Payment Processing Costs and Retail Prices: Evidence from Credit Card Surcharges

Felix Martini*

November 2026

Click here for the latest version

Abstract

I study how legalizing credit card surcharges affects retail prices. Surcharges allow merchants to price discriminate against credit card users, whose transactions generate high payment processing costs. I exploit staggered variation in merchants' ability to impose surcharges across U.S. states. The focus is on the retail gasoline market, where products are highly standardized and comparable across locations. I find that after the legalization of surcharges, cash prices fall by approximately 2 percent (6 cents per gallon). Wholesale prices do not respond. Hand-collected data from Google Street View show that uniform prices lie between cash and credit card prices, consistent with merchants using surcharges to shift payment processing costs from cash payers to credit card users. Legalizing surcharges also reduces credit card use. My findings suggest that surcharges can mitigate the implicit subsidy from cash payers to credit card users. More broadly, the results provide causal evidence on the pass-through of platform intermediation costs into retail prices, a central mechanism in models of two-sided markets.

Keywords: Credit Card Surcharges, Retail Prices, Price Discrimination, Payment Systems, Financial Intermediation

JEL Classification: E42, G23, G28, G59

*Frankfurt School of Finance & Management. Email: f.martini@fs.de. I am grateful to my advisors, Tobias Berg and Sascha Steffen, for their guidance and support. I also thank Nicole Hentschel (discussant), Eva Mulder, Lea Paoli, Manju Puri, Markus Reisinger, Zacharias Sautner, Philipp Schnabl, various other colleagues and faculty members at Frankfurt School of Finance and NYU Stern, as well as participants at the Bundesbank/SAFE Summer School, the HEC Paris Finance PhD Workshop, the Rising Scholar Conference in Finance (Zurich), and the DGF Doctoral Workshop (Dusseldorf). The project described in this paper partly relies on data from surveys administered by the Understanding America Study, which is maintained by the Center for Economic and Social Research (CESR) at the University of Southern California. The content of this paper is solely the responsibility of the author and does not necessarily represent the official views of USC or UAS.

1 Introduction

Consumers have heterogeneous preferences over payment methods. Different payment methods, in turn, impose different costs on merchants. In the United States, the costs of accepting credit card payments, for example, can reach 4 percent of the transaction value (U.S. Government Accountability Office, 2025). When merchants cannot price discriminate between users of different payment methods, they may instead incorporate these costs uniformly into prices. In that case, cash payers implicitly subsidize card users. Although this mechanism is well established in theory, it is unclear whether and to what extent it arises in practice.

One opportunity to identify the mechanism empirically comes from credit card surcharges. Surcharges allow merchants to pass the costs of accepting card payments directly to the consumers who generate them. If merchants would otherwise recover these costs through higher prices for all consumers, surcharging credit cards creates scope for lower cash prices. In this paper, I study how legalizing surcharges affects retail prices.

I focus on the retail gasoline market, where products are highly standardized and comparable across locations. My main finding is that legalizing surcharges reduces gasoline cash prices by about 6 cents per gallon, or approximately 2 percent. Gas stations that visibly price discriminate by payment method charge about 10 cents more per gallon for credit card payments. These patterns are consistent with the cross-subsidization mechanism that is central to canonical models of payment markets (Rochet and Tirole, 2002; Edelman and Wright, 2015; Egan et al., 2026). To the best of my knowledge, my paper provides the first causal evidence in support of this mechanism.

The economic stakes are substantial. Consumer payment activity continues to shift toward cards, contributing to a secular rise in payment processing costs.[1] Annual fees paid by U.S. merchants to the card industry are now equivalent to more than $1,400 per household (Figure 1, Panel B). How these costs are passed through to retail prices can have significant distributional consequences.

Yet, identifying the pass-through of payment processing costs into retail prices is inherently difficult (see, e.g., Mukharlyamov and Sarin, 2025). There are two major challenges. First, variation in payment processing costs is often endogenous, reflecting strategic pricing decisions by an interconnected chain of financial intermediaries. Second, merchants may respond to cost changes along several margins, adjusting not only prices but also product quality or quantities sold at a given price. These responses may unfold only gradually and can be difficult to disentangle from other determinants of prices. My empirical setting allows me to address both challenges.

[1] In the United States, the ratio of card payment volume to GDP has grown from 16 percent in 2000 to 41 percent in 2025 (Figure 1, Panel A).

To address the first challenge, I leverage the staggered legalization of credit card surcharges across U.S. states. Historically, the two leading card networks, Visa and Mastercard, largely prohibited surcharges.[2] Following a landmark class action settlement, the networks eventually relaxed these prohibitions in 2013. The settlement led to plausibly exogenous state-level variation in merchants' ability to surcharge because several U.S. states initially retained, and then gradually repealed, independent statutory surcharge prohibitions.

To address the second challenge, I focus my analysis on the retail gasoline market. Beyond high product standardization, this market has several characteristics that are useful for the purpose of this study. First, gasoline prices are quoted per gallon, preventing hidden quantity adjustments from obscuring price effects. Second, gasoline is purchased primarily in person rather than online, limiting substitution across purchasing channels. Third, gasoline prices adjust frequently, making it easier to detect systematic price changes over relatively short periods. Fourth, the availability of wholesale price data can help distinguish surcharge-induced changes in retail prices from changes that are driven by fluctuations in upstream costs. Finally, the market is economically important: In 2024, U.S. households spent about $327 billion on gasoline, making it one of the largest recurring household expenses (U.S. Bureau of Labor Statistics, 2025).

For causal identification, I use a stacked difference-in-differences design. In my baseline specification, gasoline cash prices decline by 6.76 cents per gallon after the legalization of surcharges. With controls for state characteristics and fuel-market conditions, as well as alternative sample weights, the cash price decline ranges from 6.30 to 6.97 cents per gallon. All estimates are statistically significant at the 5 percent level. In percentage terms, the estimates correspond to a decline of 2.11 to 2.33 percent relative to the pre-treatment price. The price decline appears within the first year after treatment and largely persists thereafter. I find no evidence that gasoline prices evolved differently in treated and control states before the legalization of surcharges, supporting a causal interpretation of the results.

The findings are consistent with surcharge legalization allowing merchants to unbundle the costs of accepting card payments from the uniform price and recover them through a higher credit card price. To provide evidence on this mechanism, I analyze hand-collected data from Google Street View panoramas. U.S. gas stations often post separate cash and credit card prices side by side. Historical Street View panoramas allow me to observe these prices over time. At gas stations that post separate cash and credit card prices ('dual-price stations'), the average credit card price per gallon is 9.86 cents higher than the cash price. The difference is significant at the 1 percent level. Single-price stations, on the other hand, charge prices that tend to fall between the credit card and cash prices displayed by other stations.

[2]Nearly all U.S. merchants that take credit cards accept Visa or Mastercard (Ohio v. American Express Co., 2018). American Express, the third major U.S. card network, restricts differential surcharging, so the rules by Visa and Mastercard constituted a de facto general prohibition on surcharging.

Given that surcharges plausibly alter consumers' payment incentives, I also study changes in consumers' payment behavior. To this end, I construct a harmonized dataset from several Federal Reserve consumer payment surveys of a representative sample of U.S. adults. After the legalization of surcharges, consumers shift their gas station payments away from credit cards. The credit card share of the average consumer's gas station payments falls by approximately 5 to 6 percentage points. The decline is substantial relative to the pre-treatment level of about 32 percent. Lower credit card use is offset by higher cash and debit card use.

Total gasoline consumption remains largely unchanged, consistent with aggregate demand for gasoline being relatively price inelastic (Levin, Lewis, and Wolak, 2017). Applying the estimated cash price decline to gasoline sales in the treated states implies roughly $2.1 billion in lower annual spending by non-credit-card payers.

I conduct a series of other analyses to rule out alternative explanations for the observed decline in gasoline cash prices. As a placebo test, I apply the same stacked difference-in-differences design as in the main analysis to *wholesale* gasoline prices. If the decline in retail prices was, for example, driven by changes in upstream costs, one would expect a corresponding decline in wholesale prices. Instead, I find a precisely estimated null result, consistent with surcharges operating at the consumer payment stage. The *retail* cash price effect, in turn, remains negative when (i) excluding the COVID-19 period, (ii) omitting any individual state or treatment cohort from the sample, (iii) using city-level prices, or (iv) estimating the effect separately by gasoline grade. Alternative difference-in-differences estimators also yield negative coefficients. To preempt potential concerns about 'nonstandard errors' (Menkveld et al., 2024), I re-estimate the retail price effect of legalizing surcharges under 34,560 alternative regression specifications. These specifications systematically vary the sample period, control variables, sample weights, fixed effects, and other empirical design choices. The estimated cash price effect remains negative across all 34,560 specifications, with a median coefficient of -5.67 cents per gallon.

From a policy perspective, my findings inform longstanding debates over the regulation of payment markets. U.S. President Trump has publicly endorsed legislation aimed at reducing credit card processing fees on multiple occasions (see, e.g., Glickman, 2026), and related disputes have reached the highest courts in the United States, the United Kingdom, and the European Union.[3] Surcharge rights, in particular, have been central to multibillion-dollar antitrust litigation (see, e.g., Andriotis, 2025). Yet, regulatory approaches to surcharging differ sharply across jurisdictions. Australia protected merchants' right to surcharge for more than two decades before reversing that policy in October 2026. The European Union and the United Kingdom largely prohibit surcharges, while Canada permits them in all provinces outside Quebec. The empirical basis for these policies remains limited. The Competition Appeal Tribunal in the United Kingdom, for example, recently found

[3]See Expressions Hair Design v. Schneiderman (2017) and Ohio v. American Express Co. (2018) for the United States, Sainsbury's Supermarkets Ltd v Visa Europe Services LLC (2020) for the United Kingdom, and MasterCard and Others v Commission (2014) for the European Union.

that Visa and Mastercard had failed to establish that merchants pass card fees through to retail prices (Merchant Interchange Fee Umbrella Proceedings, 2026). Policymakers themselves have acknowledged that existing surcharge rules "*were not properly analysed and backed up by relevant empirical data*" before their implementation (European Court of Auditors, 2025). My findings address this gap by showing that surcharge regulation affects retail prices and reallocates payment processing costs among market participants.

Literature: The main contribution of this paper is to provide causal evidence on how relaxing price coherence in two-sided markets affects retail prices.[4] Under price coherence, sellers charge the same price to all customers, regardless of whether they transact with them directly or through an intermediary (Frankel, 1998). Canonical models of two-sided markets imply that the cost of intermediation is then incorporated in the uniform price. As a result, this cost is partly borne by customers who do not use the intermediary (Rochet and Tirole, 2002; Edelman and Wright, 2015). I provide empirical support for this mechanism by showing that legalizing credit card surcharges leads to lower cash prices. While card payments provide a prime example, similar issues arise in other two-sided markets, including online retail, publishing, travel booking, and food delivery.[5]

Within the payments literature, this paper contributes to the closely related but distinct question of whether payment processing costs pass through into retail prices. Direct empirical evidence on this pass-through is remarkably limited. Existing studies mainly focus on changes in interchange fees but do not provide conclusive causal evidence of a retail price effect (Wang, Schwartz, and Mitchell, 2014; Mukharlyamov and Sarin, 2025). I exploit plausibly exogenous variation in merchants' ability to recover payment processing costs directly from credit card users. The observed decline in cash prices shows that payment processing costs do indeed pass through into retail prices.

The design of payment systems has welfare implications for consumers, merchants, and financial intermediaries. Existing work estimates transfers between cash payers and card users (Barron, Staten, and Umbeck, 1992; Schuh, Shy, and Stavins, 2010), describes how payment costs and rewards vary across income groups (Felt et al., 2023), and analyzes welfare redistribution among consumers (Agarwal et al., 2026; Egan et al., 2026). I complement this work by estimating the implicit subsidy from non-credit-card payers to credit card payers in a major retail market. My findings indicate that surcharge regulation can have substantial distributional consequences.

[4]The market for card payments is a prime example of a two-sided market. In two-sided markets, a platform (e.g., a payment network) facilitates interactions between two distinct user groups (e.g., consumers and merchants). The platform's value to users on either side of the market crucially depends on the number of users on the other side (see, e.g., Rochet and Tirole, 2003, 2006; and Rysman, 2009 for a survey). Related theoretical work specifically on payment economics includes Baxter (1983), Schmalensee (2002), Wright (2003, 2012), Rochet and Tirole (2011), and Wang (2026); Rysman and Wright (2014) survey this literature.

[5]Platforms such as Amazon, Apple (e-books), Booking.com, and Lieferando have used price parity clauses that restrict sellers' ability to offer lower prices through other sales channels; see Johnson (2017), Foros, Kind, and Shaffer (2017), Mantovani, Piga, and Reggiani (2021), and Bundeskartellamt (2023), respectively; see also Wang and Wright (2020) and Sullivan (forthcoming).

This paper also directly connects to the literature on merchant steering and consumer payment behavior. Survey-based studies document merchants' use of surcharges and cash discounts (Stavins and Shy, 2015) and provide evidence on consumer responses to these incentives (Bolt, Jonker, and van Renselaar, 2010; Stavins, 2018; Greene, Shy, and Stavins, 2026). Simulations based on U.S. consumer data predict that surcharges would shift payments away from credit cards (Koulayev et al., 2016). I show that legalizing credit card surcharges reduces credit card use at U.S. gas stations.[6]

Finally, this paper connects to the wider literature on credit cards and payments. Prior work examines the pricing and regulation of consumer credit cards (Agarwal et al., 2015; Drechsler et al., 2026) and the role of business credit cards in small-firm finance (Benetton and Buchak, 2024). Related research studies how bank overdraft practices affect alternative borrowing and consumer financial health (Di Maggio, Ma, and Williams, 2025). Other papers analyze innovations in consumer payments (Berg et al., 2025) and the welfare consequences of restricting cash payments (Alvarez and Argente, 2022). Recent work explores the role of digital payment data in credit provision and financial privacy (Ahnert, Hoffmann, and Monnet, 2025; Ouyang, 2026).

The remainder of the paper proceeds as follows. Section 2 presents a conceptual framework for how enforcing or relaxing price coherence should affect retail prices from a theoretical point of view. Section 3 describes institutional details on credit card processing and the evolution of U.S. surcharge regulations over time. Section 4 presents the empirical setting, data, and research design. Section 5 reports the main results. Section 6 presents robustness checks. Section 7 discusses the findings and their implications. And Section 8 concludes.

2 Conceptual Framework

This section presents a simplified framework to illustrate how relaxing price coherence affects prices for cash payers and credit card users. In standard models of payment markets, merchants accept payments from consumers who differ in their preferred payment method. Different payment methods, in turn, impose different costs on merchants. When merchants cannot charge consumers separately based on how they pay, these models imply that payment processing costs are pooled uniformly into prices (e.g., Rochet and Tirole, 2002, 2011; Wright, 2012; Edelman and Wright, 2015). Based on this mechanism, I compare two stylized pricing regimes. Under the "price coherence" regime, merchants charge a uniform price to all customers, regardless of how they pay. Under the "price discrimination" regime, merchants can charge different prices to cash payers and credit card users. When credit card acceptance imposes an incremental cost on merchants, price coherence

[6]The decline in credit card use is not mechanical. Merchants could in principle absorb payment costs rather than charge them separately to card users (Gomes and Tirole, 2018). Moreover, because cash discounts were permitted throughout the sample period, surcharges might have had little additional effect. By contrast, my findings are consistent with arguments and models in which surcharges and cash discounts need not be equivalent (Schuh et al., 2012; Bourguignon, Gomes, and Tirole, 2019).

spreads that cost across all sales. Relaxing price coherence, on the other hand, allows merchants to unbundle the cost of accepting credit cards from the uniform price and recover it directly from credit card users through a higher price.

2.1 Retail Prices under Price Coherence

Consider a merchant that accepts both cash and credit cards. Let $p^* = c + \mu$ denote the benchmark retail price in the hypothetical case in which credit card acceptance entails no incremental cost. c is the marginal cost common to all sales, including the marginal cost of accepting cash. μ is the merchant's markup, with $\mu \geq 0$. To account for the costs of credit card acceptance, let m denote the merchant's cost of a credit card payment per unit sold. b_S is the merchant's corresponding benefit, including any marginal cash-handling costs avoided when a customer pays by card. The incremental net cost of accepting credit cards is $\kappa \equiv m - b_S > 0$.

In practice, the incremental net cost of accepting credit cards is likely close to the processing fees merchants pay. Credit card payments entail low fixed costs but high marginal costs, as card processing fees are typically proportional to the transaction value. By contrast, cash payments entail high fixed costs (e.g., security and transportation expenses) but low marginal costs: Once a merchant has made the general decision to accept cash payments, the marginal cost of processing an additional dollar of cash (which enters κ negatively through b_S) is often negligible. Against this background, it is plausible to assume that b_S is small relative to m ($b_S \ll m$), so that $\kappa \approx m$.[7] For simplicity, I take merchants' decision to accept both cash and credit cards as given.

Let $s \in (0, 1)$ denote the initial credit card share of the merchant's sales volume under the price coherence regime. Assuming a constant markup (i.e., full pass-through of the incremental cost of credit card acceptance), the uniform price for all customers is

$$p_{\text{uniform}} = p^* + s \cdot \kappa = c + \mu + s \cdot (m - b_S). \tag{1}$$

Because a fraction s of sales volume is paid by credit card, the average incremental cost of credit card acceptance is $s \cdot \kappa$ per unit sold. Cash customers therefore pay $s \cdot \kappa$ above p^*, while credit card users pay less than the full incremental cost κ associated with their payment method. In this sense, price coherence creates an implicit subsidy from cash payers to credit card users.

[7] A positive κ does not imply that merchants should reject credit cards. Card acceptance can make the merchant's offer more attractive to some customers and increase sales even when credit card transactions are more costly to accept at the margin. This distinction is central to models of card acceptance and steering (Rochet and Tirole, 2011; Bourguignon, Gomes, and Tirole, 2019).

2.2 Retail Prices under Price Discrimination by Payment Method

Surcharging allows the merchant to assign the incremental credit card cost directly to credit card users rather than pool it across all sales. Holding c, μ, and κ fixed, the prices for cash payers and credit card users are

$$\begin{aligned} p_{\text{cash}} &= p_{\text{uniform}} - s \cdot \kappa = p^*, \\ p_{\text{card}} &= p_{\text{uniform}} + (1 - s) \cdot \kappa = p^* + \kappa. \end{aligned} \tag{2}$$

The cash price falls by $s \cdot \kappa$ because it sheds the credit card cost previously pooled across all sales. The credit card price includes the full incremental cost of credit card acceptance κ and therefore rises by $(1 - s) \cdot \kappa$. Everything else equal, the cash price decline is larger when initial credit card use is higher or credit card transactions are more costly.

For $\kappa > 0$ and $0 < s < 1$,

$$p_{\text{cash}} < p_{\text{uniform}} < p_{\text{card}}, \qquad p_{\text{card}} - p_{\text{cash}} = \kappa.$$

The cash price falls below the former uniform price, while the credit card price rises above it. Figure 2 illustrates this decomposition.

Holding fixed the initial credit card share (s) and the incremental net cost of accepting credit cards (κ), the average transaction price under price discrimination equals the uniform price under price coherence:

$$p_{\text{uniform}} = (1 - s) \cdot p_{\text{cash}} + s \cdot p_{\text{card}}.$$

2.3 Testable Predictions

In practice, allowing merchants to charge separate cash and credit card prices changes consumers' payment incentives. Let $S(z)$ denote the credit card share of the merchant's sales volume when the credit card price exceeds the cash price by z. Assume $S'(z) < 0$, so credit card use declines as the price difference increases. Under price coherence, cash payers and credit card users pay the same price by construction, so the initial credit card share in Equation (1) is $s = S(0)$. Under price discrimination, the credit card price exceeds the cash price by $\kappa > 0$, so

$$S(\kappa) < S(0) = s.$$

Thus, under price discrimination, credit card use declines relative to the price coherence regime.

Surcharge legalization allows merchants to move away from price coherence, but it does not require them to do so. Some merchants may adopt separate cash and credit card prices, while others may retain a uniform price. Moreover, cash discounts can in principle generate the same price discrimination as credit card surcharges. Merchants that already fully unbundle payment costs through cash discounts have no pooled credit card costs left to remove after surcharge legalization. The extent to which the legalization of surcharges changes cash and credit card prices is ultimately an empirical question. Simultaneously, the price response to the legalization of surcharges need not be limited to merchants that visibly price discriminate by payment method. If merchants compete on retail prices, a lower cash price at one merchant may induce competitors to adjust their prices as well. The average cash price response may therefore reflect both direct price unbundling and competitive responses by other merchants.

In summary, the framework yields three testable predictions: First, relaxing price coherence lowers cash prices on average. Second, at merchants that price discriminate, the cash price falls below the former uniform price and the credit card price rises above it. Third, credit card use declines as credit card prices rise relative to cash prices.

3 Institutional Background

3.1 Payment Processing Fees and Surcharging

A credit card payment typically involves five parties: the credit card user, the merchant, the merchant's acquiring bank, the card network, and the card-issuing bank. When a credit card user pays a merchant, the acquiring bank routes the transaction through the card network to the card-issuing bank for authorization. After settlement, the merchant receives the payment amount net of processing fees. These fees include interchange paid to the card-issuing bank, fees paid to the card network, and fees paid to the acquiring bank. In the United States, total processing fees are typically between 2 and 3 percent of the transaction value. Fees vary across merchants, card products, and transaction characteristics (Congressional Research Service, 2024; Egan et al., 2026). Panel A of Figure A.1 illustrates the payment and fee flows for a stylized $100 credit card purchase. With a 3 percent processing fee, the merchant receives $97.

A credit card surcharge is an extra fee that a merchant may charge a credit card user at checkout for paying by credit card. Surcharges make paying by credit card more expensive and shift payment processing costs from the merchant to the credit card user. Panel B of Figure A.1 illustrates the same $100 purchase with a 3 percent credit card surcharge. With the surcharge, the credit card user pays $103 and the merchant receives approximately $100.[8]

3.2 U.S. Surcharge Regulations

Merchants' ability to impose credit card surcharges depends on both public law and private network rules. Surcharge regulation varies substantially across jurisdictions.[9] In the United States, the binding constraints for several decades were private network rules: Before 2013, Visa and Mastercard explicitly prohibited surcharges on their credit card transactions. The third major U.S. credit card network, American Express, permitted surcharges only if its cards were not surcharged more than competing cards. Because cards from Visa and Mastercard could not be surcharged, merchants accepting cards from either network were automatically prohibited from surcharging American Express cards (U.S. Government Accountability Office, 2009; American Express, 2012). Together, these network rules created a de facto general prohibition on credit card surcharging.[10] Several U.S. states also had longstanding statutory bans on surcharging dating back to the 1980s (i.e., decades before the start of my study period). However, these bans were largely redundant as long as the network rules remained in force.

The regulatory environment changed following a class settlement between Visa and Mastercard and U.S. merchants in a major antitrust lawsuit (see Table A.1). The settlement required Visa and Mastercard to relax their network-level surcharge prohibitions and pay a fine of up to $7.25bn. The revised network rules took effect in January 2013. Previously redundant state-level prohibitions

[8] Processing fees still apply to the full surcharge-inclusive price of $103, so the merchant receives slightly less than $100. To illustrate the mechanics of surcharging, this simplified example holds the cash price and payment processing costs fixed. In practice, equilibrium prices, processing costs, and payment choices may change in response to surcharging.

[9] Australia maintained a regulatory framework protecting merchants' ability to surcharge from 2003 until October 2026 (Reserve Bank of Australia, 2026). The European Union and the UK largely prohibit surcharges on both debit and credit cards (European Commission, 2025; UK Department for Business and Trade, 2018). Canada permits credit card surcharges outside Quebec (Financial Consumer Agency of Canada, 2025). Arguments against surcharging emphasize that the practice reduces price transparency, can expose consumers to excessive fees, and is difficult to police. Proponents of surcharging instead emphasize that surcharges can reduce implicit subsidies, steer consumers toward lower-cost payment methods, and give merchants leverage when bargaining fees with payment providers.

[10] The card networks enforce these rules through acquiring banks. Acquiring banks incorporate the network rules into their merchant agreements. If a merchant violates the rules, the card network can fine the acquiring bank. The acquiring bank, in turn, can pass the fine on to the merchant and, ultimately, terminate the merchant's ability to accept cards (Visa Inc., 2024). Compliance is monitored through cardholder complaints and regular mystery shopping by outside auditors (Visa Inc., 2024). Since 2013, merchants that surcharge need to notify their acquirer 30 days in advance, and report the surcharge amount in a dedicated field in the transaction message.

remained in place and became binding. Merchants in states without such pre-existing prohibitions could begin surcharging credit cards. Merchants in states with such prohibitions could not.[11] Over time, several state-level surcharge prohibitions were removed or narrowed through court decisions and changes in state law. Figure A.2 illustrates the regulatory transition. Table A.2 summarizes surcharge regulation by state.[12]

4 Empirical Setting, Data, and Research Design

To identify the price effects of surcharge legalization, I focus on the retail gasoline market and exploit variation in merchants' ability to impose credit card surcharges across U.S. states. In this section, I first discuss the empirical challenges and explain why gasoline provides a suitable setting for addressing them. Next, I describe the main gasoline price data. Finally, I present the research design and discuss the identifying assumptions.

4.1 Setting: Retail Gasoline Market

Empirically identifying the retail price effects of payment regulation is challenging. First, merchants may respond to payment regulation by adjusting not only prices but also the quantity or quality of goods provided. Second, retail prices respond to macroeconomic conditions and input costs unrelated to payment regulation. Comparing simultaneous developments in retail and wholesale prices can help address this concern, but suitable wholesale price data are often difficult to obtain. Third, retail price responses may unfold only gradually. As illustrated in Figure A.1, payment processing involves a chain of financial intermediaries whose pricing decisions can delay the pass-through of upstream cost changes to merchants. Moreover, retail prices are often sticky (i.e., merchants adjust them only infrequently). Fourth, payment processing costs typically account for only a small fraction of the purchase price, making the resulting price effects potentially small in absolute terms. Finally, in the specific case of surcharges, empirical analysis is usually complicated by the limited availability of data on payment-specific prices. Existing evidence on surcharging therefore mostly relies on consumer surveys (e.g., Stavins and Shy, 2015), which in turn depend on consumers' awareness and understanding of the practice.

[11] State prohibitions are enforced by attorneys general, local prosecutors, or state regulators, mostly in response to consumer complaints. Sanctions range from misdemeanor fines in New York and Florida to private treble-damages actions in California (Expressions Hair Design v. Schneiderman, 2017; Italian Colors Restaurant v. Becerra, 2018; Dana's Railroad Supply v. Attorney General, 2015).

[12] Another means of price discrimination by payment method are cash discounts. Cash discounts were generally permitted across all U.S. states throughout the paper's sample period. A cash discount and a credit card surcharge can produce the same final price pair, but differ in the advertised reference price, disclosure, and adjustment applied at checkout (Expressions Hair Design v. Schneiderman, 2017; Mastercard, 2013; Visa Inc., 2024).

The retail gasoline market has several characteristics that make it particularly suitable for addressing these challenges. First, gasoline is highly standardized, limiting unobserved quality differences. Prices are quoted in a common unit (cents per gallon), facilitating comparisons across locations and over time. Gasoline is also purchased primarily in person rather than online, limiting substitution across purchasing channels. Second, wholesale gasoline price data are publicly available, allowing me to distinguish price changes driven by upstream costs from those arising at the retail stage. Third, gasoline prices adjust frequently, helping me detect price responses over relatively short periods. Fourth, payment processing costs are substantial relative to gas stations' narrow margins, making even small price adjustments economically meaningful.[13] Finally, payment-specific pricing is particularly visible at gas stations: many display separate cash and credit card prices, allowing me to study actual rather than reported price differences.[14]

From a consumer perspective, gasoline is a substantial recurring expense. In 2024, U.S. households spent about $327 billion on gasoline, or $2,411 per household on average. This exceeds, for example, average spending on apparel ($2,001) and education ($1,569). Outside major urban centers, spending on gasoline is even higher (U.S. Bureau of Labor Statistics, 2025). Taken together, gasoline represents a major retail market with several characteristics that make it particularly well suited to studying the price effects of payment regulation.

4.2 EIA Gasoline Price Data

As outlined in Section 3.2, U.S. surcharge regulation varies at the state level. The main analyses in the paper therefore build on state-level gasoline prices. The data come from the U.S. Energy Information Administration (EIA). The EIA sample covers nine U.S. states: California, Colorado, Florida, Massachusetts, Minnesota, New York, Ohio, Texas, and Washington. These states span all four major U.S. Census regions and account for about 50 percent of U.S. GDP (U.S. Bureau of Economic Analysis, 2025). Figure C.1 illustrates the geographic coverage. My sample period runs from January 2009 through December 2025.

The EIA collects the data through its weekly *Motor Gasoline Price Survey* (U.S. Energy Information Administration, 2026a).[15] Reporting is mandatory for sampled gas stations. Each Monday, sampled stations report the self-service pump price for regular, midgrade, and premium gasoline as of 8:00 a.m. local time. Reported prices include federal, state, and local taxes. The EIA cleans the data and aggregates the station-level observations into volume-weighted price estimates by state and fuel

[13] For U.S. gas stations, NACS (2026) reports average credit card expenses of 8.4 cents per gallon in 2024, compared with a gross fuel margin of 39.7 cents per gallon.

[14] In Yelp customer reviews, for example, higher card prices are mentioned more than five times as frequently at gas stations as in the overall sample. Beyond gas stations, surcharges are also mentioned relatively frequently in reviews of businesses such as nail salons, massage studios, and dry cleaners (Figure B.1).

[15] The EIA uses the survey to monitor the gasoline market and analyze the price effects of legislative requirements. EIA gasoline price data have also been used, for example, to study consumer choice, vehicle valuation, and cost pass-through; see Hastings and Shapiro (2013), Allcott and Wozny (2014), and Sangani (2026).

grade. The survey measures the cash price at the pump. At stations that post separate cash and credit card prices, the EIA records the cash price; at stations that post a uniform price, it records that uniform price. The price does not include potential surcharges paid by credit card users. My main outcome is the weekly state-level all-grades gasoline cash price, measured in cents per gallon.

Table 1 reports gasoline prices by state and treatment period. The panel contains 7,965 state-week observations, with 885 weekly observations for each state. The full-sample mean is 311.6 cents per gallon, with a standard deviation of 70.7 cents. State averages range from 276.5 cents in Texas to 379.6 cents in California. Price differences across states are persistent over time. At the same time, Figure 3 shows large common movements in gasoline prices across states.

For the following analyses, I also draw on several additional data sources, including wholesale gasoline price data, station-level price observations from Google Street View, consumer payment surveys, and online customer reviews. I discuss these data and their role in the analysis in greater detail in the respective results sections and separate data appendices.

4.3 Empirical Strategy and Identification

My empirical strategy exploits the staggered legalization of credit card surcharges across U.S. states. As described in Section 3, Visa and Mastercard removed their national surcharge restrictions in January 2013. As a result, surcharging became legal in U.S. states without independent surcharge prohibitions but remained prohibited elsewhere. Figure 4 provides anecdotal evidence that the 2013 rule change was salient: national search interest in credit card surcharges increased sharply after the first wave of legalization and has continued to trend upward. Several state-level prohibitions were later removed or narrowed through court decisions and changes in state law. I classify states as treated once credit card surcharges become legal under both network rules and state law.[16] States where surcharging remains prohibited are eligible controls.

I use a stacked difference-in-differences design following Cengiz et al. (2019) and Baker, Larcker, and Wang (2022). This approach excludes already-treated states from the control group, avoiding potentially problematic comparisons when treatment effects vary across cohorts or over time (Goodman-Bacon, 2021). Each legalization date defines a separate stack in which newly treated states are compared with states where surcharging remains prohibited. Later-treated states serve as controls until their own treatment date. Massachusetts remains untreated throughout the sample and enters every stack as a control state. The event window in each stack spans up to four years before and after surcharge legalization. The transition week is omitted. The resulting sample contains 11,184 state-week-stack observations, corresponding to 5,666 unique state-weeks.

[16]The treatment dates used in the analysis are January 27, 2013 for Minnesota, Ohio, and Washington; November 4, 2015 for Florida; January 3, 2018 for California; August 16, 2018 for Texas; October 23, 2018 for New York; and July 1, 2022 for Colorado. Table A.2 documents the legal authority for each date. Legal implementation and merchant adoption may occur with some delay.

I estimate the pooled post-treatment effect using

$$y_{stg} = \beta\,(\text{Treated}_{sg} \times \text{Post}_{tg}) + X'_{st}\gamma + \alpha_{sg} + \lambda_{q(t)g} + \varepsilon_{stg}, \tag{3}$$

where s indexes states, t weeks, and g cohort stacks. The outcome y_{stg} is the weekly gasoline cash price. Treated_{sg} identifies treated states within each stack, and Post_{tg} identifies observations after surcharge legalization. The coefficient β compares the change in gasoline cash prices in treated states with the contemporaneous change in eligible control states. The vector X_{st} contains control variables, while α_{sg} and $\lambda_{q(t)g}$ denote state-by-stack and time-by-stack fixed effects. State-by-stack fixed effects absorb time-invariant differences across states, such as persistent differences in geography, demographics, and market structure. Time-by-stack fixed effects absorb common shocks across states within each stack, including national macroeconomic conditions, seasonal patterns, and movements in oil prices.

I also include indicators for two state-specific tax changes that mechanically affected gasoline prices during the sample period. California increased its gasoline excise tax by 12 cents per gallon in November 2017 (California State Legislature, 2017). New York temporarily suspended gasoline taxes in 2022, reducing the tax burden by approximately 16 cents per gallon (New York State Department of Taxation and Finance, 2022). In specifications with additional controls, I add measures of state economic activity and gasoline market conditions. State controls include the monthly unemployment rate, log average weekly wage, personal income growth, and log population. Market controls include the annual state motor fuel tax rate and regional refinery gross inputs, measured at the Petroleum Administration for Defense District (PADD) level. To limit the influence of potential outliers, I winsorize gasoline prices at the 1st and 99th percentiles. I cluster standard errors by state because surcharge legalization varies at the state level.

To avoid placing disproportionate weight on some control observations, I also estimate specifications using corrective weights. These weights rebalance cohort comparisons to account for the fact that states can appear in multiple stacks. The weighted specifications estimate a trimmed aggregate average treatment effect on the treated (ATT) using valid treated–control comparisons (Wing, Freedman, and Hollingsworth, 2024).

As treatment is defined by merchants' legal ability to impose a credit card surcharge, rather than by actual surcharge adoption, the coefficient β captures the reduced-form effect of surcharge legalization on prices. This effect includes direct price responses by gas stations that adopt surcharging and competitive responses by other stations in treated states. In a frictionless setting, credit card surcharges and cash discounts can generate similar pricing outcomes. Cash discounts were legal in every state throughout the sample. The legalization of surcharges therefore expands merchants' abilities to price discriminate by payment method rather than introducing such price discrimination for the first time. In practice, however, surcharges and cash discounts differ in framing, disclosure,

and implementation (Stavins and Shy, 2015; Bourguignon, Gomes, and Tirole, 2019). Any time-invariant effect of cash discounts on prices is absorbed by the empirical design. Gas stations that already price discriminate by payment method have less scope to respond to surcharge legalization and attenuate the treatment effect.

A causal interpretation of the β coefficient requires that, absent surcharge legalization, gasoline prices in treated states would have followed similar trends as those in control states. As I will discuss in Section 5, the pre-treatment dynamics are consistent with this parallel trends assumption. The assumption is also plausible for institutional reasons. The first treatment cohort in 2013 was determined by whether states had pre-existing surcharge bans when a nationwide antitrust settlement required Visa and Mastercard to relax their surcharge restrictions. These state bans dated back to the 1980s and had been largely redundant under the network rules. Most subsequent treatment dates arose from court decisions that invalidated or narrowed these legacy restrictions or legislative repeals. These regulatory changes and their precise timing were not tied to gasoline market conditions. The design further assumes no systematic anticipation of surcharge legalization and no material spillovers into control states. Spillovers across states are possible but likely limited because competition among gas stations tends to be localized (Houde, 2012). Any such spillover into control states would attenuate the estimated treatment effect. Competitive responses among gas stations within treated states are part of the treatment effect.

5 Results

5.1 Retail Gasoline Cash Prices

The main finding of my paper is that legalizing credit card surcharges lowers retail gasoline cash prices. Table 2 reports pooled estimates from the stacked difference-in-differences design outlined in Section 4. The baseline specification in column (1) implies a cash price decline of 6.76 cents per gallon (SE = 2.82) after the legalization of surcharges. The result is statistically significant at the 5 percent level. Relative to the treated pre-period mean of 299.3 cents per gallon, the coefficient corresponds to a price decline of 2.26 percent. The effect is stable across specifications. Column (2) adds state controls to account for differential changes in local economic conditions. Column (3) adds fuel market controls to account for cost-side variation in gasoline markets. Column (4) applies the corrective weights of Wing, Freedman, and Hollingsworth (2024) to rebalance control observations across stacked comparisons. The estimates range from -6.30 to -6.97 cents per gallon and remain statistically significant at the 5 percent level in all four specifications.[17] The full coefficient range

[17] Statistical significance in Table 2 is based on conventional standard errors clustered by state. With only nine clusters, conventional cluster asymptotics may overstate precision, so I also assess significance with wild cluster bootstrap p-values (Cameron, Gelbach, and Miller, 2008; MacKinnon, Nielsen, and Webb, 2023). They remain below 0.10 in all four specifications and below 0.05 in columns (2) and (3).

is less than one cent per gallon. Accounting for observable macroeconomic conditions and for differences in the composition of the stacked control group has little effect on the estimated cash price decline. I will examine the influence of these controls individually in Section 6.1.

The estimand of interest is the average reduced-form effect of surcharge legalization in treated states relative to states in which surcharging remains prohibited. Treatment is defined by gas stations' legal ability to impose credit card surcharges. As such, the estimates in Table 2 capture the overall policy effect of legalizing surcharges on posted cash prices, including potential spillovers and competitive responses.

Figure 5 presents event-study estimates of the dynamic cash price response around surcharge legalization. The figure builds on the baseline specification in column (1) of Table 2 and reports annual coefficients relative to the last year before surcharge legalization. There is no visual evidence for any pre-treatment trends. A formal F-test of the pre-treatment coefficients yields $F(3, 8) = 0.44$ ($p = 0.729$). Together, the pattern is consistent with the identifying parallel trends assumption underlying the stacked difference-in-differences design. The coefficient of interest turns negative in the treatment year and remains negative thereafter. Estimates are statistically significant through year two and only become less precisely estimated at longer horizons. Overall, the results support the notion of a persistent decline in gasoline cash prices after the legalization of credit card surcharges in treated U.S. states.[18]

5.2 Wholesale Gasoline Prices

A potential alternative explanation for the decline in cash prices is that the legalization of surcharges may have coincided with changes in upstream costs or unrelated economic shocks. The headline specifications include controls for observable fuel market conditions and local economic developments. However, these controls may still not fully capture regional supply shocks such as refinery outages, pipeline disruptions, or other changes in local fuel supply that differentially affect treatment and control states. I address this concern with a placebo test based on wholesale gasoline prices. If upstream cost movements or macroeconomic conditions in certain states were driving the decline in retail prices, the corresponding wholesale prices in those states should also decline. By contrast, the legalization of credit card surcharges should have no direct effect on wholesale prices, since wholesale prices are determined upstream of the retail payment stage.

[18] Table E.1 splits the pooled estimates in Table 2 by year since legalization. The estimates are negative in every year and in all four specifications.

The EIA publishes wholesale gasoline spot prices for three major U.S. trading hubs. I match states to regional wholesale benchmarks based on their Petroleum Administration for Defense District (PADD).[19] I then re-estimate the stacked difference-in-differences design from Section 5.1 using the matched wholesale prices as outcome variables.

Table 3 reports the results. Wholesale gasoline prices do not decline after the legalization of surcharges. The tightest specification in column (4) yields an estimate of −0.44 cents per gallon (SE = 0.92). Across the four specifications, the coefficients range from −0.20 to −0.64 cents per gallon. Relative to a treated pre-period mean of about 210 cents per gallon, these estimates correspond to declines of only 0.09 to 0.31 percent. All coefficients are insignificant. The findings weigh against coincident upstream cost movements as an explanation of the main result. The absence of a wholesale price response instead strengthens the interpretation that surcharge legalization drives the retail price decline.[20]

I also directly estimate the effect of legalizing surcharges on the retail-minus-wholesale margin using the same stacked difference-in-differences design. The outcome variable is the retail cash price minus the matched wholesale price. Table E.2 shows that the margin declines by 6.08 to 6.48 cents per gallon across specifications, or 6.81 to 7.26 percent of a treated pre-period mean of about 89 cents per gallon. Because wholesale prices remain largely unchanged, the decline in the retail-minus-wholesale margin closely matches the decline in the retail cash price. This pattern is again consistent with the price adjustment occurring at the retail payment stage rather than at the wholesale stage.

5.3 Evidence on Price Discrimination from Google Street View

The EIA data allow me to study the effect of surcharge legalization on gasoline cash prices. To analyze the prices paid by credit card users, I exploit the fact that U.S. gas stations often publicly display separate cash and credit card prices. I collect these prices by hand from gas station signs in historical Google Street View panoramas. The data provide descriptive evidence on how posted gasoline prices vary by payment method and therefore speak directly to the price unbundling mechanism described in Section 2.

To construct the sample, I focus on the ten major U.S. cities for which the EIA publishes city-level gasoline prices. I use the Yelp online business directory to identify gas stations in each city and its surrounding metropolitan area. I select five stations in each metropolitan area. I limit the number of stations from the same brand and seek to include both dual-price and uniform-price stations across the sample. For each selected station, I manually search historical Google Street View panoramas

[19] Because the EIA does not publish a gasoline spot price benchmark for PADD 4, I match Colorado to the Gulf Coast series.

[20] The wholesale benchmarks are measured at the PADD level, and some treated and control states share the same regional series. The placebo is therefore most informative for cohort comparisons with genuine cross-PADD variation. It does not test every possible state-specific retail shock.

for legible price signs. Street View reports the month and year of each panorama (see Figure C.2). Coverage varies across locations and years so that the number of available observations can vary across stations. I retain approximately one usable panorama per station-year. When a gas station posts payment-specific prices, I record the regular-grade cash and credit card prices. When a gas station posts only one price, I record that uniform price. The final sample contains 519 panoramas from 50 stations. I use this sample to compare observed price schedules.[21]

Figure 6 shows the observed price patterns. To compare prices across cities and months, I first subtract the EIA regular gasoline price for the same city and month from each posted price observed in Google Street View. I then center these differences around zero by subtracting the average cash price difference among dual-price stations. The comparison between cash and credit prices is the cleanest in the figure. Both prices appear on the same sign for the same grade, station, and panorama. Across 118 panoramas with separate cash and credit prices, the credit price is 9.86 cents per gallon higher on average. The median difference is 10.00 cents per gallon. The figure also shows that uniform prices fall between cash and credit prices. On average, uniform prices are about 5 cents per gallon higher than cash prices at dual-price stations.

I formalize these comparisons in Table 4. The unit of observation is a posted price. The 519 panoramas contain 637 posted prices because each of the 118 dual-price panoramas contributes both a cash and a credit card price. I estimate

$$y_i = \beta^{\text{credit}} \,\text{Credit}_i + \beta^{\text{uniform}} \,\text{Uniform}_i + \alpha_{k(i)} + \lambda_{t(i)} + \varepsilon_i, \tag{4}$$

where y_i is the centered price residual plotted in Figure 6. Credit_i indicates a credit card price, and Uniform_i indicates a single posted price. Cash prices in dual-price panoramas form the omitted category. The coefficient β^{credit} measures the credit–cash difference, while β^{uniform} measures the uniform–cash difference. Their difference, $\beta^{\text{credit}} - \beta^{\text{uniform}}$, measures the credit–uniform difference.

The coefficients in the unconditional specifications in Table 4 (columns (1), (3), and (5)) equal the corresponding mean differences plotted in Figure 6. The specifications in columns (2), (4), and (6) include city fixed effects $\alpha_{k(i)}$ and year fixed effects $\lambda_{t(i)}$. The city fixed effects absorb persistent differences between sampled station prices and the local EIA benchmark, while the year fixed effects absorb common changes over time in these residuals. Because the cash and credit card

[21] The sampling design does not support representative estimates of the general prevalence of surcharging at U.S. gas stations. First, a visible cash–credit gap does not map one-for-one to a formal surcharge. Some stations may apply a surcharge without displaying separate cash and credit card prices directly on their observable price signs, while others may frame an observed price difference as a cash discount. Second, the sample deliberately includes both dual-price and uniform-price stations. The purpose of the exercise is not to estimate how common either pricing practice is, but to measure the posted cash–credit price difference when separate prices are observed and compare those prices with uniform prices. The same approach can, in principle, be applied to a larger sample of stations.

prices in each pair share the same city and year, these fixed effects leave the paired cash–credit difference unchanged. For comparisons involving uniform prices, the fixed effects account for average differences across cities and years. Standard errors are clustered by station.

The estimates show a precisely estimated credit–cash price wedge. The credit card price exceeds the cash price by 9.86 cents per gallon in column (1) of Table 4 (SE = 0.71). Column (2) reports the same point estimate with city and year fixed effects (SE = 0.72). Both estimates are statistically significant at the 1 percent level. The unchanged point estimate reflects the paired design: the 118 cash–credit pairs come from 18 stations, and the two prices in each pair share the same city and year. The wedge equals 2.85 percent of the matched local EIA price. In the stylized framework of Section 2, this wedge equals the incremental net cost of accepting credit cards, κ (Equation (2)), assuming markups are equal across payment methods. In practice, however, markups may differ across payment methods, and the net cost of processing specific payments may vary across merchants. Therefore, I interpret the observed wedge more conservatively as a benchmark for payment-specific price differences rather than as a direct estimate of κ.

The remaining estimates in Table 4 compare uniform prices with the credit card and cash prices at dual-price stations. The estimates follow the ordering predicted by the conceptual framework in both specifications, but are less precise than the paired cash–credit estimates. Uniform prices are below credit card prices by 4.86 cents in column (3) (SE = 4.80) and by 3.31 cents in column (4) (SE = 4.71). Uniform prices exceed cash prices by 5.00 cents per gallon in column (5) (SE = 4.54) and by 6.55 cents in column (6) (SE = 4.48). None of these differences is statistically significant. Unlike the paired cash–credit comparison, these estimates compare prices across different signs, which may come from different stations or from the same station at different dates. As a result, the estimates retain station- and date-level price variation that the EIA benchmark does not absorb. Nevertheless, the ordering is directionally consistent with a uniform price that spreads expected card costs across payment methods and separate cash and credit card prices that assign those costs more directly to card users. The paired cash–credit wedge remains the clearest Street View result. The Street View evidence complements the causal cash price estimates by revealing payment-specific prices that are unobserved in the EIA data.

5.4 Consumer Payment Behavior

Section 2 predicts that legalizing credit card surcharges raises the price of paying by credit card relative to cash and therefore reduces credit card use. I test this prediction using data from the Federal Reserve's Diary of Consumer Payment Choice (DCPC). The DCPC is a representative three-day diary of U.S. adults that records payment activity at the transaction level. Respondents report each payment they make during the diary period. For each transaction, the data identify the amount, payment instrument, and merchant category. DCPC data are available for 2012 and annually from 2015 through 2025. I harmonize the available survey waves to obtain consistent

transaction and respondent data over time. The DCPC does not directly identify the location of each transaction, so I assign transactions to the respondent's state of residence.[22] I treat each DCPC survey wave as a separate cross section and apply individual-level survey weights (Foster, 2026; Angrisani, 2019). To align the payment analysis with the gasoline price analysis, I restrict the sample to respondents in the nine EIA states with at least one valid gas station expenditure. Appendix D describes the survey architecture, data harmonization, and sample construction in detail.

For each consumer-year, I calculate the share of gas station payments made by (i) credit card, (ii) cash or debit card, and (iii) other instruments.[23] I estimate the effect of surcharge legalization on these payment shares using the same stacked difference-in-differences design as in the gasoline price analysis (see also Section 4). Treatment is defined by the date on which credit card surcharging became legal in each state, consistent with the gasoline price analysis. Within each stack, newly treated states are compared with not-yet-treated and never-treated states using all available DCPC waves. The baseline specifications include state-by-stack and year-by-stack fixed effects. The tight specifications, reported in the even-numbered columns, also control for state unemployment and per capita personal income growth and apply the corrective weights of Wing, Freedman, and Hollingsworth (2024). Standard errors are clustered by state.[24]

Table 5 presents the results. Panel A reports each consumer's payment shares in dollars. Panel B reports the corresponding shares in transaction counts. The main finding is that surcharge legalization reduces credit card use at gas stations. In the baseline specification, the credit share of gas station dollars falls by 5.06 percentage points (SE = 2.10) from a treated pre-removal mean of 31.8 percent, a relative decline of 15.9 percent. The credit share of transaction counts falls by 4.79 percentage points (SE = 2.16). The effects are similar, but slightly larger, in the tighter specifications. Cash and debit absorb most of the decline in credit card use. In the tight specification, their combined share rises by about 7 percentage points in both dollar spending and transaction counts. Other payment instruments show no detectable response. The shift away from credit cards is consistent with the conceptual framework's prediction that credit card use declines as it becomes relatively more expensive (Section 2). For comparison, Bolt, Jonker, and van Renselaar (2010) estimate that debit card surcharges in the Netherlands reduce the debit card share of retail payments by about 8 percentage points.

[22] I obtain residence information from the DCPC where available and supplement it with the Survey of Consumer Payment Choice (SCPC), an annual companion survey of payment behavior and respondent characteristics, and the Understanding America Study (UAS). One potential concern is that the respondent's state of residence may sometimes differ from the state in which a transaction occurs. However, point estimates are similar when I exclude diary days on which respondents report "traveling".

[23] Other instruments include checks, ACH payments, prepaid instruments, and money orders.

[24] With only nine state clusters, conventional cluster asymptotics may overstate precision, so I also assess significance with wild cluster bootstrap p-values (Cameron, Gelbach, and Miller, 2008; MacKinnon, Nielsen, and Webb, 2023). The credit share results are unchanged. The cash-and-debit estimates remain significant at the 10 percent level in the baseline specifications and at the 5 percent level in the tight specifications.

5.5 Gasoline Consumption

Next, I examine whether the legalization of surcharges has any impact on gasoline consumption. I proxy consumption using monthly state-level gasoline sales from the Energy Information Administration's Form EIA-782C (U.S. Energy Information Administration, 2022). The series records prime supplier gasoline sales for local consumption. The sample runs from January 2009 through March 2022, when the EIA discontinued the survey. Across the eight treated states in the sample, sales average 52.5 billion gallons a year.[25] I estimate the effect of surcharge legalization using the same stacked difference-in-differences design as for gasoline prices, with log monthly sales volume as the outcome. The specifications follow the same progression of fixed effects, state controls, market controls, and corrective weights as in the gasoline price analysis. Controls are measured at monthly frequency where necessary.[26]

The predicted effect of legalizing surcharges on gasoline consumption is ambiguous: cash prices fall while credit prices rise. Moreover, consumers may have limited scope to adjust gasoline consumption in the short run because driving needs and vehicle choices are largely fixed. Consistent with this, Table 6 shows no statistically detectable change in gasoline consumption. Estimates across the specification ladder range from 0.95 to 1.77 percent. All point estimates are positive, but statistically indistinguishable from zero. The tightest specification in column (4) implies a 1.77 percent increase in sales volume (wild cluster bootstrap $p = .418$). The absence of a precisely estimated effect on gasoline consumption lines up with the low price elasticity of gasoline demand documented in other work. Published estimates of this elasticity range from -0.03 to -0.08 in Hughes, Knittel, and Sperling (2008) and from -0.27 to -0.37 in Levin, Lewis, and Wolak (2017) and Coglianese et al. (2017). Even at the upper end of this range, an average price decline of about 2 percent would raise sales by less than 1 percent. Such a response is well within the confidence intervals in Table 6.

6 Robustness

In this section, I return to the paper's headline result. In Section 5.1, I document that surcharge legalization leads to lower retail gasoline cash prices. The event study and wholesale price placebo in Sections 5.1 and 5.2 speak against differential pre-trends and upstream cost shocks as alternative explanations for the observed price decline. Next, I examine other threats to the interpretation that surcharge legalization caused this decline. I show that the price decline persists when adding macroeconomic and fuel-market controls one at a time (rather than in groups) and after excluding the COVID-19 period. I then demonstrate that the result is not driven by individual states or

[25] The average builds on thirteen complete calendar years from 2009 through 2021 and excludes the partial 2022 year. Annual sales are relatively stable over this period, ranging from 46.7 billion gallons in 2020 to 55.6 billion in 2018.

[26] Because the survey ends before Colorado's July 2022 legalization, Colorado is never treated in the quantity sample and serves only as a control state.

treatment cohorts, nor by the weighting and estimation method. I also examine city-level estimates, gasoline grades, and log prices. Finally, I confirm the result across 34,560 alternative regression specifications to address potential concerns about "nonstandard errors" arising from idiosyncratic choices in the empirical design (Menkveld et al., 2024).

6.1 The Role of Individual Control Variables

The main results in Table 2 show that the estimated decline in gasoline cash prices is robust to controlling for observed macroeconomic and fuel-market conditions. However, these controls enter the specifications in groups, potentially masking offsetting effects of individual variables. To address this concern, this subsection separately examines the influence of each control variable. Surcharge legalization could theoretically coincide with changes in local economic conditions, gasoline demand, or fuel supply conditions. If left unaccounted for, these changes could create omitted variable bias because they also affect gasoline prices. The tightest specification in Table 2 controls for unemployment, average weekly wages, personal income growth, and population. These variables capture labor market conditions, consumer purchasing power, and market size. The data come from the BLS Local Area Unemployment Statistics and Quarterly Census of Employment and Wages, the BEA, and the Census via FRED. The specification also controls for state gasoline taxes and regional refinery inputs, which capture tax and fuel-supply conditions. The tax data come from the FHWA, supplemented with EIA data for 2025, and refinery inputs come from the EIA.

Table E.3 adds these controls one at a time to assess whether any particular variable materially affects the estimated price decline. All specifications retain the state-by-stack and year-quarter-by-stack fixed effects and the indicators for California's S.B. 1 tax increase and New York's gasoline tax holiday. All specifications also apply the corrective weights of Wing, Freedman, and Hollingsworth (2024). Without the six additional controls, the estimated effect is slightly larger in magnitude than in the tightest specification (-7.27 cents per gallon; SE $= 3.10$). Adding the controls one at a time produces estimates from -7.03 to -7.37 cents. The joint specification yields -6.97 cents per gallon (SE $= 2.79$), the headline estimate in Table 2. The point estimate therefore moves by less than one cent across the full sequence. No individual control materially changes the estimated effect of surcharge legalization on gasoline cash prices.

6.2 COVID-19 Period

The estimated decline in gasoline cash prices is not driven by the COVID-19 period. The pandemic sharply reduced commuting and caused large swings in fuel demand. Consumer payment behavior also changed, with consumers using less cash (Greene, Merry, and Stavins, 2021). Since the pandemic

may have affected states differently, it could in principle move the pooled estimate. In Table E.4, I therefore exclude all observations from March 2020 through June 2021, recompute the corrective weights on the restricted sample, and then re-estimate the specification ladder.

The main findings remain unchanged when I exclude the COVID-19 period. All four estimates in the specification ladder remain statistically significant at the 5 percent level. In the tightest specification, the magnitude of the estimate declines from −6.97 cents per gallon in the full sample to −5.66 cents after excluding the pandemic period. This still corresponds to a 1.88 percent decline in gasoline cash prices relative to the treated pre-period mean. The smaller magnitude may reflect the pandemic shift away from cash, which could have raised the card processing costs embedded in uniform prices during those months. While the sample restriction cannot directly isolate this channel, it establishes that the headline price decline is not generated by the pandemic months.

6.3 Sample Composition and Population Weighting

The negative sign of the pooled estimate does not depend on any individual state. Table E.5 removes each of the nine states from both its treated and comparison roles and re-estimates the tightest specification. All nine estimates remain negative and statistically significant at least at the 10 percent level. They range from −2.75 cents per gallon when Colorado is removed to −8.60 cents when Ohio is removed. Massachusetts is the only state that remains untreated throughout the sample. Dropping Massachusetts yields an estimate of −7.58 cents per gallon (SE = 2.58). Because Massachusetts is the sole comparison state for Colorado, this exercise also removes the treatment period for the Colorado stack. As a complementary check, I also drop each of the four treatment cohorts in turn. This tests whether the pooled result is driven by a single legalization episode rather than a single state. The pooled estimate remains negative in every case, ranging from −5.07 to −11.54 cents per gallon in the tight specification, and is statistically significant at least at the 10 percent level.

The baseline design gives each state similar weight, regardless of each state's population. State population ranges from 5.2 million in Colorado to 39.3 million in California in the years before legalization. The resulting estimate therefore describes the average legalizing state. Applying population weights instead gives more emphasis to larger states and yields more informative estimates for aggregate magnitudes. In Table E.6 I re-estimate the model using pre-treatment population weights. The resulting estimates range from −5.45 to −6.12 cents per gallon. The tightest specification yields an estimate of −6.08 cents (SE = 2.63), close to the headline estimate of −6.97 cents. Thus, the headline finding does not depend on placing disproportionate weight on less populous states.

6.4 Alternative Estimation Approach

The previous checks retain the stacked difference-in-differences design and change its sample or weights. The stacked design is well suited to my setting because it accommodates time-varying state controls, such as tax changes and refinery inputs, within a single regression. As a complementary approach, I also compute a long-difference estimate following Callaway and Sant'Anna (2021). For each treatment cohort g and horizon h, I compute

$$\widehat{\tau}_{g,h} = \left(\bar{y}^{T}_{g,\text{post},h} - \bar{y}^{T}_{g,\text{pre},h}\right) - \left(\bar{y}^{C}_{g,\text{post},h} - \bar{y}^{C}_{g,\text{pre},h}\right),$$

where $\bar{y}^{T}_{g,\text{pre},h}$ and $\bar{y}^{T}_{g,\text{post},h}$ are average gasoline cash prices for states in cohort g during the h years before and after legalization. The corresponding terms $\bar{y}^{C}_{g,\text{pre},h}$ and $\bar{y}^{C}_{g,\text{post},h}$ are averages for states that had not yet legalized surcharges when cohort g was treated. The weekly price series are first averaged to state-quarter cells. I then aggregate the cohort estimates using treated-group-size weights,

$$\widehat{\tau}_{h} = \sum_{g} \omega_{g} \widehat{\tau}_{g,h}, \qquad \omega_{g} = \frac{N_{g}}{\sum_{j} N_{j}},$$

where N_g is the number of treated states in cohort g.

Unlike the stacked regressions in Section 5.1, this estimator uses no controls or corrective weights. The California S.B. 1 and New York tax holiday adjustments are applied directly to the outcome. The closest benchmark is therefore column (1) of Table 2, which uses neither. That benchmark specification yields an estimate of -6.76 cents per gallon (SE $= 2.82$).

The long-difference estimates in Table E.7 confirm a negative effect of surcharge legalization on gasoline cash prices. Using two years before and after treatment, gasoline cash prices decline by 4.33 cents per gallon (SE $= 1.51$), statistically significant at the 1 percent level. The retail-minus-wholesale margin declines by 3.74 cents (SE $= 1.77$), significant at the 5 percent level. Using four years on each side yields smaller estimates of -3.65 cents for the cash price (SE $= 2.67$) and -2.67 cents for the margin (SE $= 2.62$), neither of which is statistically significant. The long-difference estimates are smaller than the stacked estimates, although the two-year cash price estimate lies within one standard error of the closest stacked benchmark. Since estimates across Table 2 differ by only about 0.7 cents, the absence of controls is unlikely to fully explain this difference. The remaining difference may instead reflect the long-difference estimator's quarterly averaging and different aggregation across cohorts. Overall, the negative price response is not specific to the stacked regression, although the longer-horizon estimates are less precise.

6.5 City-Level Results, Gasoline Grades, and Log Prices

Although surcharge legalization varies at the state level, the estimated price decline is also visible at a finer geographic level. State averages could potentially mask changes in the composition of local gasoline markets. I therefore re-estimate the design using weekly gasoline prices that the EIA publishes for ten major metropolitan areas. This EIA "city sample" covers eight of the nine states in the main panel and adds Chicago, Illinois.[27] The results are in Table 7. The specification replaces state-by-stack with city-by-stack fixed effects. The empirical design is otherwise unchanged. All four cash price estimates remain negative and statistically significant at least at the 10 percent level. They range from −4.60 to −5.79 cents per gallon. The tightest specification yields an estimate of −5.38 cents (SE = 2.62), or 1.75 percent of the treated pre-period mean. The city-level estimates are somewhat smaller than the corresponding state-level estimates. One possible explanation is that the state-level sample also covers rural areas, where local market structure may differ from that in major cities. At the same time, the city and state samples are not fully nested, and the observed gap is small relative to the standard errors.

The main results use the EIA all-grades gasoline price series. I also estimate the effect separately for regular, midgrade, and premium gasoline. Table E.8 shows cash price declines of 5.17 cents per gallon for regular gasoline (SE = 2.15), 8.34 cents for midgrade (SE = 3.47), and 8.93 cents for premium (SE = 4.72). The regular- and midgrade estimates are statistically significant at the 5 percent level, and the premium estimate at the 10 percent level. Within each grade, the baseline and tight estimates differ by roughly one cent or less. The point estimates are more negative for higher grades. However, the estimates are not precise enough to establish differences across grades. The negative price response appears in all three price series, so the all-grades result is not driven by a single grade.

Finally, I show that the result is robust to expressing gasoline prices in levels or logs. I re-estimate the specification ladder using log gasoline cash prices as the outcome. This provides a proportional specification, which is natural because card processing fees and surcharge limits often scale with transaction value. The tightest specification in Table E.9 yields an estimate of −2.56 percent (SE = 0.80 percentage points), close to the 2.33 percent decline implied by the level estimate. All four log price estimates are statistically significant at least at the 5 percent level.

6.6 34,560 Alternative Regression Specifications

The targeted robustness tests in the previous subsections address specific economic threats to the interpretation of my findings. In this subsection, I address the broader concern that the headline estimate may reflect idiosyncratic empirical choices (Menkveld et al., 2024; Simonsohn, Simmons,

[27] Chicago is treated in 2013 because Illinois had no state surcharge ban when Visa's and Mastercard's network rules on surcharging changed.

and Nelson, 2020). To assess such "nonstandard errors," I identify several dimensions of empirical discretion and re-estimate the cash price effect across a wide range of alternative specifications. I vary the following dimensions:

(1) Gasoline grade – The main analysis uses the EIA all-grades price series. I also use regular gasoline prices to test whether aggregation across fuel grades affects the estimate.

(2) Event window – I use symmetric windows of two, three, and four years before and after legalization. I also use an asymmetric window that retains all available observations. This tests whether the estimate depends on the chosen treatment horizon.

(3) Sample start date – The main sample starts in 2009, four years before the first treatment date. I also start the sample in 2010 or 2011 to test whether the earliest sample years affect the results.

(4) Winsorization level – The main analysis winsorizes gasoline prices at the 1st and 99th percentiles. I also use raw prices without winsorization.

(5) Winsorization rule – When winsorizing prices, I vary how the cutoff values are calculated. I compute them using unique state-week observations, the stacked estimation sample, or observations within each state.

(6) Weighting – I consider unweighted specifications, population weights, and the corrective weights of Wing, Freedman, and Hollingsworth (2024). These choices vary how states and repeated control observations contribute to the pooled estimate.

(7) Controls – I estimate specifications with no additional controls, state controls, fuel market controls, or both sets of controls. This varies the extent to which observed macroeconomic and fuel-market conditions are accounted for.

(8) Time fixed effects – I use year-by-stack, year-quarter-by-stack, year-month-by-stack, or year-week-by-stack fixed effects. Finer fixed effects absorb common gasoline price movements over shorter periods.

(9) Data frequency – The main analysis uses weekly prices. I also aggregate the data to monthly and quarterly frequency to test whether the result depends on high-frequency price variation.

(10) Standard error clustering – I use either state-level or two-way clustering. This tests whether statistical precision is sensitive to the clustering choice.

(11) COVID-19 period – I estimate specifications both with and without observations from March 2020 through June 2021. This tests whether the unusual gasoline market conditions during the pandemic affect the results.

Combining these choices yields 34,560 alternative regression specifications.[28] The identifying design remains unchanged throughout. Treatment is always the legalization of credit card surcharges at the state level, and every specification preserves the cohort stacks and includes state-by-stack and time-by-stack fixed effects.

Panel A of Figure 7 plots the distribution of the estimated coefficients. The estimate is negative in every specification. The median is −5.67 cents per gallon, with an interquartile range from −6.85 to −4.63 cents. The least negative estimate is −1.02 cents. The headline estimate of −6.97 cents lies just beyond the more negative edge of the interquartile range, while the distribution is centered well below zero. Panel B plots the corresponding distribution of t-statistics. The median t-statistic is −2.18. Across all specifications, 65.2 percent of t-statistics fall below −1.96 and 83.0 percent fall below −1.645, indicating that most estimates are statistically significant at conventional thresholds. Statistical precision varies across specifications. Despite this variation, most estimates imply economically meaningful price declines. The specification grid shows that the central result does not depend on a narrow combination of empirical choices.

Figure E.1 in Appendix E breaks down the specifications by each dimension. Horizontal shifts reflect changes in the estimated effect. Vertical shifts reflect changes in statistical significance. Across all specification groups, the median cash price decline is at least 5 cents per gallon and the median t-statistic is below −1.645. Gasoline grade, time fixed effects, and the COVID-19 period have the largest effects on the coefficient. Yet they shift the median estimate by at most 1.5 cents per gallon. Excluding the pandemic months, for example, reduces the estimated decline by about 1.2 cents and the standard error by about 0.5 cents. The t-statistic remains nearly unchanged. This is consistent with the findings in Table E.4. Time fixed effects and state controls have the largest effects on the t-statistics. Year-by-stack fixed effects yield estimates about 1.3 cents more negative than year-quarter-by-stack fixed effects, with similar standard errors. They also account for most of the left tail in Panel A of Figure 7. By contrast, year-month and year-week fixed effects change the median coefficient by less than 0.3 cents. State controls reduce standard errors by about 15 percent without materially changing the coefficient. Aggregating weekly prices to monthly or quarterly frequency increases standard errors by only about 5 percent. The result therefore does not depend on the exact week of legalization, consistent with a nonuniform adoption of surcharges across gas stations. Winsorization, the sample start year, and the clustering method have little effect on the estimates or their t-statistics.

[28] In the order of the list, the dimensions combine to $2 \times 4 \times 3 \times 4 \times 3 \times 4 \times 15 \times 2 = 34{,}560$ specifications. Winsorization, items (4) and (5), contributes four variants rather than six because the three cutoff rules coincide when prices are not winsorized. The factor of 15 counts the feasible combinations of items (8) to (10). Time fixed effects cannot be finer than the data frequency. On monthly and quarterly data, I use two-way clustering only when the time fixed effects match the data frequency.

7 Discussion

7.1 Interpreting the Price Effects

Based on the four main specifications in Table 2, the legalization of credit card surcharges lowers gasoline cash prices by 6.30 to 6.97 cents per gallon. Across 34,560 alternative specifications, the median estimated price decline is 5.67 cents (Figure 7). For regular-grade gasoline, the estimated price decline is 4.99 to 5.17 cents per gallon (Table E.8). Collectively, these estimates point to a cash price decline of about 6 cents per gallon, or about 2 percent of the treated pre-period mean. The placebo test on wholesale gasoline prices yields no corresponding decline (Table 3), consistent with surcharges operating at the consumer payment stage.

The hand-collected Google Street View data provide support for the proposed price unbundling mechanism. At stations that post separate cash and credit card prices, credit card prices exceed cash prices by about 10 cents per gallon on average (Table 4). At stations that do not visibly price discriminate by payment method, prices are about 5 cents higher than cash prices at dual-price stations. Although it is less precisely estimated, the price difference is similar in magnitude to the estimated decline in regular-grade cash prices. Overall, the pattern is consistent with the framework in Section 2: under price coherence, payment processing costs enter the uniform price, while surcharges shift these costs toward credit card users.

Price competition can spread the effects of legalizing surcharges across merchants. Gas stations respond to the prices of competing stations (Barron, Umbeck, and Waddell, 2008; Byrne and de Roos, 2019). A lower cash price at one station can put pressure on nearby stations to lower their prices, including stations that retain a uniform price. Relatedly, competition can limit how much merchants gain from adopting surcharges. If higher credit card prices are fully offset by lower cash prices, surcharges merely reallocate payment processing costs across consumers without increasing merchants' profits.

Legalizing surcharges could still benefit merchants through other channels. First, surcharges can change how consumers pay. In my sample, the credit card share of gas station payments falls by approximately 5 to 6 percentage points. The decline is offset by higher cash and debit use (Table 5). This substitution plausibly lowers merchants' average payment processing costs. Second, lower cash prices may increase in-store sales. Most U.S. gasoline is sold at convenience stores. These stores earn a substantial share of their gross profit from in-store sales and often use gasoline to draw customers into the store (NACS, 2026). Because card users can pay at the pump, whereas cash payers typically pay at the register, a lower cash price can bring more customers into the store, where they may buy higher-margin products. Third, surcharge rights may strengthen merchants' bargaining position with payment providers. Evidence from Australia, for example, indicates that merchants can use the threat of surcharging as a negotiating tool to exert downward pressure on card acceptance costs

(Reserve Bank of Australia, 2026). Here, too, competitive pressure may induce gas stations to pass some of these additional benefits on to consumers through lower prices. This, in turn, could amplify the cash price decline beyond the direct effect of relaxing price coherence.

The simplified framework in Section 2 isolates the direct price effect of relaxing price coherence. To illustrate the unbundling mechanism, the framework abstracts from merchants' adoption decisions and holds markups, processing costs, and consumer payment behavior fixed when comparing the two pricing regimes. In contrast, the reduced-form estimates in Section 5 capture the overall price response to surcharge legalization. Beyond direct price unbundling, the estimates reflect endogenous responses by various market participants. These include (i) merchants' decisions to adopt surcharges, (ii) price adjustments by non-adopting competitors, (iii) potential changes in card processing fees set by payment intermediaries, and (iv) shifts in consumer payment behavior.

7.2 Implications for Market Participants

When applied to aggregate gasoline sales volumes, the estimated cash price decline is economically meaningful. During the sample period, gas stations in the eight treated states sold an average of 52.5 billion gallons of gasoline per year (U.S. Energy Information Administration, 2022). Before the legalization of surcharges, credit cards accounted for 31.8 percent of the average consumer's gas station spending (Table 5). Table 6 shows no statistically detectable change in gasoline consumption after the legalization of surcharges. Using the pre-treatment credit card spending share as a proxy for the credit card share of gasoline sales, a 6-cent price decline applied to the remaining $(1 - 0.318) \times 52.5 = 35.8$ billion gallons implies roughly \$2.1 billion in lower annual spending by non-credit-card users.

The welfare implications for individual consumers depend on how they pay. In the stylized framework of Section 2, consumers who pay cash under both pricing regimes unequivocally benefit from lower prices. Consumers who continue to pay by credit card, in turn, face higher prices. For consumers who switch from credit to cash, the welfare effect is ambiguous and depends on their private benefits of card use. The empirical results establish a decline in cash prices following the legalization of surcharges. The Street View data suggest that credit card prices are higher at dual-price stations than at single-price stations. Together, both results support the framework's central distributional implication: surcharge legalization can reduce the implicit subsidy from cash payers to credit card users. Assessing the net change in consumer surplus would require additional assumptions. Specifically, the calculation depends on how widely surcharges are adopted, how prices change at adopting and non-adopting stations, how consumers switch between payment methods, and how much consumers value the benefits of different payment methods.

Consumer surplus is only one component of total welfare. All else equal, merchants should benefit from surcharge rights, although competitive pressure may force them to pass part of these benefits on to consumers. Payment intermediaries, on the other hand, should lose fee revenue as credit card

use declines. The resulting changes in merchant profits and intermediary surplus are not separately identified in my setting. Surcharge legalization may also lead to endogenous adjustments in card processing fees. These fees represent costs for merchants but revenues for payment intermediaries. Changes in card processing fees can redistribute surplus without necessarily changing total welfare. Finally, welfare also depends on the real costs of processing different payment methods.

Beyond these broader welfare considerations, my analyses highlight a notable tension in surcharge policy. The estimated cash price decline implies substantial savings for non-credit-card users, yet in practice consumer reactions to surcharges appear strongly negative. Yelp customer reviews that mention a surcharge are markedly more negative than other reviews, even within the same business (Table B.2). This difference persists over time and, if anything, becomes stronger in later years (Figure B.2).[29] Surcharges make payment processing costs explicit. Without them, these costs may still be embedded in retail prices but be less apparent to consumers (see also Gabaix and Laibson, 2006). This asymmetry could explain why surcharges remain controversial despite their potential to reduce the implicit subsidy from non-credit-card payers to credit card users. As such, possible surcharge reforms may be difficult to implement without thoroughly educating consumers about their effects.

8 Conclusion

This paper studies how legalizing credit card surcharges affects retail prices. After the legalization of surcharges, gasoline cash prices fall by approximately 2 percent. When merchants post separate cash and credit card prices, credit card prices are higher than cash prices. These patterns are consistent with surcharges allowing merchants to unbundle the costs of accepting credit cards from the uniform price and recover them directly from credit card users. Consumers respond to surcharges by shifting their payments away from credit cards, implying that surcharges can steer consumers toward lower-cost payment methods. Taken together, the findings suggest that surcharges can be an effective tool for merchants to recover rising payment processing costs directly from the consumers who generate them.

More broadly, the findings provide causal evidence on the pass-through of payment processing costs into retail prices. Under price coherence, merchants incorporate these costs uniformly into prices. Cash payers therefore bear part of the cost of credit card payments. Legalizing surcharges relaxes price coherence and allows merchants to shift these costs toward credit card users. In that sense, surcharges can reduce the implicit subsidy from cash payers to credit card users. In my sample,

[29] Customer reviews naturally capture negative reactions more readily than offsetting gains. An explicit surcharge gives card users a reason to complain, whereas small price declines for cash payers are likely to be less salient. However, survey evidence also points to consumer aversion to surcharges and a preference for all-inclusive prices (Reserve Bank of Australia, 2026).

surcharge legalization lowers annual spending by non-credit-card payers by about $2.1 billion. This provides empirical support for a central implication of canonical two-sided market models: enforced price coherence imposes intermediation costs on consumers who do not use the intermediary.

My findings are relevant for ongoing debates over surcharge restrictions. I exploit variation in merchants' ability to impose surcharges across U.S. states. Yet the policy debate extends well beyond the United States. Australia maintained a regulatory framework protecting merchants' ability to surcharge for more than two decades, before reversing that framework in October 2026 as part of a broader reform. In the European Union, surcharge rules varied widely across member states before PSD2 largely prohibited surcharges in 2018. In the United States, by contrast, surcharges are now permitted in most states. These policy differences point to a need for more evidence on the welfare implications of surcharge regulation in different settings. They also raise a broader question about how surcharge regulation interacts with other features of the payment system, including fee caps and card rewards.

A full welfare assessment requires more comprehensive data on surcharge adoption, all-in consumer prices, the private costs and benefits of different payment methods, endogenous changes in merchant processing costs, and the surplus of payment intermediaries. Future work could also examine how broadly the findings in my paper extend beyond the U.S. gasoline market. Overall, my paper shows that surcharge regulation can materially affect retail prices and consumer payment choice, shaping how payment processing costs are allocated among market participants.

References

Agarwal, Sumit, Souphala Chomsisengphet, Neale Mahoney, and Johannes Stroebel, 2015, Regulating consumer financial products: Evidence from credit cards, *Quarterly Journal of Economics* 130, 111–164.

Agarwal, Sumit, Andrea Presbitero, André F. Silva, and Carlo Wix, 2026, Who pays for your rewards? Redistribution in the credit card market, Working paper.

Ahnert, Toni, Peter Hoffmann, and Cyril Monnet, 2025, Payments and privacy in the digital economy, *Journal of Financial Economics* 169, 104050.

Allcott, Hunt, and Nathan Wozny, 2014, Gasoline prices, fuel economy, and the energy paradox, *Review of Economics and Statistics* 96, 779–795.

Alvarez, Fernando, and David Argente, 2022, On the effects of the availability of means of payments: The case of Uber, *Quarterly Journal of Economics* 137, 1737–1789.

American Express, 2012, Merchant regulations—U.S., April 2012 edition, reproduced in the joint appendix in *Ohio v. American Express Co.*, No. 16-1454, appliedantitrust.com/21_npvr/02_credit_cards/amex_doj/4_sct_merits/ohio_us_joint_appendix12_7_2017.pdf.

Andriotis, AnnaMaria, 2025, Visa and Mastercard near deal with merchants that would change rewards landscape, The Wall Street Journal.

Angrisani, Marco, 2019, 2019 Survey and Diary of Consumer Payment Choice: Sampling and weighting, Technical note, University of Southern California, Center for Economic and Social Research.

Baker, Andrew C., David F. Larcker, and Charles C. Y. Wang, 2022, How much should we trust staggered difference-in-differences estimates?, *Journal of Financial Economics* 144, 370–395.

Barron, John M., Michael E. Staten, and John Umbeck, 1992, Discounts for cash in retail gasoline marketing, *Contemporary Economic Policy* 10, 89–102.

Barron, John M., John R. Umbeck, and Glen R. Waddell, 2008, Consumer and competitor reactions: Evidence from a field experiment, *International Journal of Industrial Organization* 26, 517–531.

Baxter, William F., 1983, Bank interchange of transactional paper: Legal and economic perspectives, *Journal of Law and Economics* 26, 541–588.

Benetton, Matteo, and Greg Buchak, 2024, Revolving credit to SMEs: The role of business credit cards, Working paper.

Berg, Tobias, Valentin Burg, Jan Keil, and Manju Puri, 2025, The economics of "Buy Now, Pay Later": A merchant's perspective, *Journal of Financial Economics* 171, 104093.

Bolt, Wilko, Nicole Jonker, and Corry van Renselaar, 2010, Incentives at the counter: An empirical analysis of surcharging card payments and payment behaviour in the Netherlands, *Journal of Banking & Finance* 34, 1738–1744.

Bourguignon, Hélène, Renato Gomes, and Jean Tirole, 2019, Shrouded transaction costs: Must-take cards, discounts and surcharges, *International Journal of Industrial Organization* 63, 99–144.

Bundeskartellamt, 2023, Examination of a price parity clause – Bundeskartellamt terminates proceeding against Lieferando, www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2023/12_07_2023_Lieferando.html.

Byrne, David P., and Nicolas de Roos, 2019, Learning to coordinate: A study in retail gasoline, *American Economic Review* 109, 591–619.

California State Legislature, 2017, Senate Bill No. 1: Transportation funding, approved April 28, 2017, leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1.

Callaway, Brantly, and Pedro H. C. Sant'Anna, 2021, Difference-in-differences with multiple time periods, *Journal of Econometrics* 225, 200–230.

Cameron, A. Colin, Jonah B. Gelbach, and Douglas L. Miller, 2008, Bootstrap-based improvements for inference with clustered errors, *Review of Economics and Statistics* 90, 414–427.

Cengiz, Doruk, Arindrajit Dube, Attila Lindner, and Ben Zipperer, 2019, The effect of minimum wages on low-wage jobs, *Quarterly Journal of Economics* 134, 1405–1454.

Coglianese, John, Lucas W. Davis, Lutz Kilian, and James H. Stock, 2017, Anticipation, tax avoidance, and the price elasticity of gasoline demand, *Journal of Applied Econometrics* 32, 1–15.

Congressional Research Service, 2024, Credit card swipe fees and routing restrictions, CRS Report R48216, by Andrew P. Scott.

Dana's Railroad Supply v. Attorney General, 2015, 807 F.3d 1235 (11th Cir. 2015), No. 14-14426.

Di Maggio, Marco, Angela Ma, and Emily Williams, 2025, In the red: Overdrafts, payday lending, and the underbanked, *Journal of Finance* 80, 1691–1738.

Drechsler, Itamar, Hyeyoon Jung, Weiyu Peng, Dominik Supera, and Guanyu Zhou, 2026, Credit card banking, Working paper.

Edelman, Benjamin, and Julian Wright, 2015, Price coherence and excessive intermediation, *Quarterly Journal of Economics* 130, 1283–1328.

Egan, Mark L., Gregor Matvos, Amit Seru, Lulu Wang, and Vincent Yao, 2026, Who pays for payments?, Working paper.

European Commission, 2025, Electronic and cash payments and rules on surcharges, europa.eu/youreurope/business/finance-funding/making-receiving-payments/electronic-cash-payments/index_en.htm.

European Court of Auditors, 2025, Digital payments in the EU: Progress towards making them safer, faster and less expensive, despite remaining gaps, Special Report 01/2025.

Expressions Hair Design v. Schneiderman, 2017, 581 U.S. 37 (2017), No. 15-1391.

Felt, Marie-Hélène, Fumiko Hayashi, Joanna Stavins, and Angelika Welte, 2023, Regressive effects of payment card pricing and merchant cost pass-through in the United States and Canada, *Journal of Banking & Finance* 154, 106968.

Financial Consumer Agency of Canada, 2025, Merchant surcharges, service and convenience fees, and discounts, www.canada.ca/en/financial-consumer-agency/services/merchants/credit-fees-merchant.html.

Foros, Øystein, Hans Jarle Kind, and Greg Shaffer, 2017, Apple's agency model and the role of most-favored-nation clauses, *RAND Journal of Economics* 48, 673–703.

Foster, Kevin, 2026, Data user's guide: 2025 Diary of Consumer Payment Choice, Federal Reserve Bank of Atlanta, www.atlantafed.org/-/media/Project/Atlanta/FRBA/Documents/banking/consumer-payments/survey-diary-consumer-payment-choice/2025/dcpc-2025-data-codebook.pdf.

Frankel, Alan S., 1998, Monopoly and competition in the supply and exchange of money, *Antitrust Law Journal* 66, 313–361.

Gabaix, Xavier, and David Laibson, 2006, Shrouded attributes, consumer myopia, and information suppression in competitive markets, *Quarterly Journal of Economics* 121, 505–540.

Glickman, Ben, 2026, Trump throws his weight behind credit-card legislation most feared by banks, The Wall Street Journal.

Gomes, Renato, and Jean Tirole, 2018, Missed sales and the pricing of ancillary goods, *Quarterly Journal of Economics* 133, 2097–2169.

Goodman-Bacon, Andrew, 2021, Difference-in-differences with variation in treatment timing, *Journal of Econometrics* 225, 254–277.

Greene, Claire, Ellen Merry, and Joanna Stavins, 2021, Has COVID changed consumer payment behavior?, Working paper.

Greene, Claire, Oz Shy, and Joanna Stavins, 2026, Merchant steering of consumer payment choice, Working paper.

Hastings, Justine S., and Jesse M. Shapiro, 2013, Fungibility and consumer choice: Evidence from commodity price shocks, *Quarterly Journal of Economics* 128, 1449–1498.

Houde, Jean-François, 2012, Spatial differentiation and vertical mergers in retail markets for gasoline, *American Economic Review* 102, 2147–2182.

Hughes, Jonathan E., Christopher R. Knittel, and Daniel Sperling, 2008, Evidence of a shift in the short-run price elasticity of gasoline demand, *The Energy Journal* 29, 113–134.

Italian Colors Restaurant v. Becerra, 2018, 878 F.3d 1165 (9th Cir. 2018), No. 15-15873.

Johnson, Justin P., 2017, The agency model and MFN clauses, *Review of Economic Studies* 84, 1151–1185.

Koulayev, Sergei, Marc Rysman, Scott Schuh, and Joanna Stavins, 2016, Explaining adoption and use of payment instruments by US consumers, *RAND Journal of Economics* 47, 293–325.

Levin, Laurence, Matthew S. Lewis, and Frank A. Wolak, 2017, High frequency evidence on the demand for gasoline, *American Economic Journal: Economic Policy* 9, 314–347.

MacKinnon, James G., Morten Ørregaard Nielsen, and Matthew D. Webb, 2023, Cluster-robust inference: A guide to empirical practice, *Journal of Econometrics* 232, 272–299.

Mantovani, Andrea, Claudio A. Piga, and Carlo Reggiani, 2021, Online platform price parity clauses: Evidence from the EU Booking.com case, *European Economic Review* 131, 103625.

Mastercard, 2013, Mastercard Rules 5.11.2, effective January 27, 2013, www.mastercard.com/content/dam/mccom/us/business/documents/Merchant-Surcharge-Rules.pdf.

MasterCard and Others v Commission, 2014, Case C-382/12 P, ECLI:EU:C:2014:2201.

Menkveld, Albert J., Anna Dreber, Felix Holzmeister, Juergen Huber, Magnus Johannesson, Michael Kirchler, Sebastian Neusüß, et al., 2024, Nonstandard errors, *Journal of Finance* 79, 2339–2390.

Merchant Interchange Fee Umbrella Proceedings, 2026, [2026] CAT 11.

Mukharlyamov, Vladimir, and Natasha Sarin, 2025, Price regulation in two-sided markets: Empirical evidence from debit cards, *Journal of Financial Economics* 172, 104094.

NACS, 2026, Key facts about fueling, www.convenience.org/topics/fuels-and-energy/the-us-petroleum-industry-statistics-definitions.

New York State Department of Taxation and Finance, 2022, Suspension of certain taxes on motor fuel and diesel motor fuel beginning June 1, 2022, Important Notice N-22-1, issued May 11, 2022.

Ohio v. American Express Co., 2018, 585 U.S. 529 (2018), No. 16-1454.

Ouyang, Shumiao, 2026, Cashless payment and financial inclusion, *Journal of Financial Economics* 180, 104277.

Parlour, Christine A., and Uday Rajan, 2025, New payment rails: Implications for banking, *Annual Review of Financial Economics* 17, 207–223.

Reserve Bank of Australia, 2026, Review of merchant card payment costs and surcharging: Conclusions paper, www.rba.gov.au/payments-and-infrastructure/review-of-retail-payments-regulation/2026-03/conclusions-paper/pdf/conclusions-paper.pdf.

Rochet, Jean-Charles, and Jean Tirole, 2002, Cooperation among competitors: Some economics of payment card associations, *RAND Journal of Economics* 33, 549–570.

Rochet, Jean-Charles, and Jean Tirole, 2003, Platform competition in two-sided markets, *Journal of the European Economic Association* 1, 990–1029.

Rochet, Jean-Charles, and Jean Tirole, 2006, Two-sided markets: A progress report, *RAND Journal of Economics* 37, 645–667.

Rochet, Jean-Charles, and Jean Tirole, 2011, Must-take cards: Merchant discounts and avoided costs, *Journal of the European Economic Association* 9, 462–495.

Rysman, Marc, 2009, The economics of two-sided markets, *Journal of Economic Perspectives* 23, 125–143.

Rysman, Marc, and Julian Wright, 2014, The economics of payment cards, *Review of Network Economics* 13, 303–353.

Sainsbury's Supermarkets Ltd v Visa Europe Services LLC, 2020, [2020] UKSC 24.

Sangani, Kunal, 2026, Complete pass-through in levels, *Quarterly Journal of Economics* 141, 1077–1135.

Schmalensee, Richard, 2002, Payment systems and interchange fees, *Journal of Industrial Economics* 50, 103–122.

Schuh, Scott, Oz Shy, and Joanna Stavins, 2010, Who gains and who loses from credit card payments? Theory and calibrations, Working paper.

Schuh, Scott, Oz Shy, Joanna Stavins, and Robert Triest, 2012, An economic analysis of the 2011 settlement between the Department of Justice and credit card networks, *Journal of Competition Law and Economics* 8, 107–144.

Simonsohn, Uri, Joseph P. Simmons, and Leif D. Nelson, 2020, Specification curve analysis, *Nature Human Behaviour* 4, 1208–1214.

Stavins, Joanna, 2018, Consumer preferences for payment methods: Role of discounts and surcharges, *Journal of Banking & Finance* 94, 35–53.

Stavins, Joanna, and Oz Shy, 2015, Merchant steering of consumer payment choice: Evidence from a 2012 diary survey, *Journal of Behavioral and Experimental Economics* 55, 1–9.

Sullivan, Michael, forthcoming, Fee optimality in a two-sided market, *Journal of Political Economy*.

UK Department for Business and Trade, 2018, Consumer rights: Payment surcharges, updated June 22, 2018, www.gov.uk/government/publications/payment-surcharges.

U.S. Bureau of Economic Analysis, 2025, Gross domestic product by state and personal income by state, 4th quarter 2024 and preliminary 2024, News release BEA 25-12.

U.S. Bureau of Labor Statistics, 2025, Table 1721. Type of Area: Annual Expenditure Means, Shares, Standard Errors, and Relative Standard Errors, Consumer Expenditure Surveys, 2024, www.bls.gov/cex/tables/calendar-year/mean-item-share-average-standard-error/cu-area-type-2024.xlsx.

U.S. Energy Information Administration, 2022, Form EIA-782C, Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption, monthly by state; survey discontinued with the March 2022 reference month, www.eia.gov/petroleum/marketing/prime/.

U.S. Energy Information Administration, 2026a, Form EIA-878, Motor Gasoline Price Survey, www.eia.gov/survey/#eia-878.

U.S. Energy Information Administration, 2026b, Gasoline and diesel fuel update: Gasoline geographies, www.eia.gov/petroleum/gasdiesel/gas_geographies.php.

U.S. Government Accountability Office, 2009, Credit cards: Rising interchange fees have increased costs for merchants, but options for reducing fees pose challenges, Report GAO-10-45.

U.S. Government Accountability Office, 2025, Payment cards: Costs and benefits for federal entities, Report GAO-25-107298.

Visa Inc., 2024, U.S. Merchant Surcharge Q and A, usa.visa.com/content/dam/VCOM/global/support-legal/documents/merchant-surcharging-qa-for-web.pdf.

Wang, Chengsi, and Julian Wright, 2020, Search platforms: Showrooming and price parity clauses, *RAND Journal of Economics* 51, 32–58.

Wang, Lulu, 2026, Regulating competing payment networks, Working paper.

Wang, Zhu, Scarlett Schwartz, and Neil Mitchell, 2014, The impact of the Durbin Amendment on merchants: A survey study, *Economic Quarterly* 100, 183–208.

Wing, Coady, Seth M. Freedman, and Alex Hollingsworth, 2024, Stacked difference-in-differences, Working paper.

Wright, Julian, 2003, Optimal card payment systems, *European Economic Review* 47, 587–612.

Wright, Julian, 2012, Why payment card fees are biased against retailers, *RAND Journal of Economics* 43, 761–780.

Tables

Table 1: Gasoline Cash Prices by State and Period

Summary statistics for weekly EIA gasoline cash prices, in cents per gallon, from January 2009 through December 2025. The sample covers the nine states used in the main analysis; Section 4 describes the data in detail. For treated states, the table reports statistics for the full sample and separately for the periods before and after surcharge legalization. Massachusetts remains untreated throughout the sample. EIA prices measure the posted cash price at the pump.

		2009–2025				Pre-treatment				Post-treatment			
State	Treatment year	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
MN	2013	885	290.8	287.3	60.0	212	305.8	306.2	57.2	673	286.1	284.2	60.1
OH	2013	885	293.3	289.2	60.7	212	306.5	312.9	57.1	673	289.2	286.8	61.2
WA	2013	885	347.8	338.8	70.9	212	333.8	329.1	57.2	673	352.2	339.7	74.2
FL	2015	885	297.2	294.2	57.9	357	314.4	335.1	54.3	528	285.5	282.1	57.4
CA	2018	885	379.6	374.1	79.8	470	340.3	325.0	56.4	415	424.2	433.0	79.0
NY	2018	885	317.3	313.8	61.2	512	314.7	297.5	61.9	373	320.9	321.1	60.1
TX	2018	885	276.5	271.9	58.2	502	277.2	265.3	59.3	383	275.7	277.0	56.7
CO	2022	885	297.9	292.7	61.0	704	287.6	276.1	60.1	181	337.8	326.6	46.0
MA	—	885	304.2	302.4	61.5	—	—	—	—	—	—	—	—
Full sample	—	7,965	311.6	306.8	70.7	4,066	306.1	302.3	62.1	3,899	317.4	310.9	78.4

Table 2: Effect of Surcharge Legalization on Gasoline Cash Prices

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on weekly state-level EIA gasoline cash prices, in cents per gallon. The sample covers nine states; Section 4 describes the data and empirical design in detail. Column (1) reports the baseline specification; columns (2) and (3) add state and fuel-market controls, respectively; and column (4) applies the corrective weights of Wing, Freedman, and Hollingsworth (2024). All specifications include state-by-stack and year-quarter-by-stack fixed effects. Gasoline prices are winsorized at the 1st and 99th percentiles. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-6.76**	-6.68**	-6.30**	-6.97**
	(2.82)	(2.30)	(2.45)	(2.79)
Change vs. pre-mean	-2.26%	-2.23%	-2.11%	-2.33%
R-squared	0.932	0.933	0.933	0.933
Within R-squared	0.029	0.045	0.048	0.044
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Table 3: Wholesale Gasoline Price Placebo

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on weekly EIA wholesale gasoline spot prices, in cents per gallon. States are matched to regional wholesale benchmarks as described in Section 5.2. Standard errors are clustered by state and reported in parentheses.

	Wholesale spot price (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-0.64	-0.61	-0.20	-0.44
	(0.96)	(1.01)	(1.01)	(0.92)
Change vs. pre-mean	-0.31%	-0.29%	-0.09%	-0.21%
R-squared	0.928	0.928	0.928	0.927
Within R-squared	0.001	0.002	0.004	0.003
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Table 4: Posted Gasoline Price Differences by Payment Type at Sampled U.S. Gas Stations

Ordinary least squares estimates of Equation (4) using the hand-collected regular-grade gasoline prices shown in Figure 6. An observation is one posted price. Cash and credit card prices are paired observations from signs that post both. Uniform prices are single posted prices. Each price is measured relative to the EIA average for the same city and month. These differences are centered on the mean cash price residual at dual-price stations. Columns (1), (3), and (5) report pairwise differences from one unconditional regression. Columns (2), (4), and (6) report the same differences with city and year fixed effects. Within each specification, the credit–cash difference equals the sum of the other two differences. The percent row scales each price residual by the matched EIA price. All regressions are unweighted. Standard errors are clustered by station and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Posted price difference (¢/gal)					
	Credit − Cash		*Credit − Uniform*		*Uniform − Cash*	
	(1)	(2)	(3)	(4)	(5)	(6)
Difference	9.86***	9.86***	4.86	3.31	5.00	6.55
	(0.71)	(0.72)	(4.80)	(4.71)	(4.54)	(4.48)
In % of local price level	2.85	2.85	1.50	1.56	1.35	1.30
Observations	637	637	637	637	637	637
Unique stations	50	50	50	50	50	50
Unique cities	10	10	10	10	10	10
Year FE		✓		✓		✓
City FE		✓		✓		✓

Table 5: Payment Choice at Gas Stations after Surcharge Legalization

Person-level stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on how consumers pay at gas stations. Outcomes are payment method shares, in percentage points. An observation is a consumer-year with at least one gas station purchase. "Other" includes checks, ACH, prepaid instruments, and money orders. Estimates use DCPC individual weights. Even-numbered columns add the state unemployment rate, per capita income growth, and the corrective weights of Wing, Freedman, and Hollingsworth (2024). Appendix D describes the sample construction. The treated pre-mean is the weighted mean among treated-cohort consumer-years before surcharge legalization. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Credit		*Cash/Debit*		*Other*	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Share of dollars (%)						
Treated × *Post*	-5.06**	-6.00**	7.27**	7.35**	-2.21	-1.35
	(2.10)	(2.58)	(2.69)	(2.88)	(2.47)	(2.24)
Treated pre-mean	31.8	31.8	64.2	64.2	4.0	4.0
Panel B: Share of transactions (%)						
Treated × *Post*	-4.79*	-6.07**	6.62**	7.00*	-1.83	-0.93
	(2.16)	(2.63)	(2.79)	(3.24)	(2.41)	(2.19)
Treated pre-mean	31.0	31.0	65.2	65.2	3.8	3.8
Observations	6,877	6,877	6,877	6,877	6,877	6,877
Unique states	9	9	9	9	9	9
State × stack FE	✓	✓	✓	✓	✓	✓
Year × stack FE	✓	✓	✓	✓	✓	✓
State controls		✓		✓		✓
Weighted		✓		✓		✓

Table 6: Effect of Surcharge Legalization on Gasoline Sales Volumes

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline sales volumes. The outcome is log monthly prime supplier gasoline sales, with coefficients multiplied by 100 to approximate percentage changes. Prime supplier sales measure wholesale deliveries into a state for local consumption. The sample runs from January 2009 through March 2022, when the EIA discontinued Form EIA-782C. The specifications match Table 2, with market controls aggregated to monthly frequency. Standard errors are clustered by state and reported in parentheses.

	Log gasoline sales volume			
	(1)	(2)	(3)	(4)
Treated × *Post*	0.96	0.95	1.48	1.77
	(2.62)	(2.39)	(1.91)	(1.84)
Treated pre-mean ('000 gal/day)	20,109	20,109	20,109	20,109
R-squared	0.996	0.996	0.996	0.996
Within R-squared	0.014	0.115	0.158	0.146
Observations	2,379	2,379	2,379	2,379
Unique state-months	1,208	1,208	1,208	1,208
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Table 7: Effect of Surcharge Legalization on Gasoline Cash Prices, City-Level Sample

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, estimated on a city-level sample. The unit of analysis is the city-week across the ten metropolitan areas with weekly EIA coverage (Figure C.1), with state controls matched to each city's state. The specifications otherwise match Table 2. Prices are winsorized at the 1st and 99th percentiles of the city sample, and standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

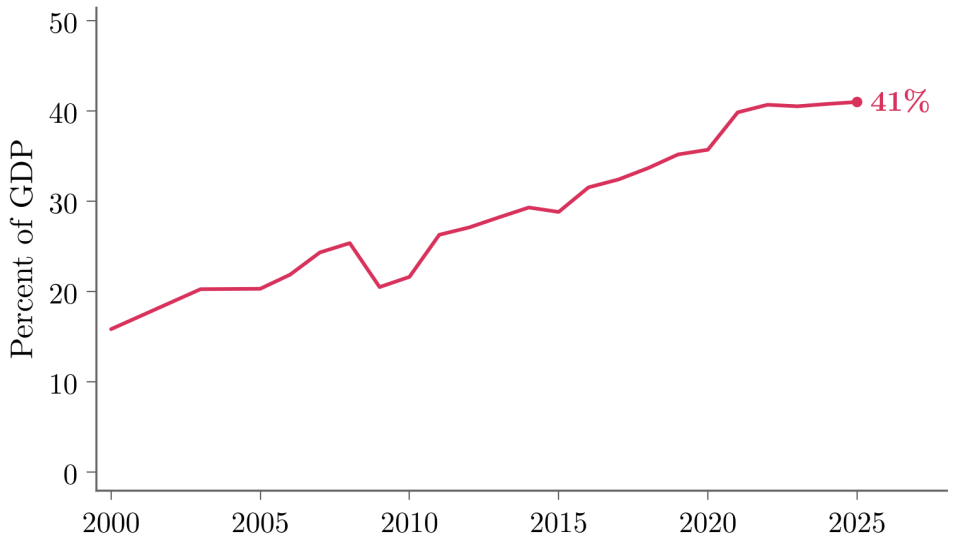
	Gasoline cash price (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-5.79**	-5.57**	-4.60*	-5.38*
	(2.35)	(2.09)	(2.27)	(2.62)
Change vs. pre-mean	-1.89%	-1.82%	-1.50%	-1.75%
R-squared	0.929	0.931	0.931	0.932
Within R-squared	0.029	0.047	0.055	0.055
Observations	12,337	12,337	12,337	12,337
Unique city-weeks	6,339	6,339	6,339	6,339
Unique states	9	9	9	9
City × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Figures

Figure 1: Growth of U.S. Card Payments and Merchant Processing Costs

Panel A plots annual U.S. card payment volume relative to GDP from 2000 to 2025. Panel B plots annual card processing costs for U.S. merchants per household over the same period. Card payment data are from Nilson Reports and the National Retail Federation; card processing cost data are from Nilson Reports; GDP and household counts are from the Global Macro Database and the Federal Reserve Bank of St. Louis (FRED), respectively.

(a): U.S. Card Payment Volume Relative to GDP



(b): U.S. Merchant Card Processing Costs per Household

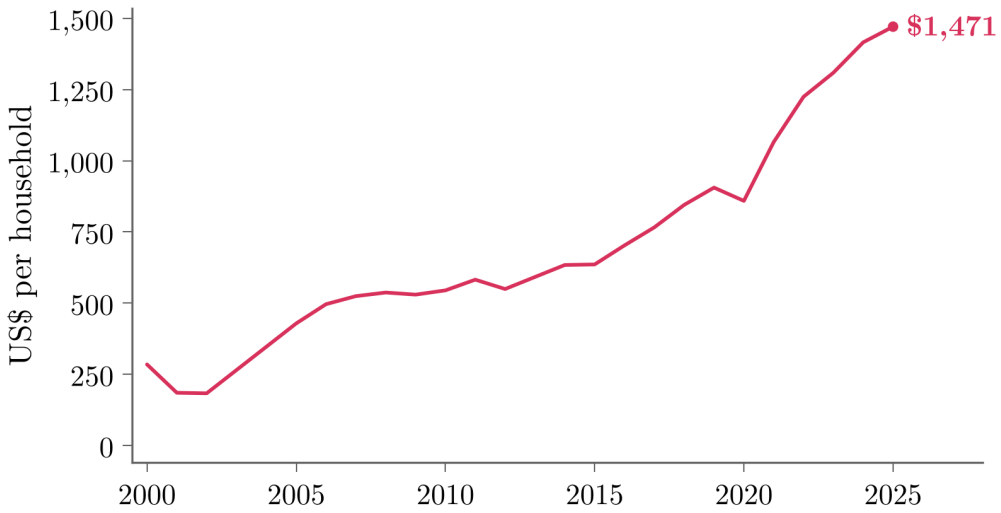


Figure 2: Price Coherence and Retail Price Unbundling

Retail price decomposition under price coherence (left) and price discrimination by payment method (right), illustrating Equations (1) and (2). s is the initial credit card share and κ the incremental net cost of accepting credit cards. Amounts compare pricing regimes rather than tracing a time path, holding payment processing costs, nonpayment marginal cost, retail conduct, and consumer payment behavior fixed.

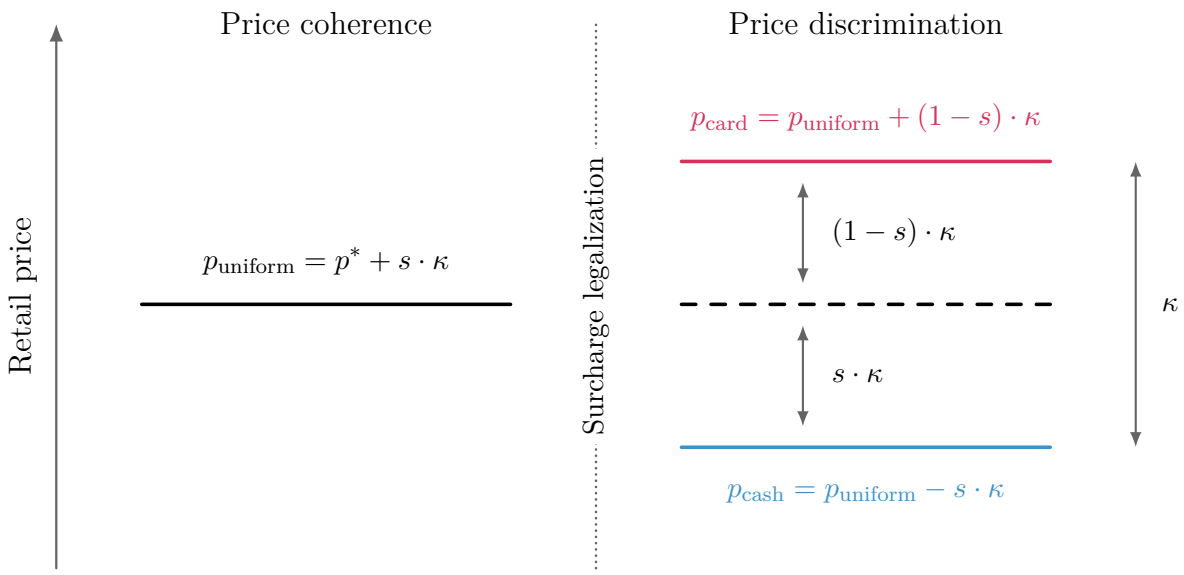


Figure 3: Gasoline Cash Prices Over Time

Weekly EIA gasoline cash prices (all grades) for the nine states with state-level EIA series, plotted as a 4-week rolling mean. The crimson line is the unweighted average across those states. Vertical dashed black lines indicate the year of each treatment cohort's surcharge legalization. EIA cash prices are prices at the pump before any credit card surcharge; surcharges added on top are not captured in these data.

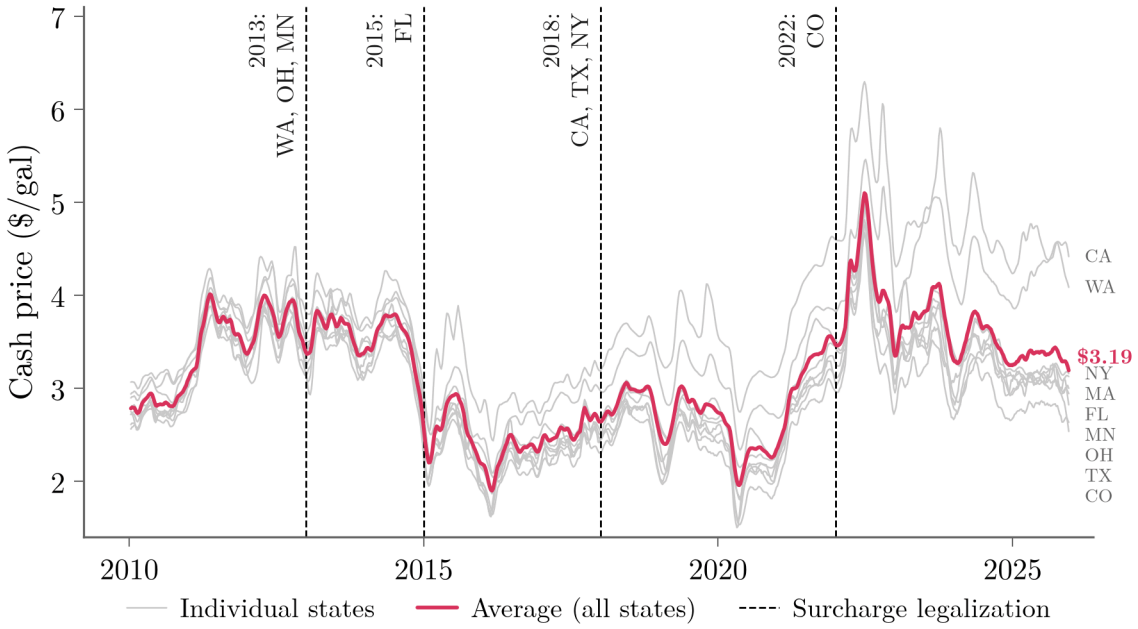


Figure 4: Google Search Interest in Credit Card Surcharging

Google Trends search interest in the query "credit card surcharge," United States, plotted as a five-month trailing moving average of the monthly series. Google normalizes the monthly series so that its peak equals 100; the moving average is not renormalized after smoothing and therefore peaks below 100.

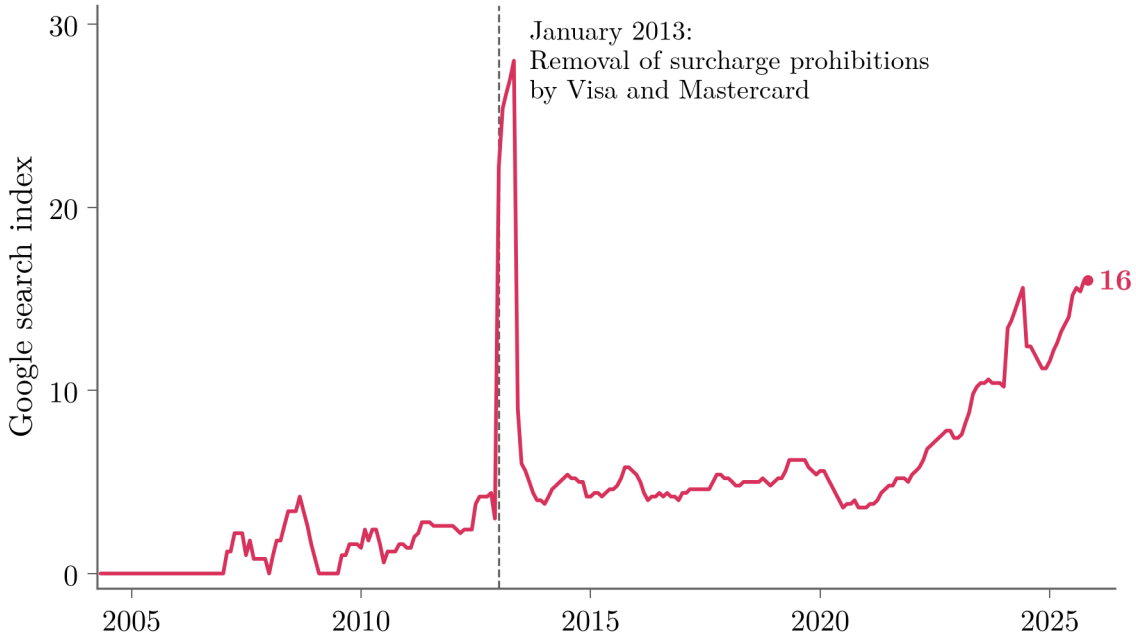


Figure 5: Effect of Surcharge Legalization on Gasoline Cash Prices: Event Study

Event-study estimates of the effect of legalizing credit card surcharges on weekly EIA gasoline cash prices, in cents per gallon. The specification builds on column (1) of Table 2 and uses annual event-time indicators. The year before legalization is the omitted reference period, the treatment week is excluded, and years four and beyond are pooled. Shaded areas show 90 percent confidence intervals based on standard errors clustered by state.

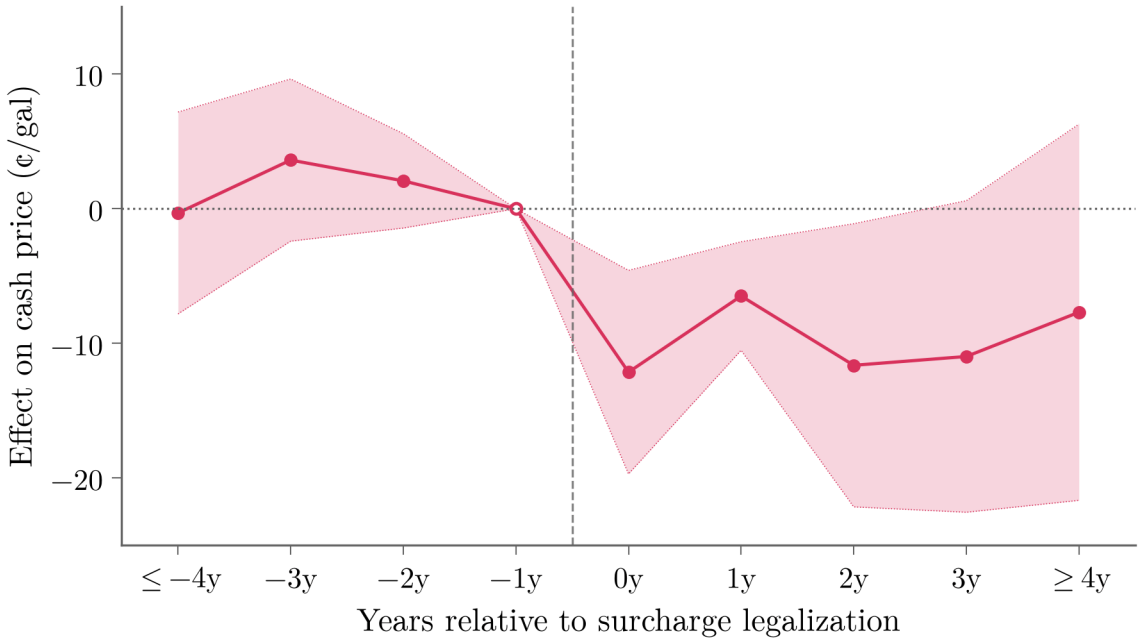


Figure 6: Posted Pump Sign Prices by Payment Type at U.S. Gas Stations

Each marker is a hand-collected regular-grade gasoline price from a pump sign in a historical Google Street View panorama. The sample contains five stations in each of the ten EIA city-level retail markets shown in Figure C.1. Cash and credit card markers are paired prices from signs that post both. Uniform-price markers are single posted prices. Each price is measured relative to the EIA average for the same city and month. These differences are centered on the mean cash price residual at dual-price stations, so the cash benchmark equals zero. Dotted lines show the mean for each price type. Values beyond ±40 cents per gallon are shown at the axis bounds.

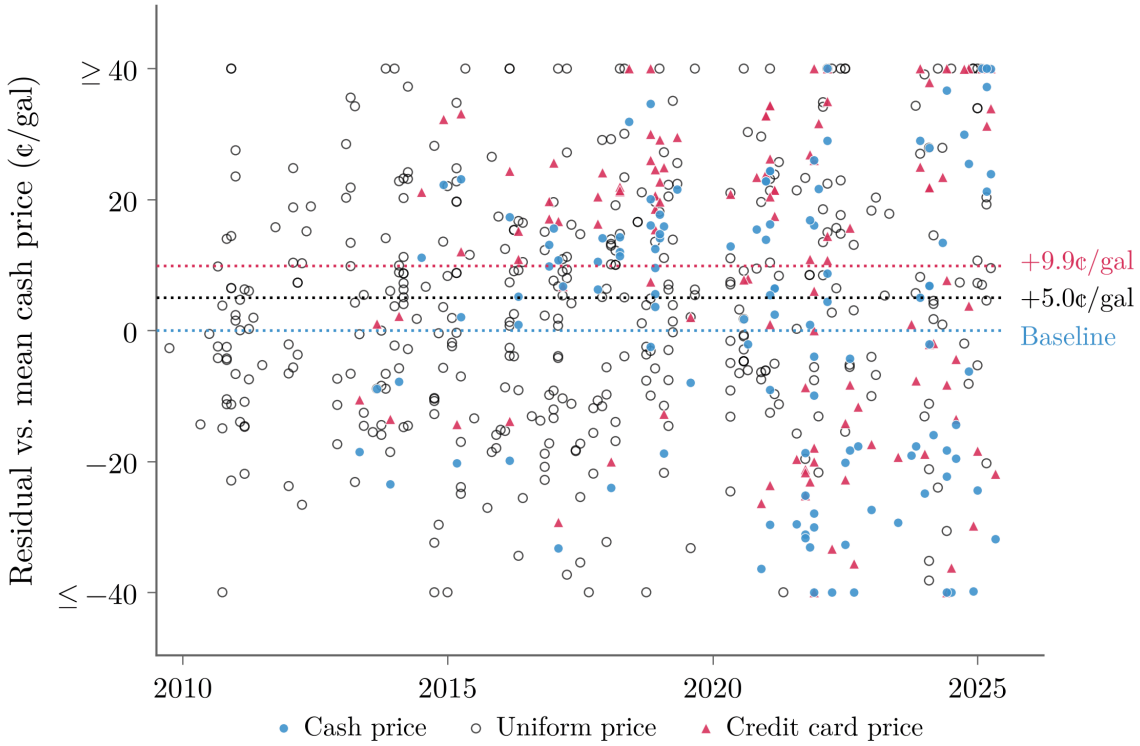
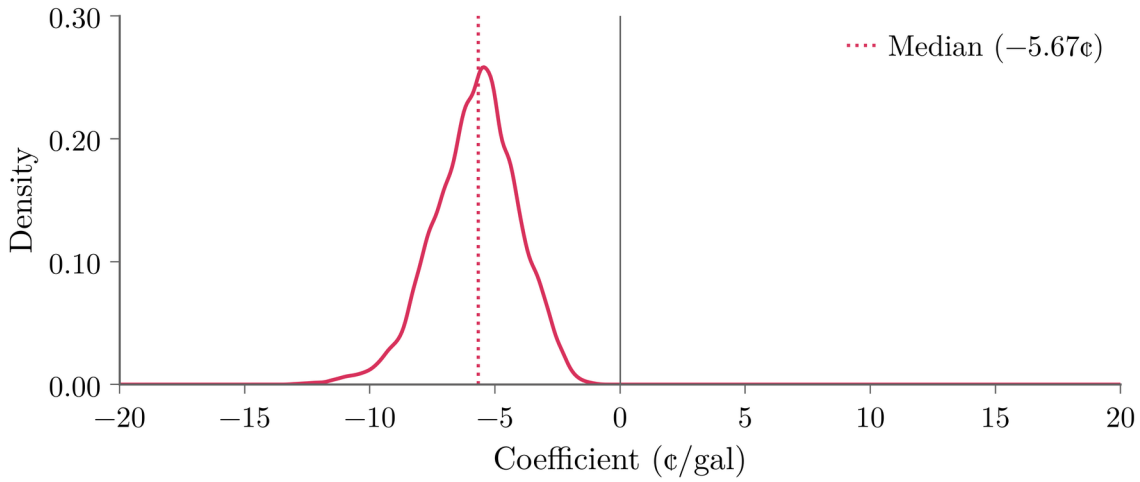


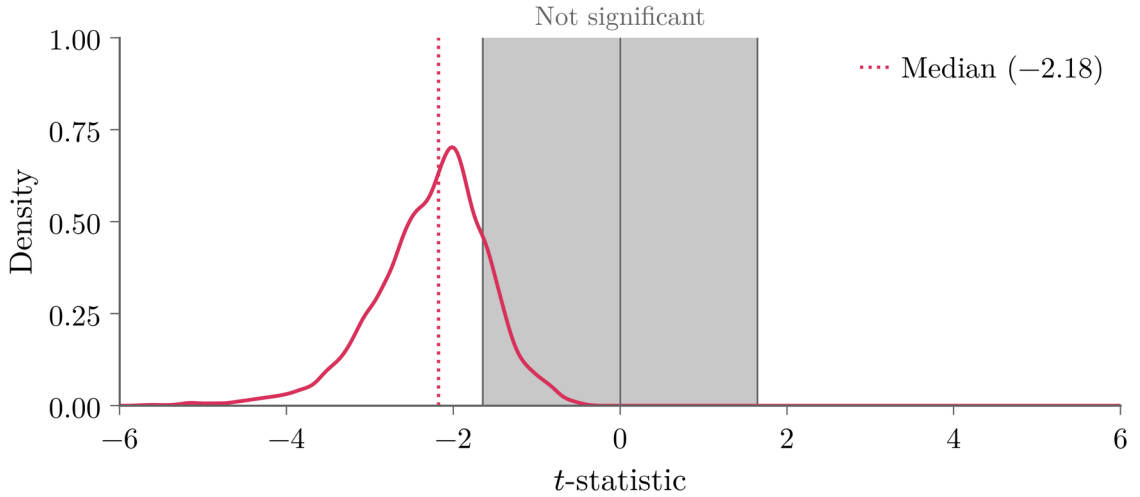
Figure 7: Specification-Curve Robustness: Coefficient and t-Statistic Distributions

Kernel densities of the pooled post coefficient (Panel A, in cents per gallon) and t-statistic (Panel B) across 34,560 gasoline cash price specifications of the nine-state panel. Specifications vary on eleven dimensions: gasoline grade (all grades/Regular), event window (±2/±3/±4/asymmetric full-sample), sample start (2009/2010/2011), winsorization level (none/p1–p99), winsorization rule (unique state-weeks/stacked panel/within state), weights (none/population/WFH), controls (none/state/market/state + market), time FE granularity (year/year-quarter/year-month/year-week), data frequency (weekly/monthly/quarterly), SE clustering (state/two-way), and COVID period (in/out). Three combinations are excluded as undefined rather than unusual: a winsorization rule without winsorization, a time FE finer than the data frequency, and two-way clustering with a time FE coarser than the data frequency. The gray band in Panel B marks $|t| < 1.645$.

(a): Coefficient kernel density (¢/gal)



(b): t-statistic kernel density

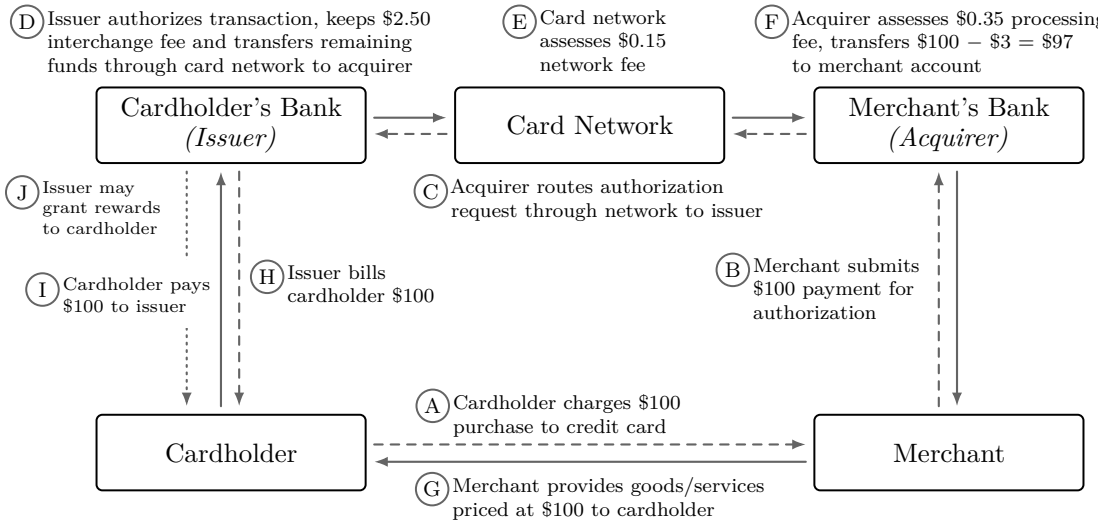


Appendix A. Institutional Background

Figure A.1: Credit Card Processing With and Without Surcharging

Stylized $100 credit card transaction without a surcharge (Panel A) and with a 3 percent surcharge (Panel B). Fees are illustrative and informed by Parlour and Rajan (2025) and the Congressional Research Service (2024). The precise allocation of fee components varies across networks, card products, and merchant contracts (see e.g., Egan et al., 2026).

(a): $100 credit card transaction without surcharging



(b): $100 credit card transaction with surcharging

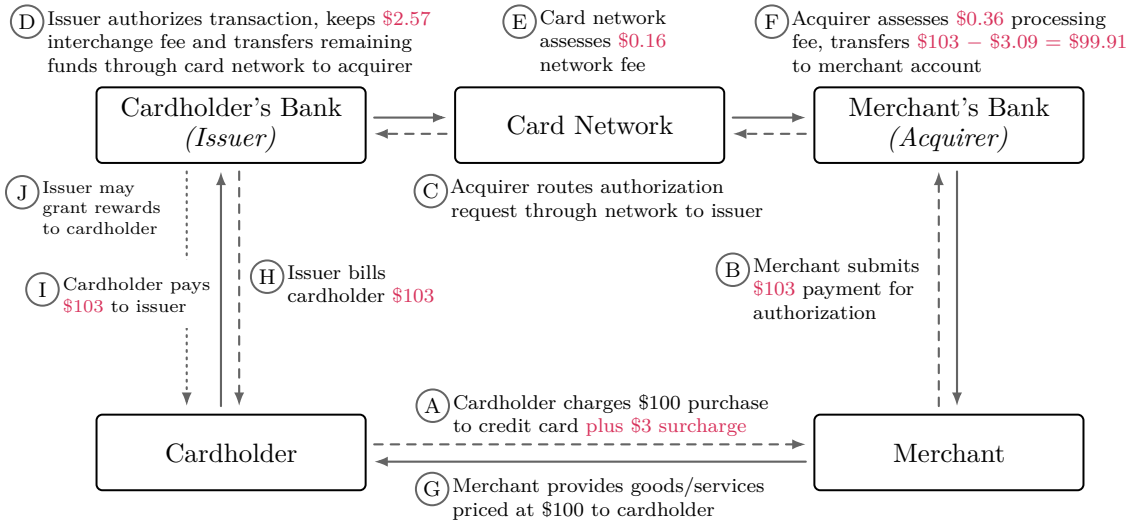


Table A.1: Timeline of Antitrust Class Action Lawsuit Against Major Card Networks

This table provides a chronological overview of key events in the antitrust class action brought by merchants against Visa, Mastercard, and multiple bank defendants over interchange fees and related network rules. It records major filings and court decisions, with references to primary documents and selected contemporaneous reporting.

Date	Event
22-Jun-2005	*Litigation Initiation* • Merchants file antitrust class action complaints against Visa, Mastercard, and multiple bank defendants (*Photos Etc. Corp., et al. v. Visa U.S.A. Inc., et al., No. 05-CV-01007 [D. Conn.]*; consolidated into *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation, No. 05-MD-01720 [E.D.N.Y.]*) • Allegation: defendants unlawfully coordinated over interchange fees and related network rules, including "anti-steering" and "honor-all-cards" rules *Source:* Court docket record (2005).
19-Oct-2012	*First Settlement Proposal* • Parties file *Definitive Class Settlement Agreement*, seeking settlement class treatment for past damages (Rule 23(b)(3)) and injunctive relief (Rule 23(b)(2)) • Proposal entails modification of existing "no-surcharge" rules that would allow merchants to surcharge Visa- and Mastercard-branded credit card transactions within 60 days after the preliminary settlement approval date • Agreement also establishes two settlement funds with combined headline value of $7.25bn (before opt-outs), at the time the largest ever in a private antitrust case; funds to be distributed among approximately seven million merchants that accepted Visa and Mastercard cards in the United States since 2004 *Sources:* Settlement agreement (2012a); public announcement by involved parties (Visa Inc., 2012); press coverage (Bloomberg News, 2012; Wall Street Journal, 2012).
27-Nov-2012	*Preliminary District Court Ruling* • District Court grants preliminary approval of the proposed settlement • Preliminary approval triggers 60-day implementation window for Visa and Mastercard to modify network rules and amend "no-surcharge" provisions *Source:* Preliminary approval order (2012b).
27-Jan-2013	*Surcharge Rule Change* • New "no-surcharge" rules take effect for Visa- and Mastercard-branded credit cards • Merchants now permitted to impose a surcharge of up to 4% on credit card transactions (subject to state law prohibitions and a 30-day notice requirement) *Sources:* Visa merchant guidance (2013); Mastercard merchant guidance (2013).
13-Dec-2013	*Final District Court Ruling* • District Court grants final approval of the 2012/2013 settlement • No incremental change to the surcharge rules in effect since January 2013 • Court order can still be appealed *Source:* Final approval order (2013).

Continued on next page

Table A.1 continued

Date	Event
30-Jun-2016	*Appeals Court Ruling* • Court of Appeals for the Second Circuit reverses District Court's approval of the 2013 settlement; case remanded to District Court for further proceeding • Numerous parties had appealed the proposed settlement; appellants also include firms not party to the lawsuit (notably American Express, Discover, First Data) • Justification: settlement classes were inadequately represented because the same counsel negotiated for (i) an opt-out 'Damages Class', and (ii) a non-opt-out 'Injunctive Relief Class' with materially different interests • Surcharging permissions established in 2013 not directly altered by the decision *Source:* Second Circuit opinion (2016).
10-Apr-2017	*Amended Litigation Filing ('Injunctive Relief Class')* • Plaintiffs who did not support the 2012/2013 settlement file *Barry's Cut Rate Stores, Inc., et al. v. Visa, Inc., et al.*, seeking certification of an injunctive-relief-only class under Rule 23(b)(2) • Formalizes separation of an 'Injunctive Relief Class', focused on forward-looking changes to the card network rules *Source:* Injunctive relief class complaint (2017a).
06-Nov-2017	*Amended Litigation Filing ('Damages Class')* • Plaintiffs who did support the 2012/2013 settlement file *Third Consolidated Amended Class Action Complaint*, seeking certification of a damages-only class under Rule 23(b)(3) • Formalizes separation of a 'Damages Class', focused on interchange fee damages *Source:* Third consolidated amended complaint (2017b).
18-Sep-2018	*Amended Settlement Proposal ('Damages Class')* • Parties file amended settlement proposal for the 'Damages Class' • Proposal establishes settlement fund with headline value of $5.54–6.24 billion • Surcharging permissions established in 2013 remain unaffected *Source:* Amended settlement agreement (2018).
13-Dec-2019	*Final District Court Ruling ('Damages Class')* • District Court grants final approval of the amended settlement proposal for the 'Damages Class' *Source:* Final approval order (2019).
15-Mar-2023	*Appeals Court Ruling ('Damages Class')* • Court of Appeals for the Second Circuit affirms District Court's approval of the amended settlement for the 'Damages Class' *Source:* Second Circuit opinion (2023).
26-Mar-2024	*First Amended Settlement Proposal ('Injunctive Relief Class')* • Parties file amended settlement proposal for the 'Injunctive Relief Class' • Settlement would (i) reduce swipe fees by at least 4 bps for at least three years, (ii) cap the average effective swipe fees for five years, and (iii) expand merchants' flexibility to steer customers and decline certain cards • Overall settlement value estimated at $29.79 billion *Sources:* Proposed injunctive relief settlement (2024b); press coverage (Stempel, 2024).

Continued on next page

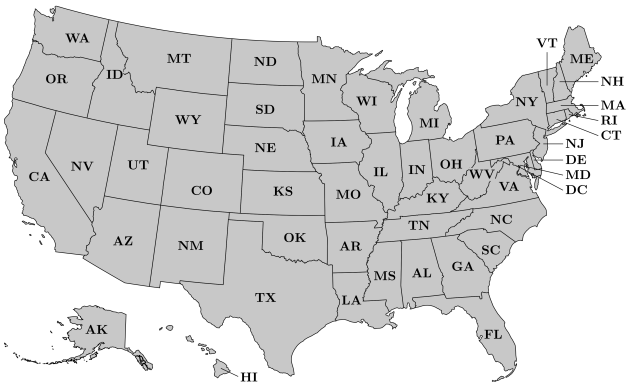
Table A.1 continued

Date	Event
25-Jun-2024	*Preliminary District Court Ruling ('Injunctive Relief Class')* • District Court denies preliminary approval of the proposed settlement for the 'Injunctive Relief Class' • Justification: (i) limited relief from "honor-all-cards" rules, (ii) limited relief from remaining surcharging constraints, (iii) unequal treatment across merchants *Source:* Opinion and order (2024a).
10-Nov-2025	*Second Amended Settlement Proposal ('Injunctive Relief Class')* • Parties file amended settlement proposal for the 'Injunctive Relief Class' • Settlement would (i) reduce swipe fees by 10 bps for five years, (ii) cap fees for standard cards at 1.25% for eight years, (iii) increase surcharging flexibility at the product level (e.g., allow surcharging one network without surcharging others), (iv) relax "honor-all-cards" restrictions (i.e., allow acceptance of standard credit cards while rejecting certain premium reward cards from the same network) *Source:* Second amended settlement proposal (2025).

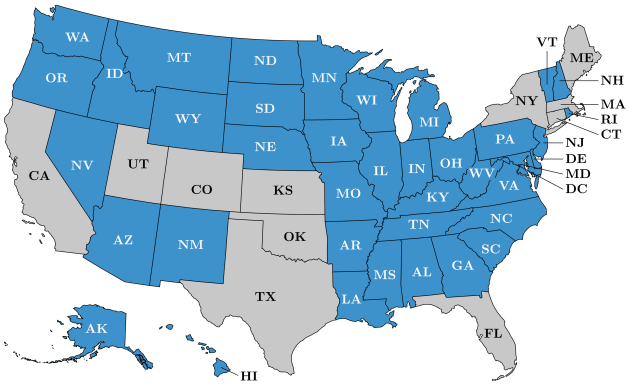
Figure A.2: Geographic Variation in Surcharge Legalization, 2012–2025

Geographic variation in surcharge legalization across U.S. states, 2012–2025. Gray shading indicates surcharging prohibited; blue shading indicates surcharging permitted. States that lifted local prohibitions between 2014 and 2025 (staggered legalization) appear gray in panel (b) and blue in panel (c).

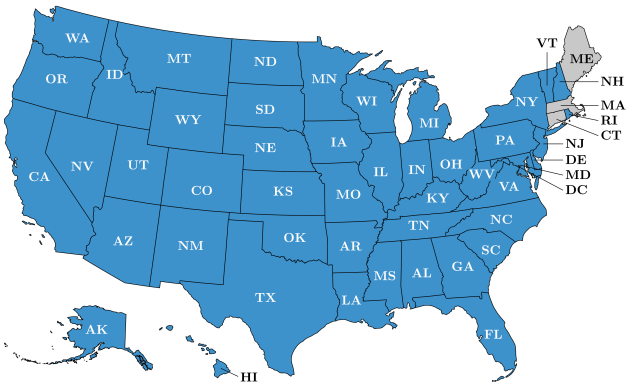
(a): Pre-2013: Network-wide surcharge prohibitions



(b): 2013: (Pre-existing) state-level surcharge rules become binding



(c): 2025: Current regime



Surcharges prohibited Surcharges allowed

Table A.2: Credit Card Surcharge Regulation by State

Summary of U.S. rules on credit card surcharges through December 31, 2025. Visa and Mastercard network rules prohibited credit card surcharges in every state until January 27, 2013, and continued to prohibit debit and prepaid card surcharges thereafter. Dates mark when credit card surcharging became legally feasible under state and network rules for the first time. EIA coverage marks the nine states with a weekly state-level EIA gasoline cash price series, which form the analysis sample.

State(s)	Legal status of surcharging	Legal basis	EIA coverage
Panel A: Surcharges permitted after the 2013 network rule change			
MN	Permitted; subject to a 5% cap and disclosure.	Minn. Stat. § 325G.051 (2025).	Yes
NJ	Permitted; subject to a processing cost cap and advance disclosure since 2023.	P.L. 2023, c. 146 (2023).	No
OH, WA	Permitted; no state-level restrictions.	Visa/Mastercard rule change (2013).	Yes
35 other states[a]	Permitted; no state-level restrictions.	Visa/Mastercard rule change (2013).	No
Panel B: Regulation changed during the sample			
UT	Prohibited May 2013–Jun 2014; permitted thereafter.	Utah S.B. 67 (2013).	No
FL	Prohibited until Nov 2015; permitted thereafter.	*Dana's Railroad Supply v. Attorney General*, 11th Cir. (2015).	Yes
CA	Transparent surcharges permitted from Jan 2018.	*Italian Colors v. Becerra*, 9th Cir. (2018); Cal. AG guidance (2018).	Yes
TX	Transparent, cost-linked surcharges permitted from Aug 2018.	*Rowell v. Paxton*, W.D. Tex. (2018); Tex. AG guidance (2019).	Yes
NY	Permitted from Oct 2018 with total credit card price posted; percentage-only add-ons prohibited; subject to a processing cost cap since Feb 2024.	*Expressions Hair Design*, N.Y. Ct. App. (2018); 2024 N.Y. law (2024).	Yes
OK	Transparent surcharges permitted from Dec 2019; statutory ban repealed Nov 2025.	2019 OK AG 12 (2019); S.B. 677 (2025).	No
CO	Prohibited through Jun 2022; permitted thereafter, capped at 2% or the actual merchant discount fee.	Colo. S.B. 21-091 (2021).	Yes
KS	Plaintiff-specific relief in 2021; permitted statewide from Jan 2025.	*CardX v. Schmidt* (2021); 2024 amendment (2025).	No

Continued on next page

Table A.2 continued

State(s)	Legal status of surcharging	Legal basis	EIA coverage
Panel C: General prohibition through 2025			
CT, ME	Prohibited throughout the sample.	Conn. Gen. Stat. § 42-133ff (2024); Me. Rev. Stat. tit. 9-A, § 8-509 (2025).	No
MA	Prohibited throughout the sample.	Mass. Gen. Laws ch. 140D, § 28A (2025).	Yes

[a] Includes: AL, AK, AZ, AR, DE, GA, HI, ID, IL, IN, IA, KY, LA, MD, MI, MS, MO, MT, NE, NV, NH, NM, NC, ND, OR, PA, RI, SC, SD, TN, VT, VA, WV, WI, WY.

Appendix B. Customer Reviews

Data and Sample

Yelp is an online platform where customers rate and review local businesses. I use the business and review files from the Yelp Open Dataset (Yelp Inc., 2022), which Yelp makes available for academic use. The dataset contains 6,990,272 reviews of 150,345 businesses, written between February 2005 and January 2022. The businesses are in ten U.S. metropolitan areas and Edmonton, Canada.[30] Each review records a one-to-five-star rating, a date, the review text, and identifiers for the reviewer and business. Business records include location information and category tags. Gas Stations, for example, sits under the top-level category Automotive.

The sample period runs from January 2013 to January 2022. It begins when Visa and Mastercard removed their national surcharge restrictions. I keep U.S. businesses with at least five reviews during this period. The analysis sample contains 6,079,975 reviews of 135,659 businesses (Table B.1).

A surcharge review reports that paying by card costs more than paying by cash. Reviews that merely discuss card minimums, cash-only policies, tips, or unrelated fees are not classified as surcharge reviews. A keyword screen keeps 221,306 reviews containing "card," "cash," or "surcharge." A large language model (gpt-4o-mini) then labels these reviews in two passes.[31] The first pass flags 5,608 reviews as surcharge reviews. For 4.6 percent of screened reviews, the first-pass model output is malformed and yields no usable label. I classify these as non-surcharge reviews. The second pass rereads the flagged reviews under stricter instructions and confirms 2,613. I check a sample of the confirmed reviews by hand.

The key variable is an indicator for whether a review is classified as a surcharge review. In aggregate analyses, I report surcharge reviews per 1,000 reviews. A value of one corresponds to one surcharge review per 1,000 Yelp reviews.

I group Yelp's 21 top-level categories into eight industries.[32] A business counts in every industry represented by its tags. Every gas station counts in Automotive, regardless of its other tags. The 581 reviews of businesses without category tags belong to no industry.

[30] The U.S. areas are Philadelphia, Tampa, Nashville, Indianapolis, St. Louis, New Orleans, Tucson, Reno, Santa Barbara, and Boise.

[31] The model runs at temperature zero. The prompts are available on request.

[32] Automotive and Shopping are single Yelp categories. The other industries are Health & fitness (Active Life, Beauty & Spas, Health & Medical); Food & drink (Food, Restaurants, Nightlife, Local Flavor); Professional services (Financial Services, Home Services, Local Services, Professional Services, Pets); Community services (Education, Public Services & Government, Religious Organizations); Media & entertainment (Arts & Entertainment, Mass Media); and Travel & hospitality (Hotels & Travel, Event Planning & Services).

Table B.1: Construction of the Yelp Review Sample

Reviews are from January 2013 to January 2022. Each indented row applies the next step to the row above. I first keep reviews of U.S. businesses. I then keep businesses with at least five reviews, which form the analysis sample. Next, I keep reviews containing "card," "cash," or "surcharge." A large language model (gpt-4o-mini) labels these reviews. Reviews without a usable label are treated as non-surcharge reviews. In the first pass, the model flags reviews that report an extra charge for paying by card. A lower cash price than card price also counts. Card minimums, cash-only policies, tips, and unrelated fees do not count. In the second pass, the model rereads the flagged reviews using stricter instructions. Reviews confirmed in this pass are the surcharge reviews. Source: Yelp Open Dataset (Yelp Inc., 2022).

Construction stage	Reviews
Reviews in the Yelp Open Dataset, January 2013 to January 2022	6,191,620
Of U.S. businesses	6,099,878
Of businesses with at least five reviews (analysis sample)	6,079,975
Containing "card," "cash," or "surcharge"	221,306
Labeled by the model, first pass	211,068
Flagged as surcharge reviews, first pass	5,608
Confirmed in the second pass (surcharge reviews)	2,613

Figure B.1: Surcharge Reviews by Industry

Yelp customer reviews that mention an extra charge for paying by card, per 1,000 reviews, by industry, with 95 percent confidence intervals. The eight industries group Yelp's 21 top-level business categories. A business counts in every industry that its category tags belong to, so a gas station with a convenience store counts in both Automotive and Food & drink. Automotive includes every business tagged as a gas station. Gas stations alone have 2.4 surcharge reviews per 1,000 reviews. The dashed line marks the rate across all reviews. Appendix B describes the data, sample construction, and review classification in detail.

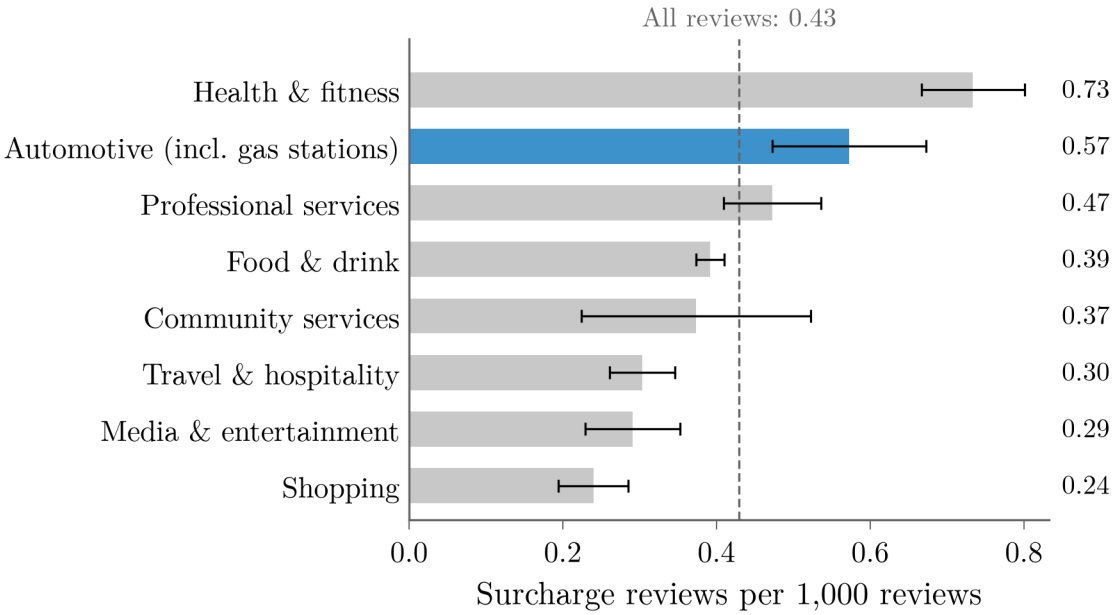


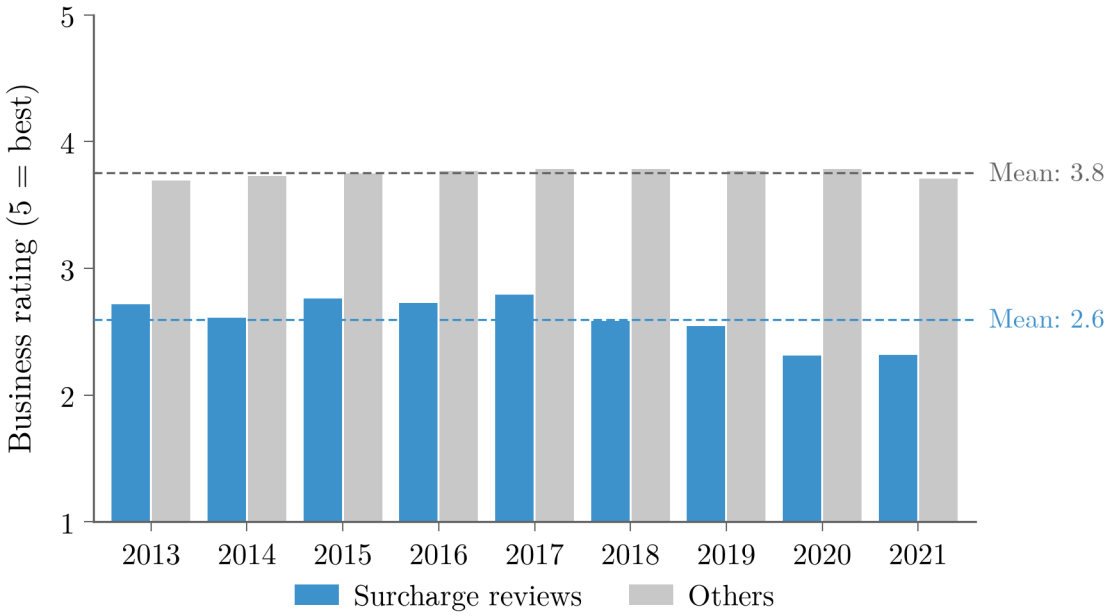
Table B.2: Surcharge Reviews and Star Ratings

Ordinary least squares estimates of the difference in ratings between Yelp reviews that report an extra charge for paying by card and all other reviews. The outcome is the star rating, from one to five, in columns (1) to (4) and an indicator for a one-star review, in percent, in columns (5) to (8). *Surcharge* equals one for reviews that report such a charge. Within each outcome, the first two columns use all reviews of U.S. businesses with at least five reviews, January 2013 to January 2022, and the last two use reviews of gas stations. Business fixed effects compare reviews of the same business. Mean is the average outcome among all other reviews. Standard errors are clustered by business and reported in parentheses. Appendix B describes the Yelp data, sample construction, and review classification. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Source: Yelp Open Dataset (Yelp Inc., 2022).

	Star rating (1–5)				*One-star review (%)*			
	All reviews		Gas stations		All reviews		Gas stations	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Surcharge	-1.17***	-0.98***	-1.33***	-0.72**	21.3***	16.0***	25.7**	9.7
	(0.04)	(0.03)	(0.29)	(0.31)	(1.1)	(0.9)	(10.7)	(10.0)
Mean	3.76	3.76	3.33	3.33	16.1	16.1	27.5	27.5
R-squared	0.000	0.257	0.002	0.302	0.000	0.238	0.001	0.236
Within R-squared		0.000		0.001		0.000		0.000
Observations	6,079,975	6,079,975	13,174	13,174	6,079,975	6,079,975	13,174	13,174
Businesses	135,659	135,659	964	964	135,659	135,659	964	964
Year FE		✓		✓		✓		✓
Business FE		✓		✓		✓		✓

Figure B.2: Star Ratings of Yelp Surcharge Reviews by Year

Average star rating, from one to five, of Yelp reviews that mention an extra charge for paying by card and of all other reviews, by year of review. Dashed lines mark the averages of the yearly values over 2013–2021. Reviews of U.S. businesses with at least five reviews. Appendix B describes the Yelp data, sample construction, and review classification. Source: Yelp Open Dataset (Yelp Inc., 2022).



Appendix C. Gasoline Prices

Figure C.1: EIA Gasoline Cash Price Data Coverage

Geographic coverage of the EIA weekly gasoline cash price series. Blue shading marks the nine states with state-level series, which form the analysis sample for the staggered difference-in-differences; dot shading marks the ten metro areas with additional EIA city-level series, each defined as a fixed union of counties under the EIA retail motor gasoline city definitions. Source: U.S. Energy Information Administration (U.S. Energy Information Administration, 2026b).

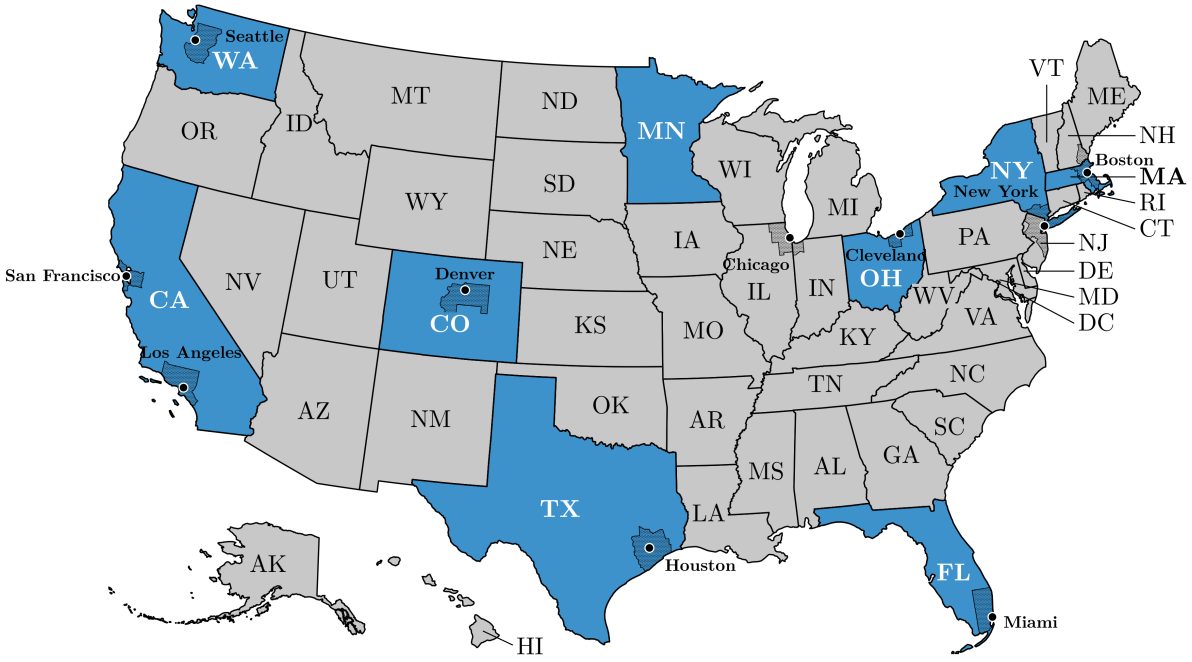
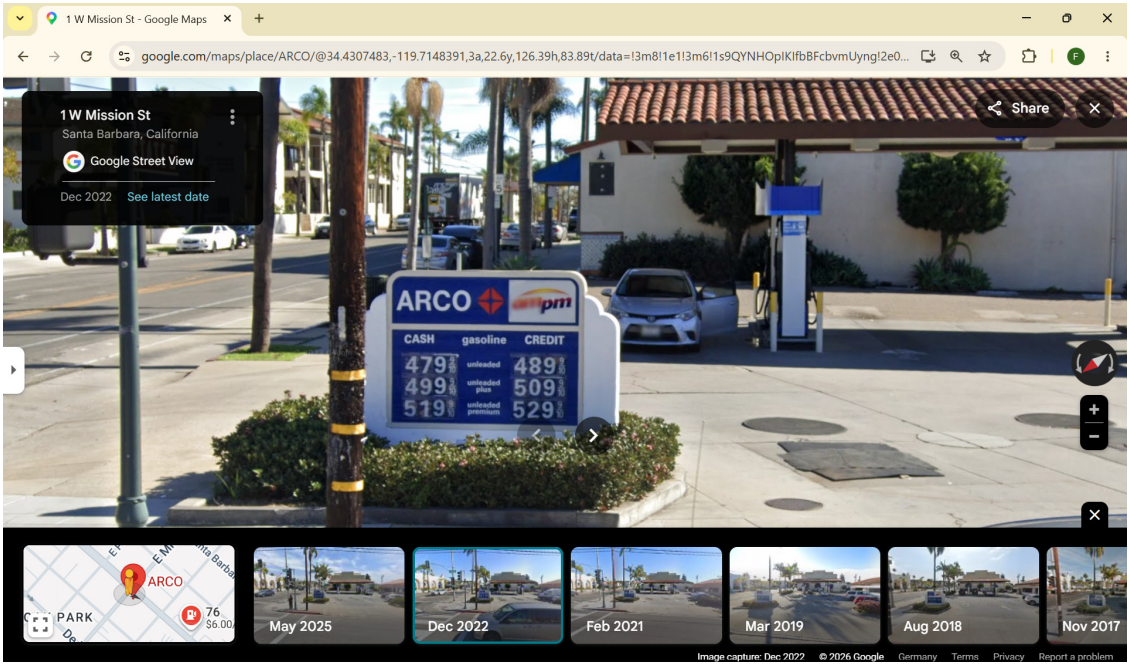


Figure C.2: Pump Sign Data Collection: Example Google Street View Panorama

Illustrative example of the data collection procedure. The pump sign visible in the Google Street View panorama posts separate cash and credit card prices by fuel grade; the strip at the bottom shows the alternative panorama dates available at the same location, from which paired cash–credit observations are hand-collected across time. Source: Google Maps (2022).



Appendix D. Consumer Payments

Data and Sample

The Federal Reserve Banks of Boston and Atlanta field the Diary of Consumer Payment Choice each fall. Since 2015 it has been administered through the University of Southern California's Understanding America Study (UAS); the 2012 wave used RAND's American Life Panel. Each diarist is assigned three consecutive diary days within a fielding window around the October diary month.[33] Besides in-person purchases, diarists record online purchases, transfers, and income receipts. Start dates are staggered so that every day of the diary month contains a similar mix of diarists on their first, second, and third diary day. The staggering smooths the decline in reporting over a diary period. The Federal Reserve removes duplicate entries and edits amounts it judges implausible, retaining the reported value alongside the cleaned one (Foster, 2026). Unlike processor or card network data, the diary records cash, checks, and account-based payments alongside card payments, so it observes the alternatives a consumer can switch to.

The UAS is a probability-based panel of adults recruited by address-based sampling, and the diary invites its nationally representative core (Angrisani et al., 2019). Each core diarist carries an individual weight, a post-stratification weight raked to the Current Population Survey on gender, age, race, education, household size, and income (Angrisani, 2019). Daily and day-of-week weights exist only for diary days within the official diary period. Two sample restrictions follow. Diarists outside the core carry no individual weight, so the core is the set of diarists with a positive individual weight; from 2021 the public files add oversamples of Los Angeles County and California under separate weights that are not nationally representative, and I exclude them. The burn-in and burn-out days, the diary days that the staggered start dates place outside the official diary period, carry no daily weight. They drop out automatically under daily weights, but the individual weight does not vary by day, so the data guide instructs users to drop them. I exclude them at the transaction level, before any share is formed.

The diary was not fielded in 2013 or 2014, so the harmonized file pools twelve waves. The 2020 wave is smaller than its neighbors, and only its regular October fielding enters. Merchant categories were recorded in a broad classification in 2012, in 45 subcategories in 2015 and 2016, and in 22 categories from 2017. I map every wave onto the 22-category classification and identify gas stations in each wave's own coding. I consolidate payment instruments into cash, credit card, debit card,

[33] The 2015 wave was fielded from October 13 to December 17, pooled the UAS sample with a GfK panel supplement fielded in December, and offered some diarists a second diary, so its 1,392 diarists completed 1,901 diaries (Angrisani, 2016). The public individual weight covers both panels, and both diaries of a diarist enter the same consumer-year.

and a residual category of checks, bank-account and online-banking payments, prepaid cards, money orders, mobile payment applications, and other methods. The Federal Reserve's respondent identifier links the waves from 2015 onward; the 2012 identifiers do not link to later waves.

A diarist's state of residence determines the surcharge rule that applies. The 2019 and 2022 to 2025 releases carry a state variable. For 2012 and 2015 to 2020, the SCPC, which the same diarists completed before the diary in those years, supplies residence where the release carries none, linked through the respondent identifier within a wave. The UAS My Household survey, a quarterly panel questionnaire, supplies it for 2021 and for any diarist still unresolved, using the most recent record before the diary date. Residence is resolved for nearly every diarist from 2016 onward, for most in 2015, and for about half in 2012, where the SCPC record is the only source (Table D.1). Residents of the District of Columbia leave the sample at the merge with the state-year surcharge rule panel, which covers the fifty states. Neither companion source supplies a payment outcome.

I retain expenditures with a positive cleaned amount and an identified payment instrument. I drop income receipts, transfers between a diarist's own accounts, and records the survey does not classify as payments. A gas station purchase is a retained expenditure in the gas station merchant category; the valid gas station expenditures of Section 5.4 are the same object. For each diarist and wave, I compute the share of the diarist's own gas station payments made with each instrument, in transaction counts and in dollars. The consumer-year is the unit of analysis because a few very large cleaned amounts survive the Federal Reserve's edits: six 2016 gas station purchases of $336 to $4,904, all on credit, carry 59 percent of that wave's recorded gas station dollars and would dominate transaction-level dollar shares, whereas a diarist's own share is bounded.

Because the diary is fielded in October, a state is treated in a wave when surcharging is legal in the third quarter of that year. The cohorts, dated by the first year in which surcharging was legal in the third quarter, are 2013 for Minnesota, Ohio, and Washington; 2016 for Florida; 2018 for California and Texas; 2019 for New York; and 2022 for Colorado. Massachusetts is never treated. The 2012 wave is the only pre-treatment wave for the 2013 cohort. Florida's and New York's legalization dates fall inside the 2015 and 2018 fielding windows, so those two waves are coded as untreated for the two states.

Control consumer-years reappear across the five stacks. Regressions weight each consumer-year by its individual weight, scaled so that a state-year appearing in several stacks counts once; the tight specification multiplies in the corrective weights of Wing, Freedman, and Hollingsworth (2024). Table D.2 traces the sample from the public transaction records to the stacked estimation sample, with the unit of each count stated. Many diarists take part in several waves (Table D.1), but the waves enter as repeated cross sections and no result follows a diarist over time.

Table D.1: DCPC Wave Coverage and the Gas Station Sample

Unstacked diarist counts by wave of the Diary of Consumer Payment Choice; each diarist counts once per wave. Diarists with a recorded expenditure have at least one retained expenditure. Residence resolved is the share of them whose state of residence is identified after the DCPC, SCPC, and UAS construction and who match the state-year surcharge rule panel. Returning diarists were observed in an earlier wave, as a share of diarists with a recorded expenditure; the respondent identifier links the waves from 2015 onward, so the share is undefined for 2012 and 2015. Gas station purchasers are counted among residence-resolved diarists and record at least one expenditure in the gas station merchant category. The last column restricts gas station purchasers to the nine EIA states and to the nationally representative core, diarists with a positive individual weight, which every diarist has through 2020 and 89–94 percent have from 2021. Source: Diary of Consumer Payment Choice, 2012 and 2015–2025 (Foster, 2026).

					Gas station purchasers	
Wave	Diarists	With a recorded expenditure	Residence resolved (%)	Returning diarists (%)	All states	Nine EIA states, core
2012	2,468	2,334	55.2	–	572	237
2015	1,392	1,274	78.3	–	338	135
2016	2,848	2,463	99.6	27.3	883	295
2017	2,793	2,382	99.7	76.5	930	289
2018	2,873	2,486	99.7	83.1	955	274
2019	3,016	2,555	99.7	85.2	917	307
2020	1,537	1,269	99.7	71.6	359	109
2021	4,453	3,747	99.8	59.8	1,118	353
2022	4,720	4,152	99.9	78.8	1,294	417
2023	4,579	4,124	99.6	76.5	1,374	427
2024	5,583	5,041	99.6	79.0	1,607	559
2025	6,079	5,449	99.7	84.0	1,662	528
All waves	42,341	37,276	96.2	73.9	12,009	3,930

Table D.2: Construction of the Consumer-Year Estimation Sample

Construction of the sample behind Table 5 from the public Diary of Consumer Payment Choice files. Within each unit, each row applies one restriction to the row above; the count collapses from transactions to consumer-years after the gas station row and expands to stacked rows in the last row. A consumer-year is one diarist in one wave. The burn-in and burn-out exclusion is applied to transactions before shares are formed and removes 940 of the 15,906 gas station expenditures across all states. The stacked count repeats eligible control consumer-years across the five cohort comparisons. Counts are unweighted.

Construction stage	Observations	Unit
Diary records in the transaction files, 2012 and 2015–2025	226,415	Transactions
Expenditures with a positive cleaned amount and an identified payment instrument	194,380	Transactions
With state of residence resolved	185,870	Transactions
Matched to the state-year surcharge rule panel	185,204	Transactions
Gas station expenditures	15,906	Transactions
Consumer-years with at least one gas station purchase	12,009	Consumer-years
In the nine EIA states	4,363	Consumer-years
In the nationally representative core	3,930	Consumer-years
With a gas station purchase outside burn-in and burn-out days	3,733	Consumer-years
Stacked cohort comparisons (estimation sample)	6,877	Stacked consumer-years

Appendix E. Robustness

Table E.1: Year-by-Year Effects of Surcharge Legalization on Gasoline Cash Prices

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, by year since legalization. Panel B replaces the pooled post indicator of Panel A with mutually exclusive yearly indicators measured from each cohort's legality date; the year 3-or-later bin may contain few observations because the symmetric four-year window truncates that tail. The omitted reference period is the full pre-legalization window. The specifications match Table 2. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)			
	(1)	(2)	(3)	(4)
Panel A: Pooled post indicator				
Treated × Post	-6.76**	-6.68**	-6.30**	-6.97**
	(2.82)	(2.30)	(2.45)	(2.79)
Panel B: Year-by-year post indicators				
Treated × Post, year 0	-6.32**	-6.77**	-6.89**	-7.15**
	(2.09)	(2.39)	(2.53)	(2.37)
Treated × Post, year 1	-7.07*	-7.02**	-7.21**	-8.31**
	(3.44)	(3.04)	(2.94)	(3.29)
Treated × Post, year 2	-6.89	-6.31	-5.72	-6.23
	(5.18)	(4.26)	(4.48)	(4.61)
Treated × Post, year 3+	-6.78	-6.61	-4.78	-5.67
	(3.79)	(3.59)	(4.24)	(4.58)
Treated pre-mean	299.30	299.30	299.30	299.30
R-squared	0.932	0.933	0.933	0.933
Within R-squared	0.029	0.045	0.049	0.044
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Table E.2: Effect of Surcharge Legalization on the Retail-minus-Wholesale Margin

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on the retail-minus-wholesale gasoline margin, in cents per gallon. The outcome is the weekly EIA retail cash price minus the matched regional wholesale benchmark. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Retail–wholesale price margin (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-6.13*	-6.11**	-6.08**	-6.48**
	(2.82)	(2.56)	(2.60)	(2.71)
Change vs. pre-mean	-6.86%	-6.84%	-6.81%	-7.26%
R-squared	0.717	0.723	0.723	0.713
Within R-squared	0.049	0.069	0.070	0.062
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Table E.3: Stepwise Addition of State and Market Controls

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, adding controls one at a time. Column 1 is the no-controls shell, Columns 2 through 7 each add a single control, and Column 8 includes all six at once; the candidates are the controls of Table 2. Every column applies the corrective weights of Wing, Freedman, and Hollingsworth (2024), recomputed on that column's estimation sample. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated × Post	-7.27**	-7.13**	-7.36*	-7.25**	-7.20**	-7.03*	-7.37**	-6.97**
	(3.10)	(2.84)	(3.21)	(3.01)	(2.93)	(3.06)	(3.12)	(2.79)
Unemployment rate (monthly, %)		-2.28*						-2.13
		(1.17)						(1.18)
Log(Avg. weekly wage, all private)			49.92**					49.80***
			(15.81)					(14.14)
Personal income growth (YoY, %)				0.179				0.138
				(0.462)				(0.458)
Log(Population, millions)					50.19			69.72
					(86.75)			(66.38)
State gas tax (¢/gal)						-0.193		-0.230
						(0.405)		(0.312)
PADD refinery gross inputs (million bbl/d)							-2.38	-2.57
							(4.30)	(3.68)
Change vs. pre-mean	-2.43%	-2.38%	-2.46%	-2.42%	-2.41%	-2.35%	-2.46%	-2.33%
R-squared	0.932	0.932	0.932	0.932	0.932	0.932	0.932	0.933
Within R-squared	0.028	0.034	0.036	0.029	0.029	0.029	0.029	0.044
Observations	11,184	11,184	11,184	11,184	11,184	11,184	11,184	11,184
State × stack FE	✓	✓	✓	✓	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓	✓	✓	✓	✓
Weighted	✓	✓	✓	✓	✓	✓	✓	✓

Table E.4: Effect of Surcharge Legalization on Gasoline Cash Prices, Excluding 2020–21

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, excluding the pandemic period. The sample drops the weeks from March 2020 through June 2021. The specifications otherwise match Table 2, with the corrective weights recomputed on the restricted sample. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-5.83**	-5.86**	-5.05**	-5.66**
	(2.34)	(1.93)	(1.95)	(2.23)
Change vs. pre-mean	-1.93%	-1.95%	-1.68%	-1.88%
R-squared	0.932	0.933	0.933	0.932
Within R-squared	0.025	0.038	0.046	0.040
Observations	10,414	10,414	10,414	10,414
Unique state-weeks	5,316	5,316	5,316	5,316
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓
Sample excludes 2020–21	✓	✓	✓	✓

Table E.5: Leave-One-Out Robustness for the Gasoline Cash Price Effect

Each column re-estimates the specification of Table 2, column 4, after dropping one state from the sample, removing it from both the treated and the control group in every cohort stack. The corrective weights are recomputed on each column's own sample. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)								
	(1) Drop MN (2013)	(2) Drop OH (2013)	(3) Drop WA (2013)	(4) Drop FL (2015)	(5) Drop CA (2018)	(6) Drop NY (2018)	(7) Drop TX (2018)	(8) Drop CO (2022)	(9) Drop MA (never-tr.)
Treated × *Post*	-7.68*	-8.60**	-7.33*	-8.14**	-7.27*	-6.70**	-6.32**	-2.75*	-7.58**
	(3.31)	(2.99)	(3.21)	(2.81)	(3.67)	(2.48)	(2.36)	(1.40)	(2.58)
Treated pre-mean	298.03	297.95	294.01	294.74	296.10	304.14	308.88	300.53	300.53
Change vs. pre-mean	-2.58%	-2.89%	-2.49%	-2.76%	-2.45%	-2.20%	-2.05%	-0.91%	-2.52%
R-squared	0.933	0.933	0.933	0.933	0.936	0.930	0.929	0.942	0.933
Within R-squared	0.047	0.051	0.048	0.055	0.022	0.048	0.051	0.054	0.052
Observations	10,768	10,768	10,768	8,544	8,706	8,703	8,713	8,346	8,322
Unique state-weeks	5,250	5,250	5,250	5,105	4,992	4,950	4,960	4,622	4,605
Unique states	8	8	8	8	8	8	8	8	8
State × stack FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Market controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Weighted	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table E.6: Effect of Surcharge Legalization on Gasoline Cash Prices, Population-Weighted

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, weighted by state population. All four columns weight observations by state population in the year before the cohort's treatment year; in Column 4 that weight is multiplied by the corrective weight of Wing, Freedman, and Hollingsworth (2024), which identifies the population-weighted trimmed aggregate ATT. The specifications otherwise match Table 2. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-5.88*	-6.12**	-5.45*	-6.08**
	(2.82)	(2.22)	(2.38)	(2.63)
Change vs. pre-mean	-2.00%	-2.08%	-1.85%	-2.07%
R-squared	0.934	0.936	0.936	0.936
Within R-squared	0.028	0.053	0.064	0.058
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Corrective weights				✓
Population weights	✓	✓	✓	✓

Table E.7: Long-Difference DiD Estimates

Cohort-by-cohort long-difference estimates of the effect of legalizing credit card surcharges, aggregated with treated-group-size weights in the Callaway and Sant'Anna (2021) family. The weekly price series are first averaged to state-quarter cells, and the control group contains not-yet-treated states. Observations count state-quarter-stack cells, so a state-quarter can enter more than one treatment date stack. Adjustments for California's S.B. 1 tax increase (−12 cents per gallon after November 2017) and New York's gas tax holiday (+16 cents per gallon, June to December 2022) are applied directly to the outcome. Standard errors come from a state-level multiplier bootstrap with 999 replications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)	*Ret.–whsl. price (¢/gal)*
	(1)	(2)
Short run (±2yr)		
Treated × *Post*	-4.33***	-3.74**
	(1.51)	(1.77)
Observations	464	464
Medium run (±4yr)		
Treated × *Post*	-3.65	-2.67
	(2.67)	(2.62)
Observations	924	924
Unique states	9	9

Table E.8: Effect of Surcharge Legalization on Gasoline Cash Prices by Grade

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in cents per gallon, by fuel grade. For each grade, the odd-numbered column reports the baseline specification and the even-numbered column the tightened specification of Table 2; columns (1) and (2) reproduce columns (1) and (4) of that table. The corrective weights are computed separately for each grade because the corresponding stacked panels have their own cohort sizes, and each grade's price series is winsorized at its own 1st and 99th percentiles. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Gasoline cash price (¢/gal)							
	All grades		Regular		Midgrade		Premium	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated × *Post*	-6.76**	-6.97**	-4.99*	-5.17**	-7.45**	-8.34**	-7.89*	-8.93*
	(2.82)	(2.79)	(2.35)	(2.15)	(2.94)	(3.47)	(3.91)	(4.72)
Treated pre-mean	299.30	299.30	291.50	291.50	309.74	309.74	326.64	326.64
Change vs. pre-mean	-2.26%	-2.33%	-1.71%	-1.77%	-2.41%	-2.69%	-2.42%	-2.73%
R-squared	0.932	0.933	0.933	0.934	0.930	0.933	0.926	0.930
Within R-squared	0.029	0.044	0.024	0.039	0.030	0.043	0.024	0.040
Observations	11,184	11,184	11,184	11,184	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666	5,666	5,666	5,666	5,666
Unique states	9	9	9	9	9	9	9	9
State × stack FE	✓	✓	✓	✓	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓	✓	✓	✓	✓
State controls		✓		✓		✓		✓
Market controls		✓		✓		✓		✓
Weighted		✓		✓		✓		✓

Table E.9: Effect of Surcharge Legalization on Log Gasoline Cash Prices

Stacked difference-in-differences estimates of the effect of legalizing credit card surcharges on gasoline cash prices, in logs. Coefficients are multiplied by 100 and approximate percentage changes. The sample and specifications match Table 2, with prices winsorized before logs are taken. Standard errors are clustered by state and reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Log(cash price)			
	(1)	(2)	(3)	(4)
Treated × *Post*	-2.68**	-2.66***	-2.40**	-2.56**
	(1.03)	(0.72)	(0.72)	(0.80)
R-squared	0.927	0.930	0.930	0.931
Within R-squared	0.022	0.056	0.062	0.057
Observations	11,184	11,184	11,184	11,184
Unique state-weeks	5,666	5,666	5,666	5,666
Unique states	9	9	9	9
State × stack FE	✓	✓	✓	✓
Year-quarter × stack FE	✓	✓	✓	✓
State controls		✓	✓	✓
Market controls			✓	✓
Weighted				✓

Figure E.1: Specification-Curve Robustness: Estimates by Specification Dimension

Each panel plots the 34,560 specifications of Figure 7, one point per specification, with the pooled post coefficient in cents per gallon on the horizontal axis and its t-statistic on the vertical axis. All panels show the same points and differ only in how they group them. Each panel colors the specifications by the choice they make on one dimension of Section 6.6, and the larger markers show the median coefficient and median t-statistic of each group. Panel (d) combines the winsorization level and rule: None leaves prices unwinsorized, while Unique, Stacked, and Within winsorize at the 1st and 99th percentiles computed from unique state-weeks, the stacked estimation sample, and observations within each state. WFH in panel (e) denotes the corrective weights of Wing, Freedman, and Hollingsworth (2024). In panel (g), Year, Quarter, Month, and Week denote year-, year-quarter-, year-month-, and year-week-by-stack fixed effects. Group sizes differ in panels (g) to (i) because combinations that are not defined are excluded. Clustering changes only the standard error, so each two-way point shares its coefficient with a state-clustered point. The gray band marks $|t| < 1.645$.

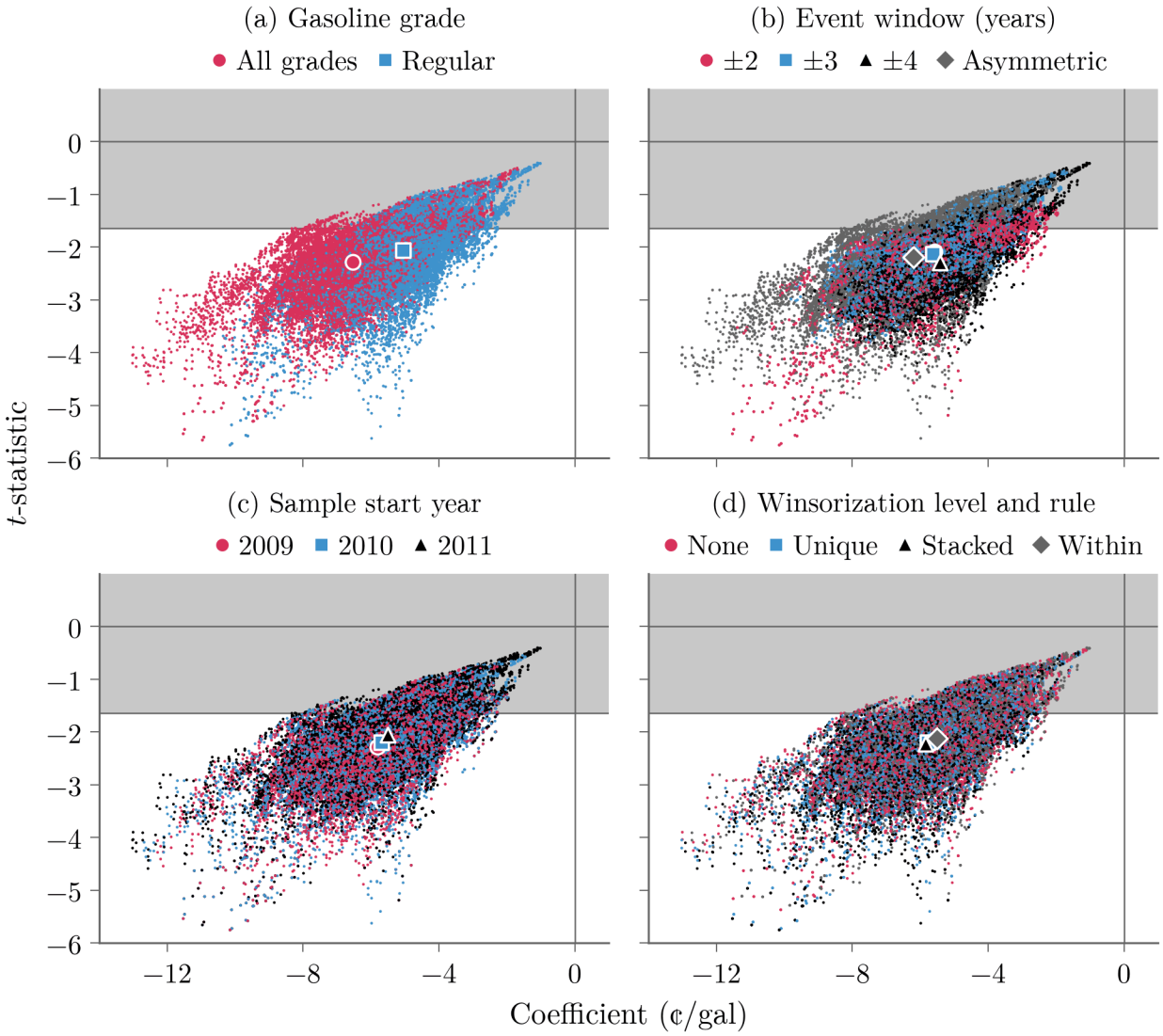
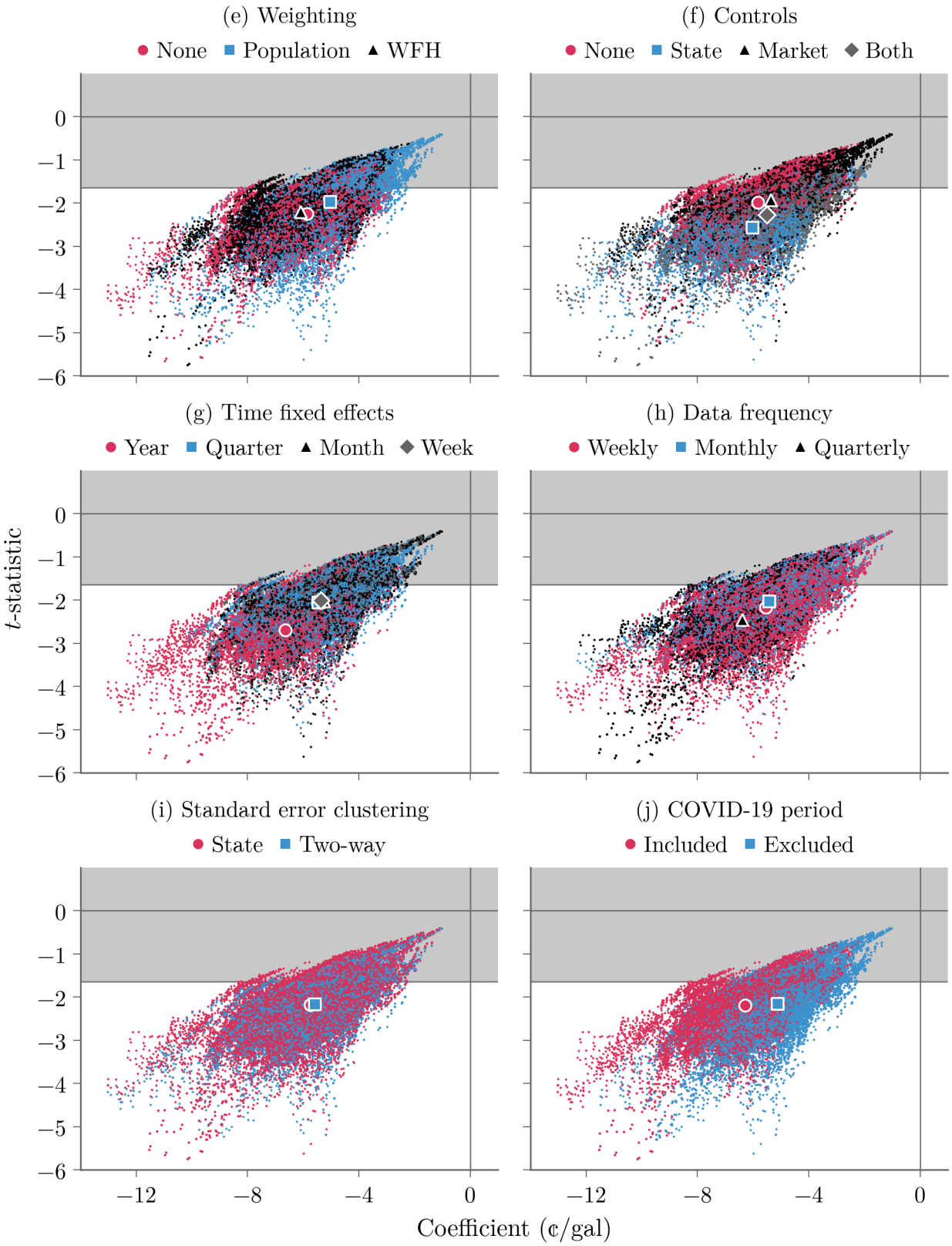


Figure E.1: (Continued)



Appendix References

Angrisani, Marco, 2016, 2015 Survey and Diary of Consumer Payment Choice: Weighting procedure, Technical note, University of Southern California, Center for Economic and Social Research.

Angrisani, Marco, Arie Kapteyn, Erik Meijer, and Htay-Wah Saw, 2019, Sampling and weighting the Understanding America Study, Working paper.

Bloomberg News, 2012, Visa, Mastercard said to near accord on swipe fee lawsuit, www.bloomberg.com/news/articles/2012-07-05/visa-mastercard-said-to-near-accord-on-swipe-fee-lawsuit.

California Department of Justice, 2018, Credit Card Surcharges, oag.ca.gov/node/38842.

Colorado General Assembly, 2021, S.B. 21-091: Credit Transaction Charge Limitations, effective July 1, 2022, www.leg.colorado.gov/bills/sb21-091.

Connecticut Department of Consumer Protection, 2024, What Is the Connecticut Surcharge Law?, portal.ct.gov/dcp/home/knowledge-base/articles/surcharge-faqs/what-is-the-connecticut-surcharge-law.

Google Maps, 2022, ARCO Gas Station, 1 W Mission St, Santa Barbara, California, Google Street View panorama, captured December.

Kansas Office of Revisor of Statutes, 2025, Kansas Statutes Section 16a-2-403: Surcharge on Credit or Debit Cards; When Permitted, effective January 1, 2025, kslegislature.gov/b2025_26/laws/016a_000_0000_chapter/016a_002_0000_article/016a_002_0403_section/016a_002_0403_k/.

Maine Legislature, 2025, Maine Revised Statutes, Title 9-A, Section 8-509: Credit Card and Debit Card Surcharge Prohibition, legislature.maine.gov/statutes/9-A/title9-Asec8-509.html.

Massachusetts Legislature, 2025, Massachusetts General Laws, Chapter 140D, Section 28A, text in force on December 31, 2025, malegislature.gov/Laws/GeneralLaws/PartI/TitleXX/Chapter140D/Section28A.

Minnesota Office of the Revisor of Statutes, 2025, Minnesota Statutes 2025, Section 325G.051: Surcharges on Credit Cards, www.revisor.mn.gov/statutes/cite/325G.051/pdf.

New Jersey Division of Consumer Affairs, 2023, Credit Card Surcharges: Frequently Asked Questions, revised December 11, 2023, www.nj.gov/oag/newsreleases23/2023-1219_credit-card-surcharges-faq.pdf.

New York Court of Appeals, 2018, Expressions Hair Design v. Schneiderman, 2018 NY Slip Op 07037, decided October 23, 2018, www.nycourts.gov/Reporter/3dseries/2018/2018_07037.htm.

Office of the Attorney General of Texas, 2019, Opinion No. KP-0257, issued June 14, 2019, www2.texasattorneygeneral.gov/opinions/opinions/51paxton/op/2019/kp0257.pdf.

Office of the Governor of New York, 2024, New Law to Clarify Disclosure of Credit Card Surcharges Goes Into Effect February 11, issued February 6, 2024, www.governor.ny.gov/news/governor-hochul-announces-new-law-clarify-disclosure-credit-card-surcharges-goes-effect-sunday.

Oklahoma Attorney General, 2019, 2019 OK AG 12, decided December 17, 2019, www.oscn.net/applications/OCISWeb/DeliverDocument.asp?CiteID=486348.

Oklahoma Legislature, 2025, S.B. 677, Enrolled Version, effective November 1, 2025, www.oklegislature.gov/cf_pdf/2025-26%20ENR/SB/SB677%20ENR.PDF.

Stempel, Jonathan, 2024, Mastercard, Visa reach $30 billion settlement over credit-card fees, Reuters.

U.S. Court of Appeals for the Second Circuit, 2016, Opinion vacating settlement approval, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 12-4671 (2d Cir.), www.paymentcardsettlement.com/Content/Documents/Second%20Circuit%20Opinion.pdf.

U.S. Court of Appeals for the Second Circuit, 2023, Opinion affirming approval of damages class settlement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 20-339 (2d Cir.), www.paymentcardsettlement.com/Content/Documents/New%20Docs/Dkt%20No.%20503_Second%20Circuit%20Opinion.pdf.

U.S. District Court for the District of Connecticut, 2005, Photos Etc. Corp. et al. v. Visa U.S.A. Inc. et al.: Docket record, No. 05-CV-01007 (D. Conn.), ecf.ctd.uscourts.gov/cgi-bin/iqquerymenu.pl?70239.

U.S. District Court for the District of Kansas, 2021, CardX, LLC v. Schmidt, 522 F. Supp. 3d 929, signed February 25, 2021; copy filed as testimony with the Kansas Senate Committee on Financial Institutions and Insurance, February 9, 2023, www.kslegislature.gov/li/b2023_24/committees/ctte_s_fin_inst_ins_1/documents/testimony/20230209_17.pdf.

U.S. District Court for the Eastern District of New York, 2012a, Definitive class settlement agreement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/1656-1%20part%201%20Exhibit%201%20to%20Notice%20of%20Motion.pdf.

U.S. District Court for the Eastern District of New York, 2012b, Order preliminarily approving settlement and providing for notice, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/signed%20prelim%20approval%20order.pdf.

U.S. District Court for the Eastern District of New York, 2013, Final approval order, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/Final%20Approval.pdf.

U.S. District Court for the Eastern District of New York, 2017a, *Barry's Cut Rate Stores, Inc. et al. v. Visa, Inc. et al.*: Complaint, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/New%20Docs/Dkt%20No.%206910_Barrys%20Cut%20Rate%20Stores%20Inc%20Complaint.pdf.

U.S. District Court for the Eastern District of New York, 2017b, Third consolidated amended class action complaint, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), paymentcardsettlement.com/Content/Documents/New%20Docs/Third%20Consolidated%20Complaint.pdf.

U.S. District Court for the Eastern District of New York, 2018, Superseding and amended definitive class settlement agreement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/New%20Docs/Dkt%20No.%207257-2_Settlement%20Agreement.pdf.

U.S. District Court for the Eastern District of New York, 2019, Final approval order for damages class settlement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), www.paymentcardsettlement.com/Content/Documents/New%20Docs/Dkt%20No.%207818_Final%20Approval%20Order.pdf.

U.S. District Court for the Eastern District of New York, 2024a, Opinion and order denying preliminary approval of settlement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), storage.courtlistener.com/recap/gov.uscourts.nyed.249477/gov.uscourts.nyed.249477.9342.0_5.pdf.

U.S. District Court for the Eastern District of New York, 2024b, Rule 23(b)(2) class settlement agreement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), storage.courtlistener.com/recap/gov.uscourts.nyed.249477/gov.uscourts.nyed.249477.9179.2_2.pdf.

U.S. District Court for the Eastern District of New York, 2025, Second amended Rule 23(b)(2) class settlement agreement, *In re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*, No. 05-MD-01720 (E.D.N.Y.), storage.courtlistener.com/recap/gov.uscourts.nyed.249477/gov.uscourts.nyed.249477.9692.2.pdf.

U.S. District Court for the Western District of Texas, 2018, Rowell v. Paxton, 336 F. Supp. 3d 724, order on cross-motions for summary judgment signed August 16, 2018, caselaw.findlaw.com/court/us-dis-crt-w-d-tex-aus-div/1952276.html.

Utah State Legislature, 2013, S.B. 67, Consumer Protection Revisions, effective May 14, 2013, le.utah.gov/~2013/bills/static/sb0067.html.

Visa Inc., 2012, Visa, U.S. retailers resolve claims in the federal multi-district interchange litigation, investor.visa.com/news/news-details/2012/Visa-US-Retailers-Resolve-Claims-in-the-Federal-Multi-District-Interchange-Litigation/default.aspx.

Visa Inc., 2013, Surcharging FAQ by merchants, usa.visa.com/dam/VCOM/download/merchants/surcharging-faq-by-merchants.pdf.

Wall Street Journal, 2012, Visa, Mastercard in $7.25 billion settlement, www.wsj.com/articles/SB10001424052702304022004577516613196796338.

Yelp Inc., 2022, Yelp Open Dataset, www.yelp.com/dataset.