Who Pays for Payments? Consumer Sorting, Fee Heterogeneity, and Passthrough *

Mark Egan[†] *Harvard University and NBER*

Gregor Matvos[‡] *Northwestern University and NBER*

Amit Seru[§] *Stanford University and NBER*

Lulu Wang[¶] *Northwestern University*

Vincent Yao[||] *Georgia State University*

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Abstract

We examine how the fees that merchants pay to process card payments shape retail prices and redistribute consumption. Credit cards, especially premium ones, offer generous rewards but impose higher interchange fees on merchants. If merchants pass through these fees to retail prices, users of low-cost payment methods (e.g., cash, debit) effectively cross-subsidize high-reward credit card users. Using large-scale merchant-level data that covers both card and cash transactions, we document substantial heterogeneity in payment composition and interchange fees across merchants, as well as a causal impact of fees on prices. Variation in average interchange fees leads to differences in retail prices, suggesting that low-cost, low-reward users subsidize high-reward cardholders. However, consumer sorting—where shoppers who use different payment methods also shop at different merchants—mitigates this cross-subsidization. Additionally, merchants serving a broad range of payment types, such as grocery stores, negotiate the lowest interchange rates, further reducing redistribution. We embed these results in a sufficient-statistics framework to quantify how the payment system redistributes consumption via prices and card rewards. We estimate that interchange fees generate an implicit annual transfer of approximately $30 billion from cash and debit users to credit card users — comparable in scale but opposite in direction to major government transfer programs. Consumer sorting and negotiated rates reduce regressivity substantially by 25%, but do not eliminate it. Our findings highlight how the rise of premium credit cards has reshaped the redistribution of consumption, with significant implications for competition, regulation, and the distributional impact of financial innovation.

Keywords: Interchange Fees, Redistribution, Durbin Amendment, Price Discrimination, Payment Systems

JEL Classification: E42, D14, L11, L81.

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[†]Harvard University, Harvard Business School. Email: megan@hbs.edu.

[‡]Northwestern University, Kellogg School of Management. Email: gregor.matvos@kellogg.northwestern.edu.

[§]Stanford GSB. Email: aseru@stanford.edu.

[¶]Northwestern University, Kellogg School of Management. Email: lulu.wang@kellogg.northwestern.edu.

[||]Georgia State University, J. Mack Robinson College of Business. Email: wyao2@gsu.edu.

1 Introduction

In most U.S. retail settings, consumers choose how to pay without directly bearing the costs associated with their chosen payment method. This disconnect arises because merchant fees vary significantly across payment types — zero for cash, low for debit, and high for credit cards — yet retail prices typically do not differ by payment method (Stavins, 2018). Since these fees fund rewards for credit card users through a mechanism called interchange fees, a cross-subsidy emerges: when merchants raise prices to cover higher card acceptance costs, consumers who use cash or debit effectively subsidize the rewards enjoyed by credit card users (Carlton and Frankel, 1994). These redistributive effects, often described as a "reverse Robin Hood" transfer, have drawn increasing scrutiny from policymakers, most recently with the introduction of the Credit Card Competition Act (Andriotis, 2022). The growth of premium credit cards, such as the Chase Sapphire Reserve, has amplified these dynamics by offering even more generous rewards, which are funded by higher interchange fees.

Despite their policy relevance, the effects of interchange fees on retail pricing and redistribution have been challenging to study due to a lack of merchant-level data on payment composition and acceptance costs. These data are essential because the welfare consequences of interchange fees depend not only on the magnitude of fee pass-through to prices, but also on where consumers shop (Wang et al., 2014; Gans, 2018). Redistribution arises only when consumers using low-cost payment methods (e.g., cash or debit) shop at the same merchants as those using high-cost methods (e.g., rewards credit cards). Thus, the total fees a merchant pays—and the extent of redistribution, which occurs at the merchant level—depend on the specific mix of payment methods and their associated acceptance costs. While card networks publish headline interchange fee schedules, the actual fees incurred are highly merchant-specific, shaped by factors such as sector, size, and transaction characteristics. In practice, large or low-margin merchants, such as grocery stores, often negotiate lower effective interchange rates, further complicating efforts to generalize from posted fee schedules.

This paper asks two central questions: (1) how do consumers pay for goods and services across different types of merchants, and (2) what are the implications for merchant costs, prices, and consumer welfare? To address these questions, we utilize novel merchant-level data from Fiserv, which covers roughly one-fifth of U.S. card transactions, to analyze the cost and composition of payments across a wide range of retailers. We combine this reduced-form analysis with a quantitative framework of retail competition to estimate the redistributive effects of interchange fees.

The paper proceeds in three parts. First, we document striking heterogeneity in both payment mix and interchange fees across merchants. While some merchants predominantly receive low-cost payments, such as cash and debit, others are heavily skewed toward high-cost premium credit cards. We then explore the determinants of this variation and its implications

for merchant-level acceptance costs. Second, we leverage this heterogeneity, along with a regulatory shock, to estimate the causal effect of interchange fees on retail prices. We find that, on average, merchants pass these fees to consumers in the form of higher prices at a rate close to one-for-one. These first two parts are essential for understanding redistribution and for the final section of the paper: they establish how payment mix influences merchant costs and how those costs translate into consumer prices, providing the empirical foundation for our quantification of redistribution. In the third part, we embed these findings in a sufficient-statistics framework to measure how the payment system redistributes consumption through retail prices and card rewards.

Our results highlight the magnitude and limits of redistribution through the payment system. We estimate that interchange fees generate approximately $30 billion in annual transfers from cash and debit card users to credit card users each year. These transfers are economically significant, comparable in size (but opposite in direction) to major government programs such as SNAP ($120bn), the Earned Income Tax Credit ($57bn), and unemployment insurance ($50bn). Put differently, cash users pay the equivalent of a 20% higher sales tax than premium credit card users.

Critically, however, two mechanisms substantially attenuate this transfer. First, consumers who use different payment methods tend to shop at different types of merchants, reducing the scale of cross-subsidization by approximately 25%. Since cross-subsidization occurs at the merchant level, there is no redistribution if cash, debit card, and credit card users shop at different merchants. Second, variation in negotiated interchange rates, especially the lower fees paid by large, low-margin merchants like grocery stores, further reduces transfers by approximately $2 billion annually. While the direction of redistribution aligns with theory, the degree of transfer is significantly reduced by consumer sorting and merchant bargaining power.

To study the effect of interchange fees, we draw on two comprehensive datasets from Fiserv, a large U.S. merchant acquirer. The first is transaction-level settlement data from all Fiserv merchants from 2009 to 2022, covering the value, payment method, network, and interchange fee for each card transaction. We focus primarily on a 2022 cross-section of approximately 1 million merchants[1], which covers around one-fifth of all U.S. card payments. The second dataset contains transaction data from Fiserv's Clover platform, covering approximately 800,000 merchants between 2019 and 2022. Clover is the largest U.S. cloud-based point-of-sale (POS) system and processed over $133 billion in transactions as of 2020.[2] A unique feature of the Clover data is that it includes both cash and card payments, allowing us to observe the full composition of payments. Cash transactions are notoriously difficult to capture in large datasets. We augment these sources with merchant-level characteristics such as sector and county, and

[1]The transaction-level data allows us to study both payment volumes at the outlet level, as well as at the corporate level. We refer to this latter as a merchant.

[2]Source: https://web.archive.org/web/20230717211716/https://investors.fiserv.com/static-files/820517ed-48a8-4925-aca7-181065168e25

validate the data against public sources including the IRS, the U.S. Census, and the Diary of Consumer Payment Choice.

In the first part of the paper, we document two basic facts about heterogeneity in the cost and composition of payments across merchants. Our first fact is that the composition of payments—defined by the share of payments made with a payment method—varies substantially across merchants. Given the large fee differences between card types, the variation in payment composition necessarily implies substantial heterogeneity in the cost of payments across merchants. For example, although debit card transactions account for a little more than half of all card transactions, the share of debit transactions across merchants has a standard deviation of approximately 24%. The distribution is also bimodal: some stores have almost all debit card shoppers, while others have few. This variation constrains the extent to which credit card interchange fees redistribute consumption from debit card consumers.

The composition of payments across sectors and geographies is consistent with the fact that higher-income individuals are more likely to use credit cards, especially premium credit cards, and less likely to use debit cards. Travel and retail tend to feature more credit card expenditures, whereas grocery and gas stations tend to feature more debit cards. Within retail, luxury categories, such as jewelry stores, are more likely to receive credit card payments, whereas shoe stores are more likely to receive debit card payments. Consumers in higher-income counties are also more likely to use credit cards. Ultimately, the variation in the composition of payments, sector, and firm size explains around 65% of the variance in average interchange fees across merchants, which, as we discuss later, has important implications for redistribution.

Our second fact is that card type, merchant sector, and merchant size play fundamental roles in determining merchant-level interchange fees. While much of the prior literature has focused on the distinction between debit and credit, we show that different types of debit and credit cards charge significantly different fees. For example, debit cards issued by large banks regulated under the Durbin Amendment charge 0.7% whereas debit cards issued by smaller, exempt banks charge around 1.1%. These high-fee exempt debit cards for account for 40% of debit transactions.Within credit cards, basic credit cards charge merchants around 1.7%, while high-fee/high-rewards premium credit cards, often used by higher-income consumers, charge around 2.1%. Credit card premiumization has accelerated in recent years; premium credit cards represented 20% of credit card volume in 2010 and now account for 60% as of 2022. The fee variation across cards plays an increasingly important role in determining merchant-level fees, as cash use—around 12% of transaction value in the Clover data—has declined.[3]

Even holding card types fixed, interchange fees also vary across merchants. Merchants in high-gross-margin sectors, such as travel and retail, pay high interchange fees, whereas gro-

[3]Payment methods in the U.S. have shifted gradually over time, with cash use declining and debit card use steadily increasing. The use of cash and checks fell from approximately 13% of consumer payments in 2019 to around 11% in 2022. Since 2005, debit cards have gained share relative to credit cards: while credit accounted for roughly 60% of card payment volume in 2005, it accounted for only 50% in 2022.

cery stores and gas stations pay around 50 bps lower interchange fees. Large merchants in the grocery and retail sectors, with annual card sales exceeding $\$1$ billion tend to pay lower interchange rates, which are approximately 50 basis points lower, compared to smaller merchants. These lower rates are the consequence both of publicly posted volume discounts as well as private negotiation and reflect the bargaining power of larger merchants.

In the second part of the paper, we present novel evidence that interchange fees have real effects on merchant sales. To do this, we exploit variation in the effects of the 2011 Durbin Amendment across merchants, which has been exploited in other work such Mukharlyamov and Sarin (2025). The Durbin Amendment capped interchange fees only on debit cards issued by large banks, but not on debit cards issued by small banks, nor on credit cards. It also inadvertently increased debit card interchange fees for merchants with small average transaction sizes, while creating significant savings for merchants with large transaction sizes. We implement an instrumental variables design that compares sales growth across merchants with different predicted savings from the Durbin Amendment, using variation in local exposure to large banks to isolate causal effects. We find evidence suggesting that Durbin Amendment led to a decline in prices and, ultimately, find that every one percentage point in interchange expense saved causes around a 7% increase in card sales.[4]

In the final part of the paper, we use these facts about payment mix, interchange fees, and merchant pricing to analyze how changes in interchange fees affect consumer welfare. Our empirical evidence highlights the importance of accounting for consumer sorting and interchange fees at the merchant level. We incorporate these sources of merchant-level heterogeneity into our analysis by developing sufficient statistics that capture the consumer welfare effects of changes in baseline interchange fees, sector-level pricing, and large-merchant discounts. These statistics remain valid even when consumers' payment and shopping preferences are arbitrarily correlated. The sufficient statistics apply to any model in which merchants pass through interchange fees into retail prices and operate under imperfect competition. The key insight of our approach is that the effects of consumer sorting across merchants can be summarized by the distribution of payment shares across merchants.

Even after accounting for the complexities of the interchange schedule and the variation in payment composition across merchants, we find that the payment system generates large transfers from cash and debit card users to credit card users of around $\$30$ billion per year. Our calculations suggest that cash users lose around 88 basis points of purchasing power and that regulated debit card users lose around 40 basis points. Although much of the emphasis has been on cash users subsidizing credit card rewards, our results suggest that debit card users also subsidize a substantial share of those rewards. Relative to an average state and local sales tax rate of around 6%, our calculation suggests that interchange fees are analogous to raising

[4]Using zip-code level data on retail gasoline prices, Mukharlyamov and Sarin (2025) find that they lack sufficient power to identify the effects of interchange fees on retail prices. In our setting, we are able to use the Fiserv data to show that merchant-level shocks to interchange fees do affect merchant-level sales.

the sales tax rate for cash users by around 17% and that for regulated debit card users by 10%. In contrast, basic and premium credit card users consume around 50 basis points more as a result of high interchange fees, effectively reducing their effective sales taxes by 10%.

At the same time, we find that consumer sorting matters for the magnitude of this transfer and, for specific groups, can even change the direction of the transfer. Because cash, debit, and credit card users tend to shop at different types of stores, consumer sorting reduces the effective size of the transfer by approximately $9 billion per year. This effect is largely driven by the tendency of many high-income, premium credit card users to shop at merchants that primarily serve similar customers. If a merchant primarily accepts premium credit cards, there is little to no cross-subsidization. As a result, consumer sorting insulates cash and debit card users from the full effects of the rise in premium credit card usage.

Variation in interchange fees across merchants, often driven by bargaining power and volume discounts, also has important implications for redistribution. Because redistribution occurs at the merchant level, it is most pronounced at merchants where consumers exhibit substantial heterogeneity in payment methods. Grocery stores, gas stations, and large retailers—where all types of consumers shop—have wide variation in payment mix and, therefore, the greatest potential for redistribution. However, our reduced-form analysis shows that these very merchants, despite having the most scope for redistribution, are often able to negotiate the lowest interchange rates. Lower interchange fees inherently limit the extent of redistribution. As a result, the fact that merchants with the greatest scope for redistribution face the lowest fees significantly reduces the total amount of redistribution. These negotiated discounts lead to a progressive redistribution of approximately $2 billion per year to cash and exempt debit card users.

We also use our framework to examine how two recent shifts in the industry, the Durbin Amendment and the rise in card premiumization, have impacted redistribution. Although cash users benefited from the Durbin Amendment, our analysis shows that credit card users were the primary beneficiaries. Our results also indicate that the Durbin Amendment was a regressive policy, benefiting wealthier households on net at the expense of lower-income households. Similarly, we find that the increase in credit card premiumization has been regressive and has altered the nature of redistribution. The rise in premiumization has come largely at the expense of basic credit card users.

The paper proceeds as follows. Section 2 describes the institutional setting and the two primary data sources, including merchant-level transaction data from Fiserv's settlement platform and the Clover point-of-sale system. Section 3 documents variation in the cost and composition of payments across merchants, highlighting the role of card type, sector, and merchant size. Section 4 estimates the causal effect of interchange fees on merchant outcomes, using variation induced by the Durbin Amendment. Section 5 develops a sufficient-statistics framework to quantify redistribution across consumers, accounting for consumer sorting and merchant

bargaining. Section 6 concludes.

1.1 Related Literature

Our paper is related to several different strands of the literature. First, our paper relates to the literature on payment choice. Much of this literature has relied on survey evidence (Foster et al., 2011; Bagnall et al., 2014; Greene et al., 2018; Huynh et al., 2022). One commonly used data source is the Survey and Diary of Consumer Payment Choice, which typically surveys 1,000 to 5,000 consumers annually. Our work complements the existing literature by examining high-frequency transaction-level data. Surveys can help understand individual-level payment preferences. However, as we demonstrate in our framework, observing payments and the associated costs at the merchant-level, as we do in our data, is essential for understanding cross-subsidization.

Our paper examines the impact of interchange fees on prices and the potential implications for consumer rewards. Much of the prior evidence on the effects of interchange fees comes from regulatory interventions. Previous studies show that when interchange fees are capped by regulation, merchant fees decline nearly one-for-one (Gans, 2007; Valverde et al., 2016; European Commission, 2020).Caps on interchange fees also affect consumer rewards. Following the EU's 2015 credit card interchange cap, UK banks scaled back credit card rewards (Gunn, 2016). Similarly, after Australia capped interchange fees on Visa and Mastercard credit cards in 2003, banks substantially reduced their credit card reward programs(Chan et al., 2012).

Our analysis of the Durbin Amendment builds on the findings of Mukharlyamov and Sarin (2025), who find that the amendment led some retailers to pass on lower prices to consumers. While much of their work focuses on how the Durbin Amendment affected checking accounts and banking activity more broadly, the authors also examine its impact on gasoline prices.[5] As they note, a limitation of their analysis is that they observe interchange fees, card transactions, and gasoline prices only at the ZIP code level and with annual frequency as of 2016. We extend their analysis by examining monthly transactions at the merchant level during the years immediately surrounding the Durbin Amendment. This provides a more granular and timely assessment of its impact. We also use our data to measure precisely how the Durbin Amendment affected merchants' costs.

Our paper also relates to the literature examining how cash payments potentially subsidize card payments, dating back to Carlton and Frankel (1994). In related work, Schuh et al. (2010); Felt et al. (2023) develop a calibrated model to quantify who gains and loses from credit card payments. Empirically, while we find that card use imposes a cost on cash users, the amount of subsidization is much smaller in our data. However, we add the caveat that we are studying a more recent period, during which card use has become dominant. Our findings are broadly

[5]Manuszak and Wozniak (2017) and Kay et al. (2018) also find that the Durbin Amendment impacted bank deposit fees and prices.

consistent with Wang (2025), who develops a structural model of payment competition and find that network competition exacerbates the problem of high merchant fees and excessive card use. In similar work, Huynh et al. (2022) develop and estimate a structural model to understand competition in the payments sector; the authors find that a decline in interchange fees could be welfare enhancing.

Our paper also relates to the literature on Fintech and payments more generally. Evidence from Higgins (2024) suggests that consumers and merchants benefit from the introduction of debit cards in Mexico. At the same time, Alvarez and Argente (2020) find that having a choice over payment methods, including cash, is valuable to consumers. Understanding the value of cash is particularly important given the potential implications of central bank digital currency (Whited et al., 2022).

2 Institutional Setting and Data

In this section, we outline the institutional details and describe our data. We begin by explaining how credit and debit card payment systems operate, focusing on the key participants as well as the associated costs, benefits, and transfers. We then introduce our two primary transaction-level payments datasets from Fiserv, which allow us to observe how the types and costs of payment methods vary across merchants. Together, these data provide a detailed view of the U.S. payment system, linking card types, merchant characteristics, and fees.

2.1 Payments Processing and Interchange Fees

A typical card payment involves the customer making a purchase, the merchant accepting the payment, and three key financial intermediaries: the merchant acquirer, the issuer, and the card network. The issuer, effectively the consumer's bank (e.g., Chase), facilitates the transaction from the consumer's perspective by providing the card and processing the payment. Merchants, in turn, accept card payments by contracting with a merchant acquirer, usually a bank (e.g., Wells Fargo) or fintech firm (e.g., Fiserv, Square), which supplies payment terminals and facilitates settlement and fund transfers. The card network (e.g., Visa, Mastercard, American Express, Discover) is an intermediary between the issuer and the acquirer, routing transaction data, collecting and distributing fees, and coordinating settlement.

To accept card payments, merchants must pay transaction fees, which vary by payment method due to the involvement of different financial intermediaries and the services bundled with each method (e.g., credit card rewards). The primary component of these fees is the interchange fee, which is split among the intermediaries and simultaneously determines the merchant's cost and the consumer's rewards. Therefore, interchange fee data is essential to understanding cross-subsidization within the payment system.

Figure 1 illustrates how fees flow among these parties. When a consumer makes a card payment, the merchant pays a merchant discount fee to its acquirer. While the acquirer retains a portion of this fee, it passes most of the fee to the issuer as an interchange fee. Additionally, both the issuer and the acquirer pay network fees to the card network. The interchange fee is typically the largest component of the merchant discount fee and funds consumer rewards, and consequently, is the focus of much of our analysis.

The typical merchant discount fee for a credit card transaction in the US is 2.25%, of which the average interchange fee accounts for about 1.90% and the average consumer reward is around 1.40% (Nilson, 2023b; Drechsler et al., 2025). In contrast, network fees average only 0.14% of the transaction value and do not vary with card type or merchant sector.

Our analysis focuses on both the level and heterogeneity of interchange fees across payment methods and merchants, and the implications for redistribution. Interchange fees vary based on the type of card used, the sector and size of the merchant, and other transaction characteristics. Table 4 presents an excerpt from Visa's 2022 public interchange schedule, illustrating variation along these dimensions. For example, a premium credit card transaction at a small grocery store incurs an interchange fee of 7 cents plus 2% of the transaction value. For a $\$100$ transaction, this would amount to $\$2.07$. The same transaction on a regulated debit card would cost just 27 cents. If the $\$100$ transaction occurred at a gas station, the cost would be $\$1.10$, while at a large grocery store, it would be $\$1.45$. Although it has been understood, at least anecdotally, that transaction fees potentially vary across merchants, we are the first to study data on the realized fees paid across merchants.

2.2 Data

We use two proprietary datasets from Fiserv, one of the largest U.S. merchant acquirers, to examine how interchange fees vary across merchants and their impact consumer welfare. A key feature of these data is that we observe both the composition and price of transactions at the merchant level, which, as detailed in Section 5, is critical for understanding the implications for redistribution and capturing heterogeneity in payment costs.

2.2.1 Sources

Our primary dataset comes from Fiserv's payment settlement records, which cover approximately one million merchants and account for one-fifth of all U.S. card volume. As discussed above, Fiserv is a merchant acquirer responsible for processing transactions and calculating the interchange fees owed to issuers, making it an ideal source for studying how the composition and cost of payments vary across merchants. The data include both in-person and online transactions. From the Fiserv dataset, we derive four distinct samples for our analysis.

1. We construct a cross-sectional dataset of sales, the number of transactions, and total interchange fees at the merchant-sector-location-card type level from 2022. We use this data to study how the composition and pricing of payments varies across merchants and geographies. All sales and interchange values are measured net of returns and chargebacks. Sectors are defined using the merchant's MCC code. We focus on a single cross-section of data covering all payments made in 2022, which reflects current pricing structures and consumer behavior. Since merchants often set uniform prices across establishments (DellaVigna and Gentzkow, 2019), but the cost of accepting different payment methods can vary substantially, we aggregate the data to the merchant-by-sector-by-payment-method level. This also allows us to split large multi-sector merchants (e.g., those selling gas and retail goods under different MCC codes).

2. We construct a three-year panel of card sales and interchange fees at restaurants that spans 2010 to 2013. We use this dataset to study the effect of a regulatory cap on interchange fees. In that dataset, we aggregate the data to the establishment-by-payment method-by-year level.

3. We construct an four-year imbalanced panel spanning of merchants that use Clover, a Fiserv-owned point-of-sale (POS) system. This data covers approximately 800,000 merchants and covers the period from 2019 to 2022. A distinguishing feature of the Clover data is that it includes cash and check transactions, which are typically unavailable in settlement data. Similar to the settlement data, the Clover dataset contains information on the value and count of transactions by payment method. However, it does not have data on interchange fees. We also observe each merchant's location and sector. While the Clover sample skews toward smaller merchants and over-represents restaurants, it provides valuable insight into cash usage and variation in payment composition that informs redistribution.

4. We construct time series of total payment volumes and interchange fees by the type of card. These time series cover $2005 - 2023$ and give context for general changes in the composition and pricing of payments over time.

We supplement our data from Fiserv with survey data on consumers' preferred payment method from the Atlanta Federal Reserve's Diary of Consumer Payment Choice (DCPC) and the MRI-Simmons Ultimate Survey of Americans (USA). The Diary of Consumer Payment Choice records the transactions of around 5,000 respondents each year and tracks their payments over a three day window in October. Crucially for our applications, it provides us data on consumers' incomes and their preferred payment methods. The MRI-Simmons USA surveys around $50,000$ respondents each year on their brand preferences, including for financial products. The data on bank choice and credit card type allow us to group consumers by more granular payment

preferences that are relevant for the rewards they receive and the interchange fees they impose on merchants.

2.2.2 Data Coverage and Representativeness

The Fiserv data is highly representative of the broader U.S. economy in terms of sectoral coverage, firm size (based on card sales), and geographic distribution. Figure 2a compares the sector composition of card transactions in the Fiserv data to that reported in the Diary of Consumer Payment Choice. We observe close alignment across major retail categories such as restaurants, grocery stores, merchandise retailers, gas stations, and travel.

Figure 2b compares the state-level distribution of card transactions in the Fiserv data with state shares of GDP. Most points lie along the 45-degree line, indicating strong geographic representativeness. Figure 2c compares firm size distributions in the Fiserv dataset with those reported by the IRS Statistics of Income, again showing close correspondence across revenue categories.

The breadth and granularity of the Fiserv data allow us to analyze how payment fees vary across merchants and how changes in fee policies may affect economic outcomes. A key advantage is that we observe payment methods at the merchant level, allowing for a detailed analysis of the distributional impacts. We also capture fine-grained information on specific payment types, including distinctions across debit card regulation status, credit card tiers, and the inclusion of cash.

3 Variation in Payment Mix and Payment Costs

How consumers pay for goods and services has important implications for merchants' costs and, ultimately, prices. It also generates distributional effects. We begin by documenting trends in payment methods and the variation in payment behavior across merchants. We show that consumers' choice of payment method varies substantially across and within industries. At some merchants, consumers primarily pay by credit card, while cash and debit dominate at others. Fees also vary by the type of card, the sector of the merchant, and the size of the merchant.

The heterogeneity in the composition and pricing of payments has two essential implications for quantifying the amount of redistribution in the payment system, as we illustrate in Section 5. First, cross-subsidization only arises when consumers with different payment preferences shop at the same set of merchants. Second, redistribution is further reduced (amplified) if the firms that serve the most heterogeneous consumer bases pay lower (higher) interchange fees.

3.1 Variation in Payment Mix

One notable feature of the data is that the composition of payments varies significantly across merchants. We examine how the use of cash, debit cards, and credit cards differs across the merchants in our sample and then investigate how the payment mix varies across sectors, regions, and other firm-specific factors.

We begin by documenting heterogeneity in payment types across merchants in Figure 3, panels (a)-(d). Figure 3a displays the distribution of the share of cash payments across merchants, focusing on those merchants where cash accounts for at least 2% of sales. Observations are at the merchant-by-month level using our Clover data, which includes information on cash payments. We measure the cash share based on the dollar-weighted share of cash and check payments relative to the total transaction value. We group cash and check payments into a single category, labeled as 'cash,' because they are distinct from card payments in that they do not incur interchange fees for the merchant and do not generate explicit rewards for the user. On average, cash accounts for 11% of transactions at a given merchant (Figure 3b). However, this masks substantial heterogeneity. For approximately two-thirds of merchants, cash accounts for less than 2% of transactions. In contrast, for the one-third of merchants where cash represents at least 2% of sales, it accounts for more than 30% of their transactions—and for merchants in the 90th percentile, over 80%.

This heterogeneity is critical when considering redistribution. For the two-thirds of firms where cash use is almost nonexistent, there is little scope for redistribution between cash and card users. Similarly, at firms where cash is the predominant payment method, redistribution is limited. Redistribution inherently requires a mixed payment environment.

The remaining 89% of sales occur via debit and credit card payments. Here, too, the payment mix varies across merchants. Figure 3c displays the share of credit-card payments relative to total card payments (i.e., debit plus credit) in card settlement data. Observations are at the merchant-by-month level. The figure illustrates that, on average, credit card sales account for 53% of card transactions at the typical merchant in our sample. Moreover, the share of credit card transactions has remained relatively constant over time (Figure 3d).

The distribution of credit card sales is bimodal, with peaks at approximately 25% and 70%. This bimodality suggests that although credit cards account for 53% of card transactions on average, merchants tend to fall into two distinct groups: those where credit accounts for around 25% of credit card transactions and those where it accounts for about 75%. This pattern has implications for cross-subsidization. Debit cards carry lower interchange fees and rewards relative to credit cards. Just as cash transactions can subsidize credit card rewards, debit card transactions also potentially play a subsidizing role. The bimodal nature of the distribution suggests that variation in card payment mix is significant at the merchant level—again limiting the potential for cross-subsidization.

3.1.1 Variation Across and Within Sectors

Part of this heterogeneity in the merchant payment mix stems from sector-specific characteristics. Figure 4 shows the payment shares, weighted by transaction value, across sectors. Although cash accounts for only 11% of transactions at the average merchant, it plays a more significant role in sectors such as grocery, restaurants, and gas stations. For instance, cash accounts for 23% of sales in the grocery sector, slightly less than the share for credit cards. By contrast, in the travel sector, credit cards account for 70% of sales, with debit and cash representing 27% and 3%, respectively. These summary statistics suggest that, in the travel sector, there is limited scope for redistribution between credit and cash users, and any residual redistribution is likely minimal and occurs primarily between credit and debit users.

In addition to variation across sectors, we also find substantial dispersion in the composition of payments within sectors. Figure 5 plots kernel densities of the share of card transactions on credit cards across merchants in each of the major sectors. Although grocery stores tend to have a relatively low share of credit card transactions, and travel merchants tend to have a higher share, there remains substantial dispersion within these sectors. This dispersion is important, as it implies that even within a given sector, consumers with different payment preferences shop at different merchants.

3.1.2 Variation Across Regions and Income Levels

We also find substantial regional variation in the payment mix. Figure 6a displays the county-level share of cash payments. Light green and yellow regions correspond to higher cash usage, while dark blue areas reflect lower usage. In some counties (highlighted in yellow), cash accounts for more than 23% of transactions. Cash usage is higher in the Midwest and the South, while card usage is more prevalent along the East and West Coasts, as well as in metropolitan areas.

Figure 6b displays the county-level share of credit card transactions relative to all card payments. Areas shaded in yellow and light green correspond to higher credit card usage, whereas areas shaded in dark green and blue reflect higher debit card usage. The results indicate that debit card usage is especially prevalent in the Deep South relative to other U.S. regions. Conversely, credit card usage is higher in the coastal areas.

The geographic correlation between income and credit card usage is also borne out in individual demographic data. Figure 7 combines data from the DCPC and the MRI-Simmons USA to show how consumers' preferred payment methods change with income. Whereas the DCPC has data on preferences between cash, debit, and credit by income, the USA provides supplementary data on whether consumers who use debit cards have bank accounts at small banks (i.e. exempt debit) or largeones, as well as whether their credit cards are premium (e.g. Visa Signature, MC World). At low levels of income, consumers prefer using debit cards and cash.

At higher levels of income, consumers use more credit cards, and in particular premium credit cards. Thus transfers from cash and debit card consumers are also transfers from relatively lower income consumers to higher income consumers.

3.1.3 Decomposing the Variation in Payment Methods

To better understand what drives the variation in payment methods, we estimate regressions of the form:

$$Cash\,Share_{jt} = X'_{jt}\beta + \mu_{l(j)} + \mu_{c(i)} + \mu_{j(i)} + \epsilon_{jt}. \tag{1}$$

Observations are at the merchant (j)-by-month (t) level. The dependent variable $Cash\,Share_{jt}$ measures the dollar-weighted share of cash transactions relative to other payment methods. We control for merchant characteristics in the vector X_{jt}, including average transaction size and total transaction volume. We also include fixed effects for industry (l), time (t), and county (c) fixed effects. In addition to studying cash share, we also analyze how the share of credit versus debit card transactions varies across merchants.

We report the corresponding estimates in Table 2. Columns (1)–(3) examine cash and check as a share of all payment volumes in the Clover data, while columns (4)–(6) analyze the share of credit card usage within card transactions. In all columns, the dependent variable is scaled by 100, so coefficients are interpreted in percentage points.

The results in Table 2 show that consumers are more likely to use cash at merchants with higher sales volumes but lower average transaction values. In column (1), a 100 log-point increase in total sales is associated with a 1.37 percentage point (12%) increase in the share of cash transactions. In contrast, a 100 log-point increase in average transaction value is associated with a 5.55 percentage point (50%) decline in cash usage. Unsurprisingly, cash usage is negatively correlated with e-commerce: a 10 percentage point increase in a firm's e-commerce share is associated with a 0.38 percentage point decline in cash usage.

Consistent with Figure 6a, local demographics also help explain cash usage. Consumers are more likely to pay in cash in less wealthy, less educated, and less densely populated regions. Column (2) shows that a one standard deviation increase in median income is associated with a 0.14 percentage point decline in cash usage. Similarly, a one standard deviation increase in the share of college-educated households corresponds to a 1.07 percentage point decline in cash usage.

In contrast, consumers are more likely to use credit cards (relative to debit cards) at merchants with lower sales volumes and higher average transaction values. Column (4) indicates that a 100 log-point increase in transaction value is associated with a 9.11 percentage point (17%) increase in credit card usage. As with cash, demographics also influence card mix: credit card usage is more prevalent in wealthier, older, more educated, and more urban areas.

Overall, these results suggest that the payment mix varies substantially across merchants, depending on characteristics such as sector and region. As shown below, this heterogeneity has important implications for both the cost and redistributive aspects of payments.

3.2 Variation in Payment Costs

The heterogeneity in the payment mix that we document implies that merchants may face substantial variation in average transaction costs. Figure 9 displays the distribution of average card interchange fees across merchants in our sample. On average, merchants pay around 1.5% of sales to accept cards, but this average masks considerable variation. At the 10th percentile, interchange fees are 0.8% of sales, while at the 90th percentile, they rise to 2.2% of sales.

Part of the variation in average transaction costs is driven by the mix of cash versus card payments across firms, as cash transactions incur zero interchange fees, while card interchange fees can be upwards of two percent. However, there is still substantial variation in card-related costs across merchants. Figure 9 displays the average card transaction costs across merchants in our sample with more than $100,000 in annual sales. The average transaction cost is 1.5%, with a standard deviation of 0.5%.

We next examine the factors driving this variation in payment costs. The overall payment mix—including the types of debit cards (regulated vs. exempt) and credit cards (basic vs. premium) used—has a first-order impact on merchant costs. Additionally, even within a given payment type, cost variation arises due to merchant-specific characteristics, such as industry, firm size, and the average transaction size at a merchant. We begin by documenting the variation in transaction costs and conclude by decomposing this variation into its key components.

3.2.1 Card Types

We classify card payments into four categories: regulated debit, exempt debit, basic credit, and premium credit. Distinguishing between these card types is crucial because they impose different costs on merchants. Figure 10, panels (a)–(d), and Table 3 display average interchange rates for each of these categories. Regulated debit cards earn around 0.7% of transaction value in interchange, while exempt debit cards earn higher rates around 1.1%. Basic credit cards carry higher interchange rates, around 1.7%, and premium credit cards have even higher rates, averaging approximately 2.1%.

We classify debit card transactions based on whether the issuing bank is regulated or exempt under the Durbin Amendment, which capped interchange fees for debit cards issued by large banks (regulated debit) but not for those issued by smaller institutions (exempt debit). Specifically, the 2011 Durbin Amendment capped interchange fees for debit cards issued by banks with over $10 billion in assets, setting a maximum fee of 22 cents plus 0.05% per transaction. Banks below this threshold remained exempt and continued to earn higher fees. Table

4a compares reported exempt and regulated debit interchange rates across sectors using Visa's public interchange schedule. At an average debit card transaction size of around $40, exempt rates are substantially higher than regulated rates in many sectors. Figures 10b and 10c display average interchange fees for debit transactions overall and separately for regulated and exempt debit cards. Figure 10b shows that average debit card interchange fees fell by more than 50% following the implementation of the Durbin Amendment.

Figure 11a shows the share of debit card transactions that are subject to the Durbin Amendment cap over time. By definition, the share of regulated debit transactions was zero before the amendment, and it jumped to 60% following its introduction in 2011. This share has remained roughly constant since then.

We classify credit card payments into basic and premium categories. Premium cards include those in higher interchange tiers, such as Visa Signature, Visa Infinite, Visa Signature Preferred, Mastercard World, and Mastercard World Elite. These cards offer enhanced rewards and carry higher interchange fees.[6] Basic credit cards include all other credit cards. Table 4a shows that premium credit cards have publicly reported interchange rates that are higher than those for basic cards. Figures 10b and 10d display average interchange fees for credit card transactions overall and separately for basic and premium credit cards. Figure 10b shows that average credit card fees have increased over time. However, this increase is primarily driven by the growing prevalence of premium credit cards, as the average interchange fees for basic and premium cards have remained relatively stable over this period (Figure 10b). Figure 11b illustrates the rising dominance of premium cards, which grew from about 20% of credit card volume in 2006 to 60% in 2022.[7]

We examine the extent to which differences in payment mix can explain variations in transaction costs. Specifically, we predict each merchant's average transaction costs based on their payment mix, including variations within card types (e.g., regulated vs. exempt debit and basic vs. premium credit). Variation in payment mix accounts for approximately 24% of the overall variation in transaction costs. The dashed red line in Figure shows the density of predicted transaction costs based on each merchant's observed payment mix. The remaining variation in transaction costs is attributable to within–card-type differences in interchange fees, which reflect variation across merchants due to factors such as industry, firm size, and transaction size.

[6]Rewards can still vary within card type because the exact structure of rewards are determined by issuers. Visa and Mastercard influence the set of rewards primarily by changing the interchange fees issuing banks can earn for different card types.

[7]Historically, card networks such as Visa and Mastercard have required that merchants accepting their cards must accept all cards issued under their respective brands. In other words, merchants cannot selectively accept certain Visa cards—they must accept all Visa cards or none at all. This policy has been the subject of ongoing "honor-all-cards" litigation.

3.2.2 Merchant Sectors

Interchange rates also vary across sectors, with high-margin sectors typically paying higher fees. Figure 12b plots average interchange rates in the Fiserv data across five major spending categories: travel, restaurants, merchandise, grocery stores, and gas stations. These five categories account for approximately 85% of card sales. We focus on rates for credit cards and exempt debit cards, as the Durbin Amendment cap limits variation in regulated debit card fees.

Fees are highest in the travel and retail sectors, which generally have higher margins and more affluent customers compared to other sectors. In contrast, grocery stores and gas stations, which operate on thinner margins and serve a broader swath of the income distribution, pay interchange fees that are one-third or 50 basis points lower. One natural explanation for why high margin merchants are more willing to accept cards is that interchange fees are charged as a percentage of sales. Even if accepting credit cards has the same impact on sales across sectors, card acceptance would increase profits at high-margin businesses by a greater amount . Historically, Visa and Mastercard had lower acceptance at supermarkets until they started to give supermarkets discounts on interchange rates in the 1990's (Stearns, 2011).

Accounting for the merchant sector, in addition to the payment mix, explains roughly 43% of the overall variation in transaction costs. The dashed green line in Figure 13 shows the distribution of predicted transaction costs based on each merchant's observed payment mix and sector.

3.2.3 Merchant Size and Other Characteristics

Interchange fees are generally lower for larger firms. Figure 12c plots average interchange rates in the merchandise and grocery store sectors for large firms (with more than $1 billion in sales) and smaller firms (with less than $1 billion in sales). Larger firms pay approximately 50 basis points less in fees on their credit card and exempt debit card transactions. This pattern aligns with public data from Visa's interchange schedule, shown in Table 4b.

One explanation for this size-based discount is that large merchants can influence consumer payment behavior by choosing not to accept specific payment methods. In response, networks offer lower interchange rates to large merchants to keep them on the platform. Historically, large department stores were slow to accept Visa and MC credit cards because they had their own alternatives in the form of store credit. Only after Visa made concessions did JC Penney's become the first large department store to accept credit cards, and Sears held out until the mid 1990's (Nocera, 1995).

Another important factor influencing the average interchange fee is the transaction size. Visa's public interchange schedules, as shown in Table 4, indicate that interchange fee schedules include a fixed component that does not vary with the transaction size, as well as a variable component that scales linearly with the transaction size.

Accounting for firm characteristics such as total sales and the average transaction size, in addition to payment mix and sector, explains approximately 64% of the overall variation in transaction costs. The dashed orange line in Figure 13 shows the distribution of predicted transaction costs based on each merchant's observed payment mix, sector, and firm characteristics.

4 Real Effects of Payments

Variation in the payment mix and in interchange fees, both within and across payment methods, generates substantial heterogeneity in merchants' payment-related transaction costs, as documented in Section 3. In this section, we show that these costs have real effects on both sales and prices.

These effects matter not only because of their impact on the real economy, but also because they shape patterns of cross-subsidization among cash, credit, and debit users. For instance, if merchants do not pass through interchange fees into retail prices, then cross-subsidization between cash and card users does not occur; instead, merchants effectively bear the burden of subsidizing card rewards themselves. Documenting the real effects of interchange fees is therefore important both for understanding their role in the economy and for motivating our subsequent analysis of cross-subsidization in Section 5.

4.1 The Impact of the Durbin Amendment

One challenge in studying the real effects of interchange fees is that it requires both granular data—at the merchant level—on interchange fees and merchant outcomes, as well as exogenous variation in interchange fees. Using our detailed merchant-level data, we exploit heterogeneity in the impact of the Durbin Amendment across merchants to show that interchange fees affect the allocation of consumption and retail prices.

The 2011 Durbin Amendment, passed as part of the Dodd–Frank Act, imposed a binding cap on debit card interchange fees for banks with over $10 billion in assets. Specifically, it limited fees to a maximum of 22 cents plus 0.05% of the transaction amount. The rule applied only to regulated debit cards—those issued by large banks—and left fees for exempt debit cards—those issued by small banks and credit unions—unchanged. As illustrated in Figure 10b, the Durbin Amendment had a substantial impact on debit interchange fees while having no effect on credit interchange. While the Durbin Amendment reduced the average level of interchange fees, its impact varied significantly across merchants, which we exploit in our analysis. The amendment created sharp, plausibly exogenous variation in interchange fee savings across merchants, driven by three forces. First, only merchants with substantial sales via debit cards saw cost savings. Second, because the cap includes a fixed 22-cent component, the percentage reduction in

fees was larger for merchants with larger average transaction sizes.[8] Third, only merchants in areas with a high concentration of large banks experienced changes to their fee structure. We use our detailed merchant-level data to measure these forces precisely.

Figure 14 displays two binned scatter plots illustrating how the Durbin Amendment affected debit card interchange rates, conditional on average transaction size and the share of regulated banks. Figure 14a illustrates that the Durbin Amendment benefited restaurants with large average ticket sizes relative to those with smaller ones. This occurred because the Durbin Amendment changed the structure of debit interchange for restaurants from a large linear fee with a low fixed fee (1.19% of transaction value + 10 cents) to a low linear fee with a high fixed fee (0.05% of transaction value + 22 cents) [9] The blue dots indicate average debit interchange rates prior to the Durbin regulations. As average transaction size increases, the average interchange rate falls because the fixed component of the fee accounts for a smaller share of total costs. At a ticket size of $80, the curve approaches 1.2%, which corresponds to the linear component of debit interchange rates. The red dots represent average debit interchange rates after the Durbin Amendment. They reveal a much steeper relationship between interchange rates and ticket size, reflecting the increased importance of the fixed fee. Merchants with small average ticket sizes actually faced higher costs, since the rise in the fixed fee outweighed the cap on the linear fee. By contrast, only merchants with large ticket sizes realized savings. The vertical line marks the theoretical transaction size at which a merchant would have been indifferent between the two fee structures; it also roughly coincides with the point at which the two curves cross, underscoring the value of the settlement data.[10] In the data, the median merchant has an average ticket size of about $15 and therefore benefited modestly from the Durbin Amendment. However, these modest gains for the median restaurant are small relative to the large variation in benefits across establishments.

Figure 14b plots average debit interchange fees against the post-Durbin share of debit transactions on regulated cards at the ZIP code level. Using post-Durbin data, we calculate the share of debit card transactions in each ZIP code conducted on regulated cards. As before, the blue dots represent pre-Durbin interchange rates, while the red dots represent post-Durbin rates.

[8] An inspection of Visa's public interchange fee schedules before and after the policy suggest that most regulated debit fees bunched at the cap. In principle, the Durbin Amendment could have forced the networks to cut debit fees for the largest merchants even more to incentivize said merchants to stay on the Visa and Mastercard networks. However, Figure 12c shows regulated debit fees are similar at both large and small firms, suggesting this additional negotiation channel was not a major force.

[9] We exclude supermarkets and gas stations because Table 4 shows that those sectors saw less dramatic increases in fixed fees. For example, gas stations went from being charged $\min\{0.75\% + 0.17, 0.95\}$ to $0.05\% + 0.22$. Supermarkets went from being charged a flat fee of $\$0.25$ to $0.05\% + 0.22$. Over transaction sizes from 5 to 100 dollars, the average change in fee for restaurants covers $[-100, 120]$ bps. The same numbers for gas stations would imply half as much variation, spanning changes in $[-30, 65]$ bps. We do not focus on large merchandise retailers because past work shows that they charge uniform prices across establishments that face different payment costs (DellaVigna and Gentzkow, 2019).

[10] We compute this by solving $0.0119x + 0.10 = 0.0005x + 0.22$. The two curves do not cross exactly there because we approximate the average interchange fee with the interchange fee at the average transaction size. We do this because we do not have data on the distribution of transaction sizes.

The red dots indicate that, after the Durbin Amendment, average interchange rates declined sharply in areas with a higher share of regulated banks. In the next section, we exploit these two dimensions of heterogeneity to examine how interchange fees influenced merchants' sales and prices.

4.2 Estimation

We estimate the real effects of interchange fees using the following regression specification:

$$\Delta y_j = \beta \Delta \tau_j + \epsilon_j \tag{2}$$

The dependent variable, Δy_j, is the change in sales at merchant j in the year following the implementation of the Durbin Amendment (i.e., October 2011 to October 2012). The independent variable of interest, $\Delta \tau_j$, measures the average change in credit and debit interchange fees over the same period. Observations are at the merchant level. We first focus on sales, rather than prices, because we directly observe detailed sales data. In subsequent analysis, we also examine changes in average ticket size as a proxy for prices. To reduce noise from cross-industry heterogeneity, we restrict our analysis to merchants in the restaurant industry.

One challenge in estimating eq. (2) using OLS is the potential endogeneity of interchange fees and reverse causality. As discussed in Section 3, interchange fees depend on merchant characteristics, including sales volume and average transaction size. For example, if the firms with the fastest sales growth are also the ones that expand the debit card share of sales or increase average transaction sizes, that would mechanically generate a negative correlation between lower interchange fees and stronger sales growth. The fact that most of the variation in interchange fees stems from the Durbin Amendment, an arguably exogenous policy shock, helps alleviate these concerns.

To address the potential endogeneity issue, we construct an instrument based on the expected decline in interchange fees resulting from the Durbin Amendment, derived from each merchant's pre-policy characteristics. We calculate the expected change in interchange fees as:

$$\widetilde{\Delta \tau_j} = r_{z(j)} \times d_j \times \left(\tau^{\text{Reg Debit,Post}}(t_j) - \tau^{\text{Debit,Pre}}(t_j) \right)$$

Here, $r_{z(j)}$ is the share of debit cards in merchant j's zip code that are subject to Durbin regulation; d_j is the share of the merchant's card sales made with debit cards in the pre-Durbin period; and t_j is the merchant's average transaction size in the pre-Durbin period. The term $\tau^{\text{RegDebit,Post}}(t_j)$ is the expected interchange rate under the post-Durbin regulated debit fee schedule, given transaction size t_j, and $\tau^{\text{Debit,Pre}}(t_j)$ is the expected rate under the pre-Durbin fee schedule for the same t_j. This instrument captures the theoretical savings for a merchant, assuming no change in transaction size or payment composition after the policy. It exploits

heterogeneity in both the expected share of regulated debit transactions and the change in regulated-debit interchange fees.

We report results for the one-year change in sales in columns (1)-(2) of Table 5. Column (1) presents OLS estimates, while column (2) presents our IV estimates. The OLS results indicate that a one-percentage-point increase in average interchange fees leads to approximately a 10.6% decrease in sales. However, as discussed previously there are many reasons why increases in interchange rates are mechanically associated with lower sales. Column (2) then presents IV estimates that a one-percentage-point increase in average interchange fees causes a 6.3% decrease in sales. Columns (3) and (4) show that these effects are larger in the long run. Assuming full pass-through of interchange fees to prices, these estimates imply a demand elasticity of around 8. This elasticity is high relative to the elasticity of around 5 found in Sullivan (2024)'s study of restaurants using detailed transaction data. However, the elasticities are comparable Edmond et al. (2022) macro calibration of markups.

This decline in sales could reflect either a price increase and/or a decline in product quality (e.g., a rise in the quality-adjusted price). Although we do not observe the prices set by the restaurants, we do observe average transaction sizes as a proxy of price. Average transaction size is a potential proxy for price if consumers respond to higher restaurant prices by going to a restaurant less often while ordering the same dishes for any given trip. Column (5) shows that increases in interchange are strong negative predictors of average transaction size. This reflects the mechanical negative correlation between transaction size and interchange rates that arises when interchange fees have fixed components that do not scale with the transaction size. Column (6) shows that our IV estimate instead finds that a one percentage point increase in interchange causes a roughly one-percent increase in prices. Column (8) finds a similar pass-through at the 2 year horizon. The one-for-one passthrough of costs in this setting is consistent with findings in Amiti et al. (2019) that small firms tend to pass through costs one-for-one to prices.

To rule out the possibility that merchants are merely steering customers toward card payments by imposing cash-discounts or surcharges, we re-estimate our Durbin-Amendment effects using only the ten states that prohibit any form of card surcharging (Table A1).[11] If payment-method steering were driving the sales responses, we would expect these effects to dissipate where surcharges are illegal. Instead, the instrumented estimates in this no-surcharge subsample remain virtually unchanged—and statistically indistinguishable—from our full-sample results. This persistence demonstrates that the increase in card sales following lower interchange fees cannot be attributed to merchants manipulating payment choices, but rather reflects genuine adjustments to posted prices that apply to all customers.

[11] These states are California, Colorado, Connecticut,Florida, Kansas, Massachusetts, Maine, New York, Oklahoma, and Texas.

5 The Redistributive Effects of Interchange Fees Across Consumers

In the previous section, we show that payment methods and fees vary across merchants and consumer demographics, ultimately impacting firms' costs and prices. In this section, we develop a simple quantitative framework that incorporates these facts to evaluate the welfare consequences of changes in interchange fees. Our approach takes as inputs the variation in both the composition and cost of payments across merchants and computes the welfare effects of changes in interchange fees when merchants can adjust retail prices in response to interchange fees and consumers can re-optimize consumption decisions in response to retail prices and rewards. The framework captures the key insight that redistribution occurs only when consumers using different payment methods shop at the same set of merchants, and that the amount of redistribution depends on the heterogeneous fees charged to individual merchants. We then use this framework to quantify the extent of redistribution generated by the payment system, how sorting across merchants mitigates this redistribution, and how within payment-type variation in interchange fees affects consumer welfare.

5.1 Theoretical Framework

We develop a sufficient-statistics framework to quantify the redistributive effects of interchange fees across consumers. Our approach links variation in payment composition across merchants to consumer welfare impacts that operate through retail price changes and rewards.

5.1.1 Modeling Interchange Fees

We model interchange fees as linear fees that depend on the card type and merchant. There are $j = 1, \ldots, J$ merchants in the economy, split into a set of sectors S. Merchant j is in sector s_j, and let b_j be an indicator equal to 1 if merchant j has a negotiated interchange rate. Motivated by our analysis from Section 3 and public interchange schedules, the interchange fee τ_{jk} charged to merchant j for transactions made with card $k = 0, 1, \ldots, K$ is written as:

$$\tau_{jk} = \overline{\tau}_k + \tau_{s_j k} + b_j \delta_k \tag{3}$$

where $\overline{\tau}_k$ is a baseline fee for card k, $\tau_{s_j k}$ is a sector-specific adjustment, and $\delta_k < 0$ is a discount negotiated by firms with bargaining power. We let $k = 0$ denote cash. Without any loss in generality, we normalize the sector adjustments τ_{sk} so that the total dollar weighted value of the sector level adjustments is zero for card k.

5.1.2 Retail Pricing

Merchant j sets a uniform price p_j for all consumers. We denote q^*_{jk} as the equilibrium amount that consumers with card k purchase from merchant j. Total equilibrium sales by merchant j are $Q^*_j = \sum_k q^*_{jk}$. We assume merchant prices are log-linear in interchange fees, given by:

$$\log p_j = \log \overline{p}_j + \sum_k \mu_{jk} \tau_{jk}, \tag{4}$$

where $\mu_{jk} = q^*_{jk}/Q^*_j$ represents the share of merchant j's sales from consumers using card k, and $\overline{p}$ is a baseline price that reflects the merchant's marginal costs. This linear relationship is a first-order approximation if merchants are monopolistically competitive and consumers have CES preferences over merchants. It also holds under logit demand when the number of firms is large and when the markup is small relative to the marginal cost. Importantly, this pricing assumption is also consistent with our findings from Section 4, where we find that a one percent point increase in the interchange rate causes a one percentage point increase in prices.

5.1.3 Rewards

Networks pay consumers lump-sum rewards that equal average interchange fees collected from merchants, less average costs. We interpret rewards broadly, as any kind of subsidy consumers might receive for card use. For example, high debit card interchange fees may not fund cash back rewards, but they can fund free checking accounts (Kay et al., 2018; Mukharlyamov and Sarin, 2025). Denote merchant j's equilibrium revenue by $R^*_j = p_j Q^*_j$, normalized so that $\sum_j R^*_j = 1$. Since revenues add up to 1, R_j also defines a measure on the set of firms. This allows us to express revenue-weighted sums as expectations of the summand. Thus the per-capita reward for users of card k, denoted f_k, equals average interchange fees collected on card k, net of some cost:

$$\begin{aligned} f_k &= \frac{\sum_j p_j q^*_{jk} (\tau_{jk} - c_k)}{\sum_m p_m q^*_{mk}} \\ &= \mathbb{E}_R [\mu_{jk}]^{-1} \mathbb{E}_R [\mu_{jk} (\tau_{jk} - c_k)] \end{aligned}$$

5.1.4 Consumer Welfare

Consumers with card k choose quantities q_{jk} across merchants to maximize a differentiable, strictly monotonic, and strictly quasi-concave utility function U subject to a budget constraint.

$$q_k^* = \underset{q_k}{\operatorname{argmax}}\, U_k\left(q_{1k}, \ldots, q_{Nk}\right)$$
$$\text{s.t.} \sum_j q_{jk} p_j \leq 1 + f_k$$

where the budget constraint reflects available income plus rewards.[12]

Our framework allows for rich heterogeneity in how consumption preferences differ across consumers with different payment preferences. For instance, premium card users may prefer luxury retailers, while debit users may prefer mass-market stores. The framework also allows for premium credit card users to have different demand elasticities and substitution patterns compared to debit card consumers.

The regularity assumptions ensure a unique interior optimal choice of consumption for every price vector p, and thus we can use Roy's identity to study the welfare effects of changes in interchange rates. Denote $V_k\left(p, f_k\right)$ as the indirect utility function from this consumer problem, and let λ_k be the Lagrange multiplier on the budget constraint. By Roy's identity, we have that

$$\frac{\partial V_k}{\partial p_j} = -q_{jk}^* \times \lambda_k$$

where q_{jk}^* reflects consumption at the optimum. Roy's identity captures the insight that even though interchange fees can affect how consumers allocate their consumption across merchants, this margin of adjustment does not have any direct effects on consumer welfare.

We are interested in how changes in interchange fees affect consumer welfare. Let x_l be any parameter that affects the fees on payment method l. We would like to compute the money-metric effect of changing x_l on the welfare of consumers who use payment method k. By applying Roy's identity and dropping all higher order terms in τ, we obtain

$$\begin{aligned}
\frac{1}{\lambda_k}\frac{dV_k}{dx_l} &= \sum_j -q_{jk}^* \frac{\partial p_j}{\partial x_l} + \frac{\partial f_k}{\partial x_l} \\
&= \sum_j -q_{jk}^* p_j \left(\mu_{jl}\frac{\partial \tau_{jl}}{\partial x_l} + \frac{\partial \mu_{jl}}{\partial x_l}\tau_{jl}\right) + \frac{\partial f_k}{\partial x_l} \\
&\approx \mathbb{E}_R\left[\mu_{jk}\right]^{-1}\left(-\mathbb{E}_R\left[\mu_{jk}\mu_{jl}\frac{\partial \tau_{jl}}{\partial x_l}\right] + I\left\{k = l\right\} \times \mathbb{E}_R\left[\mu_{jk}\frac{\partial \tau_{jk}}{\partial x_k}\right]\right) \qquad (5)
\end{aligned}$$

The above expression captures the money-metric effect on a representative consumer of payment method k. To convert to dollar values, we multiply equation 5 by $\mathbb{E}_R\left[\mu_{jk}\right]$, the total

[12] Our assumptions rule out utility functions that treat goods as perfect substitutes, but are compatible with nested CES and random-coefficients logit.

amount of spending by payment method k consumers and the dollar amount of spending across all payment methods.

5.1.5 Applying the Sufficient Statistic to Changes in the Interchange Fee Schedule

Our sufficient statistic provides intuition on the effects of changing the overall level of fees and reducing fee heterogeneity.

Baseline Fees We model changing the baseline fee by perturbing $\overline{\tau}_l$. Because $\frac{\partial \tau_{jl}}{\partial \overline{\tau}_l} = 1$, the re-distributive effect of reducing the baseline interchange level by Δ in dollar terms for all consumers who use payment method k is:

$$\Delta \times \left(\mathbb{E}_R \left[\mu_{jk} \mu_{jl} \right] - I \left\{ k = l \right\} \mathbb{E}_R \left[\mu_{jk} \right] \right) \tag{6}$$

This first term of the formula says that a decrease in the overall fees on card l benefits consumers of card k by lowering retail prices by the extent to which card k and card l consumers overlap. The second term then says that card l consumers are hurt from lowering fees on card l because they receive fewer rewards.

The appearance of second moments makes the framework rich enough to nest leading cases in the literature. When consumers with different cards shop at disjoint sets of merchants, as in Gans (2018), $\mu_{jk}\mu_{jl} = 0$ for all j whenever $k \neq l$ and there is no redistribution. Conversely, when merchants are homogeneous, so that $\mu_{jk} = \overline{\mu}_k$ for all merchants j, the redistribution depends on the aggregate share of each card type, consistent with the intuition in Felt et al. (2023). To the extent that there is a large mass of cash-only merchants that are both unobserved in our dataset and not well captured in the GDP statistics, the second moments are zero and thus ignoring them has no effect on our estimates of redistribution. Thus, the sufficient-statistics framework captures a wide range of economic environments—from perfect merchant homogeneity to full segmentation—allowing us to quantify redistribution in the presence of observed heterogeneity in payment behavior.

Sector Discounts We model eliminating the sector discounts by perturbing τ_{rl}. The dollar effect of removing all of the sector level discounts on card l is:

$$\begin{aligned} \sum_r \tau_{rl} \times \frac{\partial V_k}{\partial \tau_{rl}} &= \sum_r \mathbb{E}_R \left[\mu_{jk} \mu_{jl} I \left\{ s_j = r \right\} \right] \tau_{rl} - I \left\{ k = l \right\} \mathbb{E}_R \left[\mu_{jk} \tau_{rk} \right] \\ &= \sum_r \mathbb{E}_R \left[\mu_{jk} \mu_{jl} | s_j = r \right] P_R \left(s_j = r \right) \tau_{rl} \end{aligned} \tag{7}$$

where the $\mu_{jk}\tau_{rk}$ terms sum to zero from the normalization of the sector level discounts in Equation 3.

This formula says that the sector weighted discounts are transmitted sector-by-sector according to how much consumers overlap in each sector. Intuitively, if debit card and credit card consumers overlap more in groceries than in travel, then a discount for groceries and a higher fee for travel benefits debit card users at the cost of credit card users.

Negotiated Rates We model bargaining by simultaneously removing the bargaining parameter δ_l while increasing the baseline fee $\overline{\tau}_l$ so as to maintain the same overall level of fees on card l. In effect, we model a removal of price discrimination along the firm size dimension. The dollar effect of eliminating δ_l while increasing $\overline{\tau}_l$ to compensate is:

$$\begin{aligned} &-\delta_l \times \left(\frac{\partial V_k}{\partial \delta_l} - \frac{\partial V_k}{\partial \overline{\tau}_l} \times \frac{\mathbb{E}_R\left[\mu_{jl} b_j\right]}{\mathbb{E}_R\left[\mu_{jl}\right]} \right) \\ =&\delta_l P_R\left(b_j\right) \left(\mathbb{E}_R\left[\mu_{jk}\mu_{jl} | b_j = 1\right] - \mathbb{E}_R\left[\mu_{jk}\mu_{jl}\right] \times \frac{\mathbb{E}_R\left[\mu_{jl} | b_j = 1\right]}{\mathbb{E}_R\left[\mu_{jl}\right]} \right) \end{aligned} \tag{8}$$

This formula predicts that debit card users benefit from the discounts that large merchants receive on credit card interchange provided that debit and credit card users overlap more at the merchants that receive discounts than at the merchants that do not. To see this, consider the case when bargaining and non-bargaining firms have the same average use of payment method l, so that $\frac{\mathbb{E}_R\left[\mu_{jl}|b_j=1\right]}{\mathbb{E}_R\left[\mu_{jl}\right]} = 1$. Then if $\delta_l < 0$, consumers on card k benefit from the discount (i.e. are hurt if the discount is removed) provided that $\mathbb{E}_R\left[\mu_{jk}\mu_{jl}|b_j = 1\right] > \mathbb{E}_R\left[\mu_{jk}\mu_{jl}|b_j = 0\right]$. This condition holds if k users overlap more with l users at the large stores with discounted interchange than at the small stores that do not have discounted interchange. Because large merchants have a consumer base that covers consumers with different income levels, this condition will generally be satisfied, highlighting a progressive role for negotiated rates.

5.1.6 Comments on the Sufficient Statistic

The sufficient statistic formula 5 shows that the redistributive effects of interchange fees can be summarized by the distribution of of payment shares μ across merchants provided two conditions hold: full merchant passthrough to retail prices and full issuer passthrough to rewards.

The sufficient statistic is valid even when consumers are allowed to re-optimize their consumption in response to retail prices or consumer rewards. One intuitive way of evaluating the effects of reducing interchange fees would be to conduct an accounting exercise in which one adjusts retail prices at each store according to the weighted change in interchange fees, and then take the expenditure share-weighted sum of these price changes to compute welfare. The formula in equation 5 provides a numerically convenient way of doing this exercise. One concern with such an exercise is that it omits the result of consumers responding to the change in retail prices by changing their shopping behavior. The envelope theorem and Roy's identity highlight that such concerns are second order in the change in interchange fees τ.

The validity of the sufficient statistic does not depend on any particular value of merchant demand elasticity. The essential ingredient comes from the passthrough of interchange fees to retail prices. The best empirical evidence that suggests interchange fees should be largely passed through comes from Amiti et al. (2019), who show that sector-level cost shocks are fully passed through, whereas idiosyncratic cost shocks are only passed through incompletely at large firms. Given that interchange fees affect the cost of all merchants, the usual evidence of incomplete passthrough that typically applies to one firm at a time does not apply to the effects of interchange.

Although the framework treats rewards as being paid out as a lump-sum, this is not essential to the argument. If rewards were paid out for specific merchants or sectors, then taking away rewards would change consumers' allocation of spending across merchants. But by Roy's identity, the re-optimization across merchants is second-order for welfare. Only the income effect while holding fixed consumers' consumption decisions is directly relevant.

5.2 Counterfactual: Quantifying Redistribution

We utilize our general formulas to examine the welfare effects of setting interchange fees to zero, enabling us to understand the distributional impact of interchange fees across different consumer payment types. We apply our framework to a cross-section of sales and interchange fees by card type in 2022. To implement our sufficient statistics framework, we simply need to know, at the merchant level, equilibrium payment shares and the corresponding interchange fees, both of which are directly observable in our data.

5.2.1 Eliminating Interchange Fees and Card Rewards

Eliminating interchange fees and card rewards has two equal and opposite effects on consumers as a whole. On one hand, when interchange fees are set to zero, consumers no longer receive rewards when they pay with debit or credit cards. On the other hand, eliminating interchange fees reduces merchants' transaction costs, which leads to lower prices, benefiting all consumers. Although these effects offset each other in the aggregate, they have large distributional effects. Consumers who use high-reward, and therefore high-interchange credit cards, are worse off, whereas consumers who use low-fee payment methods like cash and regulated debit cards are better off. Moreover, the consumers who use low-fee payment methods at stores that primarily serve other consumers that use high-fee payment methods experience the largest benefits.

We compute the consumer welfare effects of setting interchange fees to zero after accounting for consumer sorting and merchant fee heterogeneity in Table 6. We calculate effects measured both as a percentage of each consumer group's baseline expenditures as well as in terms of overall dollars when the total expenditures across all consumers are scaled up to around $\$12$ trillion. On average, cash-using consumers would be better off by 88 basis points of baseline

consumption. Across all cash users, this amounts to approximately $17.1 billion in additional annual consumption. Cash users benefit purely because the decline in interchange fees lowers effective prices, and they are not hurt by the loss of rewards, since they never received them in the first place.

Even though much of the literature focuses on transfers between card and cash users, regulated debit card users also benefit substantially from capping interchange fees. For this group, average consumer surplus would increase by 40 basis points, corresponding to approximately $10.8 billion in additional annual consumption. Although these users lose out on modest card rewards, the associated price reductions more than offset the loss. This is because rewards tied to regulated debit cards are relatively small, especially compared to those from credit cards, and credit card usage is more prevalent. As a result, setting interchange fees to zero yields a significant decline in average prices relative to the value of regulated debit card rewards. These findings indicate that it is not only cash users who subsidize credit card rewards. Regulated debit card users, who face lower fees and receive lower rewards, also contribute to this subsidy.

Whereas cash and regulated debit card users benefit from reductions in interchange fees, both basic and premium credit card users are hurt by the reduction in interchange fees. This is because they are disproportionately hurt by the reduction in rewards while receiving only modest benefits from the reduction in retail prices. On net, basic and premium credit card users lose 52 and 61 bps of consumption, respectively, amounting to $10.2 and $17.7 billion, respectively.

It is helpful to put these changes in consumption in perspective. One natural benchmark is the sales tax, which serves as a tax on consumption. As of 2024, the average state sales tax rate in the U.S. was 6%.[13] Our results suggest that the cross-subsidization between cash and credit card users is equivalent to cash users effectively paying a 28 percent higher sales tax than premium credit card users. The numbers also imply that credit card users receive around $30 billion in aggregate from cash and debit card users. These annual transfers are large relative to the outlays of many government social insurance programs, such as SNAP benefits ($120 billion), EITC ($57 billion), and regular unemployment insurance ($40 billion). The transfers here are also large relative to other transfers in consumer financial markets, such as the inter-regional transfer due to the GSE's lack of risk-based pricing ($15 billion), consumers' losses from high-fee index funds ($20 billion), and consumer losses from shrouded credit card fees ($10 billion) (Agarwal et al., 2015; Hurst et al., 2016).

These results also shed light on who receives rewards and who "pays" for those rewards. The orange squares in Figure 15 display the share of total card rewards received by regulated and exempt debit card users and basic and premium credit card users. The share of rewards received reflects both card usage and associated reward levels. The results indicate that premium credit card users capture the largest share of total rewards at 43%. In comparison, basic

[13] https://taxfoundation.org/data/all/state/sales-tax-revenue-reliance-breadth/

credit card users receive 25%, and exempt and regulated debit card users receive 13% and 18%, respectively.

The green circles in Figure 15 display the share of interchange costs borne by cash, debit, and credit card users. The results indicate that cash users pay for 15% of interchange fees and thus implicitly pay for 15% of card rewards, representing a transfer from cash users to card users. In contrast, regulated debit and premium credit card users pay for 24% and 28%, respectively, of rewards programs.

Comparing the vertical distance between the share of rewards received and the share of interchange fees paid highlights the extent of cross-subsidization. For example, premium credit card users receive 43% of rewards but pay only 28% of total interchange fees. This 15 percentage point gap represents a transfer from consumers using other payment methods to premium credit card users. Conversely, regulated debit users receive 13% of rewards but pay 24% of interchange fees. This implies that regulated debit cards substantially subsidize the rewards programs associated with more expensive payment methods such as credit cards. While the literature and policymakers have often emphasized that cash users subsidize rewards programs, our findings suggest that debit users, particularly regulated debit card users, play a quantitatively important role in subsidizing credit card rewards.

5.2.2 Implications of Merchant Heterogeneity

Our sufficient statistics framework shows that the sorting of consumers with different payment preferences across merchants, along with fee heterogeneity across merchants shapes the impact of interchange fees on consumers. We find that accounting for merchant heterogeneity has important implications for two reasons. First, as documented in Section 3, we find evidence of consumer sorting: cash, debit card, and credit card users tend to shop at different merchants, which limits cross-subsidization. Second, the merchants frequented by all consumer types, where the potential for redistribution is the greatest, tend to pay the lowest interchange fees, which inherently restricts redistribution.

To evaluate the relative importance of these channels, it is useful to compare our model's results to a counterfactual model that instead assumes all merchants serve the same mix of consumers, and that all cards of a given card type charge all merchants the same fee. The second row of Table 6 shows the results under these two assumptions about merchant homogeneity. If all merchants were homogeneous, the gains to cash users and regulated debit card users from setting interchange fees to zero would be substantially higher. Consumer surplus among cash users would increase by 117 basis points (approximately $22.6 billion). Similarly, surplus among premium credit card users would decrease by -94 basis points (roughly $22.6 billion). In a world of homogenous merchants, the losses for premium card users would be $9.7 larger , and the gains for cash users would be $5.5 billion larger.

Consumer sorting explains most of the difference between our baseline results and the

homogeneous-merchant counterfactual. Specifically, merchant heterogeneity, arising from both consumer sorting and interchange fee variation, reduces credit card (basic and premium) surplus by roughly $9 billion relative to the homogeneous world. Of this, about $8 billion is explained by consumer sorting: because cardholders disproportionately shop at card-accepting merchants, they effectively fund a large share of their own rewards through higher prices. The remaining $1 billion comes from interchange fee heterogeneity: merchants where cash, debit, and credit card users all shop—and where redistribution could be greatest—tend to pay lower interchange fees, further limiting redistribution.

Merchant heterogeneity, therefore, has important implications for who pays for rewards. The purple triangles in Figure 15 show the share of card interchange fees paid by each user group if all merchants were homogeneous. This figure illustrates that cross-subsidization would be substantially larger in a setting without merchant heterogeneity. For example, premium credit card users would still receive 43% of rewards, but they would pay for only 22% of them. In other words, the degree of cross-subsidization for credit card rewards would be much greater if there were no consumer sorting across merchants (i.e., if all merchants were homogeneous).

The results indicate that premium credit card users would effectively receive 48% (=(43%-22%)/43%) of their rewards for free if merchants were homogeneous. However, due to consumer sorting across merchants by payment method, premium credit card users currently receive only 34% (=(43%-28%)/43%) of their rewards for free. Thus, ignoring merchant heterogeneity overstates the degree of cross-subsidization by around one-half. This highlights the crucial role that consumer sorting and variation in interchange rates play in reducing the extent of redistribution across payment types.

5.2.3 Redistribution by Income

We also examine how the redistributive effects of interchange fees and rewards programs vary across household income levels. In Section 5.2.1, we showed how much consumers with different payment preferences (e.g., debit or credit) gain or lose from capping interchange fees, expressed as a share of their baseline consumption. To translate these results into distributional effects by income, we combine them with the evidence in Figure 7 on how payment preferences vary with income. At each income level, we calculate the net effect as a weighted average of the consumption impacts across payment types, using as weights the market shares of each payment method among households at that income level. We then map these effects to dollar transfers by assuming consumers of all income levels have the same proportion of purchases to income, and by scaling up total purchases to $\$12$ trillion.

We find that capping interchange would generate a large progressive transfer from households with incomes greater than $\$150,000$ to those with incomes below that level. Figure 16a shows that the highest income households lose around 30 basis points of consumption because they have the highest levels of credit card use. As a result, they would be hurt by the decline

in rewards more than they would benefit from lower retail prices. In contrast, the effect is reversed for lower income households who are more likely to use cash and debit cards. In dollar terms, this is a transfer of around $\$500$ per year from households with incomes above $\$150,000$ per year to fund transfers of around $\$100$ to households with incomes below that cutoff. Cumulatively, the high income households lose around $\$10$ billion from a cap on interchange fees, whereas the low-income households gain around hte same amount.

5.2.4 Effects of the Durbin Amendment

Our framework also sheds light on the redistributive impact of the Durbin Amendment. The Durbin Amendment was designed to limit interchange fees on debit card transactions. Table 7 presents an estimate of the effects of this regulation. The results indicate, unsurprisingly, that regulated debit card users were hurt by the regulation, with their surplus decreasing by 37 basis points of consumption ($9.9 billion). Intuitively, high debit interchange funded free checking accounts for such consumers, and these perks went away after the regulation (Mukharlyamov and Sarin, 2025). While debit card users were hurt, credit card users benefitted substantially, with their surplus increasing by around $5 billion. This is because they benefited from lower retail prices while earning the same rewards. Thus, regulating interchange fees on debit cards primarily benefited credit card users.

We also examine the redistributive impact of the Durbin Amendment across household income levels. Figure 16b illustrates the effects of the Durbin Amendment. The figure shows that low-income consumers were relatively unaffected, middle-income consumers were hurt the most by the Durbin Amendment, and higher-income consumers benefitted. This pattern arises because low income consumers are likely to use both cash and debit cards. Whereas the low-income debit card users were hurt, low-income cash users benefit from lower retail prices. At the other end of the spectrum, high income households are most likely to use credit cards, and thus they benefit from the lower retail prices while their rewards are unaffected. In the end, it's the middle-income consumers that primarily uses debit cards that bore the brunt of the Durbin Amendment. Cumulatively, this transfer was around $\$1$ billion from middle-income to high-income consumers.

5.2.5 Who Pays for Premiumization?

Lastly, we examine the welfare effects of the rise in premium credit cards. As documented in Section 3 and Figure 11b, the share of premium credit cards increased from 15% in 2006 to over 60% in 2022. Since the average interchange rate on premium cards is 2.34%, compared to 1.64% for basic cards, this shift has raised total credit card interchange fees by roughly 20%.

Table 8 reports the redistributive effects of the rise in premium credit cards compared to a benchmark where there are no premium credit cards. Figure 16c displays the corresponding

redistributive impact of increased premiumization across household income levels. Unsurprisingly, premium cardholders benefit from the increase in premiumization: their surplus increases by 27 basis points of consumption (about $8 billion). By contrast, cash users, exempt debit users, regulated debit users, and basic cardholders all are hurt by the rise in premiumization. Interestingly, the largest costs accrue not to cash users, but to regulated debit and basic credit card users. These groups shop more frequently at the same merchants as premium cardholders, and therefore bear a greater share of the burden from the higher interchange fees associated with premium cards.

This finding underscores that it is not only cash users who subsidize credit card rewards; low-reward cardholders also subsidize the rewards of high-reward cardholders. Moreover, because all consumers face the same prices regardless of payment method, consumers have incentives to adopt the most expensive card offering the most generous rewards. Consequently, costly payment methods, such as premium credit cards, tend to crowd out cheaper ones, such as basic cards, helping to explain the rise of premiumization.

6 Conclusion

We show that interchange fees are not just a technical feature of the payments industry but a pervasive force shaping retail activity and redistributing consumption among consumers. First, using merchant-level data, we document substantial heterogeneity in the composition and cost of payments across stores. This heterogeneity has critical implications for merchants' costs and redistribution. We also show, using the Durbin Amendment as a natural experiment, that interchange fees matter for real outcomes: a one–percentage point decline in interchange rates causally increases card sales by about 7 percent over two years.

Finally, through a sufficient-statistics framework, we quantify the overall impact of interchange pricing, finding that interchange fees redistribute approximately $30 billion per year from cash and debit users to credit card users, with consumer sorting attenuating these transfers by about 25 percent. We also find that the heterogeneity in fees across sectors and the firm-size distribution are progressive, redistributing around $ 2 billion per year to cash and exempt debit card users. In addition, we document that two recent shifts in the industry, the Durbin Amendment and the rise of premium credit cards, have had regressive impacts. Surprisingly, and likely unintentionally, the Durbin Amendment primarily benefited credit card users.These results highlight that interchange policies affect not only banks and card networks but also prices, market competition, and the distribution of economic surplus across consumers.

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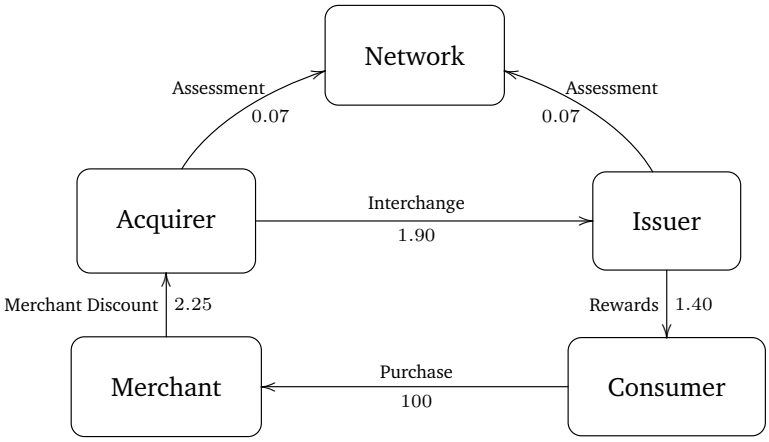
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Figures

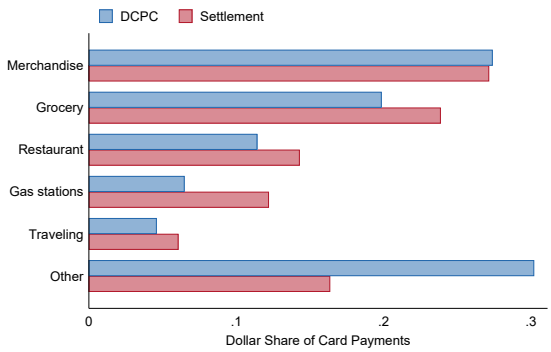
Figure 1: Illustration of payment flows in a payment network



Notes:

Figure 1 shows average fee levels for a credit card transaction in the US. Data on merchant fees comes from (Nilson, 2023b). Drechsler et al. (2025) calculate average interchange fees and rewards from regulatory data on large banks in the US. The average network fee comes from fees disclosed by acquirers as well as the annual financial statements from Visa (Visa, 2020; Helcim, 2021).

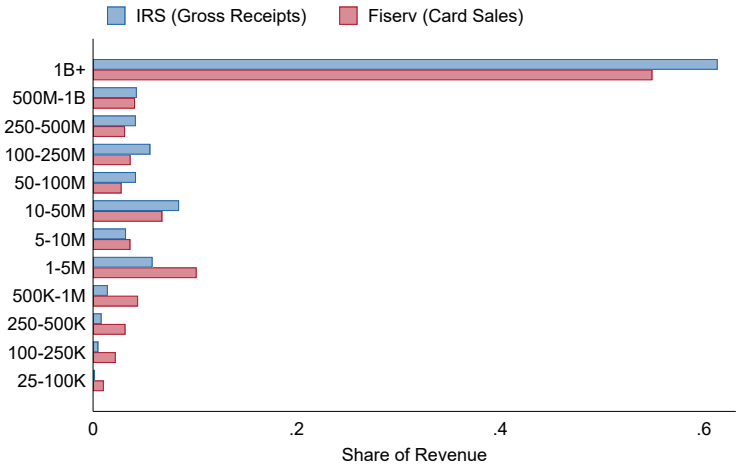
Figure 2: Data Coverage and Representativeness



(a) Sector Composition



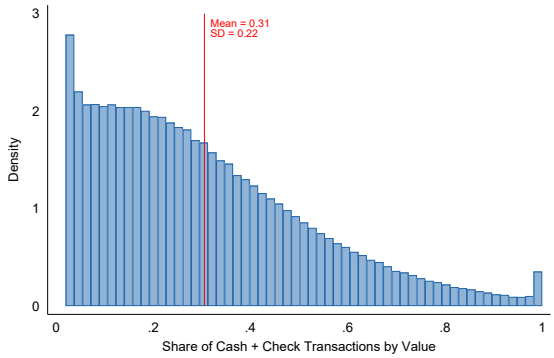
(b) Geographic Composition



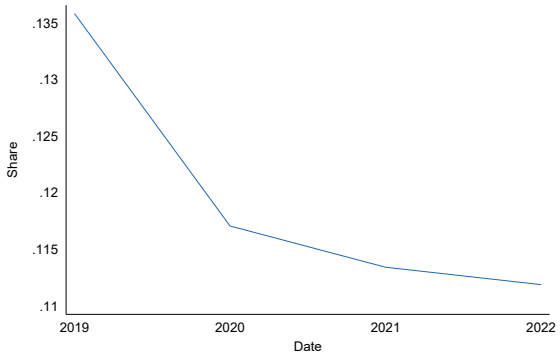
(c) Firm Size

Notes: Figure 2a shows the share (by value) of card transactions across sectors according to different datasets. DCPC refers to data from the Atlanta Fed's Diary of Consumer Payment Choice. Settlement refers to the main Fiserv card settlement data that covers both large and small merchants.
Figure 2b shows the GDP share of each state versus the share (by value) of card transactions across states in the Fiserv settlement data.
Figure 2c shows the share (by value) of transactions by merchants with different levels of revenue. The IRS measure uses the Statistics on Income to show the share of gross receipts in each firm-size category. The Fiserv measure uses the settlement data to show the share of card spending in each firm-size category.

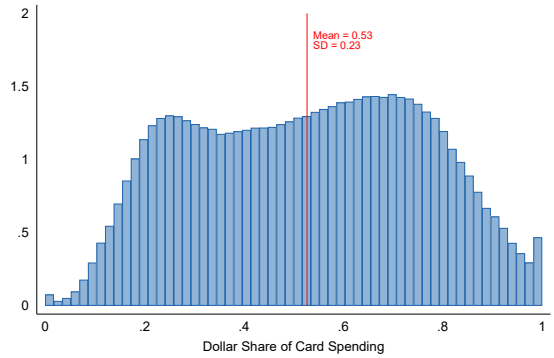
Figure 3: Heterogeneity in the Payment Mix Across Merchants



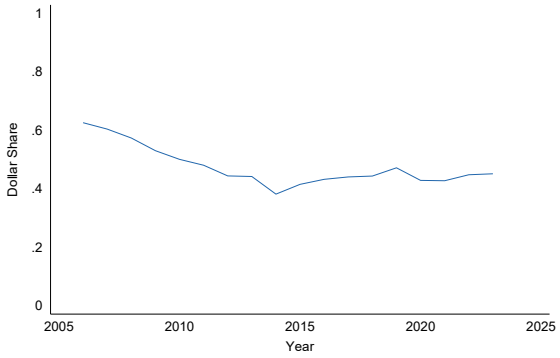
(a) Cash Share



(b) Cash Share over Time



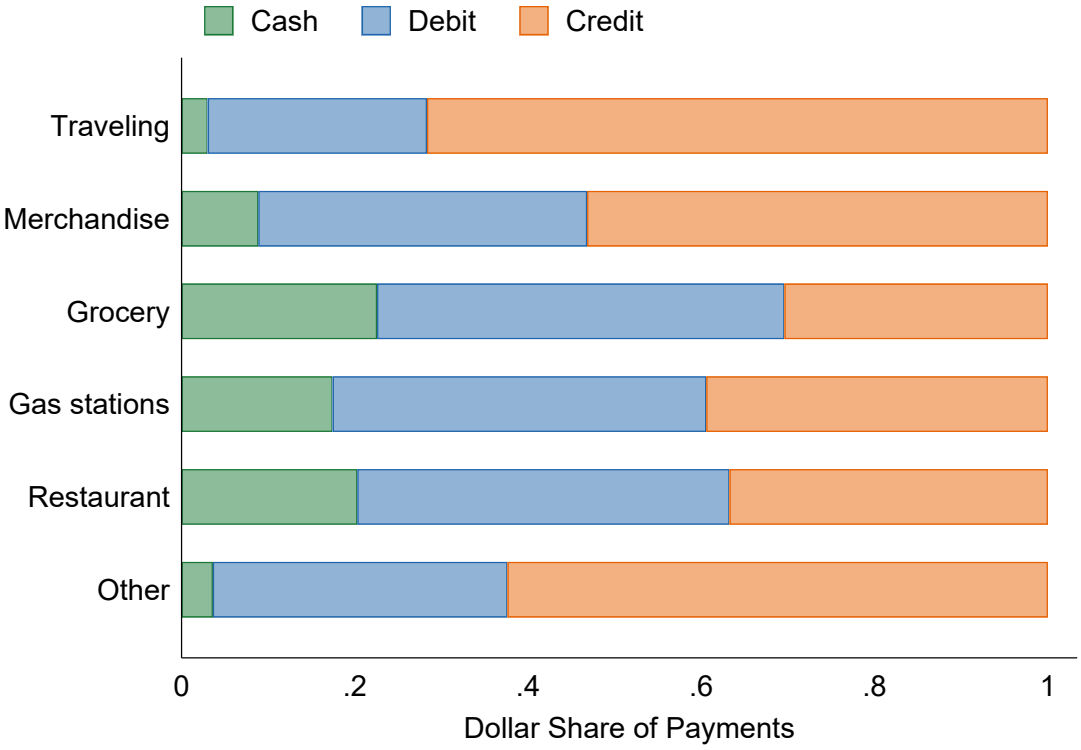
(c) Credit Card Share of Card Payments



(d) Credit Card Share over Time

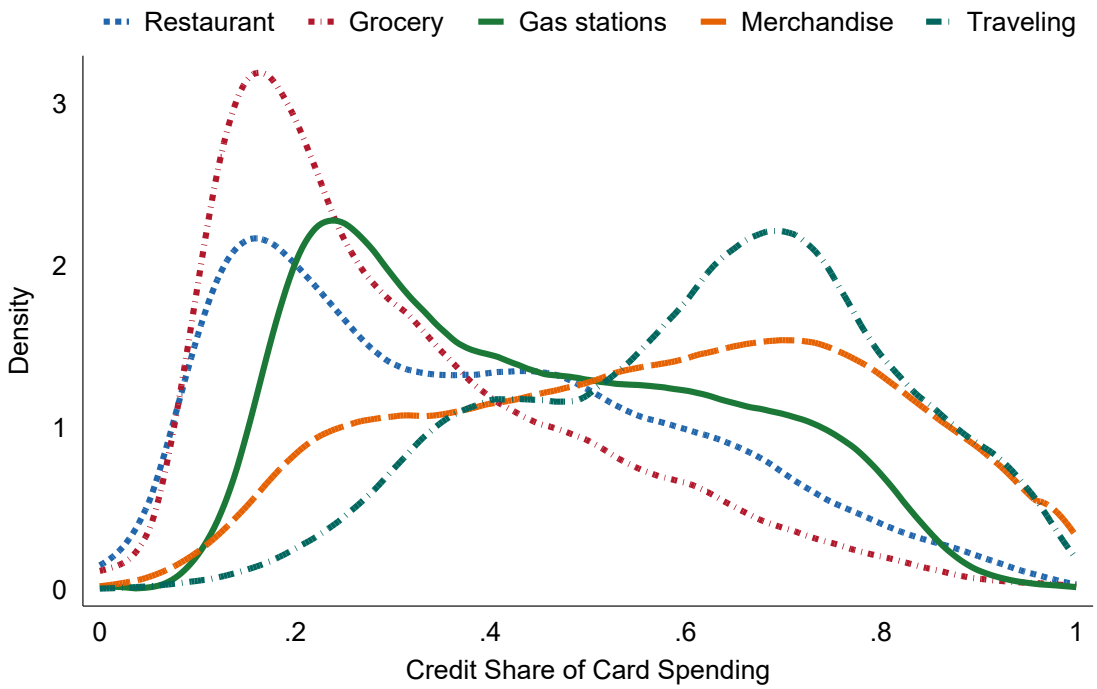
Notes: Figure 3a shows the distribution of cash and check share among merchants in the Clover data, conditional on having at least 2% of payments made via cash or check. Around two-thirds of merchant-year observations do not feature any cash transactions. Observations are at the merchant-year level and are equally weighted over the period 2019–2022.
Figure 3b displays the corresponding dollar-weighted average cash share over time, computed at the annual level.
Figure 3c shows the distribution of the dollar share of card transactions on credit cards across merchants in 2022 with more than $100,000 in annual card sales. Observations are at the merchant-year level and are equally weighted.
Figure 3d displays the corresponding dollar-weighted average credit card share of total card transactions over time. The time series excludes large firms in the merchandise and retail sector with more than $1 billion in sales to prevent the entry and exit of large merchants from the sample from influencing trends in fees.

Figure 4: Heterogeneity in the Payment Mix Across Sectors



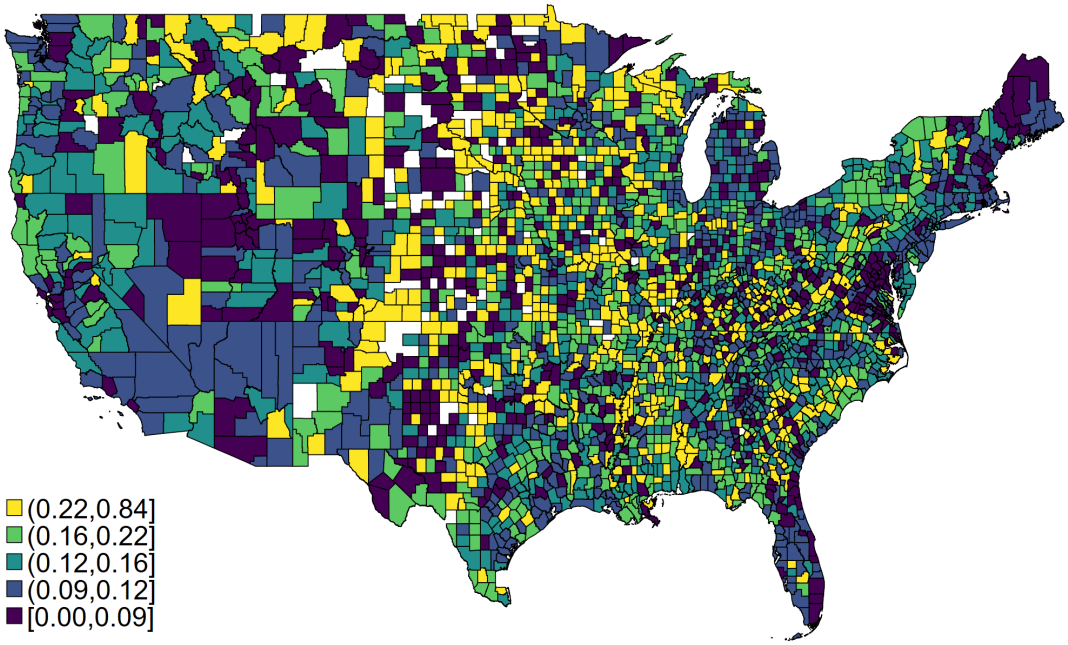
Notes: Figure 4 shows the dollar share of different types of card transactions across major merchant categories in the Clover data.

Figure 5: Variation in Composition of Card Payments Within Sectors

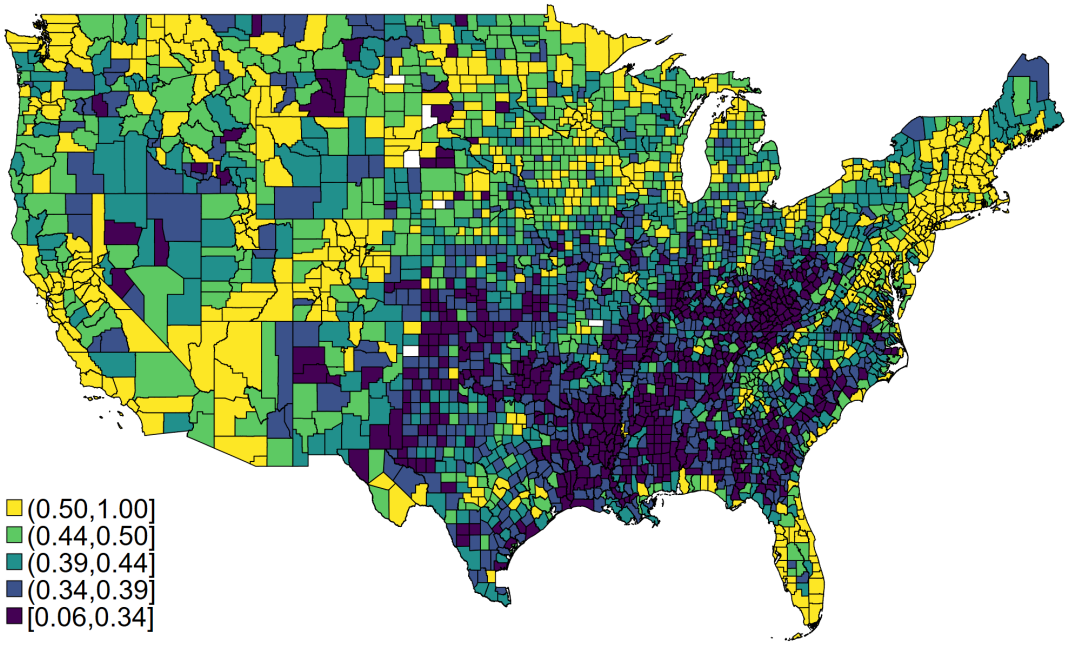


Notes: Figure 5 shows credit card transactions as a dollar share of total card transactions across firms in 2022.

Figure 6: Geographic Variation in the Payment Mix



(a) Cash Share



(b) Credit Card Share of Card Payments

Notes: Figure 6 shows the geographic distribution of cash and credit card payments. Figure 6a displays the share of all transactions conducted in cash, equally weighted across merchants in the county. Figure 6b presents the share of total card transactions made using credit cards across U.S. counties, equally weighted across merchants in the county. Lighter colors in panels (a) and (b) indicate regions with higher shares of cash and credit card payments, respectively.

Figure 7: Payment Choice and Income

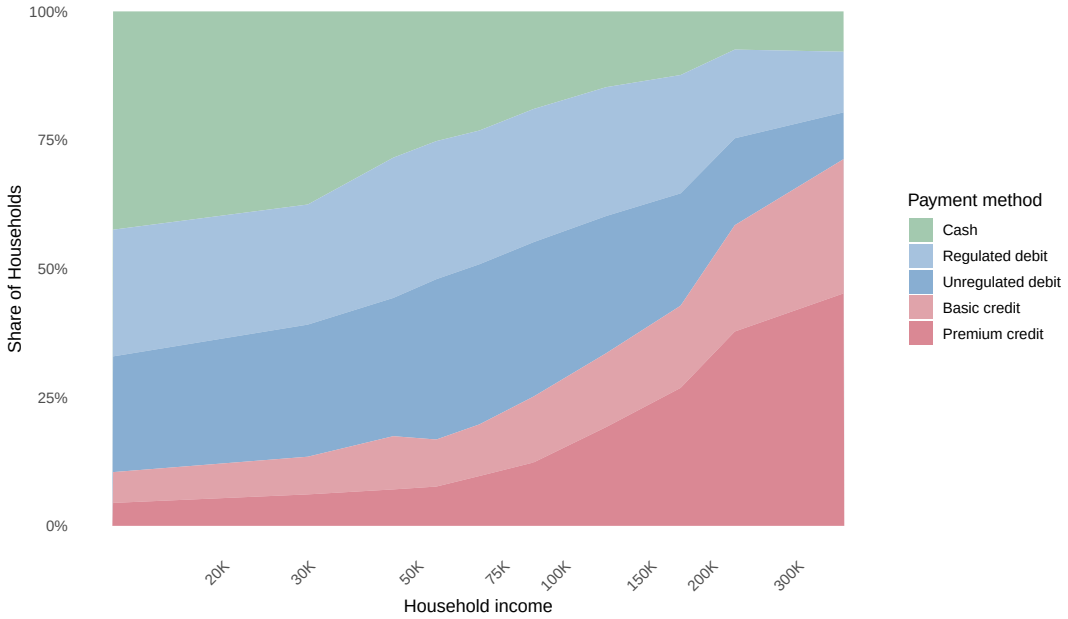
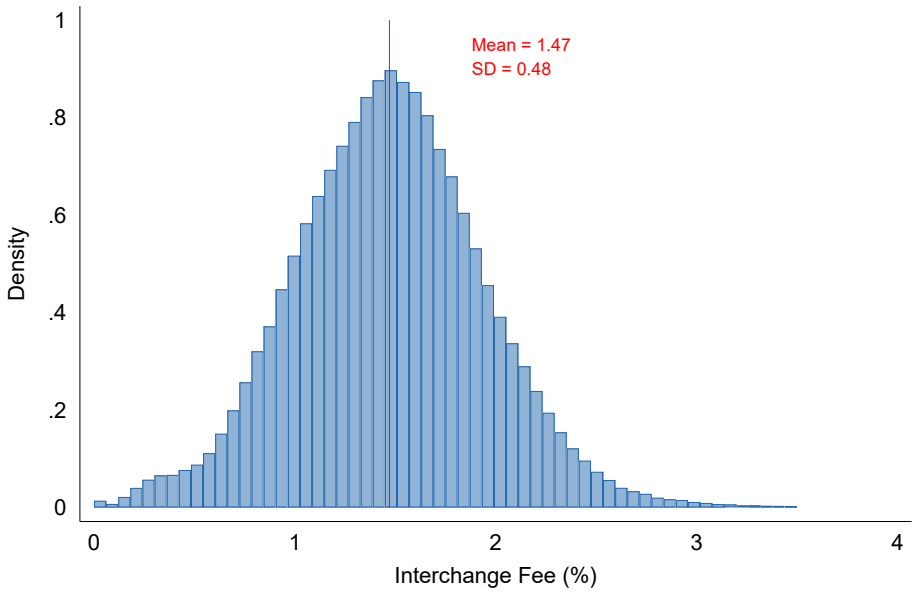


Figure 8: Preferences for Cash, Debit, and Credit by Income

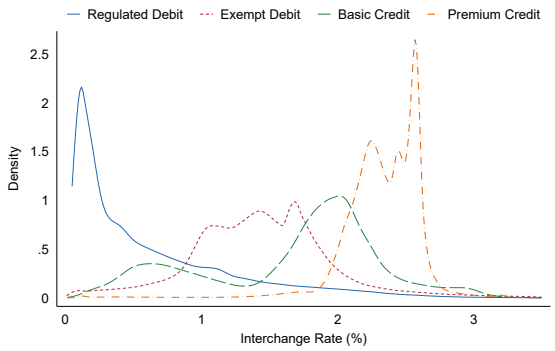
Notes: Figure 7 shows data from MRI's Ultimate Survey of Americans on consumer's primary payment methods by income. Cash respondents are those who agree with the statement "I try to pay with cash, when possible". Debit card consumers are non-cash consumers who report more monthly spending on debit cards than credit cards. Within debit cards, small bank consumers are those who report having an account at a community bank or credit union. Within credit cards, premium credit consumers are those who report owning a Visa Signature, MC world elite, or American Express card.

Figure 9: Distribution of Avg. Transaction Fees (Excluding Cash)

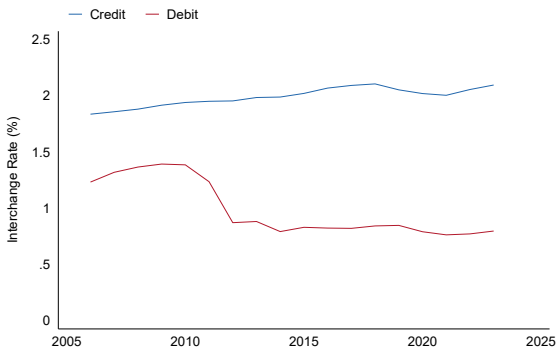


Notes: Figure 9 shows the distribution of average interchange fees across merchants. The sample covers merchants in 2022 with more than $100,000 in card sales.

Figure 10: Interchange Fees by Instrument



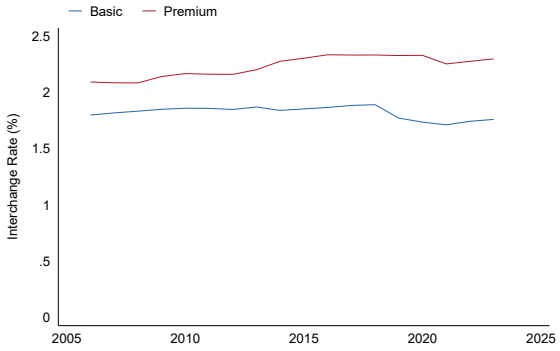
(a) Distribution of Fees by Instrument



(b) Average Debit and Credit Fees over Time



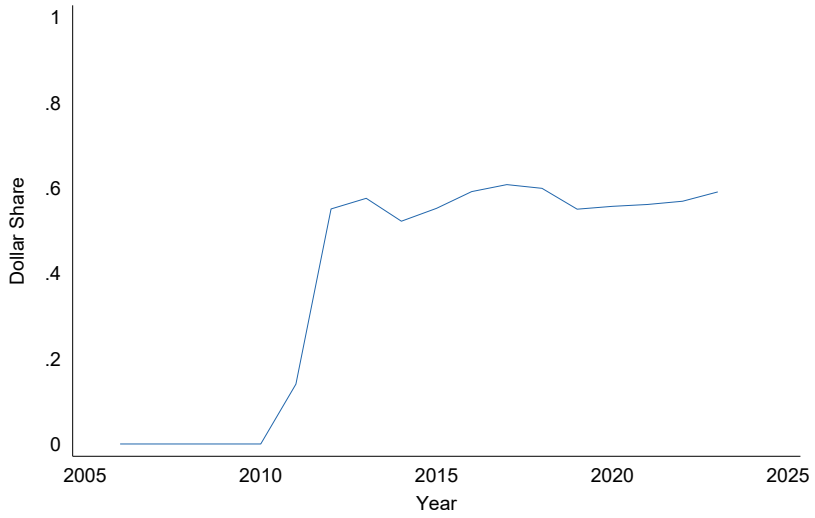
(c) Debit Card Fees over Time



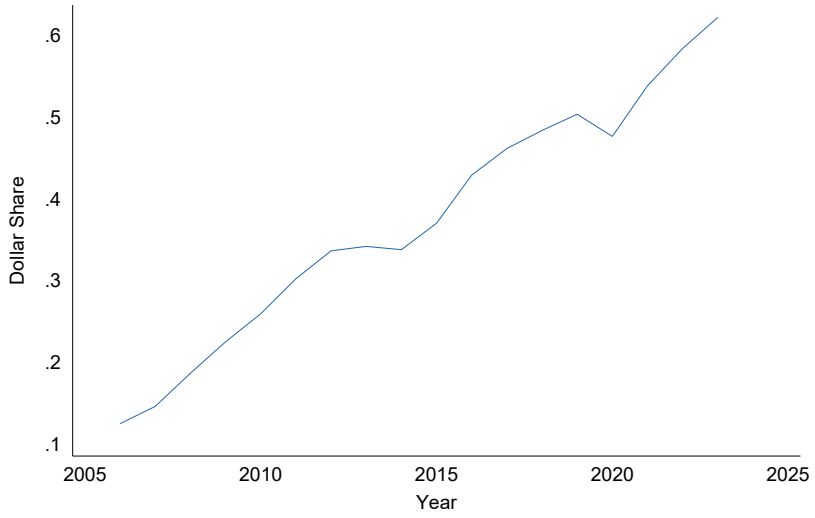
(d) Credit Card Fees over Time

Notes: Figure 10a shows kernel density plots of the average interchange fee for different payment methods across merchants with more than $100,000 in sales in 2022. The leftmost distribution is for regulated debit cards; the dotted red distribution is for exempt debit cards; the dashed green distribution is for basic credit cards; and the peaked orange distribution is for premium credit cards.
Figure 10b shows the evolution of dollar-weighted average credit- and debit-card interchange fees over time.
Figure 10c shows how dollar-weighted debit-card interchange fees vary by debit card type over time. The *Regulated* line reflects the lower interchange tier created after the 2011 Durbin Amendment.
Figure 10d shows how dollar-weighted credit-card interchange fees vary by credit card type over time; premium credit cards target transactors and earn higher interchange fees.
All time series exclude large firms in the merchandise and retail sector with more than $1 billion in sales to prevent entry and exit of large merchants from influencing fee trends.

Figure 11: Composition of Card Payments



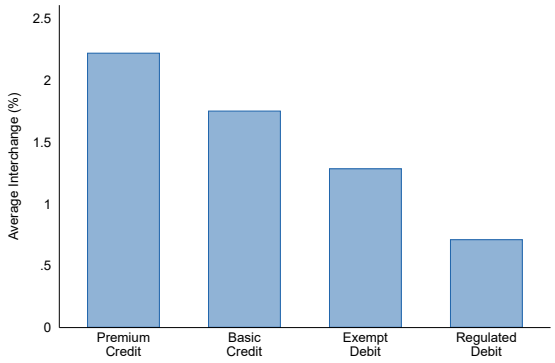
(a) Share of Debit that is Regulated



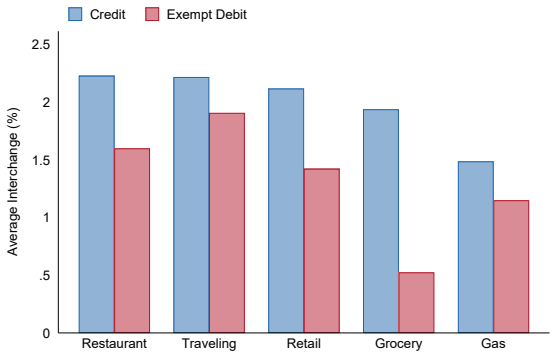
(b) Share of Credit that is Premium

Notes: Figure 11a shows the dollar-weighted share over time of debit card transactions that receive capped interchange. Figure 11b shows the dollar-weighted share over time of credit card transactions that receive premium interchange. Both time series exclude large firms in the merchandise and retail sector with more than $1 billion in sales to prevent the entry and exit of large merchants from the sample from influencing trends in fees.

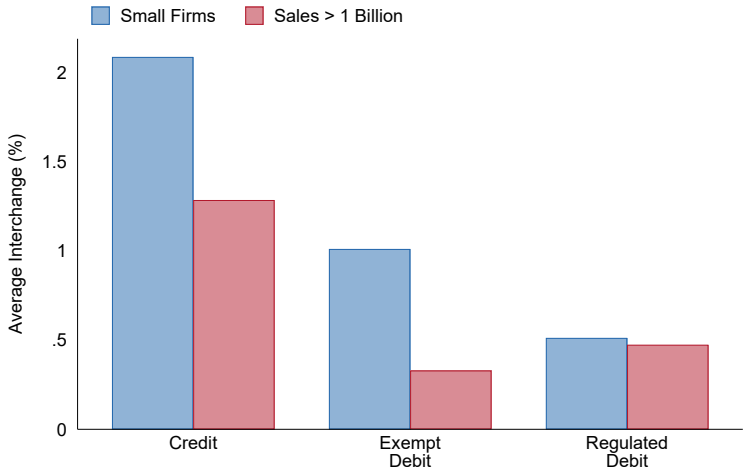
Figure 12: Variation in Interchange Fees by Card Type, Merchant Sector, and Size



(a) Interchange Fees by Card Type



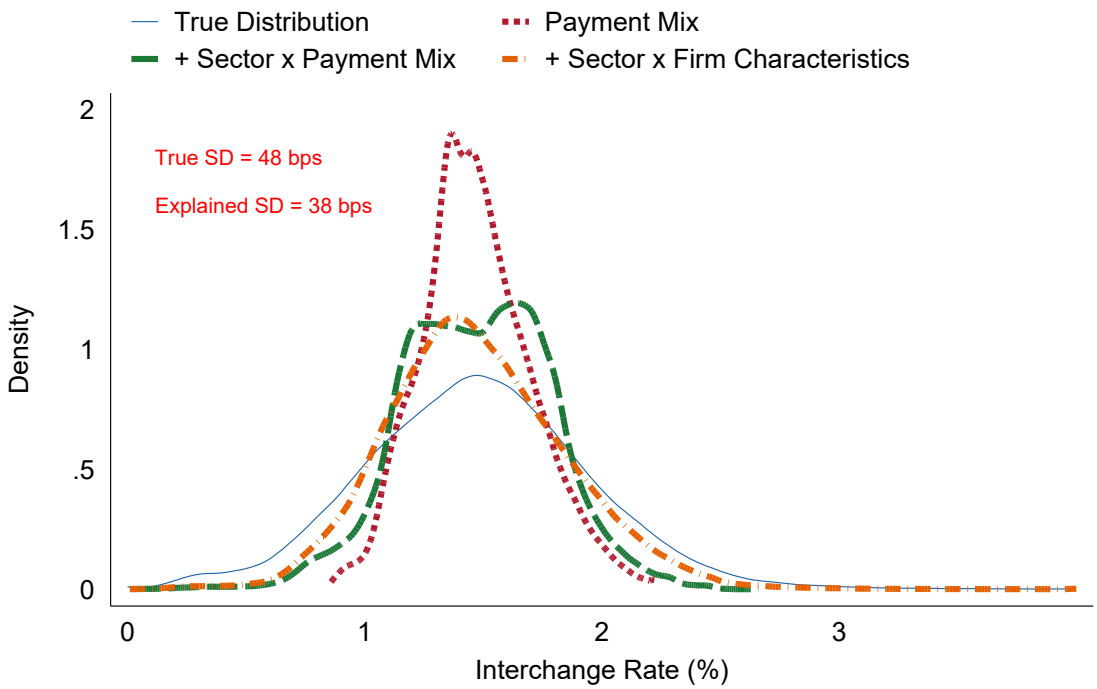
(b) Interchange Fees by Sector



(c) Interchange Fees by Merchant Size

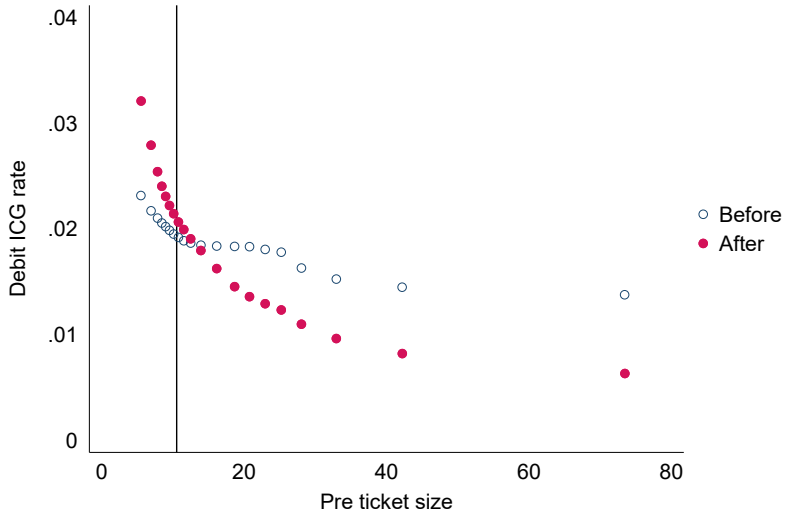
Notes: Figure 12a shows dollar-weighted interchange fees for different card types for merchants with more than $100,000 in sales, excluding merchants that receive volume discounts. Premium credit cards are defined as transactions on the Visa Signature and Visa Infinite (and Mastercard equivalents) interchange tiers. Regulated debit cards refer to debit cards issued by banks with more than $10 billion in assets; exempt debit cards are those issued by smaller banks. Interchange fees are calculated as total interchange fees paid divided by total card volume within the category. Figure 12b shows average interchange fees across sectors for credit cards and exempt debit cards for firms that do not receive volume discounts. Figure 12c provides evidence of volume discounts by comparing average interchange fees by merchant size in the grocery and merchandise categories. When calculating size, we use the merchant's total card sales across all establishments.

Figure 13: Variation in Merchant Interchange Fees Explained by Different Factors

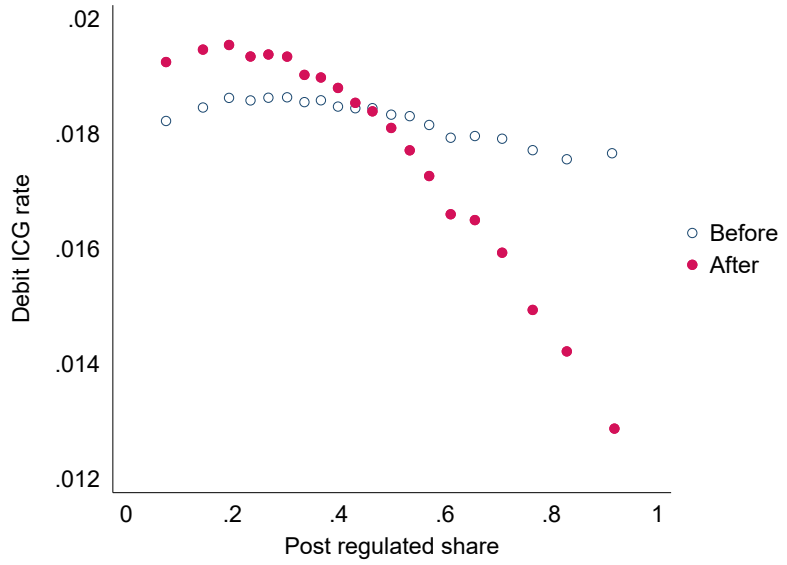


Notes: Figure 13 shows the distribution of average interchange fees across merchants in solid blue, and then shows how much of the variation in interchange fees can be explained by different factors.

Figure 14: Explaining the Heterogeneous Impact of the Durbin Amendment Across Restaurants



(a) Variation by Ticket Size



(b) Variation by Share of Regulated Debit Cards

Notes: Figure 14 illustrates the heterogeneous impact of the Durbin Amendment across merchants in the restaurant sector (MCC codes 5812 and 5814) and across regions. Panel 14a shows a binscatter of pre-Durbin average ticket size against pre- and post-Durbin debit interchange rates. Ticket size is calculated as the total dollar value of debit card transactions divided by the total count of debit card transactions in the October 2010–September 2011 window preceding the Durbin Amendment; observations are at the merchant-year level. Panel 14b shows a binscatter of the ZIP-code-level post-Durbin share of debit cards that earn regulated interchange against pre- and post-Durbin debit interchange rates.

Figure 15: Who Pays for and Receives Rewards

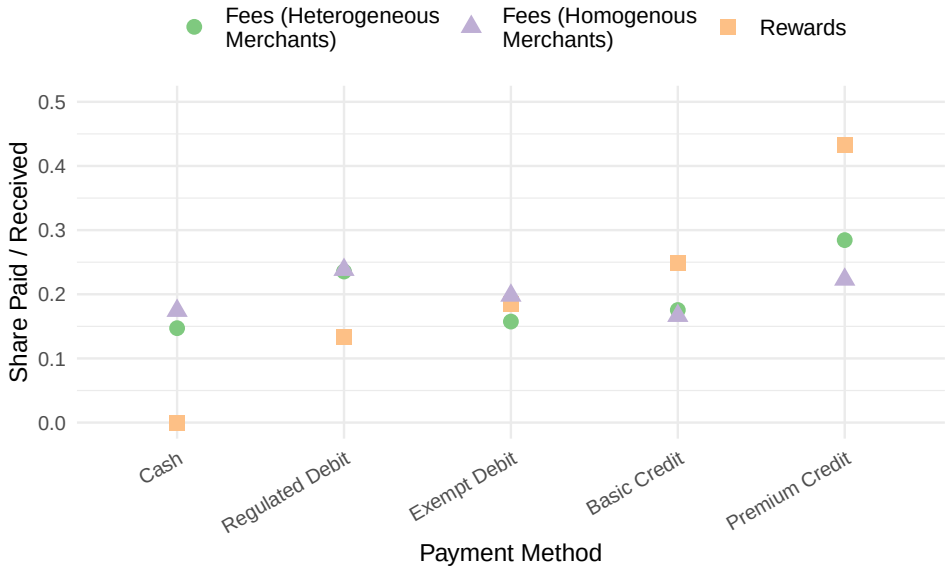
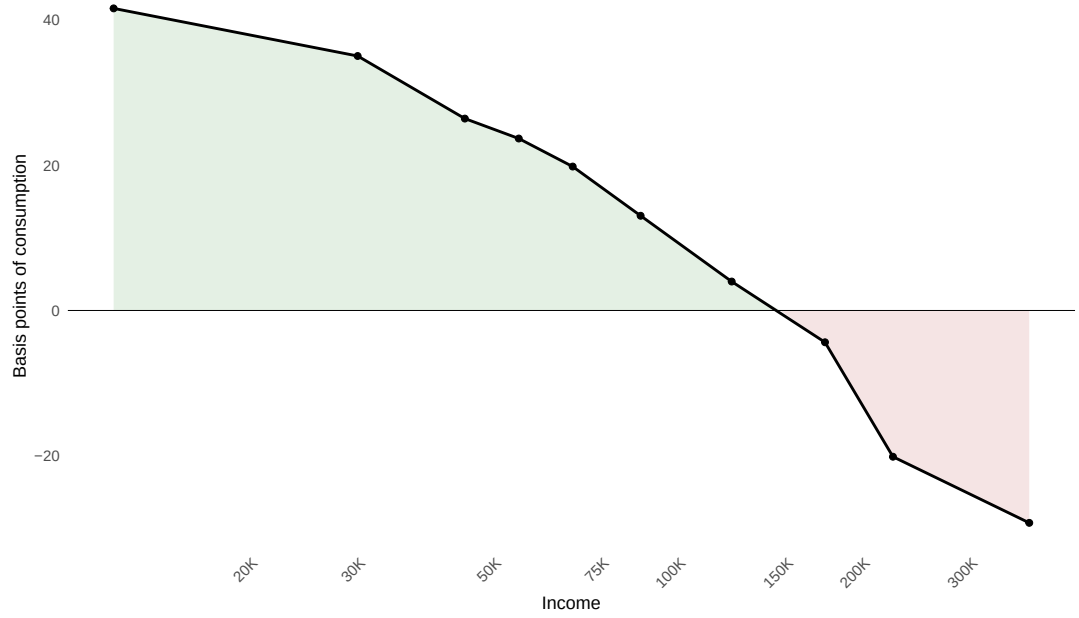
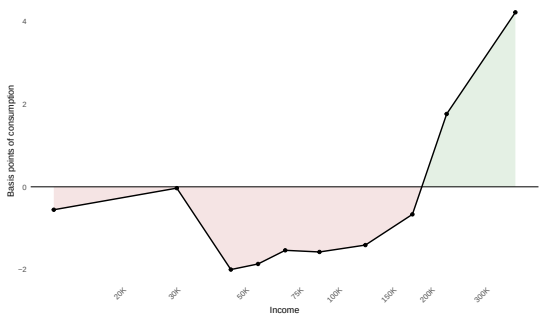


Figure 15 displays the share of interchange fees paid and rewards received by consumers of different payment methods. The figure shows how the burden of interchange fees changes after modeling merchant heterogeneity in both payment composition and fees. The figure is calculated under the assumption that all merchants passthrough interchange fees into prices, dollar for dollar.

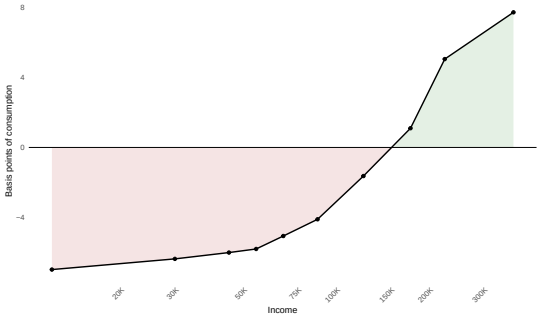
Figure 16: Redistribution Across Household Income



(a) Eliminating Interchange Fees



(b) Durbin Amendment



(c) Rise of Premium Credit Cards

Notes: Figure 16 illustrates the impact of policy changes on household surplus by income. Panel (a) shows the change in household surplus if interchange fees and card reward programs were banned. Panel (b) shows the change in household surplus if the Durbin Amendment were repealed. Panel (c) shows the change in household surplus if premium credit cards were banned.

Tables

Table 1: Summary of Fiserv Data

(a) Settlement Data Cross Section from 2022

	N	Mean	SD	P10	Median	P90
Regulated Debit	1,410,173	0.27	0.22	0.00	0.23	0.57
Exempt Debit	1,410,173	0.17	0.19	0.00	0.12	0.43
Basic Credit	1,410,173	0.28	0.24	0.03	0.19	0.63
Premium Credit	1,410,173	0.28	0.25	0.00	0.22	0.65
Annual Card Sales (M)	1,410,173	1.33	182.60	0.01	0.09	0.84
Average Interchange (%)	1,410,173	1.49	0.57	0.80	1.47	2.20

(b) Restaurant Settlement Panel 2010–2013

	N	Mean	SD	Median
Annual Sales (M)	268,143	0.65	1.48	0.38
Share of Sales on Debit	268,143	0.66	0.19	0.71
Regulated Share of Debit in Zip Code	171,736	0.49	0.20	0.49
Average Ticket Size of Debit Transactions	268,143	19.21	16.71	12.65

(c) Summary of Clover Data

	Count	Mean	SD	Median
Cash + Check > 2%	1,416,857	0.36	0.48	0.00
Conditional Cash + Check Share	509,738	0.31	0.22	0.26
Debit as Share of Card Spend	1,416,857	0.52	0.27	0.53
Annual Card Sales (M)	1,416,842	0.27	0.82	0.08
Annual Sales (M)	1,416,857	0.31	0.86	0.09

Notes: Panel (a) shows summary statistics from the 2022 cross-section at the merchant-sector level. The payment-method variables refer to the share of card sales at the merchant on each payment method. Regulated debit cards are issued by large banks. Exempt debit cards are issued by small banks. Premium credit refers to high-interchange credit cards in the Visa Signature and Visa Infinite (and the Mastercard equivalent) interchange tiers. Average interchange is calculated as total interchange paid divided by total sales. Transaction size is the total dollar volume divided by the number of transactions. Panel (b) shows summary statistics at the merchant-year level from our 2010–2013 panel of restaurant sales. Regulated debit statistics are computed for 2011 and onward. Interchange rates are calculated as total interchange within a category divided by total sales in that category. Panel (c) shows summary statistics of the Clover data from 2019–2022 at the merchant-year level. The cash and check share is defined as the dollar value of cash and check transactions divided by the total value of transactions for the merchant in that year.

Table 2: Spatial and Firm Determinants of Payment Mix

	Cash	Cash	Cash	Credit	Credit	Credit
Share Online	-3.76***	-3.81***	-3.79***	2.63***	3.28***	3.58***
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Log Ticket Size	-5.55***	-4.40***	-4.38***	9.11***	8.29***	8.20***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log Sales	1.37***	1.05***	1.05***	-1.42***	-1.16***	-1.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log Population (Std. Dev.)		-0.61***			1.46***	
		(0.02)			(0.02)	
Median Income (Std. Dev.)		-0.14***			1.58***	
		(0.02)			(0.02)	
Pct. Hispanic (Std. Dev.)		-0.02			2.03***	
		(0.02)			(0.02)	
Pct. College (Std. Dev.)		-1.07***			3.79***	
		(0.02)			(0.02)	
Pct. 65+ (Std. Dev.)		0.19***			3.35***	
		(0.02)			(0.02)	
Pct. Black (Std. Dev.)		0.63***			0.12***	
		(0.02)			(0.02)	
Observations	1,416,842	1,416,839	1,416,793	2,172,044	2,172,030	2,172,038
R2	0.20	0.23	0.25	0.27	0.33	0.35
DV Mean	11	11	11	51	51	51
Sector FE		X	X		X	X
County FE			X			X

Notes: Columns (1) to (3) report regressions of the firm-level share of transactions on cash and check in the Clover data on firm characteristics, sectors, and spatial factors. Columns (4) to (6) report regressions using the settlement data of the firm-level share of card transactions on credit cards on firm characteristics, sectors, and spatial factors.

Table 3: Summary Statistics on Interchange Rates by Card Type Across Firms

	N	Mean	SD	P10	Median	P90
Regulated Debit	1,225,787	0.60	0.62	0.09	0.36	1.50
Exempt Debit	1,115,701	1.43	0.54	0.82	1.43	2.02
Basic Credit	1,272,668	1.64	0.70	0.57	1.80	2.42
Premium Credit	1,206,011	2.34	0.28	2.06	2.36	2.60

Notes: Interchange rates are defined as total net interchange divided by total net sales for a given card type. Interchange fees are set as missing if the given payment method does not have any transactions. Merchants are equal weighted, which explains differences with the aggregate fees in Figure 12.

Table 4: Interchange rates from Visa's 2022 interchange publication.

(a) By Sector and Card Type

Card Category	Gas Station	Supermarket	Merchandise	Restaurant
Regulated Debit Card	$0.05\% + 0.22$	$0.05\% + 0.22$	$0.05\% + 0.22$	$0.05\% + 0.22$
Exempt Debit Card	$\min\{0.8\% + 0.15, \$0.95\}$	\$0.30	$0.80\% + 0.15$	$1.19\% + 0.10$
Basic Credit	$\min\{1.15\% + 0.25, \$1.10\}$	$1.50\% + 0.07$	$1.51\% + 0.10$	$\max\{2.10\%, \$0.04\}$
Premium Credit	$\min\{1.15\% + 0.25, \$1.10\}$	$2.00\% + 0.07$	$2.10\% + 0.10$	$\max\{2.60\%, \$0.04\}$

(b) By Firm Size

Supermarket Size Category	Premium Credit Rate
Tier 0 ($\geq \$19.6$ Bn)	$1.40\% + \$0.05$
Tier 1 ($\geq \$10.65$ Bn)	$1.55\% + \$0.05$
Tier 2 ($\geq \$4.2$ Bn)	$1.65\% + \$0.05$
Tier 3 ($\geq \$0.95$ Bn)	$1.75\% + \$0.05$
All Other (Smallest)	$2.00\% + \$0.07$

Notes: Percents denote the variable part of the interchange fee; the remainder is the fixed fee. Thus $0.05\% + 0.22$ indicates a fee of 0.05% of transaction value plus \$0.22. Premium credit corresponds to Visa Infinite Spend Qualified Cards. Basic credit corresponds to "All Other Products." Regulated debit cards are those issued by large banks subject to the Durbin Amendment's caps on interchange fees.

Table 5: The Effects of Changes in Interchange Fees on Sales and Prices

	1Y Sales		2Y Sales		1Y Price		2Y Price	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Change in average ICG	-10.61***	-6.255***	-13.36***	-6.989***	-2.923***	1.226***	-3.640***	1.180**
	(0.316)	(0.581)	(0.470)	(0.932)	(0.138)	(0.255)	(0.186)	(0.371)
Debit share in pre-period	-0.0192***	-0.0101***	-0.00603	-0.00202	0.0127***	0.0214***	0.0328***	0.0359***
	(0.00286)	(0.00304)	(0.00438)	(0.00442)	(0.00125)	(0.00133)	(0.00174)	(0.00176)
Change in fees	11.68***	8.926***	16.13***	12.85***	2.685***	0.0576	2.660***	0.177
	(0.230)	(0.385)	(0.301)	(0.512)	(0.101)	(0.169)	(0.119)	(0.204)
Constant	0.139***		0.203***		0.00996***		0.00889***	
	(0.00198)		(0.00285)		(0.000866)		(0.00113)	
Zip FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	94,890	94,890	76,252	76,252	94,890	94,890	76,252	76,252
1st Stage F		35,776		22,630		35,776		22,630

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: Table 5 shows the results of regressing changes in log sales and changes in log ticket size on the change in average interchange rates paid at restaurants in the 1 year and 2 year windows after the implementation the Durbin Amendment. Log ticket size is measured as the log of the ratio of the dollar value of sales to the number of transactions. The pre-debit share is the share of debit card transactions at the restaurant from October 2010 to September 2011. The Change in Fees is defined as the change in the average per transaction debit interchange fee for a regulated debit card at the store, as computed from the average ticket size measured from October 2010 to September 2011 and the public debit interchange schedule prior to the Durbin Amendment.

Table 6: Effects of Capping Interchange Fees

(a) As Basis Points of Baseline Consumption

Mechanism	Consumer Group				
	Cash	Regulated Debit	Exempt Debit	Basic Credit	Premium Credit
Full Model	88	40	0	-52	-61
Homogeneous	117	50	7	-55	-94
Difference	29	10	8	-3	-33
Consumer Sorting	-16	-7	-13	3	28
Merchant Fee Heterogeneity	-12	-3	6	0	6

(b) In Dollar Terms ($Bn)

Mechanism	Consumer Group				
	Cash	Regulated Debit	Exempt Debit	Basic Credit	Premium Credit
Full Model	17.1	10.8	-0.1	-10.2	-17.7
Homogeneous	22.6	13.5	2.1	-10.8	-27.4
Difference	5.5	2.7	2.1	-0.6	-9.7
Consumer Sorting	-3.1	-1.8	-3.7	0.6	8.1
Merchant Fee Heterogeneity	-2.4	-0.8	1.6	0	1.6

Notes: These tables summarize the consumer-welfare effects of setting all interchange fees to zero for consumers with different payment preferences. Panel 6a shows the effects measured as a percentage of each group's baseline consumption. "Homogeneous merchants" is the effect from a model in which consumers do not sort across merchants, so the composition of payments is identical across merchants. "Full model" is the effect from our framework that incorporates both heterogeneity in the composition and the costs of payments across merchants. "Consumer Sorting" captures the effects from accounting for variation in the composition of payments across merchants. "Merchant Fee Heterogeneity captures the combined effects of fee variation across sectors and by firm size. Panel 6b shows the effects in dollar terms, where we normalize total consumer purchases to $12 trillion Nilson (2023a).

Table 7: Effects of the Durbin Amendment

Change in Consumption	Consumer Group				
	Cash	Regulated Debit	Exempt Debit	Basic Credit	Premium Credit
Basis Points	12	-37	11	12	8
Dollars ($Bn)	2.3	-9.9	3	2.4	2.3

Notes: Table 7 summarize the consumer-welfare effects of capping the interchange fees on regulated debit cards as per the Durbin Amendment.

Table 8: The Rise of Premium Credit Cards

Change in Consumption	Consumer Group				
	Cash	Regulated Debit	Exempt Debit	Basic Credit	Premium Credit
Basis Points of Consumption	-9	-9	-8	-8	27
Dollars (billions)	-1.7	-2.4	-2.3	-1.6	8

Notes: Table 8 summarize the consumer-welfare effects of the rise in premium credit cards.

A Additional Tables

Table A1: Effects of the Durbin Amendment in states with no-surcharge rules

	1Y Sales		2Y Sales		1Y Price		2Y Price	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Change in average ICG	-10.24***	-6.380***	-14.02***	-8.317***	-3.035***	0.778	-3.246***	1.211
	(0.493)	(0.972)	(0.714)	(1.562)	(0.217)	(0.430)	(0.301)	(0.660)
Debit share in pre-period	-0.0285***	-0.0189***	-0.0301***	-0.0227**	0.0113***	0.0207***	0.0287***	0.0345***
	(0.00470)	(0.00514)	(0.00709)	(0.00732)	(0.00207)	(0.00227)	(0.00299)	(0.00309)
Change in fees	11.59***	9.088***	16.84***	13.82***	2.594***	0.125	2.361***	-0.00211
	(0.365)	(0.654)	(0.465)	(0.871)	(0.161)	(0.289)	(0.196)	(0.368)
Constant	0.144***		0.223***		0.0105***		0.0101***	
	(0.00323)		(0.00459)		(0.00142)		(0.00193)	
Zip FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	37,989	37,989	30,363	30,363	37,989	37,989	30,363	30,363
1st Stage F		11,782		7,041		11,782		7,041

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Notes: This table shows the results of regressions studying the cross-sectional effects of interchange fees on merchant sales in the 10 states that had no-surcharge rules at the time of the Durbin Amendment. The selected states are California, Colorado, Connecticut,Florida, Kansas, Massachusetts, Maine, New York, Oklahoma, and Texas.