

**AN ASSESSMENT OF THE RESERVE BANK OF AUSTRALIA'S INTERCHANGE FEE
REGULATION**

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I. Introduction

In recent years interchange fees have come under increasing scrutiny by regulators and competition authorities around the world, including the European Commission, the Office of Fair Trading in the United Kingdom, and the Reserve Bank of Australia (RBA).¹ The Australian experience is the focus of this paper. It is the most significant interchange fee regulation to date.² And the regulatory scheme has resulted in a substantial effect on interchange fees, cutting them almost in half, from about 0.95 percent to around 0.55 percent. This experience provides a natural experiment for assessing the effects of regulatory intervention in payment systems.

We consider two main issues. First, we consider the extent to which the regulation has, to date, addressed the concerns expressed by the RBA as a basis for intervention. The rationale for regulation was that, even though credit cards are a relatively expensive payment instrument for society, consumers were not facing the true social cost of credit cards when making payment instrument decisions. Therefore, credit cards were being overused. The RBA stated that “[n]ormal market mechanisms are not working effectively in the retail payments system in Australia and, overall, the community is paying a higher cost for retail payments than is necessary.”³

The RBA believed that the interchange fees set by the card associations led to “a misleading signal about the cost to the community of different payment instruments” and that “the Australian community is paying a higher cost for its retail payments system than it

¹ Weiner and Wright 2005 provide a survey. For discussions of the economic literature on interchange fees, see Katz 2001, Chakravorti 2003, Rochet 2003, Rochet and Tirole 2003, Schmalensee 2002 and 2003, and Evans and Schmalensee 2005.

² The agreement between Visa and the European Commission on interchange fees applies only to multi-lateral interchange fees across countries in Europe and therefore only effects transactions in which a cardholder in one EU country uses her card in another.

³ Reserve Bank of Australia 2002, p. 2.

would if the normal market mechanisms were working effectively.”⁴ That is, the RBA believed that its regulatory scheme would improve the price signals for payment instruments and limit the use of what it viewed as the more expensive credit card system. In Section II, we summarize the background leading up to the RBA regulatory scheme. Then, in Section III, we use RBA data to examine the extent to which usage of credit cards has been limited by the regulation.

The second issue we consider is distributional. Given the substantial decrease in the interchange fee, how are the different parties affected? The RBA believed that the beneficiaries would be merchants that accept credit cards and the community as whole, while the credit card association members and their cardholders would be made worse off.⁵ In Section IV, we consider the cardholder side. Using data on cardholder revenues from Visa Australia, we examine the extent to which decreases in the interchange fee have been passed on to cardholders. We explore in Section V what the RBA’s regulation has meant for merchants, the extent to which they have benefited from decreases in the merchant discount fee, and whether those decreases have been passed on to consumers. Section VI offers our assessments of the lessons from the Australian experience.

II. Background

The credit card industry in Australia grew quickly in the 1990s. Between December 1994 and December 1999, the total number of credit card accounts grew at an annual average compound rate of 5.9 percent, from about 6.6 million to about 8.8 million (1994 is the first year when account information is available). Between 1994 and 1999, real annual purchase volume per account grew at an average annual compound rate of 13.7 percent, from about AU\$4,344 to about AU\$8,257. Over the same time period, total real annual purchase volume grew at an average annual compound rate of 20 percent, from about AU\$28.7 billion to about AU\$73 billion.⁶

The Australian Payments System Board was established in 1998. In its early deliberations, the Board focused on payment system efficiency and noted that a useful

⁴ Reserve Bank of Australia 2002, pp. 9, 32. There is an extensive debate about whether regulation of interchange fees is desirable. For a discussion, see sources cited in footnote 1 above.

⁵ Reserve Bank of Australia 2002, pp. 22-23.

⁶ Reserve Bank of Australia 2005. Unless otherwise noted, all figures are in real 2004 Australian dollars.

starting point was to determine whether relative prices of payment instruments reflected relative social costs. Since data and analysis on these issues were scarce at the time, the Board undertook a comprehensive study of credit card, debit card, and ATM systems. This study, conducted jointly with the Australian Competition and Consumer Commission (ACCC), and thus called the “Joint Study,” was published in October 2000. The Joint Study presented a detailed description of the interchange fees that the various systems charged, collected data from issuers and acquirers on the costs of providing their services, analyzed payment system use and efficiency, and requested that participants in the various systems provide an explanation for their various interchange fees.⁷

According to the Joint Study, credit card interchange fees encouraged the provision of credit card services at negative prices to consumers. Therefore, the credit card network had been encouraged to grow at the expense of a less costly instrument, PIN debit cards.⁸ On the basis of these findings, the Board concluded that the efficiency of the payments system would be improved if relative prices were aligned with relative costs. In April 2001, the RBA designated the Bankcard, MasterCard, and Visa credit card systems as payment systems subject to its regulation.⁹

In December 2001, the RBA published a “Consultation Document,” outlining the need for regulation of the payment system. According to the Consultation Document, the pricing of credit card services was sending “consumers a quite misleading signal about the cost to the community of different payment instruments.”¹⁰ The Consultation Document proposed regulating the credit card schemes using “an objective, transparent and cost-based methodology for determining interchange fees.”¹¹

The Joint Study and the Consultation Document identified three aspects of credit card scheme rules that allegedly impeded the efficiency of the overall payments system—the collective setting of interchange fees, the “no surcharge” rule, and certain restrictions on entry to the schemes. These were the key issues addressed in the regulation that followed in

⁷ Reserve Bank of Australia 2004, pp. 1-5.

⁸ The debit cards the RBA views as less costly are the EFTPOS PIN debit cards, not the Visa debit cards that are also offered. MasterCard does not offer a debit card in Australia.

⁹ *ibid*, pp. 5-6.

¹⁰ Reserve Bank of Australia 2001, p. vi.

¹¹ *ibid*, p. 116.

2002 through 2004.¹² After designating the credit card schemes as payment systems under its regulation, the Bank undertook a process of consultation and analysis to determine whether the Bank's intervention would be in the public interest. The Bank published final standards regarding interchange fees and the no-surcharge rule in August 2002 and on the access regime in February 2004.¹³

In September 2002, MasterCard International and Visa International challenged the RBA's decision in the Federal Court on procedural and jurisdictional grounds. The Court rejected the challenge in September 2003, finding against MasterCard and Visa. The no-surcharge standard came into effect on January 1, 2003. The standard on interchange fees came into effect on July 1, 2003. The Bank required the credit card schemes to publish and put in force the new interchange fees by October 31, 2003. For all practical purposes, in November 2003 interchange fees declined from an average of around 0.95 percent to around 0.55 percent.¹⁴

Table 1 offers a timeline.

¹² Reserve Bank of Australia 2004, p. 7.

¹³ *ibid*, p. 7.

¹⁴ *ibid*, pp. 8-9.

Table 1. Timeline of RBA Investigation and Regulation

Date	Event
October 2000	Publication of the Joint Study
April 2001	Designation of Visa, MC, and Bankcard as payment systems subject to regulation
December 2001	Publication of the Consultation Document
August 2002	Publication of final standards regarding no-surcharge and interchange fees
September 2002	Visa and MC challenge standards in court
January 2003	No-surcharge standard comes into effect
July 2003	Interchange standard comes into effect
September 2003	Court rejects the Visa-MC challenge of the standards
October 2003	New interchange fees are implemented
February 2004	Publication of final standard on entry

Source: Reserve Bank of Australia and Australian Competition and Consumer Commission 2000, Reserve Bank of Australia 2001, and Reserve Bank of Australia 2004.

The timing of when the impact of the regulation has been or will be felt is important for assessing its market effects. Although regulated interchange fees did not come into effect until the end of October 2003, it is clear that there was anticipation that regulation was coming. That is not to say, however, that even if a bank in say January 2002 was certain that regulation would be implemented in October 2003, it would have changed its pricing or strategy in January 2002, since interchange fee levels for itself and its competitors were still at prior levels. Nor does it mean that a bank would wait until the actual date of the regulation to change its behavior. A bank would not offer a cardholder annual fees in say September 2003 based on pre-regulation interchange fee levels if it knew that the post-regulation levels would be in place two months later.

Our best estimate on timing is that there were at least some changes in bank behavior in early 2003 in anticipation of the regulatory intervention. The annual report for one of the major banks, ANZ, noted that in 2003 it had “[r]eshaped product set across the Australian

Cards Issuing portfolio to address the impact of the Reserve Bank interchange reforms.”¹⁵ There are a number of newspaper articles along the same lines in the period prior to October 2003.¹⁶ The *Sunday Telegraph* (Sydney), for example, reported in its September 21, 2003 edition that the five major banks had increased credit card fees by up to 50 percent in the past 12 months. The article goes on to quote a bank executive who expressed that the rise in fees had the goal of making up for the loss in interchange income that would happen after the implementation of the regulatory scheme.¹⁷ In our analyses below, we consider whether we see any effect of regulation starting in 2003 and, alternatively, starting in 2004.

III. Impact of RBA Regulation on Credit Card Usage

According to the RBA, changing the relative prices that consumers face for credit and debit was one of the main objectives of the regulatory scheme. In theory, this relative-price change would lead to a price structure more aligned with the relative social costs of the payment instruments. This would, as a consequence, reduce the influence of credit cards in the economy while at the same time encouraging the use of debit cards.¹⁸

In order to determine whether the regulatory scheme has achieved its objective, we studied official RBA data on the number of credit card accounts, the number of purchase transactions, and the purchase volume on credit cards.¹⁹

A. Overview

The first question we pose is: Has credit card use declined as a consequence of RBA regulation? The answer, thus far, seems to be “no.” The number of accounts was 4.7 percent

¹⁵ ANZ 2003, p. 31.

¹⁶ See, for example, McKinnon 2001, Hanna 2002, Brammall 2002 and 2003, Horan 2003, and Graeme 2003.

¹⁷ Horan 2003.

¹⁸ Reserve Bank of Australia 2004, pp. 5-6.

¹⁹ There was a small break in the credit card data series starting in January 2002, when some credit cards without interest free periods were reclassified, apparently as debit cards (the data series for debit cards also had a break in January 2002, with an increase in the number of cards and other statistics). For consistency, we have adjusted data prior to January 2002 by assuming the same proportion of cards that should have been removed as there were in January 2002. For the statistics involving the number of transactions and the volume of transactions, we have assumed that the cards removed were like the average debit card in terms of transactions and transaction volume. We also compared the change in transactions and transaction volume from December 2001 to January 2002 but could not find any discernable decline relative to changes over the same period in previous years. Making the adjustments increases the growth rates in the pre-regulatory period and is therefore conservative in terms of our conclusions that the regulation had no significant effect on credit card growth.

higher in 2003 than in 2002 and 6.0 percent higher in 2004 than in 2003.²⁰ The number of accounts per capita was 3.3 percent higher in 2003 than in 2002 and 4.8 percent higher in 2004 than in 2003.

The number of transactions also grew. The total number of transactions was 8.9 percent higher in 2003 than in 2002 and 8.7 percent higher in 2004 than in 2003. The number of transactions per capita was 7.4 percent higher in 2003 than in 2002 and 7.5 percent higher in 2004 than in 2003. The number of transactions per account was about 4.0 percent higher in 2003 than in 2002 and about 2.5 percent higher in 2004 than in 2003.

Purchase volume per account increased as well. Purchase volume per account was 4.9 percent higher in 2003 than in 2002 and 3.0 percent higher in 2004 than in 2003. Relative to consumption per capita, purchase volume per account was 4.7 percent higher in 2003 than in 2002 and 1.2 percent higher in 2004 relative to 2003. Overall, total purchase volume on credit cards increased by almost 10 percent in 2003 and by slightly more than 9 percent in 2004.

In sum, if the regulatory scheme attempted to generate a decline in the level of credit card activity, thus far they have failed—the number of transactions per account has increased, the amount spent on each account has gone up, and the number of accounts has grown as well. The growth of credit cards has exceeded population growth and consumption growth significantly.

One could ask: Have credit cards grown more slowly than they would have in a world without RBA regulation? In order to address this possibility we have to look at some of these trends in more detail. Table 2 summarizes the information we have on the annual growth rates of the relevant variables.

²⁰ Unless otherwise noted, all growth rates are in real terms.

Table 2. Annual Growth Rates of Indicators of Credit Card Use

	Accounts	Accounts per Capita	Purchase Transactions	Purchase Transactions per Capita	Purchase Transactions per Account	Real Purchase Volume	Real Purchase Volume per Capita	Real Purchase Volume per Account
1996	7.7	6.2	14.2	12.7	6.1	13.7	12.1	5.6
1997	5.6	4.1	19.7	17.9	13.3	23.3	21.5	16.7
1998	6.1	5.3	30.8	29.8	23.2	31.7	30.7	24.2
1999	5.9	4.8	32.5	31.1	25.1	33.0	31.6	25.6
2000	7.0	5.8	24.0	22.6	15.9	23.5	22.1	15.5
2001	2.5	1.3	16.9	15.5	14.0	16.4	15.0	13.5
2002	1.5	0.1	13.9	12.3	12.2	12.4	10.9	10.7
2003	4.7	3.3	8.9	7.4	4.0	9.9	8.3	4.9
2004	6.0	4.8	8.7	7.5	2.5	9.2	7.9	3.0

B. Number of accounts

The total number of credit card accounts grew at an average annual compound rate of about 6.5 percent between 1995 and 2000. Growth continued at a much slower pace in 2001 (2.6 percent) and 2002 (1.5 percent) but accelerated in 2003 (4.7 percent) and 2004 (6.0 percent).

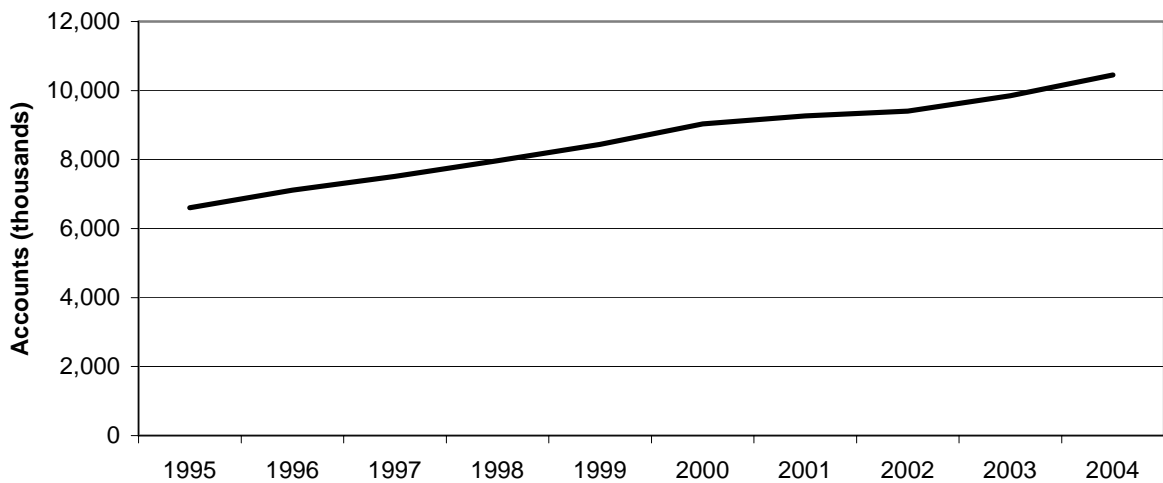


Figure 1. Credit Card Accounts

Similar trends are observable in terms of accounts per capita. Accounts per capita grew at a rate of 5.2 percent between 1995 and 2000. Growth slowed down in 2001 (1.3 percent) and 2002 (0.1 percent) but picked up the pace in 2003 (3.3 percent) and 2004 (4.8 percent). If any trend was associated with the RBA regulation, therefore, it was one of acceleration in the growth of the number of credit card accounts.

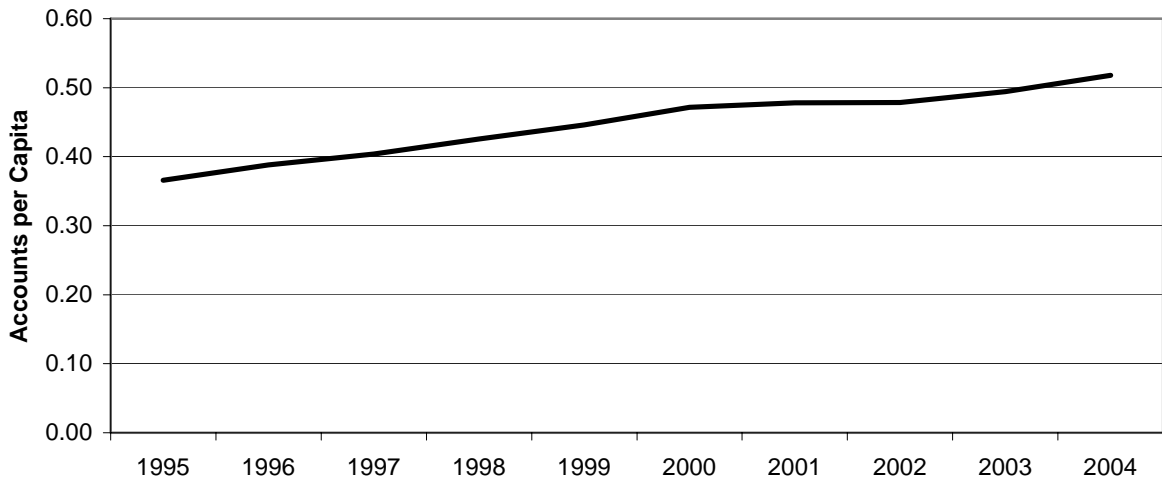


Figure 2. Credit Card Accounts per Capita

C. Number of transactions

The total number of purchase transactions²¹ grew at a very fast pace between 1995 and 1999. In fact, the number of transactions grew at an increasing pace from a growth rate of 14.2 percent between 1995 and 1996 to 32.5 percent between 1998 and 1999. Growth in the number of transactions slowed down to 24.0 percent in 2000, 16.9 percent in 2001, 13.9 percent in 2002, and then 8.9 percent in 2003 and 8.7 percent in 2004. Although the growth in the number of transactions was much slower in 2003 and 2004 than in the late 1990s, it seems inappropriate to attribute this slowdown in the growth rate to the effects of regulation—the slowdown had already started in the year 2000, when regulation was many years away from implementation. If anything, the slowdown seems to have been halted after the implementation of the RBA regulatory scheme.

²¹ We are focusing on purchases here as opposed to cash advances.

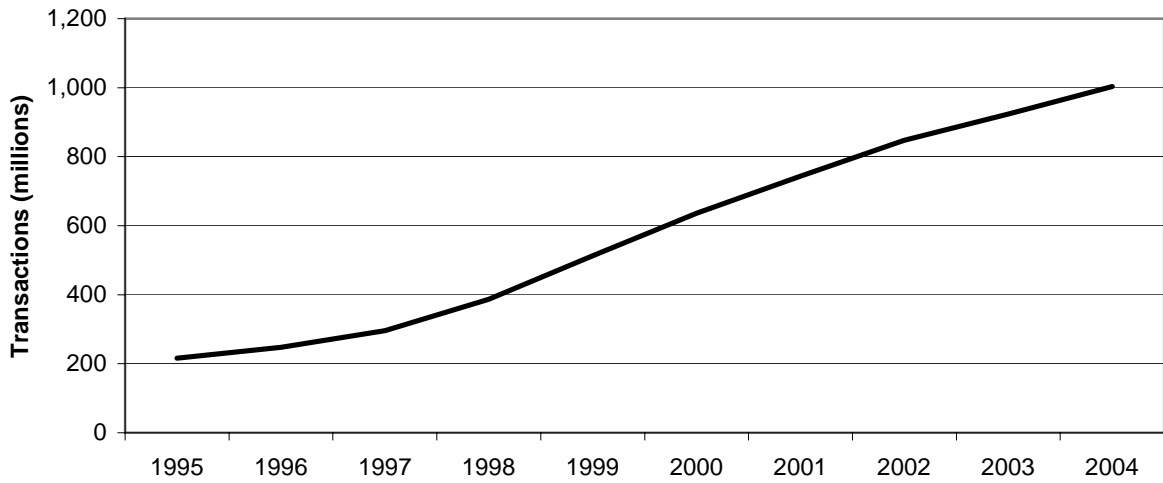


Figure 3. Credit Card Purchase Transactions

Similar trends are observable in the purchases-per-capita time series. Transactions per capita grew at an increasing rate from 12.7 percent from 1995 to 1996 to 31.1 percent from 1998 to 1999. From then on, growth slowed down considerably to 22.6 percent in 2000, 15.5 percent in 2001, 12.3 percent in 2002, and then to 7.4 percent in 2003 and 7.5 percent in 2004. Once again, transactions per capita did grow at a slower pace in 2003 and 2004 than in the late 1990s, but the slowdown in the growth rate started already in the year 2000. If anything, the slowdown seems to have stopped after the implementation of the RBA regulation.

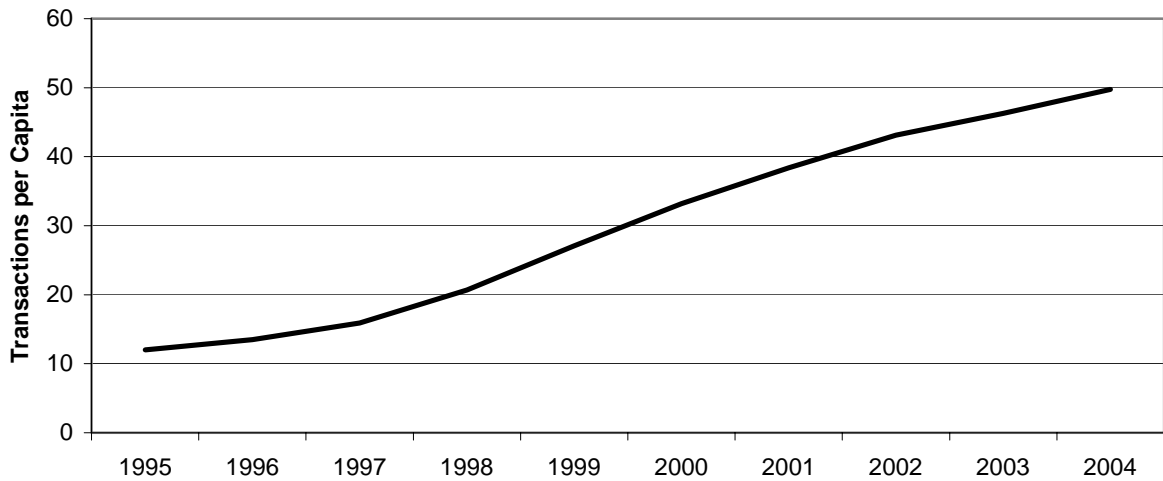


Figure 4. Credit Card Purchase Transactions per Capita

Purchase transactions per account grew at an increasing rate from 1995 to 1996 (6.1 percent) and 1998 to 1999 (25.1 percent). Starting in 2000 growth slowed down—it was 15.9 percent in 2000, 14.0 percent in 2001, 12.2 percent in 2002, 4.0 percent in 2003, and 2.5 percent in 2004. Although purchases per account did grow more slowly in 2003 and 2004 than in the late 1990s, the decline in the growth rate started between 2000 and 2001, much earlier than the implementation of the RBA regulatory scheme.

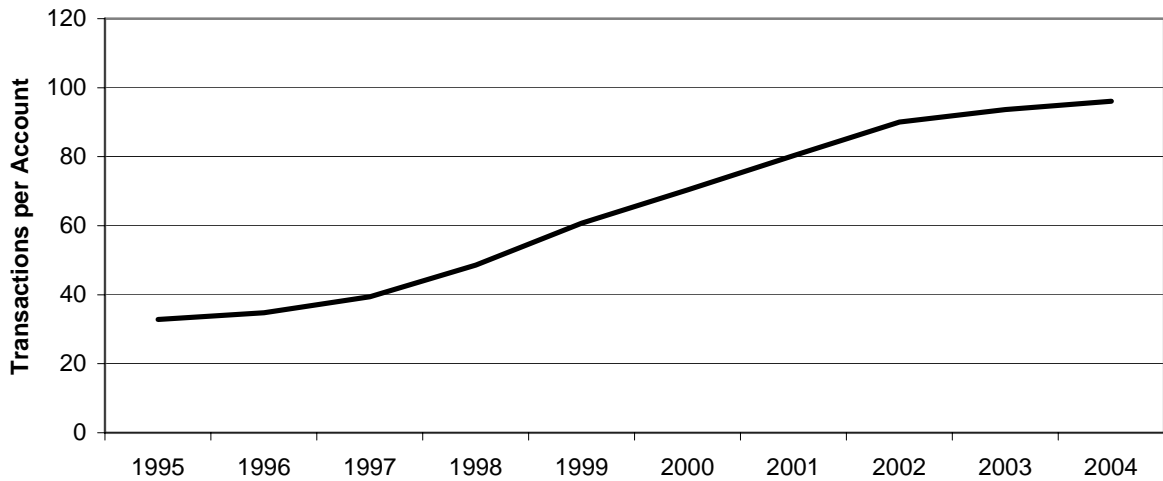


Figure 5. Credit Card Purchase Transactions per Account

D. Purchase volume

Real purchase volume per account grew at an increasing rate between 1995 to 1996 (5.6 percent) and 1998 to 1999 (25.6 percent). The growth rate declined starting in the year 2000—it was 15.5 percent in 2000, 13.5 percent in 2001, 10.7 percent in 2002, 4.9 percent in 2003, and 3.0 percent in 2004. As with purchases per account, growth in purchase volume per account was slower in 2003 and 2004 than in the late 1990s. It seems inappropriate to attribute this slowdown to regulation, however, since the decline in the growth rate had started already in the year 2000.

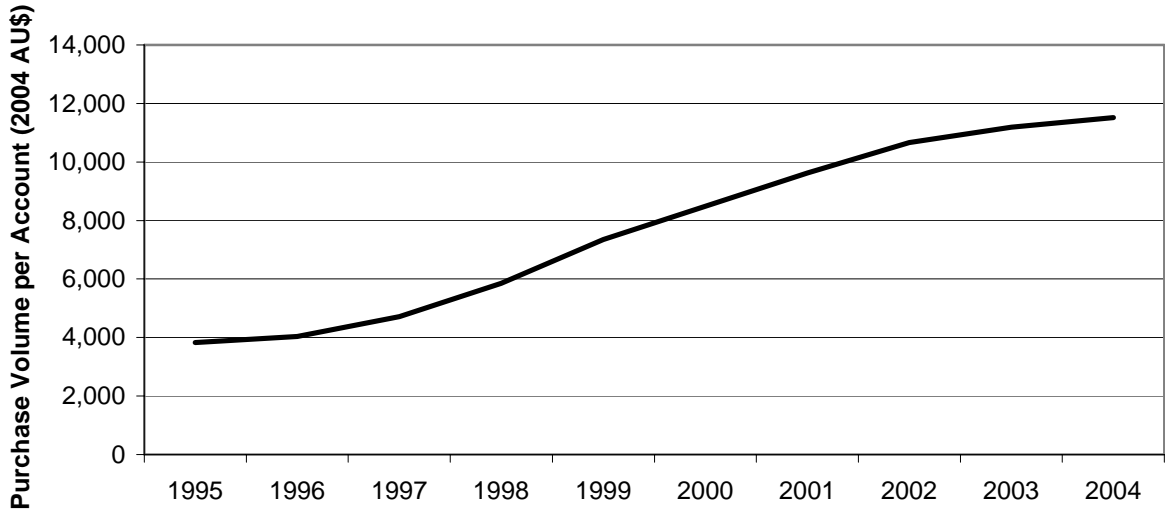


Figure 6. Real Credit Card Purchase Volume per Account

The trend in purchase volume per account relative to consumption per capita is similar. This relative measure of purchase volume per account grew at an increasing pace through 1999. Since then, it continued to grow at a declining pace. The slowdown in the growth rate, however, started in 2000, so it does not seem justified to attribute it to the RBA regulatory scheme.

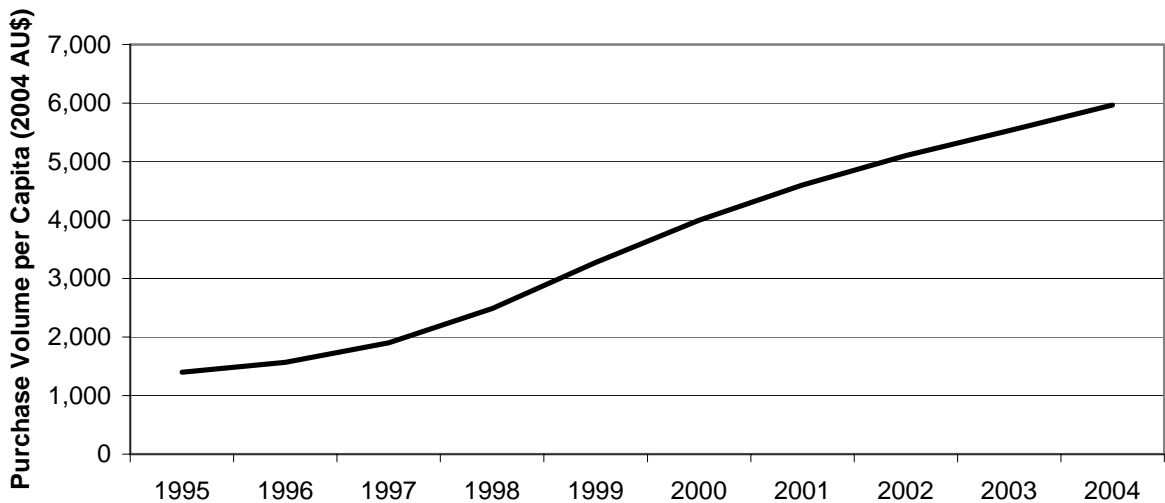


Figure 7. Real Credit Card Purchase Volume per Capita

Similarly, total purchase volume on credit cards, in real terms, grew at an increasing pace in the 1990s, from 13.7 percent in 1995 to 1996 to 33.0 percent in 1998 to 1999. After that growth slowed down—it was 23.5 percent in 2000, 16.4 percent in 2001, 12.4 percent in

2002, 9.9 percent in 2003, and 9.2 percent in 2004. If anything, the decline in the rate of growth seems to have slowed down after the implementation of the RBA regulatory scheme.

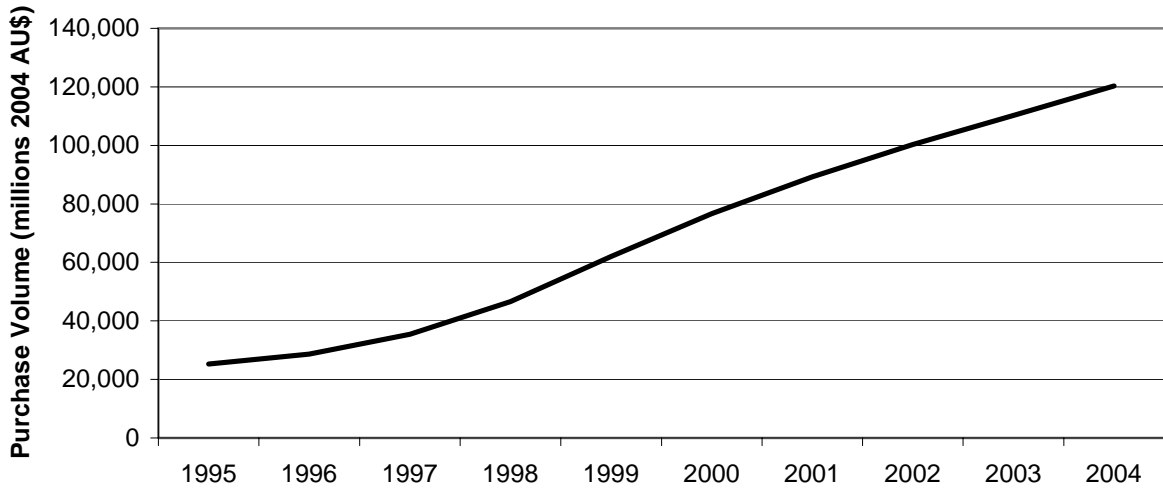


Figure 8. Real Credit Card Purchase Volume

E. A closer look at the trends

In order to address the question whether credit cards grew more slowly than they would have in a world without RBA regulation, we explored further the patterns discernible in the evolution of the growth rates. As we have observed above, all of the indicators of credit-card use grew at an increasing rate either through 1999 or 2000 and then grew at a declining rate through 2002. After 2003, the decline in the rate of growth seems to have slowed down for several of the relevant variables.

We studied these patterns in greater detail by regressing the growth rates of the relevant variables on a linear spline function.²² We performed the analysis with annual data and quarterly data. With quarterly data, we calculated proportional growth rates between quarter q and quarter $(q-4)$.

We describe the model on the basis of quarterly data. We first created a linear trend t that starts at 1 in the first quarter for which growth rates can be calculated and grows by 1 every quarter through the fourth quarter of 2004. We then defined the spline time dimension variables as follows:

$$X(t) = t, t = 1, 2, \dots, T;$$

$$Y(t) = \max(0, t - a);$$

$$Y(t)' = \max(0, t - b) ; \text{ and}$$

$$Z(t) = \max(0, t - c).$$

In this model, a is the number that corresponds to the last quarter of 1999 in the trend sequence, b is the number that corresponds to the last quarter of 2000, and c is the number that corresponds to the last quarter of 2002.

Think of a world where the number of credit card accounts, the number of credit card purchases, and the real purchase volume on credit cards are a function of real consumption. Then in order to assess whether there have been significant changes in the trend of the growth rates of credit card use variable, we can estimate models of the following form:

$$G_{CC}(t) = \alpha_1 + \delta_{11} * X(t) + \delta_{12} * Y(t) + \delta_{13} * Z(t) + \gamma_1 * C(t) + u_1(t), \text{ or}$$

$$G_{CC}(t) = \alpha_2 + \delta_{21} * X(t) + \delta_{22} * Y(t)' + \delta_{23} * Z(t) + \gamma_2 * C(t) + u_2(t).$$

We can also estimate models in the log of the growth rate:

$$\log(G_{CC}(t)) = \alpha_3 + \delta_{31} * X(t) + \delta_{32} * Y(t) + \delta_{33} * Z(t) + \gamma_3 * \log(C(t)) + u_3(t), \text{ or}$$

$$\log(G_{CC}(t)) = \alpha_4 + \delta_{41} * X(t) + \delta_{42} * Y(t)' + \delta_{43} * Z(t) + \gamma_4 * \log(C(t)) + u_4(t).$$

In these models, $G_{CC}(t)$ stands for the growth rate of the credit-card-use variable in question and $C(t)$ stands for the growth rate of consumption (or consumption per capita, depending on the model) in real terms. The first set of models focuses on the percentage-point change in growth rates over time. The second set focuses on the proportional (or percent) change in the growth rates over time.

The δ_{i1} parameters (for $i = 1$ to 4) capture the trend in the growth rate between the starting point and 1999 (or between the starting point and 2000). The δ_{i2} parameters capture the change in the trend of the growth rate over 1999-2002 relative to the previous period (or 2000-2002 relative to the previous period). The δ_{i3} parameters, finally, capture the change in

²² On linear spline functions see, for example, Poirier 1976, ch. 2, Poirier and Garber 1974, Johnston 1983, pp. 392ff, and Greene 1993, pp. 235ff.

the trend of the growth rate over 2003 to 2004 (the regulatory period) relative to 1999 to 2002 (or 2000 to 2002). The estimated parameters are reported below in Table 3 and Table 4.

Table 3. Regression of the growth rate of the credit-card-use variables on a linear spline function on the basis of quarterly data, 1994-2004, controlling for changes in the growth rate of real consumption (or real consumption per capita)

	Coefficient	P-value
Growth in Number of Accounts		
d(1)	0.0006	0.053
d(2)	-0.0085	0.000
d(3)	0.0168	0.000
Growth in Number of Accounts per Capita		
d(1)	0.0007	0.039
d(2)	-0.0088	0.000
d(3)	0.0182	0.000
Growth in Number of Purchases		
d(1)	0.01146	0.000
d(2)	-0.0301	0.000
d(3)	0.0152	0.002
Growth in Number of Purchases per Capita		
d(1)	0.0111	0.000
d(2)	-0.0288	0.000
d(3)	0.0104	0.045
Growth in Number of Purchases per Account		
d(1)	0.009	0.000
d(2)	-0.0200	0.000
d(3)	-0.0061	0.257
Growth in Real Purchase Volume		
d(1)	0.0117	0.000
d(2)	-0.0310	0.000
d(3)	0.0170	0.001
Growth in Real Purchase Volume per Account		
d(1)	0.0092	0.000
d(2)	-0.0207	0.000
d(3)	-0.0058	0.279
Growth in Real Purchase Volume per Capita		
d(1)	0.0112	0.000
d(2)	-0.0294	0.000
d(3)	0.0106	0.046

Table 4. Regression of the log of the growth rate of the credit-card-use variables on a linear spline function on the basis of quarterly data, 1994-2004, controlling for changes in the log of the growth rate of real consumption (or real consumption per capita)

	Coefficient	P-value
Log of Growth in Number of Accounts		
d(1)	0.0129	0.075
d(2)	-0.2251	0.000
d(3)	0.4598	0.000
Log of Growth in Number of Accounts per Capita		
d(1)	0.0217	0.031
d(2)	-0.3764	0.000
d(3)	0.8088	0.000
Log of Growth in Number of Purchases		
d(1)	0.0589	0.000
d(2)	-0.1583	0.000
d(3)	0.0526	0.050
Log of Growth in Number of Purchases per Capita		
d(1)	0.0559	0.000
d(2)	-0.1545	0.000
d(3)	0.0081	0.790
Log of Growth in Number of Purchases per Account		
d(1)	0.0614	0.000
d(2)	-0.1264	0.000
d(3)	-0.242	0.001
Log of Growth in Real Purchase Volume		
d(1)	0.0625	0.000
d(2)	-0.1669	0.000
d(3)	0.0716	0.023
Log of Growth in Real Purchase Volume per Account		
d(1)	0.0636	0.000
d(2)	-0.1331	0.000
d(3)	-0.2104	0.005
Log of Growth in Real Purchase Volume per Capita		
d(1)	0.0569	0.000
d(2)	-0.158	0.000
d(3)	0.0191	0.572

The results, based on quarterly growth rates, show the following. Out of 16 models estimated (8 for the growth-rate levels and 8 for the logarithm of the growth rates), 12 show a statistically significant break in trend in the regulatory period. In 10 out of these 12 cases the coefficient for the regulatory period is positive—i.e., there seems to be a slowdown in the decline of the growth rates with the advent of regulation. In the remaining 2, the coefficient is negative, suggesting an accelerating decline in the rate of growth with the advent of regulation. In the remaining 4 models the relevant coefficient is positive twice and negative twice but it is not significant. Taken as a whole, this evidence does not seem to support the idea that the influence of credit cards in the economy would have grown much faster in a world without RBA regulation.

F. Conclusions

The evidence seems to suggest that, thus far, the RBA regulatory scheme has not achieved its objective of decreasing the level of credit-card activity in the economy. The number of accounts, the number of accounts per capita, the number of transactions, the number of transactions per capita, the number of transactions per account, real purchase volume per account, and purchase volume per account relative to consumption per capita all grew in 2003 and 2004. Furthermore, both the number of accounts and the number of accounts per capita grew faster in 2003 and 2004 than in 2001 and 2002, and grew faster in 2004 than in 2003.

Most indicators of credit-card use grew more slowly in 2003 and 2004 than in the late 1990s. The slowdown in the growth rate of all these series, however, started already in 2000-2001—it thus seem inappropriate to attribute the slowdown to regulation since, when the decline in the growth rate started, regulation was still many years away from implementation. In short, the RBA regulatory scheme does not seem to have produced any visible decline in the level of credit card activity vis-à-vis a world without regulation. If anything, the decline in certain indicators of credit card growth seems to have leveled off after regulation.

IV. Impact of RBA Regulation on Issuers and Cardholders

The Australian regulation of the interchange-fee system presents an interesting natural experiment on pricing in two-sided markets. The price structure in the credit card industry has been dramatically shifted. The question then arises as to whether credit card

issuers have made an attempt to recover revenues from cardholders. A natural focus of this investigation is the evolution of various sources of income for credit card issuers.

A. Data

The data used in the calculations in this section were provided by Visa Australia. The dataset was constructed with information from the operating certificates that banks submit to the Visa organization. The dataset provides quarterly information on the number of Visa cards, card purchase volume, other service charges (i.e., fees that issuers charge cardholders, primarily annual fees and service fees), finance charges, and outstanding balances on cards in Australia between the third quarter of 1992 and the second quarter of 2004. From these basic time-series data we can obtain information on the evolution of, for example, interchange income over time—this requires multiplying the interchange rate in force in a given quarter times the purchase volume in that quarter. We can also obtain information on the evolution of other service charges per card and finance charges per card. The original dataset contains information on the “average cost per card,” which is, for any given quarter, other service charges divided by the average number of cards in the economy in the previous quarter and in the current one. We use this variable in some of our regressions below.

The data on other service charges and finance charges are for credit cards only, while the data on the number of cards and purchase volume are for credit and debit cards combined. This raises several issues, one of which is whether any changes in the debit-credit composition of the Visa card portfolio could be introducing biases in our calculations. If the proportion of debit cards in the data increases then the calculated average fee will go down, even if credit card fees remain unchanged. The proportion of debit cards in the Visa total increased from about 30 percent at the end of 2002 to 33 percent at the end of 2004. This suggests that our estimates on increases in fees after regulation are understated.²³

B. Interchange income

Between the last quarter of 1992 and the fourth quarter of 1999, real interchange income per Visa card grew at an average quarterly compound rate of about 2.8 percent, from

²³ We are attempting to obtain comprehensive data that are for credit cards only and will update our study when available.

around AU\$8.60 to around AU\$18.88, driven by the rise in purchase volume per card.²⁴ Between the first quarter of 2000 and the third quarter of 2003, the quarter prior to the introduction of the new interchange rates, real interchange income per card grew at an average quarterly compound rate of about 3 percent, from around AU\$17.81 to around AU\$27.13.²⁵

Interchange-fee regulation was implemented in the fourth quarter of 2003. If we compare the first two quarters of 2003 with the first two of 2004, we find that issuers lost, on average and in real terms, about AU\$9.57 per card in interchange income per quarter, a loss of about 39 percent on a total interchange income per card of about AU\$24.49 in the first two quarters of 2003.

A somewhat more interesting way to look at this loss is to ask how much the issuers would have made in interchange income in the absence of regulation. From this perspective, we calculate a “but for” interchange income per card under the assumption that the regulatory scheme was not implemented and the interchange rate remained at an average of 0.95 percent. (Of course, this also assumes a *ceteris paribus* condition that goes beyond the interchange rate.) We then subtract the actual interchange income per card from the “but for” interchange income per card and we find that, on average, in the first two quarters of 2004 issuers lost about AU\$10.85 per quarter per card. This represents a loss of about 42 percent with respect to the interchange income they would have obtained in the “but for” world. Figure 9 shows these facts.

²⁴ As noted above, all figures are reported in real 2004 Australian dollars.

²⁵ Based on data from Visa International.

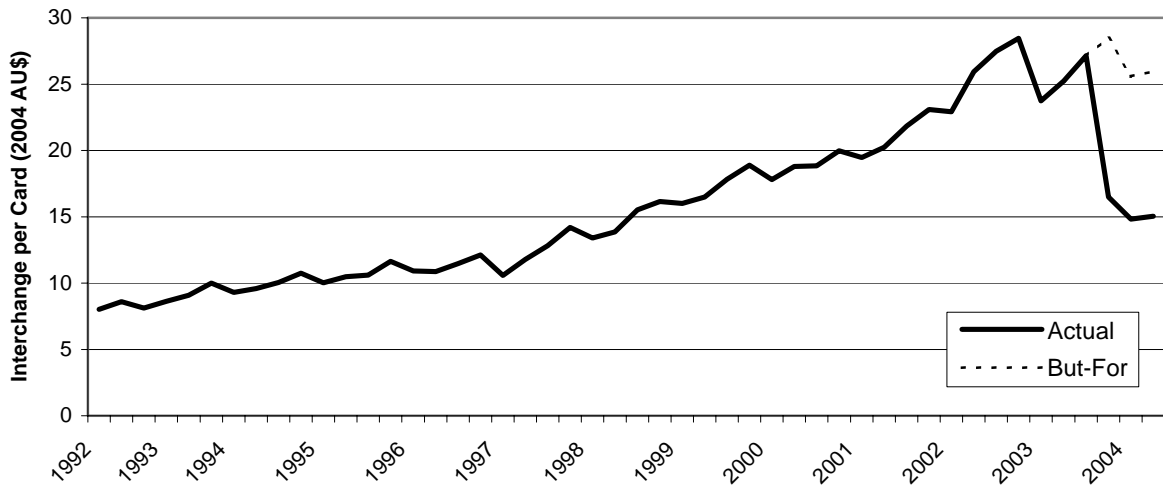


Figure 9. Real Interchange Revenue per Card

C. Income from other service charges

It is then worth raising the question as to whether issuers have attempted to recover directly from the consumer some of the income lost from regulation on the merchant side of the two-sided platform. A back-of-the-envelope comparison of other service charges made to consumers right before and after regulation does not provide a clear-cut answer. In the first two quarters of 2003 other service charges were, on average and in real terms, around AU\$9.34, whereas in the first two quarters of 2004 they were about AU\$10.25. This seems to suggest a modest attempt at recovery. It is far from clear, however, whether such a simple “before-and-after” comparison is justified—it seems that a *ceteris paribus* condition should be somehow imposed to isolate the impact of regulation. Furthermore, as we noted, there is considerable evidence that banks started adjusting in anticipation of regulation in early 2003.

This raises at least two questions. Is there any evidence that, in real terms and *ceteris paribus*, other service charges per card have been higher in recent years (in anticipation or as a result of regulation) than in previous years? Second, is there any evidence that, in real terms and *ceteris paribus*, other service charges per card have grown at a faster rate in recent years (in anticipation or as a result of regulation) than in previous years?

We first addressed the question about the level of real other service charges per card. We deflated the quarterly data on other service charges per card provided by Visa Australia

using the Australian Consumer Price Index. The data cover the period from the fourth quarter of 1992 through the second quarter of 2004. Figure 10 shows the quarterly data.

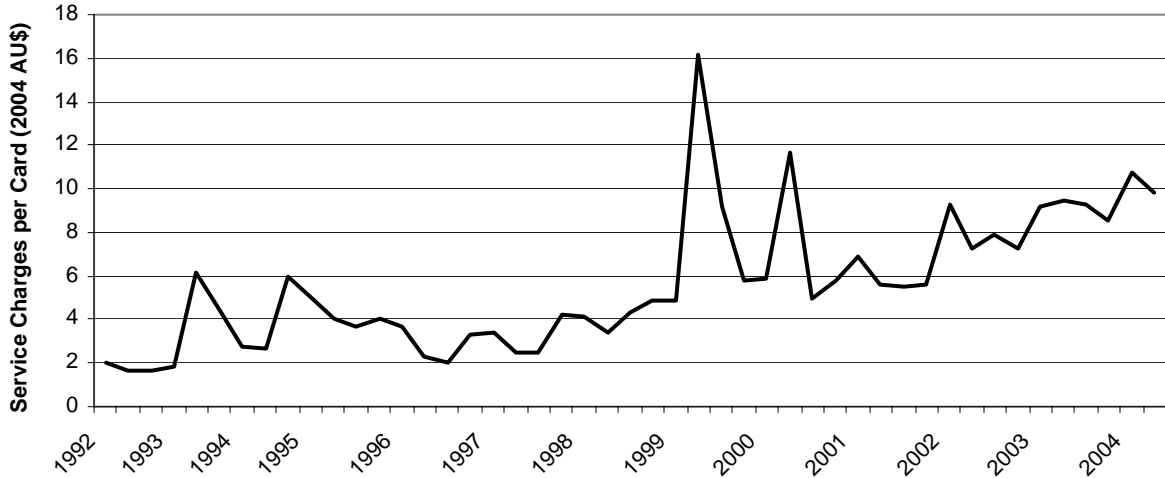


Figure 10. Real Other Service Charges per Card

A perusal of the time-series data for other service charges per card (or average cost per card) reveals that a few data points (in 1999 and 2000) dramatically break the series trend. Furthermore, to our knowledge this happens for no apparent reason, which suggests the existence of potential data problems at those dates.

In order to preclude our calculations from being driven by a few “influential” data points, we took a number of measures. First, we ran a regression of “average cost per card” on a time trend and a time trend squared. (We estimated the model in levels and in logs.) We calculated the residuals and their standard deviation. We identified the observations associated with residuals greater than two standard deviations—they were the second quarter of 1999 and the second quarter of 2000. Second, we estimated the full model reported below (average cost per card on seasonal binary variables, the real rate of interest on 3-year government bonds, real purchase volume per card, a linear time trend, and a binary variable for the regulatory period). We calculated the residuals and their standard deviation, and we identified the observations associated with residuals greater than two standard deviations—again, they were the second quarter of 1999 and the second quarter of 2000. In the ordinary least squares (OLS) regressions reported below we did not use these two data points.

We also followed an alternative approach. We kept the outliers in the dataset but ran a robust regression *a la* Huber.²⁶ In this iterative approach, observations receive weights that are a function of the magnitude of the associated residuals. More specifically, the estimation procedure consists of calculating a benchmark, usually around twice the median absolute deviation from the median residual, and in down-weighting the observations whose absolute residual exceeds that benchmark. The procedure is repeated until the difference in weights between iteration j and iteration $(j+1)$ drops below a certain pre-specified level. The “robust regression” coefficients reported below were estimated with this approach.

We created binary variables that take on the value 1 over the period of time when issuers may have been either anticipating or experiencing the impact of regulation and 0 before that. Using this approach, B_REG_2003 takes on the value 1 from the first quarter of 2003 onward, and B_REG_2004 takes on the value 1 from the first quarter of 2004 onward.

Some portion of other service charges per card corresponds to annual fees but some other portion corresponds to service fees, such as late fees or overcharge fees. One could reasonably hypothesize that these fees increase with the number of transactions or with purchase volume. We do not have information on the number of transactions, but we do have information on real purchase volume per card and we include this variable as one of the right-hand-side variables in our model. We estimated a number of models of the following form:

$$\begin{aligned} \text{ROSCC}(t) = & \alpha_1 + \beta_1 * \text{B_q2}(t) + \gamma_1 * \text{B_q3}(t) + \delta_1 * \text{B_q4}(t) + \\ & \varepsilon_1 * \text{RRI}(t) + \eta_1 * \text{RPVC}(t) + \phi_1 * t \\ & + \lambda_1 * \text{B_REG_XXXX}(t) + v_1(t) \end{aligned} \quad (1)$$

In equation (1), ROSCC(t) stands for the level of real other services charges per card at time t ; B_q2(t), B_q3(t), and B_q4(t) are binary variables that take on the value 1 if the observation belongs to the second, third, or fourth quarter, respectively, and 0 otherwise; RRI(t) is the real rate of interest on 3-year government bonds at time t ; RPVC(t) is the real purchase volume per card at time t ; t is a linear trend that takes on the value 1 in the fourth quarter of 1992 and goes up by one each quarter through the second quarter of 2004. Finally,

²⁶ Huber 1964.

B_REG_XXXX(t) is a binary variable that takes on the value 1 starting in 2003 or 2004 (depending on when we believe the impact of regulation started), and takes on the value 0 before that.

We are, of course, particularly interested in estimating the λ_1 parameter. We included the real rate of interest on government bonds to control for an element of cost for credit card issuers. We included real purchase volume per card to control for those dimensions of real other service charges per card that vary with the level of credit-card activity. We also included a linear trend to control for other unobserved factors that may be changing over time and may have had an impact on the level of real other service charges.²⁷ The results from these regressions are reported below.²⁸

There is evidence of higher real other service charges per card starting in 2003 and 2004. If issuers started anticipating the impact of regulation in 2003, for example, then this anticipation was accompanied by an increase in real other service charges per card of about AU\$1.73 per quarter (in the OLS-estimated model). (The results are similar for the impact of regulation beginning in 2004. The number for 2004 is not significant at 5 percent, but it is at a slightly higher significance level in the OLS-estimated model.)

²⁷ It is well known that including a time trend in a time-series regression is equivalent to eliminating the trend from all variables in the regression and then estimating the model on the de-trended variables. In other words, it is equivalent to running a regression of each variable on the time trend and then estimating the model on the basis of the residuals from these regressions. See Goldberger 1991, ch. 17 and Wooldridge 2000, ch. 10.

²⁸ In every regression reported in this paper, we checked for the existence of autocorrelation of order 1 by running a regression of the residuals from the regression on the lagged residuals. In no occasion was the null hypothesis of no autocorrelation rejected at standard significance levels.

Table 5. Regression of the level of other service charges per card on an indicator variable for the regulatory period

	OLS (excluding outliers)		Robust Regression	
	Coefficient	P-value	Coefficient	P-value
I. Assuming issuers start anticipating regulation in 2003				
Constant	-1.172	0.503	-2.419	0.057
B_REG_2003	1.727	0.016	1.860	0.000
II. Assuming no anticipation—effect, if any, felt starting in 2004				
Constant	-1.660	0.354	-2.752	0.058
B_REG_2004	1.933	0.065	1.779	0.033

Note: Left-hand-side variable = real other service charges per card, fourth quarter of 1992 through second quarter of 2004; other right-hand-side variables = seasonal dummy variables, the real rate of interest on 3-year government bonds, real purchase volume per card, and a linear time trend

We also addressed the issue of whether the rate of growth of real other service charges per card has been higher in anticipation, or as a consequence, of regulation. In order to explore this issue, we created a linear spline function similar to the one described in section III of this paper, but with the knots in the relevant locations. More specifically we defined the time dimension variables as follows:

$$X(t) = t, t = 1, 2, \dots, T;$$

$$Y(t) = \max(0, t - a); \text{ and}$$

$$Y(t)' = \max(0, t - b).$$

In this model the knots fall, alternatively, in the last quarter of 2002 (which we identify as time period a) and the last quarter of 2003 (time period b), depending on when we hypothesize that the impact of regulation may have begun. We then estimated models of the following form:²⁹

$$\begin{aligned} \text{Log(ROSCC}(t)) = & \alpha_2 + \beta_2 * B_q2(t) + \gamma_2 * B_q3(t) + \delta_2 * B_q4(t) + \\ & \varepsilon_2 * \log(\text{RRI}(t)) + \eta_2 * \log(\text{RPVC}(t)) + \end{aligned}$$

²⁹ Estimating a linear spline model for time $t = 1$ through T with a knot at time x is equivalent to running separate regressions for time periods 1 through x , and x through T , but forcing the function to be continuous at knot x .

$$\lambda_{21} * X(t) + \lambda_{22} * Y(t) + v_2(t) \quad (2)$$

The results from these regressions are reported below. Of course, we are particularly interested in estimating the λ_{22} parameter.

There seems to be a change in trend in 2003 and 2004, but the estimated coefficients are not significantly different from zero at standard levels. These results, in conjunction with those from the model estimated previously (in levels), suggest that the issuers' reaction to regulation seems to have taken the form of discrete jumps in fee levels rather than significant changes in the growth rates of these fees.

Table 6. Regression of the log of other service charges per card on a linear spline function with knots alternatively at the end of 2002 and the end of 2003

	OLS (excluding outliers)		Robust regression	
	Coefficient	P-value	Coefficient	P-value
I. Assuming issuers start anticipating regulation in 2003				
Trend	-0.032	0.166	-0.007	0.760
Change in trend from 2003 on	0.059	0.130	0.033	0.369
II. Assuming no anticipation—effect, if any, felt starting in 2004				
Trend	-0.028	0.209	-0.005	0.828
Change in trend from 2004 on	0.192	0.182	0.095	0.502

Note: Left-hand-side variable = natural logarithm of real other service charges per card, fourth quarter of 1992 through second quarter of 2004; other right-hand-side variables = seasonal dummy variables, the natural logarithm of the real rate of interest on 3-year government bonds, and the natural logarithm of real purchase volume per card

D. Income from finance charges

Of course, issuers can recover the income that they have lost due to regulation, not only through changes in other service charges per card, but also through changes in finance charges per card. It is thus worth exploring what the time-series behavior of this variable shows. Changes in finance charges per card may be driven by changes in interest rates and by changes in total outstanding balances per card. Therefore, in order to identify changes in

issuers' behavior, we have to control for changes in outstanding balances per card over time. Figure 11 shows the behavior of real finance charges per card over time.

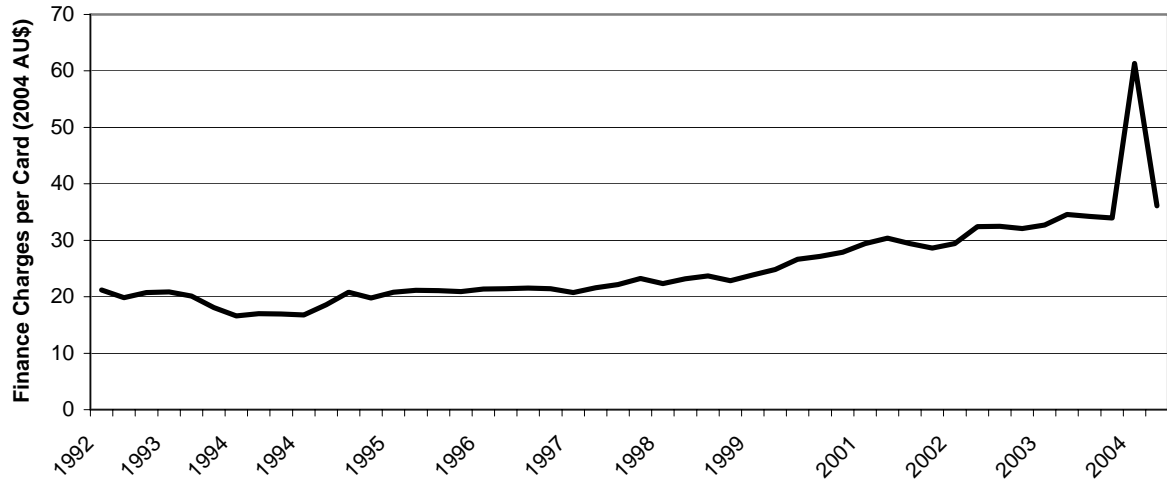


Figure 11. Real Finance Charges per Card

A perusal of the time-series data for finance charges per card reveals that one data point (in 2004) dramatically breaks the series trend. Furthermore, to our knowledge, this happens for no apparent reason, which suggests the existence of potential data problems on this date.

In order to preclude our calculations from being driven by a few “influential” data points, we took a number of measures. First, we ran a regression of “finance charges per card” on a time trend and a time trend squared. (We estimated the model in levels and in logs.) We calculated the residuals and their standard deviation. We identified the observation associated with a residual greater than two standard deviations—it was the first quarter of 2004. Second, we estimated the full model reported below (finance charges per card on seasonal binary variables, the real rate of interest on 3-year government bonds, real outstanding balances per card, a linear time trend, and a binary variable for the regulatory period). We calculated the residuals and their standard deviation, and identified the observation associated with a residual greater than two standard deviations—again, it was the first quarter of 2004. In the OLS regressions reported below we did not use this data point. We also estimated the coefficients with the “robust regression” approach described above.

Again, we posed two questions. Is there any evidence that, in real terms and *ceteris paribus*, finance charges per card have been higher in recent years (as a consequence of regulation) than in previous years? Second, is there any evidence that, in real terms and *ceteris paribus*, finance charges per card have grown at a faster rate in recent years (as a consequence of regulation) than in previous years?

In order to address the first question, we estimated a number of models of the following form:

$$\begin{aligned} \text{RFCC}(t) = & \alpha_3 + \beta_3 * \text{B_q2}(t) + \gamma_3 * \text{B_q3}(t) + \delta_3 * \text{B_q4}(t) + \\ & \epsilon_3 * \text{RRI}(t) + \eta_3 * \text{ROBC}(t) + \phi_3 * t + \\ & \lambda_3 * \text{B_REG_XXXX}(t) + v_3(t) \end{aligned} \quad (3)$$

In equation (3), RFCC(t) stands for the level of real finance charges per card at time t; B_q2(t), B_q3(t), B_q4(t) are binary variables that take on the value 1 if the observation belongs to the second, third, or fourth quarter, respectively, and 0 otherwise; RRI(t) is the real rate of interest on 3-year government bonds at time t; ROBC(t) is the level of real outstanding balances per card at time t; t is a linear trend that takes on the value 1 in the fourth quarter of 1992 and goes up by one each quarter through the second quarter of 2004. Finally, B_REG_XXXX is a binary variable that takes on the value 1 starting in 2003 or 2004 (depending on when we believe the impact of regulation started), and takes on the value 0 before that. We are particularly interested in estimating the λ_3 parameter. The results from these regressions are reported below.

There is statistically significant evidence (at 10 percent) of higher real finance charges starting in 2003. (There is also evidence of higher charges starting in 2004, but it is not significant at standard levels.) For example, if we assume that the anticipation of regulation started in early 2003, then this anticipation was accompanied by an increase in real finance charges per card of about AU\$1.51 per quarter. The number for 2004 is slightly larger but not statistically significant at standard levels.

Table 7. Regression of the level of real finance charges per card on an indicator variable for the regulatory period

	OLS (excluding outliers)		Robust regression	
	Coefficient	P-value	Coefficient	P-value
I. Assuming issuers start anticipating regulation in 2003				
Constant	7.036	0.010	6.751	0.025
B_REG_2003	1.514	0.078	1.420	0.133
II. Assuming no anticipation—effect, if any, felt starting in 2004				
Constant	5.809	0.028	5.452	0.066
B_REG_2004	1.561	0.318	n/a	n/a

Note: Left-hand-side variable = real finance charges per card, fourth quarter of 1992 through second quarter of 2004; other right-hand-side variables = seasonal dummy variables, the real rate of interest on 3-year government bonds, real outstanding balances per card, and a linear time trend

In order to address the issue of whether there has been an acceleration in the rate of growth of real finance charges, we estimated a number of regressions of the natural logarithm of real finance charges on a linear spline function, quarterly binary variables, the natural logarithm of real outstanding balances per card and the natural logarithm of the real rate of interest on 3-year government bonds. The linear spline function was defined as above, with knots (alternatively) at the end of 2002 and the end of 2003. In other words, we estimated versions of the following model:

$$\begin{aligned} \text{Log(RFCC}(t)) = & \alpha_4 + \beta_4 * B_q2(t) + \gamma_4 * B_q3(t) + \delta_4 * B_q4(t) + \\ & \varepsilon_4 * \log(\text{RRI}(t)) + \eta_4 * \log(\text{ROBC}(t)) + \\ & \lambda_{41} * X(t) + \lambda_{42} * Y(t) + v_4(t) \end{aligned} \quad (4)$$

Our focus is, of course, on estimating the λ_{42} parameter.

The estimated model suggests that there is a break in the trend of growth of real finance charges per card in connection with regulation. The results convey the idea that, *ceteris paribus*, for all practical purposes there was no growth in real finance charges per card prior to the anticipation of regulation. The anticipation of regulation was accompanied by an increase in the growth rate of real finance charges per card. (The break in 2004 is statistically not significant at standard levels.)

Table 8. Regression of the log of real finance charges per card on a linear spline function with knots alternatively at the end of 2002 and the end of 2003

	OLS (excluding outliers)		Robust regression	
	Coefficient	P-value	Coefficient	P-value
I. Assuming issuers start anticipating regulation in 2003				
Trend	-0.004	0.517	-0.004	0.556
Change in trend from 2003 on	0.019	0.070	0.019	0.101
II. Assuming no anticipation—effect, if any, felt starting in 2004				
Trend	-0.003	0.602	-0.002	0.754
Change in trend from 2004 on	0.038	0.333	n/a	n/a

Note: Left-hand-side variable = natural logarithm of real finance charges per card, fourth quarter of 1992 through second quarter of 2004; other right-hand-side variables = seasonal dummy variables, the natural logarithm of the real rate of interest on 3-year government bonds, and the natural logarithm of real outstanding balances per card

E. Summary

The evidence suggests that issuers started losing, in real terms, roughly between AU\$9.57 and AU\$10.85 per card per quarter in interchange income as a consequence of the RBA regulatory scheme. In this section we have explored whether this has resulted in higher cardholder prices, either through higher other service charges per card or higher finance charges per card.

The evidence suggests that cardholders are paying more. For example, a regression model that compares the level of real other service charges per card after 2003 with the level before, controlling for seasonal effects, changes in the real interest rate, changes in the real purchase volume per card, and changes in unobserved factors over time, suggests that the anticipation of regulation was accompanied by a rise in real other service charges of about AU\$1.73. (The number is about AU\$1.93 in the OLS-estimated model if we compare pre- and post-2004.) A similar regression model for real finance charges per card that controls for seasonal effects, changes in the real interest rate, changes in real outstanding balances per card, and changes in unobserved factors over time, suggests that regulation was accompanied by a rise in real finance charges per card of about AU\$1.51 after 2003. (The number is about

AU\$1.56 after 2004, although the 2004 result is not statistically significant.) This suggests that total recovery starting in 2003 may have been around AU\$3.24 per card per quarter. If we take the AU\$10.86 figure as our interchange-income loss benchmark, this suggests that short-run recovery has been of the order of 30 to 35 percent.

What we have estimated is also the short run impact. Since cardholders are a valuable asset—issuers spend considerable costs to acquire new cardholders and pay a premium on portfolio purchases—one would expect issuers to be cautious in raising prices quickly to their existing mature cardholder portfolio. Over the longer run, as cardholders switch from one issuer to another, one would expect price effects to be more fully realized. It is also important to note that credit card issuers are relatively concentrated in Australia. The top four issuers account roughly for 90 percent of issuing in Australia according to the RBA.³⁰ As we discuss in more detail in the next section, the degree of pass through of costs to consumers depends on degree of competition among firms. In other countries with a more competitive environment—for example, the top four credit card issuers account for 58 percent in the United States³¹—pass through of an increase in costs or a reduction in interchange fees is likely to be more immediate and complete.

V. Impact of RBA Regulation on Merchants and Consumers

According to the RBA, the reduction in interchange fees imposed by regulation led to a reduction in merchant service fees (i.e., the merchant discount). The average merchant service fee fell from 1.41 percent immediately prior to regulation to 0.99 percent in the quarter ending June 2004.³² The RBA estimates that the fall in the merchant discount represents savings to merchants of over \$500 million per annum.³³

The RBA also met with a large number of merchants in Sydney and Melbourne. And it obtained detailed data on merchant service agreements for more than 200 additional merchants. On the basis of these data and interviews, the RBA concluded that most merchants in the sample received substantial fee reductions that tended to match the decrease

³⁰ Reserve Bank of Australia 2002, p. 8.

³¹ HSN Consultants 2005a and 2005b.

³² Reserve Bank of Australia 2004, p. 9.

³³ We have not made any attempts to verify this independently.

in the interchange fee. We do not have the data to verify this independently, but take it as our starting point.

The RBA states that, given the competitive environment in which most merchants allegedly operate, the reduction in the merchant discount will eventually find its way to consumers in the form of lower prices for goods and services: “When fully passed through, the reduction in fees would be expected to reduce the Consumer Price Index (CPI) by between 0.1 and 0.2 percentage points.” The RBA adds: “[...] this change is difficult to observe in the overall CPI, which is increasing, on average, by around 2½ percent per year.”³⁴ The RBA assumes that the reduction in the merchants’ marginal costs of card transactions will be fully passed through to consumers, based on the assumptions that the Australian retail sector is highly competitive and that pass through of costs will be straightforward. We examine the validity of these two assumptions.

Comprehensive government statistics on firm concentration are not available for Australia. We have identified what data we could find from a range of sources. Many merchant categories appear to have significant levels of concentration. For example, within their respective categories, the top department store had a 71 percent share (and the top two had an 83 percent share) in 2003; the top two supermarket and grocery stores (excluding convenience, specialty and miscellaneous food stores) had a 75 percent share in 2003; the top two mobile telephone operators had a 78 percent share in 2005; the top land-line telephone operator had a 75 percent share in 2005; and the top two airlines had an 83 percent share in 2005. In contrast, the four-firm concentration index for these categories is significantly lower in the United States based on 2002 U.S. Census data: 65 percent for department stores, 33 percent for supermarkets and grocery stores, 61 percent for mobile telephone operators, and 60 percent for land-line telephone operators. The U.S. Bureau of Transportation Statistics reports the top two firms accounting for 32 percent of enplaned passengers among major U.S. airlines in 2000.³⁵

If the Australian retail sector is far from being highly competitive, as the evidence seems to suggest, then the assumption of full pass through of the reduction in merchants’

³⁴ *ibid.*, p. 12.

³⁵ See Euromonitor 2005a, 2005b, and 2005c, United States Census Bureau 2004, Bureau of Transportation Statistics 2000, Maxwell 2005, and McFarland 2005.

marginal transaction costs is not appropriate. It is well known that, under monopolistic and oligopolistic market conditions, pass through rates may well be less than 100 percent.³⁶

The situation is further complicated here by the fact that the decrease in merchant discount rates is not uniform across merchants or even across products sold by a given merchant. The extent to which a merchant benefits from the reduction in credit card interchange fees depends on the proportion of its sales on credit cards.³⁷ And the extent to which the costs associated with a given product decrease depends on the proportion of sales of that product on credit cards. This is not like a uniform tax on all merchants and all goods. Given the complex effect on the cost structure, reaching conclusions about pass through is even more difficult. The theoretical literature provides little guidance about how the reduction in costs will be reflected in lower prices to consumers, increases in service or other quality dimensions, or increases in profitability for merchants.

The very little empirical evidence there is suggests that, in fact, merchants have tended not to pass through the reduction in the merchant discount to consumers in the form of lower prices. Cannex, an independent research group, surveyed merchants in Australia regarding the impact of the interchange fee regulation on their regular business practices.³⁸ Among merchants who reported a change in the merchant discount during the previous year, less than 5 percent declared that they had reduced prices to consumers. On the other hand, more than 20 percent reported that their profits had increased and almost 60 percent reported that they had not experienced any changes in their regular operations.

VI. Conclusions

The Australian experience provides a useful laboratory to evaluate the impact of interchange-fee regulation. The intention was to produce a realignment of relative prices that would reduce the influence of credit cards in the economy and facilitate faster growth for

³⁶ See, for example, Katz and Rosen 1998, pp. 421-423. More generally, in both monopolistic and oligopolistic settings, the shape of the demand curve affects the pass through rate. For constant-elasticity demand curves, pass through rates may be larger than 100 percent. For linear demand curves, on the other hand, pass through rates may well be lower than 100 percent. Thus nothing in the theory suggests that merchants will fully pass through the reduction in the merchant's discount to consumers in the form of lower prices. This raises the possibility that merchants will retain at least a portion of this reduction in the form of increased profits. The credit card issuing business is also fairly concentrated in Australia, again at least by U.S. standards.

³⁷ If credit card usage does decrease as a result of regulation, then the extent to which a merchant benefits will also depend on its costs of processing those other payment methods to which consumers shift from credit cards.

allegedly cheaper payment instruments, like debit cards. This, in theory, would bring about gains in welfare. As far as we can tell, regulation has brought about redistributions in income and welfare rather than welfare gains—some parties (particularly merchants) have gained and some parties (particularly issuers and cardholders) have lost from the intervention, but it is far from obvious that consumers overall are better off.

We find no evidence that regulation has been effective in reducing credit card usage, at least thus far—we see no structural break in the time series tracking the influence of credit cards in the Australian payment system. We do find evidence that cardholder fees have increased. In the short run at least, pass through has been incomplete, on the order of one third of the change in the interchange fee. Merchants have experienced reductions in the fees that they pay acquiring banks, but there is no evidence that they have passed through these cost reductions to consumers in the form of lower prices. In fact, very few merchants report that they have lowered prices to consumers, but many more report that their profits have increased. On balance, there has been a loss to consumers in credit card fees, with an uncertain effect on retail prices.

One important reason for lack of impact on credit card usage is that the effect on marginal credit card prices has been minimal. While some reward programs were made somewhat less generous, these cover only a fraction of consumers and card transactions, and we have not seen widespread evidence of surcharging by merchants or the imposition of fees by issuers that increase with card usage.³⁹ As we found, annual fees, service fees and finance charges have increased, and may increase more in the longer run. Higher annual fees might have some effect on card ownership, although it is difficult to conceive of consumers dropping all their credit cards in today's economy and the data above suggest there has been no such effect to date. Higher service fees might have an effect on card usage, but the relationship is again far from direct. A higher fee for late payments might primarily lead the cardholder to be more careful to send payments in on time, rather than discouraging card use.

³⁸ Cannex Australia 2004.

³⁹ Industry estimates suggest that reward cards constitute about one third to one half of all credit cards in the United States; we lack comparable data for Australia. Bayot 2003. Many of these changes to rewards programs were in the form of caps on the total number of rewards points that can be earned each year. These limits have been set at relatively high levels, over AUS\$40,000 (approximately US\$31,000 at the time of this writing) a year, and likely have not been a binding constraint for many cardholders. See Reserve Bank of Australia 2004, p. 11.

And higher finance rates would more likely be felt in a reduction in borrowing, and much less directly in transaction volume.

Even if there were agreement that, for example, cardholders should face a positive marginal price for using a credit card, there is little guarantee that lowering interchange fees will achieve that goal. The effect might be felt in other price or quality variables that make cards less attractive generally, but not in a positive marginal price. Suppose, for example, that lower interchange fees result in higher annual fees and higher rates on balances. This would provide a disincentive for some consumers on the margin to hold a card, when having a card for at least some transactions (such as reserving a car rental or being able to shop over the internet or phone) might be socially beneficial. Or this might discourage consumers from taking out temporary loans on credit cards, when other alternatives might otherwise be more costly. That is, the price variables that get raised may well not be the ones that motivated the regulation in the first place. Alternatively, card issuers might spend less on customer service or other quality dimensions. The RBA's analysis was that the marginal price signals were misaligned, not that too many consumers had cards or that accessing credit on those cards was too cheap, or that quality was too high.

Another potential reason for the lack of impact of regulation is that the unitary systems—American Express and Diners Club in Australia—are not regulated. They are permitted to set prices independently to their merchants and to offer issuers a fee on card volume that, from the issuers' perspective, looks like an interchange fee. Not surprisingly, three of the four major banks in Australia have signed deals to issue cards on the unitary systems.⁴⁰ The incentive for issuers to join card systems not subject to interchange fee regulation is likely to be particularly important in the long run. While there are switching costs in the short run, over the longer run one would expect issuers to choose systems that offer lower costs—that is, the ones that can offer higher interchange fees, all else being equal. There are other differences among card systems that matter to issuers besides the interchange fee, but the ability of the proprietary systems to offer an unregulated fee to issuers will provide a significant incentive for issuers to join, or to form their own unregulated systems.

⁴⁰ See, for example, Cornell 2004 and 2005.

The RBA was aware of this concern, but hoped that regulating interchange fees for the multi-party systems would lead the unitary systems to make similar reductions in their merchant discounts. There would, however, have to be very substantial effects to offset the already higher merchant discounts of the unitary systems. The RBA suggests that there has been some downward pressure on merchant discounts for American Express and Diners Club in Australia, with a decline of 13 basis points over the 12 months ending June 2004 (although it does not discuss whether other factors might have been responsible for this). But it expresses concern that the gap between the merchant discount for the unitary versus multi-party systems has widened by 30 basis points.⁴¹ Given that the merchant discounts for the unitary systems were, according to the RBA, about 100 basis points higher than for the multi-party systems,⁴² even if there is a modest decrease in the merchant discounts for unitary systems attributable to regulation, the post-regulation unitary merchant discount would still exceed the pre-regulation multi-party merchant discount. For example, if the merchant discounts of the unitary systems decreased by say 20 basis points in the long run, they would still be 80 basis points higher than for Visa and MasterCard. And the merchant discount paid on volume shifted from the multi-party to the unitary systems would increase. Furthermore, cardholders switched to American Express or Diners Club would likely have similar or lower marginal prices (or higher card rewards) for using cards than before. This may also account for the absence of an effect from regulation in the data that we have analyzed.⁴³

What guidance does the Australian experience provide for other countries? It suggests that there will be a clear impact on prices for cardholders, especially in countries with less concentration among issuers. The extent to which this is offset by lower retail prices is unclear. The other lesson, we believe, is that the interchange fee is an imprecise regulatory tool. Interchange fees adjust relative price levels between the cardholder and merchant sides, but they do not dictate how end prices are set, especially on the cardholder side. If the goal is to make cardholders face a positive marginal price for each transaction, lowering interchange fees is not the solution. Lower interchange fees would likely make cards less attractive,

⁴¹ Reserve Bank of Australia 2004, pp. 12-13.

⁴² Reserve Bank of Australia 2001, Figure 2.2.

⁴³ Data on shares of American Express and Diners Club in Australia are not available. The RBA reports that they have grown since regulation, from an initially low base, but does not report figures. All but one of the card offerings from the bank deals with American Express and Diners Club are credit cards and would be part of the data discussed.

especially in a competitive issuing environment over the longer run, but they may have a lesser effect on marginal card prices or on usage.

REFERENCES

ANZ. 2003. "Annual Report."

Australian Bureau of Statistics. 2005. "Table 20. Household Final Consumption Expenditure," March.

Bayot, Jennifer. 2003. "Credit Card Rewards Turn From Nouns to Verbs," *New York Times*, September 21.

Brammall, Bruce. 2002. "Watchdog Fears ANZ Card Hikes," *Herald Sun*, November 5.

_____. 2003. "Bank May Ditch Reward Scheme," *Herald Sun*, February 20.

Bureau of Transportation Statistics. 2000. "Airport Activity Statistics of Certificated Air Carriers: Summary Tables 2000," Table 1, online:
http://www.bts.gov/publications/airport_activity_statistics_of_certificated_air_carriers/2000/tables/table01.html.

Cannex Australia. 2004. Data on merchant service fees. August/September.

Chakravorti, Sujit. 2003. "Theory of Credit Card Networks: A Survey of the Literature," *Review of Network Economics*, vol. 2, no. 2, June, pp. 50-68.

Cornell, Andrew. 2004. "Deal Highlights Change in Card Market," *Australian Financial Review*, July 12.

_____. 2005. "American Express Aims for Expansion," *Australian Financial Review*, April 18.

Euromonitor International. 2005a. "Department Stores in Australia," October.

Euromonitor International. 2005b. "Grocery Stores, Food Retailers and Supermarkets in Australia," October.

Euromonitor International. 2005c. "Superstores and Warehouse Clubs in Australia," October.

Evans, David S., and Richard Schmalensee. 2005. "The Economics of Interchange Fees and Their Regulation: An Overview," Working Paper, May.

Goldberger, Arthur S. 1991. *A Course in Econometrics*, Cambridge, Massachusetts: Harvard University Press.

Graeme, James. 2003. "Loyalty is No Longer Paying Off," *Sunday Telegraph*, May 4.

Greene, William H. 1993. *Econometric Analysis*, New York: Macmillan, 1993.

Hanna, Jim. 2002. "Fed: Consumers to Save \$500m-Plus Under Credit Card Shake-Up," *AAP Newsfeed*, August 27.

Horan, Matthew. 2003. "Banks Up Card Fees Yet Again," *Sunday Telegraph*, September 21.

HSN Consultants. 2005a. *The Nilson Report*, no. 826, January.

_____. 2005b. *The Nilson Report*, no. 828, February.

_____. 2004. *The Nilson Report*, no. 805, February.

_____. 1996a. *The Nilson Report*, no. 617, April.

_____. 1996b. *The Nilson Report*, no. 618, April.

Huber, Peter J. 1964. "Robust Estimation of a Location Parameter," *Annals of Mathematical Statistics*, vol. 35, no. 1, March, pp. 73-101.

Johnston, Jack. 1983. *Econometric Methods*, New York: McGraw-Hill.

Katz, Michael L. 2001. "Network Effects, Interchange Fees, and No-Surcharge Rules in the Australian Credit and Charge Card Industry," Commissioned Report in *Reform of Credit Card Schemes in Australia*, Reserve Bank of Australia, August.

_____. and Harvey S. Rosen. 1998. *Microeconomics*, Boston, Massachusetts: Irwin/McGraw-Hill.

Maxwell, Miranda. 2005. "Tough Leader Wanted for Australia's Telstra," *Reuters*, May 10, online:

<http://www.reuters.com/newsArticle.jhtml?type=reutersEdge&storyID=8443245>.

McFarland, Lyndal. 2005. "Update: Australia's Virgin Blue Outlook Clouded by Fuel," *CNN Money*, May 18, online:

http://money.cnn.com/services/tickerheadlines/for5/200505180450DOWJONESDJONLINE000368_FORTUNE5.htm.

McKinnon, Michael. 2001. "Credit Card Profit Under Fire," *Courier Mail*, April 27.

Poirier, Dale J. 1976. *The Econometrics of Structural Change*, Amsterdam: North-Holland Publishing.

Poirier, Dale J. and Steven G. Garber. 1974. "The Determinants of Aerospace Profit Rates 1951-1971," *Southern Economic Journal*, vol. 41, no. 2 (October), pp. 228-238.

Reserve Bank of Australia. 2001. "Reform of Credit Card Schemes in Australia I: A Consultation Document," December.

_____. 2002. "Reform of Credit Card Schemes in Australia IV: Final Reforms and Regulation Impact Statement," August.

_____. 2004. "Payment System Board Annual Report 2004."

_____. 2005. "Table C01: Credit and Charge Card Statistics," April, online:

<http://www.rba.gov.au/Statistics/Bulletin/C01hist.xls>.

_____ and Australian Competition and Consumer Commission. 2000. "Debit and Credit Card Schemes in Australia: A Study of Interchange Fees and Access," October.

Rochet, Jean-Charles. 2003. "The Theory of Interchange Fees: A Synthesis of Recent Contributions," *Review of Network Economics*, vol. 2, no. 2, June, pp. 97-124.

- _____ and Jean Tirole. 2003. "An Economic Analysis of the Determination of Interchange Fees in Payment Card Systems," *Review of Network Economics*, vol. 2, no. 2, June, pp. 69-79.
- Schmalensee, Richard. 2002. "Payment Systems and Interchange Fees," *Journal of Industrial Economics*, vol. 50, no. 2, June, pp. 103-122.
- _____. 2003. "Interchange Fees: A Review of the Literature," *Payment Card Economics Review*, vol. 1, Winter, pp. 25-44.
- United States Bureau of Economic Analysis. 2005. "Table 8.2. Personal Consumption Expenditures by Major Type of Product, Not Seasonally Adjusted," May.
- United States Census Bureau. 2004. "2002 Economic Census: Industry Series," online: <http://www.census.gov/econ/census02/guide/INDSUMM.HTM>.
- Visa U.S.A. various years. "Payment Systems Panel Study."
- Weiner, Stuart E. and Julian Wright. 2005. "Interchange Fees in Various Countries: Developments and Determinants, Working Paper, April 25.
- Wooldridge, Jeffrey M. 2000. *Introductory Econometrics: A Modern Approach*, South-Western College Publishing.