

The Impact of the Durbin Amendment on Merchants: A Survey Study

Zhu Wang, Scarlett Schwartz, and Neil Mitchell

The interchange fees associated with debit and credit cards have long been a controversial issue in the retail payments system. These fees are paid by a merchant to the cardholder's bank (the so-called issuer) through the merchant-acquiring bank (the so-called acquirer) when credit or debit card payments are processed. Merchants have criticized that card networks (such as Visa and MasterCard) and their issuing banks have wielded market power to set excessively high interchange fees, which drive up merchants' costs of accepting card payments. The controversy has also attracted great attention from policymakers, who are concerned that high interchange fees may inflate retail prices and cause welfare losses to merchants and consumers.¹

To resolve this issue, a provision of the Dodd-Frank Act, known as the Durbin Amendment, mandates a regulation aimed at reducing debit card interchange fees and increasing competition in the payment processing industry. The Durbin Amendment directs the Federal Reserve Board to regulate debit card interchange fees so that they are "reasonable and proportional to the cost incurred by the issuer with

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¹In recent years, a sizable body of research literature has developed to evaluate whether fee setting in the payment card industry involves some market failure (see, for instance, Rochet and Tirole [2002, 2011], Wright [2003, 2012], Wang [2010], and Bedre-Defolie and Calvano [2013]). Wang (2012) provides a review of the interchange controversy in the U.S. market.

respect to the transaction.” The latter subsequently issued Regulation II (Debit Card Interchange Fees and Routing), which took effect on October 1, 2011.

The regulation establishes a cap on the debit interchange fees that financial institutions with more than \$10 billion in assets can charge to merchants through merchant acquirers. The permissible fees were set based on an evaluation of issuers’ costs associated with debit card processing, clearance, and settlement. The resulting interchange cap is composed of the following: a base fee of 21 cents per transaction to cover the issuer’s processing costs, a 0.05 percent charge of the transaction value to cover potential fraud losses, and an additional 1 cent per transaction to cover fraud prevention costs if the issuer is eligible. This cap applies to both signature and PIN debit cards.

Since its implementation, the regulation has substantially reduced the interchange revenues to covered issuers, while exempt small issuers have been well protected. The cap reduced the average debit interchange fee by almost half from its pre-regulation level.² As a result, covered issuers are losing billions of dollars every year in interchange revenues (Wang 2012; Kay, Manuszak, and Vojtech 2014). However, due to lack of data, the regulation’s impact on merchants has not been much examined, which motivated this study.

In this article, we report results from a merchant survey conducted by the Federal Reserve Bank of Richmond and Javelin Strategy & Research. The survey was performed two years after the regulation was established. The results suggest that the regulation has had limited and unequal impact on merchants’ debit acceptance costs. In the sample of 420 merchants across 26 sectors, two-thirds reported no change or did not know the change of debit costs post-regulation. One-fourth of the merchants, however, reported an increase of debit costs, especially for small-ticket transactions. Finally, less than 10 percent of merchants reported a decrease of debit costs. The impact varies substantially across different merchant sectors.

The survey results also show asymmetric merchant reactions to changing debit costs in terms of adjusting prices and debit restrictions. A sizable fraction of merchants are found to raise prices or debit restrictions as their costs of accepting debit cards increase. However, few merchants are found to reduce prices or debit restrictions as debit costs decrease. The sources of the asymmetric reactions remain a puzzle, which may warrant additional research.

² For an average debit card transaction at \$40, the regulated interchange fee is capped at 24 cents (21 cents + $(\$40 \times 0.05\%)$ + 1 cent).

The article is organized as follows. Section 1 provides industry and regulatory background, which motivates the study. Section 2 introduces the merchant survey and provides an overview of the data. Section 3 uses the survey results to analyze the impact of the regulation on merchants across different sectors in terms of debit costs, price change, and debit restrictions. Section 4 investigates merchants' asymmetric reactions to debit cost changes. Section 5 concludes.

1. MOTIVATION

To understand the debit interchange fee regulation, some familiarity with the market is helpful. Debit cards are one of the most popular general-purpose payment cards in the United States. In 2012, they were used in 47 billion transactions for a total value of \$1.8 trillion.³ Debit card payments are authorized either by the cardholder's signature or by a PIN (personal identification number). The former is called signature debit and the transactions are processed through either the Visa or MasterCard network. The latter is called PIN debit and the transactions are processed through a dozen PIN debit networks.

Visa, MasterCard, and PIN debit networks are commonly referred to as four-party schemes because four parties are involved in each transaction in addition to the network whose brand appears on the card. These parties include: (1) the cardholder who makes the purchase; (2) the merchant who makes the sale and accepts the card payment; (3) the financial institution that issues the card and makes the payment on behalf of the cardholder (the so-called issuer); and (4) the financial institution that collects the payment on behalf of the merchant (the so-called acquirer).

In each of the debit card systems, interchange fees are collectively set by the network on behalf of their member issuers. When accepting a debit card payment, a merchant needs to pay a fee, known as the merchant discount, to the acquirer. The acquirer then passes along a fraction of that to the issuer as the interchange fee.

By regulating the interchange fee, the goal of the Durbin Amendment was to lower merchants' costs of accepting debit cards and to pass along the cost savings to consumers in terms of reduced retail prices. A few years after the regulation was in place, however, it is unclear how effectively the regulation has fulfilled its intention.

There are several important factors that may complicate the intended effects on merchants. First, the regulation sets a cap on the

³ Source: *The 2013 Federal Reserve Payments Study*.

interchange fee but not on the merchant discount rate. The latter is the ultimate fee that a merchant has to pay to the acquirer for accepting a card payment, which typically includes the interchange fee plus the markup charged by the acquirer. Therefore, how much interchange reduction caused by the regulation can be passed along to merchants may depend on the pass-through rate of the acquirers.

Second, small issuers with less than \$10 billion in assets are exempt from the regulation. According to the Federal Reserve Board Survey, exempt transactions constituted 36.5 percent of transaction value and 37.3 percent of transaction volume across all networks in 2013, although the proportions varied by network. For merchants whose customers primarily use exempt debit cards, they may not necessarily see a fall of debit acceptance costs.

Third, the impact can vary substantially by merchant sector. Before the regulation, card networks charged different interchange fees to different merchant sectors, and the fees varied in both level and structure. For example, Visa debit cards charged \$0.20+0.95% (with a \$0.35 cap) to supermarkets, \$0.17+0.75% (with a \$0.95 cap) to gas stations, \$0.20 +0.95% to retail stores, \$0.10+ 1.19% to restaurants, and \$0.75 to utility firms.⁴ Therefore, how much a merchant can benefit from the regulatory cap of \$0.21+0.05% also depends on the sector-specific interchange fees that the merchant used to pay prior to the regulation.

Fourth, interchange fees unintendedly rose for small-ticket transactions (Wang 2014). Prior to the regulation, most networks offered discounted debit interchange fees for small-ticket transactions as a way to encourage card acceptance by merchants for those transactions. For example, Visa and MasterCard used to set the small-ticket debit interchange rate at \$0.04 plus 1.55 percent of the transaction value for sales of \$15 and below. As a result, a debit card would only charge a 7 cent interchange fee for a \$2 sale or 11 cents for a \$5 sale. However, in reaction to the regulation, card networks eliminated the small-ticket discounts and all transactions (except those on cards issued by exempt issuers) have to pay the maximum cap amount, \$0.21+0.05%, set by the regulation. Since merchants may have different compositions of transaction sizes, they could be affected differently by the changes of interchange fees. However, merchants who specialize in small-ticket transactions would be most adversely affected.

Finally, it is unclear how merchants would react to the regulation in terms of changing prices and debit card restrictions. For merchants who had a fall of debit costs, would they reduce prices and encourage the use

⁴ Source: *Visa U.S.A. Interchange Reimbursement Fees, October 2010.*

of debit cards? Alternatively, would merchants who had a rise of debit costs do the opposite? To understand how much the regulation may have indirectly affected consumers, we need to look at these important issues.

In this article, we explore these issues using a merchant survey conducted two years after the regulation. Particularly, we investigate two sets of questions. First, we study how the regulation affected merchants' costs of accepting debit cards and how the cost impact varied across different merchant sectors for all transactions and for small-ticket transactions. Second, we study merchants' reactions to their debit cost changes through changing prices and through encouraging or restricting debit use. In terms of debit restrictions, we consider several practices including minimum amount requirement, surcharge, and discount to nondebit payment means.

2. MERCHANT SURVEY

The Federal Reserve Bank of Richmond contracted with Javelin Strategy & Research, a division of the Greenwich Group, to create and launch an online and telephone survey, which was conducted in winter 2013 through January 2014 to explore the merchant perspective of the Durbin Amendment's impact.

Survey respondents were merchants serving on a pre-existing research panel who sell goods and services directly to consumers and accept debit cards as a payment method.⁵ The sample comprises 420 merchants across 26 sectors in all U.S. states with various attributes.

The survey also collects information regarding the regulation's various impacts on merchants: first, the costs of accepting debit cards for all transactions and for small-ticket transactions; second, the retail prices of goods or services; and third, the restrictions on debit card use, including minimum amount, surcharge, and discount to nondebit payment means.

Below we list a few sample survey questions. For simplicity, the survey uses the Durbin Amendment to refer to the original legislation and the resulting regulation.

- As you know, the Durbin Amendment was the recent policy change in 2011 which states that debit interchange fees be capped at 21 cents per transaction. How have your debit card acceptance costs changed after the Durbin Amendment came into effect?

⁵ One limitation of the survey is that it does not include merchants who did not accept debit cards at the time of the survey, so it does not provide information on how the regulation may have affected debit card acceptance.

(a) Costs increased; (b) No change in cost; (c) Costs decreased; (d) I do not know.

- After the Durbin Amendment in 2011, have you experienced an impact on the costs to accept debit card transactions with values of \$10 and less? (a) Yes, the cost increased; (b) No, there has been no impact; (c) Yes, the cost decreased; (d) I do not know.
- Has the Durbin Amendment directly impacted the price of the goods or services you sell or offer? (a) Yes, prices were increased because of Durbin; (b) No, Durbin had no impact on prices; (c) Yes, prices were decreased because of Durbin.
- Prior to the Durbin Amendment in 2011, did you set a minimum charge to accept debit card payments? (a) Yes; (b) No; (c) Did not accept debit cards prior to 2011.

Do you currently have a minimum charge to accept debit card payments? (a) Yes; (b) No.

Similarly, the survey also asked questions on surcharges and discounts on debit cards and other payment means, including cash, check, and credit cards, before and after the regulation.

To analyze the survey responses, we divide the data into two categories. The first category comprises data on merchants' attributes, which will be used as explanatory variables in our following regression analysis. For each merchant, we have information on its sector, years in business, whether or not it accepts emerging payments (e.g., Square, Google, or PayPal), customer base, sales channels, geographic location, annual sales, and average ticket size.

The second category comprises data related to merchant impact from and reactions to the regulation, including cost changes for debit acceptance, price changes, and changing debit restrictions, which will serve as dependent variables in our regression analysis.

Table 1 provides a summary of the merchant attribute variables. Merchants in the sample belong to 26 sectors, of which fast food, restaurants, and apparel each account for 11 percent–17 percent of the sample, and the other sectors each account for a share below 10 percent. Some of the merchants operate in multiple sectors, so the sum of sector shares shown in Table 1 exceeds 100 percent. Of the merchants who reported, 3.8 percent said they had existed in business less than two years; 24.5 percent accepted emerging payments; and 46.7 percent were primarily serving repeat customers. Also, 86.4 percent of the merchants were selling through physical stores, 40.7 percent through online, and 35.2 percent through other sales channels (e.g., catalog and mail orders). Moreover, merchants in the sample distribute quite evenly across nine

Table 1 Summary of Merchant Attribute Variables (N=420)

Merchant Sectors		Other Attributes	
Apparel	10.5%	New Firm	3.8%
Art	2.4%	Emerging Payments	24.5%
Auto	6.7%	Repeat Customers	46.7%
Casinos	1.7%	Physical Store	86.4%
Consumer Electronics	7.9%	Online Channel	40.7%
Convenience Stores	6.7%	Other Channel	35.2%
Delivery Services	2.9%	East North Central	24.3%
Department Stores	3.1%	East South Central	13.8%
Discount Retail	5.2%	Middle Atlantic	23.8%
Education	0.5%	Mountain	17.4%
Entertainment	8.3%	New England	16.7%
Fast Food	16.7%	Pacific	28.3%
Grocery Stores	6.0%	South Atlantic	28.1%
Home Furnishings	6.0%	West North Central	16.9%
Home Improvement	5.5%	West South Central	21.0%
Hospitality	3.8%	Sales < \$100,000	18.1%
Maintenance	4.0%	Sales \$100,000-\$1M	30.7%
Medical	6.9%	Sales \$1M-\$10M	25.7%
Office Products	2.9%	Sales \$10M-\$100M	16.4%
Other Sector	3.3%	Sales > \$100M	3.8%
Real Estate	1.4%	Sales Missing	5.2%
Restaurants	10.7%	Average Ticket < \$10	23.81%
Services	5.0%	Average Ticket \$10-\$50	22.14%
Sporting Goods	3.8%	Average Ticket \$50-\$250	30.71%
Toys	3.8%	Average Ticket >\$250	23.33%
Transportation	4.5%		

census districts, annual sales ranges (except for the largest sales range above \$100 million), and average ticket sizes.

Table 2 provides a summary of merchant impact/reaction variables. Most respondents (67 percent) reported no change or did not know the change in their overall costs of accepting debit cards post-regulation. Among those who did see a change in debit costs, about three times as many (25 percent over 8 percent) reported a cost increase as those who reported a cost decrease. A similar pattern is found for small-ticket transactions, while nine times as many (27 percent over 3 percent) respondents reported a cost increase as those who reported a cost decrease.

The majority of respondents (75 percent) reported no price change due to the regulation. For those who had a price change, 11 times more (23 percent over 2 percent) reported price hikes than cuts. Meanwhile, most respondents (76 percent) reported no increase or decrease in the restrictions on debit card use. For those who did report a change, they are even on each side (12 percent and 12 percent).

**Table 2 Summary of Merchant Impact/Reaction Variables
(N=420)**

Merchant Average	Decrease	Stay the Same	Increase	Don't Know
Cost Change	8%	41%	25%	26%
Small-Ticket Cost Change	3%	47%	27%	24%
Price Change	2%	75%	23%	0%
Debit Restriction Change	12%	76%	12%	0%
	Minimum Amount	Surcharge	Discount	Others
Before Durbin	26%	24%	20%	55%
After Durbin	29%	20%	20%	58%

Note that the restrictions on debit card use are measured by three practices, namely, whether the merchant imposes a minimum amount requirement on debit transactions, surcharges debit cards, or offers discounts only to nondebit payment means. In the case that a merchant added more (or dropped some) restrictions on accepting debit cards after the regulation, we call it increasing debit restrictions (or decreasing debit restrictions).⁶

Table 2 also provides information on merchants' practices on each specific debit restriction before and after the regulation. In the sample, 26 percent of merchants imposed the minimum amount on debit transactions prior to the regulation, and the fraction changed to 29 percent post-regulation. Meanwhile, the fraction of merchants surcharging debit cards changed from 24 percent to 20 percent, and the fraction of merchants offering discounts only to nondebit payment means remained at 20 percent.

Finally, Table 3 drops multisector merchants and summarizes merchant impact/reaction variables based on 362 merchants that only operate in one sector. For each variable, we report the average fraction across 26 sectors so that the results would not be driven by certain sectors that have more observations. Nevertheless, the patterns are very similar to Table 2.

⁶ Here, a merchant's change in debit restrictions is measured by comparing the numbers of restrictions before and after the regulation. We use this measure for the analysis in Section 3. However, in Section 4, we take a step further to look at each type of the three restrictions.

Table 3 Summary of Merchant Impact/Reaction Variables Based on One-Sector Merchants (N=362)

Sector Average	Decrease	Stay the Same	Increase	Don't Know
Cost Change	9%	43%	25%	23%
Small-Ticket Cost Change	3%	49%	25%	23%
Price Change	2%	76%	23%	0%
Debit Restriction Change	13%	73%	14%	0%

3. REGULATORY IMPACT ON MERCHANTS

In this section, we conduct ordered logit regressions to estimate the debit interchange regulation's impact on merchants on several aspects, including the change of merchants' costs of accepting debit cards for all transactions and for small-ticket transactions, price changes, and the change of debit restrictions. In this analysis, we do not intend to identify any causal effects or impact channels. Rather, our focus is to investigate how the regulation's impact varies across different merchant sectors.

In each of the regressions, we include sector dummies together with other merchant attribute variables listed in Table 1.⁷ The sample we use comprises merchants operating only in one sector, so that the estimated sector dummies clearly identify the sector fixed effect, and we exclude merchants who reported "do not know" regarding their debit cost changes wherever appropriate.

The ordered logit regression assumes the following structure. Suppose the underlying process to be characterized is

$$y^* = x\beta + \varepsilon,$$

where y^* is the exact but unobserved dependent variable, x is a vector of independent variables, and we observe the categories of outcome

$$y = \begin{cases} 0 \text{ (decrease)}, & \text{if } y^* \leq u_1, \\ 1 \text{ (unchanged)}, & \text{if } u_1 < y^* < u_2, \\ 2 \text{ (increase)}, & \text{if } y^* \geq u_2, \end{cases}$$

⁷ Note that we exclude average ticket size as an explanatory variable in all regressions because of its duplication with the sector fixed effect.

Table 4 Debit Cost Change for All Transactions (Estimated Probabilities)

Merchant Sector	Decrease	Stay the Same	Increase
Apparel	0.070	0.632***	0.298
Art	0.357	0.589**	0.054
Auto	0.100*	0.677***	0.224**
Casinos	0.112**	0.686***	0.202**
Consumer Electronics	0.126**	0.693***	0.181**
Convenience Stores	0.242	0.667***	0.091
Delivery Services	0.000	0.000	1.000***
Department Stores	0.032	0.474***	0.495***
Discount Retail	0.059	0.603***	0.338*
Entertainment	0.163*	0.696***	0.141*
Fast Food	0.016*	0.327***	0.657***
Grocery Stores	0.026*	0.433***	0.541***
Home Furnishings	0.259**	0.658***	0.084*
Home Improvement	0.034	0.489**	0.478*
Hospitality	0.106	0.682***	0.211
Maintenance	0.166*	0.696***	0.138
Medical	0.141	0.696***	0.162
Office Products	0.024	0.414*	0.561**
Other Sector	0.038	0.515***	0.447**
Real Estate	0.038	0.513***	0.449**
Restaurants	0.047**	0.561***	0.392***
Services	0.140**	0.696***	0.164***
Sporting Goods	0.259**	0.658***	0.084*
Toys	0.077	0.647***	0.276
Transportation	0.139***	0.696***	0.165***
Sector Average	0.111	0.576	0.313

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The estimated probabilities are based on an ordered logit regression that includes other regressors as shown in Table 1. (Obs: 254; R^2 : 0.17).

where u_1 and u_2 are latent thresholds. Then the ordered logit regression will use the observations on y , which are a form of censored data on y^* to estimate the parameter vector β and the thresholds u_1 and u_2 .

Tables 4 and 5 report the model-estimated distributions of debit cost change for all transactions and for small-ticket transactions across 26 merchant sectors, taking all the other merchant attribute variables at their mean values.

The results suggest limited and unequal impact on merchant debit costs: Averaging across 26 sectors, 11.1 percent of merchants are estimated to have reduced debit costs for all transactions, 31.3 percent have increased costs, and 57.6 percent are unchanged. For small-ticket

**Table 5 Debit Cost Change for Small-Ticket Transactions
(Estimated Probabilities)**

Merchant Sector	Decrease	Stay the Same	Increase
Apparel	0.008	0.577***	0.415***
Art	0.081	0.860***	0.060
Auto	0.071*	0.861***	0.068*
Casinos	0.000	0.000	1.000***
Consumer Electronics	0.026	0.802***	0.172
Convenience Stores	0.058	0.859***	0.083
Delivery Services	0.003	0.371	0.626**
Department Stores	0.038**	0.838***	0.125***
Discount Retail	0.006	0.501**	0.493**
Entertainment	0.025	0.796***	0.180**
Fast Food	0.004	0.396***	0.600***
Grocery Stores	0.017	0.743***	0.239*
Home Furnishings	0.167**	0.806***	0.027*
Home Improvement	0.030	0.816***	0.155
Hospitality	0.018	0.745***	0.238*
Maintenance	0.003	0.316	0.681***
Medical	0.018	0.751***	0.231**
Office Products	0.003	0.364	0.633
Other Sector	0.013	0.696***	0.290
Real Estate	0.007	0.545**	0.448
Restaurants	0.022*	0.782***	0.195**
Services	0.035**	0.831***	0.134***
Sporting Goods	0.016	0.732***	0.252
Toys	0.008	0.593***	0.399**
Transportation	0.020	0.764***	0.216
Sector Average	0.028	0.654	0.318

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The estimated probabilities are based on an ordered logit regression that includes other regressors as shown in Table 1. (Obs: 259; R^2 : 0.20).

transactions, only 2.8 percent are estimated to have reduced debit costs, 31.8 percent have increased costs, and 65.4 percent are unchanged.⁸

As mentioned before, the mixed cost impact on merchants may result from several complication factors discussed in Section 1, which could vary substantially by sector. Merchants who had reduced total debit costs could be those who gained more from the large-ticket transactions than losing on small-ticket ones. Merchants who had no change on total debit costs could be those whose customers were primarily using debit cards from exempt issuers or whose loss from

⁸ Our estimated distributions are fairly consistent with the pattern found in the raw data. However, the regression analysis allows us to control other merchant attributes while identifying the sector effects.

small-ticket transactions balanced out gains from large-ticket ones. Finally, merchants who had increased total debit costs could be those who specialized on small-ticket transactions.

The estimated cost impact varies substantially across merchant sectors:

- Top sectors of total debit cost reduction are home furnishings (25.9 percent), sporting goods (25.9 percent), maintenance (16.6 percent), entertainment (16.3 percent), and services (14.0 percent).
- Top sectors of total debit cost increase are delivery services (100 percent), fast food (65.7 percent), office products (56.1 percent), grocery stores (54.1 percent), and home improvement (47.8 percent).
- Top sectors of small-ticket debit cost increase are casinos (100 percent), maintenance (68.1 percent), delivery services (62.6 percent), fast food (60.0 percent), and discount retail (49.3 percent).

It is intuitive that fast food and delivery services rank top in both total debit cost increase and small-ticket debit cost increase. Presumably, merchants in those sectors deal with mostly small-ticket transactions, so they were likely to feel cost increases in both small-ticket and total debit transactions. However, home furnishings and sporting goods rank top in total debit cost reduction, which may reflect their relatively large transaction sizes.

Table 6 reports the model-estimated probabilities of price change. The results suggest the regulation has had a limited impact on prices. Averaging across all sectors, it is estimated that the majority of merchants (77.2 percent) did not change prices post-regulation, very few merchants (1.2 percent) reduced prices, while a sizable fraction of merchants (21.6 percent) increased prices.

The estimated price change pattern also varies by sector:

- Top sectors of price increase are delivery services (100 percent), office products (77.8 percent), fast food (39.6 percent), and apparel (28.6 percent).
- Top sectors of price decrease are auto (5.6 percent), other sector (4.3 percent), sporting goods (2.7 percent), and art (2.5 percent).

Table 7 reports the model-estimated probabilities of changing debit restrictions. Again, the results suggest limited and unequal impact. Averaging across all sectors, it is estimated that the majority of merchants (76.6 percent) did not change debit restrictions post-regulation,

Table 6 Change of Prices: Estimated Probabilities

Merchant Sector	Decrease	Stay the Same	Increase
Apparel	0.002	0.711***	0.286***
Art	0.025**	0.940***	0.035
Auto	0.056**	0.929***	0.015*
Casinos	0.037	0.940***	0.024
Consumer Electronics	0.006	0.863***	0.131
Convenience Stores	0.002	0.686***	0.312
Delivery Services	0.000	0.000	1.000***
Department Stores	0.002	0.655**	0.343
Discount Retail	0.005	0.827***	0.168
Entertainment	0.009	0.895***	0.097
Fast Food	0.001	0.602***	0.396***
Grocery Stores	0.003	0.734***	0.264*
Home Furnishings	0.015	0.929***	0.056
Home Improvement	0.004	0.822***	0.174
Hospitality	0.006	0.866***	0.127*
Maintenance	0.002	0.661***	0.337*
Medical	0.006	0.852***	0.142*
Office Products	0.000	0.222	0.778***
Other Sector	0.043**	0.937***	0.020*
Real Estate	0.009	0.902***	0.089
Restaurants	0.002	0.727***	0.270***
Services	0.011	0.910***	0.080*
Sporting Goods	0.027**	0.941***	0.032**
Toys	0.032	0.941***	0.027
Transportation	0.004	0.798***	0.199
Sector Average	0.012	0.772	0.216

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The estimated probabilities are based on an ordered logit regression that includes other regressors as shown in Table 1. (Obs: 340; R^2 : 0.21).

12.4 percent of merchants increased debit restrictions, while 10.9 percent decreased restrictions.

The estimated changing debit restriction pattern varies by sector:

- Top sectors of increased debit restrictions are maintenance (30.8 percent), other sector (25.7 percent), transportation (20.2 percent), and hospitality (18.9 percent).
- Top sectors of reduced debit restrictions are sporting goods (26.5 percent), services (16.9 percent), fast food (11.8 percent), and home improvement (11.8 percent).

It is interesting to see sporting goods ranks top in both price reduction and debit restriction reduction. This is consistent with the finding above that the sector ranks top in the total debit cost reduction. In contrast, fast food ranks top in price increase but also in reducing

Table 7 Change of Debit Restrictions: Estimated Probabilities

Merchant Sector	Decrease	Stay the Same	Increase
Apparel	0.161**	0.792***	0.047**
Art	0.142	0.804***	0.054
Auto	0.112*	0.818***	0.070*
Casinos	0.092*	0.823***	0.0860*
Consumer Electronics	0.073	0.820***	0.107
Convenience Stores	0.099**	0.822***	0.080**
Delivery Services	0.011	0.517*	0.472
Department Stores	0.033	0.750***	0.217
Discount Retail	0.255	0.718***	0.027
Entertainment	0.064*	0.814***	0.122**
Fast Food	0.118**	0.816***	0.066**
Grocery Stores	0.111**	0.818***	0.071*
Home Furnishings	0.042	0.780***	0.178
Home Improvement	0.118**	0.816***	0.066**
Hospitality	0.039	0.772***	0.189*
Maintenance	0.021	0.671***	0.308**
Medical	0.117*	0.816***	0.067*
Office Products	0.041	0.776***	0.183
Other Sector	0.027*	0.717***	0.257**
Real Estate	0.387	0.599**	0.015
Restaurants	0.109***	0.819***	0.072***
Services	0.169*	0.786***	0.045
Sporting Goods	0.265**	0.710***	0.026
Toys	0.092	0.822***	0.085
Transportation	0.036	0.762***	0.202*
Sector Average	0.109	0.766	0.124

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The estimated probabilities are based on an ordered logit regression that includes other regressors as shown in Table 1. (Obs: 340; R^2 : 0.10).

debit restrictions. This may reflect the nature of the business where merchants value particularly the checkout speed so they responded to a rise of debit costs mainly through a price increase instead of adding debit restrictions.

4. MERCHANT REACTIONS TO DEBIT COST CHANGES

In this section, we take a step further to investigate the impact channels behind the intended and unintended consequences of the regulation. We examine two sets of questions. One is on the intended effects: Did lower debit costs lead to lower retail prices and debit restrictions? The

other is on the unintended effects: Did higher debit costs lead to higher retail prices and debit restrictions?

The analysis is conducted using logit regressions, which connect survey respondents' answers of their post-regulation debit cost changes with their reported changes of prices and debit restrictions. The sample we use again comprises merchants operating only in one sector, but we no longer need to exclude merchants who reported "do not know" regarding their debit cost changes.

Reactions to a Debit Cost Decrease

We first analyze merchants' reactions to a debit cost decrease. We run five separate logit regressions, with the binary dependent variables being merchants' status post-regulation. Specifically, in each of the five regressions, the dependent variable takes the value of 1 (otherwise, 0) if a merchant satisfies the respective criteria: (1) price decrease; (2) no debit restriction; (3) no minimum amount requirement on debit transactions; (4) no surcharge on debit cards; and (5) no discount offered only to nondebit payment means.

On the explanatory variable side, we control for merchants' debit restrictions prior to the regulation as well as other attributes listed in Table 1. We also divide merchants into four dummy groups according to their debit cost changes: (1) small-ticket costs decreased, total costs decreased; (2) small-ticket costs decreased, total costs did not decrease; (3) small-ticket costs did not decrease, total costs decreased; (4) small-ticket costs did not decrease, total costs did not decrease. Using these dummy variables will allow us to separate the variation of merchant reactions due to different types of cost shocks.

Table 8 reports the logit regression results. The first column is the price reaction. However, the regression fails to run given that too few merchants reported a price reduction.

The next four columns in Table 8 show the estimated merchant reactions in terms of debit restrictions. First, the results suggest that merchants tend to have persistent policies. If a merchant did not impose any debit restrictions (or specifically, requiring minimum amount on debit transactions, surcharging debit cards, or offering discount only to nondebit payment means) prior to the regulation, it is likely the merchant would not restrict debit post-regulation. The persistence effects are statistically and economically significant. To put the estimation results into perspective, Table 9 reports the estimated probabilities. Holding other explanatory variables at their mean values, if a merchant did not impose any debit restrictions prior to the regulation, there

Table 8 Logit Regressions: Merchant Reactions to a Debit Cost Decrease

Variables	Price Decrease	Not Restricting Debit After	No Minimum After	No Surcharge After	No Discount After
Not Restricting Debit Before	—	0.746*** (0.051)			
No Minimum Before	—		0.611*** (0.072)		
No Surcharge Before	—			0.877*** (0.048)	
No Discount Before	—				0.889*** (0.058)
Small-Ticket Costs Decreased, Total Costs Decreased	—	0.258*** (0.047)		0.018 (0.012)	0.015 (0.019)
Small-Ticket Costs Decreased, Total Costs Did Not Decrease	—		-0.233 (0.409)	0.018 (0.012)	-0.005 (0.018)
Small-Ticket Costs Did Not Decrease, Total Costs Decreased	—	-0.004 (0.184)	0.125*** (0.058)	-0.027 (0.073)	Included
Other Regressors	—	Included	Included	Included	Included
Obs		334	330	285	324
Pseudo R ²	—	0.530	0.383	0.663	0.659

Notes: Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

**Table 9 Merchant Reactions to a Debit Cost Decrease
(Estimated Probabilities)**

Variables	Not Restricting Debit After	No Minimum After	No Surcharge After	No Discount After
Had Restriction/Minimum/Surcharge/Discount Before	0.193*** (0.044)	0.305*** (0.068)	0.120*** (0.047)	0.105* (0.055)
Didn't Have Restriction/Minimum/Surcharge/Discount Before	0.939*** (0.019)	0.916*** (0.022)	0.997*** (0.003)	0.994*** (0.004)
Small-Ticket Costs Decreased, Total Costs Decreased	0.975*** (0.030)		1.000*** (0.000)	
Small-Ticket Costs Decreased, Total Costs Did Not Decrease		0.581 (0.417)	1.000*** (0.000)	0.993*** (0.019)
Small-Ticket Costs Did Not Decrease, Total Costs Decreased	0.713*** (0.183)	0.949*** (0.054)	0.953*** (0.080)	0.973*** (0.022)
Small-Ticket Costs Did Not Decrease, Total Costs Did Not Decrease	0.717*** (0.042)	0.824*** (0.031)	0.982*** (0.013)	0.978*** (0.012)
Other Regressors	At mean	At mean	At mean	At mean
Obs	334	330	285	324

Notes: Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

is a 93.9 percent chance that the merchant will not restrict debit use post-regulation. Otherwise, the chance would be reduced to 19.3 percent. A similar pattern is found for each of the specific restrictions, namely minimum amount, surcharge, and discount.

Second, the reduction of debit costs does not seem to have a big impact on reducing debit restrictions. As shown in Table 8, the dummy variable “small-ticket costs did not decrease, total costs decreased” is not statistically significant for most regressions except for that of minimum amount. Table 9 reports the estimated probabilities. Holding other explanatory variables at their mean values, if a merchant did not have a reduction for either the total debit costs or the small-ticket costs, there is a 71.7 percent chance that the merchant would not impose any debit restrictions post-regulation. In comparison, if the merchant belongs to the group that “small-ticket costs did not decrease, total costs decreased,” the chance of not restricting debit use is 71.3 percent post-regulation, almost no difference. The same pattern is found for the regressions on surcharge and discount. However, there is some effect in the minimum amount regression, though the magnitude is relatively small. As shown in Table 9, if a merchant did not have a reduction for either the total debit costs or the small-ticket costs, there is an 82.4 percent chance that the merchant would not impose a minimum amount on debit transactions post-regulation. In contrast, if the merchant belongs to the group that “small-ticket costs did not decrease, total costs decreased,” the chance of not imposing a minimum amount on debit transactions would rise to 94.9 percent post-regulation, a 12.5 percent increase.

Note that most merchants in the sample who had a debit cost decrease belong to the group “small-ticket costs did not decrease, total costs decreased.” As shown in Table 10, among the 362 one-sector merchants in the sample, they account for 7.1 percent. In contrast, only 1.8 percent of merchants belong to the group “small-ticket costs decreased, total costs decreased,” and 0.6 percent belong to the group “small-ticket costs decreased, total costs did not decrease.” Accordingly, the estimated parameters for the latter two group dummies are less meaningful. In fact, they are dropped from some of the regressions due to lack of variation.

Reactions to a Debit Cost Increase

We then analyze merchants’ reactions to a debit cost increase. We also run five separate logit regressions, with each of the dependent variables being a merchant’s status post the regulation: (1) price increase; (2) restricting debit use; (3) imposing minimum amount on debit

Table 10 Variation of Debit Cost Decrease Across Merchant Sectors

Merchant Sector	Small-Ticket Costs Decreased, Total Costs Decreased	Small-Ticket Costs Decreased, Total Costs Did Not Decrease	Small-Ticket Costs Did Not Decrease, Total Costs Decreased	Small-Ticket Costs Did Not Decrease, Total Costs Did Not Decrease
Apparel	0%	0%	17%	83%
Art	13%	0%	13%	75%
Auto	0%	0%	13%	88%
Casinos	0%	0%	0%	100%
Consumer Electronics	0%	0%	8%	92%
Convenience Store	15%	0%	15%	69%
Delivery Services	0%	0%	0%	100%
Department Stores	0%	0%	0%	100%
Discount Retail	8%	0%	0%	92%
Entertainment	0%	0%	10%	90%
Fast Food	0%	0%	2%	98%
Grocery Stores	0%	6%	0%	94%
Home Furnishings	0%	0%	0%	100%
Home Improvement	0%	0%	10%	90%
Hospitality	0%	0%	7%	93%
Maintenance	0%	0%	17%	83%
Medical	0%	0%	16%	84%
Office Products	0%	17%	0%	83%
Other Sector	8%	0%	0%	92%
Real Estate	0%	0%	0%	100%
Restaurants	3%	0%	0%	97%
Services	0%	0%	10%	90%
Sporting Goods	0%	0%	25%	75%
Toys	0%	0%	17%	83%
Transportation	0%	0%	0%	100%
Merchant Average	1.8%	0.6%	7.1%	90.6%
Sector Average	1.9%	0.9%	7.2%	90.1%

transactions; (4) surcharging debit cards; and (5) offering discounts only to nondebit payment means.

On the explanatory variable side, we again control for merchants' debit restrictions prior to the regulation, debit cost changes post-regulation, and other merchant attributes.

Table 11 reports the coefficient estimates. Again, the results show merchants' debit restriction policies are persistent. If a merchant imposed debit restrictions (or specifically, minimum amount, surcharge, or discount) prior to the regulation, it is likely the merchant would continue to do so post-regulation. Table 12 reports the estimated probabilities. Holding other explanatory variables at their mean values, if a merchant imposed any debit restrictions prior to the regulation, there is a 78.2 percent chance the merchant will continue to restrict debit use post-regulation. Otherwise, the chance is only 6.46 percent. A similar pattern is found for each of the three specific restrictions.

More interestingly, the results in Table 11 show that debit cost increases have significant effects on increasing merchants' prices and debit restrictions. Table 12 reports the estimated probabilities. Holding other explanatory variables at their mean values, if a merchant had no change for either the total debit costs or the small-ticket costs, there is only a 5.1 percent chance that the merchant would raise prices. However, if a merchant belongs to the group "small-ticket costs increased, total costs increased," the chance rises to 59.6 percent; for the group "small-ticket costs increased, total costs did not increase," the chance is 74.7 percent; and for the group "small-ticket costs did not increase, total costs increased," the chance is 33.1 percent. In other words, merchants in our sample are likely to pass along their increased debit costs to prices.

Similarly, the results show that merchants in our sample are likely to increase debit restrictions in reaction to debit cost increases. According to Table 12, holding other explanatory variables at their mean values, if a merchant had no change for either total debit costs or small-ticket costs, there is only a 17 percent chance that the merchant would restrict debit use post-regulation. However, if a merchant belongs to the group "small-ticket costs increased, total costs increased," the chance rises to 57.3 percent; for the group "small-ticket costs increased, total costs did not increase," the chance is 41.4 percent; and for the group "small-ticket costs did not increase, total costs increased," the chance is 68.1 percent. Moreover, most of the effects are found working through the minimum amount requirement, and to a less extent, through surcharging.

Table 11 Logit Regressions: Merchant Reactions to a Debit Cost Increase

Variables	Price Increase	Restricting Debit After	Minimum After	Surcharge After	Discount After
Restricting Debit Before		0.718*** (0.055)			
Minimum Before			0.473*** (0.098)		
Surcharge Before				0.724*** (0.099)	
Discount Before					0.830*** (0.074)
Small-Ticket Costs Increased, Total Costs Increased	0.630*** (0.095)	0.428*** (0.111)	0.431*** (0.111)	0.152* (0.086)	0.054 (0.048)
Small-Ticket Costs Increased, Total Costs Did Not Increase	0.761*** (0.079)	0.286 (0.184)	0.315* (0.160)	0.136 (0.099)	0.011 (0.026)
Small-Ticket Costs Did Not Increase, Total Costs Increased	0.431*** (0.154)	0.526*** (0.124)	0.421*** (0.144)	0.091 (0.153)	0.058 (0.062)
Other Regressors	Included	Included	Included	Included	Included
Obs	292	336	336	285	330
Pseudo R ²	0.426	0.568	0.443	0.684	0.653

Notes: Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

**Table 12 Merchant Reactions to a Debit Cost Increase
(Estimated Probabilities)**

Variables	Price Increase	Restricting Debit After	Minimum After	Surcharge After	Discount After
Didn't Have Restriction/Minimum/ Surcharge/Discount Before		0.065*** (0.020)	0.079*** (0.020)	0.004 (0.004)	0.007 (0.005)
Had Restriction/Minimum/ Surcharge/Discount Before		0.782*** (0.049)	0.551*** (0.094)	0.728*** (0.099)	0.836*** (0.072)
Small-Ticket Costs Increased, Total Costs Increased	0.596*** (0.103)	0.573*** (0.100)	0.451*** (0.102)	0.119* (0.068)	0.061 (0.043)
Small-Ticket Costs Increased, Total Costs Did Not Increase	0.747*** (0.106)	0.414** (0.171)	0.309** (0.137)	0.086 (0.053)	0.022 (0.023)
Small-Ticket Costs Did Not Increase, Total Costs Increased	0.331** (0.131)	0.681*** (0.144)	0.415*** (0.135)	0.057 (0.085)	0.059 (0.056)
Small-Ticket Costs Did Not Increase, Total Costs Did Not Increase	0.051*** (0.017)	0.170*** (0.037)	0.075*** (0.020)	0.008 (0.007)	0.014 (0.010)
Other Regressors	At mean	At mean	At mean	At mean	At mean
Obs	292	336	336	285	330

Notes: Standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1.

In comparison with the analysis on merchants who had a decrease of debit costs, the data show more variation of merchants who had debit cost increases. Table 13 shows a decent size of observations in each of the groups that involve debit cost increases. Specifically, among the 362 one-sector merchants in the sample, 16 percent reported “small-ticket costs increased, total costs increased”; 8 percent reported “small-ticket costs increased, total costs did not increase”; and 9 percent reported “small-ticket costs did not increase, total costs increased.”

Merchant Reactions: Additional Discussions

Our analysis suggests asymmetric merchant reactions to changing debit costs. On the one hand, few merchants in our sample are found to reduce prices or debit restrictions as their debit costs decrease. This is also related to the fact that a relatively small fraction of merchants in our sample reported a decrease of their debit costs in the first place. On the other hand, a sizable fraction of merchants are found to raise prices or debit restrictions as their debit costs increase. Then, a natural question is: What can explain the asymmetry of merchant reactions?

There might be several possibilities. First, our analysis is based on a relatively small sample. While the survey is intended to capture a diversified set of merchants, there is no guarantee that the sample is fully representative. Also because the survey is voluntary, it could be possible that the survey oversampled merchants who were adversely affected by the regulation.

Second, it is not entirely clear how the survey respondents treated inflation or other sector-specific factors that may have influenced the price changes. To address the issue, the survey explicitly asked respondents whether their prices were increased, decreased, or not affected because of Durbin. Presumably, the respondents should tease out any non-Durbin factors that may have affected prices. However, it could still be possible that some respondents may not be able to perfectly identify price changes solely due to the regulation. Therefore, it would be useful if we could control for price changing factors other than Durbin if that data is available.

Third, merchants may indeed have asymmetric reactions to cost changes. In fact, it is a well-documented fact that retail prices tend to respond faster to input cost increases than to decreases (Peltzman 2000). However, since the survey was conducted two years post-regulation, the asymmetric adjustment speed does not seem to provide

Table 13 Variation of Debit Cost Increase Across Merchant Sectors

Merchant Sector	Small-Ticket Costs Increased, Total		Small-Ticket Costs Increased, Total Costs Did Not Increase		Small-Ticket Costs Did Not Increase, Total Costs		Small-Ticket Costs Did Not Increase, Total Costs Did Not Increase	
	Costs Increased	Costs Did Not Increase	Costs Did Not Increase	Costs Did Not Increase	Costs Did Not Increase	Costs Did Not Increase	Costs Did Not Increase	
Apparel	17%	9%	13%	13%	61%			
Art	0%	13%	0%	13%	75%			
Auto	6%	0%	0%	19%	75%			
Casinos	0%	50%	0%	0%	50%			
Consumer Electronics	8%	8%	8%	8%	75%			
Convenience Store	8%	8%	8%	8%	77%			
Delivery Services	50%	0%	0%	50%	0%			
Department Stores	0%	0%	0%	25%	75%			
Discount Retail	46%	8%	8%	0%	46%			
Entertainment	15%	5%	5%	5%	75%			
Fast Food	33%	10%	10%	8%	48%			
Grocery Stores	13%	13%	13%	19%	56%			
Home Furnishings	0%	0%	0%	0%	100%			
Home Improvement	10%	0%	0%	20%	70%			
Hospitality	13%	7%	7%	0%	80%			
Maintenance	17%	17%	17%	0%	67%			
Medical	11%	5%	5%	11%	74%			
Office Products	50%	17%	17%	0%	33%			
Other Sector	25%	0%	0%	8%	67%			
Real Estate	33%	17%	17%	0%	50%			
Restaurants	9%	6%	6%	11%	74%			
Services	5%	0%	0%	0%	95%			
Sporting Goods	0%	13%	13%	0%	88%			
Toys	17%	17%	17%	17%	50%			
Transportation	0%	23%	23%	8%	69%			
Merchant Average	16%	8%	8%	9%	67%			
Sector Average	15%	10%	10%	10%	65%			

an adequate explanation.⁹

Finally, it is possible that merchants may also engage in non-price competitions. Therefore, in reaction to a cost reduction, merchants may not necessarily reduce prices but could instead adjust other margins such as providing better quality of services. Of course, these are all conjectures that require further research.

5. CONCLUSION

In this article, we investigate empirical evidence from a merchant survey conducted two years after the debit interchange regulation, introduced by the Durbin Amendment to the Dodd-Frank Act, took effect.

The survey results suggest that the regulation has had a limited and unequal impact on merchants' debit acceptance costs. The majority of merchants in the survey sample (about two-thirds) reported no change or did not know the change of debit costs post-regulation. Some merchants (about a quarter) reported an increase of debit costs, especially for small-ticket transactions. The remaining less than 10 percent of merchants reported a decrease of debit costs. The impact varies substantially across different merchant sectors.

We also find asymmetric merchant reactions in terms of changing prices and debit restrictions. A sizable fraction of merchants are found to raise prices or debit restrictions as their costs of accepting debit cards increase. However, few merchants are found to reduce prices or debit restrictions as debit costs decrease. Further research is needed to understand the asymmetric reactions.

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⁹ Yang and Ye (2008) develop a model of search with learning to explain this phenomenon of asymmetric price adjustments. They show that, when a positive cost shock occurs, all the searchers immediately learn the true state; the search intensity, and hence the prices, fully adjust in the next period. When a negative cost shock occurs, it takes longer for nonsearchers to learn the true state, and the search intensity increases gradually, leading to a slow falling of prices.

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