ability to change terms. These examples are consistent with changes in one area leading to price changes in other areas of the customer relationship.

fashion with the fee data: bank-issued American Express cards are included, while commercial cards and non-bank-issued cards are excluded. However, the RPS data cover a larger proportion of accounts than do the bank fee survey data, as not all credit card accounts are issued through banks. In 2003, bank fee survey institutions covered around 91% of accounts (consistent with few non-bank-issued credit cards), but currently account for around 82% of the personal credit card accounts covered in the RPS. Other data series available have similar differences in coverage and have the additional problem of not including consistently defined groups of cards or institutions. Calculations of card fees per purchase, purchase value or account using these data thus appear to be the most accurate calculations possible using publicly available data.

Following the RBA's practice, the pre-2002 figures for number of purchases, value of purchases and number of accounts are rescaled using the pre-2002 growth rates and assuming that the growth rate for 2001-2002 is equal to the average of the growth rates in 2000-2001 and 2002-2003. This change is done to account for the series break in reporting sources, as discussed above.

Household Credit Card Statistics

Year	Number of Purchases	Value of Purchases	Number of Accounts
1995	218,824,157	$20,043,934,513	6,199,768
1996	251,284,297	$23,428,051,223	6,590,561
1997	300,976,983	$28,961,539,358	7,040,244
1998	391,527,618	$38,406,513,742	7,450,642
1999	515,779,460	$51,692,917,906	7,867,702
2000	638,127,483	$66,607,161,994	8,441,830
2001	745,372,607	$80,873,383,734	8,821,672
2002	843,352,000	$94,961,000,000	9,164,250
2003	923,334,000	$107,705,000,000	9,463,667
2004	1,006,481,000	$120,572,000,000	10,093,833
2005	1,062,878,000	$130,076,000,000	10,854,250
2006	1,141,618,000	$143,888,000,000	11,720,917
2007	1,214,317,000	$157,746,000,000	12,327,833
2008	1,272,526,000	$167,405,000,000	12,822,667
2009	1,338,026,000	$175,707,000,000	13,143,250

Cardholder fees are then divided by each of these potential divisors. The results are given below.

Cardholder Fees

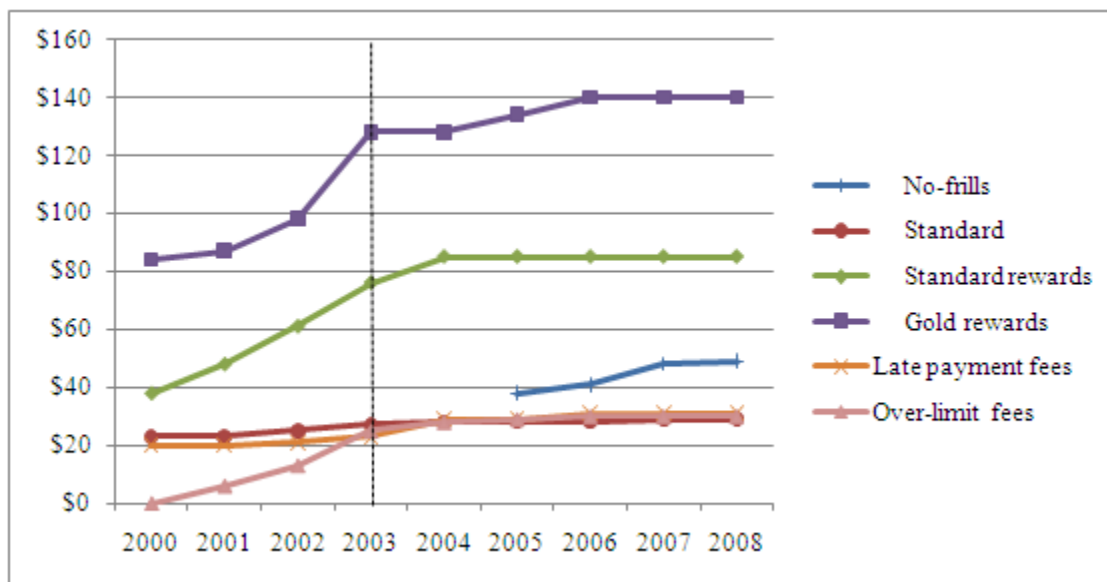| Year	Per Purchase	% of Purchase Value	Per Account
1997	$0.45	0.47%	$19.15
1998	$0.43	0.44%	$22.69
1999	$0.42	0.42%	$27.62
2000	$0.46	0.44%	$34.45
2001	$0.46	0.42%	$38.89
2002	$0.51	0.45%	$46.78
2003	$0.65	0.56%	$63.38
2004	$0.76	0.63%	$75.44
2005	$0.85	0.69%	$82.79
2006	$0.95	0.76%	$92.93
2007	$0.99	0.76%	$97.23
2008	$1.05	0.80%	$103.90

While cardholder fees have clearly increased since the RBA's intervention in 2003, the relevant question is how different are they from where they would have been without the RBA's intervention. For example, account fees tripled between 1997 and 2002. Given such a strong trend, it is unreasonable to assume that all further increases after 2002 are due only to the RBA's intervention. On the other hand, cardholder fees as a percent of purchase value appear largely unchanged prior to the RBA's intervention.

Interpretation of these data may be aided by looking at how particular significant fees have changed. The RBA publishes survey data on annual fees by card type, late payment fees and over-limit fees. These data are available from 2000 to 2008. While these data cannot be used to determine overall trends because they do not include information on the mix of cards and fees, they are useful for looking at trends within type of card.

Cardholder Fees by Type
2000-2008

Category	Year								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Annual Fees									
No-frills						$38	$41	$48	$49
Standard	$23	$23	$25	$27	$28	$28	$28	$29	$29
Standard rewards	$38	$48	$61	$76	$85	$85	$85	$85	$85
Gold rewards	$84	$87	$98	$128	$128	$134	$140	$140	$140
Late payment fees	$20	$20	$21	$23	$29	$29	$31	$31	$31
Over-limit fees	$0	$6	$13	$25	$28	$29	$30	$30	$30

Sources: RBA, Banking Fees in Australia, May 2006 (Table 4) and May 2009 (Table 4).

There is a popular perception that the RBA's intervention has increased annual fees, but looking back over the 2000 to 2008 period, that is not so clear. For each card type, annual fees were growing prior to the intervention and continued to grow after the intervention until they reached a plateau. It is possible that gold rewards annual fees grew somewhat faster in 2003, but the level appears to return to trend the following year. The only series to show any significant increase in growth after the intervention is late payment fees, which was essentially flat prior to the intervention. It is possible that the level of the plateau was influenced by the RBA's intervention, but the fact that the intervention does not appear to have had any dramatic impact on the growth rates suggests otherwise.

The effects of the RBA's intervention on overall fee income may be estimated using regression analysis. Unfortunately, the results turn out to be sensitive to the specification. In particular, the results will vary significantly depending upon whether interaction terms are introduced. The results for four specifications are presented here. The first is a simple linear regression with a dummy variable for the RBA intervention (years 2003 – 2008). The second introduces an interaction term allowing both the constant and the slope to change after the intervention. The third is a simple quadratic regression with a dummy. The fourth is a quadratic with interaction terms for both the trend and trend squared variables. The tables also give the predicted effect of the intervention as of 2008 and the simple difference in the variable between 2008 and 2002.

Per Purchase

Trend	0.046	0.012	-0.023	-0.036
	(3.86)**	(2.04)	(1.85)	(2.64)*
RBA Intervention (2003-2008)	0.144	-0.294	0.144	-1.061
	(1.75)	(4.70)**	(3.98)**	(6.16)**
Trend x RBA Intervention		0.067		0.269
		(7.93)**		(6.84)**
Trend Squared			0.005	0.007
			(6.21)**	(3.61)*
Trend Squared x RBA Intervention				(0.015)
				(5.49)**
Constant	0.294	0.412	0.454	0.477
	(5.79)**	(17.60)**	(13.32)**	(22.59)**
Observations	12	12	12	12
R-squared	0.93	0.99	0.99	1
Estimated Impact of RBA Intervention	**$0.144**	**$0.510**	**$0.144**	**$0.007**
Difference Between 2002 and 2008	**$0.540**			

Percent of Purchase Value

Trend	0.000217	-0.00004	-0.000303	-0.000415
	(2.34)*	(0.75)	(2.87)*	(2.65)*
RBA Intervention (2003-2008)	0.001297	-0.002046	0.001297	-0.008628
	(2.03)	(3.70)**	(4.15)**	(4.42)**
Trend x RBA Intervention		0.000514		0.002212
		(6.84)**		(4.97)**
Trend Squared			0.00004	0.000054
			(5.46)**	(2.45)*
Trend Squared x RBA Intervention				-0.000123
				(3.98)**
Constant	0.00364	0.00454	0.004854	0.00504
	(9.23)**	(21.94)**	(16.51)**	(21.08)**
Observations	12	12	12	12
R-squared	0.89	0.98	0.98	1
Estimated Impact of RBA Intervention	**0.13%**	**0.41%**	**0.13%**	**0.02%**
Difference Between 2002 and 2008	**0.35%**			

Per Account

Trend	6.738429	5.530857	4.39411	3.057109
	(13.31)**	(12.01)**	(5.16)**	(2.46)*
RBA Intervention (2003-2008)	13.917764	-1.780667	13.917764	-66.13435
	(3.98)**	(0.37)	(5.52)**	(4.27)**
Trend x RBA Intervention		2.415143		18.171926
		(3.71)**		(5.14)**
Trend Squared			0.180332	0.353393
			(3.05)*	(2.03)
Trend Squared x RBA Intervention				-1.0525
				(4.28)**
Constant	8.012167	12.238667	13.482243	15.536998
	(3.72)**	(6.83)**	(5.68)**	(8.18)**
Observations	12	12	12	12
R-squared	0.99	1	1	1
Estimated Impact of RBA Intervention	**$13.92**	**$27.20**	**$13.92**	**$0.37**
Difference Between 2002 and 2008	**$57.12**			

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

It is not clear which specification is appropriate to use as the base case. The most extensive specification also generally has the most statistically significant coefficients, but using five explanatory variables on twelve observations may be asking more of the data than it can support. Since the linear and quadratic regressions produce the same estimates for the effects of the RBA intervention, and because those specifications use relatively few explanatory variables, their estimates will be used for the base case.

Two other approaches have been presented in the literature. The first approach follows CRA International (2008): one may simply compare the 2002 and 2008 figures and assume the entire difference is due to the RBA's intervention.[13] This approach will tend to significantly overstate the impact of the RBA's intervention on fees for at least two reasons. First, it ignores any pre-existing trends such as the clear upwards trend in per account fees. While such an assumption may be reasonable in the absence of data prior to the intervention, that is not the case here. Second, it assumes that all changes in 2003 are due to the RBA's intervention. If 2003 were used as a base year rather than 2002, the results would be significantly smaller.

The second approach comes from Chang et al. (2005), who use proprietary Visa data to estimate changes in fee income as a result of the RBA's intervention ranging from $3.08 (if intervention effects start in 2003) to $4.11 (if intervention effects start in 2004) per card per quarter.[14] For sensitivity analysis, the average of these two figures is used: $14.38 per account per year. That amount implies changes of $0.145 per purchase and .110% of purchase value. These estimates are similar to the base case estimates obtained here.

For sensitivity analysis, the highest and lowest alternative estimates will be presented, regardless of the source (i.e., no particular alternative methodology will be used, but individual estimates will be taken based on which methodologies produce the highest and lowest estimates).

3.2   Rewards Programs to Cardholders

The Reserve Bank of Australia reports, on an annual basis, the "benefit" of credit card rewards programs to cardholders at the four largest banks as a proportion of spending based on a survey of nominal card rewards listed on bank web sites. The Reserve Bank of Australia data begin in 2003.

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13. Robert Stillman, William Bishop, Kyla Malcolm, Nicole Hildebrandt, "Regulatory intervention in the payment card industry by the Reserve Bank of Australia," CRA International, 28 April 2008, pp. 14-15.
14. Howard Chang, David Evans and Daniel Garcia-Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," 4 Review of Network Economics (2005), pp. 356-357.

Listed Benefit to Cardholder

Date	% of Spending
2003	0.81%
2004	0.69%
2005	0.66%
2006	0.63%
2007	0.61%
2008	0.60%
2009	0.59%

Source: RBA, Payments System Board Annnual Report 2009, p. 14.

Changes in list reward rates can be problematic when attempting to determine price changes because changes in list reward rates do not necessarily correspond to changes in rewards received by cardholders. The industry term for the difference between list rates for rewards and rewards paid out is "breakage." Breakage is significant in the industry and may change significantly over time. Thus, list rates may fall even as effective rates increase. For example, in the United States, Discover and Capital One differentiated their rewards cards by offering simple terms – 1% cash back, automatically awarded. As a result, the list rewards rate for simple cash back cards was often lower than for competing cards, but the effective rate was higher, as there was substantially less breakage. These offerings were accompanied by advertising campaigns ridiculing other cards with higher nominal rewards which, in practice, were difficult to achieve. Generally, breakage appears to have been falling in recent years as issuers compete to offer simpler rewards plans.

This distinction is particularly relevant given the methodology used to obtain the RBA's estimates. The RBA survey determines the dollar spending required to obtain a $100 shopping voucher and then divides that dollar spending by $100 to obtain the listed rewards rate. However, the terms of such offers have changed significantly over the years. For example, in the United States, points accumulated towards such rewards were often awarded in large increments, with expiration dates for excess points or unredeemed points. In recent years, it has become easier to redeem such rewards and points expiration has become less common. Again, this is an example where list rates may fall while effective rates rise (or, at least, do not fall as much), and that changes in other terms may be relevant to consumers' perception of list rates.

The fact that banks compete using list rates indicates that banks believe those rates have some effect on consumer behaviour. However, the fact that competition has resulted in rewards becoming simpler and easier to redeem suggests that consumers are aware of breakage and discount rewards appropriately (i.e., the success of simple cards with modest rewards over cards with high nominal rates that are difficult to achieve demonstrates that at least some consumers can and do discount rewards based on breakage). For purposes of calculating a "two sided price"

here, the most relevant calculation is assumed to be dollars in less dollars out. For that purpose, only rewards actually paid are relevant. The effective rewards will thus be used for the base case.

This question may also be framed as defining a "quality adjusted" price. Anecdotally, the worth of rewards points to consumers appears to have declined significantly even though the dollar cost for the same reward may have increased. In particular, airline miles have been devalued repeatedly by most carriers, increasing the number of miles required to obtain a particular upgrade or flight and decreasing the number of flights and upgrades available. Westpac, for instance, uses airline miles for all of its reward credit cards – although in some instances those points may also be used to obtain merchandise. The price of miles may also have increased to the issuers at the same time, resulting in fewer miles being awarded for the same dollar expenditure by the issuer. On the other hand, the number and type of rewards programs have increased.[15] Such concerns are more relevant for list prices than for effective rewards, however.

With respect to estimating changes in rewards, there are very few data points available on rewards actually paid. The RBA estimated in 2000 that actual average reward costs were 0.46% of purchase value (with a range of 0.30% to 0.62%) and $0.46 per transaction.[16] The 2007 cost study estimated actual average reward costs of 0.49% of purchase value.[17] Using the RPS data, the average purchase size for 2007 was $129.91, so the actual average reward cost per transaction would be $129.91 x 0.49% = $0.64. These figures may also be expressed on a per account basis: $34.77 and $62.70 for 2000 and 2007, respectively.[18] As a percent of purchase value, rewards have remained relatively unchanged (i.e., increased by 3 basis points). Rewards paid per purchase have increased by $0.18 and per account by $27.93. Given only 2000 and 2007 data points, the entire change is assumed to be due to the RBA's intervention. However, with only two data points, one cannot determine whether there was a trend towards higher or lower effective rewards prior to the RBA's intervention.

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15. See, for example, Robert Stillman, William Bishop, Kyla Malcolm, Nicole Hildebrandt, "Regulatory intervention in the payment card industry by the Reserve Bank of Australia," CRA International, 28 April 2008, p. 17, discussing increases in rewards point costs to banks; Robin Arnfield, "A shakeup in Australia's card market," Credit Card Management, March 2003, p. 22, discussing devaluation of Qantas points; and http://www.westpac.com.au/personal-banking/credit-cards/all/.
16. The average transaction was roughly $100. Reserve Bank of Australia / Australian Competition and Consumer Commission, Debit and Credit Card Schemes in Australia: A Study of Interchange Fees and Access, October 2000, pp. 43-44.
17. C. Schwartz, J. Fabo, O. Bailey and L. Carter, "Payment Costs in Australia," in Payments System Review Conference, Proceedings of a Conference, Reserve Bank of Australia and Centre for Business and Public Policy at the Melbourne Business School, Sydney, November 29, 2007, pp. 88-138.
18. These figures assume that the price effect on cardholders is equal to the actual cost for the reward. For further discussion of the appropriate treatment of reward costs and prices, see Daniel Garcia-Swartz, Robert Hahn and Anne Layne-Farrar, "The Move Toward a Cashless Society: A Closer Look at Payment Instrument Economics," 5 Review of Network Economics 2 (2006) and "Further Thoughts on the Cashless Society: A Reply to Dr. Shampine," 6 Review of Network Economics 4 (2007); and Allan Shampine, "Another Look at Payment Instrument Economics," 6 Review of Network Economics 4 (2007) and "The Evaluation of Social Welfare for Payment Methods," 2009 Oxford Business and Economics Conference Proceedings.

Alternatively, one can estimate a change based on list rates. The RBA's 2007 Use Study found that 83 per cent of credit card transactions were made by a person with at least one credit card with a loyalty program attached to it. Assuming that all purchases made by a person with a rewards card are made on that card (i.e., that they make no purchases on any of their other cards), that the purchase value per transaction is the same whether a rewards card or a non-rewards card are used, and that the fraction of rewards card usage has remained unchanged over time[19] then the aggregate list rewards in 2003 would be 0.81% x 83% = 0.67%, and in 2008 would be 0.60% x 83% = 0.50%, for a net reduction of 17 basis points per dollar of purchase value. These figures may be expressed on a per transaction and per account basis as well, yielding declines of $0.13 per transaction and $11.50 per account. Again, lacking data on list reward rates prior to 2003 which might establish a pre-existing trend, the entire change is assumed to be due to the RBA intervention.

3.3   Interest Rates to Cardholders

The Reserve Bank of Australia reports that its intervention helped in the development of low interest credit card offerings.

> In addition to their effect on price signals to cardholders, the reforms have also had an impact on the type of credit card products offered in the market place. Prior to the reforms, competition amongst issuers largely focused on rewards programs, with issuers using these programs to attract spending on their cards. Now that issuers are receiving lower interchange revenue, cardholders who do not pay interest, but redeem rewards points, have become less profitable, notwithstanding the changes to the reward programs. This has encouraged some card issuers to focus more on attracting customers who use their credit cards to borrow, by offering them lower interest rates. While the development of the 'low-rate' market would have occurred in the absence of the reforms, the lower interchange revenue prompted issuers to reassess their product offerings.[20]

According to Cannex, a financial services research group, such low interest credit cards did not exist prior to the RBA's intervention.[21]

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19. All three of these assumptions are likely incorrect but may be at least partially offsetting. The fact that a person has more than one credit card suggests that at least some of them use multiple cards or choose to use a card other than a rewards card. Spending may differ between rewards card users and non-rewards card users. Finally, rewards card usage may have changed over time. Worldwide, rewards cards have become more prevalent. However, the introduction of low-interest rate cards in Australia which do not have rewards may have decreased the proportion of rewards cards. These caveats may impact the calculation in different directions, depending on their relative magnitudes.
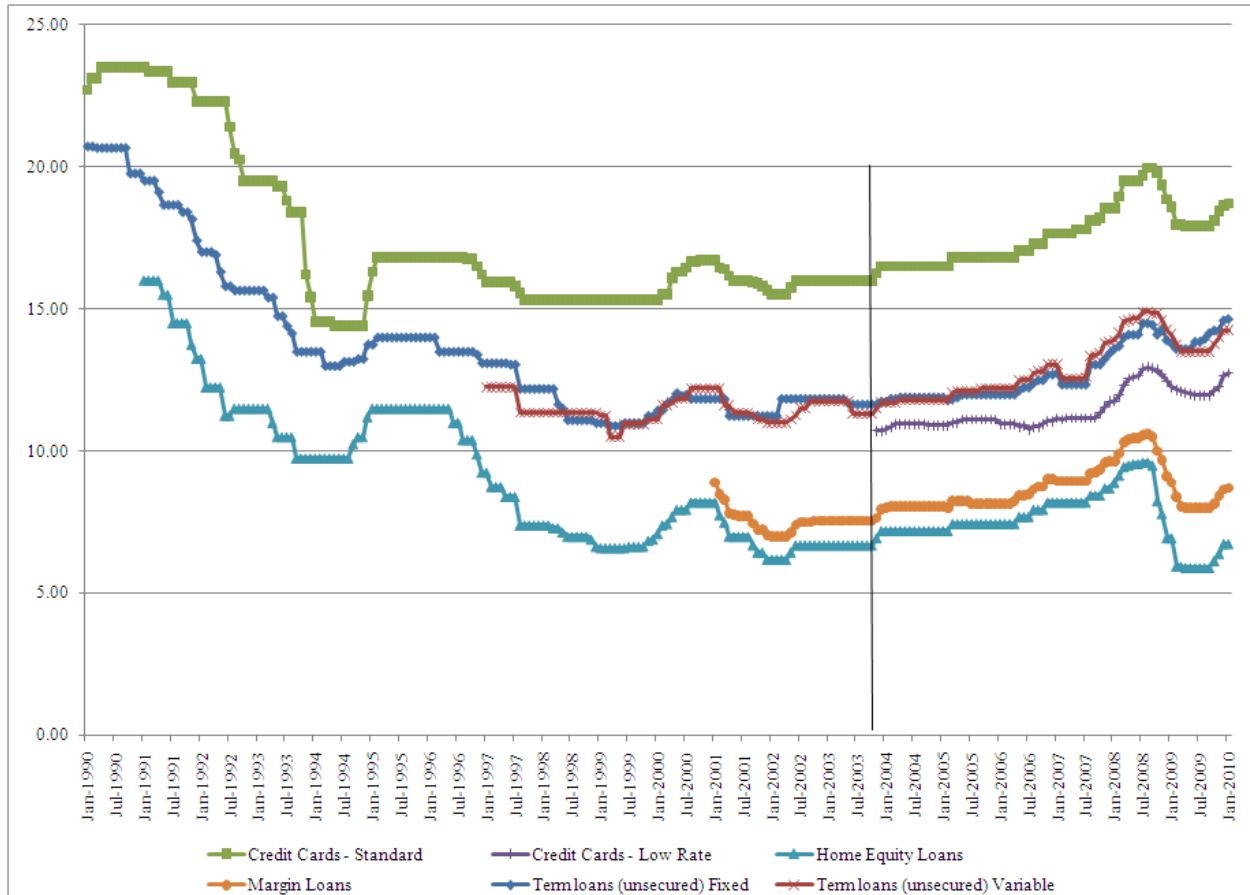20. RBA, Payments System Board Annual Report 2006, p. 13.
21. "Competition forces down rates," Herald Sun, September 25, 2006 ("As little as three years ago [2003] there were no credit cards charging less than 13 per cent interest. There are now about a dozen with an interest rate below 10 percent. Mr. Wright [a Cannex financial analyst] said recent changes to the credit card market, the devaluing of reward programs, and higher media profile of Australia's record credit card debt levels could have contributed to the rise in the number of no-frills cards.").

The effects of the introduction of low interest rate cards on the price to cardholders involves estimating first the effect of low interest rate cards on the average interest rate paid by cardholders. Direct data are not available on the proportion of low interest rate cards, but, as noted above, the 2007 Use Study found that 83% of credit card transactions were made by people with at least one credit card with a loyalty program attached. Weighted to be representative of the Australian population, the proportion of total value of credit card spending in the survey by a person without a loyalty program attached to any of their credit cards is roughly 18% (although this fraction will understate the relevant total as some consumers will have both low interest rate cards and loyalty cards). Low interest rate cards do not typically have loyalty programs attached and so constitute some fraction of this 18%, with standard (non-rewards) credit cards accounting for the remainder. Presumably revolvers favour low interest rate cards and transactors favour standard cards (which, as shown above, have lower annual rates but higher interest rates). Assume, then, that half of this volume (9%) of purchase value is on low interest rate cards.

In 2008, the average interest rates on standard and low interest cards were 19.43% and 12.55%, respectively. If 9% of purchases that incur interest are on low interest cards, the average interest rate paid will be 91% x 19.43% + 9% x 12.55% = 18.81%. (For sensitivity, the weighted average interest rate if 4.5%, or ¼, of such purchases is assumed to be low interest cards is 19.12%, and if 13.5%, or ¾, is assumed the average interest rate paid is 18.50%).

The next question is what would the interest rate on standard credit cards have been absent the introduction of low interest rate cards. The Reserve Bank of Australia's F5 series reports interest rates charged by banks for personal loans, both revolving credit – credit cards (standard and low interest), home equity loans, and margin loans – and term loans (fixed and variable). These rates are reported monthly.

To estimate what the interest rate on standard cards would have been in the absence of low interest cards, regression analysis is used with a dummy for the period when low interest cards exist and using the other personal loan interest data provided by the RBA as controls. The low interest cards data begins in November 2003 and so is coincident with the RBA intervention.

VARIABLES	Standard Card Interest Rate
Low Rate Cards Dummy	0.1288***
	[0.035]
Home Equity Loans	-0.2690***
	[0.072]
Personal Margin Loans	0.9352***
	[0.129]
Personal Term Loans - Variable	0.2518***
	[0.089]
Personal Term Loans - Fixed	0.2760***
	[0.065]
Constant	4.6330***
	[0.241]
Observations	109
R-squared	0.988

Data from January 2001 –
February 2010
Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Based on the regression results, the 2008 standard card interest rate would have been .1288% lower in the absence of low interest rate cards. The net effect of the introduction of low interest rate cards is then 19.43% - .1288% - 18.81% = .4904%. (If 13.5% of total purchase value is on low interest rate cards, then this effect would be .80%, and if 4.5% is on low interest rate cards, the effect would be .18%).

The effect of interest rates on cardholder prices is significant. On average in 2008, 72% of total balances, or $31.460 billion, were accruing interest every month.[22] A .4904% reduction in the annual interest on those balances would save cardholders $31.460 x .004904 = $154 million. That translates into savings of $0.12 per purchase, 9.2 basis points of purchase value, and $12.03 per account. (If 13.5% of total purchase value is on low interest rate cards, these savings would be $0.20 per purchase, 15 basis points of purchase value and $19.63 per account, and if 4.5% is on low interest rate cards, the savings would be $0.04 per purchase, 3.4 basis points of purchase value and $4.44 per account.)

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22. RBA, Additional Credit Card Statistics and Series C1.

If the introduction of low interest credit cards is attributed entirely to the RBA's intervention, these would be the relevant amounts to use. Alternatively, if low interest credit cards would have been introduced regardless, and if their prevalence and interest rates were not affected by the intervention, then the net effect of the intervention, as measured by differences in interest rates as of 2008, would be zero. For the base case, it is assumed that low interest cards would have developed in any case but that the intervention has caused them to be more prevalent than they otherwise would have been (i.e., the effects of 4.5% of total purchase volume being on low interest rate cards are assumed to be due to the RBA intervention).

Alternatively, Chang et al. (2005) used proprietary Visa data to examine real finance charges per card before and after the RBA's intervention. They concluded that real finance charges increased by $1.14 per quarter after the RBA's intervention. Assuming that figure holds constant for 2008, that would yield increases of $4.56 per card per year ($0.05 per transaction and .03% of purchase value).[23] However, no effort was made to control for other changes in the lending environment. As shown by the RBA's F5 series (graphed above), all personal loan interest rates increased during the post-intervention period examined by Chang et al., which suggests that some or all of the increase in charges documented by Chang et al. is likely associated with the general increase rather than with the RBA's intervention. Nonetheless, the Chang et al. estimates are used for sensitivity analysis.

3.4   Bank Fees Charged to Merchants

Bank fees charged to merchants (merchant service fees) as a percentage of credit card purchase volume are reported by the Reserve Bank of Australia in Series C3 on a quarterly basis. The series begins in 2003. The unweighted average annual percentage fees are reported below.[24]

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23. Howard Chang, David Evans and Daniel Garcia-Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," 4 Review of Network Economics (2005), pp. 357-358.
24. These data include fees on scheme debit cards. It appears that most scheme debit transactions currently attract the same blended merchant discount rate as credit transactions, however. The RBA also reports on "other" fees, including joining fees, annual and monthly fees and terminal fees. These fees grew from 4 basis points to 6 basis points between 2003 and 2008 for MasterCard and Visa, and fell from 3 basis points to 1 basis point for American Express. Their inclusion or exclusion does not materially affect the analysis.

Merchant Service Fees – Visa, MasterCard and BankCard

Year	Merchant Service Fees
1Q - 3Q 2003	1.40%
4Q 2003	1.14%
2004	0.99%
2005	0.92%
2006	0.88%
2007	0.83%
2008	0.80%
2009	0.81%

According to the RBA, interchange list rates had not changed for years prior to the intervention.[25] However, data on effective interchange rates are not available prior to the RBA's intervention. The RBA reported a figure for average merchant service fees around 2000 of 1.78% in its joint study.[26] If comparable, this figure suggests that merchant service fees declined sharply between 2000 and 2003. The merchant service fee may be divided into two parts – the interchange fee and the acquirer fee. While interchange appears to have been relatively unchanged outside of the RBA's intervention, the 2000 figure suggests that acquirer fees have been falling both before and after intervention. Assuming that the prior trend in falling acquirer fees would have continued, the change in merchant service fee attributable to the RBA's intervention would be the reduction in effective interchange of 45 basis points.[27] This figure will be used as the base case.

Several banks have also begun issuing American Express cards since the RBA's intervention, and American Express' share of purchase volume has increased slightly. If these changes are assumed to be due to the RBA's intervention, then an offsetting increase in fees may be estimated due to a shift of volume from MasterCard and Visa to American Express. The RBA publishes data on the shares of purchase volume for MasterCard and Visa as compared to American Express and Diners Club. There does not appear to be a clear pre-existing trend in the data. The average share of American Express and Diners Club in 2008 was 15.8%, which was 0.8 percentage points higher than the average share in 2002. This estimate is consistent with the

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25. For example, Michael Katz, Commissioned Report, August 2001, ¶ 113 indicates that Visa last updated its interchange fee schedule in Australia in 1993.
26. Reserve Bank of Australia / Australian Competition and Consumer Commission, Debit and Credit Card Schemes in Australia: A Study of Interchange Fees and Access, October 2000, p. 78.
27. A general difficulty with using data immediately prior to the RBA's intervention is that the regulatory process itself may have affected the results. In particular, increased scrutiny of merchant service fees prior to the intervention may have resulted in lower acquirer fees. Similarly, the increased cardholder fees in 2003 may have occurred at least in part prior to and in anticipation of the November 2003 intervention.

best-fitting regression analysis (quadratic), which returns an estimate of 0.85, which will be used for the sensitivity analysis.[28]

American Express Fraction of Value Purchased

Trend	-0.013105	-0.01575	0.048254	0.089441
	(3.59)**	(0.69)	(2.87)**	(1.05)
RBA Intervention	1.777058	1.742458	0.845084	-0.53637
	(7.39)**	(4.56)**	(2.51)*	(0.75)
Trend x RBA Intervention		0.002719		0.001691
		(0.12)		(0.02)
Trend Squared			-0.00053	-0.00457
			(3.73)**	(1.27)
Trend Squared x RBA Intervention				0.003698
				(1.03)
Constant	15.01889	15.04935	14.40408	14.62857
	(99.62)**	(49.94)**	(66.31)**	(34.46)**
Observations	96	96	96	96
R-squared	0.4	0.4	0.48	0.54

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1%

The average American Express total merchant fee in 2008 was 2.09%, which was 1.29% higher than the average MasterCard and Visa merchant fee over the same period. For sensitivity purposes, an offsetting effect may then be estimated as 1.29% x (0.85% / 84.2%) x 2008 purchase volume ($167.4 billion) = $21.8 million, which is $0.017 per purchase, 0.013% of purchase value and $1.70 per account.

The RBA has noted, however, that requiring publication of interchange fees, therefore allowing merchants to compare acquirer prices directly, may have imposed pressure on acquirer margins. Furthermore, the RBA's access reforms may have allowed additional entry that further depressed acquirer margins, and any prior trend may have been due to increased attention paid to merchant service fees as a result of the regulatory investigation.[29] These pressures would result in acquirer prices being lower than they otherwise would have been absent the RBA's intervention. For sensitivity analysis, one may look at merchant service fees and assume that the

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28. The RBA's reforms also appear to have decreased American Express' merchant service fees. However, this paper focuses on the "two sided price" of MasterCard and Visa transactions only.
29. RBA, Reform of Australia's Payments System, Preliminary Conclusions of the 2007/08 Review, April 2008, p. 22.

entire decline after 1-3Q 2003 is due to the RBA's intervention (i.e., the intervention reduced the interchange fee directly and the acquirer fee indirectly). That reduction would be 60 basis points as of 2008.

4. Conclusions

The sums of the estimated changes in price for each category (i.e., the estimated net change in the "two sided price") are presented below.

Change in Price Elements
Associated With RBA Intervention
(Positive Indicates Price Increase)

Category	Per Purchase	% of Purchase Value	Per Account
Cardholder Fees			
Low	$0.01	0.02%	$0.37
Base	$0.14	0.13%	$13.92
High	$0.54	0.41%	$57.12
Rewards			
Effective (Low / Base)	-$0.18	-0.03%	-$27.93
List (High)	$0.13	0.17%	$11.50
Interest Rates			
Low	-$0.20	-0.15%	-$19.63
Base	-$0.04	-0.03%	-$4.44
High	$0.05	0.03%	$4.56
Merchant Fees			
Low	-$0.79	-0.60%	-$78.33
Base	-$0.59	-0.45%	-$58.75
High	-$0.57	-0.44%	-$57.05
Net Change in "Two Sided Price"			
Low	**-$0.85**	**-0.76%**	**-$86.09**
Base	**-$0.67**	**-0.38%**	**-$77.19**
High	**$0.14**	**0.18%**	**$16.13**

The low, base and high cases have each been discussed. The base case is the one regarded by the author as the most plausible. The low and high cases, as well as other estimates given in the text, are provided as sensitivity analysis.

To put the per purchase figures into perspective, the average purchase size for 2008 was $131.55. The % of purchase value figures are independent of scale, and the per account (per year) figures are readily interpreted.

The net effect of the RBA's interventions, which include the 45 basis point reduction in interchange as well as the elimination of the schemes' no surcharging rules, requiring entry for non-bank entities and increasing transparency of pricing, appears to have been a 38 basis point reduction in the "two sided" price measured as a percent of purchase value, a $0.67 reduction per purchase, and a $77.19 reduction per account per year. Given the uncertainty associated with the data, however, the results should be viewed as suggestive with a focus more on the range and the methodology than on the point estimates.

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