How Changes in Payment Card Interchange Fees Affect Consumers Fees and Merchant Prices: An Economic Analysis with Applications to the European Union

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A number of jurisdictions are considering imposing price caps on the interchange fees that card issuers receive from merchant acquirers when cardholders pay with their cards. Several have already done so. This paper examines the net impact of these price caps on consumers. The economics of pass-through predicts that issuers would pass on some of their lost revenues to consumers in the form of higher fees while merchants would pass on some of their reduced costs to consumers in the form of lower prices. The net impact depends on the relative magnitude of these two effects. While the answer depends on the parameters for the particular jurisdiction that is imposing the caps, this paper shows that there are asymmetries between the issuer and merchant side that are likely to result in consumers incurring greater costs from increased fees than they obtain in lower costs from merchants thereby resulting in a loss of consumer welfare. Banks are likely to have higher pass-through rates than merchants so that the long-run impact on bank fees is greater than on merchant prices. While the analysis is general we pay particular attention to the situation in the European Union.

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I. Introduction

This paper presents an economic analysis of how changes in interchange fees for payment cards are passed through to final consumers. It shows that a decrease in the interchange fee would tend to increase the fees charged by banks that issue cards to consumers but would tend to decrease the prices charged to consumers by merchants that accept cards. The net effect on consumers depends on the magnitude of these countervailing effects. The paper shows how an analysis of competitive conditions in markets can provide some guidance on the likely overall effect.

Although some previous studies of interchange fee regulations have recognized these competing effects there has been little rigorous analysis of the question.[1] That is unfortunate since the sign and magnitude of the overall effect on consumers is relevant for the debate over interchange fee regulation. It is generally accepted that antitrust should benefit consumers, at least in the long run. Government intervention is often justified on the grounds that it is needed to correct some "market failure" that prevents competition from maximizing consumer welfare. Competition authorities take consumer interests as paramount in enforcing the competition

[1] In the United States, Federal Reserve economist, Mark Manuszak, in response to questions posed regarding the impact of recently proposed debit card interchange fee regulations reported to the Federal Reserve Board of Governors that, "any savings that consumers might realize at point of sale could be offset by fee increases at their banks, as well as changes in terms that debit cardholders face for card use and deposit accounts. So, specifically, account holders at covered institutions may face higher fees for debit card use or additional account fees …. [I]t's hard to anticipate what the overall [e]ffect on consumers will be." "Federal Reserve Board of Governors Holds an Open Meeting," CQ Financial Transcripts, December 16, 2010, at pp. 10-11 of 28. The Reserve Bank of Australia simply asserted that merchants would pass on all of the their savings on interchange fees to consumers: "[n]o concrete evidence has been presented to the Board regarding the pass-through of these saving, although this is not surprising as the effect is difficult to isolate…[d]espite the difficulties of measurement, the Board's judgment remains that the bulk of these savings have been, or will eventually be, passed through into savings to consumers." See "Reform of Australia's Payments System Preliminary Conclusions Of The 2007/08 Review," Reserve Bank of Australia, April 2008, at pp 22-23, available at http://www.rba.gov.au/payments-system/reforms/review-card-reforms/pdf/review-0708-pre-conclusions.pdf. The European Commission estimated the extent to which banks pass on interchange fee revenues to consumers in the form of lower prices from data on a panel of European countries; See "Interim Report I Payment Cards," European Commission, April 12, 2006, ("Interim Report I"). However, there are severe econometric issues with the methods that it used which render its estimates unreliable, as we discuss further below.

laws.[2] Evidence that a particular reduction in interchange fees increases consumer welfare could confirm the desirability of that reduction, while evidence that the reduction decreases consumer welfare raises questions on the amount of the reduction and possibly the desirability of the intervention.[3]

This paper is related to and complements several strands of the literature on interchange fee regulation. First, there is a large theoretical literature on the socially optimal level of interchange fees and on whether card schemes have an incentive to set these fees too high. We do not address that literature, but simply provide a local analysis of a further reduction of the fees already set in Europe, and consider if that reduction would improve overall consumer welfare.[4] Furthermore, it provides a check on indirect empirical approaches towards designing socially optimal interchange fees such as the tourist test.

Second, there is an empirical literature on how interchange fee reductions have altered consumer fees and merchant prices in jurisdictions that have lowered fees.[5] This paper makes

[2] Joaquín Alumina, the European Commission's Commissioner of Competition, has stated: "[C]ompetition policy is a tool at the service of consumers. Consumer welfare is at the heart of our policy and its achievement drives our priorities and guides our decisions. Our objective is to ensure that consumers enjoy the benefits of competition, a wider choice of goods, of better quality and at lower prices." See "Competition and Consumers: the Future of EU Competition Policy," a speech delivered by Joaquín Almunia on European Competition Day, May 12, 2010, available at http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/233&format=HTML&aged=0&language=EN&guiLanguage=en.

[3] It is possible that a horizontal agreement could be permitted under Article 101(3) TFEU if that agreement provides sufficient benefits that are shared with consumers.

[4] We do not present an analysis of social welfare. To move from our analysis to an analysis of social welfare one would have to further consider, and quantify, producer surplus and dynamic efficiencies resulting from improved performance on payment methods. Nevertheless, when policies harm consumers there should be an exceptionally strong showing that there are countervailing economic efficiencies that would warrant this. Moreover, our analysis suggests that the net effect of interchange fee reductions is to transfer wealth from consumers to merchants and that this policy is more consistent with rent-seeking behavior on the part of merchants than with sound public policy.

[5] See Howard Chang, David S. Evans, and Daniel D. Garcia Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," *Review of Network Economics*,

advances in the economic framework for assessing the pass-through and likely effects of reductions.

Third, there is a recent literature, which is closely related to this paper, which uses evidence on market structure and historical fluctuations in interchange fees to assess the likely net effect on consumers.[6] This paper provides a more detailed analysis of the economics of pass-through as applied to the payments card industry and explores its relevance to the situations in the highly diverse Member States of the European Union.

The paper reaches three main conclusions.

1) Government authorities can obtain considerable insights into the impact of interchange fee reductions on consumers by applying the "economics of pass-through" literature to the particular circumstances of the payment card systems, banking, and retail markets in their jurisdictions.

2) The analysis confirms the general finding of the two-sided markets literature that the ability to improve consumer welfare through government regulation of the interchange fee is very dependent on the specific empirical facts of the market. One would reach very different conclusions on the impact of regulation on consumers in a jurisdiction with highly competitive retail industries and

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4:4 (2005); Robert Stillman, William Bishop, Kyla Malcolm, and Nicole Hildebrandt , "Regulatory intervention in the payment card industry by the Reserve Bank of Australia," CRA International, (2008) ("CRA International Report"); and Santiago Carbo Valverde, Sujit Chakravorti, and Francisco Rodriguez Fernandez, "Regulating Two-Sided Markets: An Empirical Investigation," ECB Working Paper No. 1137, (2009), available at http://ssrn.com/abstract=1522023.

[6] David Evans, Robert Litan, and Richard Schmalensee , "The Net Effects of the Proposed Durbin Fee Reductions on Consumers and Small Businesses," *Lydian Journal*, Issue 5(2011), available at http://www.pymnts.com/assets/Lydian_Journal/LydianJournal-March-2.pdf and David Evans, Robert Litan, and Richard Schmalensee, "Economic Analysis of the Effects of the Federal Reserve Board's Proposed Debit Card Interchange Fee Regulations on Consumers and Small Businesses," Submission to the Federal Reserve Board of Governors, (2011), also available at http://ssrn.com/abstract=1769887.

highly concentrated retail banking (consumers likely to benefit from a reduction) than with very concentrated retail industries and highly competitive retail banking (consumers unlikely to benefit from a reduction).

3) A review of the competitive circumstances in many European countries suggests that it is unlikely that significant reductions in interchange fees would result in an improvement in the situation of consumers at least through price effects. The impact of interchange fee reductions on consumer banking fees is likely to be large and quick. Banks would experience a significant reduction in revenue for their current accounts. The evidence strongly suggests that banks would increase fees to largely compensate for this loss. The reductions in merchant prices to consumers are likely to be small and delayed. Merchants would receive a small decrease in their overall costs. The evidence suggests that they would not pass on much of this savings to consumers in the short run and on average only about half in the long run.

The paper is organized as follows. Section II describes the economics of four-party systems. Section III summarizes what economists have learned about the pass-through of cost changes to final consumer prices. Section IV applies this to assess the impact of interchange fee reductions on retail banking prices, while Section V applies it to merchant pricing. Section VI reports estimates of the overall effect of an interchange fee reduction under alternative assumptions. Section VII concludes.

II. Economics of Four-Party Payment Systems

Payment card systems are two-sided platforms that facilitate transactions between consumers and merchants by providing a means of payment for both parties. Some payment

card systems are the sole intermediary between merchants and cardholders and are known as three-party (or three-corner) systems. Most payment card systems have additional intermediaries that stand between the card network and the merchant (merchant acquirers) and between the card network and consumers (card issuers). They are traditionally called four-party (or four-corner) systems—merchant, acquirer, issuer, and cardholder—even though they are technically five-party systems after including the network. This paper focuses on four-party systems.[7]

Economic models of the payment card industry typically focus on the four-party model and make a variety of simplifying assumptions.[8] These may include assuming that one side of the platform (typically the acquiring side) is perfectly competitive and that the card network is a monopolist. These models then analyze the determinants of price levels and price structure. Of particular interest, in many of these models, is the interchange fee that determines the relative prices paid by merchants versus cardholders for the payment transaction services provided by the platform. The network charges the interchange fee to acquirers and pays the interchange fee to issuers.[9] Under perfect competition on the acquiring and issuing side the interchange fee is fully passed through as a cost to merchants and received as a benefit by cardholders. It thus determines the prices paid by merchants and cardholders. While these are

[7] The analysis is similar for three-party systems in which case the issuing and acquiring functions are integrated with network thereby eliminating two of the five arms-length contracts discussed below.

[8] See Jean-Charles Rochet and Jean Tirole, "Cooperation among Competitors: Some Economics of Payment Card Associations," *The RAND Journal of Economics*, 33:4 (2002), pp. 549-570 and Julian Wright, "The Determinants of Optimal Interchange Fees in Payment Systems," *The Journal of Industrial Economics*, 52:1 (2004), pp. 1-26.

[9] The models do not assume that the acquirer necessarily pays the fee to the issuer; the direction of the payment is determined by profit maximization. Although the acquirer does pay the fee to the issuer in most payment systems in reality there are some—such as the Australian domestic debit scheme—in which the issuer pays the acquirer.

useful modeling assumptions that make the mathematics tractable, the actual economics of the four-party systems is more complex in ways that can affect the impact of interchange fees on consumer fees and merchant prices. This section explains these details, which can vary greatly across countries and across payment systems within countries.

A. Card Issuing

In most countries the card network contracts with banks to issue cards under its brand. For many countries the debit card is the predominant type of card that is issued. The debit card provides a method that a checking account customer can use for accessing funds in her checking account. She can use the debit card to withdraw cash at cash machines that are connected to the bank or to pay with funds in her checking account at merchants that accept the debit card brand for payment.[10] There is no direct competition among issuers for consumers to take debit cards. Rather, banks compete for checking account customers and the debit card is included in the bundle of services provided by the bank.

Credit cards, on the other hand, are not necessarily linked to the checking account. Consumers have the choice of paying off their charges over the course of month in full, often by making a payment from their bank account, or taking out a loan for some or all of these charges. Credit cards are sometimes provided by the bank to its retail banking customers and in other cases provided by banks that specialize in offering credit cards to consumers regardless of whether they have a checking account at that bank.

[10] In some countries the bank provides a "deferred debit card" in which case the funds are swept from the checking account periodically, say at the end of the month, and which provide a line of credit.

B. Card Acquiring

Typically the acquirer and its sales agents sign up merchants to accept card payments.[11] In some markets the acquirer signs up merchants to accept only one card brand, whereas in most markets, the merchant is signed up to accept multiple card brands. The acquirer then works with the merchant to get the appropriate equipment and communications systems installed to accept cards and transmit the relevant information to the acquirer when a payment card transaction occurs. The acquirer typically has a contract with the merchant that determines the services that the acquirer will provide the merchant and the prices the merchant will pay for those services.

The most important service the acquirer provides is acting as an intermediary between the merchant and the network, whereby the acquirer assumes ultimate responsibility for merchant settlement risk.[12] The acquirer is compensated by a per-transaction charge for handling the acquiring services; while there may be fixed transaction charges most of the fees collected by merchants come from charges that are based on a percent of the transaction amount. In some cases the acquirer charges merchants its own fee plus the applicable

[11] Acquirers may delegate some of these tasks to other firms. In some countries such as the United States acquirers are financial institutions are participating members in a networks such as MasterCard or Visa and have the unique ability to enter into contracts with merchants on behalf of the card network. But many of these acquirers then either delegate most of processing, risk management and other work to other companies or in some cases in effect rent their licenses to larger firms.

[12] When the consumer pays with their card an electronic communication is sent from the merchant via the acquirer to the card network and then back to the card issuer to authenticate the cardholder and determine if funds are available. Once a successful transaction takes place and it is time for settlement, the acquirer receives the funds on behalf of the merchant and ultimately deposits those fees less any "off the top" service charges in the merchant account. In the event of a fraudulent transaction, return or other standard exception, the acquirer facilitates appropriate reversal of the transaction, and assessment of any chargeback or exception fees according to the rules established by the network. In the event of merchant fraud or bankruptcy, the acquirer—either on its own or as a result of a requirement by the network—will assume the risk of outstanding merchant transactions that require refunds to consumers. In addition, the acquirer is typically accountable to the networks for ensuring that merchant business practices do not result in excessive reversals or chargebacks, and as such often levy fines against acquirers when merchants exceed certain fraud, risk or other exception thresholds.

interchange fee for the transaction, which varies by card brand, type of card, kind of transaction, and possibly other factors. This is known as "interchange plus pricing" and is common for acquirer contracts with large merchants. In other cases, particularly for small and medium size enterprises, the acquirer charges the merchant a single all-inclusive fee. With "blended rate pricing" the merchant acquirer does not distinguish between different brands and types of cards.

The acquiring side of the business exhibits considerable variety across countries. There are several major ways in which acquiring is structured.

1) Competitive non-exclusive acquiring. In this case the card networks enter into contracts with multiple acquirers who compete with each other for merchants. The acquirers can represent multiple systems and present merchants with the ability to take cards from multiple brands. Card issuers can also act as acquirers.

2) Competitive exclusive acquiring. The acquirer only works for one card system and as a result merchants have to contract with multiple acquirers to accept the brands of multiple networks.

3) Sole acquirer. The banks in a country, or an individual card network, grant a single acquiring license. In one variation of this model the banks hold an equity interest in the acquirer and receive dividends based on the profitability of the acquirer.

Bank issuers may participate directly or indirectly in the acquiring business in some countries. Banks that issue cards may also acquire merchants. This situation gives rise to "on-us" transactions where the merchant and the cardholder are both serviced by the same bank. The interchange fee in this case nets out since the bank that pays the fee and the bank that

receives the fee are one in the same. In other countries, as noted above, banks may receive a dividend or some other form of compensation from the merchants. We do not treat these varied organizational arrangements in detail in our analysis below but we would recommend that regulators consider them carefully in their particular jurisdictions to estimate the impact on consumers accurately.

C. Card Schemes

The card networks typically earn money through fees they charge merchant acquirers and merchant issuers. Public information on these is usually not available. In the United States, however, a study by the Federal Reserve Board found that on average payment networks charge acquirers 4.1 cents per transaction and issuers 4.5 cents per transaction; those figures compare to an average of 44 cents for interchange fees. Thus the networks earned 48 percent of their net network fees revenue from acquirer assessments and 52 percent from issuer assessments.

The organization of the card networks varies across jurisdictions. Historically, most card systems were membership organizations in which the system was owned by the issuers and acquirers or sometimes just the issuers.[13] The two global networks, MasterCard and Visa, became publicly owned equity corporations in 2006 and 2008 respectively; although some banks have equity the issuers and acquirers do not have majority ownership.[14]

[13] In some countries such as Brazil the card system is owned by some of the banks that issue cards while other banks are licensed to issue cards but do not have an ownership position.

[14] Visa Europe is not owned by Visa International and has continued as an association of banks.

D. Flow of Funds among Parties

With this background in mind let us now consider a card network that has a 1.0 percent interchange fee and explore how that fee flows to the various parties based on a €100 transaction. The €1 interchange fee is paid by the acquirer to the issuer. The acquirer charges the merchant for its services using either on an interchange-fee plus (in which case the merchant pays €1) or a blended rate contract (in which case the acquirer has selected a rate that reflects its interchange fee cost). The card network does not receive anything from the interchange fee but assesses its own separate fees to the acquirer (which would become part of the cost basis for the acquirer) and the issuer.[15]

E. Interchange Fees and Contracts between Payment System Participants

The remainder of this paper will focus on the impact of changing the interchange fee exogenously through government-imposed price caps. A four-party system involves five "contracts" between the parties that involve prices and the delivery of services. In some cases the contract is explicit: acquirers generally have a formal contract with the merchant. In other cases it may be informal: banks may tell consumers what they are getting with their bank accounts but there may be no formal agreement. Importantly, these contracts spell out a price, a variety of services that will be provided, and rights and obligations of the parties. A price cap that lowers the interchange can affect the contracts between

[15] That does not mean, however, that the network is indifferent to the interchange fee. The card network uses the interchange fee to affect the incentives faced by merchant acquirers and card issuers and through them merchants and consumers. A lower interchange fee encourages more merchant acceptance by effectively lowering the cost to the acquirer and ultimately the merchant; a lower interchange fee also reduces the revenue that issuers receive from cards and therefore reduces their incentives to issue cards and in turn increases the prices that consumers have to pay for cards. As is well known in the two-sided market literature the card network will balance these considerations to maximize the volume of transactions on the network since it will make more money if there are more transactions. It is actually a bit more complicated and depends in part on the ownership structure of the network (in particular whether the issuers or acquirers are owners).

1) the acquirer and the merchant as a result of the acquirer's costs going down;

2) the merchant and the consumer as a result of the merchant's costs going down;

3) the network and the acquirer as a result of the acquirer's costs going down;

4) the issuer and the cardholder as a result of the issuer's revenue going down; and,

5) the network and the issuer as a result of the issuer's revenue going down.

A proper accounting of the effects of an interchange fee change has to consider all of these contracts. In each case the parties can adjust both the prices and the services provided. In the remainder of this paper we focus only on the price recognizing that in reality the parties could also adjust services and therefore the "quality-adjusted prices" being paid between the parties in the system. We further assume that the network does not change its assessments on acquirers and issuers as a result of the change in the interchange fee and therefore focus on contracts 1, 2, and 4.[16]

When the interchange fee changes, the costs and revenues of the various parties in the system change. The "economics of pass through" is the framework used by economists to evaluate how these sorts of changes ultimately affect the final prices to consumers.

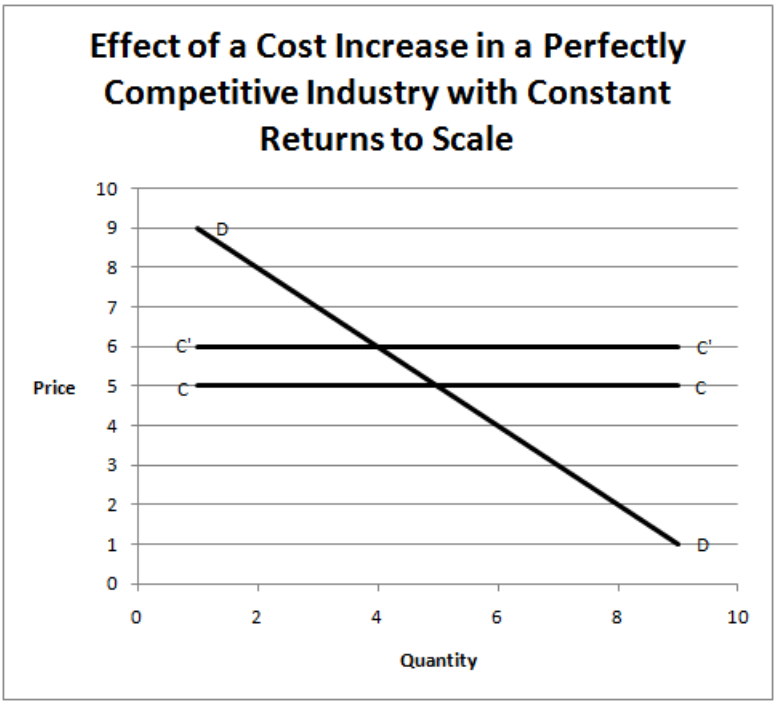
III. The Economics of Pass-Through

Beginning students of economics often learn a simple and elegant result. When there is perfect competition among firms and there are constant unit costs of production 100 percent of a change in costs will be passed on to consumers in the form of higher or lower prices. The situation is shown in Figure 1. DD reflects the demand schedule facing consumers. CC is the

[16] The incentive for the network to change its fees has not been explored in the literature and is beyond the scope of this paper.

constant average and marginal cost of production; CC also reflects the industry supply curve since firms will be willing to supply as much output as the market wants at that price which covers costs. The competitive price and output level is at the intersection of CC and DD. If CC increases by €1.00 to C'C' then it is apparent from the diagram that the price increases by €1.00 as well. If, for example, the government imposed a €1.00 tax on each unit of output that the producer had to pay, the price to consumers would simply rise by this €1.00. It is easy to verify that the result does not depend on the shape of the demand schedule; replacing the linear schedule in the diagram with any proper nonlinear demand schedule would give the same result.

Figure 1



Economics does not provide such a specific conclusion about the pass-through of costs when markets deviate from perfect competition with constant returns to scale. The percent of the cost change that is passed through to consumers in price changes depends on details such as

the market structure, extent of product differentiation, the competitive interactions among the firms, and the precise shape of the demand schedule around the profit-maximizing price and output level before the cost change.[17]

As a general matter, we would expect that when firms are not in a competitive industry with constant returns to scale they would only pass on a portion of a cost change to consumers—and thereby share both the pain and gain of cost changes with consumers. We can motivate this result by considering the situation for a firm that faces a downward sloping demand curve and therefore has some market power to set its own price. Consider the situation in which the government imposes a €1.00 tax on each unit of output sold by the firm. Figure 2 shows how this affects the setting of the profit-maximizing price. At least in the case of linear demand the firm will increase its price by less than €1.00.[18] The firm passes through only a portion of the cost increase to consumers and absorbs a portion through reduced profit. There is a similar result when the firm has a cost decrease. Consider the case in which the tax falls by €1.00. The firm will lower its price to consumers.

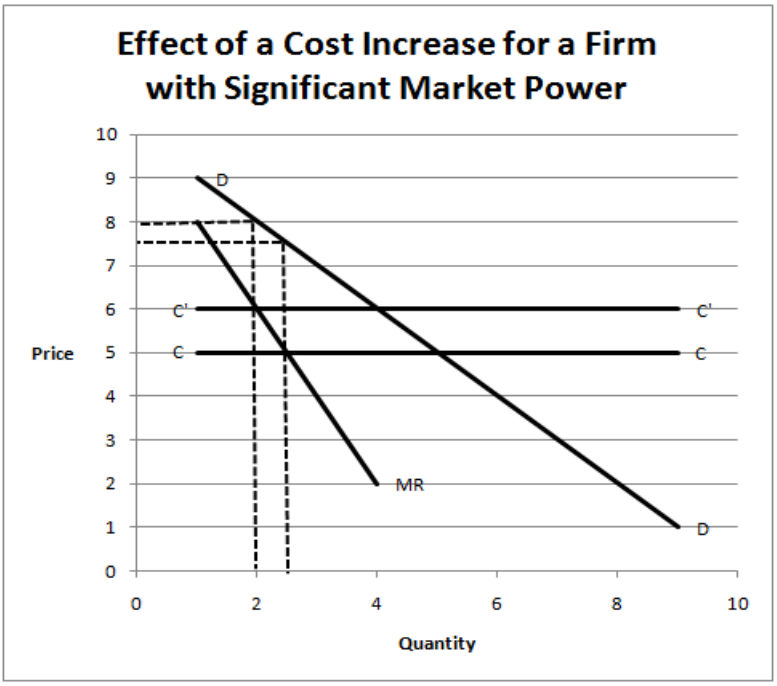
This result exposes two common fallacies. The first is that a monopolist would keep the benefits of a cost reduction for itself; it will not because with lower costs it can make more profits by lowering price and increasing sales. The second is that a monopolist would just take

[17] See E. Glen Weyl, "Pass-Through as an Economic Tool," Working Paper, (2008), available at http://economics.uchicago.edu/pdf/weyl_110308.pdf ("Weyl 2008").

[18] As Weyl observes the impact of a cost change on final prices depends critically on the precise shape of the demand schedule around the equilibrium from which prices are changing in addition to the nature of competition and costs. While economists write down linear demand schedules for convenience there is no reason to believe that schedules are linear in the real world. If the demand schedule is non-linear then, depending on the curvature around the equilibrium, a cost increase could result in varying degrees of pass-through including possibly more than 100 percent (what is known as cost amplification).

a cost increase from its profits; it will not because it can lower the reduction in profits by raising prices somewhat.

Figure 2



A number of economists have studied empirically the extent to which cost changes have affected final prices. Many of these studies have looked at situations in which the government imposed a tax that producers had to pay, or the extent to which changes in foreign exchange rates effect have on import prices and the prices of domestic goods. The studies are summarized in Appendix A.[19] Overall these studies find that the pass-through rate varies in real-world markets from 22-74 percent in the long run with a median of approximately 50 percent in the long run.[20] For studies that focused on Europe the pass-through rates range from

[19] We have reported recent significant papers on pass through that we have identified in searching the literature, that cover a range of products, and that provide an estimate of the pass-through rate.

[20] We took the median of the estimates reported in Appendix A. For papers reporting a range, we took the midpoint of the range. For the Campa and Goldberg paper, we used the (larger) estimate reported for the one year rather than one quarter pass-through rate.

19 to 66 percent in the long run with a median of approximately 53 percent. We will use 50 percent as the long-run pass-through rate on the merchant side for our illustrative calculations below.

The previous studies have focused on long-run price changes as a result of cost changes. Economists have also studied the degree to which prices are sticky—how long does it take for firms to changes their prices in response to cost shocks. These studies, summarized in Appendix B, have found that merchants do not adjust prices quickly.[21]These studies typically find that prices stay constant for about a year or more. Moreover, prices appear to be particularly sticky in Europe.[22]

The cost and other shocks analyzed in the price-stickiness literature are large enough to enable the researchers to measure their effects on prices. Dhyne et al. calculated the average price decrease in the ten European countries they analyzed was 10 percent.[23] Nakamura and Steinsson calculated the median price reduction in their analysis to be 9.2 percent.[24] Klenow and Kyrstov observed a median price change of 9.7 percent and found that only 12.1 percent of

[21] We have reported recent significant papers on price stickiness that we have identified in searching the literature, that cover a range of products, and that have an estimate of the duration over which prices are sticky.

[22] One study found that in Europe only about 40 to 64 percent of the equilibrium price adjustment needed take place within two years, in contrast to about 58 to 80 percent in the United States. See Rita Duarte and Carlos Robalo Marques, "Wage and Price Dynamics in the United States and the Euro Area," *Banco de Portugal Economic Bulletin*, Autumn 2009, pp. 173-189. The shocks that necessitate price adjustments in this paper relate to demand and technological shocks, so the paper is not directly estimating the pass-through of costs.

[23] Emmanuel Dhyne , Luis J. Álvarez, Hervé Le Bihan, Giovanni Veronese, Daniel Dias, Johannes Hoffmann, Nicole Jonker, Patrick Lünnemann, Fabio Rumler and Jouko Vilmunen, "Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data," *Journal of Economic Perspectives*, 20:2 (2006), pp. 171-192.

[24] Emi Nakamura and Jón Steinsson, "Five Facts About Prices: A Reevaluation of Menu Cost Models," *Quarterly Journal of Economics*, 123:4 (2008), pp. 1415-1464.

all price changes were less than 1 percent in absolute value.[25] These studies may not therefore accurately predict what happen for very small changes in costs. It turns out that this is important for our discussion of merchant pass through since the reduction in the average cost for merchants, as a percent of price, from even drastic interchange fee reductions is small in percentage terms (typically less than 0.5 percent) and tiny in absolute terms (typically less than 4 cents on a typical €50 purchase by a consumer). The price-stickiness literature finds that firms appear to try to minimize menu costs by avoiding the types of small price changes that could result from the very small per item cost changes resulting from changes in interchange fees.[26]

Several conclusions emerge from the theoretical and empirical literature on pass-through

1. For highly competitive industries with constant returns to scale, firms would pass through 100 percent of a change in cost to buyers.

2. For other situations, the rate of pass through as a theoretical matter depends on the precise shape of the demand schedule, market structure, costs and the nature of the competitive interaction among firms. It is therefore case specific.

[25] Peter J. Klenow and Oleksiy Kryvtsov (2008), "State-Dependent or Time-Dependent Pricing: Does it Matter for Recent U.S. Inflation?," *Quarterly Journal of Economics*, 123:3, pp. 863-904.

[26] Jeffrey R. Campbell and Bejamin Eden, "Rigid Prices: Evidence from U.S. Scanner Data," Federal Reserve Bank of Chicago Working Paper WP 2005-08, (2010); Alberto Cavallo, "Scraped Data and Sticky Prices: Frequency, Hazards, and Synchronization," Working Paper, (2010); Alberto Cavallo and Roberto Rigoborn, "The Distribution of the Size of Price Changes," Working Paper, (2010); Saul Lach and Daniel Tsiddon, "Small Price Changes and Menu Costs," *Managerial and Decision Economics*, 28 (2007), pp. 649-656; Fredrik Wulfsberg, "Inflation and Price Adjustments: Evidence from Norwegian Consumer Price Data 1975-2004," Working Paper, (2010).

3. Studies of actual industries undergoing cost shocks find pass-through rates ranging from 22 to 74 percent with a median of 50 percent.

4. Firms are unlikely to pass small cost changes along in the short run (about a year) as a result of menu costs and other factors that tend to make prices sticky.

5. There is little empirical evidence on how quickly and how much of very small cost changes will be passed on but we would expect they would be passed on more slowly than larger ones.

IV. The Impact of Changes in Interchange Fees on Retail Banking Fees

Changes in interchange fees result in effective cost changes for acquirers and issuers. When the interchange fee declines the cost that acquirers incur for a transaction declines as well. There are then two pass-through issues: how much of the cost decrease does the acquirer pass on to the merchant and how much of the cost decrease received by the merchant does the merchant pass on to the consumer. When the interchange fee declines the revenues that issuers receive from acquirers for transactions increases; this decrease in revenue from acquirers is equivalent to a cost increase for serving cardholders. The pass-through question for the issuer is: how much of the cost increase for serving cardholders gets passed on to the consumer? This section addresses the retail-bank pass through and the next section the final merchant pass through, focusing in both cases on the European Union.

A. Overview of Payment Cards in the European Union

Most payment card transactions in the European Union involve debit cards rather than credit cards although the relative shares vary considerably across countries. Overall, debit cards accounted for about two-thirds of payment card spending and credit cards including

deferred debit cards account for one-third in 2009.[27] Credit and debit cards are provided through four-party card systems in most countries. Most of these schemes are national networks that have an affiliation with an international scheme to facilitate card use outside of the countries; some of the domestic schemes are run by one of the international schemes.

Most of the credit and debit card networks provide for interchange fees that are charged to the acquirer and paid to the issuer. The interchange fee rates vary considerably across countries and between credit and debit schemes within countries.[28] Data on total interchange fees for domestic and cross-border payment card schemes in the EU are not available. However, based on some rough calculations, in 2009, European card issuers received around €9.2 billion in interchange fees of which roughly €3.7 billion were for credit cards including deferred debit cards and €5.5 billion were for debit cards.[29]

In recent settlement discussions with MasterCard and Visa the European Commission has agreed to allow interchange fees for debit cards of 0.20 percent and interchange fees for

[27] "Payment Statistics," European Central Bank, September 2010, available at http://sdw.ecb.europa.eu/reports.do?node=1000001440. The reported percentages excludes France for which there was no subtotals provided for the categories credit, debit, and delayed debit.

[28] The European Commission reported a wide range of rates across countries in 2004. See Interim Report I, Graphs 7, 10, and 11, at pp. 25, 29, and 30. The current published rates for Visa and MasterCard also differ significantly across countries. For Visa's current interchange rates in individual European countries, see the country links at "Visa Europe Interchange Fees," http://www.visaeurope.com/en/about_us/what_we_do/fees_and_interchange/interchange_fees.aspx. For MasterCard's current interchange rates in individual European countries, see the country links at "MasterCard Intra-Country Interchange Fees," http://www.mastercard.com/us/company/en/whatwedo/interchange/Country.html. Current rates for the domestic debit systems in individual European countries are not generally publicly available.

[29] These estimates are based on the following. The European Central Bank reports that payment card volume in 2009 was €1,632 billion. For a subset of transactions, the ECB reports the type of transactions. Of these transactions, we classify 32.7% of the volume as credit (consisting of the categories "delayed debit," "credit," and "credit and/or delayed debit"). We assumed a weighted average interchange fee of 0.50 percent for debit and 0.70 percent for on credit based as very rough illustrative numbers based on discussions with knowledgeable industry observers. Our understanding is that the interchange fees for many domestic card systems are confidential and not necessarily known publicly and also that interchange fees vary widely across countries. We emphasize that we are using the 0.50 and 0.70 percent figures for illustrative purposes only.

credit cards of 0.30 percent (applicable only to MasterCard). These rates have been based in part on an application of the "tourist test" to assess the appropriate interchange fee. If interchange fees declined to this amount across the European Union the debit interchange fee rate would decline by roughly 60 percent and the credit interchange fee by 57 percent.[30] Such a change would reduce approximately €5.4 billion of costs payments made by acquirers to retail banks that issue debit and credit cards based on 2009 information and on our rough estimates of aggregate interchange fees. We are going to evaluate how this reduction would be passed-through in both sides of the markets.

B. The Retail Banking Industry in Europe

We are going to focus on debit cards which, including deferred debit cards, account for more than two-thirds of transaction volume on payment cards in Europe.[31] Debit cards are part of the suite of products and services that retail banks provide customers who open checking accounts with them. To understand how changes in interchange fees could be pass through to customers it is necessary to examine how these fees relate to the overall retail banking business.

Although there are differences across countries, retail banks typically provide consumers with a suite of services that includes a current account into which consumers deposit funds (usually from their paychecks) and then access those funds to make payments by withdrawing cash from the bank or ATMs, writing checks, or using debit cards. Some banks require customers that take out a mortgage, a personal loan or small business loan to open a current account. Banks typically charge consumers monthly or annual fees for these accounts

[30] This is based on 0.50 percent for debit and 0.70 percent for credit. See, *supra* note 29.

[31] If deferred debit cards were included in debit cards the fraction of transaction volume on debit cards would be even higher than two-thirds.

as well as charges for specific services such as withdrawing money from an ATM, using a debit card, or making a direct debit. They also earn revenue from lending available funds; in some countries banks pay consumers some interest on their funds while in others banks do not pay interest on funds (and are sometimes legally prohibited from doing so).

Retail banks incur fixed costs for building and maintaining bank branches and ATM networks. They also incur incremental costs for providing various services. They recover these costs and earn profits from the fees mentioned above as well as the interchange fees they receive from acquirers. While published data are not readily available, our understanding from knowledgeable industry participants is that interchange fees account for about 10 percent of revenues from core retail banking services (including account payments, account management, and cash utilization, and excluding loans and mortgages).[32] Although the amount would vary across country and bank, typical bank would experience a roughly 6 percent reduction in customer account revenue as a result of a 60 percent reduction in the debit card interchange fee rate.

To assess the extent to which retail banks would increase fees to customers we consider several sources of evidence which together suggest that retail banks would likely pass on a significant portion of the cost increases to consumers in the form of higher fees. That finding is based on two principle sources of evidence, which we preview here. The first is that retail banking is fairly competitive in many EU countries and there is evidence that retail banking has roughly constant returns to scale. That would tend to suggest that retail banks would pass on

[32] This compares with estimates that the originally proposed debit card interchange fee regulation in the United States of about 80 percent would decrease deposit account related revenues by 21 to 24 percent. See Evans, David S., Robert E. Litan & Richard Schmalensee, "Economic Analysis of the Effects of the Federal Reserve Board's Proposed Debit Card Interchange Fee Regulations on Consumers and Small Businesses," Submission to the Federal Reserve Board of Governors, (2011), p. 21, also available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1769887.

most of the cost increase in the long run; price stickiness would temper that in the short run. The second is based on what happened in Australia following the interchange fee reductions that started about a decade ago. Although Australia has a relatively concentrated banking industry the short-run pass through was around 40 percent and it appears that there was close to full pass through in the long run.

1. The Extent of Retail Bank Competition

As noted earlier we would expect 100 percent pass through of a cost change to consumers only in the case of perfect competition with constant returns to scale. It is therefore useful to examine the extent of competition in retail banking. The European Commission constructed and analyzed the concentration ratios for the top 3 and top 5 retail banks in each of the European countries and determined that, "European retail banking markets in general are moderately concentrated at national level."[33] The population-weighted average five-firm concentration level is around 60 percent (they did not report data on the more commonly used HHI measure). This is a relatively low concentration level in our experience based on that measure.

The European Central Bank completed a similar analysis of institutions that provided credit based on total assets in 2008s. The average (unweighted) HHI for the EU27 in 2008 was 1,120 and, after weighting for population in each country, 677.[34] The HHIs for each individual country are reported in Table 1 below. We would expect that some of these HHIs would have

[33] European Commission, Report on the Retail Banking Sector Inquiry, Commission Staff Working Document, SEC (2007) 106, at p. 19.

[34] "Structural Indicators for the EU Banking Sector," European Central Bank, January 2010, available at http://www.ecb.int/pub/pdf/other/structralindicatorseubankingsector201001en.pdf. Population data from Eurostat, available at http://epp.eurostat.ec.europa.eu/tgm/web/_download/Eurostat_Table_tps00001HTMLDesc.htm.

increased in some countries as a result of bank failures and consolidations during the financial crisis.[35] Nevertheless, the figures point to a generally unconcentrated banking industry in many of the EU countries measured on a national basis.

[35] Recent instances of bank consolidation in Europe include the acquisition of Fortis by BNP Paribas, the acquisition of HBOS by Llyods TSB, the merger of Banques Populaires and Caisses d'Epargne, the acquisition of Commerzbank by Dresdner, and the acquisition of an interest in Postbank by Deutsche Bank. "BNP Paribas Completes the Acquisition of Fortis Bank and Forms a Strategic Partnership in Insurance with Fortis," *BNP Paribas Press Release,*_, May 12, 2009; BBC News, "Lloyds HBOS Merger Gets Go-Ahead," January 12, 2009; "Merger Between Groupe Banque Populaire and Groupe Caisses d'Epargne," *Banque Populaire Press Release*, June 23, 2009; "Commerzbank Successfully Concludes the Bankwide Project to Integrate Dresdner Bank,"*Commerzbank Press Release*, May 27, 2011; "Postbank Welcomes Deutsche Bank as Major Shareholder," *Postbank Press Release*, November 26, 2010. In Spain the Cajas, regional banks owned by regional governments, have been consolidated in about half of the number and some major ones are in the process of being privatized. In the United Kingdom, HHIs for banks have increased from 2008 to 2010. See Independent Commission on Banking, Interim Report: Consultation on Reform Options, April 2011 ("Independent Commission on Banking Interim Report"), available at http://s3-eu-west-1.amazonaws.com/htcdn/Interim-Report-110411.pdf, at p. 28.

Table 1: Banking HHIs by Country

	HHI for Credit Institutions (Total Assets)					Share of the 5 largest Credit Institutions (Total Assets)				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Belgium	2,102	2,112	2,041	2,079	1,877	84.3	85.3	84.4	83.4	80.8
Bulgaria	721	698	707	833	834	52.3	50.8	50.3	56.7	57.3
Czech Republic	1,103	1,155	1,104	1,100	1,000	64	65.5	64.1	65.7	62
Denmark	1,146	1,115	1,071	1,120	1,229	67	66.3	64.7	64.2	66
Germany	178	174	178	183	191	22.1	21.6	22	22	22.7
Estonia	3,887	4,039	3,593	3,410	3,120	98.6	98.1	97.1	95.7	94.8
Ireland	500	600	600	600	800	43.9	45.7	44.8	46.1	55.7
Greece	1,070	1,096	1,101	1,096	1,172	65	65.6	66.3	67.7	69.5
Spain	482	487	442	459	497	41.9	42	40.4	41	42.4
France	623	727	726	679	681	49.2	51.9	52.3	51.8	51.2
Italy	230	230	220	328	344	26.4	26.8	26.2	33.1	33
Cyprus	940	1,029	1,056	1,089	1,024	57.3	59.8	63.9	64.9	63.9
Latvia	1,021	1,176	1,271	1,158	1,205	62.4	67.3	69.2	67.2	70.2
Lithuania	1,854	1,838	1,913	1,827	1,714	78.9	80.6	82.5	80.9	81.2
Luxembourg	304	312	294	276	278	29.7	30.7	29.1	27.9	27.3
Hungary	798	795	823	840	822	52.7	53.2	53.5	54.1	54.5
Malta	1,452	1,330	1,185	1,177	1,236	78.5	75.3	71.4	70.2	72.8
Netherlands	1,726	1,796	1,822	1,928	2,168	84	84.5	85.1	86.3	86.8
Austria	552	560	534	527	454	43.8	45	43.8	42.8	39
Poland	692	650	599	640	562	50	48.5	46.1	46.6	44.2
Portugal	1,093	1,154	1,134	1,098	1,114	66.5	68.8	67.9	67.8	69.1
Romania	1,111	1,115	1,165	1,041	922	59.5	59.4	60.1	56.3	54
Slovenia	1,425	1,369	1,300	1,282	1,268	64.6	63	62	59.5	59.1
Slovakia	1,154	1,076	1,131	1,082	1,197	66.5	67.7	66.9	68.2	71.5
Finland	2,680	2,730	2,560	2,540	3,160	82.7	82.9	82.3	81.2	82.8
Sweden	854	845	856	934	953	54.4	57.3	57.8	61	61.9
United Kingdom	376	399	394	449	412	34.5	36.3	35.9	40.7	36.5
Unweighted average	1,114	1,134	1,104	1,103	1,120	58.5	59.3	58.9	59.4	59.6
Population-weighted average	649	667	656	674	677	44	45	45	46	45

Source: "Structural Indicators for the EU Banking Sector," European Central Bank, January 2010, available at http://www.ecb.int/pub/pdf/other/structralindicatorseubankingsector201001en.pdf. Population data from Eurostat, available at http://epp.eurostat.ec.europa.eu/tgm/web/_download/Eurostat_Table_tps00001HTMLDesc.htm.

Since retail banking competition tends to be primarily local the national HHIs could provide a distorted picture of the choices available to individuals. Some data are available based on the regional coding system known as NUTS used by the EU for 2004. Not surprisingly Germany has a higher concentration at the regional level than it appears to have at the national level because of the system of Sparkassen and Volksbanken that do not compete nationally. Nevertheless, according to our estimates about 83 percent of the regions have an HHI below 1,400 and 55 percent below 1,200.[36]

Of course, even these regions may provide a distorted picture because people still typically go to branches for banking near where they live or work. We have not found systematic data on local levels of concentration. However, we have identified the number of banking alternatives in three cities that we are personally familiar with—Brussels, Lisbon, and Toulouse—as well as an illustrative UK city—Manchester. A consumer in Brussels would find at least 14 different retail banks to choose from within a 10-minute drive from the city center; Lisbon (14); Toulouse (11); and Manchester (18).

Of course, HHIs and other concentration measures have only limited ability to predict the extent of marketplace competition. Several economists have also studied the extent of competition in banking in the EU. An economic study by Bikker and Haaf analyzes competition in nine EU countries (Belgium, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden and the UK) using a measure of market power, based on earlier work by Bresnahan, of the average bank in each of the markets for two core product groupings: deposits and loans. The authors conclude that, "[t]he measure of competition from the Bresnahan model

[36] Using data on current accounts. See EC, Interim Report 2, 2007. The regional data reports to 2004.

indicates for both the deposit and loan markets in all nine EU countries under consideration that the degree of competition is high."[37]

There is some evidence that these estimates may, in fact, understate the competitiveness of European banking markets. Carbo et al. reviewed the banking markets in 14 European countries between 1995 and 2001 by analyzing five different commonly used measures of competition.[38] The authors complete an adjustment of each measure for country-specific factors such as banking market-specific differences in cost efficiency, non-traditional activities, real output growth and inflation. They find that when they adjust for these market-specific factors, the estimate of the degree of competition increased.

Overall, the evidence suggests that retail banking is a reasonably competitive industry in much of Europe although there are variations across countries and locales. There is also evidence that the assumption that retail banking has constant costs of production is roughly true.[39] Under these circumstances, we would expect that retail banks would pass on much of

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[37] J.A. Bikker and K. Haaf, "Competition, Concentration and Their Relationship: An Empirical Analysis of the Banking Industry," *Journal of Banking and Finance*, 26 (2002): pp. 2191–2214.

[38] The five measures were net interest margin/total asset ratio (NIMTA), Lerner Index, the ratio of bank net income to the value of total assets (ROA), the Panzar-Rosse H-statistic, and the HHI. Santiago Carbo, David Humphrey, Joaquin Maudos, and Philip Molyneux, "Cross-Country Comparisons of Competition and Pricing Power in European Banking," *Journal of International Money and Finance*, 28 (2009): pp. 115–134.

[39] The early literature on bank cost functions found constant returns to scale. For a survey, see Jeffrey A. Clark, "Economies of Scale and Scope at Depository Financial Institutions: A Review of the Literature," *Federal Reserve Bank of Kansas City Economic Review*, 3 (1988): 16-33. The more recent literature has found some evidence of increasing returns to scale in both the United States and in Europe, particularly for small banks, but the magnitude of the scale economies tend to be small and/or sensitive to the exact assumptions made about the shape of the production function. For example, Maggi and Rossi (2003) estimate three versions of their model. In one version, they find constant returns to scale at all bank sizes. In another, they find increasing returns to scale for small banks, constant returns to scale for medium-sized banks, and decreasing returns to scale for large banks. In the third version, they find slightly increasing returns to scale at all bank sizes. Bernardo Maggi and Stefania P.S. Rossi, "An Efficiency Analysis of Banking Systems: A Comparison of European and United States Large Commercial Banks Using Different Functional Forms," University of Vienna Department of Economics Working Paper No. 0306, (2003). Other studies of returns to scale at European banks have similar findings. Yener Altunbas and Phil Molyneux, "Economies of Scale and Scope in European Banking," *Applied Financial Economics*, 6:4 (1996): 367-375; Jaap W.B. Bos and James W. Kolari, "Large Bank Efficiency in Europe and the United States: Are There Economic Motivations for Geographic Expansion in Financial Services?" *Journal*

any increase in cost in the long run in the form of higher fees or reduced services. Of course, we are not suggesting that this evidence means that banking is literally perfectly competitive or immune from competition problems.[40] Several competition authorities have brought investigations and cases. A recent banking commission report in the UK suggested that there were serious competition issues in that country in part resulting from the banking consolidation following the financial crisis.[41] It is therefore useful to look at other sources of evidence.

2. Evidence of Pass-Through from Other Banking Markets

Although there are differences in banking across countries, in particular concerning the regulation of prices and services, there are also many similarities. It is therefore useful to consider the evidence on the extent to which interchange fee changes have been passed through in other countries.

The clearest evidence, and the most extensively studied situation, involves Australia. In 2003, the Reserve Bank of Australia (RBA) mandated a reduction in credit card interchange fees in Australia.[42] The RBA imposed cost-based regulation that took effect in November 2003

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of Business, 78:4 (2005), 1555-1592; and Laura Cavallo and Stefania P.S. Rossi, "Scale and Scope Economies in the European Banking Systems," *Journal of Multinational Financial Management*, 11:4-5 (2001): 515-531.

[40] Six of the 25 largest metropolitan areas including Los Angeles, Chicago, and Washington DC had HHIs below 1,000 in 2010; two other metropolitan including Boston and Denver had HHIs slightly above 1,000 (below 1,100). Eighteen of the 25 largest metropolitan areas including New York City had HHIs below 1,500. Twenty-one of the 25 largest metropolitan areas had HHIs below 1,800, with the median HHI for the 25 at 1,270.

[41] See Independent Commission on Banking Interim Report.

[42] "Payment System Board Annual Report," *Reserve Bank of Australia*, November 2004, available at http://www.rba.gov.au/publications/annual-reports/psb/2004/pdf/2004-psb-ann-report.pdf. The RBA also imposed regulation of debit card interchange fees in Australia effective November 2006, which mandated a slight decrease in the interchange fees paid by issuers to acquirers for domestic Australian PIN debit transactions, which accounted for the substantial majority of debit usage in Australia. See "Update on Payment System Issues," *Reserve Bank of Australia*, September 13, 2006, available at http://www.rba.gov.au/media-releases/2006/mr-06-06.html. Note that this interchange fee flowed from issuers to acquirers—that is, in the opposite direction from interchange fee payments for most credit and debit card transactions worldwide, so that the decrease in interchange fees would be an increase in interchange fees when defined in the usual direction of being paid by acquirers to issuers. At the same time, the RBA mandated a decrease in the Visa and MasterCard

and resulted in a reduction of the credit card interchange fee from about 0.95 percent to about 0.55 percent. This substantial reduction represented an annual loss of about AU$40 per card and about AU$490 million per year for all banks.

A study of the impact of the RBA's interchange fee regulations estimated that Australian banks passed on 30-40 percent of the reduced credit card interchange fee revenues to cardholders in about the first year after the start of the reduction.[43] It is difficult to estimate long-run pass through as there are likely other changes in market conditions that affect prices. But it is notable that credit card fees continued to increase in later years following the intervention. By 2006, for example, the average fee per account had increased by roughly the decline in interchange fees per account when the new regulations were implemented at the end of 2003; in addition banks had effectively increased prices by reducing reward programs.[44] Without having performed a detailed analysis, the Australian experience therefore suggests that the reductions in interchange fees were likely largely or fully passed on to consumers in the form of higher fees in the long run. It is notable that that Australian credit card issuers largest

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debit card interchange fees (which were paid by acquirers to issuers). Given the relatively small size of the debit card interchange fee changes and the potentially offsetting effects between higher issuer costs resulting from the regulation of the Visa and MasterCard interchange fee and the lower issuer costs resulting from the regulation of the domestic debit interchange fee, an assessment of the impact of those reforms on fees for debit cards and/or deposit account would be difficult, and no one has done an empirical study to our knowledge.

[43] Howard Chang, David S. Evans, and Daniel D. Garcia Swartz, "The Effect of Regulatory Intervention in Two-Sided Markets: An Assessment of Interchange-Fee Capping in Australia," *Review of Network Economics*, 4:4 (2005), pp. 328 – 358.

[44] Credit card usage continued to increase from 2003 to 2006, so that the increase in annual fees smaller (roughly three-quarters) relative to the reduction in interchange fees per account in 2006 (based on the interchange fees rates before and after the RBA's intervention). See http://www.rba.gov.au/paymentssystem/resources/statistics/rps.xls for the number of credit card accounts. For fee data, see "Banking Fees in Australia," Reserve Bank of Australia, May 2008, available at http://www.rba.gov.au/publications/bulletin/2008/may/3.html; and "Banking Fees in Australia," Reserve Bank of Australia, May 2006, available at http://www.rba.gov.au/publications/bulletin/2006/may/2.html. See also CRA International Report, at p. 20.

four issuers have accounted for about 85 percent of all issuing and it is therefore, based on concentration measures, seemingly less competitive than many EU banking markets.

Although there have been no systematic studies it appears that the experience in Spain was directionally similar. As a result of an agreement with merchants the Spanish card systems reduced payment card interchange fees from 1.54 percent on average in 2002 to 0.64 percent in 2009.[45] Following that decrease, Spanish banks increased account fees to consumers. Our understanding from knowledgeable industry executives is that the increase in account fees largely compensated for the decrease in interchange fees.

Carbo et al. claim, however, to have found evidence that Spanish efforts to reduce interchange fees enhanced consumer welfare.[46]This study, however, suffers from some flaws that lead us to put little weight on it. First, it attempts to measure consumer welfare solely by the volume of transactions conducted by consumers. The study does not consider whether consumers are paying more to conduct those transactions through account fees which, as we saw above, increased after the reduction in interchange fees. Therefore it does not assess the true impact on consumer welfare. Second, the study claims that output increased as a result of decrease in interchange fees, but it does not control for the rapid growth of the Spanish economy during that timeframe. From 2002-2007, the number of payment card transactions grew at an average annual rate of 13 percent in Spain. While this is a faster growth rate than

[45] Banco de España, Bank Payment Cards Statistics, http://www.bde.es/webbde/es/sispago/estadisticas_ingles.pdf. Figures are for domestic intra-system payment card transactions (debit and credit). For domestic inter-system payment card transactions, the corresponding figures are 1.87% in 2002 and 0.88% in 2009. Beginning in 2006, Banco de España began reporting interchange separately for debit and credit transactions. Interchange on domestic intra-network transactions declined from € 0.32 in 2006 to € 0.24 in 2009. The corresponding figures for inter-network transactions were € 0.36 in 2006 and € 0.31 in 2009.

[46] Santiago Carbó Valverde, Sujit Chakravorti, and Francisco Rodriguez Fernandez, "Regulating Two-Sided Markets: An Empirical Investigation" *Federal Reserve Bank of Chicago*, Working Paper 2009-11 (2010).

some European countries, it is not an exceptional for a country with rapid economic growth and starting with a less than fully mature payment card infrastructure. For example, the corresponding growth rates in payment card volume were 14 percent in Ireland and 31 percent in Poland, which did not have significant interchange fee reforms over that time period.[47] Third, the authors do not analyze the net effect of an increase in interchange fees on card volume. That is, their analyses if correct would show that a decrease in interchange fees increases merchant acceptance and that an increase in merchant acceptance increases card usage, which almost all economists would likely agree *a priori*. But they did not address the other side of the market: the potential impact of an increase in interchange fees that could lead to an increase in cardholder fees and a decrease in card ownership and usage. The negative impact on the cardholder side could be smaller, similar, or greater than the impact of lower interchange fees on the merchant side. Finally, the authors recognize that their econometric estimates could be flawed because of endogeneity. They, in fact, test for whether their results are subject to this flaw and find conclusively that they are.

Evans, Litan, and Schmalensee have also examined the extent to which US banks pass through increases in total debit interchange revenues to their customers.[48] The US retail banking industry is generally acknowledged to be fairly competitive. The average HHI for the top 25 metropolitan areas in the US is only 1,329.[49] Banks started issuing debit cards in significant numbers in the mid-1990s. Since then the volume on transactions, and the

[47] Carbo et al. include a linear time trend in their analysis. Any non-linear effects would likely be captured in their regulatory dummy variables.

[48] David Evans, Robert Litan, and Richard Schmalansee, "The Net Effects of the Proposed Durbin Fee Reductions on Consumers and Small Businesses," *Lydian Journal*, Issue 5 (2011), available at http://www.pymnts.com/assets/Lydian_Journal/LydianJournal-March-2.pdf.

[49] FDIC Quarterly," FDIC, 2010, 4:4 (2010), at p. 46 ("FDIC Quarterly 2010-4").

associated interchange fees, have grown considerably. Evans et al. show that the expansion of debit card interchange fee revenues was associated with a significant decline in the fees that banks charged for checking accounts. By 2009 about three quarters of banking customers paid essentially no annual fees for their accounts. (A contributing factor in this was the expansion of overdraft fees.) They also show that banks have quickly responded to regulation of overdraft fees and anticipated reductions in debit card interchange fees with increases, or announcements of planned increases, in customer fees.

The Australian, Spanish, and US experience with changes in interchange fees provides strong support that banks tend to pass on significant changes in interchange fees quickly and substantially.

3. European Commission's Analysis of Interchange Fees and Rates

The European Commission reported a statistical analysis of the relationship between interchange fees and customer fees based on data it collected from banks for its Sector Inquiry. The Commission reports that the estimated pass-through rate is 25 percent.[50] Unfortunately, we believe that the Commission's estimates are not reliable because of some serious statistical problems. Most importantly, the analysis is likely to be subject to severe simultaneity bias. The theory of two sided markets tells us that interchange fees are set by the card scheme as a function of consumer and merchant demand, issuer and acquirer marginal costs, and the externalities between cardholders and merchants. Cardholder fees in turn depend on the interchange rate, consumer demand, and issuer marginal costs. As a result, the interchange rate and the cardholder fee are *simultaneously* determined by these underlying factors. Analysis that fails to account for this simultaneity will be biased and not reliable.

[50] Interim Report I, Annex 5.

The following example illustrates what can go wrong. Suppose that issuer marginal costs decrease due to improved anti-fraud technology. This will affect cardholder fees in two ways. First, the direct effect of reducing issuer costs leads to lower cardholder fees. Second, the reduction in issuer costs leads the platform to reduce the interchange rate and what merchants have to pay. But, now, the reduction in the amount paid by the acquirers in interchange fees to the issuers leads to an offsetting effect, and an increase in the cardholder fees. The Commission's analysis needs to isolate the effect of interchange rates on cardholder fees, which requires netting out the offsetting direct effect. If the analysis fails to do so, it will tend to understate the true rate of pass through. This problem is not limited to this specific example, but occurs with any change that has both a direct effect on cardholder fees and an effect on interchange rates. Unless the analyst perfectly controls for all such factors or uses some other appropriate technique, the estimates will be worthless.[51]

4. Summary of Findings on Retail Banking Pass Through

The evidence described above suggests that we would expect a priori that banks would pass on a relatively large portion of the lost interchange fees to consumers in the form of higher prices or less service. Economic theory suggests that competitive industries with constant returns to scale will tend to pass on cost changes go consumers and those characteristics seem to describe retail banking competition in many countries in the EU. The actual experience of countries with dramatic changes in interchange fee revenues also points towards significant pass through. That was the case with Australia—and Spain, though it is less well documented—from an interchange fee revenue decrease following the interchange fee cuts. It

[51] In its analysis of the pass-through of interchange rates into merchant discount rates, the Commission recognizes this problem and uses dynamic panel methods in response. This method is not perfect, but in principal it can handle the simultaneity problem. The Commission did not use these methods for its interchange fee analysis.

is also appears to be the case in the United States from an interchange fee revenue increase following the expansion in the use of debit cards. There is some tension between the theory and the experience in Australia, which appears to have had significant pass through even though it had a relatively concentrated issuing market. The Australian result could result from idiosyncratic features of that market or it could indicate that there is something about the demand and cost structure of banking that results in high pass through.[52]

The pass-through rate for changes in interchange fees is likely to vary across countries depending on the details of retail banking competition including the structure of the industry and the nature of consumer demand. Retail banking is a relatively competitive industry in many European countries based on structural indicia, thus the rate of pass-through should be relatively high. However, in countries with less competitive retail banking the rate may be lower. The evidence of Australia (a low competitive system on the acquiring side) and the United States (highly competitive on the acquiring side) on the relationships between customer fees and interchange fee revenues is consistent with customer fees changing considerably in response to changes in interchange fees revenues.

We would also expect that retail banks would change customer fees relatively quickly in response to a significant change in fees. Interchange fees account for a relatively large fraction of retail bank revenues for current accounts. The experience in Australia, Spain, and the United States are consistent with that. Significant changes in consumer offers took place quickly after the change in interchange fee revenues.

[52] Once one deviates from perfect competition with constant unit costs and form imperfect competition with linear demand schedules the pass through rate could be less than or greater than 100 percent. See Weyl 2008, *supra.* The empirical studies suggest that on average pass through is 50 percent but for any particular industry it could be much higher with particular demand conditions.

We would like to emphasize, however, that the purpose of analysis is not to predict how much interchange fee reductions would be passed on to retail bank consumers in any particular country. That really depends on the circumstances in that country. However, we would suggest that regulatory authorities study this issue by, for example, estimating pass-through rates from historical changes in retail banking costs. To highlight the importance of this exercise we are going provide a rough estimate of the EU-wide increase in fees based on some plausible assumptions. Before we do that we turn to the merchant side.

V. Merchants and Interchange Fee Pass-Through

A reduction in interchange fees would result in merchant acquirers passing some portion of those cost savings on to merchants and those merchants in turn passing some portion of those cost savings on to consumers. This section begins by examining the acquirer-merchant relationship to assess the portion of the interchange fee reductions that merchants could expect to receive. It then considers the competitive situation in various industries that accept payment cards to assess the extent to which firms in these industries would pass cost savings on to consumers.

A. Pass-Through from Acquirers to Merchants

Merchants in most European countries have access to few acquirers and sometimes only one. Some merchants are, however, very large firms that account for a significant portion of the sales in their category. These merchants have countervailing buyer power that would likely restrain the prices that merchant acquirers can charge. In these circumstances it is difficult to predict the extent to which merchant acquirers would pass along reductions in interchange fees without undertaking a careful examination of the dynamics between the merchants and acquirers, and their relative bargaining power, in each particular country. To the extent that

large merchants have negotiated interchange-fee plus contracts they would receive full and quick pass through of interchange fee reductions.

Smaller merchants are another matter. They have less bargaining power and that is reflected in part by the fact that they often have blended-rate merchant fee contracts for which the interchange fee is not transparent. The economics of pass through would suggest that, a priori, acquirers would pass on only a portion of their interchange fee cost savings to small and medium size merchants.[53]

The actual pass-through of interchange fees from acquirers to merchants for a country depends on the competitive structure of its acquiring business, the types of contracts in use, and the share of larger versus smaller merchants that accept cards.

B. Pass-Through from Merchants to Consumers

Merchants that take payment cards operate across many industries with highly diverse competitive conditions. There is no reason to believe that there is a single answer to how much of the interchange fee reduction would be passed on to consumers in the form of lower prices. The answer might be quite different for restaurants versus supermarkets versus department

[53] The European Commission's Sector Inquiry of Retail Banking reported that there was a low correlation between merchant service charges and concentration. However, as the report acknowledges, this correlation analysis does not control other variables that affect the level of merchant service charges. In particular, economic theory predicts that concentration should affect acquirers' markups over costs, so at a minimum the analysis would have to control for interchange fees and other acquirer costs. If these costs are higher in countries with greater than average concentration, the raw correlation will understate the true impact of concentration on merchant service charges. In the United States analysts expect that the proposed approximately 80 percent reduction in debit-card interchange fees would result in increased profits for acquirers at least in the near term because they would not pass on all of the savings to small merchants who have blended fee contracts. See David Evans, Robert Litan, and Richard Schmalensee, "Economic Analysis of the Effects of the Federal Reserve Board's Proposed Debit Card Interchange Fee Regulations on Consumers and Small Businesses," Submission to the Federal Reserve Board of Governors, (2011), at p. 44, available at http://ssrn.com/abstract=1769887. In Australia, the Reserve Bank of Australia reported that acquirers passed on all of the interchange fee cost savings within a year. See "Payments System Board: Annual Report 2006," *Reserve Bank of Australia,* pp. 11-12. Note that Australia has a highly concentrated retail sector.

stores versus online sellers. Even within industries the answer may vary since firms differentiate themselves and some larger firms within an industry may have more market power than small ones. Of course, the answer is likely to vary across countries.

The pass-through literature discussed above provides, however, some preliminary insights for Europe. As noted earlier, we identified studies for European countries and then considered those that examine the impact of cost changes, or exchange rate fluctuations, on consumer prices. The median long-run pass-through rate for those studies was 53 percent which is similar to the overall median of 50 percent.

These pass-through rates are not surprising given the market structure of leading retail categories in many countries.[54] Some categories such as restaurants are highly competitive. Consumers have many choices; can easily switch between restaurants; and easy entry disciplines prices. Other categories such as large supermarkets are relatively concentrated in some countries.[55] The French competition authority, for example, found that in many areas consumers only had one or two supermarket chains available to them.[56] The UK competition authority reached a similar conclusion.[57]

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[54] We are not arguing that any of these categories are markets for the purposes of assessing dominance under Article 102 TEFU and have not undertaken that analysis.

[55] See Peter Freeman, Jayne Almond, Barbara Donoghue, Alan Gregory, Alan Hamlin, Bruce Lyons, "The Supply of Groceries in the UK Market Investigation," Competition Commission, April 30, 2008 ("UK Competition Commission Grocery Investigation") and Stéphane Turolla, "Spatial Competition in the French Supermarket Industry," Working Paper, (2010), available at http://www.sfer.asso.fr/content/download/3698/32881/version/1/file/B4+-+Turolla.pdf.

[56] République Française Authorité de la concurrence, "Avis n° 10-A-26 du 7 décembre 2010 relatif aux contrats d'affiliation de magasins indépendants et les modalités d'acquisition de foncier commercial dans le secteur de la distribution alimentair," 10-A-26, December 7, 2010, available at http://www.autoritedelaconcurrence.fr/pdf/avis/10a26.pdf.

[57] UK Competition Commission Grocery Investigation.

Using the same four illustrative cities as we used above to consider the availability of different banks—Brussels, Lisbon, Manchester, and Toulouse—we considered the number of supermarkets available to consumers within a 10 minute drive of the city center. In each case, we found that there were far fewer supermarkets than banks: 3 supermarkets versus 14 banks for Brussels; 2 versus 14 for Lisbon; 6 versus 18 for Manchester; 3 versus 11 for Toulouse.

These pass-through rates likely overstate the extent to which retail businesses would lower prices in the short run because the cost changes for merchants are small and merchants would tend not to lower prices quickly as a result of the price stickiness issues that we discussed earlier. To estimate the cost savings to the merchant, we make the following assumptions. We assume as above that the average debit card interchange is 0.50 percent and consider a decline to 0.20 percent, which is the rate Visa and MasterCard agreed to assess as a result of their respective settlements with the European Commission. If the merchant acquirer passed on the full interchange fee cost savings to a merchant the merchant would pay 60 percent less in interchange fees on a debit card transaction. Visa reports that the average value for a card transaction in Europe was about €50 in the mid-2000s before the recent recession.[58] Using that figure, and assuming that the merchant acquirer passes on 100 percent of the reduced interchange fee to the merchant, the merchant would save interchange fee costs of €0.15 on a €50 purchase that paid for with a debit card. Merchants, however, typically charge the same price for all transactions regardless of the payment method and therefore we would need to assess the average cost savings for all consumers who purchase from a merchant and not just those who pay with a debit card. We were not able to obtain data on the fraction of

[58] "Annual Report 2010," Visa Europe, available at http://www.visaeurope.com/en/annual_report/annual_report.aspx.

retail transactions that are paid for with cards in Europe. In the United States approximately 29 percent of consumers' payments are made with debit cards.[59] We assume the same fraction applies in Europe. In that case the average debit card interchange fee savings for a merchant would be a little over €0.04 on a €50 purchase. Given the results of the price stickiness literature we would not expect that merchants would pass on this savings quickly.

Based on this analysis we conclude that across all merchants:

- Merchants would obtain less than 100 percent of an interchange fee reduction from merchant acquirers. Very large ones would be likely to obtain 100 percent pass while smaller ones would get less than 100 percent.
- Merchants would pass on roughly 50 percent of their savings to consumers in the long run if the experience for the very small cost decreases from interchange fee reductions was similar to the much larger cost changes studied by economists. There would be great variation across merchant categories in the degree of pass through with some highly competitive merchant categories passing on all of the savings and other less competitive segments passing on less than 50 percent.
- Merchants would not reduce prices quickly in response to an interchange fee reduction given that the reduction would be very small for any particular item or for typical purchases overall.

[59] Kevin Foster, Erik Meijer, Scott Schuh, and Michael A. Zabek, "The 2009 Survey of Consumer Payment Choice," *The Federal Reserve Bank of Boston*, (2011).

VI. Overall Assessment of the Impact on Consumers

Consumers could gain or lose from a reduction in interchange fees depending on the particular competitive situations of the retail banking, the structure of the merchant acquiring market, and card accepting industries in their country. There are two extremes.

Consumers are more likely to benefit when their retail banks have significant market power, the merchant acquirers have little market power, and card-accepting merchants have little market power. In this case retailers would receive most of the interchange fee reduction and would pass most of it on to consumers at least in the long run. Meanwhile banks might not pass on all of the cost increases in the form of higher fees even in the long run.

Consumers are less likely to benefit when their retail banks are pretty competitive, the merchant acquires have significant market power, and card-accepting merchants consumers have significant market power. In this case, banks would likely pass on most of the cost increases to bank customers in the form of higher fees in the long run and a large portion even the short run. Meanwhile, merchants would obtain only a part of the cost decrease from acquirers and then would only pass on a portion of those decreases to consumers even in the long run.

In our view regulators should carefully study the circumstances in their jurisdictions to see where they are between these extremes and thereby assess whether interchange fee reductions are likely to harm final consumers. The remainder of this section provides an admittedly rough calculation for the EU overall based on plausible assumptions. We claim only that the results are indicative that drastic reductions in interchange fees could pose significant harm to end consumers in the EU and that regulators should therefore examine this issue carefully.

In order to simulate the long-run impact of a roughly 60 percent reduction in interchange fees in the European Union we started by estimating the annual impact of such reduction under two extreme sets of parameters:[60]

Simulation A: For countries and regions with a competitive retail banking system and small sector of competitive merchants we made the following assumptions:

- In 2009, total interchange was €9.2 billion.
- Issuers pass-through 70 percent of the reduction in interchange fees to cardholders in the form of additional fees.
- Acquirers pass-through 100 percent of the reduction in interchange fees to large merchants, which comprise 75 percent of card sales.
- Acquirers pass-through 50 percent of the reduction in interchange fees to small merchants, which constitute 25 percent of card sales.
- Large merchants pass-through 50 percent of their cost reduction to consumers.
- Small merchants pass-through 80 percent of cost reduction to consumers.

Simulation B: For countries and regions with a concentrated retail banking system and large sector of competitive merchants we make the following hypothesis:

- In 2009, total interchange was €9.2 billion.
- Issuers pass-through 50 percent of the reduction in interchange fees to cardholders in the form of additional fees.

[60] For these illustrative purposes, we assume a reduction in the credit card interchange fee from 0.70 percent to 0.30 percent and a reduction in the debit card interchange fee from 0.50 percent to 0.20 percent, which is a reduction of about 59 percent on a blended basis. See also *supra* note 29.

- Acquirers pass-through 100 percent of the reduction in interchange fees to large merchants which comprise 50 percent of card sales.
- Acquirers pass-through 50 percent of their reduction in interchange fees to small merchants which comprise 50 percent of card sales
- Large merchants pass-through 50 percent of cost reduction to consumers
- Competitive merchants pass-through 80 percent of cost reduction to consumers.

We now combine these two simulations in four variants, considering each side of the market: AA is simulation A, BB is simulation B, AB takes the issuer-consumer impact from simulation A and the merchant-consumer prices effect from B, and BA the converse combination. Table 2 reports the results in millions of Euros.

Table 2: Annual Impact on Consumers (€ Millions)

Scenario	**Consumer Fees**	**Consumer Prices**	**Consumer Net**
AA	-3,793	+2,573	-1,219
AB	-3,793	+2,492	-1,300
BA	-2,709	+2,573	-135
BB	-2,709	+2,492	-217

The estimates of the annual cost to European consumers of a 60 percent reduction in interchange fees vary from a low of €135 million from a high of a €1.3 billion. We present these not as definitive estimates but as illustrative calculations based on plausible assumptions

that demonstrate the importance of regulators developing more refined estimates based on the circumstances of their jurisdictions.

We have also estimated the impact for the period of 2012-2021 of a mandated reduction in interchange fees, under the following assumptions of the distribution of the impact over time:

1. Total interchange fees for the EU were €9.2 billion in 2009 and transaction volume grows by 5 percent a year over the next decade.
2. Interchange revenues experience a roughly 60 percent decline starting in 2012.[61]
3. Retail banks will pass on 50 percent of the reduced interchange revenues to consumers in the form of higher prices in the first year, 65 percent in the second year, and 70 percent after that.
4. Merchant acquirers pass on 80 percent of the interchange fee cost savings to merchants in the first year, 90 percent in the second, and 100 percent after that.
5. Merchants pass on 10 percent of their cost savings in the first year, 20 percent in the second, and 50 percent after that.
6. Future values are discounted back at a rate of 2.0 percent.

Under these assumptions a 60 percent EU-wide reduction in interchange fees would result in consumers incurring net higher costs between 2012 and 2021 with a net present value of €17.5 billion. Again, we are not presented this figure as an estimate of the actual cost to European consumers but as an illustration, based on plausible assumptions, of the potential impact of a

[61] This assumes, as discussed above, that debit card interchange fees currently average 0.50 percent and decline to 0.20 percent and that credit card interchange fees currently average 0.70 percent and decline to 0.30 percent.

pan-European reduction of interchange fees on European consumers. The point is that the wealth transfer under these assumptions from merchants to consumers is significant. It would therefore be desirable for regulators to develop more refined calculations of the impact of interchange fee reductions on consumers.

VII. CONCLUSIONS

The net effect of a reduction in interchange fees on consumers depends on the relative magnitudes of the increase in banking fees and the reduction of merchant prices. If the pass-through rates of cost changes for merchants and retail banks were symmetric and both sides passed on changes just as quickly consumers would just break even. The higher fees they would pay to banks would be just offset by the lower prices they would pay to merchants.

This paper has shown that it is more likely that there are asymmetric effects that result in consumers incurring net losses as a result of interchange fee reductions. Banks are likely to pass along the much costs of revenues they have lost from merchants to consumers in the form of higher fees (or reduced services) based on the theoretical and empirical evidence we have reported. Banks are likely to impose those increases quickly given that they would lose a significant portion of retail banking revenue as a result of the decreased fees. Although there would be great variation across merchant categories on average merchants would be likely to pass on only half of the cost savings in the long run. They would pass on little in the short run because prices are sticky and the cost savings on a per-product basis are tiny.

We have conducted rough calculations based on plausible assumptions that show that a roughly 60 percent reduction in interchange fees would cost European consumers about €17.5 billion, in present discounted value terms, over a decade. We are not putting this number forward as an actual estimate of the cost of an interchange fee reduction since it is ultimately

based on many assumptions that would require verification. However, we do believe that the evidence we have reported suggests that significant reductions in interchange fees would likely impose substantial costs on European consumers.

APPENDIX A

SUMMARY OF PASS-THROUGH LITERATURE

Study	Location(s)	Product(s)	Source of Cost Changes	Pass-Through
Pinelopi Koujianou Golberg and Michael M. Knetter (1997), "Goods prices and exchange rates: What have we learned?" *Journal of Economic Literature*, 35(3), 1243-1272.	United States	Imported goods	Exchange rate fluctuations	40 to 60 percent
José Manuel Campa and Linda S. Goldberg (2005), "Exchange rate pass-through into import prices," *Review of Economics and Statistics*, 87(4), 679-690.	23 OECD countries	Imported goods	Exchange rate fluctuations	46% (quarter) 64% (year) 48% (European countries, quarter) 66% (European countries, year)
Ehsan U. Choudhri, Hamid Faruqee, and Dalia S. Hakura (2005), "Explaining the exchange rate pass-through in different prices," *Journal of International Economics*, 65, 349-374.	G-7 countries excluding the US	Imported goods	Exchange rate fluctuations	22 to 73 percent (overall) 19 to 64 percent (European countries)
David Besanko, Jean-Pierre Bube, and Sachin Gupta (2005), "Own-brand and cross-brand retail pass-through," *Marketing Science*, 24(1), 123-137.	United States	Supermarket products	Trade Promotions	74 percent (median pass-through rate for product categories with pass-through less than 100%)
Gita Gopinath and Roberto Rigobon (2008), "Sticky borders," *Quarterly Journal of Economics*, 123(2), 531-575.	United States	Imported Goods	Exchange rate fluctuations	22 percent
Vincent Nijs, Kanishka Misra, Eric T. Anderson, Karsten Hansen, and Lakshman Krishnamurthi (2010), "Channel pass-through of trade promotions," *Marketing Science*, 29(2), 250-267.	United States	Consumer Products	Trade Promotions	60 to 70 percent
Mikael Carlsson and Oskar N. Skans (forthcoming),	Sweden	Manufactured goods	Firm-level costs	33 percent

"Evaluating microfoundations for aggregate price rigidities: evidence from matched firm-level data on product prices and unit labor cost," *American Economic Review*.				
John Beirne and Martin Bijsterbosch (2011), "Exchange rate pass-through in central and eastern European EU Member States," *Journal of Policy Modeling*, 33(2), 241-254.	Nine Central and Eastern European countries	Imported goods	Exchange rate fluctuations	50 to 60 percent
Lian An and Jian Wang, "Exchange rate pass-through: Evidence Based on Vector Autoregression with Sign Restrictions," Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute, Working Paper No. 70.	Nine OECD countries	Imported goods	Exchange rate fluctuations	44 percent (Overall) 56 percent (European countries)

APPENDIX B

SUMMARY OF PRICE STICKINESS LITERATURE

Study	Location(s)	Data	Price Duration
Alan S. Blinder, Elie R.D. Canetti, David F. Lebow, and Jeremy B. Rudd, *Asking About Prices: A New Approach to Understanding Price Stickiness*, New York: Russell Sage Foundation, 1998.	United States	Survey of executives	12.0 months
Anil K. Kashyap (1995), Sticky Prices: New Evidence from Retail Catalogs," *Quarterly Journal of Economics*, 110(1), 245-274.	United States	Mail order catalogs	14.7 months
Emmanuel Dhyne, Luis J. Álvarez, Hervé Le Bihan, Giovanni Veronese, Danial Dias, Johannes Hoffman, Nicole Jonker, Patrick Lünnemann, Fabio Rumler, and Jouko Vilmunen (2006), "Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data," *Journal of Economic Perspectives*, 20(2), 171-192.	Ten Euro Area countries (Austria, Belgium, Finland, France, Germany, Italy, Luxembourg, the Netherlands, Portugal, and Spain) and the United States	Consumer Price Index	Europe: 13.0 months United States: 6.7 months
James M. MacDonald and Daniel Aaronson (2006), "How Firms Construct Price Changes: Evidence from Restaurant Responses to Increased Minimum Wages," *American Journal of Agricultural Economics*, 88(2), 292-307.	United States	Consumer Price Index (Restaurants)	12.0 months
Denis Fougè, Hervé Le Bihan, and Patrick Sevestre (2007),	France	Consumer Price Index	8.2 months

"Heterogeneity in Consumer Price Stickiness: A Microeconometric Investigation," *Journal of Business and Economic Statistics*, 25(3), 247-264.			
Emi Nakamura and Jón Steinsson (2008), "Five Facts About Prices: A Reevaluation of Menu Cost Models," *Quarterly Journal of Economics*, 123(4), 1415-1464.	United States	Micro Consumer Price Index	11.0 months
Peter J. Klenow and Oleksiy Kryvtsov (2008), "State-Dependent of Time-Dependent Pricing: Does it Matter for Recent U,S, Inflation?" *Quarterly Journal of Economics*, 123(3), 863-904.	United States	Micro Consumer Price Index	7.2 months