Regulating Two-Sided Markets: An Empirical Investigation

Santiago Carbo Valverde
(U of Granada and Federal Reserve Bank of Chicago)

Sujit Chakravorti
(Federal Reserve Bank of Chicago)

Francisco Rodriguez Fernandez
(U of Granada)

Board of Governors
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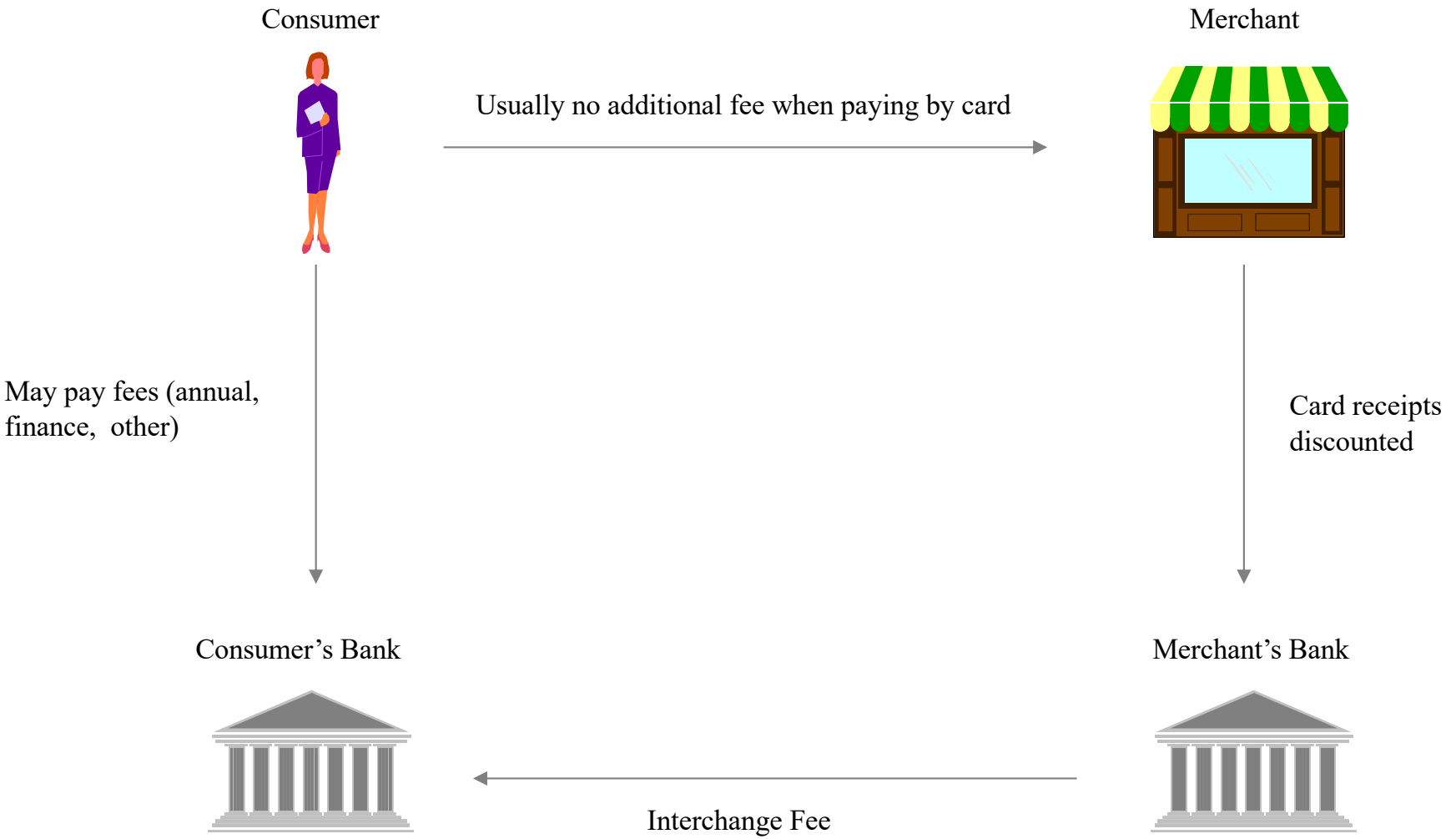
Payment Card Network Fees



Antitrust Scrutiny of Interchange Fees

- U.S. merchant interchange fee lawsuit
- Interchange fee regulation in Australia
- European Union interchange fee decision
- Bank of Mexico used moral suasion to lower interchange fees

Motivation to Regulate

- Price fixing among competitors
- Distortion of incentives to use efficient payment instruments
- Limit tax evasion

Key Questions

- What is the socially optimal interchange fee?
- Does competition among payment providers, networks, or instruments improve consumer and merchant welfare?
- Is there a network externality that justifies government intervention?

Balancing the Two Sides

- Cards benefit society when:

$$b_B + b_S \geq c_I + c_A$$

where c_I and c_A are issuer and acquirer costs respectively

- A transfer may be necessary to bring both sides on board
  - Consumer fee decreases when interchange fees increase
  - Merchant fee increases when interchange fees increase

Competition and Merchant Acceptance

- Platform competition does not necessarily improve the price structure although the total price may decrease resulting from platform competition
- Issuers may use surplus extracted elsewhere e.g. finance charges or interchange fees to entice rewards for consumer usage
- When merchant acceptance is far from complete, lowering interchange fees may result in higher merchant and consumer adoption resulting in greater usage

Interchange Fee Regulation

Year	Regulatory action	Regulatory body	Main implications for interchange fees
1999	REDUCTION OF INTERCHANGE FEES	THE SPANISH MINISTRY OF THE ECONOMY	Interchange fees were gradually reduced from around 3.5% in 1999 to 2.75% in July 2002
2002	INVESTIGATION ON THE SETTING OF INTERCHANGE FEES (MORAL SUASION)	SPAIN'S ANTITRUST AUTHORITY	Based on the European Commission on cross-border interchange fees analysis, Spain's Antitrust Authority requested the payment card networks to provide information on how interchange fees were determined
2003	PROPOSALS FROM THE NETWORKS ON THE SETTING OF INTERCHANGE FEES ARE REFUSED	SPAIN'S ANTITRUST AUTHORITY	The TDC refused several proposals of the networks on their setting of interchange fees
2005	A REDUCTION OF INTERCHANGE FEES AND A FINAL DATE FOR THE ADOPTION OF A COST-BASED MODEL	THE SPANISH MINISTRY OF INDUSTRY, TOURISM AND TRADE	From 2006 to 2009, the maximum credit card was reduced from 1.40% to .35% and the fixed per transaction fee for debit cards fell from .53 euro to .35 euro

Payment Card Adoption and Usage in Spain

	1997	2007
Total Number of Debit Cards (millions)	22	31
Total Number of Credit Cards (millions)	14	43
Total Debit Card Transactions (millions)	156	863
Total Credit Card Transactions (millions)	138	1037
Average Number of POS Transactions (per card)	7.1	27.8
Average Interchange Fee (earliest avail 2002)	1.71	.90

Our Dataset

- Data are from 45 Spanish banks from 1997:1 to 2007:4 (1,980 panel observations)
- Quarterly data on the number of payment cards by issuer, rival ATM density by issuer, number of transactions by payment card and consumer and merchant fees for debit and credit card transactions
- Merchant acceptance of debit and credit cards by issuer and crime rates in the area that the issuer operates

Our Dataset

- Average transaction-weighted merchant fee per acquirer per quarter
- Average cardholder fee per issuer per quarter
- Unfortunately, we do not have any cost data and cannot study issuer and acquirer profits

Summary Statistics

	Mean	Std. dev.	Min	Max
Debit card merchant acceptance by acquirer in regions where it has branches (%)	55.36	2.16	51.15	59.36
Credit card merchant acceptance by acquirer in regions where it has branches (%)	57.23	1.97	52.12	61.06
Debit card merchant acceptance in the network (%)	58.02	2.02	53.60	61.94
Credit card merchant acceptance in the network (%)	59.37	1.92	53.51	62.49
Merchant debit card discount fee by acquirer (%)	1.36	1.18	0.36	3.18
Merchant credit card discount fee by acquirer (%)	2.03	1.93	1.06	3.56
Number of debit cards by issuer (millions)	0.48	0.72	0.02	4.2
Number of credit cards by issuer (millions)	0.55	0.94	0.01	4.9
Number of debit cards in the network (millions)	16	5.8	12	21
Number of credit cards in the network (millions)	20	6.3	10	32
Debit card transactions at the POS by acquirer (millions)	11.14	34.18	0.11	88.1
Credit card transactions at the POS by acquirer (millions)	12.28	56.26	0.09	94.7
Debit card transactions by issuer (%)	1.21	4.16	0.04	10.27
Credit card transactions by issuer (%)	1.60	5.21	0.02	12.56
Rival ATM density by issuer (ATMs/km^2)	0.9	0.4	0.3	1.5
Annual credit card fee by issuer (euros)	15	10	3	35

Empirical Model

- Use simultaneous equation estimation techniques (GMM) distinguished by extensive (adoption) and intensive (usage) margin and type of card
- Focus on growth rates (difference of logs)
- Control variables include *bank size*, *crime rate* and *time trend*
- 4 regulatory dummies for the identified regime shifts
- Bank fixed effects and clustered standard errors

Empirical Model (exclusion restrictions)

Merchant extensive margin

- **Exclusion restrictions**: *merchant discount fees* (prediction: as fees decrease, merchant acceptance increases) and *number of cards* (prediction: as adoption of cards increases, there are more potential merchant sales).

Cardholder extensive margin

- **Exclusion restrictions**: *Lagged merchant acceptance* (prediction: increased merchant acceptance should increase the value of debit cards and spur greater adoption). For debit cards, density or rivals' ATM (indicator of increased cash acquisition costs to a given bank's customers). For credit cards, we include annual fees (no annual fees for debit cards).

Merchant intensive margin

- **Exclusion restrictions**: *an interaction term of merchant acceptance by acquirer and the total number of cards in that network* (prediction: as the interaction of variables increases, the transactional volume should increase).

Cardholder intensive margin

- **Exclusion restrictions:** *interaction of merchant acceptance in the network and the number of debit cards issued by a bank* (prediction as the interaction term increases, the number of transactions per card should increase)

Results for Debit Card (adoption)

	Merchant extensive margin	***Consumer extensive margin***
	Merchant acceptance by acquirer($MACCD_{it}$)	*Number of debit cards by issuer ($DCARDS_{it}$)*
Constant	0.24E-11 (0.001)	0.21E-12 (0.001)
Merchant acceptance in the network (lagged)	-	0.0363** (0.012)
Merchant debit card discount fee	-0.0429** (0.005)	-
Number of debit cards in the network	0.0015** (0.002)	-
Rival ATM density	-	.1637** (0.014)
Bank size (in the card network)	0.0122 (0.021)	0.0443** (0.018)
Crime rate	-0.0268 (0.161)	-0.0123 (0.852)
Linear time trend	0.0193** (0.005)	0.1951** (0.018)
Regulation dummy 1999	-0.0234* (0.013)	0.0926** (0.011)
Regulation dummy 2002	0.0116** (0.008)	-0.1425* (0.016)
Regulation dummy 2003	0.0155** (0.007)	-0.1007 (0.023)
Regulation dummy 2005	0.0126** (0.005)	-0.1852** (0.035)
Adjusted R^2	0.82	0.71

Results for Debit Cards (usage)

	Merchant intensive margin	***Consumer intensive margin***
	Debit card transactions per POS terminal	*Debit card transactions per card*
Constant	0.04E-13 (0.001)	-0.03E-10 (0.001)
Merchant acceptance by acquirer X Number of debit cards in the network	0.0359** (0.004)	-
Merchant acceptance in the network X Number of debit cards by issuer	-	0.0458** (0.009)
Rival ATM density	-	0.0630* (0.018)
Bank size (in the card network)	0.0441* (0.004)	0.0112 (0.013)
Crime rate	0.1503 (0.323)	0.1130 (0.692)
Linear time trend	0.1853** (0.001)	0.1138** (0.002)
Regulation dummy 1999	0.0226* (0.004)	0.0963** (0.004)
Regulation dummy 2002	0.1308** (0.008)	0.0635* (0.008)
Regulation dummy 2003	0.0921* (0.005)	0.1002* (0.019)
Regulation dummy 2005	0.2528** (0.011)	0.2331** (0.011)
Adjusted R^2	0.89	0.71

Results for Credit Cards (adoption)

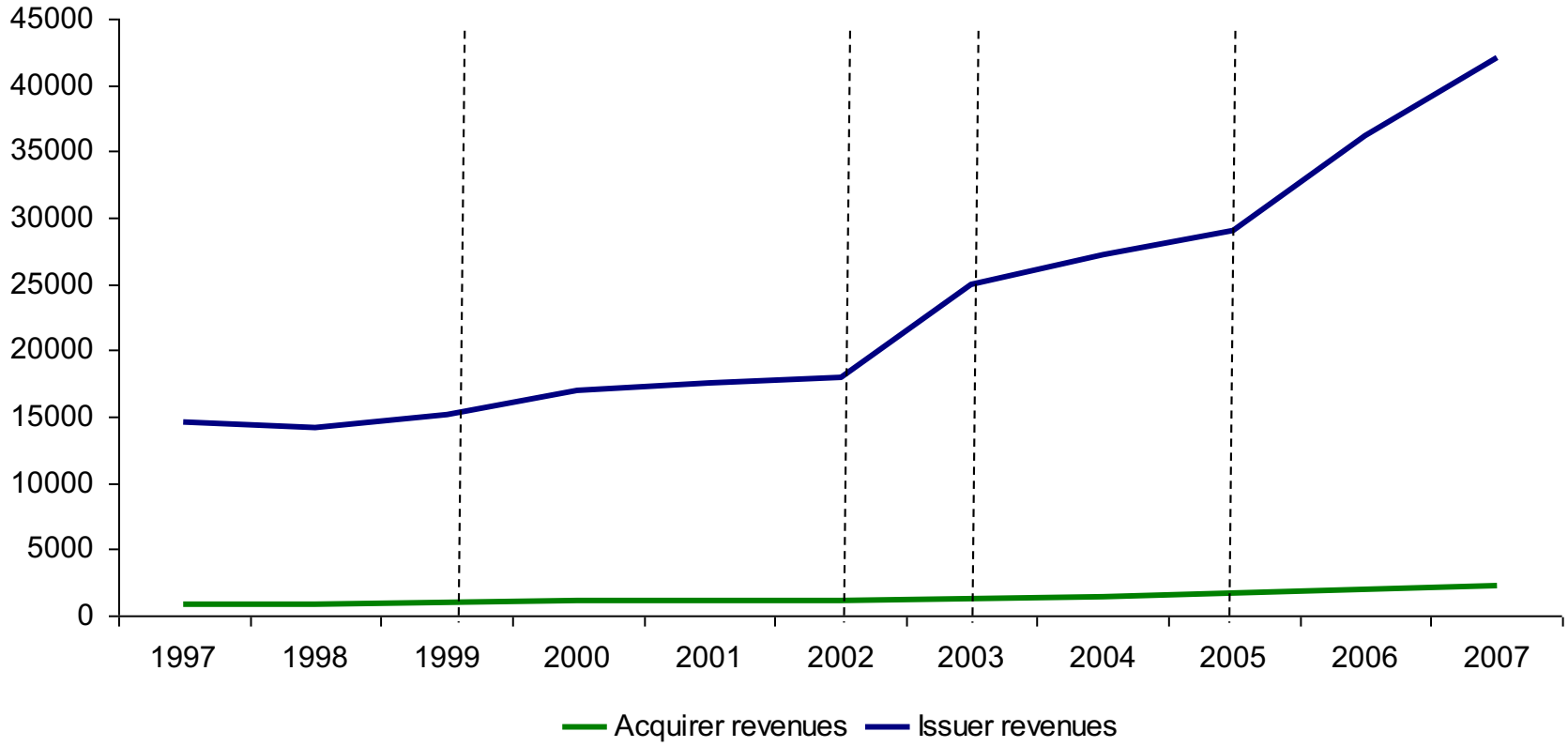
	Merchant extensive margin	***Consumer extensive margin***
	Merchant acceptance by acquirer	*Number of credit cards by issuer*
Constant	-0.30E-06 (0.001)	0.53E-06 (0.001)
Merchant acceptance in the network (lagged)	-	0.2985** (0.007)
Merchant credit card discount fee	-0.1585** (0.023)	-
Number of credit cards in the network	0.1630** (0.018)	-
Annual credit card fee	-	0.6023 (0.730)
Bank size (in the card network)	0.0045* (0.001)	-0.0013 (0.019)
Crime rate	0.0696* (0.012)	0.0651** (0.018)
Linear time trend	0.1694** (0.001)	0.1388** (0.042)
Regulation dummy 1999	-0.0950 (0.011)	0.0372** (0.004)
Regulation dummy 2002	0.0633 (0.071)	-0.0231 (0.032)
Regulation dummy 2003	0.1124** (0.055)	0.2651** (0.018)
Regulation dummy 2005	0.2023** (0.018)	0.2955** (0.009)
Adjusted R^2	0.87	0.93

Results for Credit Cards (usage)

	Merchant intensive margin	***Consumer intensive margin***
	Credit card transactions per POS terminal	*Credit card transactions per card (issuer perspective)*
Constant	0.10E-07 (0.001)	-0.13E-05 (0.001)
Merchant acceptance by acquirer X Number of credit cards in the network	0.2243* (0.005)	-
Merchant acceptance in the network X Number of credit cards by issuer	-	0.1931** (0.002)
Bank size (in the card network)	-0.1814 (0.226)	0.0108** (0.003)
Crime rate	0.0995* (0.008)	0.0550* (0.016)
Linear time trend	0.2201** (0.006)	0.1864** (0.002)
Regulation dummy 1999	0.0428 (0.063)	0.0792* (0.008)
Regulation dummy 2002	0.2633** (0.004)	0.2131** (0.002)
Regulation dummy 2003	0.1491* (0.003)	0.1016* (0.004)
Regulation dummy 2005	0.2950** (0.009)	0.3056** (0.004)
Adjusted R^2	0.68	0.95

Acquirer and issuer revenues (1997-2007)

(€ million)



Acquirer and issuer revenues (1997-2007)

(€ million)

	Bank (debit card) acquiring revenues	*Bank (debit card) issuing revenues*	*Bank (credit card) acquiring revenues*	*Bank (credit card) issuing revenues*
Constant	0.11E-07* (0.001)	0.09E-10* (0.001)	0.04E-09* (0.001)	0.09E-10 (0.001)
Merchant acceptance by acquirer X Number of debit cards in the network	0.0362* (0.014)	-	-	-
Number of debit cards by issuer X Merchant acceptance in the network	-	0.1432** (0.008)	-	-
Merchant acceptance by acquirer X Number of credit cards in the network	-	-	0.0838** (0.008)	-
Number of credit cards by issuer X Merchant acceptance in the network	-	-	-	0.1743** (0.005)
Rival ATM density	0.0020 (0.004)	0.00672 (0.005)	-	
Bank size (in the card network)	0.0837** (0.009)	0.1284** (0.0010)	0.1924** (0.005)	0.0754** (0.004)
Crime rate	0.0346 (0.047)	0.0182 (0.019)	0.0305 (0.034)	0.0310 (0.040)
Liner time trend	0.6684** (0.003)	0.6577** (0.004)	0.5938** (0.006)	0.8036** (0.006)
Regulation dummy 1999	0.0110 (0.011)	0.0439 (0.082)	0.01432 (0.033)	0.0320 (0.077)
Regulation dummy 2002	0.0189 (0.019)	0.0916** (0.003)	0.0316 (0.031)	0.0671** (0.005)
Regulation dummy 2003	0.04461* (0.009)	0.1432** (0.004)	0.0925* (0.010)	0.1946** (0.006)
Regulation dummy 2005	0.031 (0.027)	0.1673** (0.001)	0.1063 (0.012)	0.2838** (0.003)
Adjusted R^2	0.42	0.88	0.44	0.89

Conclusion

- Our results suggest that reductions in interchange fees has had a positive effect on consumer and merchant adoption and usage
- Banks may be better off because the increase in the volume of transactions offsets the decrease in per-transaction revenue
- However, once the network (adoption and usage) externality is eliminated or usage and adoption do not increase sufficiently, interchange fee regulation may no longer improve social welfare