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The Impact of the U.S. Debit Card Interchange Fee Regulation on Consumer Welfare: An Event Study Analysis

By David S. Evans, Howard Chang, Steven Joyce^{*}

October 23, 2013

Abstract

The cost to merchants of taking payment on debit cards declined by more than \$7 billion annually as a result of the Durbin Amendment to the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, while the effective cost to issuers of providing debit card services to consumers increased by a corresponding amount. This paper reports an event-study analysis of stock prices to determine the impact on consumers of the Durbin Amendment. Did consumers gain more from cost savings passed on by merchants, in the form of lower prices and better services, than they lost from cost increases passed on by banks, in the form of higher prices or less service? We find that consumers lost more on the bank side than they gained on the merchant side. Our estimate is that, based on the expectations of investors, the present discounted value of the losses for consumers as a result of the implementation of the Durbin Amendment is between \$22 and \$25 billion.

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I. Introduction

As a result of the Durbin Amendment to the Dodd-Frank Act, the Federal Reserve Board placed a cap on the amount of interchange fee revenues that banks¹ with assets of at least \$10 billion² could receive when consumers use their debit cards to pay merchants. Average interchange fee revenue per transaction fell from roughly 44 cents to roughly 24 cents. In 2012, the first full year following the implementation of the Durbin Amendment, banks that issued debit cards will have received an estimated \$7.3 billion less revenue in 2012 than they would have but for the regulations. That amount will increase over time as the volume of debit card transactions rises.³ Interchange fees are paid by companies—often called acquirers—that work with merchants to process card transactions. These acquirers pass most of these interchange fee costs on to merchants. The Durbin Amendment resulted in merchants saving an estimated \$7.3 billion in 2012, a figure that will also increase over time as the volume of debit card transactions rises.

This paper examines whether consumers will gain or lose from the regulation. Merchants would tend to pass some of their cost savings on to consumers in the form of lower prices and better services. Banks would tend to pass some of their revenue losses on to consumers in the form of higher prices and fewer services. Consumers are better off if the gains on the merchant side outweigh the losses on the bank side; otherwise they are worse off.⁴ It is difficult, however, to calculate the gains and losses directly and determine which is bigger.

¹ We use the term “banks” to refer to banks, savings and loans associations, and credit unions. All of these banks typically issue debit cards as part of demand depository accounts they offer consumers and small business customers.

² Banks with assets of less than \$10 billion were exempt from the debit interchange fee provisions of the Durbin Amendment. Debit Card Interchange Fees and Routing, 12 C.F.R. § 235.5 (2012). For the remainder of this paper “covered banks” refers to those banks with at least \$10 billion of assets that are covered by the Durbin Amendment.

³ See Appendix A for details of this calculation. As noted in the appendix, the change in interchange fees could be as high as \$9 billion a year if we assume that the interchange fee cap was binding primarily on debit card transactions that would otherwise have a percentage (rather than flat) interchange fee.

⁴ The Federal Reserve Board noted this tradeoff but concluded that it did not have enough information to assess whether consumers would win or lose from the regulations. Federal Reserve Staff, Memorandum

The reductions in debit interchange amount to less than 5 cents per transaction on average.⁵ Since a transaction typically consists of a basket containing multiple goods, the merchants save substantially less per item. For example, if the average basket contains five or more items the merchant would save less than a penny per item. It is difficult to separate this small reduction in cost per item from the many other demand and supply factors affecting merchant prices.

Previous work on the extent to which merchants lower prices following a reduction in interchange fees have relied mainly on the economic literature on pass-through. The Reserve Bank of Australia (RBA), for example, claimed that merchants in Australia passed most of the cost savings from reductions in credit card interchange fees on to consumers.⁶ The RBA based that conclusion on two false premises: that retailing in Australia is a competitive industry and that economic theory shows that competitive industries pass on most or all of cost savings. Many sectors of retailing in Australia are not highly competitive and are quite concentrated. Moreover, as we discuss below, economic theory finds that full pass-through occurs only under very special conditions: there must be perfect competition

Regarding Final Rule on Debit Card Interchange Fees and Routing and Interim Final Rule on Fraud Prevention Adjustment, June 22, 2011, available at http://www.federalreserve.gov/aboutthefed/boardmeetings/20110629_FINAL_RULE.BOARD_MEMO.06_22_2011.SGA.FINAL2.pdf, at pp. 28-29; Federal Reserve Board, Open Board Meeting Transcript, June 29, 2011, available at <http://www.federalreserve.gov/mediacenter/files/OpenBoardMeeting20110629.pdf>, at pp. 8, 11, 13-14.

⁵ Before the regulation, debit interchange averaged \$0.44 per debit transaction, with an average debit transaction value of \$38.58. See Debit Card Interchange Fees and Routing, 75 Fed. Reg. 81722, 81725, (December 28, 2010) (codified at 12 C.F.R. 235). Under the regulation, debit interchange is capped at \$0.21 per debit transaction, plus 0.05% of the debit transaction's value, plus \$0.01 per debit transaction if certain fraud prevention measures are taken. Debit Card Interchange Fees and Routing, 12 C.F.R. §§ 235.3, 235.4 (2012). This works out to a cap of \$0.24 on the average transaction of \$38.58, which gives a savings of \$0.20 per covered debit transaction. This savings needs to be multiplied by two factors in order to account for the fact that not all transactions are covered debit transactions. First, covered issuers accounted for 69% of all debit transactions in 2010. See Appendix A for the details on this calculation. Second, debit transactions account for an estimated 29.3% of all transactions. See Kevin Foster, Erik Meijer, Scott Schuh, and Michael A. Zabeck (2011), "The 2009 Survey of Consumer Payment Choice," Federal Reserve Bank of Boston Discussion Paper 11-1, available at <http://www.bos.frb.org/economic/ppdp/2011/ppdp1101.pdf>, at 66. We need to account for debit's share of transactions under the assumption that retailers will not selectively cut prices for debit transactions, but will instead spread the cost reduction across all transaction types. If they were to cut prices only for debit card transactions, prices for those users would drop by the full 20 cents, while other customers would see no savings. Combining all of these factors gives an average savings per transaction of $0.293 \times 0.69 \times (0.44 - 0.22 - 0.0005 \times 38.58) = \0.040744 , or less than \$0.05 per transaction.

⁶ Reform Bank of Australia (2008), "Reform of Australia's Payments System: Preliminary Conclusions of the 2007/8 Review," available at <http://www.rba.gov.au/payments-system/reforms/review-card-reforms/pdf/review-0708-pre-conclusions.pdf>, at 22-23.

with constant unit costs. Otherwise, economic theory does not provide robust predictions.⁷ The size of the pass-through rate is an empirical question that requires a fact-intensive examination.

It is complicated, as well, to estimate directly how much of their losses banks will pass on to their customers. Banks typically provide depository customers with a bundle of services. These often include access to that account through tellers at bank branches, ATMs, debit cards, checks, direct deposit, on-line access including on-line bill pay, and wire transfers. Banks often provide other services such as fraud protection and overdraft protection with the depository account. They often provide an associated savings account on which they pay interest and they may pay interest on the checking account balances as well. Banks typically charge depository account customers a monthly fee that is commonly waived if the customer meets certain requirements, such as maintaining a certain level of deposits or making direct deposits into the account. Banks often also charge for individual services, such as account overdrafts, ATM withdrawals, direct debits, wire transfer, and the use of tellers. When banks lose revenue from their checking account customers they can increase any of these fees, reduce interest rates, and reduce services. It is challenging in practice to identify all these possible changes and then to determine the extent to which these changes are the result of the loss of debit card interchange fee revenues versus other changes in cost, demand, and regulation.

This paper uses stock-market data on publicly traded retailers and banks to estimate the impact of the debit card interchange fee reductions on merchant profits and bank profits. It then uses these estimates to infer the gains to consumers on the merchant side and the losses to consumers on the bank side. We have used a well-accepted and widely used empirical technique known as an “event study.”⁸ An event study assumes that financial

⁷ David S. Evans and Abel Mateus (2011), “How Changes in Payment Card Interchange Fees Affect Consumers Fees and Merchant Prices: An Economic Analysis with Applications to the European Union,” Working Paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1878735 [hereinafter “Evans and Mateus (2011)”], at 12-18.

⁸ A. Craig MacKinlay (1997), “Event Studies in Economics and Finance,” *Journal of Economic Literature*, 35, 13-39 [hereinafter “MacKinlay (1997)”]; John J. Binder (1998), “The Event Study Methodology since 1969,” *Review of Quantitative Finance and Accounting*, 11, 111-137; S.P. Kothari and Jerold B. Warner (2007), “Econometrics of Event Studies,” in B. Epsen Eckbo (ed.) *Handbook of Corporate Finance*, Volume 1, Amsterdam: North Holland, 3-36.

markets are efficient and provide roughly accurate forecasts of company valuations. If investors got these predictions wrong they would lose money. In effect, an event study uses the “wisdom of the crowds”—in this case where the crowds are investors—to predict the financial impact of an event.⁹ Although some observers have criticized the efficient market assumption, there is overwhelming evidence that markets process information quickly and reliably.¹⁰ Economists have published hundreds of articles based on this approach,¹¹ U.S. courts rely on event studies to assess liability and damages in securities cases, and the Supreme Court has endorsed its use.¹²

On the merchant side, we find that the capital markets anticipated that publicly traded retailers would retain billions of dollars in profits as a result of regulations that reduce debit-card interchange fees in the United States. To put this a different way, thousands of investors, who follow the stocks of these individual retailers, on average, believed and bet money that the Durbin Amendment would increase the market capitalization of these retailers. On the bank side, the capital markets anticipated that banks would lose billions of dollars in profits as a result of the implementation of the Durbin Amendment. That is, the capital markets concluded that a significant portion of the decrease in interchange fees would cut into bank profits rather than be passed on to consumers.

We show that these results imply that retailers are passing on some of their savings to consumers and not keeping all the benefits as profits; and that banks are passing some of the losses to consumers but not absorbing all of the losses in the form of reduced profits.

⁹ See generally, James Surowiecki (2004), *The Wisdom of Crowds: Why the Many Are Smarter than the Few and How Collective Wisdom Shapes Business, Economies, Societies, and Nations*, New York: Doubleday.

¹⁰ For surveys, see Burton G. Malkiel (2003), “The Efficient Market Hypothesis and Its Critics,” *Journal of Economic Perspectives*, 17(1), 59-82; Andrew W. Lo (2008), “Efficient Markets Hypothesis,” in Steven N. Durlauf and Lawrence E. Blume (eds.), *The New Palgrave Dictionary of Economics*, 2nd edition, New York: Palgrave Macmillan.

¹¹ One survey reported that 565 event studies were published between 1974 and 2000 in just five journals (*Journal of Business*, *Journal of Financial Economics*, *Journal of Financial and Quantitative Analysis*, and the *Review of Financial Studies*). S.P. Kothari and Jerold B. Warner (2007), “Econometrics of Event Studies,” in B. Epsen Eckbo (ed.) *Handbook of Corporate Finance*, Volume 1, Amsterdam: North Holland, 3-36, at 6.

¹² The Supreme Court endorsed the use of event studies in *Basic Inc. v. Levinson* 485 U.S. 224 (1988). For a discussion of event studies have subsequently become the primary tool used in securities litigation, see Mark L. Mitchell and Jeffrey M. Netter (1994), “The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission,” *Business Lawyer*, 49(2), 545-590; David J. Tabek and Frederick C. Dunbar (2001), “Materiality and Magnitude: Event Studies in the Courtroom,” in Roman L. Weil, Michael J. Wagner, and Peter B. Frank (eds.), *Litigation Services Handbook: The Role of the Financial Expert*, 3rd edition, New York: John Wiley & Sons.

On balance, our estimates find that consumers lost more on the bank side than they gained from the merchant side as a result of reduced debit card interchange fees. Our best estimate is that consumers will lose between \$22 billion and \$25 billion, based on the present discounted value of their losses over time, as a result of the implementation of the Durbin Amendment.¹³ As we show below these estimates are plausible given the growth in debit card transactions over time and other evidence on the pass-through of revenue losses and cost savings to consumers.

The remainder of this paper is organized as follows. Section II describes the history of the Durbin Amendment and its implementation. To provide the background for the event analysis we describe when the stock market was likely to have learned about various aspects of the regulation that could affect retailer profitability and expectations concerning the ultimate reduction in interchange fees. Section III summarizes the economics of pass through. It shows that there is no basis for asserting as a matter of theory that merchants (or banks) would necessarily pass through 100 percent of cost savings (or revenue losses) except under extreme and implausible assumptions. Section IV presents our event study analysis. It describes how we obtained a sample of retailers and estimated the impact of the Durbin Amendment on the stock prices of these retailers. Section V offers some concluding remarks. Appendices A, B, and C provide technical details.

II. The Durbin Amendment and Its Implementation

Following the financial crisis in 2008, the U.S House of Representatives, the U.S. Senate and the Executive Branch began considering legislation to reform financial regulation. The U.S. Department of the Treasury proposed legislation in June 2009. The House and Senate worked on separate bills. The U.S. House of Representatives voted on a bill spearheaded by Representative Barney Frank. It approved that bill on December 11, 2009.

¹³ As we explain below, our estimates may understate the extent of consumer harm because the stock price of banks could have been affected by factors other than the extent to which banks were able to pass on their increased costs to consumers. For example, there could be expectations that there would be decline in bank profits resulting from a decline in level of debit card usage. This type of decrease in profits would not reflect consumer benefits from costs that the banks were willing to absorb rather than pass on to consumers. As such, our estimates of consumer harm may be understated.

There was no discussion of interchange fees during the House debate over financial reform and the House bill did not address the subject.

The Senate consideration of financial reform extended into the first half of the next year. On May 7, 2012, just before the Senate was to vote on financial reform legislation spearheaded by Senator Dodd, Senator Durbin proposed an amendment to the draft bill to regulate debit-card interchange fees. He formally introduced it into the Senate on May 12. After negotiations over the language with potential supporters, a final amendment was put up for a vote to a full Senate on May 13, 2010. During these negotiations banks with assets of less than \$10 billion were exempted from the interchange fee regulations. The amendment passed on a vote of 64 to 33 and thereby became part of the bill sponsored by Senator Dodd. This result came as a surprise to the media and analysts who expected that it would be defeated.

- Investors were placing a "relatively low probability of passage" on the measure, he writes - a big negative surprise, then.¹⁴
- [T]hursday's Senate passage of an amendment by Democratic Whip Dick Durbin of Illinois came as a surprise.¹⁵
- Just days after the surprise passage of an amendment to regulate interchange,¹⁶
- The amendment caught all investors by surprise ... [W]e're all just beginning to digest the implications."¹⁷
- The Senate approved a series of amendments unfavorable to the banking industry over the last week, but this one was widely regarded as the most surprising...¹⁸

¹⁴ Barron's, "Visa, MasterCard Hit By Durbin Legislation, But Banks Might Be Real Targets," May 14, 2010.

¹⁵ Associated Press, "Merchants' Gain From Lower Debit Card Fees Might Not Trickle Down to Shoppers," May 14, 2010.

¹⁶ American Banker, "Banks Face New Threat To Credit Cards in Bill," May 18, 2010.

¹⁷ Reuters, "Visa, MasterCard Shares Drop Amid Regulatory Fears," May 18, 2010.

¹⁸ New York Times, "Debit Fee Cut Is a Rare Loss For Big Banks," May 14, 2010.

- The two amendments, proposed by Sen. Richard Durbin (D., Ill.), each hold risks for the card companies and the passage of the amendment was somewhat of a surprise given previous debates.¹⁹

The Senate's proposed financial reform bill was passed on a vote 59 to 39 on May 20, 2010. A conference committee of the House and Senate reconciled the two bills. The final bill was called the "Wall Street Reform and Consumer Protection Act" and included the Durbin Amendment as Section 1075. It passed both the House (on June 30, 2010) and the Senate (on July 15, 2010) and was signed into law by President Obama on July 21, 2010. The legislation is often referred to as the Dodd-Frank Act after its Senate and House sponsors.

Section 1075 of the Dodd-Frank Act mandates that the Federal Reserve Board regulate various aspects of debit cards. The Act requires that the Federal Reserve Board prescribe regulation of the amount of interchange fees that issuers receive and identifies various factors that the Board should consider including the cost of authorization, clearing, and settlement. Under the schedule in the Act the Board was supposed to announce its final rules by April 1, 2011 and impose the interchange fee regulations on October 1, 2011.

What is required under the Durbin Amendment is open to interpretation.²⁰ After it became clear in June 2010 that the Durbin Amendment would become law, the financial media, analysts, issuers and others began speculating about what the Board would decide. While opinions varied across a wide range, most analysts and press accounts predicted that the Federal Reserve Board would reduce debit card interchange fees by 40-60 percent, with a minority warning that the reduction could be as large at 60-80 percent.

- The analyst expects a 50% reduction in U.S. debt interchange and believes each incremental 5% could impact shares by 1%.²¹

¹⁹ DJ News Wires, "US Senate Swipe-Fee Plan Raises Fears For Card Cos," May 14, 2010.

²⁰ That became apparent from the comments submitted to the Federal Reserve Board arguing for difference interpretations (available at http://www.federalreserve.gov/apps/foia/ViewAllComments.aspx?doc_id=R-1404&doc_ver=1) and from the fact that between December 16, 2010 and June 29, 2011 the Federal Reserve Board itself changed its interpretation.

²¹ Fly on the Wall, "Visa and MasterCard valuations reflect debt legislation impact, says RW Baird," December 15, 2010.

- “If it's a 50 percent reduction or less, that's better or as good as the market is expecting,” said Evan Staples, equity analyst with First American Funds.... Bank of America, the largest U.S. retail bank, spooked investors in July when it said the law could cost it between 60 percent to 80 percent of its annual debit fee revenues....²²
- We believe consensus expects a 50% cut in interchange (we think it could be 40-70%), and network exclusivity (i.e., a debit card must have at least two unaffiliated networks) to be limited to PIN-debit only (and not signature debit). We are cautiously optimistic that consensus is right, and believe we could see some relief in the stocks if this scenario plays out.²³
- Our sense is that the market is pricing in (1) the no network exclusivity provision, which requires debit cards to have at least two unaffiliated networks and will be satisfied by activating multiple PIN networks on a card (i.e., regulators will not require multiple signature networks on debit cards), and (2) a ~50% reduction in debit interchange rates. If consensus is right, a modest relief rally is likely, but we would not add to positions ahead of the 16th. Our view: We remain cautiously optimistic that consensus is right, but we would not be surprised if debit interchange rates are cut by 75%. We believe Visa and MasterCard can manage through a 50-75% cut in interchange (earned by banks) and mandated PIN debit competition (i.e., no network exclusivity).²⁴
- Many observers believe the Fed will propose sizeable rate reductions, resulting in substantial decreases in debit card issuer revenue. Aite [Group] says issuers can expect interchange revenue to drop by 40% as the rates become cost-based.²⁵

²² Reuters, “U.S. Banks Brace for Fed’s Debit Fee Crackdown,” December 15, 2010.

²³ Tien-tsin Huang, Reginald L. Smith, and Richard Shane (J.P. Morgan), “V/MA,” December 8, 2010.

²⁴ Tien-tsin Huang, Reginald L. Smith, Richard Shane, Jonathan Philpot, and Daniel Kim (J.P. Morgan), “V/MA,” December 15, 2010.

²⁵ Jeffrey Green, “Seeking ACH-Fee Hike Seen as One Option to Compensate for Reduced Interchange Revenue,” Cardline, December 10, 2010.

- A 50% or greater decline in debit interchange revenue is possible for institutions larger than \$10B, with 20—40 basis points (bps) as a realistic possibility—down from the current range of 75-125 bps.²⁶
- Credit Suisse said the Federal Reserve will release its preliminary draft ruling on the Durbin Amendment on Thursday at 2:20 pm EST. The firm said a reduction of greater than 60% to signature debit interchange would be viewed negatively, while 50% or less would be positive.²⁷
- Analysts expect the Fed to reduce debit interchange revenue by 40% or more.²⁸

The Federal Reserve Board released its draft rule on December 16, 2010. It proposed two alternatives. Under one alternative all covered issuers would be limited to receiving no more than 12 cents per transaction (a 73% percent reduction from the 2009 average of 44 cents). Under the second alternative, covered issuers could receive no more than 7 cents per transaction unless they documented a higher cost in which case they could receive up to 12 cents; based on the data the Federal Reserve Board collected from the banks and the Board's proposed methodology for estimating cost, the weighted average of interchange fees across covered banks would have been close to 7 cents which would have resulted in an 84 percent reduction in interchange fees from the 44 cent average in 2009.²⁹

These reductions were outside, or at most at the edge, of the range of reductions that observers were expecting. The media and industry observers expressed significant surprise over the Federal Reserve Board's preliminary decision.

²⁶ Adam J. Levitin (Filene Research Institute). "Interchange Regulation: Implications for Credit Unions," November 24, 2010, available at http://www.federalreserve.gov/newsevents/rr-commpublic/levitin_filene_paper.pdf.

²⁷ Theflyonthewall.com, "Durbin Decision Due on Thursday, says Credit Suisse," December 15, 2010.

²⁸ Maya Jackson Randall, "Fed Expected to Propose Rule to Rein In Debit-Card Fees," Dow Jones Capital Market Reports, December 16, 2010.

²⁹ For details, see David S. Evans, Robert E. Litan, and Richard Schmalensee (2011), "Economic Analysis of the Effects of the Federal Reserve Board's Proposed Debit Card Interchange Regulations on Consumers and Small Businesses," Working Paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1769887 [hereinafter "Evans, Litan, and Schmalensee (2011)"], at 9.

- "Nobody expected it to be this draconian," said David Robertson, publisher of credit-card industry newsletter the Nilson Report. One bank executive said the cut was larger than the company's worst-case scenario.³⁰
- The Federal Reserve's proposed rule on debit card interchange fees and routing was generally more onerous than expected. [T]he proposed reduction in interchange was larger than expected: a 75%, on average, transaction, versus a high-end expectation of a 60% reduction.³¹
- UBS Investment Research wrote in a note that at first glance it appears the 12 cent cap will drive down average debit interchange rates by about 75%. This is worse than the 40% to 60% the Street expected.³²
- The Federal Reserve dropped a bombshell on Visa and MasterCard, proposing that interchange fees for debit-card transactions be capped at 12 cents. But the market's fast and furious reaction, as shares in each plunged more than 10%, may prove too harsh. Granted, the Fed's move Thursday was shocking. Investors hadn't expected it to wade so forcefully into a highly politicized battle between card networks and banks on one side and merchants on the other. Partly for this reason, analysts expected a more nuanced, less draconian approach, entailing some formula that looked to limit fees based on a percentage of a transaction's value. Markets had expected such an approach would result in a lowering of interchange fees, a big profit driver for Visa and MasterCard, by between 40% and 60%. Instead, the Fed proposed an outright cap. And the 12 cent level would result in a reduction of fees by about 75% to 80%, analysts estimated. That would be painful indeed.³³

³⁰ Wall Street Journal, "Fed's New Debit-Card Fee Rules Hit Hard; Issuers Howl," December 16, 2010.

³¹ FBR Capital on Financial Institution, "The Durbin Debit Downer - Making Sense of the Federal Reserve's Proposal," December 17, 2010.

³² Corrie Driebusch, "Visa, MasterCard Shares Fall on Fed Debit Fee Cap Plan Details," Dow Jones News Service, December 16, 2010.

³³ David Reilly, "Red Card for Debit Fees," Dow Jones News Service, December 16, 2010.

- The revenue hit could fall between 70 to 90 percent of the fees currently paid, said Jeff Tassey, executive director of the Electronic Payments Coalition, a group that represents banks, credit unions, payment networks, and card processors. “It’s a massive reduction,” he said. Wall Street was expecting a 60 percent cut, said [Thomas] McCrohan [an analyst for Janney Capital Markets].³⁴
- The new restrictions, most of which won’t be made final until April 21, aim to cap the amount of money that debit card issuers can charge merchants for so-called swipe fees. Banks would face a seven-to-12-cent-per-transaction cap on the interchange fees under either of the two proposals unveiled Thursday. That represents as much as an 84% drop from the current average of 44 cents.³⁵
- The Fed’s proposals for debit interchange required by the Dodd-Frank Act turned out to be much harsher than expected and would cut debit interchange fees earned by the banks by about 73-83%, much higher than the 50% cut we expected and at the high end of the 60-80% range expected by BAC.³⁶
- Shares in MasterCard and Visa both dropped more than a 10th after details of the Durbin report revealed proposals for larger than expected reductions in interchange fees for debit cards – charges associated with processing transactions. The market had anticipated that fees would fall by about 50 to 60%. The Federal Reserve finally decided that the cost of processing a transaction is a mere 7 cents, and so capped the fee at 12 cents. Assuming that the average debit card transaction is about \$45, the new rate is a typical charge of 27 basis points. Compared with the current average rate of roughly 120bp, calculates UBS, the new rules impose a 75 cent price cut.³⁷

³⁴ Eileen AJ Connelly, “Federal Reserve Proposes Capping Merchant Debit Card Fees at 12 Cents in Blow to Big Banks,” Associated Press Newswires, December 16, 2010.

³⁵ Victoria McGrane, Dan Fitzpatrick, and Randall Smith, “Fed’s New Debit-Card Fee Rules Hit Hard; Issuers Howl,” Wall Street Journal Online, December 16, 2010.

³⁶ Vivek Juneja, Thomas W. Curcuruto, and Polly P. Sung (JP Morgan), “Large Cap Banks,” December 17, 2010.

³⁷ ETX Capital, “Newspaper Headlines,” December 17, 2010, summarizing a Financial Times article.

- The proposed rules would force an approximately 75% cut in fees, versus the 50% that the Street had expected.³⁸
- The Federal Reserve, fulfilling a congressional order to examine whether merchants were being charged reasonable fees to process debit card transactions, proposed new rules Thursday that analysts said could cut fees as much as 90 percent. The Fed's report went much further than the 50 percent reduction that Wall Street had expected.³⁹
- Citigroup believes the Fed's proposed debit interchange cut of approximately 73% is worse than market expectations of around 50%.⁴⁰
- FBR analyst says, "The Federal Reserve's proposed rule on debit card interchange fees and routing was generally more onerous than expected: (1) the proposed reduction in interchange was larger than expected, at 75% on average transaction, versus a high-end expectation of a 60% reduction; and (2) the debit fee was set as a flat fee of \$0.07-\$0.12 per transaction, regardless of the dollar volume of the transaction."⁴¹

The Federal Reserve Board published its draft rules in the Federal Register and, as required by law, and gave the public until February 22, 2011 to send in comments. Based on conversations we have had with lawyers who have worked on Federal Reserve Board regulations it is our understanding that once the Board has adopted a draft rule it seldom makes significant changes to it. In some cases, as in this one, the Federal Reserve Board will offer more than one possible rule and then select one for the final rule. The Federal Reserve Board announced on March 29, 2011 that it needed more time to finalize the rules and that it would not meet the April 21 deadline.

³⁸ Avi Salzman, "Fed Debit Card Cap Roils MasterCard, Visa," Barron's Online, December 17, 2010.

³⁹ Charlotte Observer, "Lower Debit Card Fees Proposed," December 17, 2010.

⁴⁰ Theflyonthewall.com, "Debit Interchange Cut Worse than Expected, says Citigroup," December 17, 2010.

⁴¹ StreetInsider.com, "FRB Capital on Financial Institutions: The Durbin Debit Downer – Making Sense of the Federal Reserve's Proposal," December 17, 2010.

During this time two, other efforts were underway that could have interfered with the interchange fee reductions. TCF, a Midwestern bank, had filed a lawsuit in October 12, 2010. It sought to enjoin enforcement of the regulations until its challenge had wound its way through the courts.⁴² On April 25, 2011, a district court judge refused that request and in the course of doing so expressed skepticism that TCF could prevail.⁴³ The 8th Circuit affirmed the District Court's denial of a preliminary injunction on June 29, 2011.⁴⁴

There were several proposals in the Senate to repeal, modify, or delay the implementation of the Durbin Amendment. Ultimately, a bill that would have delayed the implementation of the Durbin Amendment for a year, sponsored by Senators Corker and Tester, was introduced in the Senate and put to a vote on June 8, 2011. The Senate voted 54 in favor and 45 against, which fell short of the 60 votes needed under the Senate rules.

By June 8, 2011, then, the major uncertainty concerned what the Board would in fact do. Much of the commentary between June 8, 2011, when the effort to delay the regulation failed, and June 29, 2011, when the Federal Reserve Board announced the final rule focused on the Board's choice between the two alternatives it had proposed. Would the Board adopt the 7-cent or the 12-cent solution? While in the immediate aftermath of the December 16, 2010 event, there appeared to be skepticism that the final rule would raise the interchange cap, as time went by, speculation increased regarding a possible increase, perhaps to as high as 20 cents per transaction.

- There is still considerable uncertainty about major portions of the proposal, as the Federal Reserve has released a variety of options on each of the key provisions. With that said, we do not anticipate a significant departure from the draft rules to the final.⁴⁵

⁴² Complaint, TCF National Bank v. Ben S. Bernanke, No. 10-4149 (D.S.D. October 12, 2010); Plaintiffs Memorandum of Law in Support of its Motion for a Preliminary Injunction, TCF National Bank v. Ben S. Bernanke, No. 10-4149 (D.S.D. November 4, 2010).

⁴³ Findings of Fact, Conclusions of Law, and Order on Motion for Preliminary Injunction, TCF Bank v. Ben S. Bernanke, No. 10-4149 (D.S.D. April 25, 2011).

⁴⁴ TCF National Bank v. Ben S. Bernanke, No. 11-1805, (8th Cir. June 29, 2011).

⁴⁵ StreetInsider.com, "FRB Capital on Financial Institutions: The Durbin Debit Downer – Making Sense of the Federal Reserve's Proposal," December 17, 2010, quoting FRB Capital.

- We are awaiting a final ruling from the Federal Reserve as the Durbin Amendment is set to go into effect July 21. We are likely to get the ruling by the end of the month and it could be as early as this week. We would expect that the Fed will likely expand its cost definition (could be around the 20-cent level) which will be less onerous to banks and the card associations. The Fed could also call for a modest, perhaps three month, delay in implementation.⁴⁶
- The Federal Reserve may provide some moderate relief to banks when it votes Wednesday afternoon to adopt a controversial debit-card rule that is set to shift billions of dollars in revenue from financial institutions to merchants. At issue is a Fed proposal it introduced in December that would cut fees that retailers pay to accept debit-card payments by an average of 73%, to a range of 7 to 12 cents a swipe, from roughly 44 cents currently. Regulatory observers say that after pressure imposed by lawmakers and bank lobbyists, the central bank may ease up on the limits banks can charge retailers to around 20 cents a transaction. It still would be a significant reduction in fees for banks. “There seems to be some belief in the market that the Fed will provide some relief to banks over what the original proposal included, and in our discussions with clients, most seem to expect that the Fed will raise the cap to around 20 cents,” said Brian Gardner, analyst at Keefe Bruyette & Woods in Washington. “We would expect a modest rally [in bank stocks] if the rule provides a higher cap or allows the banks to consider more costs than did the original rule. Conversely, a final rule that includes a cap of less than 20 cents could result in a sell-off for issuers.”⁴⁷

⁴⁶ Barron’s Online, “Banking Picks to Play the Durbin Amendment,” June 21, 2011, reprinting analysis from Moshe Orenbuch, Craig Siegenthaler, and Jill Glaser (Credit Suisse).

⁴⁷ Ronald D. Orol, “Fed May Loosen Debit-Card Swipe-Fee Rules; Bank Lobby Says Fed Has Flexibility to Limit Cuts to Fees They Charge,” MarketWatch, June 28, 2011.

- Many analysts expect the Fed, in the plan it is slated to unveil Wednesday afternoon, to lift the cap to as much as 20 cents. But even a cap at that level would still weigh heavily on fee revenue, they said.⁴⁸
- The Fed is expected to release its final debit interchange regulation guidelines on June 29, which should provide clarity on 1) debit interchange rates, 2) debit network exclusivity requirements, and 3) implementation deadline (currently July 21). Consensus seems to expect modestly higher interchange caps (up to \$0.20), Alternative A on routing, and more time to implement, which would be a good outcome for V/MA. While consensus has been wrong on the last three regulation events, our model is stressed for the more harsh outcome (Alt B on routing), but we are hopeful that consensus will be right.⁴⁹

The Federal Reserve Board had a public meeting on June 29, 2011 at which the staff presented the final rules and at which the Board voted on, and adopted, those rules. The Board simultaneously released the final rules and a memorandum describing its reasoning around the same time. As it turns out, the Board decided to adopt an interchange fee cap of roughly 24 cents—double the higher of the two figures it had suggested in the draft rules.⁵⁰ These caps were roughly at the existing level of PIN debit rates and therefore mainly required the lowering of the signature debit rates. The caps amounted to a 45 percent reduction in the average debit-card interchange fee.

The media and analysts expressed surprise over the Board's decision.

⁴⁸ Maya Jackson Randall, "US Financial Firms Brace For Fed's Final Debit-Fee Rules," Dow Jones Global FX & Fixed Income News, June 29, 2011.

⁴⁹ Tien-tsin Huang, Reginald L. Smith, and Richard Shane (JP Morgan), "V/MA," June 29, 2011.

⁵⁰ The Federal Reserve Board prohibited issuers with assets of at least \$10 billion from receiving more than 21 cents per transaction plus 5 basis points multiplied by the value of the transaction. For issuers that meet certain standards for fraud-prevention, this ceiling is raised by an additional 1 cent per transaction. Debit Card Interchange Fees and Routing, 12 C.F.R. §§ 235.3, 235.4 (2012). For an average debit purchase transaction of \$38 that works out to 24 cents. Board of Governors of the Federal Reserve System, "2009 Interchange Revenue, Covered Issuer Cost, and Covered Issuer and Merchant Fraud Loss Related to Debit Card Transactions," available at http://www.federalreserve.gov/paymentsystems/files/debitfees_costs.pdf, at p. 18.

- Before the final rule was released, some bank analysts were expecting a 20-cent cap to be the best-case scenario for the industry. “The fact that they raised it is quite a win for the branded networks,” like Visa and MasterCard, said Tom Layman, a former chief economist for Visa who now runs the payments consulting firm Global Vision Group.⁵¹
- In the end, the Fed appeared willing to allow more flexibility than expected, with most estimates suggesting the central bank would set a hard cap of 20 cents.⁵²

The new rules went into effect on October 1, 2011. On November 22, 2011, a coalition of retailers and retailer associations filed a federal lawsuit in the D.C. District Court, alleging that the Federal Reserve’s final rule was incompatible with the statute.⁵³ The case was assigned to Judge Richard J. Leon, who granted summary judgment for the retailers on July 31, 2013.⁵⁴ He ordered the Federal Reserve to recalculate the interchange fee cap, excluding certain costs, and to revise the routing rule to require each debit card to support authorization through two different networks for each supported payment type.⁵⁵ On August 21, 2013, the Federal Reserve filed notice that it would appeal the decision.⁵⁶ On September 19, 2013, Judge Leon stayed his order pending the resolution of this appeal, meaning that Federal Reserve’s rule would remain in place.⁵⁷ As we discuss below, we do not consider this event in our analysis because the effects of Judge Leon’s ruling are highly uncertain and will

⁵¹ Reuters News, “US Fed Softens the Blow of Debit Fee Crackdown,” June 29, 2011.

⁵² Donna Borak and Rob Blackwell, “Fed Raises Debit Interchange Cap to 21 Cents, But Issuers Could Get More; Central Bank Will Give Banks Until Oct. 1 to Comply,” *American Banker*, June 30, 2011.

⁵³ Complaint, NACS et al v. Board of Governors of the Federal Reserve System, 1:11-cv-02075-RJL, November 22, 2011; First Amended Complaint, NACS et al v. Board of Governors of the Federal Reserve Systems, 1:11-cv-02075-RJL, March 2, 2012.

⁵⁴ Memorandum Opinion, NACS et al v. Board of Governors of the Federal Reserve System, 1:11-cv-02075-RJL, July 31, 2013.

⁵⁵ Memorandum Opinion, NACS et al v. Board of Governors of the Federal Reserve System, 1:11-cv-02075-RJL, July 31, 2013. This means that a debit card that supports both PIN and signature transactions would be required to give merchants a choice between two PIN networks and two signature networks.

⁵⁶ Notice of Appeal, NACS et al v. Board of Governors of the Federal Reserve System, 1:11-cv-02075-RJL, August 21, 2013.

⁵⁷ Memorandum Order, NACS et al v. Board of Governors of the Federal Reserve System, 1:11-cv-02075-RJL, September 19, 2013.

not take effect for several years following appeals and, if the decision stands, a new rule-making process by the Federal Reserve Board.

III. Economic Analysis of Pass Through

There is an extensive theoretical and empirical literature in economics, which provides insights into how much retailers and banks are likely to pass on if they behave like other industries that have experienced changes in costs.

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 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 *and 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.⁵⁸ To take a simple example, if there was perfect competition but the supply curve was upward sloping as a result of decreasing returns to scale, only a portion of the cost reduction would be passed on to consumers in the form of lower prices.

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

⁵⁸ E. Glen Weyl and Michal Fabinger (2012), “Pass-Through as an Economic Tool,” Working Paper, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1324426 [hereinafter “Weyl and Fabinger (2012)”].

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 \$1.00.⁵⁹ 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.

The implication of the theoretical work is that once we depart from the case of perfect competition *and* constant returns to scale it is not possible to predict the degree of pass through from theory alone. Pass through is an empirical question.

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

⁵⁹ As Weyl and Fabinger (2012), *id*, observe 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).

foreign exchange rates affect import prices and the prices of domestic goods. 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.⁶⁰

There is a pass-through literature specific to banks. Most of these studies look at the extent of timing of pass-through of changes in market interest rates to changes in bank lending and deposit rates. These studies typically find heterogeneous pass-through rates, with long-run pass-through rates in developed countries (particularly the U.S.) usually not statistically distinguishable from 100 percent.⁶¹ While interest rate pass-through may not be the same as the pass-through of other costs, this literature suggests that pass-through may be higher in banking than in other sectors.

⁶⁰ See Evans and Mateus (2011), at 45-46. A recent paper on the effects of the Federal Reserve's interchange fee regulation based its estimates on a retailer pass-through rate of 69 percent. Robert J. Shapiro (2013), "The Costs and Benefits of Half a Loaf: The Economic Effects of Recent Regulation of Debit Card Interchange Fees," Working Paper, available at http://www.nrf.com/modules.php?name=Documents&op=showlivedoc&sp_id=7678. This figure is the average pass-through rate calculated in a single study. Vincent Nijis, Kanishka Misra, Eric T. Anderson, Karsten Hansen, and Lakshman Krishnamurthi (2010), "Channel Pass-Through of Trade Promotions," *Marketing Science*, 29(2) 250-267. This was one of the pass-through studies included in Evans and Mateus (2011). We do not believe this single study provides a reliable estimate of the pass-through rate for analyzing the impact of changes in debit card fees. First, there is no particular reason to pick this study than other studies that have been done. Second, an average over multiple studies likely provides a more reliable estimate because it averages out possible biases in either direction from these studies and because it covers a broader range of products and services. The third reason is that the particular study chosen by Shapiro, Nijis et al (2010), is probably not representative of the average pass-through rate for debit-card merchants. The study is limited to a single product category sold in grocery stores and drug stores. Studies which focused on these types of stores find somewhat higher pass-through rates than the other studies (see Evans and Mateus (2011). This suggests that these merchants may have higher pass-through rates than the overall population of debit card accepting merchants, making this number an overestimate of the true parameter for the purposes of Shapiro's (2013) study. While it is not easy to precisely convert the estimates of market capitalization changes estimated in this paper into pass-through rates, the analysis in Appendix C suggests that our evidence is most consistent with a pass-through rate by merchants of 49-53 percent, which is somewhat lower than that assumed by Shapiro (2013).

⁶¹ One survey notes that "The estimates for the pass-through in the U.S.A. seem to be higher than in the euro area, and most of the studies seem to suggest that the pass-through to U.S. retail rates is nearly complete in the long-run." Claudia Kwapi and Johann Scharler (2006), "Limited Pass-Through from Policy to Retail Interest Rates: Empirical Evidence and Macroeconomic Implications," *Monetary Policy and the Economy*, 2006(4), 26-36. See also Gabe de Bondt (2005), "Retail Bank Interest Rate Pass-Through: New Evidence at the Euro Area Level," *German Economic Review*, 6(1), 37-78; Christopher Kok Sorensen (2006), "Bank Interest Rate Pass-Through in the Euro Area: A Cross Country Comparison," Working Paper; Leonarddo Gamacorta (2008), "How Do Banks Set Interest Rates?" *European Economic Review*, 52(5), 792-819; Nikoloz Giginishvili (2011), "Determinant of Interest Rate Pass-Through: Do Macroeconomic Conditions and Financial Market Structure Matter?" Working Paper.

These 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 change their prices in response to cost shocks. These studies have found that merchants do not adjust prices quickly and typically find that prices stay constant for about a year or more.⁶²

The theoretical and empirical literature is robust enough to rule out some extreme cases. The Reserve Bank of Australia claimed that Australian retailers were competitive and competitive industries pass on cost savings fully. In fact the Australian retail sector is highly concentrated. For example, Australia has one of the most concentrated grocery sectors in the world, with the top two chains (Woolworth and Coles) accounting for 80 percent of supermarket sales.⁶³ There is no basis for concluding that these firms are perfectly competitive. Beyond that, even if they were, the full pass through result only holds if the firms have constant returns to scale. There is no basis for that assertion either.

Other observers claim that merchants do not pass on any of the cost savings to consumers. They point to the absence of evidence that merchants have reduced prices. But as we noted above the cost reductions are so small that it would be hard to discern the price reductions especially when other costs are changing. It is plausible in the short run that merchants would not reduce prices because of price stickiness. But in the long run the theoretical and empirical literature does not provide any basis for suggesting that firms, even with market power, would retain all of the cost reductions as earnings.

⁶² See Evans and Mateus (2011), at 47-48.

⁶³ Woolworth 43%, Coles 37%, IGA/Foodworks 15%, Aldi 3%, all others 2%. These shares give an HHI of over 3450. These shares are based on 2010 sales. Stuart Alexander, “Australian Market,” available at http://www.stuartalexander.com.au/aust_grocery_market_woolworths_coles_wholesale.php.

IV. Event Study Analysis

Measuring the pass-through rate for the debit card interchange fee cost reduction from changes in prices is a challenging, and perhaps quixotic, pursuit. The decrease in cost to retailers is substantial in absolute terms—more than \$7 billion annually as noted above. But its potential impact on consumer prices is quite small—less than 5 cents on an average transaction even if retailers passed through 100 percent of the cost savings.⁶⁴ To estimate the impact on prices directly would require separating the impact of the debit-card fee reductions from other factors affecting prices including changes in cost and demand. Those factors vary across products and retail categories. Moreover, it is possible that, to the extent that retailers pass on cost savings to consumers, they do so by improving service. Small changes in service are even harder to identify than small changes in prices. Finally, as noted in the previous section, it often takes some time before merchants adjust prices in response to a cost change. Even if it were possible to measure the impact of the interchange fee cut on retailer prices, it may be that the price reductions do not take place until much later. The literature on price stickiness reviewed above suggests that prices would not change much until late 2012 or 2013. Directly assessing pass through on the bank side is also complicated, given that debit cards are part of a bundle of checking account services and given the possibility of banks to respond by reducing the quality of services.

An alternative approach to assessing consumer impact involves examining the impact of the debit-card interchange fee reduction on profits. Suppose a merchant realizes a reduction in costs of C . All else equal, it will keep a portion P_M as profits, and pass on the remainder, $C - P_M$, of its cost savings to consumers. Similarly, a bank has an increase in its costs of C , as a result of a reduction in its interchange fees of C . All else equal, its profits will decline by a portion $-P_B$, and it will pass on the rest of the cost increase, $C - P_B$, to consumers

⁶⁴ This calculation is based on a 20-cent drop in interchange per debit transaction, multiplied by debit's 29.3% share of transactions. We need to account for debit's share of transactions under the assumption that retailers will not selectively cut prices for debit transactions, but will instead spread the cost reduction across all transaction types. If they were to cut prices only for debit card transactions, prices for those users would drop by the full 20 cents, while other customers would see no savings. Debit's share of transactions based on Kevin Foster, Erik Meijer, Scott Schuh, and Michael A. Zabeck (2011), "The 2009 Survey of Consumer Payment Choice," Federal Reserve Bank of Boston Discussion Paper 11-1, available at <http://www.bos.frb.org/economic/ppdp/2011/ppdp1101.pdf>, at p. 66.

in the form of higher fees or reduced services for debit card and other banking services.⁶⁵ Consumers therefore gain an amount $C - P_M$ from merchant pass through of cost savings and lose an amount $C - P_B$ from bank pass through of revenue loss.

Now, let C , P_M , and P_B reflect the present discounted value of the sum of the cost savings and pass-through amounts across all merchants and banks. The net effect on consumers in the economy is $(C - P_M) - (C - P_B) = P_B - P_M$. That is, if the decline in profits for banks exceeds the increase in profits for retailers, then consumers benefit on net from the change in interchange fees. But if the increase in profits for retailers exceeds the decline in profits for the banks, then consumers have been made worse off because retailers are expected to keep more of the interchange fee reductions as profits than banks are expected to take as losses. This section conducts an event study to estimate P_B and P_M from changes in the stock market capitalization of retailers and banks.⁶⁶

⁶⁵ Failures in corporate governance could result in the waste of some of these savings—if, for example, the managers use the cost savings to increase their own compensation. In this case the 1-x would overstate the pass-through rate.

⁶⁶ It is likely that $P_B - P_M$ understates the losses to consumers. Our approach assumes that every dollar that the bank loses in profit following the reduction in debit interchange fees is a dollar that the bank has chosen not to pass through to consumers in the form of higher prices or reduced services. However, there are at least two reasons why this may not be the case. First, acquirers may not pass-through 100 percent of the interchange savings to banks. In that case, our measure of the increase in merchant profits would understate the amount of savings not passed on to consumers (since it excludes the increase in acquirer profits), and would thus understate the losses to consumers. Second, bank profit could also decline because some consumers decide to drop checking accounts. In that case the loss of bank profit also reflects a loss to consumers. A consumer who, for example, leaves the banking system and switches transactions away from debit will also have an effect on the profits of retailers. It is likely that a reduction in the rate of growth of debit would primarily increase the use of cash and checks rather than credit, given that debit has in the past been viewed as taking transactions away from cash and checks and given the major declines in market capitalizations of Visa and MasterCard (which both facilitate credit card as well as debit card transactions) from the Durbin Amendment. The cost of cash and checks is roughly comparable to the cost of debit cards after the enactment of the regulations, so that a shift toward cash and check would have a similar cost savings as from the reduction in debit card interchange fees. For an example, see Table 2 in Daniel D. Garcia Swartz, Robert W. Hahn, and Anne Layne-Farrar (2006), “The Move to a Cashless Society: A Closer Look at Payment Instrument Economics,” *Review of Network Economics*, 5(2), 175-198. At grocery stores, they report a (pre-Durbin) cost to merchants of \$0.82 for a \$54.24 transaction (the average transaction size for checks at grocery stores). With a \$0.20 per transaction from the Durbin Amendment, this gives a post-Durbin cost of \$0.62 per transaction. This is roughly comparable to the costs they report at the same size transaction for cash (\$0.43 per transaction), non-verified checks (\$0.64 per transaction), and verified checks (\$0.47 per transaction).

An event study enables us to estimate the profit impact and bypasses many of the problems in estimating the pass-through rate directly. Assuming markets are efficient,⁶⁷ the market capitalization of the firm—its stock price times the number of outstanding shares—equals the present discounted value of expected profits. An event that alters the expectation of future profits results in a change in the price of the stock, and thus the market capitalization, to reflect that revised stream of profits. It is possible to measure the impact of an event that reveals new information to the market concerning the future profits of the firm by examining the change in stock price and the market capitalization of the firm.⁶⁸ The main challenge with an event study concerns separating the impact of an event from other developments. That is easier when information is revealed to investors and adjustments to prices occur during a short “window” which naturally limits other possible sources of changes in stock prices.

This section describes an event study of the debit-card interchange fee reductions.

A. Event Study Design and Estimation

We focus on two key events for our analysis.

- (1) December 16, 2010 when the Federal Reserve Board announced the draft rules (the “draft rule” event).
- (2) June 29, 2011 when the Federal Reserve announced the final rules (the “final rule” event).

These events were relatively clean in the sense that there was no discernible leakage of information to the markets before the events and they did not seem to be anticipated by

⁶⁷ For the purpose of this paper we assume the financial markets are “semi-strong efficient” which means that all publicly available information is incorporated into the stock price. Michael C. Jensen (1978), “Some Anomalous Evidence Regarding Market Efficiency,” *Journal of Financial Economics*, 6(2/3), 95-101.

⁶⁸ See Mackinlay (1997) for a survey of the literature concerning the methodology for conducting event studies. As with event studies generally, our analysis estimates the change in market value of the firms studied, which can be thought of as the present discounted value of the changes in future cash flows resulting from the event. That is, it is the contemporaneous estimate, as reflected in the financial markets, of the impact of future changes resulting from the event studied.

knowledgeable observers as discussed above.⁶⁹ For both of these events we assumed that the new information reached markets only on the day of the event, with no earlier or later leakage.⁷⁰

We did not examine other events surrounding the passage of the Durbin Amendment because they involved considerable uncertainty over the likelihood of eventual passage for several weeks: the Durbin Amendment had to be adopted, then the Senate had to pass the bill, the House and Senate reconciliation had to include the Durbin Amendment, and the Senate and House needed to adopt the final bill. This occurred over the space of about a month.

Changes in stock prices following these two events reflect changes in expected profits relative to what investors expected based on prior information. As discussed earlier, investors expected that the implementation of the Durbin Amendment would lead to a roughly 50-60 percent decrease in debit-card interchange fees. The draft rule proposed two alternatives—the 12-cent rule which would have led to a 73 percent reduction and the 7-cent rule which would have led to an 84 percent reduction. Changes in stock price reflect

⁶⁹ Most of the work on this paper was completed before Judge Leon issued his decision on July 31, 2013, which would be another plausible event to consider. But adding that event would be complicated by the fact that July 31, 2013 was a rather eventful news day. There were several events that likely affect stock prices of retailers and banks. The Federal Reserve announced that it would continue its program of quantitative easing, but issued a statement that many interpreted as suggesting that it anticipated deciding to taper the program at its next meeting. Federal Reserve Press Release, July 31, 2013, available at <http://www.federalreserve.gov/newsevents/press/monetary/20130731a.htm>. There were also a number of important economic releases, including the Bureau of Economic Analysis's advance GDP for 2013 Q2 (1.70%, above the 1.00% expectations, but combined with downward revisions to the estimates for 2013 Q1 and 2012 Q4), the Mortgage Bankers' Association's Mortgage Applications Index (-3.7%), and the Chicago Purchasing Managers Index (52.3, below the expected 54). These release dates and expectations are based on data from Bloomberg. News reports that day also suggested that that CIT had cut off trade credit to J.C. Penny's suppliers, causing the retailer's stock to plummet. Matt Townsend, "J.C. Penny Falls on Report CIT Stopped Funding Suppliers," Bloomberg News, July 31, 2013. Earnings reports, generally above expectations, were released by MasterCard (11 percent above expectations) and several banks included in our analysis (BBVA was 14 percent above expectations, BOK was 4 percent below expectations, MTU, 31 percent above expectations). Data on earnings releases and expectations from Bloomberg. While in principle it might be possible to distinguish the separate effect of these events, doing so would be beyond the scope of this paper. The impact of Judge Leon's decision on stock prices is also likely to be tempered by the fact that the actual effects of the decision would not place until appeals were exhausted and, assuming his decision was affirmed on appeal, after the completion of a rule making process by the Federal Reserve Board.

⁷⁰ We found no statistical evidence to support longer windows. Specifically, estimates of cumulative abnormal returns remained approximately constant as we expanded the event windows, while the statistical significance of the effect rapidly dwindled. This indicates that the effects were concentrated in the single day of the announcement.

the change in expectation from 50-60 percent to 73-84 percent. The final rule resulted in a 45 percent reduction in the average debit-card interchange fee rate. Changes in stock price following the final rule would reflect the change in expectation from 73-84 percent to 45 percent.

To estimate the impact of these events on stock prices of retailers, we began with 100 retailers with the highest U.S. sales in 2010.⁷¹ These 100 retailers accounted for 37.5 percent of total retail sales in the U.S. in 2010. We then determined which of these retailers were publicly traded on a U.S. exchange. We found 66 retailers, listed in Table 1, which met these criteria. These 66 retailers accounted for 84.6 percent of the total sales of the 100 largest retailers and 31.7 percent of total retail sales in 2010. Many of these retailers sell outside of the U.S. Any impact of the Durbin Amendment would be limited to their U.S. sales. Table 1 reports their 2010 U.S. and worldwide sales. For each of these retailers we obtained daily stock prices, and other relevant data such as the number of shares outstanding,⁷² from October 1, 2008 to June 30, 2012.

⁷¹ As reported in the July 2011 issue of STORES magazine.

⁷² We obtained the data from Bloomberg. The prices are adjusted for dividends, splits and other events of this nature.

Table 1: Included Retailers

Company	2010 US Retail Sales (\$ millions)	2010 Worldwide Sales (\$ millions)	US Share of Sales (%)
Wal-Mart	\$307,736	\$421,886	72.9%
Kroger	\$78,326	\$78,326	100.0%
Target	\$65,815	\$65,815	100.0%
Walgreen	\$61,240	\$63,038	97.1%
The Home Depot	\$60,194	\$68,000	88.5%
Costco	\$58,983	\$78,394	75.2%
CVS Caremark	\$57,464	\$57,511	99.9%
Lowe's	\$48,175	\$48,815	98.7%
Best Buy	\$37,110	\$49,887	74.4%
Sears Holdings	\$35,362	\$41,267	85.7%
Safeway	\$33,262	\$38,445	86.5%
SUPERVALU	\$30,975	\$30,975	100.0%
Rite Aid	\$25,196	\$25,196	100.0%
Macy's	\$24,864	\$24,938	99.7%
Ahold USA / Royal Ahold	\$23,518	\$56,245	41.8%
McDonald's	\$23,130	\$69,440	33.3%
Delhaize America	\$18,799	\$27,445	68.5%
Amazon.com	\$18,526	\$32,923	56.3%
Kohl's	\$18,391	\$18,391	100.0%
Apple Stores / iTunes	\$18,064	\$20,134	89.7%
J.C. Penney	\$17,659	\$17,753	99.5%
YUM! Brands	\$17,306	\$30,362	57.0%
TJX	\$16,751	\$21,970	76.2%
Dollar General	\$13,035	\$13,035	100.0%
Gap	\$11,718	\$14,503	80.8%
BJ'S Wholesale Club	\$10,876	\$10,876	100.0%
Wendy's / Arby's	\$10,026	\$10,624	94.4%
Nordstrom	\$9,624	\$9,624	100.0%
Staples	\$9,204	\$16,320	56.4%
Whole Foods Markets	\$8,736	\$8,970	97.4%
Bed Bath & Beyond	\$8,700	\$8,785	99.0%

Limited Brands	\$8,247	\$8,778	94.0%
Verizon Wireless	\$8,021	\$61,510	13.0%
Family Dollar	\$7,867	\$7,867	100.0%
Ross Stores	\$7,860	\$7,868	99.9%
Darden Restaurants	\$7,603	\$7,603	100.0%
Starbucks	\$7,560	\$10,707	70.6%
Office Depot	\$7,557	\$11,866	63.7%
Winn-Dixie Stores	\$7,207	\$7,207	100.0%
GameStop	\$6,610	\$9,474	69.8%
AutoZone	\$6,098	\$6,433	94.8%
Dillard's	\$6,020	\$6,020	100.0%
DineEquity	\$5,884	\$6,104	96.4%
Advance Auto Parts	\$5,876	\$5,920	99.3%
Dollar Tree	\$5,801	\$5,801	100.0%
Barnes & Noble	\$5,715	\$5,715	100.0%
OfficeMax	\$5,655	\$7,077	79.9%
O'Reilly Automotive	\$5,398	\$5,398	100.0%
QVC	\$5,236	\$7,646	68.5%
AT&T Wireless	\$4,990	\$124,280	4.0%
Dell	\$4,946	\$4,946	100.0%
Big Lots	\$4,903	\$4,903	100.0%
PetSmart	\$4,839	\$5,042	96.0%
RadioShack	\$4,615	\$4,820	95.8%
Dick's Sporting Goods	\$4,414	\$4,414	100.0%
Sherwin-Williams	\$4,226	\$4,396	96.1%
Ruddick Corp.	\$4,099	\$4,099	100.0%
Tractor Supply Co.	\$3,639	\$3,639	100.0%
Foot Locker	\$3,577	\$4,955	72.2%
Williams-Sonoma	\$3,447	\$3,502	98.4%
SonyStyle	\$3,401	\$3,401	100.0%
Ingles Markets	\$3,274	\$3,274	100.0%
Brinker International	\$3,090	\$3,090	100.0%
HSN	\$2,998	\$2,998	100.0%
Bon-Ton Stores	\$2,980	\$2,980	100.0%
Abercrombie & Fitch	\$2,846	\$2,950	96.5%

Similarly, to estimate the impact of these events on the stock prices of issuers, we began with the 100 issuers with the largest total dollar volume on U.S. debit cards in 2010.⁷³ We then excluded issuers that were not traded on a U.S. exchange and prepaid-only issuers. That left us with 57 issuers that accounted for 89 percent of the debit volume of the top 100 U.S. debit issuers and 74 percent of the debit volume of all U.S. issuers. For each of these issuers, we obtained daily stock prices and other relevant data, such as the number of shares outstanding, from October 1, 2008 to June 30, 2012.⁷⁴

⁷³ As reported in issues 970 (April 2011) and 972 (May 2011) of the Nilson Reports.

⁷⁴ We obtained the data from Bloomberg. The prices are adjusted for dividends, splits and other events of this nature.

Table 2: Included Issuers

Issuer	US Debit Volume (\$ millions)	US Debit Transactions (millions)	Total Assets (\$ billions)
Bank of America	\$245,188	6,094	\$1,736
Wells Fargo	\$195,900	5,070	\$1,155
JPMorgan Chase	\$161,074	2,770	\$1,785
US Bank	\$41,334	1,161	\$308
PNC	\$38,301	1,027	\$257
Regions Bank	\$27,197	738	\$128
Citibank	\$26,800	562	\$1,312
SunTrust	\$25,554	651	\$163
MetaBank	\$22,746	666	\$1
TD Bank	\$22,398	543	\$180
Fifth Third	\$19,509	516	\$109
BB&T	\$18,735	484	\$153
Citizens Bank	\$18,458	462	\$140
Capital One	\$11,671	301	\$199
Comerica Bank	\$9,670	318	\$54
BBVA Compass	\$9,292	236	\$68
KeyBank	\$9,035	890	\$89
M&T Bank	\$8,579	208	\$68
The Bancorp Bank	\$8,074	198	\$3
TCF Financial	\$7,630	220	\$18
Huntington Bank	\$6,730	183	\$54
Sovereign Bank	\$6,443	148	\$79
HSBC	\$5,645	121	\$183
Zions Bancorp	\$5,491	128	\$50
Harris NA	\$5,465	111	\$101
Synovus/Columbus B&T	\$5,247	163	\$30
Union Bank	\$5,244	120	\$82
Commerce Bank MO	\$4,487	130	\$20
First Horizon	\$3,359	89	\$24
People's United	\$3,133	78	\$24
Associated Bank	\$2,871	79	\$22

RBC Bank	\$2,682	67	\$28
UMB Bank	\$2,618	57	\$13
IBC Bank	\$2,468	62	\$12
Bancorp South	\$2,358	58	\$14
BOK Financial	\$2,273	56	\$27
First Citizens NC	\$2,265	58	\$22
Frost National Bank	\$2,190	52	\$18
FirstMeritBank	\$2,169	60	\$14
Old National Bank	\$1,784	50	\$7
Bank of Hawaii	\$1,749	34	\$13
Webster Bank	\$1,565	32	\$18
Hancock Bank	\$1,553	39	\$8
Susquehanna Bancshares	\$1,517	38	\$14
Trustmark National	\$1,171	31	\$10
Northwest Savings Bank	\$1,137	31	\$8
E*Trade Bank	\$1,088	25	\$46
American Savings Bank	\$1,039	24	\$5
First Midwest Bank	\$1,029	26	\$8
BancFirst	\$968	26	\$5
Fulton Financial	\$966	27	\$17
New York Community	\$960	25	\$41
First Federal S&L SC	\$884	24	\$3
First Financial Bank Ohio	\$815	21	\$6
Sterling Savings Bank	\$809	22	\$10
First Interstate Bank	\$760	19	\$7
BankAtlantic	\$740	20	\$4

Note: Total assets are measured as the combined assets of all banks under the parent holding company, as of December 31, 2010.

The basic statistical framework for an event study examines the return of the stock (the percent change in its stock price) over the event window. The impact of the event is based on the difference between the actual return and the normal return that one would expect in the absence of the event. The difference between the actual and normal return is called the “abnormal return” and reflects the impact of the event.

We have developed four alternative models for estimating the impact of the draft final rule and final rule events. As the dependent variable, Model 1 and Model 2 use the daily returns for three portfolios of stocks (a retailer portfolio, an exempt issuer portfolio, and a covered issuer portfolio, each weighted by market capitalization). Model 3 and Model 4 use the daily returns for the individual stocks. The following equations describe the regression specification:

$$\begin{aligned}
(1) \quad R_{pt} &= \alpha + \beta R_{mt} + \delta_1 D_{1t} + \delta_2 D_{2t} + \sum_k \gamma_k X_{pkt} + \epsilon_{it} \\
(2) \quad R_{pt} &= \alpha + \beta R_{mt} + \delta_1 (D_{1t} + D_{2t}F) + \sum_k \gamma_k X_{ikt} + \epsilon_{it} \\
(3) \quad R_{it} &= \alpha + \beta R_{mt} + \delta_1 D_{1t} + \delta_2 D_{2t} + \sum_k \gamma_k X_{ikt} + \epsilon_{it} \\
(4) \quad R_{it} &= \alpha + \beta R_{mt} + \delta_1 (D_{1t} + D_{2t}F) + \sum_k \gamma_k X_{ikt} + \epsilon_{it}
\end{aligned}$$

where

R_{pt} = the return for the portfolio p on day t ;

R_{it} = the return for shares of stock i on day t ;

R_{mt} = the return for the S&P 500 on day t ;

D_{1t} = dummy equal to 1 if day t is within the event window for the December 16, 2010 event, and 0 otherwise;

D_{2t} = dummy equal to 1 if day t is within the event window for the June 29, 2011 event, and 0 otherwise;

F = the ratio, presumed to be known, of the surprise change to debit interchange rates from the final rule (+\$0.145/transaction) to the surprise change to debit interchange rates from the initial proposal (-\$0.125/transaction), which equals -1.16;

X_{pkt} = the value of control variable k for the portfolio p on day t ; and

X_{ikt} = the value of control variable k for stock i on day t .

These equations control for market returns using the S&P 500.⁷⁵ They do not, however, impose any restrictions on the coefficients derived from economic models of asset pricing such as CAPM. This approach is called the “market model.” It is preferred because the additional restrictions implied by asset pricing theories typically add little power and are often rejected by the data.⁷⁶ The estimation of these equations relies on the standard assumptions for event studies: markets are efficient in the semi-strong sense, new information reached the market during the assigned event window, and there were no confounding events during the event windows.⁷⁷

Since Model 1 and Model 2 aggregate the stocks into portfolios, they are robust to correlations in the error term within days across firms in a portfolio. However, because they estimate only the total effect on returns, these models may obscure important differences across retailers in the impact of the events. In Models 3 and 4, we estimate a separate equation for each stock. This allows us to detect heterogeneity, at the cost of a possible loss in efficiency due the introduction of many additional parameters. In our estimation procedure, we use a time period that includes the events of interest, as well as the pre- and post-event periods, with abnormal returns being captured by the coefficients on dummy variables indicating that the day is in the event window.⁷⁸

Models 2 and 4 exploit the fact that we have prior information about the relative magnitude of the two events. These models restrict the ratio of the two event effects to equal a constant determined by the relative magnitude of the interchange rate “surprise”

⁷⁵ We recognize that some of the firms we are analyzing are included within the S&P 500 index. Reconstructing the S&P 500 for the entire period, by removing individual retailers and issuers was outside the scope of this paper. We did, however, verify that we obtained similar results to the ones we report below using an adjusted S&P 500 index, which removed the returns of the retailers and the (covered and exempt) issuer portfolios, based their approximate weights within the full S&P 500 index.

⁷⁶ See the survey Mackinlay (1997), at 19.

⁷⁷ Abigail McWilliams and Donald Siegel (1997), “Event Studies in Management Research: Theoretical and Empirical Issues,” *Academy of Management Journal*, 40(3), 626-657, at 630-634.

⁷⁸ Our approach is typical of event studies in the field of industrial organization e.g., Nancy L. Rose (1985), “The Incidence of Regulatory Rents in the Motor Carrier Industry,” *RAND Journal of Economics*, 16(3), 299-318; George L. Mullin, Joseph C. Mullin, and Wallace P. Mullin (1995), “The Competitive Effects of Mergers: Stock Market Evidence from the U.S. Steel Dissolution Suit,” *RAND Journal of Economics*, 26(2), 314-330; Judith A. Chevalier (1995), “Capital Structure and Product-Market Competition: Empirical Evidence from the Supermarket Industry,” *American Economic Review*, 85(3), 415-435. For a comparison of the advantages and disadvantages of this approach, see John J. Binder (1998), “The Event Study Methodology Since 1969,” *Review of Quantitative Finance and Accounting*, 11(2), 111-136.

contained in the two announcements. This will enhance the efficiency of our estimates to the extent that the ratio we impose is equal to the true ratio, and the cost of introducing bias to the extent that the ratio we impose is incorrect.

B. Estimation Results

We estimate these equations using systems ordinary least squares (“Systems OLS”) and report heteroskedasticity-consistent standard errors. Summary statistics are reported in Table 3, and the regression results are reported in Table 4 and Table 5. We would expect retailers to gain and covered issuers to lose on the December 16, 2010 event, and for the reverse to occur on the June 29, 2011 event. The effect on exempt issuers is ambiguous – interchange reductions may hurt their stock price to the extent that the market expected them to be imposed on the exempt issuers (by future regulation or rule changes by Visa and MasterCard, or voluntarily due to competitive pressures). Alternatively, the reductions might help their stock price if markets expected the exempt issuers to gain a competitive advantage over covered issuers due to latter’s increased fees.

Table 3: Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Return S&P 500	0.0002184803	0.01770421	-0.0903498	0.1158004
Sales Surprise	1.881188e-05	0.001250824	-0.015	0.018
Return on Portfolio of Covered Issuers	0.0002053689	0.03104913	-0.1882226	0.1703315
Return on Portfolio of Exempt Issuers	0.0003073736	0.02464755	-0.1368497	0.1265265
Return on Portfolio of Retailers	0.0006597295	0.01476759	-0.079848	0.1179946
Fed Proposal Dummy	0.0009910803	0.03148143	0	1
Fed Final Dummy	0.0009910803	0.03148143	0	1

Note: Return variables are omitted for the 43 covered issuers, 14 exempt issuers, and 66 retailers

Table 4: Regression Results for Models using Portfolio Returns

Model	(1)	(2)
Dependent Variables	Portfolio Returns	Portfolio Returns
Cross-event Restriction	No	Yes
Retailer portfolio:		
Intercept	4.975e-04** (1.664e-04)	4.953e-04 ** (1.660e-04)
S&P 500 Return	7.768e-01** (1.718e-02)	7.767e-01** (1.717e-02)
Sales Surprise	2.517e-01* (1.135e-01)	2.517e-01* (1.135e-01)
Fed Proposal	2.017e-03** (2.102e-04)	3.238e-03** (7.352e-04)
Fed Final	-4.809e-03** (2.343e-04)	-
Exempt issuer portfolio:		
Intercept	5.80e-05 (4.377e-04)	5.661e-05 (4.368e-04)
S&P 500 Return	1.149e+00** (5.000e-02)	1.149e+00** (4.998e-02)
Fed Proposal	1.202e-03* (5.556e-04)	1.959e-03** (4.622e-04)
Fed Final	-2.924e-03** (6.260e-04)	-
Covered issuer portfolio:		
Intercept	-1.306e-04 (4.702e-04)	1.309e-04 (4.690e-04)
S&P 500 Return	1.534e+00** (6.584e-02)	1.534e+00** (6.581e-02)
Fed Proposal	-7.114e-03** (7.004e-04)	-6.929e-03** (1.560e-04)
Fed Final	7.887e-03** (8.107e-04)	-
R-squared	0.7499	0.7499

Adjusted R-squared	0.7488	0.7491
F-statistic	903.4**	1292**

Heteroskedasticity-corrected standard errors are shown in parentheses

* Significant at the 5% level

** Significant at the 1% level

Table 5: Regression Results for Models using Firm-Level Returns

Model	(3)	(4)
Dependent Variables	Individual Firm Returns	Individual Firm Returns
Cross-event Restriction	No	Yes
Retailer (66 equations):		
Intercept	0% Negative and statistically significant 5% Positive and statistically significant Mean: 6.47E-4	0% Negative and statistically significant 5% Positive and statistically significant Mean: 6.45E-4
S&P 500 Return	0% Negative and statistically significant 100% Positive and statistically significant Mean: 0.967	0% Negative and statistically significant 100% Positive and statistically significant Mean: 0.967
Sales Surprise	0% Negative and statistically significant 12% Positive and statistically significant Mean: 5.53E-1	0% Negative and statistically significant 12% Positive and statistically significant Mean: 5.53E-1
Fed Proposal	23% Negative and statistically significant 59% Positive and statistically significant Mean: 4.93E-3	3% Negative and statistically significant 41% Positive and statistically significant Mean: 6.17E-3
Fed Final	73% Negative and statistically significant 18% Positive and statistically significant Mean: -8.23E-3	-
Exempt issuer (14 equations):		
Intercept	0% Negative and statistically significant 0% Positive and statistically significant	0% Negative and statistically significant 0% Positive and statistically significant

	Mean: 5.01E-4	Mean: 5.23E-4
S&P 500 Return	0% Negative and statistically significant 100% Positive and statistically significant Mean: 1.21	0% Negative and statistically significant 100% Positive and statistically significant Mean: 1.21
Fed Proposal	57% Negative and statistically significant 36% Positive and statistically significant Mean: 2.46E-2	14% Negative and statistically significant 21% Positive and statistically significant Mean: 1.22E-2
Fed Final	50% Negative and statistically significant 29% Positive and statistically significant Mean: -3.54E-3	-
Covered issuer (43 equations):		
Intercept	0% Negative and statistically significant 0% Positive and statistically significant Mean: 3.57E-4	0% Negative and statistically significant 0% Positive and statistically significant Mean: 3.53E-4
S&P 500 Return	0% Negative and statistically significant 100% Positive and statistically significant Mean: 1.51	0% Negative and statistically significant 100% Positive and statistically significant Mean: 1.51
Fed Proposal	70% Negative and statistically significant 14% Positive and statistically significant Mean: -8.66E-3	37% Negative and statistically significant 0% Positive and statistically significant Mean: -6.85E-3
Fed Final	9% Negative and statistically significant	-

67% Positive and statistically significant		
Mean: 6.39E-3		
R-squared	0.3726	0.3721
Adjusted R-squared	0.3698	0.3699
F-statistic	166.9**	232.4**

Heteroskedasticity-corrected standard errors are used in calculating significance at the 1% level

** Statistically significant at the 1% level

In the portfolio specifications, we find statistically significant coefficients with the predicted signs for both retailers and covered issuers. In the firm-level specifications, the same pattern generally holds, although there is a great diversity in the estimated coefficients across the different firms. For exempt issuers, the estimated coefficients are small and generally statistically insignificant, with inconsistent signs.

We note that the data reject the restrictions imposed by Models 2 and 4 (the “cross-event” restriction that requires the ratio of the event responses to the two events be proportional to our estimate of the change in expected interchange rates at each event). The F-statistic for Model 2’s restriction of Model 1 equals 5691.8, which is significant at the 1% level. Similarly, the F-statistic for the Model 4’s restriction of Model 3 equals 9324.1, which is also significant at the 1% level. This suggests that the unrestricted models may be more reliable, but given that the change in responses to the two events should, in principle, be the same, we also report the results with the cross-even restrictions.⁷⁹

Table 6 reports tests of various hypotheses regarding the event dummy variables. Specifically, for each specification and each event, we calculate the implied total change in market capitalization for each group of stocks (retailers, exempt issuers, and covered issuers). The implied change in market capitalization is simply the pre-event market capitalization for each firm or portfolio, multiplied by the corresponding estimated excess return (and summed over all firms, in specifications where necessary). We then test whether each total differs significantly from zero. As shown in Table 6, for retailers and covered issuers, the

⁷⁹ Imposing the cross-event restrictions is another way of averaging the results from the two events, which we do report for the specifications without the cross-even restrictions. We recognize that the two events may differ in other ways that would affect the profits of the retailers and of the banks and would thus affect our event study results differentially.

change in market capitalization has the predicted sign and is statistically significant in all specifications. The size of the effects is substantial in absolute terms, although small relative to the total market capitalization of these firms. The change in market capitalization for exempt issuers is small in absolute terms and is not statistically significant in the firm-level specifications.

As we noted above, the data reject the restrictions imposed by Models 2 and 4. That is, the dollar impact on the market capitalization of the retailers and issuers, after controlling for the size of the surprise in the two events, is not the same. That does not strike us as particularly remarkable. The fact that the signs of the impact for the retailer and issuer groups respectively are consistent across the two events and that the estimated dollar impacts are broadly comparable for each of the two groups across the two events indicate the robustness of our results.

Table 6: Implied Change in Market Capitalization, Totaled Across firms

Model	(1)	(2)	(3)	(4)
Dependent Variables	Portfolio Returns	Portfolio Returns	Individual Firm Returns	Individual Firm Returns
Cross-event Restriction	No	Yes	No	Yes
Dec. 16, 2010 Event				
Retailers	+\$3.2 bill** (92.1)	+\$5.1 bill* (19.4)	+\$2.5 bill** (123.4)	+\$5.3 bill** (10.4)
Exempt issuers	+\$14.3 mill* (4.7)	+\$23.3 mill** (18.0)	+\$5.8 mill (2.1)	+\$24.2 mill (1.7)
Covered issuers	-\$10.0 bill** (103.2)	-\$9.7 bill** (1971.4)	-\$10.8 bill** (521.3)	-\$9.7 bill** (74.1)
June 29, 2011 Event				
Retailers	-\$7.9 bill** (421.2)	-\$6.2 bill* (19.4)	-\$8.6 bill** (1103.3)	-\$6.4 bill** (10.1)
Exempt issuers	-\$39.1 mill** (21.8)	-\$30.4 mill** (18.0)	-\$51.9 mill (1.6)	-\$32.5 mill (2.2)
Covered issuers	+\$11.0 bill** (94.4)	+\$11.2 bill** (1971.4)	+\$9.4 bill** (666.3)	+\$11.1 bill** (58.1)

Heteroskedasticity-robust F-statistics in parentheses

* Significant at the 5% level

** Significant at the 1% level

The impact of the draft final and final rules on the market values of the retailers and banks is substantial on an absolute basis. When the draft rule was announced, estimated debit card interchange fee savings increased from about 50 percent to 73-84 percent. The 66 retailers had an increase in overall market capitalization of between \$2.5 and \$5.3 billion and the 43 covered issuers experienced a loss of \$9.7 billion to \$10.8 billion. When the final rule was announced, estimates of debit card interchange fee savings were revised downward from 73-84 percent to 44 percent. The 66 retailers had a decrease in overall market capitalization of between \$6.2 and \$8.6 billion and the 43 covered issuers had an increase in overall market capitalization of between \$9.4 and \$11.2 billion. All of these changes in market capitalization for retailers and covered issuers are statistically significant. Some of the corresponding changes for exempt issuers are not statistically significant, and the effects are small in magnitude.

C. Consumer Impact

To estimate the impact on consumers, we need to scale the effects we measured on the market capitalization of the banks and retailers in our sample up to the population of all banks and retailers (or other merchants) in the United States.

On the bank side, we need to scale up the results to the entire population of U.S. banks. We do this separately for the exempt and covered issuers, as they differ in the size of the estimated effects. The covered issuers in our sample accounted for approximately 93 percent of the U.S. debit volume of all covered issuers.⁸⁰ The estimated effect for covered issuers is therefore divided by 93 percent to provide an estimate for all covered issuers. The

⁸⁰ The publicly traded covered issuers in our sample account for 94 percent of the U.S. debit purchase volume and transactions of all covered issuers in the top 100. The smallest issuer in the top 100 accounts for just over 0.05 percent of total volume and transactions. Since covered issuers generally have significantly higher volume and transactions than exempt issuers, it is unlikely that there are more than a few covered issuers outside the top 100. Since any issuers outside of the top 100 are very small, the covered issuers outside of the top 100 account for only a negligible share of volume and transactions. The adjustment (dividing by 94 percent) implicitly assumes that the pass through of fee changes by the covered issuers not included in our study is the same as those included in our study. Our reasonableness checks, reported in Appendix C, suggest that the results we obtained for banks in our study are within the range for banks generally. In addition, the fact that the banks we studied accounted for 94 percent of all covered banks means that this assumption does not have a significant impact on our reported results.

exempt issuers in our study accounted for 13 percent of the U.S. debit transactions of all exempt issuers.⁸¹ The estimated effect for exempt issuers from the event study is therefore divided by 13 percent to provide an estimate for all U.S. exempt issuers.⁸²

Similarly, on the merchant side, we need to scale up the results to the entire population of U.S. merchants. The retailers in our sample accounted for 38 percent of the U.S. retail volume of all retailers.⁸³ The estimated effect for retailers from the event study is therefore divided by 38 percent to provide an estimate for all U.S. retailers. In addition to retailers, there are debit card transactions made at non-retail merchants, including service providers (e.g., physicians or gym memberships) and travel and entertainment merchants. Accounting for all merchants, retailers account for roughly 55 percent of U.S. debit transactions according to the survey of consumer payments conducted by the Federal Reserve Bank of Boston.⁸⁴ The total retailer impact is therefore divided by 55 percent to provide a total estimated impact on the merchant side.⁸⁵

⁸¹ Issuer-level debit volumes are based on data from The Nilson Report, Issues 965 (February 2011), 970 (April 2011), and 972 (May 2011).

⁸² This adjustment (dividing by 13 percent) implicitly assumes that the pass through of fee changes by the exempt issuers included in our study is the same as that of exempt issuers not included in our study. Given the small estimated impact of the Durbin Amendment on exempt issuers, this assumption does not have a significant impact on our reported results.

⁸³ The sales figures for these retailers were taken from Stores Magazine, July 2011. Total U.S. retail sales (excluding motor vehicle and parts dealers) were taken from the U.S. Census Bureau, <http://www.census.gov/retail/marts/www/download/text/adv44y72.txt>.

⁸⁴ Kevin Foster, Erik Meijer, Scott Schuh, and Michael A. Zabeck (2011), “The 2009 Survey of Consumer Payment Choice,” Federal Reserve Bank of Boston Discussion Paper 11-1, available at <http://www.bos.frb.org/economic/ppdp/2011/ppdp1101.pdf>. Restaurants are included in the estimates of retail sales we are using, though they are sometimes classified separately from retailers in other data sources.

⁸⁵ There are four issues to note regarding these adjustments (dividing by 38 percent to get to all retailers and by 55 percent to get to all merchants). First, these adjustments implicitly assume that the pass through of fee changes by the retailers and merchants not included in our study is the same as those included in our study. Our reasonableness checks, reported in Appendix C, suggest that the results we obtained for retailers in our study are within the range for retailers generally. Second, since our sample consists of large retailers that probably qualified for the lowest interchange rates based on volume, their share of the total interchange savings may be less than their share of sales or debit transactions. If this is correct, our estimates of consumer harm below would be understated, since the correct divisor would be based on the (smaller) share of interchange savings, rather than the share of sales or debit transactions. Third, these adjustments also assume that merchants that are not retailers—such as airlines, cellular telephone and other utility providers, and medical professionals—pass through fee changes at the same rate as retailers in our study. It is possible that pass through by such merchants may be lower than for retailers in our study, as they may be in less competitive industries. If so, our estimates of consumer harm below would be understated. Fourth, the retailers in our sample may have experienced higher pass-through from their acquirers than the average merchant, due to large merchants typically negotiating contracts with their acquirers that specify prices as a

Next, after scaling up both the debit issuer and retailer effects up to the total U.S. effect from the two events, we then need a further calibration. The estimated effects from the event study were based on the size of the changes in expectations of debit card interchange fees before and after each of the two events we studied. The sizes of those changes were different from the overall change in debit card interchange fees brought about by the Durbin Amendment, so an adjustment is needed.

For the December 16, 2010 event, as we described above, financial analysts expected the Federal Reserve to lower interchange fees even prior to the announcement. The general expectation seemed to be that the Federal Reserve would lower debit interchange fees by 50 percent, down to 22 cents from the prevailing 44 cents. Instead, the Federal Reserve, set interchange fees even lower, with the two stated alternatives of 7 cents and 12 cents. We take the average of these two alternatives, 9.5 cents, as the expectation of the debit card interchange fee rate immediately following the December 16, 2010 announcement.⁸⁶ We assume therefore that the change in expectations of the debit card interchange fee was a decrease of 12.5 cents, from 22 cents per transaction to 9.5 cents per transaction. Given that the Durbin Amendment ultimately lowered debit card interchange fees by 20 cents, from 44 cents to 24 cents, rather than the 12.5 cent change from the December 16, 2010 event, the estimated impact of that event needs to be multiplied by (20/12.5). This gives us the full impact of the Durbin Amendment based on the effects seen in the December 16, 2010 event. We obtain estimates of the change in profits for the banks, P_B , and the change in profits for the merchants, P_M , with the net consumer impact being $P_B - P_M$, as discussed above.

Similarly, for the June 29, 2011 event, we need to calibrate based on the change in expectations before and after that event. Before the June 29, 2011 announcement, the

fixed markup over the interchange rate. If this is the case, our estimates of consumer harm would be understated, for reasons similar to those discussed in footnote 66.

⁸⁶ We recognize that, at the time of the Federal Reserve announcement on December 16, 2010, financial market participants may have anticipated a subsequent change in the level of interchange fees set by the Federal Reserve. It does not appear, however, financial analysts placed much weight on this possibility immediately following the Federal Reserve's announcement. See StreetInsider.com, "'FRB Capital on Financial Institutions: The Durbin Debit Downer – Making Sense of the Federal Reserve's Proposal,'" December 17, 2010, quoting FRB Capital. If we assume that financial market anticipants expected that the Federal Reserve would subsequently raise the level of the interchange fee cap, that would increase the estimates of consumer harm we describe below.

Federal Reserve had stated the alternative rates of 7 cents and 12 cents per transaction in the December 16, 2010 announcement. We take the expectation immediately preceding the June 29, 2011 announcement to be the average of these two alternative rates, or 9.5 percent. Instead, the Federal Reserve set interchange fees at 24 cents per transaction. We take the change in expectations to be 14.5 cents per transaction. Again, to get to the full impact of the Durbin Amendment based on the effects seen in the June 29, 2011 event, we need to multiply the estimated effects from that event by $(20/14.5)$. And again, we obtain estimates of P_B , P_M , and the net consumer impact $P_B - P_M$.

As we noted above, some financial market participants believed there was some chance the Federal Reserve would increase interchange fees, perhaps to as much as 20 cents per transaction before the June 29, 2011 announcement. If we assume that the pre-announcement expectation was something between the 9.5 cents and the 20 cents that had been suggested, then the adjustment factor to scale up to the full effect of the Durbin Amendment would be greater, and the estimates of consumer harm would be higher.

Tables 7-9 report our estimates of P_B , P_M , and the net consumer impact $P_B - P_M$, as estimated from the two events, taking the average of the estimates from the two events.

Table 7: Total Impact of the Durbin Amendment, Based on December 16, 2010 Event

	Cost Increase Absorbed by Banks (P_b)	Cost Decrease Retained by Merchants (P_m)	Net Consumer Impact ($P_b - P_m$)
Model (1) Portfolio Unrestricted	\$17.0 billion** (100.8)	\$24.5 billion** (92.1)	-\$7.5 billion* (6.0)
Model (2) Portfolio with Cross-Event Restriction	\$16.4 billion** (1843.6)	\$39.3 billion** (19.4)	-\$22.9 billion* (6.6)
Model (3) Firm Unrestricted	\$18.5 billion** (515.4)	\$19.3 billion** (123.4)	-\$0.7 billion (0.1)
Model (4) Firm with Cross Event Restriction	\$16.3 billion** (70.5)	\$40.3 billion** (10.4)	-\$24.0 billion (3.6)

Heteroskedasticity-robust F-statistics shown in parentheses

* Significant at the 5% level

** Significant at the 1% level

Note that the F-tests assume that the scaling factors are known with certainty, with the error coming solely from the regression coefficients.

Table 8: Total Impact of the Durbin Amendment, Based on June 29, 2011 Event

	Cost Increase Absorbed by Banks (P _b)	Cost Decrease Retained by Merchants (P _m)	Net Consumer Impact (P _b – P _m)
Model (1) Portfolio	\$15.9 billion**	\$52.0 billion**	-\$36.1 billion**
Unrestricted	(89.4)	(421.2)	(140.8)
Model (2) Portfolio	\$16.3 billion**	\$40.6 billion**	-\$24.3 billion**
with Cross-Event	(1819.8)	(19.4)	(6.9)
Restriction			
Model (3) Firm	\$13.3 billion**	\$56.9 billion**	-\$43.6 billion**
Unrestricted	(309.4)	(1103.3)	(541.7)
Model (4) Firm with	\$16.1 billion**	\$41.8 billion**	-\$25.7 billion
Cross Event Restriction	(55.0)	(10.1)	(3.7)

Heteroskedasticity-robust F-statistics shown in parentheses

* Significant at the 5% level

** Significant at the 1% level

Note that the F-tests assume that the scaling factors are known with certainty, with the error coming solely from the regression coefficients.

Table 9: Total Impact of the Durbin Amendment, based on Combination of the Two Events

	Cost Increase Absorbed by Banks (P _b)	Cost Decrease Retained by Merchants (P _m)	Net Consumer Impact (P _b – P _m)
Model (1) Portfolio	\$16.4 billion**	\$38.2 billion**	-\$21.8 billion**
Unrestricted	(3940.7)	(10309)	(2572.9)
Model (2) Portfolio	\$16.4 billion**	\$40.0 billion**	-\$23.6 billion**
with Cross-Event	(1412.5)	(19.4)	(8.9)
Restriction			
Model (3) Firm	\$15.9 billion**	\$38.1 billion**	-\$22.1 billion**
Unrestricted	(20923)	(21003)	(7111.6)
Model (4) Firm with	\$16.2 billion**	\$41.1 billion**	-\$24.8 billion*
Cross Event Restriction	(7.6)	(8.4)	(4.0)

Heteroskedasticity-robust F-statistics shown in parentheses

* Significant at the 5% level

** Significant at the 1% level

Note that the F-tests assume that the scaling factors are known with certainty, with the error coming solely from the regression coefficients.

Table 9 shows that the average impact based on the combined estimate from the two events, we see that estimates of the banks' loss in profits, P_B , ranges from \$15.9 billion to \$16.4 billion. The merchants' gain in profits, P_M , ranges from \$38.1 billion to \$41.1 billion.

These estimates are plausible given the likely evolution of debit cards.⁸⁷ They reflect present discounted values over time. Debit card volumes are growing rapidly as a result of increased usage by consumers and general growth in consumer spending. The Nilson Report, for example, forecasts the debit card purchases will reach \$2,761 billion on 67 billion transactions in 2015, compared with \$2,107 billion on 53 billion transactions in 2012.⁸⁸ By 2015, debit card interchange fee revenues would be \$9.3 billion less as a result of the regulations than if interchange fees had continued at the 2009 rates.⁸⁹ The present discounted value of the interchange fee reductions for merchants is about \$80.7 billion calculated over 25 years.

The event study estimates are also consistent with estimates of the extent to which merchants and banks "pass-through" changes in costs to consumers. As mentioned above, studies of pass-through rates for merchants vary considerably but average about 50 percent. Studies for banks suggest that pass-through rates are much higher—more than 70 percent—so that banks pass on most of the lost revenues to consumers. It turns out that under plausible assumptions our event study yields a pass-through rate of about 49-53 percent for retailers, and a pass-through rate of 80 percent for banks. Our event study results are

⁸⁷ In Appendix C, we report two rough tests of our estimates' reasonableness, which we summarize here. For the first test, we compute the approximate net present value of the change in interchange fees. Comparing the result, \$80.7 billion, to the bank losses and merchant gains reported in Table 9 gives us the pass-through rates implied by our estimates. We find an implied issuer pass-through rate of 80 percent, and an implied merchant pass through rate of 49 to 53 percent. This suggests that the magnitude of the increase in merchant profits and decrease in bank profits are quite plausible. For our second reasonableness check, we start with pass-through rates estimated in the existing literature: 50 percent for merchants and 70 percent for banks. Using the same net present value of the difference in interchange rates as in the first reasonableness check, we apply these pass through rates to get estimated bank losses of \$24.2 billion and estimated merchant gains of \$41.1 billion. These values are similar to the results of our event study, where we found bank losses of \$15.9 to \$16.4 billion, and merchant gains of \$38.1 billion to \$41.1 billion.

⁸⁸ Nilson Report, Issue 961 (December 2010), at 7.

⁸⁹ Calculation based on interchange per transaction of \$0.44 without the regulation (and for exempt issuers under the regulation) and \$0.24 for covered issuers under the regulation. The fraction of covered transactions is assumed to be 69 percent – the same value as in 2010 (See Appendix A for the details of the calculation of issuers' share of transactions).

therefore consistent with a large number of studies by economists of pass-through rates for merchants and banks.

We can also perform this reliability check in the reverse direction. Instead of computing pass-through from our estimated wealth transfers and comparing them to previous studies, we can start from the pass-through rates estimated in previous studies and calculate implied wealth transfers which can be compared to the estimates from our study. Using 50 percent pass-through for merchants and 70 percent pass-through for banks yields estimated bank losses of \$24.2 billion and estimated merchant gains of \$40.4 billion. (Details of these calculations are in Appendix C.) These values are similar to the results of our event study, where we found bank losses of \$15.9 to \$16.4 billion, and merchant gains of \$38.1 to \$41.1 billion.

There is a great deal of evidence that banks in fact raised many rates and reduced services in anticipation of the interchange regulations and after the announcement and implementation of these price caps. In its 2012 Checking Survey, Bankrate.com found that almost every category of checking account fee had increased over 2011 levels. The percentage of free checking accounts declined from 45 percent to 39 percent. The average monthly maintenance fee for non-interest checking accounts rose 25 percent. The average minimum balance required to avoid fees rose 23 percent. The average fee charged by banks to their customers for using an out-of-network ATM rose 11 percent, in addition to a 4 percent increase in the fee charged by ATM owners.

The total impact on consumers, $P_B - P_M$, ranges from a loss of \$21.8 billion to a loss of \$24.8 billion. That is, based on the expectations that the financial markets had of the impact of the regulation on bank and merchant profits, consumers are expected to lose \$22 billion to \$25 billion more from higher bank fees and reduced banking services than they are expected to gain from lower merchant prices and better merchant services.⁹⁰

The fact that the Durbin Amendment resulted in a wealth transfer from consumers and banks is not surprising. The regulations shifted more than \$7.3 billion of money from

⁹⁰ In Appendix B, we report results based on a range of alternative values for the scaling factors and changes in expectations of debit interchange fee levels associated with the two events. We find the results are consistent with our findings of significant consumer losses resulting from the implementation of the Durbin Amendment.

the annual income of banks to the annual income of merchants. There is no reason to believe that merchants would give this windfall back to consumers or the banks could absorb the full loss in their profits. A wealth of economic studies shows that does not happen in the real world. Consumers got the short end the stick though. Merchant are not giving enough of their gains back to consumers to compensate for the higher fees and reduced services that consumers are getting from banks as a result of the interchange price caps, nor, as we have shown, are merchants expected to do so.

V. Conclusions

Several countries have imposed price caps on debit and credit-card interchange fees and others are considering doing so. An important public policy issue for these regulations is how they ultimately impact consumers. To address that issue it is necessary to consider whether the consumer gain on the merchant side exceeds, or falls short of, the consumer loss on the bank side. Despite the imposition of price regulations (or as part of settlements with merchants) in Australia, Israel, Mexico, and Spain there have been no rigorous estimates of the extent to which consumers have been helped or harmed by these regulations.

Using an event study this paper finds that consumers have lost, on net, about \$22 billion to \$25 billion from the enactment of the Durbin Amendment. Those figures are present discounted values calculated over the lifetime of the interchange fee reductions. While retailers are expected to pass on some of their cost savings, that appears to be significantly outweighed by likely fee increases, or reductions in service quality, for checking accounts.

Appendix A: Calculation of the Lost Interchange Fee Revenue for Covered Issuers

This appendix reports our calculation of the decrease in interchange fees for covered debit card issuers in 2012, the first full year that the Federal Reserve Board's interchange fee regulations have been in effect. We start with the Nilson Report's forecast for purchases on U.S. debit cards in 2012: \$2,107.4 billion in volume on 52.86 billion transactions.⁹¹

Next, we estimate the share of these amounts that will be attributable to covered issuers. We match the Nilson Report's list of the top 100 U.S. debit card issuers to call report data from the FDIC and the NCUA.⁹² The Nilson Report data includes the purchase volume and purchase transactions for each issuer, while the call report data includes the total assets for each institution.⁹³ From this data, we can assign issuers with assets of at least \$10 billion to the covered group, and the remainder of the issuers to the exempt group. Totaling the 2010 debit card purchase volume and transactions of the covered issuers in the top 100 gives \$1,049.789 billion in volume on 25.538 billion transactions. This equals 76 percent of the \$1,386.33 billion in U.S. debit purchase volume, and 69 percent of the 36.86 billion U.S. debit purchase transactions. It is possible that some covered issuers fall outside of the top 100, but any such issuers should contribute only negligibly to the totals.

We assume that, going forward, covered issuers will continue to account for the same fraction of total U.S. debit purchase volume and transactions. Thus, in 2012, we expect covered issuers to account for \$1,595.81 billion in volume (76 percent of \$2,107.4 billion) and 36.62 billion in transactions (69% of 52.86 billion). Under the counterfactual of no interchange regulation, we would expect interchange rates on these transactions to

⁹¹ Nilson Report, Issue 961 (December 2010), at 7.

⁹² The Nilson Report published data on 2010 debit card volume and transactions for the top 100 debit card issuers in the United States, as well as totals for all issuers. The Nilson Report, Issue 965 (February 2011), at 8; The Nilson Report, Issue 970 (April 2011), at 10-11; The Nilson Report, Issue 972 (May 2011), at 10-11. The FDIC publishes call report data for banks and the NCUA publishes call report data for credit unions. This data included the total assets for each institution. Federal Deposit Insurance Corporation, Statistics on Depository Institutions, available at <http://www2.fdic.gov/SDI/>; National Credit Union Administration, 5300 Call Report Quarterly Data, available at <http://www.ncua.gov/DataApps/QCallRptData/Pages/CallRptData.aspx>.

⁹³ In many cases, the call report data treats various affiliates as separate entities. Following the approach in the Federal Reserve's regulation, we aggregate total assets across all subsidiaries. See Debit Card Interchange Fees and Routing, 12 C.F.R. § 235.5(a)(ii).

approximately equal the pre-regulation rates. The Federal Reserve reported average debit interchange rates of \$0.44 per transaction, or 1.14 percent of the transaction amount.⁹⁴ To avoid overstating the change in interchange fees, we assume that rate of \$0.44 per transaction would apply in 2012 in the absence of regulation.⁹⁵

Under these assumptions, total debit interchange in 2012 would be \$23.26 billion if interchange were unregulated (52.86 billion transactions * \$0.44 per transaction). Under the Fed's regulation, total debit interchange in 2012 will be \$16.0 billion (52.86 billion transactions * \$0.22 per transaction * 69 percent covered transactions + \$2,107.4 billion volume * 0.05 percent * 76 percent covered volume + 52.86 billion transactions * \$0.44 per transaction * (100 – 69) percent exempt transactions). This gives a difference of \$7.26 billion (\$23.26 billion - \$16.0 billion). If, alternatively, we assume that interchange fees in the absence of the Durbin Amendment would have been set at 1.14 percent of the transaction amount (rather than \$0.44 per transaction), the difference in interchange fees would have been \$9.3 billion.

⁹⁴ Debit Card Interchange Fees and Routing, 75 Fed. Reg. 81722, 81725 (December 28, 2010) (codified at 12 C.F.R. 235). The Fed reported separate interchange rates for signature debit, Pin debit, and prepaid cards. We have checked how separately accounting for the three debit categories affects the calculations in this appendix, and found that it has only negligible effects. For simplicity, we report only the results for the calculation that applies the new regulation to the aggregate debit statistics.

⁹⁵ Since Nilson projected that debit volume will grow at a faster rate than debit transactions between 2009 and 2012, whether we hold constant the average interchange fee per transaction or the average interchange rate per dollar of volume. In reality, debit interchange rates contain both a fixed component and a percentage component, with the percentage component being more important for most categories of debit transactions. See <http://usa.visa.com/download/merchants/october-2010-visa-usa-interchange-rate-sheet.pdf> for Visa's interchange schedule at the time of the Federal Reserve's draft proposal.

Appendix B: Sensitivity Analysis

In this appendix, we consider the sensitivity of the consumer welfare results to changes in the scaling assumptions. We consider four parameters (shown in Table 10) that are used in scaling the regression results to obtain the total impact on issuers, merchants, and consumers.⁹⁶ We re-estimate all four models eight times, and scale the results using the same procedure described in the body of this paper. We vary each of the four parameters individually. We report the bottom-line change in consumer welfare for each model under each variation, along with F-tests of the hypothesis the net change in consumer welfare (estimated using both events) equals zero.

Table 10: Value of Selected Parameters in Baseline Model

Parameter	Baseline Value
Included retailers' share of all retail debit transactions (R)	38.35%
Retail debit transactions as a share of all debit transactions (D)	54.64%
Change in expected debit interchange rate, 16-Dec-2010 (Δ^{prop})	-\$0.125
Change in expected debit interchange rate, 29-Jun-2011 (Δ^{final})	+\$0.145

Note that changes in R and D only affect the scaling of the regression results to obtain the full effect of the interchange regulation. In contrast, changes in Δ^{prop} and Δ^{final} affect both the scaling and the regression coefficients in the models that impose the cross-event restriction (Models 2 and 4). Table 11 shows the effect of changing these parameters on the estimated change in consumer welfare, averaged across the two events.

⁹⁶ The ratio of two of these parameters (the change in expected interchange rates that occurred with the two events) also affects the regression coefficients in the specifications that impose the restriction on the relative magnitude of the effect for the two events (Model 2 and Model 4).

Table 11: Estimated Consumer Welfare Effect under Alternative Parameter Values

Estimated Change in Consumer Welfare (Based on Both Events)				
Parameter Change	Model (1)	Model (2)	Model (3)	Model (4)
Baseline	-\$21.8 billion** (2532.8)	-\$23.6 billion** (8.9)	-\$22.1 billion** (7033.6)	-\$24.8 billion* (4.0)
R = 33%	-\$28.0 billion** (3299.6)	-\$30.1 billion** (10.1)	-\$28.3 billion** (8575.3)	-\$31.5 billion* (4.5)
R = 43%	-\$17.7 billion** (1976.5)	-\$19.3 billion** (7.9)	-\$18.0 billion** (5835.1)	-\$20.4 billion (3.5)
D = 50%	-\$25.3 billion** (2982.7)	-\$27.3 billion** (9.6)	-\$25.7 billion** (7951.1)	-\$28.7 billion* (4.3)
D = 70%	-\$13.4 billion** (1383.1)	-\$14.8 billion* (6.6)	-\$13.8 billion** (4450.7)	-\$15.8 billion (3.0)
$\Delta^{\text{prop}} = -\\0.08	-\$23.9 billion** (610.1)	-\$29.9 billion** (56.3)	-\$22.3 billion** (1987.1)	-\$32.9 billion** (8.4)
$\Delta^{\text{prop}} = -\\0.15	-\$21.2 billion** (8597.9)	-\$20.4 billion** (389.8)	-\$22.1 billion** (16492)	-\$21.0 billion (1.2)
$\Delta^{\text{final}} = +\\0.06	-\$47.4 billion** (393.0)	-\$22.4 billion (0.9)	-\$53.0 billion** (758.1)	-\$20.2 billion (1.4)
$\Delta^{\text{final}} = +\\0.17	-\$19.1 billion** (1286.6)	-\$22.3 billion** (15.3)	-\$18.9 billion** (3904.7)	-\$23.9 billion* (5.0)

* Significant at the 5% level

** Significant at the 1% level

As can be seen in Table 11, our general finding of significant consumer losses, based on the expectations of the financial markets, is consistent with a wide range of values for the scaling parameters. The net effect on consumer welfare is negative in all specifications, and ranges from a loss of \$13.4 billion to a loss of \$53.0 billion. For Models 1 and 3, these results are always statistically significant at the 1% level. In the other models, these results are statistically significant at the 5% level or below for seven out of the eight parameter values (Model 2) or five out of the eight parameter values (Model 4). For all eight values of the parameters (as well as for the baseline values) the restrictions imposed by Model 2 and Model 4 are both rejected at the 1% level.

Appendix C: Reasonableness Checks

In this Appendix, we report two closely related tests of our estimates' reasonableness. These tests are based on reconciling our results with evidence on pass-through rates taken from the existing literature. For the first test, we compute the approximate net present value ("NPV") of the change in interest rates. Comparing the result, \$80.7 billion, to the bank losses and merchant gains reported in Table 9 gives us the pass-through rates implied by our estimates. We find an implied issuer pass-through rate of 80 percent, and an implied merchant pass through rate of 49 to 53 percent. This suggests that the magnitude of the increase in merchant profits and decrease in bank profits are quite plausible. For our second reasonableness check, we start with pass-through rates estimated in the existing literature: 50 percent for merchants and 70 percent for banks. Using the same NPV of the difference in interchange rates as in the first reasonableness check, we apply these pass through rates to get estimated bank losses of \$24.2 billion and estimated merchant gains of \$40.4 billion. These values are similar to the results of our event study, where we found bank losses of \$15.9 to \$16.4 billion, and merchant gains of \$38.1 billion to \$41.1 billion.

For both reasonableness tests, we need to first compute the approximate NPV of the change in total debit interchange fees due to the regulation. In Appendix A, we described how we calculated the change in total debit interchange fees for 2012. Here we describe how we extend that approach in order to compute the value over time of that difference.

First, we assume that interchange fees in the absence of the Durbin Amendment would have been at the same absolute level as in 2009. The Federal Reserve reported that the average debit interchange per transaction in 2009 was \$0.44.⁹⁷

Next, we need to estimate the number of debit transactions in each future year. We start with the estimates of debit card volume through 2015 from The Nilson Report.⁹⁸ We extrapolate this growth curve to estimate debit volume in subsequent years. Specifically, debit transactions in year $t > 2015$ equals the weighted sum of debit transactions in 2010 and

⁹⁷ Debit Card Interchange Fees and Routing, 75 Fed. Reg. 81722, 81725, (December 28, 2010) (codified at 12 C.F.R. 235).

⁹⁸ The Nilson Report, Issue 961 (December 2010), at 7.

a ceiling. The ceiling grows at debit's long run growth rate, which we take to be 3.4 percent per year (the average growth rate of retail sales among the retailers in our sample). The weight on 2010 debit declines exponentially. The two parameters for the growth curve (the rate of decay for the weight on 2010 debit, and the initial level for the ceiling) are chosen by a least squares fit of onto the projections reported by Nilson. We assume the effects, subject to discounting, continue for 24 years plus one quarter – 2011 Q4 through 2035.

A few more parameter calibrations are necessary. We assume the proportion of debit transactions accounted for by covered issuers remains at the 69 percent in 2010.⁹⁹ We take 30 percent as the applicable tax rate for both merchants and banks.¹⁰⁰ And we take the weighted average cost of capital for retailers, 8.27 percent, as the applicable discount factor.¹⁰¹

As stated above, for the interchange rate without the interchange regulation, we use \$0.44 per debit transaction. We also use this number for the interchange rate on exempt debit transactions under the regulation. For covered debit transactions under the regulation, we use \$0.24 per transaction.¹⁰²

Given these assumptions, the present value of the change in debit interchange fees \$80.7 billion. This number is used in both of our reasonableness checks.

For the first reasonableness check, we construct estimates of the issuer and merchant pass-through rates by combined the NPV of the change in debit interchange with the estimates of the change in issuer and merchant profitability calculated from the event study results. The decrease in issuer profits of \$15.9 to \$16.4 billion reported in Table 9 implies a pass-through rate of about 80 percent. The increase in merchant profits of \$38.1 billion to

⁹⁹ See Appendix A for the method and data sources used in the calculation of the covered issuers' share of debit transactions.

¹⁰⁰ Based on the average effective tax rate reported in the 10-Ks for the retailers in our sample.

¹⁰¹ Aswath Damodaran (2012), "Cost of Capital by Sector," available at http://people.stern.nyu.edu/adamodar/New_Home_Page/datafile/wacc.htm.

¹⁰² Based on the final regulation of \$0.21 per transaction, plus a fraud adjustment of \$0.01 per transaction plus 5 basis points of the transaction value. Debit Card Interchange Fees and Routing, 12 C.F.R. §§ 235.3, 235.4 (2012). To compute the average value of the 5 basis points, we use the average transaction value of \$38.58 reported by the Federal Reserve for 2009. Debit Card Interchange Fees and Routing, 75 Fed. Reg. 81722, 81725, (December 28, 2010) (codified at 12 C.F.R. 235).

\$41.1 billion suggests a pass-through rate on the order of around 49-53 percent. Both of these numbers are consistent with the existing empirical literature on pass-through rates.

For the second reasonableness check, we apply pass-through rates for banks and merchants from the existing literature to the NPV of the change in interchange calculated here. For the bank pass through rate, most studies of how changes in market interest rates into deposit interest rates find long-run pass through rates of near 100 percent for the United States.¹⁰³ For this reasonableness check, we will use the estimated long-run U.S. deposit long-run pass-through rate of 70 percent recently reported by Gigineishvili (2011).¹⁰⁴ Applying these pass through rates to the estimated transfer of \$80.7 billion gives estimated bank losses of \$24.2 billion and estimated merchant gains of \$40.4 billion. These values are similar to the results of our event study, where we found bank losses of \$15.9 to \$16.4 billion, and merchant gains of \$38.1 billion to \$41.1 billion.

From the results of these two reasonableness checks, we conclude that the magnitudes of the wealth transfers implied by our event study estimates are plausible, given the magnitude of the changes in interchange rates. It is important to note that these results are fairly sensitive to the particular assumptions that we made, and therefore should not be interpreted as providing precise estimates of the pass-through rates or of the NPV of the effect on issuers and retailers. Rather, they should be interpreted as showing that the results of our estimation procedure can be reconciled to outside evidence on related issues without requiring any implausible assumptions and that our results are plausible and consistent with the evidence on pass through.

¹⁰³ Claudia Kwapil and Johann Scharler (2006), “Limited Pass-Through from Policy to Retail Interest Rates: Empirical Evidence and Macroeconomic Implications,” *Monetary Policy and the Economy*, 2006(4), 26-36, at 31.

¹⁰⁴ Nikoloz Gigineishvili (2011), “Determinants of Interest Rate Pass-Through: Do Macroeconomic Conditions and Financial Market Structure Matter?” IMF Working Paper WP/11/176, at 8.

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