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POTENTIAL ECONOMIC IMPACTS OF THE CREDIT CARD COMPETITION ACT OF 2023

By Dr. Ling Ling Ang, Dr. Alan Grant, and Peter Traber

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EXECUTIVE SUMMARY

This whitepaper considers the potential economic impacts of the Credit Card Competition Act of 2023 ("CCCA"), drawing on economic literature on two-sided markets and the effects of previous U.S. regulatory policy associated with payment cards. We begin with a discussion of the participants in the U.S. credit card ecosystem, followed by a summary of the CCCA. We then present our analysis of the potential economic impacts of the CCCA. Our analysis is supplemented by appendices that include a primer on the economics of two-sided markets and a discussion of analyses of recent policy changes related to payment cards.

The CCCA is currently a proposed bill in the Senate that includes the following four provisions:

- **No Exclusive Networks**: This provision prohibits networks and covered card issuers—card issuers who together with their affiliates have assets of more than $100 billion—from restricting transactions to a single network or to only affiliated networks. Further, at least one of the networks over which a transaction may be routed may not be one of the largest two networks by share of credit cards issued.

- **No Routing Restrictions**: This provision limits restrictions on merchants or acquirers who make transaction routing decisions: covered card issuers or networks cannot impose penalties or disadvantages for directing transactions or minimum transaction volumes. Further, the No Routing Restrictions provision also imposes limitations on requiring the exclusive use of security technology that cannot be used by all networks and prohibits inhibiting other networks from using a security technology.

- **Applicability**: The "Applicability" provision states that the "No Exclusive Network" and "No Routing Restrictions" provisions do not apply to credit cards issued in a three-party payment system model. Thus, the No Exclusive Network and No Routing Restrictions apply only to a subset of four-party system model participants.

- **Designation of National Security Risk**: This provision requires the Federal Reserve Board to publish a list of payment card networks that it determines pose a national security risk or that are "owned, operated, or sponsored by a foreign state entity."[1]

The analyses in this report focus primarily on the potential effects of the No Exclusive Networks, No Routing Restrictions, and Applicability provisions.

Our analysis of the potential economic impacts of the CCCA considers that the "No Exclusive Network" and "No Routing Restrictions" provisions of CCCA only covers some issuers (four-party system issuers with more than $100 billion in consolidated assets) but not others (three-party system issuers and four-party system issues with $100 billion or less in consolidated assets) and some networks (four-party networks are covered, three-party networks are not). Based on the

requirements of the CCCA and the variation in its coverage, our analysis of the likely economic impacts of the CCCA relative to a baseline of the current state of the U.S. payments ecosystem are:

- Interchange Fees: Interchange fees are likely to decrease for covered issuers but could also increase or stay the same if new networks compete vigorously for issuers or are not able to find it optimal to price below incumbent networks' prices. Further, there is the possibility of a network having a two-tiered interchange fee structure where exempt issuers have a different interchange fee schedule. Note a reduction in interchange fees is not a reduction in the total price of a credit card transaction, but rather a transfer in prices. The interchange fee is a transfer between the merchant side of the market to the consumer and issuer side of the market; the card network does not receive revenue directly from interchange fees.

- Network Quality: As network quality associated with higher merchant costs (*e.g.*, more chargebacks) may not be directly observed, for at least some merchants (or the acquirers to whom merchants delegate network decisions), networks would likely be predominantly competing on price, *i.e.*, interchange and network fees. For merchants (or delegated acquirers) who focus mainly on price, networks would have less incentive to provide high quality service or make further costly investments in card network security.

- Account Terms and Credit Card Rewards: Decreases in issuer interchange fee revenue could be offset by increases in revenue through other channels associated with credit card accounts, including interest, annual fees, transaction fees, and penalty fees. A decrease in credit card rewards is likely to be associated with a decrease in interchange fee revenue, and the incidence of decrease in rewards it likely to vary between consumers. Credit card rewards from three-party issuers and non-covered four-party issuers are less likely to be adversely affected by the CCCA.

- Consumer Choice of Methods of Payment: Reducing rewards points on a credit card would directly increase the price of transacting for a credit card consumer, which could lead them to consider alternative payment methods. Some consumers may turn to other credit cards (*e.g.*, credit cards issued by three-party system issuers), debit, or cash.

- Covered Issuer Consumer Mix: To the extent that consumers respond to changes due to the CCCA by switching methods of payment, covered issuers may face an adverse selection issue as consumers can seek out alternatives with higher rewards from non-covered issuers or three-party networks. A potential increase in the riskiness of consumers (*i.e.*, higher percentage of revolvers, who may eventually default on credit card debt, compared to transactors) faced by covered issuers could lead to actual and effective interest rates to be higher at covered issuers. Some consumers may therefore face higher cost of credit card usage and potentially fewer credit card options.

- Four-Party and Three-Party Networks: The CCCA could induce more consumers to effectively single-home on three-party system credit cards, which could create a competitive bottleneck situation in which a three-party system issuer has excessive, inefficient leverage over the merchant side.[2] This could give the three-party system issuer the ability to exert

market power over merchants. This market distortion would not arise from competitive market forces, but instead from CCCA provisions, and potentially increase merchant discount fees at an aggregate level.

In examining the potential economic impacts of the CCCA, it can be helpful to consider the potential impacts by type of credit card ecosystem participant. Our analysis suggests that the potential impacts are as follows:

- Networks: Entry of one or more four-party networks is likely and potentially include high fixed costs. New four-party networks would have incentives similar to extant four-party networks to balance the consumer side and the merchant side of the platform, and therefore would set interchange fees specific to the new four-party networks. Three-party networks would not be restricted by the No Exclusive Network or No Routing Restrictions provisions.

- Acquirers: Acquirers are likely to experience a decrease in interchange fees on transactions on credit cards issued by covered issuers. As there can be various intermediaries in acquiring services, such as ISOs and payment facilitators, with differing levels of market power, a decrease in interchange fees may not be passed through to each level of the supply chain. The pass through from a reduction in interchange fees is likely to differ between large merchants with high transaction volume and small merchants who rely on payment facilitators and third parties to transact with consumers over the card network.

- Merchants: The extent to which merchants experience a decrease in merchant discount fees associated with decreases in interchange fees depends on their relationships with their acquiring services provider. The extent to which merchants pass through decreases in interchange fees to end consumers factors in how much of the interchange fee decrease was passed through to the merchant, whether and how much merchants surcharge for various payment methods, and the extent to which consumers would substitute to different payment methods and the associated costs of those payment methods. Research on the effects of changes in debit card interchange fees on consumer prices shows scant evidence of measurable effects.

- Issuers: Covered issuers are likely to face higher costs from having to manage additional network relationships and lower revenues from interchange fees, which would limit their spending on incentives for consumers to sign up and transact on their cards, including rewards programs. Interchange fees for non-covered four-party system issuers and implicit transfer priced interchange fees for three-party system issuers could potentially increase or stay the same. Share for three-party credit card system issuers could increase (both in terms of number of credit cards and in terms of transaction volume) as well as for non-covered four-party credit card system issuers.

- **Consumers**: Consumers are likely to experience reductions in rewards for covered issuer cards, which could lead some consumers to switch to credit cards from non-covered issuers, although the ability of consumers to switch to credit cards from non-covered issuers ultimately depends on issuers (or three-party networks) accepting the consumer's application for a new credit card. As issuers would likely change terms of credit cards, such as credit limits, in response to lower revenue, some consumers may face reductions in credit. The incidence of the CCCA on consumers is likely going to be on consumers who face reductions in rewards or reductions in credit. Consumers are likely to experience an increase in the cost of using credit cards associated with the CCCA, with some groups of consumers facing higher increase than others.

These analyses are qualitative in nature, informed by economic theory, empirical studies on past policy decisions that affected electronic payments, and our understanding of the participants in the U.S. credit card ecosystem and their economic incentives.

BACKGROUND ON THE U.S. CREDIT CARD ECOSYSTEM

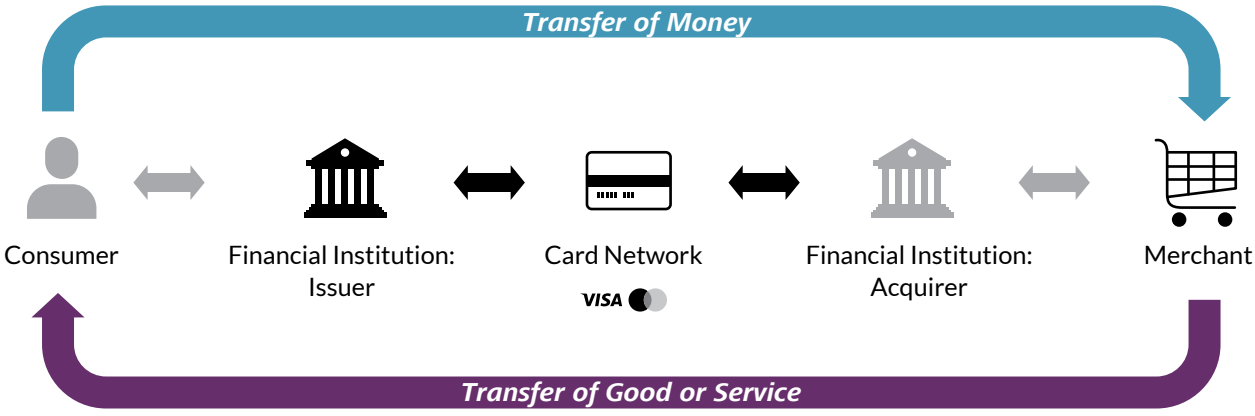
Credit Card Systems in the United States

Credit card systems connect consumers (*e.g.*, individual customers or businesses) to merchants to make payments for goods or services.[3] Credit cards can be thought of having two functions for consumers: (1) a transaction function and (2) a credit function.[4] This section focuses primarily on the mechanics of the transaction function of credit cards.

Participants in a Credit Card Transaction

Participants in a credit card system include consumers and merchants, as well as the parties that connect them through a credit card transaction. As shown in Exhibit 1, these parties can include an issuer (which supplies a credit card and the associated credit to the consumer), an acquirer (which supplies access to credit card networks to merchants), and a payment card network (which connects the issuer to the acquirer).[5] For a consumer to transfer money to a merchant (the blue arrow) for the purchase of a good or service (the purple arrow), a consumer presents their credit card to a merchant (either physically or electronically). The merchant sends the acquirer information about the transaction and the consumer's card, which the acquirer sends over the credit card network to the issuer: this process is known as clearing.[6] The issuer, which supplies credit to the consumer, authorizes the transaction against the consumer's account. Following this, the issuer sends the authorization over the credit card network to the acquirer. The last step is settlement, in which the issuer remits payment to the merchant and associated fees are paid.[7]

Exhibit 1. **Illustration of Parties in a U.S. Credit Card Transaction**



Sources: Visa Inc. Form 10-K for the Period Ended September 30, 2022; Payment Systems in the U.S., p. 75.

Exhibit 1 illustrates a four-party credit card system, where the four parties are the consumer, issuer, acquirer, and merchant.[8] While not one of the enumerated four parties in a four-party credit card system, a card network serves the function of connecting issuers to acquirers.[9] The card network can be thought of as a firm that connects issuers on one side to acquirers on the other side.[10]

Actions Performed and Decisions Made by Participants in a Four-Party Credit Card System

To better understand the parties in a four-party credit card system, it can be helpful to have more detail about the actions performed and decisions made by each party, as described below:

- Consumer: As discussed above, a consumer uses a credit card for two main functions: first, to transact using the credit card system to purchase a good or service from a merchant, and second, to access credit.[11] Consumers make two types of decisions regarding credit cards: choices to adopt (*i.e.*, sign up for) cards and choices to use cards.[12]

  - *Participation or Adoption*: For a specific credit card, a consumer must first apply for a credit card through an issuer, who accepts or denies the application and sets credit limits based on factors such as previous credit history, current income, or the consumer's tendency to utilize available credit.[13] If accepted, the consumer contracts directly with an issuer via a Card Holder Agreement. The Card Holder Agreement specifies information such as the annual percentage rate ("APR") applicable to unpaid balances, payment terms, annual fees for holding the card, transaction fees (if any), and general usage terms.[14]

  - *Use*: At the time of a purchase, the consumer chooses a payment option to use balancing both the credit function and the transactional function of a credit card.[15] Key to this decision is the consideration of what forms of payments a merchant accepts,[16] and, if a merchant does not accept a specific method of payment, then a consumer must choose an alternative form of payment or decide not to purchase.[17] A consumer may also make a choice of payment instruments based on the usage value of that instrument, which may be associated with factors such as rewards, ease of use, and security.[18]

- Merchant: A merchant can transact with a consumer using different payment instruments (*e.g.*, cash or credit card) and in-person or online. Merchants make decisions about whether to accept methods of payment, including the decision to accept cards associated with particular credit card networks.[19] The decision to accept a credit network may be made through contracting directly or indirectly with an acquirer who is a member of that card network,[20] or directly with a three-party system card network (see page 9, Four-Party vs. Three-Party Credit Card Systems).[21] Merchants contract with acquirers or other parties that contract with acquirers to process credit card transactions and to connect with credit card networks, which connect to issuers and thus consumers.[22]

- **Issuer**: Issuers are financial institutions that are responsible for handling the credit function of the credit card market and act as a connection between the consumer and the card network when a transaction takes place.[23] Issuers arrange the process of onboarding new cardholders, including issuing physical cards, managing the authorization process, managing fraud exposures, and handling disputes.[24] For the transaction function, issuers may contract with outside processors who also serve as a connection between the issuing bank and the card network and manage fraud exposure, with the issuer processers playing a more technical role in a transaction.[25] For the credit function of the credit card market, the issuer manages the cost of funds, sets the terms of the Card Holder Agreement (subject to regulations and certain rules set by the card network), manages credit exposure, and is responsible for the collections process for unpaid consumer debts.[26]

- **Card Network**: A card network sits between the issuers and acquirers and coordinates many of the processes required to complete a credit card transaction.[27] A card network acts as a company that links these two sides, providing services to both issuers and acquirers.[28] On one-side, a card network contracts with issuers to issue one of the card network's products[29] (*e.g.*, a Visa Signature Preferred credit card). On the other side of the platform, the card network typically contracts with acquirers to allow merchants to process transactions over the network.[30] A card network serves two main functions: first, to coordinate participation on the card network from both consumers and merchants, and, second, to specify rules and regulations that issuers, consumers, acquirers, and merchants must follow in order to transact using the card network.[31] A card network is responsible for setting the fees that are associated with accessing the network such as the interchange fee and the network fees (discussed in more detail on page 8, Fees Associated with a Four-Party System Credit Card Transaction).[32] Card networks also play a primary role in facilitating efforts by card issuers to fight fraud,[33] and take settlement risk on behalf of its members.[34]

- **Acquirer**: Credit card acquirers facilitate merchants' acceptance of credit cards and sit between a merchant and the card network.[35] Acquirers are financial institutions and contract directly with both card networks as well as merchants for whom they handle transaction processing.[36] An acquirer may also provide more traditional banking services for a merchant.[37] The acquirer must be a member of at least one of the networks.[38] The acquiring process includes a front-end processor and a back-end processor, as well as an acquiring bank, but there may also be additional functions provided by other institutions.[39] Expenses associated with the acquiring process include interchange fees, card network assessments, merchant acquisition costs, systems development, maintenance and compliance, processing costs, merchant servicing costs, credit losses, and fraud losses.[40] With modern development of electronic payments in the United States, a number of additional parties called payment facilitators now act effectively as a merchant, and contract with what is called "sub-merchants."[41] Sub-merchants are business that want to accept credit card payments for goods and services and contract with a payment facilitator who has an existing relationship with acquirers.[42] The payment facilitator is responsible for ensuring compliance with card network rules as well as receiving and distributing settlements for sub-merchants.[43] One of the main operational benefits of a sub-merchant using a payment facilitator is the time required for a business to begin accepting card payments. While the application process with an acquirer

may be long, payment facilitators can offer the ability to fill out an online application and receive approval almost immediately, rather than waiting days or weeks.[44] Notice under this market structure, the payment facilitator acts effectively as the merchant, while the sub-merchants provide goods and services to consumers (while potentially receiving goods and services such as POS terminals[45] that accept cards from the payment facilitator). In addition to payment facilitators, there are also many other intermediaries that may sit between a merchant and acquirer or otherwise provide value added services to merchants in the modern economy. These include Independent Sales Organizations ("ISOs"), who act similar to payment facilitators but require a direct relationship between merchants and acquirers,[46] or Third-Party Processors that aid in settlement processing, authorization, and fraud/risk monitoring.[47] This is only an abbreviated list of the multiple third-parties that may provide a value added payments-related service to merchants in the modern economy.[48]

Fees Associated with a Four-Party System Credit Card Transaction

As illustrated in Exhibit 2, a credit card transaction includes both the flow of payments for a good or service from a consumer to a merchant (gray arrows) as well as the flow of payments between different parties in the credit card system (orange and yellow arrows).[49] For each credit card transaction, the main fees that are paid to process the electronic payment are:

- Merchant Discount Fee ("MDF"): A fee paid by the merchant to the acquirer, who aids the merchant in the processing of a transaction.[50] The MDF is a per transaction fee that may be a fixed fee as well as a variable fee based on the value of the transaction. Ultimately the MDF is set by the acquirer.[51] The MDF is paid to the acquirer and used for interchange fees, network fees, and a portion of the fee is retained by the acquirer.[52] In the modern economy, the level of the fee per card transaction that is payable by businesses who provide goods and services directly to consumers may be set by a payment facilitator (or other third-parties) that are detailed in the description of a merchant above.[53]

- Interchange Fee: A fee that is set on a per transaction basis by a card network, which can vary by retailer, transaction size, and type of card.[54] The level of the interchange fee is set by the card network:[55] some card networks release a schedule of interchange fees that are often specified as a fixed cost per transaction as well as a variable cost based on the value of the transaction.[56] Card networks vary the interchange fee based on a number of factors such as a merchant's sector (*e.g.*, restaurant vs. consumer retail), the transaction volume of a merchant, and the card network product used in the transaction (*e.g.*, Mastercard World Elite card vs. Mastercard Enhanced Value card).[57] Note that the interchange fee is a fee set by a card network and can be thought of as a payment from the acquirer to the issuer (running through the card network), and is distinct from the network fees discussed below.[58]

- Network Fee: The fees that are paid by the issuer and acquirer to the card network for processing a credit card transaction over its network.[59] The network fee is the primary revenue generated by the card network for the processing of card transactions and are charged to the issuer and acquirer.[60] The fees that acquirers and issuers pay to the card network are primarily

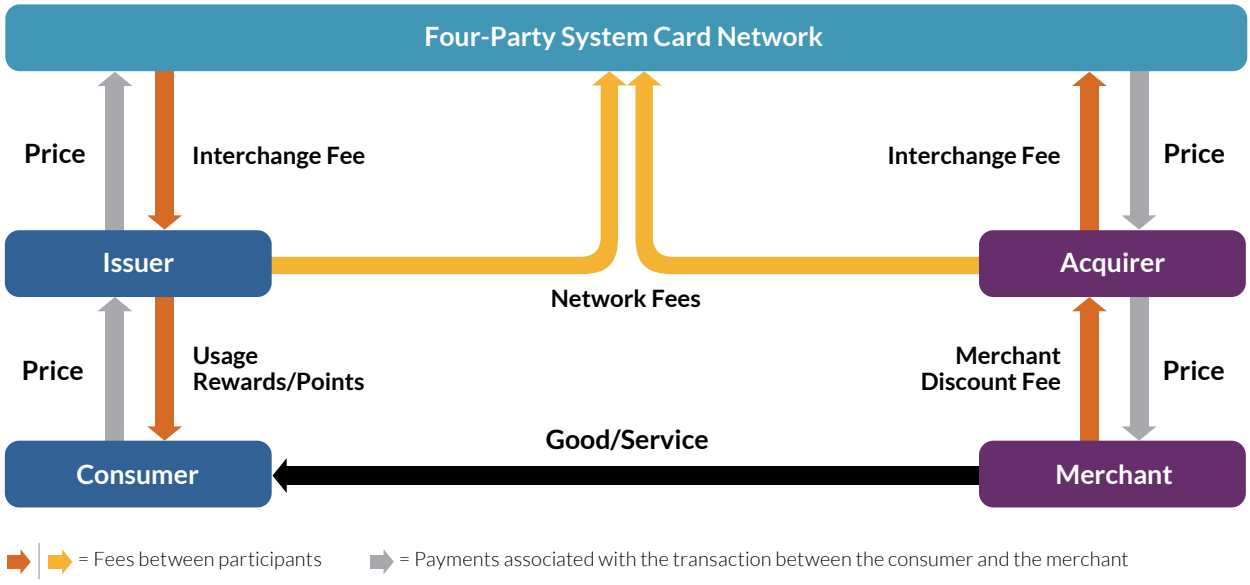
based on the volume of transactions processed on cards branded by the card network.[61] Note that the issuer and acquirer both pay a fee for the processing of a transaction, but we understand the fee need not be symmetric for each side. Network fees are typically small compared to MDF or interchange fees.[62]

- **Usage Rewards or Points**: Usage or rewards points are provided by issuers to consumers based on their volume of transactions in various spending categories, which can change over time.[63] Rewards points can be redeemed by consumers for goods, services, or cash back.[64] As rewards points can be exchanged for things of value, they can be thought of as a payment from issuers to consumers for using their cards;[65] analogously, a negative price charged by issuers to consumers for using their cards.

Four-Party vs. Three-Party Credit Card Systems

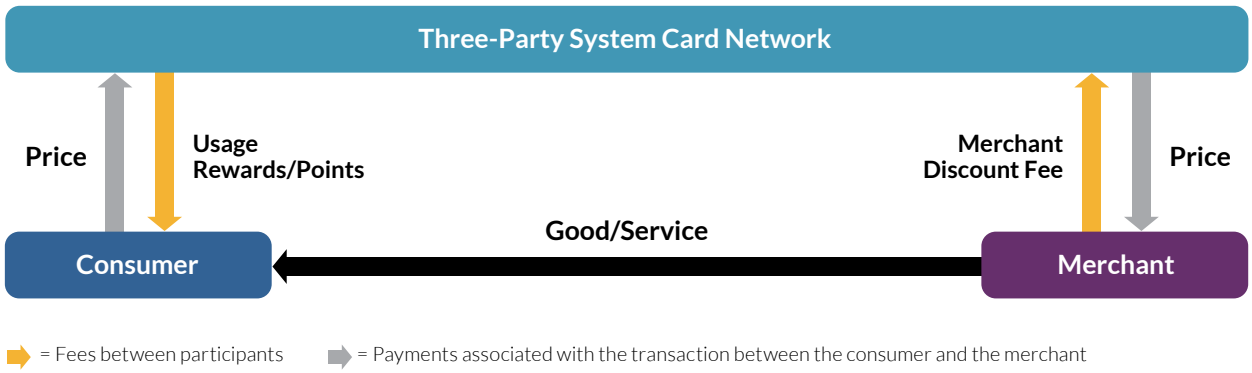
The discussion above focuses on four-party systems, in which the issuer and acquirer are distinct from each other. In the United States, there are also three-party credit card networks, in which the issuer, card network, and acquirer functions are all performed by the same firm.[66] The three parties in a three-party credit card system are the consumer, merchant, and three-party system card network.[67] The flow of payments and fees in a three-party credit card system is illustrated in Exhibit 3.

Exhibit 2. **Flow of Payments and Fees in a Four-Party Credit Card System**



Sources: Merchant Processing, p. 165; Payment Systems in the U.S., pp. 75, 87-88, 95.
Notes: 1. "Price" corresponds to the price of the good or service the consumer is purchasing from the merchant.
2. "Merchant Discount Fee Net of Merchant Acquirer Fee and Acquirer Network Fee" is equal to the Interchange Fee. It is paid from the Acquirer to the Issuer through the Card Network.

Exhibit 3. **Flow of Payments and Fees in a Three-Party Credit Card System**



Sources: Merchant Processing, p. 165; Payment Systems in the U.S., pp. 75, 88.
Note: 1. "Price" corresponds to the price of the good or service the consumer is purchasing from the merchant.

With respect to fees, there are several differences between three- and four-party credit card systems, including:

- **Interchange Fees and Network Fees**: As the issuer, acquirer, and network are integrated in a three-party system, interchange fees and network fees are not directly charged. However, one can think of these fees being transfer-priced within a three-party system network.[68]
- **MDF**: MDFs are set directly by the three-party system network with a merchant; there is no intermediation by an acquirer.
- **Rewards Points**: Rewards points can be set directly by the three-party system network.

The entity controlling issuing, network services, and acquiring in the three-party system is also responsible for all other card network functions such as managing the electronic transmission of information, structuring network usage rules for both consumers and merchants, addressing security issues, and arbitrating disputes.[69] In addition to the transaction function of a credit card, the three-party system network is responsible for the credit function on the side of the consumer.[70]

The Credit Function of Credit Cards

The previous section focuses on the transaction function of a credit card, while the credit card also provides consumers an unsecured, revolving (or "open-end") line of credit.[71] By issuing a credit card, an issuer provides consumers access to (1) merchants through a credit card network and (2) open-end credit. In contrast to a debit card where funds originate from the consumer's checking account at the issuing bank, the immediate funds required to execute a credit card transaction are supplied by the issuer.[72] Per a Card Holder Agreement between the consumer and issuer, the consumer has the option to pay all or a portion of the outstanding balance at the end of a billing cycle.[73] If a consumer maintains an outstanding balance at the conclusion of a billing

cycle, the outstanding balance begins to accrue interest according to the APR schedule agreed to by the consumer and issuer set out in the Card Holder Agreement. Therefore, a credit card provides a line of credit that can be accessed and repaid repeatedly.[74]

The limit of the unsecured, revolving line of credit can take one of two forms (1) a consumer is given a maximum amount of credit such that the outstanding balance cannot exceed this limit (also called a "credit limit")[75] or (2) the card issuer sets no pre-defined limit but retains the right to prevent a consumer's access to additional credit.[76] Issuers set the terms of credit cards and market potential credit cards that a consumer may apply to.[77] Credit cards can vary considerably with respect to their APRs, payment terms, and credit limits.[78]

In practice, there is sometimes a distinction made between two types of credit card consumers called transactors and revolvers, which refers to whether a consumer utilizes the credit function of a credit card. Transactors are consumers who use an issued credit card for the purpose of executing transactions and pay off outstanding balances within the billing cycle and thus do not accrue interest charges. Revolvers are consumers who regularly use a credit card for its credit function and carry an outstanding balance that is subject to interest expenses.[79] By this definition, a transactor typically only pays fees associated with holding the credit card and receives benefits from transacting with the credit card. On the other hand, a revolver pays the same fees and receives the same benefits as a transactor, but also must pay interest payments and other expenses related to the credit function of the credit card. Individuals may move between being transactors and revolvers over time.

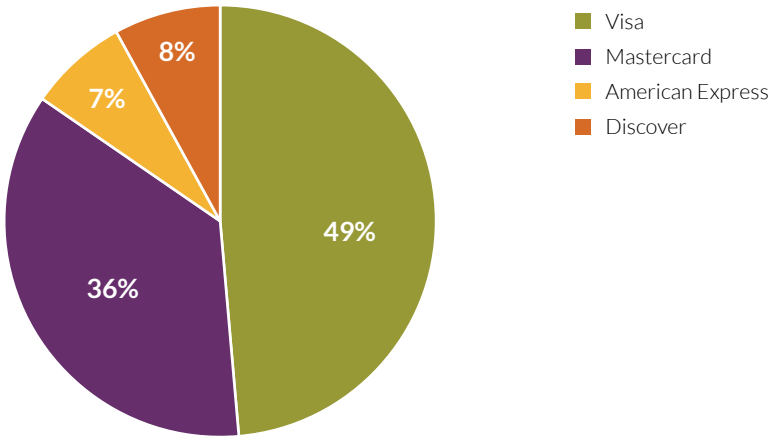
Characteristics of the Payments Ecosystem in the United States

Credit Card Networks

In the United States, there are currently four major credit card networks, which, as of 2021, account for almost 100 percent (759 million) of general-purpose credit cards in circulation in 2021:[80] Visa and Mastercard are networks that function as part of four-party systems, while American Express and Discover function in three-party payment system models.

Exhibit 4 presents shares of these credit card networks by the number of the credit cards in circulation in 2021, and Exhibit 5 presents the shares of these card networks by the value of transactions in 2021. In both exhibits, Visa has the largest share (49 percent of cards and 53 percent of transaction value), followed by Mastercard (36 percent of cards and 24 percent of transaction value), American Express (7 percent of cards and 19 percent of transaction value), and Discover (8 percent of cards and 4 percent of transaction value).

Exhibit 4. **U.S. Credit Card Share by Card Networks**
By Number of Credit Cards in Circulation
2021



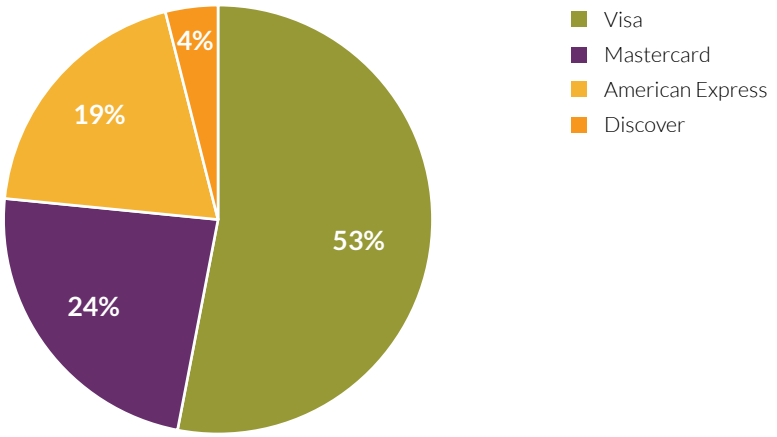
Sources: Fed Profitability Report, p. 5; "Supplemental Operational Performance Data," *Mastercard*, April 27, 2023, accessed October 11, 2023, available at http://q4live.s25.clientfiles.s3-website-us-east-1.amazonaws.com/479285134/files/doc_financials/2023/q1/1Q23-Mastercard-Supplemental-Operational-Performance-Data.pdf, p. 6; American Express Company Form 10-K for the Period Ended December 31, 2021, p. 47.

Notes: 1. The percentage points of share are calculated based on the numbers of credit cards in circulation (million) for Visa, Mastercard, American Express, and Discover in the fiscal year of 2021.
2. The numbers of credit cards in circulation for Visa, Mastercard, American Express, and Discover for the fiscal year of 2021 are calculated based on the Fed Profitability Report, the Supplemental Operational Performance Data from Mastercard, and the 10-K from American Express. The Fed Profitability Report gives figures for Visa and Mastercard as a sum and Discover and American Express as a sum. The number of cards in circulation for Mastercard is subtracted from the first sum to calculate the number of cards in circulation for Visa and the number of cards in circulation for American Express is subtracted from the second sum to calculate the number of cards in circulation for Discover.

Issuers

There are currently 785 bank credit card issuers in the United States,[81] of which 31 (3.9 percent) are associated with Bank Holding Companies with assets over $100 billion. Exhibit 6 shows the share of consumer credit card amount outstanding from bank issuers that would be regulated by the CCCA and those that would not be regulated by the CCCA, either because it operates in a three-party credit card system or because it (in combination with its affiliates[82]) has less than $100 billion in total assets. Exhibit 7 presents a list of Bank Holding Companies with assets over $100 billion along with their total assets (column b) and the total consumer credit card amounts outstanding among all bank issuers associated with the Bank Holding Company (column c). Something to note about issuers is that larger banks by consolidated asset size do not necessarily have larger credit card portfolios: Commerce Bank, with holding company assets of about $33 billion,[83] would not be considered a covered issuer under the CCCA, but has a consumer credit card amount outstanding of $575 million, which exceeds the portfolio sizes of six Bank Holding Companies that meet the asset size threshold to be covered issuers under CCCA.[84] On the other hand, Exhibit 7 shows that some bank issuers with large consolidated assets that would be covered issuers under CCCA have relatively small credit card portfolios by consumer credit card amount outstanding. For example, UBS Americas Holding Llc has assets of $196 billion, but only $267 million consumer credit card amount outstanding.

Exhibit 5. **U.S. Credit Card Share by Card Networks**
By Total Transaction Volume
2021



Sources: "Operational Performance Data," *Visa*, accessed October 11, 2023, available at https://s1.q4cdn.com/050606653/files/doc_financials/2022/q1/Q1FY22-Visa-Operational-Performance-Data-FINAL.pdf, p. 3; "Supplemental Operational Performance Data," *Mastercard*, July 27, 2023, accessed October 11, 2023, available at https://s25.q4cdn.com/479285134/files/doc_financials/2023/q2/2Q23-Mastercard-Supplemental-Operational-Performance-Data.pdf, p. 2; American Express Company Form 10-K for the Period Ended December 31, 2021, p. 56; Discover Financial Services, Inc. Form 10-K for the Period Ended December 31, 2021, p. 55.

Notes: 1. The percentage points of share are calculated based on transaction values ($billion) for Visa, Mastercard, American Express, and Discover in the fiscal year of 2021.
2. The figure used for Visa is "Total Volume" for Visa Credit Programs in the United States; The figure used for Mastercard is "Purchase Volume" for Mastercard Credit and Charge Programs in the United States; The figure used for American Express is "Network Volumes" in the United States; The figure used for Discover is "Credit Card Volume," which represents Discover card activity related to sales net of returns. The volume for Discover might include transactions outside of the U.S.

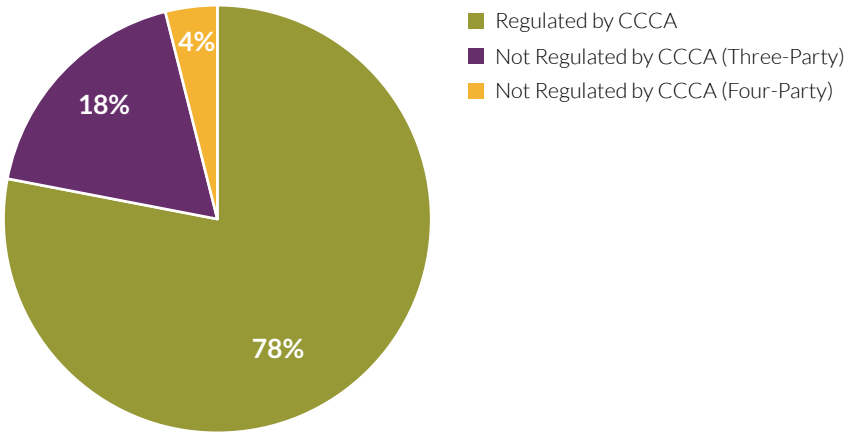
Acquirers

There are currently 53 acquirers associated with Visa and Mastercard.[85] The eight largest merchant acquirers by number of transactions on Visa or Mastercard processed in 2022 across credit, debit, and prepaid cards are listed in Exhibit 8 by transaction volume (column b).

Consumer Payment Alternatives

As shown in the Federal Reserve Bank of Atlanta's Survey and Diary of Consumer Payment Choice ("SDCPC"), consumers have access to various payment methods, including credit, debit, check, money order, cash, prepaid/gift/EBT, bank account number payment, online banking bill payment, mobile payment app, account to account transfer, income deduction, and more.[86] The Federal Reserve Bank of Atlanta defines 12 different categories of payment instruments that a consumer can use. Exhibit 9 shows the percentages of total average dollar value spent per consumer for each year from 2015 through 2022. Over this period, credit card payments accounted for between 12.1 percent and 19.7 percent of total average dollar value spent per consumer.

Exhibit 6. **U.S. Consumer Credit Card Amount Outstanding**
Bank Issuers – Q2 2023



Sources: "Call Reports – Single Period," *Federal Financial Institutions Examination Council Central Data Repository's Public Data Distribution*, reports for June 30, 2023, accessed October 11, 2023, available at https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx; "Instructions for Preparation of Consolidated Reports of Condition and Income," *Federal Financial Institutions Examination Council*, accessed October 12, 2023, available at https://www.ffiec.gov/pdf/FFIEC_forms/FFIEC031_FFIEC041_201812_i.pdf; "Large Holding Companies," Federal Financial Institutions Examination Council National Information Center, June 30, 2023, accessed October 27, 2023, available at https://www.ffiec.gov/npw/Institution/TopHoldings; "Relationships," *Federal Financial Institutions Examination Council National Information Center*, accessed October 27, 2023, available at https://www.ffiec.gov/npw/FinancialReport/DataDownload.

Notes: 1. Consumer Credit Card Amount Outstanding represents the total amount outstanding (for all bank issuers associated with the given Bank Holding Company) of funds advanced under extensions of credit for household, family, and other personal expenditures from credit cards. It includes the total amount outstanding regardless of whether there is a period of time before interest charges are made.
2. "Regulated by CCCA" indicates bank credit card issuers (banks that report consumer credit card amounts outstanding) that are part of bank holding companies with more than $100 billion in assets.
3. "Not Regulated by CCCA (Three-Party) indicates bank credit card issuers that would not be regulated by the CCCA because they operate in a three-party credit card system, including American Express and Discover.
4. "Not Regulated by CCCA (Four-Party)" indicates bank credit card issuers that operate in a four-party credit card system and would not be regulated by the CCCA because they have less than $100 billion in assets (themselves or through bank holding companies).

All payment methods may not be available for a given transaction and consumers may choose to use different payment methods. In 2022, 35 percent of consumers stated a preference for paying with credit for in-person payments.[87] Among those who state their preferred payment method is credit cards, 68 percent of in-person payments were performed using credit cards, 19 percent performed using cash, 6 percent using debit cards, and 7 percent using other payment methods.[88] This illustrates that consumers have choice of payment methods and exercise this choice of payment methods.

Exhibit 7: **U.S. Bank Issuers with Assets Over $100 Billion Consumer Credit Card Amount Outstanding**
Q2 2023

Bank Issuers that Operate in a Three-Party Credit Card System

Bank Holding Company Name	Total Assets	Consumer Credit Card Amount Outstanding
	(Thousands)	(Thousands)
(a)	(b)	(c)
American Express	$244,904,000	$89,036,187
Discover Financial Services	138,081,829	93,790,713

Bank Issuers that Operate in a Four-Party Credit Card System

Bank Holding Company Name	Total Assets	Consumer Credit Card Amount Outstanding
	(Thousands)	(Thousands)
(a)	(b)	(c)
JPMorgan Chase & Co.	$3,868,240,000	$167,989,000
Bank Of America Corporation	3,123,198,000	97,009,000
Citigroup Inc.	2,423,675,000	146,046,000
Wells Fargo & Company	1,876,322,000	47,717,000
Goldman Sachs Group, Inc., The	1,571,386,000	16,747,000
U.S. Bancorp	680,825,000	26,625,648
PNC Financial Services Group, Inc., The	558,222,918	6,165,986
Truist Financial Corporation	554,549,000	3,265,000
TD Group Us Holdings LLC	516,128,603	13,918,760
Capital One Financial Corporation	467,799,623	123,742,023
BMO Financial Corp.	293,090,359	998,395
HSBC North America Holdings Inc.	223,656,483	196,738
Citizens Financial Group, Inc.	223,468,136	2,154,598
First Citizens Bancshares, Inc.	209,515,076	294,543
M&T Bank Corporation	207,671,729	754,416
Fifth Third Bancorp	207,276,000	1,818,000
United Services Automobile Association	206,564,000	15,281,000
Ally Financial Inc.	197,241,000	1,758,000
UBS Americas Holding LLC	195,827,447	267,190
Keycorp	195,213,563	1,000,683
Barclays US LLC	190,712,000	29,151,000
Huntington Bancshares Incorporated	188,504,626	700,127
Santander Holdings USA, Inc.	170,821,696	315,095

Continued

Bank Issuers that Operate in a Four-Party Credit Card System (*Continued*)

Bank Holding Company Name	Total Assets	Consumer Credit Card Amount Outstanding
	(Thousands)	(Thousands)
(a)	(b)	(c)
Ameriprise Financial, Inc.	169,790,184	107,611
RBC US Group Holdings LLC	165,936,128	257,419
Regions Financial Corporation	155,878,000	1,231,000
Synchrony Financial	108,697,000	84,358,000

Sources: "Call Reports – Single Period," *Federal Financial Institutions Examination Council Central Data Repository's Public Data Distribution*, reports for June 30, 2023, accessed October 11, 2023, available at https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx; "Instructions for Preparation of Consolidated Reports of Condition and Income," *Federal Financial Institutions Examination Council*, accessed October 12, 2023, available at https://www.ffiec.gov/pdf/FFIEC_forms/FFIEC031_FFIEC041_201812_i.pdf; "Large Holding Companies," *Federal Financial Institutions Examination Council National Information Center*, June 30, 2023, accessed October 27, 2023, available at https://www.ffiec.gov/npw/Institution/TopHoldings; "Relationships," *Federal Financial Institutions Examination Council National Information Center*, accessed October 27, 2023, available at https://www.ffiec.gov/npw/FinancialReport/DataDownload.

Notes: 1. Total Assets represents the total assets of the Bank Holding Company listed in column (a) as of June 30, 2023 according to the Federal Financial Institutions Examination Council's National Information Center.
2. Consumer Credit Card Amount Outstanding represents the total amount outstanding (for all bank issuers associated with the given Bank Holding Company) of funds advanced under extensions of credit for household, family, and other personal expenditures from credit cards. It includes the total amount outstanding regardless of whether there is a period of time before interest charges are made.
3. Note that American Express and Discover would not be regulated by the CCCA as they operate in a three-party credit card system.

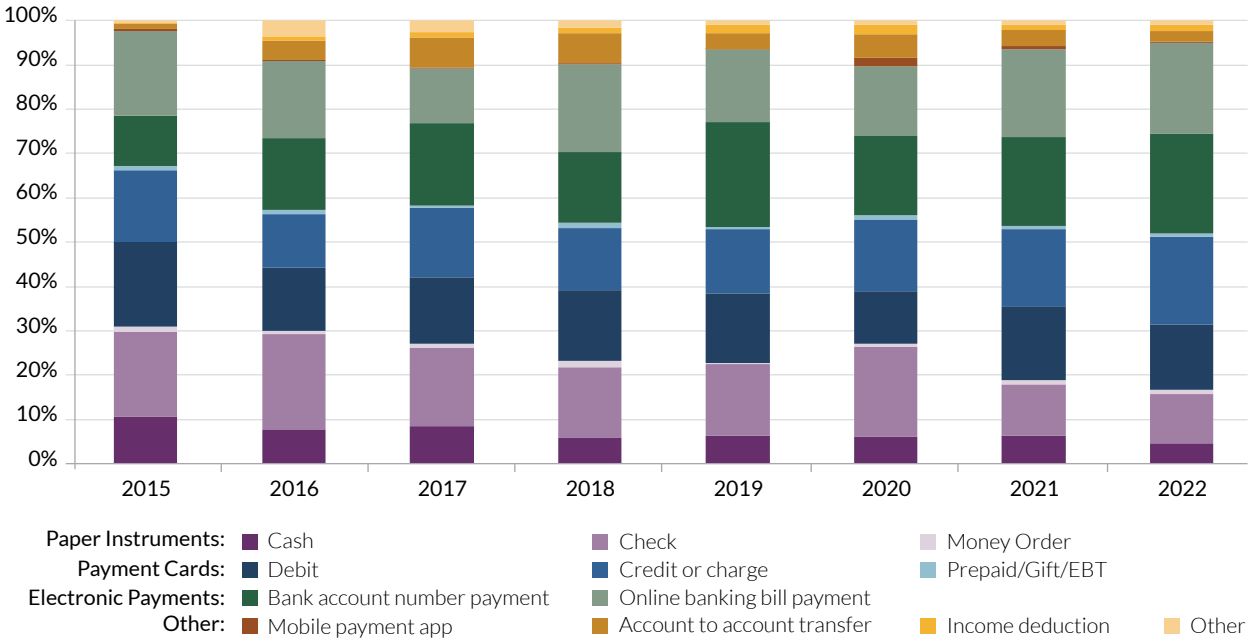
Exhibit 8: **Largest Merchant Acquirers in the U.S.**
By Number of Transactions Processed – 2022

Merchant Acquirer	Transaction Volume
	(Billions)
(a)	(b)
JPMorgan Chase	35.83
Fiserv	35.38
FIS/Worldpay	31.42
Global Payments	11.15
Wells Fargo	9.81
Bank of America	8.89
Elavon	3.34
PaySafe	1.07

Source: "Top U.S. Merchant Acquirers," *The Nilson Report*, March 2023, accessed via Statista on October 11, 2023, available at https://www.statista.com/statistics/263219/leading-payment-card-acquirers-in-the-united-states-by-purchase-volume/.

Notes: 1. Transaction Volume is the total number of transactions processed by each merchant acquirer, regardless of card network.
2. Transactions processed include credit, debit, and prepaid cards.

Exhibit 9. **Percentages of Total Average Dollar Value Spent Per Consumer**
As Reported by SDCPC Survey Respondents
By Payment Method – 2015-2022



Source: "2022 Survey and Diary of Consumer Payment Choice," *Federal Reserve Bank of Atlanta*, June 2023, accessed October 11, 2023, available at https://www.atlantafed.org/banking-and-payments/consumer-payments/survey-and-diary-of-consumer-payment-choice/2022-survey-and-diary.

Notes: 1. The SDCPC includes data on the dollar value of all payments reported by survey respondents in October of each year, which are then converted into average percentage shares by category of payment method.
2. The "Other" category includes the following payment methods: multiple payment methods for one payment, unreported payment methods, and other responses that could not be recategorized into one of the existing payment instrument categories.

THE CREDIT CARD COMPETITION ACT OF 2023

The Credit Card Competition Act of 2023 ("CCCA") is currently a bill in the Senate that calls for amendment of the Electronic Fund Transfer Act ("EFTA").[89] The amendments to the EFTA would require the Board of Governors of the Federal Reserve System ("FRB" or "Board") "to prescribe regulations relating to network competition in credit card transactions, and for other purposes."[90] The provisions described below— (1) no exclusive network, (2) no routing restrictions, and (3) applicability and (4) designation of national security risk—would be added to the EFTA in a section entitled "Competition in Credit Card Transactions."[91]

No Exclusive Network

The "No Exclusive Network" provision would apply to the following:

- **Covered Card Issuer**: "[A] card issuer that, together with the affiliates of the card issuer, has assets of more than $100,000,000,000."[92]

- **Payment Card Network**: The "No Exclusive Network" provision would not apply to credit cards issued in a three-party payment system model, which is defined as "a credit card issued by a card issuer that is— (I) the payment card network with respect to the credit card; or (II) under common ownership with the payment card network with respect to the credit card."[93]

The "No Exclusive Network" provision prohibits covered card issuers and payment networks from restricting electronic payment card transactions ("transactions") to a single network.[94] Furthermore, the second network over which a transaction may be routed may not be:[95]

- Owned, controlled, or otherwise operated by:
  - Affiliated persons with the first network, or
  - Networks affiliated with the issuer, or
  - Networks that are on the National Security Risk List (described below).
- If the first network is one of the two largest networks by market share with respect to number of credit cards issued in the United States as of the date the FRB determines the regulation, the second network cannot be the other one.

This means that covered card issuers and payment card networks would be obligated to make it possible to route transactions over at least two unaffiliated networks, at least one of which is not one of the two largest networks by market share with respect to number of credit cards issued.[96]

The FRB is obligated to prescribe associated regulations within one year after the date of enactment of the CCCA and to update the list of the two largest networks by market share with respect to the number of credit cards issued in the United States at least once every three years.[97]

No Routing Restrictions

"No Routing Restrictions" provision prevents covered card issuers and payment card networks from "inhibit[ing] the ability of any person who accepts credit cards for payments to direct the routing of electronic credit transactions for processing over any payment card network that […] may process such transactions" and that is not on the National Security Risk List (described below).[98]

Under the "No Routing Restrictions," provision the covered card issuer or credit card network is prohibited for imposing any penalty or disadvantage for:[99]

- Directing Transactions: Choosing to direct a transaction over a payment card network on which the transaction may be processed, or

- Minimum Transaction Volumes: Failing to meet a minimum transaction volume, in number or aggregate dollar amount, on a particular payment card network.

In addition, the "No Routing Restrictions" provision prevents covered issuers and payment card networks from imposing the following limitations based on "authentication, tokenization, or other security technology" ("security technology"):[100]

- Prohibition from Requiring Exclusive Use of a Security Technology that Cannot Be Used by All Networks for a Credit Card: Prohibition from requiring a person who accepts credit cards for payments to exclusively use a particular security technology that cannot be used by all the payment card networks that may process transactions for a particular credit card.

- Prohibition from Inhibiting Other Networks from Using a Security Technology: Prohibition from inhibiting another payment card network from handling or processing transactions using a security technology for the processing of transactions.

The FRB is required to prescribe regulations regarding the "No Routing Restrictions" provision within one year of the enactment of the CCCA.[101]

Applicability

The "Applicability" provision states that the "No Exclusive Network" and "No Routing Restrictions" provisions do not apply to credit cards issued in a three-party payment system model.[102]

Designation of National Security Risk

The CCCA requires that the FRB write regulations to establish a public list of payment card networks ("National Security Risk List") that "the processing of electronic credit transactions by which is determined by the Board to pose a risk to the national security of the United States" or that are "owned, operated, or sponsored by a foreign state entity."[103] This list would be required to be established within one year after the date of enactment of the CCCA and updated at least once every two years.[104]

LIKELY ECONOMIC IMPACTS OF THE CCCA

This section considers the likely economic effects of the CCCA, relative to a baseline of the current state of the U.S. payments ecosystem. This analysis leverages insights from economic literature, including recent developments in the economics of two-sided markets and analyses of policy changes affecting payment instruments in the United States. For a more complete overview of the economic literature that underpins this analysis, we provide a primer on the economics of two-sided markets in Appendix A and a discussion of recent payment instrument related policy changes in Appendix B.

This section begins with a discussion of the operational considerations associated with the CCCA for various parties in the credit card ecosystem in Operational Considerations Associated with the CCCA, followed by discussions of potential impacts of the CCCA on fees in the credit card ecosystem on page 23. As we think that a likely effect of the CCCA is a decrease in interchange fees, we discuss the likely effects of a decrease in interchange fees on page 26. We then summarize potential economic impacts of the CCCA on various parties in the credit card ecosystem on page 29.

Operational Considerations Associated with the CCCA

The CCCA prescribes that certain credit card ecosystem participants adopt or adapt to specific changes in how they interact with credit cards and credit card transactions. Itemizing these operational changes can be helpful in understanding how the incentives of participants may change and how these changes in incentives may affect those participants' behavior. This subsection focuses on the changes in permissible actions under the CCCA; potential impacts on prices, *e.g.*, interchange fees, consumer choices, and credit decisioning and terms are discussed subsequently.

Merchants

The No Exclusive Network provision prescribes that for each credit card transaction involving a credit card issued by a covered issuer, a merchant would have the option to choose to route the transaction over one of at least two networks.[105] Factors that may be considered in these choices may include price (*i.e.*, MDF) and quality (*e.g.*, security, speed, network policies on issues like chargebacks).[106] A merchant could potentially create decision rules for which networks to route transactions over, or delegate routing decisions to acquirers or other intermediaries. Such routing decisions would not need to be made for all credit cards: both three-party system credit cards and credit cards issued by issuers that, together with their affiliates, have assets of $100 billion or less would not be subject to the No Exclusive Network provision and can route credit card transactions over one network.[107]

The structure of fees that merchants pay for credit card payment services may also change as the No Routing Restriction provision explicitly prohibits penalties or disadvantages associated with directing transactions or minimum transaction volumes.[108] The No Routing Restriction provision potentially could lead the FRB to prescribe rules prohibiting volume discounts, which we understand are common for large retailers, although it is not explicitly stated in the bill.[109]

Acquirers

As the No Exclusive Network provision would almost certainly necessitate entry of additional credit card networks,[110] acquirers would have to establish and manage relationships with additional networks as well as methods to dual-route credit transactions, which could be associated with implementation and ongoing costs. Furthermore, acquirers may be delegated the responsibility of choosing or implementing decision rules associated with routing transactions for credit cards that are issued by covered issuers.

Networks

By specifying that the second network over which a transaction network may not be one of the two largest networks by market share with respect to the number of credit cards issued in the United States,[111] the No Exclusive Network provision would likely induce entry of new networks. As merchants would have the choice to route transactions over one of two or more networks for each transaction on a card issued by a covered issuer (No Exclusive Network provision) and could be limited in their ability to offer volume pricing (No Routing Restrictions Provisions),[112] the ways in which networks contract and interact with merchants or their delegates[113] might change.

Networks associated with three-party systems would not be subject to the No Exclusive Network provision or No Routing Restriction provision, so they would not have to "share the road" with other networks for some credit cards. Further, three-party networks would have no added restrictions on pricing from the CCCA and would maintain the option to have pricing that takes into account minimum transaction volumes.[114]

Issuers

The No Exclusive Network provision directly affects how covered issuers—issuers who, combined with their affiliates, have over $100 billion in assets—issue credit cards.[115] Currently, credit cards tend to be associated with a single network, but under the No Exclusive Network provision covered issuers would have to issue credit cards associated with at least two networks.[116] This would likely involve additional costs associated with implementing the changes as well as ongoing costs associated with managing additional network relationships. The No Routing Restrictions provision also prohibits covered issuers from imposing penalties or disadvantages associated with directing transactions or minimum transaction volumes on persons who accept credit cards.[117]

The No Exclusive Network provision does not apply to three-party systems,[118] so issuers of three-party system cards would not have to add a second network to their cards. Furthermore, issuers of four-party system cards that are below the $100 billion asset size threshold are also not subject to the No Exclusive Network provisions,[119] and therefore would also not have to add a second network to their cards.

Consumers

The CCCA does not include provisions that are directly aimed at consumers,[120] but there are still potential impacts on consumers, as detailed below. Consumers with credit cards issued by covered issuers would have credit cards enabled to have transactions routed over at least two networks,[121] which we understand may require large fixed costs (*e.g.*, the reissuance of many physical credit cards). Because persons who accept credit cards, *e.g.*, merchants, have the choice over which network to route a transaction, consumers no longer have the option to have a credit card issued by a covered issuer for which the consumer can choose a single network with certainty. Consumers would retain the option to choose other methods of payment or, if qualified, switch from covered issuer cards to the adoption or use of credit cards that are not obligated to route transactions over two networks (*i.e.*, credit cards issued by smaller four-party system issuers or three-party system cards).

Fees in the Credit Card Ecosystem

Role of Interchange Fees Through the Lens of the Economics of Two-Sided Markets

Before the discussion on the impact of the CCCA on interchange fees, this section describes the role of interchange fees in a credit card market when the market is viewed as a two-sided platform. As discussed on page 8, (Fees Associated with a Four-Party System Credit Card Transaction), the interchange fee is a transfer between the merchant side of the market to the consumer and issuer side of the market; the card network does not receive revenue directly from interchange fees.[122] Direct revenue due to a credit card (or debit card) transaction for the card network comes from the network fees paid by the issuer and acquirer, not the interchange fees.[123] Despite this, interchange fees are set by the card network, a firm that does not directly receive revenue due to interchange fees.[124] This raises the question of why the card network prescribes a transfer of money from one side of the market to the other side of the market.

An answer to this question comes from economic theory related to two-sided platforms, which is surveyed and described in more detail in Appendix A. At a high-level, a two-sided platform can be defined as an intermediary firm that facilitates interactions between two distinct sides of a market.[125] A role of a two-sided platform is to coordinate between these two sides of the market such that the interaction between the two sides enhances what is referred to as *cross-network effects* (*or indirect network effects*).[126] In fact, theoretical socially optimal prices, or the prices that maximize the economic welfare derived from *both* sides of the market for utilizing the intermediary,[127] may include subsidizing one side of the market in the form of lower prices, while increasing the price paid on the other side of the market.[128] The purpose of this subsidy is to facilitate interactions between the two sides. In other words, the transfer facilitated by the two-sided platform balances the market such that users on both sides of the market choose to interact via the two-sided platform.

In a four-party credit card system, the transfer used to balance the incentives of one side of the market and the other side of the market is explicit and is the interchange fee. This is described by Visa and Mastercard publicly. Visa states, "Visa uses interchange reimbursement fees as transfer fees between financial institutions to balance and grow the payment system for the benefit of all participants."[129] Mastercard describes the balancing of interchange fees as,

> *"Interchange rates are only one of many cost components included in a [MDF] and are a necessary and efficient method by which Mastercard maintains a strong and vibrant payments network. Setting interchange rates is a challenging proposition that involves an extremely delicate balance. If interchange rates are set too high, such that they lead to disproportionately high [MDF]s, merchants' desire and demand for Mastercard acceptance will drop. If interchange rates are set too low, card issuers' willingness to issue and promote Mastercard cards will drop, as will consumer demand for such cards."*[130]

With this in mind, the authors of this paper want to emphasize a number of points with respect to interchange fees prior to discussion of the potential impact of the CCCA:

- All else equal,[131] a reduction in interchange fees directly increases the price of a credit card transaction to issuers and directly decreases the price of a credit card transaction to acquirers.[132] This statement is not interpretation or analysis; the price increase for issuers and decrease for acquirers is mechanical.

- Interchange fees are not explicitly observed for credit card transactions that are processed over three-party networks, but this does not imply that the card network in three-party networks does not cross-subsidize credit card transactions between consumers and merchants. Instead, the lack of an explicit transfer between the consumer side of the market and the merchant side in a three-party network is due to the organizational structure of a three-party card network. A transfer between the merchant side of the market to the consumer side of the market would be an internal transfer price between divisions that is not observable using public documents.[133]

- A potential reduction of interchange fees in response to the CCCA does not imply that interchange fees are at a supracompetitive level currently. In the lens that interchange fees are a transfer that balances the two-sides of a market, whether interchange fees increase or decrease when the market structure is changed (as would be the case under CCCA) more accurately reflects a shift in incentives to transact using the card network. Using the logic discussed in Appendix A, if interchange fees were to decrease and network fees remained constant, then the price of a credit card transaction increases for issuers and decreases for acquirers. Issuers have less incentive to "participate" on the two-sided platform while acquirers have more incentive to "participate" on the two-sided platform relative to the status quo.[134] More concretely, "participation" in this context means the choice to use the card network to process a specific transaction over that of alternative payment methods. Key in the logic in two-sided markets discussed in Appendix A, (see page 38, Considerations for Platform Price and Participation Optimization), is that it is not clear whether this is socially beneficial to *both sides of the market*. Rather, a *shift of balance* in prices charged to each side of the market (*e.g.*, a reduction in interchange) may benefit one side *at the expense of the other side of the market*. Moreover, this shift of balance could actually decrease total surplus, as defined as the sum of consumer side surplus and merchant side surplus. This is due to the inherent link between the two sides of the market, of which interchanges fees are an explicit transfer between the two sides. For a price reduction on both sides of the market to occur,

there would necessarily have to be a reduction in the sum of issuer network fees and acquirer network fees (total network fees). Note that this reduction is independent of interchange fees. This is because interchange fees are a transfer between sides, and not an absolute price reduction to *both* sides of the market.

- Current interchange fees are a market outcome, but this also does not directly imply that interchange fees are set at a "competitive level,"[135] and network fees must also be considered in the equation. This question on whether interchange fees are competitive, in some sense, is not the correct question to be asked when a credit card market is viewed as a two-sided platform. The question is more accurately posed as whether interchange fees plus network fees are set at an *efficient* level. As discussed in Appendix A, (see page 45, Competition Between Two-Sided Platforms), increasing competition between two-sided platforms does not theoretically imply that prices will converge toward the *efficient* level. Almost by definition, the *theoretically efficient level* of prices paid by either side of the market is difficult to observe or calculate.[136] As discussed in Appendix A, (see page 38, Considerations for Platform Price and Participation Optimization), the existence of cross-network effects and the potential inclusion of cross-side subsidies in the socially optimal prices implies that the socially optimal prices can be higher, lower, or equal to observed prices.[137]

Potential Impacts of CCCA on Fees

The No Exclusive Network provision requires merchants to make choices between credit card networks when presented with a card from a covered card issuer.[138] In contrast to the current regime in which a credit card is associated with a single network, if the CCCA were to take effect networks would have to compete for routing at a transaction-level even after a consumer has chosen which card to use.[139] Networks would compete to gain transactions routed by merchants and likely further incentivize merchants to process transactions on their networks.

A way for a network to induce more merchants to process more transactions over its network is to reduce interchange fees, in an attempt to induce lower merchant discount fees, or to reduce network fees payable by acquirers.[140] Due to the inherent linkage between either side of the two-sided platform,[141] lowering interchange fees paid by acquirers per credit card transaction would directly lower issuer revenue from interchange fees that may be used to fund rewards and points programs for consumers.[142] The potential decrease in interchange fees would be due to the shift in choice of card network from the consumer side of the market to the merchant side of the market as the CCCA would impose a second card network that the merchant side may elect to process the transaction over. This represents a shift in the decision of card network from the consumer side of the market to the merchant side of the market. As discussed on page 23, (see Role of Interchange Fees Through the Lens of the Economics of Two-Sided Markets), the interchange fee is a transfer from the merchant side of the market to the consumer side of the market and is not a fee that is payable to the card network.

Networks could also compete for merchants on quality, including security features such as fraud detection.[143] As described in Appendix A, (see page 43, Bouncer's Right), card networks can enforce Bouncer's Right to promote positive externalities between users, and the absence of strong enforcement power can lead to negative externalities. A concern is that, for a given merchant, network quality may be imperfectly observed. A merchant may find it difficult to ascertain or compare security across networks as there might be merchant-specific factors that affect metrics like fraud rates and chargebacks. Low network quality associated with higher merchant costs (*e.g.*, more chargebacks) can be thought of as a hidden add-on price, or as a shrouded attribute.[144] Consequently, for at least some merchants, networks would likely predominantly be competing on price, *i.e.*, via interchange and network fees that factor into MDFs. For merchants who focus mainly on price, networks would have less incentive to provide high quality service or make further costly investments in card network security.

While interchange fees will likely decrease because of the mandate for routing choice included in the CCCA, there are scenarios under which interchange fees may remain the same or increase. On one hand, interchange fees may fall due to a number of reasons such as additional competition between card networks to incentivize merchants or acquirers who make routing decisions,[145] the shift of decision of selection of card network from issuer to a choice between (at least) two card networks by acquirer or merchant (No Exclusive Network provision), or a rise of usage of a more competitive alternative to credit cards.[146] On the other hand, the CCCA may have little effect on interchange fees or have the opposite effect of increasing interchange fees. For example, if there are multiple new credit card networks, they may have to compete vigorously to sign up issuers and may do so through interchange fees.[147] If new networks were not to find it optimal to set interchange fees price below incumbent networks' interchange fees, then interchange fees would likely remain the same. Further, there is the possibility of a two-tiered interchange fee structure where exempt issuers have a different interchange fee structure than non-exempt issuers, as occurred with the Durbin Amendment.[148] The practice of different interchange fee structures for "regulated" and "unregulated" debit cards in the U.S. persists to the most recent interchange fee schedules released by Visa and Mastercard.[149] Note that changes in interchange fees do not imply a difference in card network revenue, as interchange fees are transfers between acquirers and issuers.

Potential Impacts of a Decrease in Interchange Fees

Lower interchange fees would lower interchange fee revenues for issuers for a given set of transactions. In addition to being affected by potential decreases in interchange fees, issuer profitability may also be affected by additional costs associated with managing relationships with multiple credit card networks due to the No Exclusive Network provision. As described in several empirical papers documenting the effects of the CARD Act and the Durbin Amendment, which are summarized in Appendix B, policies that change the profitability of payment cards can have consequences with respect to the terms of and availability of products.

Account Terms and Credit Card Rewards

The effects of lowering interchange fee revenue could potentially be offset by increases in revenue through other channels associated with credit card accounts, analogously to the US experience with the Durbin Amendment that limited debit card interchange fees.[150] Consumer prices associated with credit cards include interest, annual fees, transaction fees, and penalty fees.[151] Interest rate increases and penalty fees were limited by the CARD Act,[152] which somewhat limit issuers ability to adjust these prices in response to decreases in interchange revenue. Increases in annual fees would be akin to the increase in deposit account fees observed by Kay et al. (2018)[153] and Mukharlyamov and Sarin (2022).[154] The Durbin Amendment, like the CCCA, only affected a subset of issuers, but issuers were still able to pass through much of the costs to consumers.[155]

The incidence of the impacts of the CCCA on account terms would likely differ between consumers. While all consumer credit card accounts would likely become less profitable for covered issuers, revenue from transactors would likely fall disproportionally more as revolvers would at least continue to generate interest income. As the value proposition of extending credit to transactors decreases, issuers could respond by extending less credit to transactors either with respect to credit limits (intensive margin) or with respect to marketing or approving new accounts for transactors (extensive margin).[156]

A feature of credit cards that would likely be affected by the CCCA is credit card rewards: cards issued by covered issuers would likely have their rewards decrease as a result of lower interchange fees. This would be consistent with many banks covered by the Durbin Amendment dropping or scaling back their debit card rewards programs once the Durbin Amendment took effect.[157] Various authors have posited that credit card rewards are regressive as credit card spending is correlated with higher income consumers,[158] higher income consumers are more likely to have premium rewards cards,[159] and sophisticated consumers are more likely to gain from credit card rewards than naïve consumers.[160] Other authors have suggested that there might be social benefits to rewards points, including shifting consumers from paper-based payment methods to credit cards,[161] although there are open questions about the magnitude of benefits.[162]

Transaction-related rewards and the cost of credit (*e.g.*, interest rates) are key benefits or costs associated with a consumer using a credit card. However, there are other benefits or costs associated with a credit card that are typically thought of as secondary but are also transfers made between the issuing bank and consumers. Annual fees are an example of a direct cost that a consumer may pay the issuing bank to hold a credit card in a particular year, while sign-up rewards, fee credits, travel insurance, and purchase coverage are incentives that consumers receive.[163] Although only indirectly related to the transaction function of the credit card, these characteristics of cards are likely to be affected by a reduction in interchange.

Consumer Choice of Methods of Payments

Consumers have choice over methods of payment, as acknowledged by various government sources, including the Federal Reserve Bank of Atlanta's Survey and Diary of Consumer Payment Choice that lists payment methods including credit, debit, check, money order, cash, prepaid/gift/EBT, bank account number payment, online banking bill payment, mobile payment app, account to account

transfer, income deduction, and more.[164] In addition, the Consumer Financial Protection Bureau's 2023 *The Consumer Credit Market* report lists point-of-sale loans, buy-now-pay-later, fintech personal loans, and pay-by-bank as credit card competitors.[165] The options listed above include potential substitutes for a credit card's transaction function, credit function, or both.

Reducing rewards points on a credit card would directly increase the price of transacting on a credit card for a consumer, which may cause them to look to alternatives, such as other credit cards, debit, or cash. Koulayev et al. 2016 simulate the effects of a change in the usage value of credit, and find that, based on their calibration to 2009 data, "substitution appears evenly split between cash, check, and debit, with each between 25% and 27% market share, with bank account deduction capturing 15%."[166] Koulayev et al. 2016 were considering categories of payment instruments, but the CCCA could create more subtle differentiation within the credit card payment instrument. Since only credit cards issued by covered institutions are affected, cards issued by issuers not covered by the rule (four-party system issuers with less than $100 billion in assets and three-party system issuers) may not change or may even increase their rewards. As an analogy, after the passage of the Durbin Amendment, "[s]ome community banks and credit unions, exempt from the interchange fee cap, have reacted to the larger banks' moves by going in the opposite direction: introducing new rewards for debit card purchases or for opening checking accounts—and in some cases these smaller banks have gained a significant number of new checking account customers."[167] If the CCCA were implemented, consumers who have the credit history or income to be accepted for additional credit cards would likely move from covered issuers to non-covered issuers, or other methods of payment.

The availability of alternatives for potential credit consumers would likely differ between consumers. As discussed above, covered issuers would likely adjust the terms of their customer contracts, including by changing credit limits. To the extent that consumers who use the credit function of credit cards are constrained by changes in credit limit, they may switch to alternative forms of credit, like personal loans, which may be more expensive than credit cards.[168]

Covered Issuer Consumer Mix

To the extent that consumers respond to changes from the CCCA by switching methods of payment, covered issuers may face an adverse selection issue as consumers who can seek out alternatives with higher rewards from non-covered four-party system issuers or three-party system issuers would do so. All else equal, lower rewards due to lower interchange fees would mean that the effective price of using credit cards (net of rewards) that covered issuers can offer to consumers are higher. As non-covered issuers may not face decreases in interchange fees and three-party system issuers would likely not face changes in costs due to CCCA their rewards programs and prices to consumers are unlikely to change. Non-covered issuer and three-party system issuer cards might thus become relatively more attractive to consumers who are able to switch, and customers who are able to switch are likely less risky consumers. A risky consumer is defined as a consumer who is more likely to default on existing credit card debt. Thus, the pool of potential consumers willing to adopt a credit card from covered issuers is inherently riskier.[169] A covered issuer might further adjust its interest rates upwards to deal with a likely riskier pool of borrowers, which would incentivize more borrowers who can move to other issuers' products to do so.[170]

The implications of adverse selection are that the credit function of credit cards becomes more expensive: (1) covered issuers are likely to face a riskier pool of credit card consumers, and (2) actual and effective interest rates are likely to be higher at covered issuers.[171] Some consumers may be foreclosed from the market because of higher interest rates or because issuers are no longer willing to extend credit to riskier borrowers.[172]

Four-Party and Three-Party Networks

Note that in the CCCA there is an asset size threshold for four-party system issuers to be covered by the No Exclusive Network and No Routing Restrictions provisions, but three-party networks of all sizes are excluded from these provisions. Currently, three-party system issuers American Express National Bank and Discover Bank are both over the $100 billion threshold.[173]

As discussed above, consumers who qualify for credit cards from three-party system issuers might choose these cards because of higher rewards. The CCCA could thus induce more consumers to effectively single-home[174] on three-party system credit cards. In order to access these consumers, merchants would accept the three-party system credit cards. Because some consumers would effectively single-home, this could create a competitive bottleneck situation in which a three-party system has excessive, inefficient leverage over the merchant side.[175] This could give the three-party systems the ability to exert market power over merchants,[176] that arises from CCCA provisions. With greater market power, three-party systems could potentially increase merchant discount fees, thus raising costs for merchants relative to a situation in which covered issuers are better able to compete with three-party system issuers.

Summary of Potential Impacts for Credit Card Ecosystem Participants

When considering the likely economic effects of the CCCA, it can be helpful to think in terms of the two sides of the market for a four-party system, as illustrated in Exhibit 1. On one side of the network, there are issuers, and downstream from the issuers are consumers. On the other side of the network there are acquirers, and downstream from the acquirers are merchants. As discussed above, there may be additional intermediaries between acquirers and merchants, including payment facilitators or ISOs. While we have discussed the possibility of interchange fees decreasing, increasing, or staying the same, we think it is likely that interchange fees decrease and therefore continue the discussion under the assumption that a likely effect of CCCA is a decrease in interchange fees.

Networks

Currently, four-party networks are compensated through network fees, and have an incentive to increase volume of transactions over their networks. Attempts to achieve higher volume of transactions can involve (1) incentivizing consumers to transact more on their networks through choice of card in their wallets (intensive margin) or signing up for cards on their network (extensive margin), and (2) incentivizing merchants to sign up for their networks (extensive margin). Interchange fees are a transfer from acquirer to issuer and act as the mechanism used to balance these two considerations. With the introduction of the CCCA, four-party networks on a covered issuer's

credit card would be competing directly for routing at a transaction-level.[177] This would update four-party networks' considerations for maximizing volume of transactions as follows: (1) incentivizing consumers to transact more through choice of card in their wallets (intensive margin) or signing up for cards on their network (extensive margin), and (2) incentivizing merchants to *route transactions over their network versus the other network on a covered issuer credit card* (*intensive margin*) or sign up for their networks (extensive margin). Four-party networks would continue to have incentives to balance the consumer side of the market with the merchant side of the market through interchange fees, but levels of interchange fees set by networks would likely change: networks would likely lower interchange fees to incentivize merchants to choose to route transactions over them.

As shown in Exhibit 4, the top two networks by number of credit cards in circulation are Visa and Mastercard, which are both four-party system networks. Visa and Mastercard would be directly affected by the No Exclusive Network provision of the CCCA as (1) they could not be an exclusive network associated with a covered issuer's credit card and (2) they are prohibited from being the second network over which a covered credit card issuer can be routed (assuming the first is the other top two network).[178] Three-party networks like American Express and Discover, which as of 2021 accounted for 15 percent of the number of credit cards in circulation and 23 percent of total transaction volume,[180] are specifically excluded from the No Exclusive Network and No Routing Restrictions provisions by the Applicability provision.

As neither of the top two networks can be the second network to another on a covered issuer's credit card,[181] entry of one or more additional four-party credit card networks is likely. These new networks would have similar incentives to extant four-party networks to balance the consumer side and the merchant side of the market, and thus will also set interchange fees. Three-party networks, meanwhile, would not be restricted by the No Exclusive Network or the No Routing Restrictions provisions, and would be able to continue to operate under their current structures. For example, a three-party network could continue to provide volume discounts to merchants.[182] If consumers substitute away from covered issuer credit cards to three-party system credit cards, three-party networks could gain share of transactions.

Acquirers

A likely effect of the CCCA is a decrease in interchange fees on transactions on credit cards issued by covered issuers that would be paid by the acquirer. There may also be changes in the interchange fees associated with non-covered four-party system issuers that may differ from the changes in interchange fees associated with covered issuers. As discussed above, acquiring services can take various forms, including a merchant contracting directly with an acquirer or a merchant contracting with a payment facilitator who then contracts with an upstream acquirer. The extent to which changes in interchange fees are passed through to merchants may be affected by the structure of relationships in a supply chain for payment processing services.[183]

The extent to which costs are passed through can depend on the extent to which there is competition in a market.[184] Under certain circumstances, cost pass-through may be higher in more competitive markets.[185] If one were to calculate shares of merchant acquirers in the US in

2022 based on transaction volume acquired and use these shares to calculate an Herfindahl-Hirshman Index ("HHI"),[186] the HHI would be 1352, which would be consistent with a moderately concentrated market.[187]

Even if acquirers pass through changes in interchange fees, intermediaries between acquirers and merchants may not completely pass through their reduction in interchange fees. If there are multiple intermediaries between an acquirer and a merchant, this could lead to double marginalization, which is a distortion caused by markups at two levels in a distribution channel.[188] To the extent that non-acquirers (*e.g.*, payment facilitators, ISOs, or other intermediaries) have market power, they may not fully pass through changes in interchange fees to merchants and retain the benefits of cost savings from lower interchange fees. Currently, payment facilitators tend to have pricing that is standardized across transaction types, which is consistent with not directly reflecting cost differences between different methods of payment.[189] Differences in structures of supply chains for acquiring services could be associated with differential pass through, for example, a large merchant with a direct relationship with an acquirer might experience a greater change in MDF associated with a decrease in interchange fees than a small merchant who connects to the credit card ecosystem through a payment facilitator, which is discussed in more detail in the next subsection.

As discussed above, there is the potential for three-party system to gain market power because they are unconstrained by the No Exclusive Network provision and No Routing provision in CCCA. This could shift more transactions to three-party networks due to an increase (or no-change) in rewards, which could increase merchant costs for processing for three-party system transactions. Analysis of an increase in three-party system costs for merchants would be similar to the analysis of an increase in interchange fees.

Merchants

Merchants have the option to route transactions, but the extent to which they would be impacted by changes in interchange fees depends on their relationship with their acquiring services providers (*e.g.*, acquirer, ISO, payment facilitator). Acquirers, ISOs, and payment facilitators could adjust MDFs or other prices differentially across merchants. Smaller merchants may have less bargaining power with acquirers, ISOs, or other third parties, so they would likely have less of a reduction in interchange fees passed through to them.[190] Moreover, smaller merchants may be more likely to contract with third-parties for payment processing services, which would likely subject them to potential markups at various levels of their acquiring services supply chain, and thus less pass-through of changes in interchange fees. In contrast, we understand that larger merchants may be more likely to contract directly with networks or acquirers, and therefore be more likely to experience a greater change in costs associated with interchange fees given that the regulatory constraint of the No Exclusive Network provision ensures there will always be more than one network to negotiate with for cards issued by covered issuers.

A consideration associated with merchant cost reductions via reductions in MDFs associated with interchange fees is the extent to which they are passed through to end consumers in the form of lower prices for goods and services. Papers we reviewed provide scant evidence on pass-through of

merchant cost reductions to retail prices. Wang et al. (2014) find that few merchants decrease prices after a debit cost decrease while debit cost increases have significant effects on merchant prices.[191] Similarly in a study of the impacts of the Durbin Amendment on gas prices, Mukharlyamov and Sarin (2022) find that it is "virtually impossible to quantify the extent of pass-through with statistical significance" as the relative magnitude of interchange-fee savings per gallon are too small relative to standard deviation of per-gallon gas prices.[192] There is sparse evidence of pass-through of previous changes in debit card interchange fees from the Durbin Amendment,[193] which suggests that pass-through of changes in interchange fees from the CCCA to consumer prices for goods and services would be small if it exists at all.

A related consideration is the extent to which consumers substitute to different products, what consumer substitution means in terms of merchant payment processing costs, and actions that merchants can take to affect consumer choice of methods of payment. A particular consideration with CCCA is that it might amplify decisions and settlements associated with *Ohio v. Amex*. Following from Visa and Mastercard's settlement from the case that became *Ohio v. Amex* and the *Ohio v. Amex* Supreme Court Decision, merchants have the option to steer consumers away from Visa and Mastercard cards, including through discounts, but do not have the option to steer consumers away from American Express cards.[194] This might compound the competitive bottleneck issues associated with three-party system networks gaining market power discussed on page 29 (see Four-Party and Three-Party Networks). Discounting or surcharging based on networks might become more prevalent if CCCA is implemented, the extent to which is an empirical question.[195] Australia provides one circumstance in which there was a reduction of interchange fees (implemented via a regulatory cap) combined with allowing merchants to impose credit card surcharges on consumers. Both policies were implemented over a short period of time starting in 2003.[196] Following these policies, the prevalence of merchants implementing surcharging for credit cards increased and the MDFs paid by merchants decreased. However, the average surcharge increased above that of the MDF. The situation where merchants surcharge over that of the merchant discount fee is consistent with economic theory. Bourguignon et al. 2019 show that this may arise due an informational asymmetry, at the time of purchase between the consumer and the merchant, who sets the surcharge price.[197] Since consumers are imperfectly informed about the level or existence of the merchant discount fees when the merchant is chosen, merchants may be incentivized to set the surcharge *over that* of the MDF or the costs associated with accepting the credit card.[198] Bourguignon et al. 2019 connects this to the economics literature on add-ons and shrouded attributes.[199]

Beyond substituting from covered issuer credit cards to other credit cards, consumers may also consider switching to alternative methods of payment like debit cards, buy-now-pay-later, or cash due to a potential reduction in transaction benefits (rewards and points) related to credit cards from covered issuers.[200] Merchants may consider their costs of methods of payments (*e.g.*, costs associated with cash include costs of physically managing cash and risk of theft)[201] in making decisions to accept or encourage a particular method of payment. Merchants may discount for the use of cash, following the 2017 *Expressions Hair Design et al. v. Schneiderman, Attorney General of New York et al.*[202] Merchants' current ability to discount or surcharge for the use of cash can discipline MDFs, and thus interchange fees.

Issuers

Turning to the other side of a credit card network, covered issuers are directly affected by the CCCA's No Exclusive Network provision and No Routing Restrictions provision. Covered issuers are likely to face higher costs due to having to manage relationships with additional networks for a given credit card as well as being unable to impose penalties or disadvantages for directing transactions or minimum transaction volumes and their choice of security technology.[203] Covered issuers are also likely to face lower revenues from interchange fees. Higher costs and lower revenues would limit covered issuers spending on incentives for consumers to sign up for and transact on their cards, including rewards programs. This effect might not be uniform across consumers or consumer segments; for example, when comparing currently equally profitable transactors and revolvers, the transactors would become less profitable for issuers than the revolvers with a reduction of interchange fees as transactors generate revenue for the issuer primarily through interchange whereas revolvers generate income for the issuers through two channels (interchange and interest).

Non-covered four-party system issuers would not be subject to the No Exclusive Network provision and No Routing Restrictions provision as long as they stay below $100 billion in asset size. This means that the No Exclusive Network and No Routing Restriction provisions of CCCA could provide non-covered four-party system issuers a competitive advantage to covered issuers, but covered issuers would lose that advantage if they grow too large. Similar to the incentive to remain below $100 billion in asset size, the business case for issuing credit cards by covered issuers with small credit card portfolios will likely decrease. This could incentivize issuers with consolidated assets of over $100 billion but with small credit card portfolios to exit the credit card issuing business. This potential incentive stems from the fact that covered issuers are defined in terms of consolidated assets rather than a credit card specific measure. As shown in Exhibit 7, issuer in terms of consolidated asset size of the bank holding company does not necessarily imply a large credit card portfolio. The potential exit of credit card issuers would have effects on competition for credit card issuing. Three-party network issuers would also not be subject to the No Exclusive Network and No Routing Restrictions provisions but would not have a size cap imposed on them and therefore could potentially have the opportunity to gain share above and beyond what a non-covered issuer could do without triggering the covered issuer threshold. Interchange fees for non-covered four-party system issuers would likely stay the same, or increase.

As discussed on page 28, (see Covered Issuer Consumer Mix), limiting covered issuers ability to provide rewards programs that are as generous as current programs could induce consumers to turn to alternatives, including credit cards issued by non-covered four-party system issuers and three-party system issuers. A likely consequence is that covered issuers would be faced with riskier pools of credit card consumers and would have to therefore charge more for credit cards (*e.g.*, through higher interest rates or fees). This could increase shares for three-party credit card system issuers (both in terms of number of credit cards and in terms of transaction volume) as well as for non-covered four-party credit card system issuers.

Consumers

When considering the potential impacts of CCCA on consumers, it is important to keep in mind that (1) consumers have choice over adopting and using methods of payment, (2) access to and terms of credit cards are not equal for all consumers as credit card approvals and decisioning are risk based, and (3) consumers differ in their usage of credit cards, including whether they only use their credit cards to transact or if they also use the credit function of their credit cards. To the extent that covered issuers pass through reductions in interchange fees due to the CCCA to consumers, this will directly increase the price of the use of covered issuer credit cards for consumers. A change in an interchange fee has impacts at a transaction level, so a likely candidate for changes in costs of using credit cards for consumers is through transaction-related rewards. Note that credit card rewards connect directly to transaction volume but not directly to the credit function of credit cards.[204]

To the extent that consumers' credit card rewards are reduced or eliminated, the incidence will vary based on consumers' volume of transaction, choice of cards, and availability of alternatives. For example, a consumer who has better credit could easily switch to a credit card that is issued by an issuer not covered by the CCCA (or to a three-party network) and may be able to maintain their credit card reward level. In comparison, a consumer with worse credit might have fewer alternatives to switch to and would have lower credit card rewards as they would have to stay with their extant covered issuer card. Due to negative selection issues discussed on page 28, (see Covered Issuer Consumer Mix), the consumer with worse credit might also be facing higher interest rates than they would in the current state of the world. Due to potential changes in profitability of different consumer segments, issuers may also decide to change the terms of customer accounts, including reducing credit limit, increasing fees, or imposing more stringent criteria for approving new accounts.

If credit quality correlates with demographic or income factors, the incidence of the consumer impacts of the CCCA would also likely correlate with those factors. For example, historically "Blacks, Hispanics, single individuals, those younger than age 30, and individuals residing in low-income or predominantly minority census tracts have lower credit scores than other subpopulations defined by race or ethnicity, marital status, age, or location."[205] If lower credit score individuals have their credit card rewards reduced or eliminated more than higher credit score individuals, these outcomes are likely to also be more prevalent among demographic groups that disproportionately have lower credit scores. As discussed on page 27, (see Account Terms and Credit Card Rewards), economic literature on credit card rewards has characterized credit card rewards as regressive based on correlations between having rewards and demographics, sometimes as a transfer from the poor to the rich.[206] However, this does not mean that higher income individuals are necessarily going to be the population most likely to have their rewards affected by the CCCA, as higher income individuals may be able to substitute to non-covered issuers or three-party networks. The incidence of the CCCA on consumers is likely going to be on consumers who face reductions in rewards or reductions in credit and are not able to substitute. Consumers are likely to experience an increase in the cost of using credit cards associated with the CCCA, with some groups of consumers facing higher increase than others.

APPENDIX A. A PRIMER ON THE ECONOMICS OF TWO-SIDED MARKETS

In this section, we discuss the two-sided platform literature in economics which provides a framework to analyze the credit card market and the potential impacts of the CCCA. A general theme of this section is that basic economic intuition for one-sided markets does not necessarily carry over to two-sided platform markets. In fact, the literature on two-sided platforms has argued that standard industrial organization conclusions such that observed prices in an efficient price structure are reflective of relative costs,[207] high price-cost margins are indicia of market power,[208] or pricing below marginal cost are indicia of predation[209] do not necessarily carry over to two-sided markets.[210] The economics literature on two-sided platforms began in earnest in the early 2000s.[211] Since this early literature, there have been many avenues that the literature has explored, with the credit card market and the newspaper advertising market being used as motivating practical examples.[212] A recuring topic throughout the literature is the significant impact that small, seemingly innocuous simplifying assumptions can have on market structure, competition, and platform incentives.[213] We note that the literature with respect to two-sided platforms often views a credit card market through the lens of only the transaction function.[214] Moreover, we want to emphasize that the term "two-sided platform" in a four-party system is in reference to the credit card network (*e.g.*, Visa or Mastercard).[215] While the credit function of a credit card is an important consideration when considering potential impacts of the CCCA, we leave that discussion to Likely Economic Impacts of the CCCA (page 21), where we directly consider the potential impacts of the CCCA.

The section proceeds as follows. In Appendix A: Considerations in Economic Modeling of Two-Sided Platforms, we first describe widely cited models of two-sided platform markets in economic literature and connect the characteristics to the credit card market. In Appendix A: Key Considerations for Two-Sided Platforms and Two-Sided Markets, we describe canonical results with respect to two-sided platforms, including the assumptions necessary to reach these conclusions and highlighting why using one-sided logic in two-sided markets is flawed. Finally, we discuss related literature in Appendix A: Additional Considerations for Credit Card Market: Price Coherence and Surcharging, that discusses the concept of price coherence and surcharging as well as overall considerations on competition in two-sided markets.

Considerations in Economic Modeling of Two-Sided Platforms

Characteristics that Define a Two-Sided Platform

This section considers how two-sided platforms are characterized in the literature, and how the concepts relate to four-party credit card systems. Widely cited general models for two-sided platforms in economic literature focus on three characteristics to define a two-sided platform market:[216]

1. *Multi-product Firm that Serves Two, Distinct Groups of Users.*[217] A two-sided platform serves two-separate sides of users and provides distinct services to each side. In the credit card market, the card network's direct customers in a four-party system are issuers on one side and acquirers on the other.[218] Much of the literature that uses credit card networks as a motivating example models credit card networks as serving consumers and merchants, who are, respectively, the end customers consumers of issuers and acquirers.[219] Because of precedent in the literature, in this section we sometimes reference consumers and merchants as the two sides of a credit card platform as shorthand in this section, we re-discuss some of the complexity of relationships between issuers, acquirers, consumers, and merchants on page 26, (see Potential Impacts of a Decrease in Interchange Fees).

2. *Cross-Network Effects* (*or Indirect Network Effects*).[220] The users that participate on one-side of a market directly affect participation on the other side of the market. This occurs because the extent of the benefits that a user receives from participation in a two-sided platform depends on if users participate on the other side of the market. In other words, users benefit from interaction with each other. In a credit card market, issuers would want to provide consumers with credit cards that merchants (potentially via an acquirer) will accept. A credit card that only a small number of merchants accept is of less use to consumers than a credit card that is widely accepted. Likewise, merchants providing access to a credit card network that only few consumers hold is less valuable to the merchant than a credit card network that is widely held by consumers.

3. *Bilateral Price Structure Set by a Two-Sided Platform.*[221] A two-sided platform sets a price for each set of users to pay for participation on the two-sided platform, and the price for each side need not be the same. A common assumption is that a platform sets a uniform price for each side of the market.[222] In a credit card market, a card network sets interchange fees, issuer network fees, and acquirer fees. When we refer to the "price" that the card network sets for a card transaction, we are referring to the net price that a user pays (or receives) for the card transaction, excluding the price of the good or service transferred between consumer and merchant. Specifically, the price that an issuer pays for a card transaction is the issuer network fee minus the interchange fee for the transaction.[223] Prices can be positive or negative. We emphasize that in the current U.S. credit card market issuers pay a *negative price* for a card transaction—in other words, the card network pays the issuer for the transaction. On the other side of the market, the acquirer pays interchange fee plus the acquirer network fee, this is a *positive price* that the acquirer pays for the transaction.

If a market or firm does not have all these characteristics,[224] then the logic of two-sided platforms need not apply.[225] If a market or firm fails one of these conditions, then there are simpler (and more widely studied) economic models that are likely more appropriate.[226]

To help illustrate these characteristics, two common markets that satisfy these characteristics that are not the credit card market are:

- *Newspaper Advertising*:[227] Newspaper readers read the newspaper for its publication content and advertisements for goods and services. On the other side of the market, there are advertisers who purchase advertising slots for the readers to view. Readers gain benefits from the newspaper content and potentially (positive or negative benefits) from viewing advertisements. Advertisers gain benefits from readers viewing their advertisements. The newspaper company (*e.g.*, *Wall Street Journal*) sets the price for readers to purchase an issue of the paper, and the price advertisers pay to print advertisements in the newspaper. The cross-network effects arise from there are benefits (or costs) from the newspaper facilitating interactions between readers and advertisers, with both sides gaining benefits (or costs) from the interaction.

- *Ride-Sharing Platforms*.[228] Ride-sharing platforms (*e.g.*, Uber, Lyft, and many others) connect riders with drivers. Riders gain benefits from transportation between locations, and drivers benefit from interacting with riders and being paid for the transportation service. The ride-sharing platform sets the price that the consumer pays and the price that rider receives for the interaction. To illustrate the importance of participation, the rider benefits by having more drivers, as riders are more likely to be paired with drivers. This effect also has a feedback effect due to cross-network effects, as more drivers have the incentive to participate on the two-sided platform due to more riders.

Decision to Join, Participate, and Interact by Users

In this section, we discuss a user's decision to participate in (or adopt) a two-sided platform. This is illustrative as it makes explicit the considerations that a user analyzes between the use of a two-sided platform versus alternative options. A way this is illustrated in the literature is from the point of view of a consumer making a payment to a merchant for a good or service.[229]

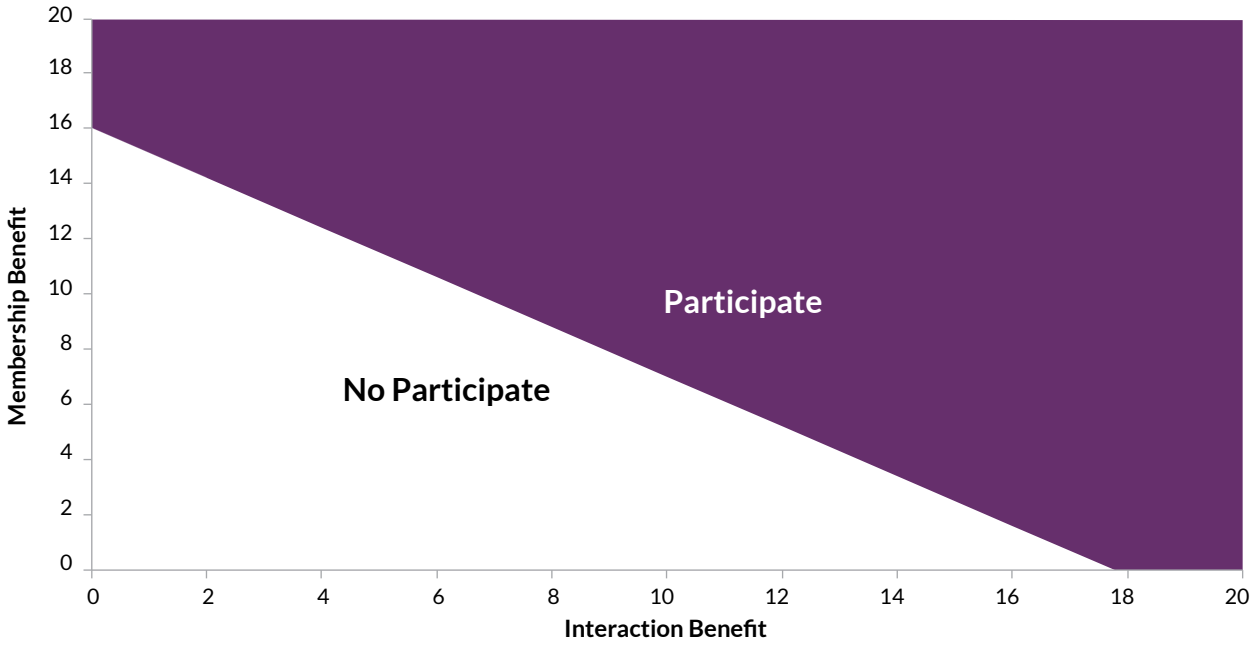
Excluding the credit function, a consumer receives two categories of benefits from using a credit card for a transaction:[230]

- Interaction Benefit: Captures the benefit that a user receives from interacting with the other side of the market. In the credit card market, the consumer's interaction benefit captures the benefit that a consumer receives over that of the next best alternative for that consumer.[231] More specifically, suppose a merchant accepts both cash and a credit card network and the consumer holds a credit card that is part of that credit card network. The interaction benefit includes factors such as the consumer's preference for cashless payments, security features that the credit card holds, ease of use, or any other benefit that a consumer receives from using the card over cash.

- Membership Benefit: The benefit that a user receives from participating on the two-sided platform that is independent of interaction with the other side.[232] In the example of the credit card market, membership benefits may be considered the prestige that a consumer feels in holding that credit card. The membership benefit is intrinsic to the consumer's usage of the platform and is typically thought to be relatively small in the credit card market.[233]

The combination of these two benefits for users determines whether a user chooses to transact through the two-sided platform. Importantly, users in a two-sided platform market consider both the *price* set by the platform for users on their side, as well as participation *on the other side* of the

Appendix Exhibit 1. **Participation of Users if Price is $16 and Participation of *Other Side* is 90%**



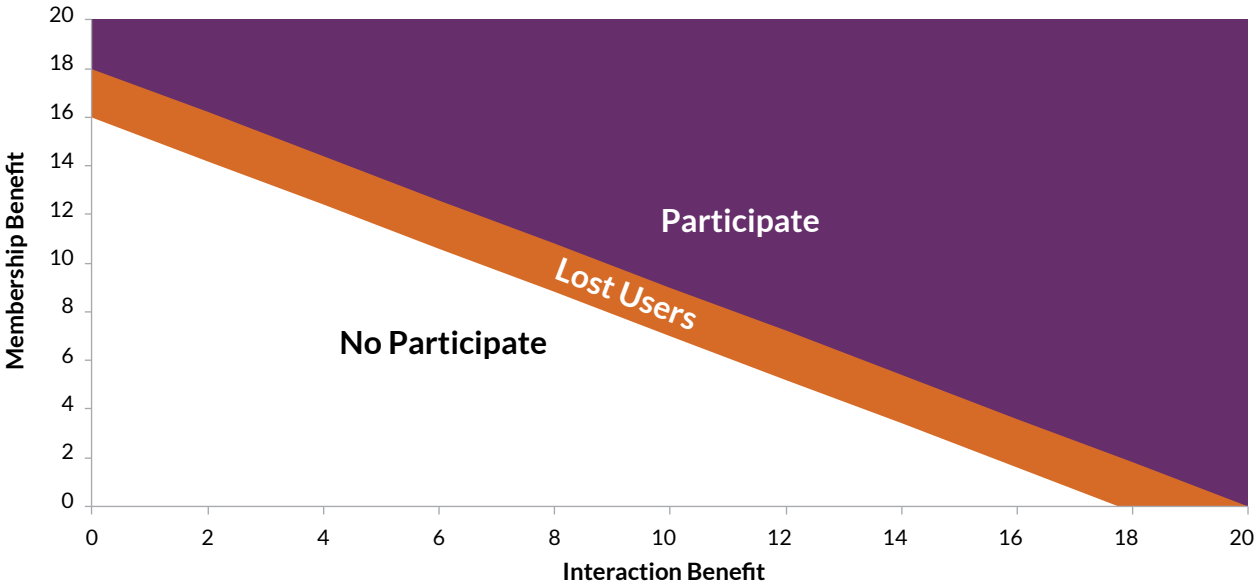
Source: NERA adapted from Weyl (2010).

market. An increase in price makes participation on the platform *strictly more expensive*, and strictly decreases participation on the side of the market that the price was increased, which is pictured in Appendix Exhibit 2 relative to Appendix Exhibit 1.[234] However, the number of users participating on the two-sided platform on the other side of the market also affects participation via the interaction benefits. A *decrease* in participation on a given side can be attributed to a decrease in participation on the *other* side (and increase in the other case). The decrease in participation on the other side also disproportionally selects users with *higher* interaction benefits.[235] A decrease in participation on the other side is shown in Appendix Exhibit 3 relative to Appendix Exhibit 1.

Considerations for Platform Price and Participation Optimization

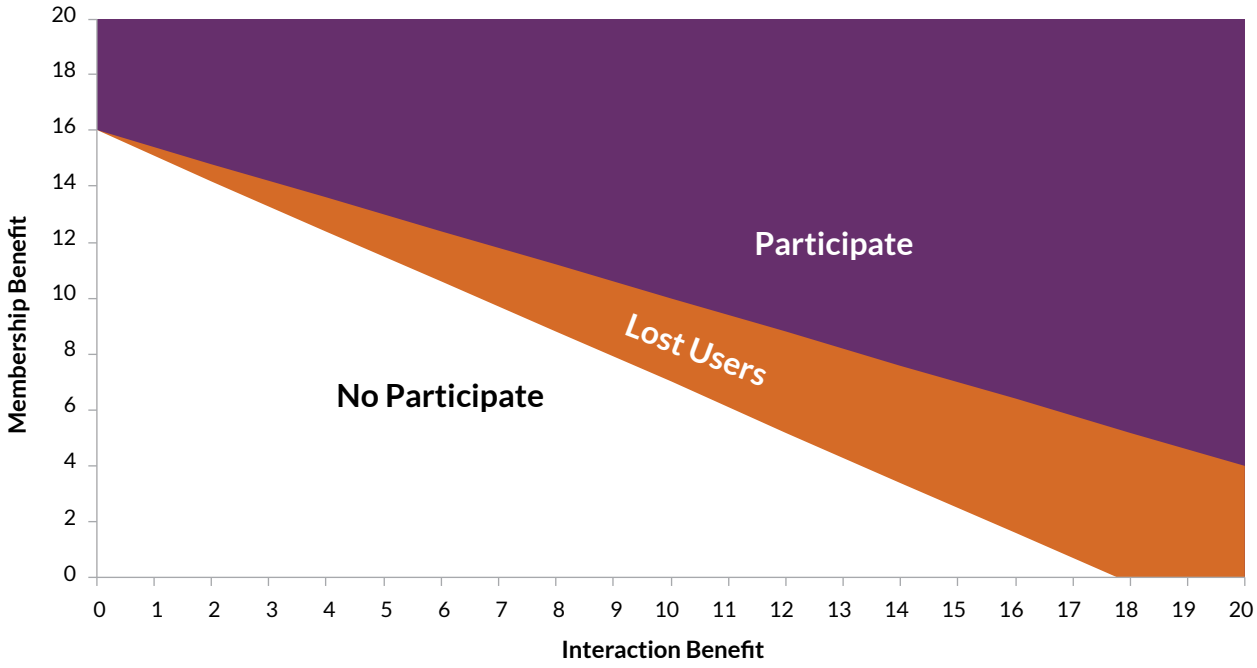
The incentives faced by and the pricing optimization problem for a two-sided platform is discussed in this section to better understand the incentives and tradeoffs that a two-sided platform faces. To illustrate this point, consider a two-sided platform that is a monopoly and faces no direct competition in the two-sided market.[236] Considering the monopoly case can be helpful to understand how a monopoly would optimally set prices as a two-sided platform and compare these prices to the socially optimal price.[237] In the case of one-sided markets, a theoretical economic result is that the price under perfect competition in idealized scenarios is set at the marginal cost of production and optimizes social welfare, while the price set under a monopoly lies on the other side of the spectrum and optimizes the profits of the monopoly. In this section, we discuss the similar, but distinctly different, concepts when applied to two-sided platforms. In two-sided markets, economic value is created by the two sides interacting, or transacting.[238] The two-sided platform sets two distinct prices to optimize the *participation* (or total interactions between user sides). Since there are two sides, the socially optimal prices internalize all cross-network effects on either side of the market to maximize

Appendix Exhibit 2. **Participation of Users if Price is $18 and Participation of *Other Side* is 90%**



Source: NERA adapted from Weyl (2010).
Note: Lost users are defined relative to the case where users participate if price is $16 and participation of other side is 90% (Appendix Exhibit 1).

Appendix Exhibit 3. **Participation of Users if Price is $16 and Participation of *Other Side* is 60%**



Source: NERA adapted from Weyl (2010).
Note: Lost users are defined relative to case where users participate if price is $16 and participation of other side is 90% (Appendix Exhibit 1).

the total surplus of users. The social optimal prices, therefore, may include an implicit subsidy to one side of the market in the form of a price lower than that of the marginal cost of provision.[239] On the other hand, the monopoly platform optimally prices to maximize its own profit and also must account for cross-network effects, but imperfectly. This market structure leads to different types of pricing distortions than in one-sided markets.

The two-sided platform faces the tradeoff of increasing the price on one-side of the market and lower participation on the other side of the market due to cross-network effects. The two-sided platform broadly faces two types of costs: (1) an interaction cost for an interaction between users on either side and (2) a membership cost per user on each side of the platform.[240] In a credit card market, (1) would represent cost attributable to processing a card transaction and (2) represents incremental onboarding cost a card network faces for each additional user of its network such as costs required to manage more users, costs associated with membership relation functions, and incremental infrastructure costs per additional user.[241]

A hypothetical monopolist two-sided platform maximizes profit with respect to the price paid by either side minus the membership cost, multiplied by participation of each side. The hypothetical monopolist also subtracts the interaction cost incurred when users interact via the two-sided platform, which depends on the participation of users on either side of the market. Solving the optimization problem, we can directly compare the socially optimal price for one side (call this "Side A"), P_A^S, to the price that a monopoly sets, P_A^M,[242]

$$P_A^M - P_A^S = Markup + \underbrace{Spence + Displacement + Scale}_{Platform\text{-}Specific\ Distortions}$$

Therefore, the difference between the monopoly price and the socially optimal price can be decomposed into:

- Markup: The standard, one-sided force that causes monopoly prices to deviate from the socially optimal price, or the monopolist prices at a level such that a reduction in participation within a side allows the monopolist to increase the prices charged for remaining participating users.[243]

- Spence Distortion: Refers to the monopolist platform internalizing the cross-network effects on one side of the market that occurs by increasing participation on the *other side of the market*. The profit maximizing monopolist, however, does so imperfectly by catering to marginal users of the two-sided platform rather than the average benefits accrued by participating users.[244] In other words, the monopolist considers how the interactions between loyal consumers and marginal consumers diverge, and distort prices in favor of the marginal consumers.[245]

- Displacement Distortion: Refers to the difference in the marginal users' interaction benefits *on the other side* caused by any difference in participation on Side A relative to the socially optimal price.[246] In other words, users on the other side of the two-sided market value interactions differently, and thus any change in participation on either side changes this marginal user. Some

marginal users are "displaced." In many scenarios where users derive the majority of benefits from interaction with the other side, the displacement distortion will counteract (fully or partially) the Spence Distortion.[247]

- Scale Distortion: Refers directly to the difference in the *total number* of participating users on the other side of the market.[248] In other words, the monopolist considers that a decrease (increase) in participation on the other side leads to less (more) interactions between the two sides.

The interactions between these four distortions away from the socially optimal price are complex. In particular, an observed price to one side set by a monopolist two-sided platform that faces no competitive pressures can be higher or lower than a socially optimal price.[249] Specifically, if we focus on markets with only interaction benefits with membership benefits equal across all users to approximate the credit card market, then the Spence distortion and the displacement distortion will push prices in opposing directions.[250]

Consider standard definitions of market power in economics. Market power in one-sided markets has been defined as the ability of a firm to raise prices significantly above the price that is charged in a competitive market.[251] With the discussion above, we want to note that, in the context of two-sided platforms, the discussion above raises the questions regarding observing market power – on which side will a two-sided platform with market power raise the price? What are the prices that we observe? What is the impact within a side for a change in price, and how does changing this price affect the other side?

Key Considerations for Two-Sided Platforms and Two-Sided Markets

Market Coordination and the Chicken and Egg Problem

Two-sided platforms face a fundamental potential market failure[252] when facilitating the interaction between two independent sides – a platform must attract both sides of the market to participate simultaneously.[253] In the context of the credit card market, a card network must coordinate between issuers and acquirers (or downstream consumers and merchants) such that both the consumers use the credit card and the merchant accepts the credit card at the time of a purchase. Related to market coordination is the often-discussed chicken and egg problem, which has been discussed in the context of two-sided markets.[254] The chicken and egg problem, also called "failure to launch," refers to the idea that participants on one side of the market have little incentive to participate on the two-sided platform while there are no participants on the other side of the market. Notice that this is a specific form of a market coordination problem before widespread adoption of a two-sided platform.

A two-sided platform can play this coordinating role in the credit card market. An issuer contracts with the card network and acquirers also contract with the card network. The consumer receives a credit card and they are aware (or at the very least can make an educated guess) on which merchants accept an American Express, Discover, Visa, and/or Mastercard.[255] On the other side of the market, a merchant chooses an acquirer who is connected to the Mastercard, Visa, Discover, and/or American

Express network.[256] In doing so, the merchant knows (or at very least can make an educated guess) that a certain portion of their consumers will hold these credit cards. Thus, the card networks play a coordinating role.[257]

Two-sided platforms overcome market coordination, in some economic models, using what is called an "insulating tariff," and the key to the ability to set an insulating tariff is the ability to set differential prices to each side.[258] The insulating tariff can be thought of as a type of insurance policy that a two-sided platform provides to either side of the market.[259] Suppose that there is a significant change, or shock, to the preferences on one side of the market that fundamentally changes either the interaction or membership benefit of one of the sides.[260] The two-sided platform protects the other side via the use of the bi-lateral price structure and can adjust the price paid by either side to "re-balance" to better coordinate the market.

Seesaw Principal

A common result discussed in the economic literature has been called the seesaw principle. Rochet and Tirole 2006 defines the seesaw principle as, "a factor that is conducive to a high price on one side, to the extent that it raises the platform's margin on that side, tends to call for a low price on the other side as attracting members on the other side becomes more profitable."[261] The name of this alludes to the linkage between the two sides and that a change in price directly affects participation on the other side in an opposite direction.[262] The seesaw principle highlights the linkage and implies that a change in price will also have an opposing change in the price on the other side.

Competitive Bottleneck Equilibrium

Armstrong 2006 discusses the concept of a competitive bottleneck equilibrium. When there is competition between two-sided platforms, a distinction is made between "single-homing" and "multi-homing" users. A single-homing user is a user that only interacts with the other side using one of the competing platforms, where a multi-homing user interacts with the other side across several platforms.[263] The competitive bottleneck equilibrium is a situation where one side of the market largely single-homes while the other side of the market multi-homes and joins multiple platforms.[264]

Notice that there is essentially a lack of competition for users on one side of the market as these users single-home, call this group of users "Side A." Side A users choose to only join one of the competing platforms. However, the other side, "Side B," multi-homes as each of the competing two-sided platforms give essentially exclusive access to its users on the other side (due to single-homing).[265] In this situation, the platforms compete aggressively (in the form of lower prices) to sign up the single-homing side, as signing up a single-homing consumer essentially gives the platform leverage against the *multi-homing side* and access to the *single-homing* users on the other side.[266]

We note that the implications on the total user welfare from moving a side from single-homing to multi-homing is not straightforward.[267] If single-homing users are allowed to multi-home and interact via other platforms, the choices of the previously single-homing users expand and welfare is weakly increasing for that side of the market, all else equal.[268] However, this ignores the change in prices (to either side of the market). Belleflamme and Peitz 2019 show that it is not always beneficial to the

side of the market that moves from single-homing to multi-homing, as there is the possibility that this hurts the total surplus of the side that moves from single-homing to multi-homing through higher prices.[269] In addition, Belleflamme and Peitz 2019 finds that prices will move in *opposite directions* in the situation described in their paper.[270]

Bouncer's Right

The role of the two-sided platform is not only to coordinate the interaction between either side of the market, but also plays a key role in the security or trust of the interaction. Evans 2012 used the term Bouncer's Right to signify a multi-sided platform's role to selectively allow participation from users and retain the right to eject bad actors or users who manipulate the system.[271] The role of excluding users or providing rules and regulations on the usage of the two-sided platform's services is to reduce negative externalities between users.[272] In other words, a two-sided platform holds users to a set of rules that it designs to increase positive externalities between users and prevent interactions between users from imposing negative interaction cost between each side.[273]

The *lack* of enforcing Bouncer's Right or underenforcing rules of behavior of participants by a two-sided platform can also increase the incidence negative interactions between users that could otherwise be beneficial. Lack of enforcement has even been suggested to be the impetus of a large loss in userbase.[274] Therefore, it is worth stressing that not only maintaining Bouncer's Right, but also enforcing rules and governance is critical to widespread participation of users on two-sided platforms.

The monitoring and enforcement of Bouncer's Right and the interactions between users is not costless, and two-sided platforms may choose to invest significantly to maintain positive interactions between users. For example, hosting two-sided platform Airbnb makes investments to enhance "trust" on their platform such as investments in software and compliance processes to verify user identity, developing departments focused on safety systems, and taking legal actions against guests who violate their polices.[275] All of these policies induce costs associated with the provision of these governance services – labor costs, research and development costs, as well ongoing operational costs for maintenance of these programs.

For an example outside of the credit card market, consider ride-sharing platforms who typically "score" the behavior of users on either side of the market.[276] Users are prompted to rate the behavior of the user that they interact with on the other side. For example, the rider is prompted to rate if the driver was safe and timely, while the driver is prompted to rate if the rider was courteous and non-disruptive. These rating systems are used to give the ride-sharing platform information on if a user is negatively impacting the experience of other users and thus compromising the trust of all users in the platform's ability to ensure a positive interaction between drivers and riders. Ride-sharing platforms maintain the ability to remove low rating users from their platform.[277]

Card networks place rules of interaction on their two-sided platform on issuers as well as on acquirers and merchants. These rules encompass explicitly poor or negligent behavior such as prohibiting merchants from engaging in potentially deceptive up-selling business practices[278] or allowing excessive fraud or inappropriate activity on transactions over the card network.[279] On the

other side of the market, card networks impose requirements on issuers such as requiring that an issuer limit a cardholder's liability to zero on unauthorized transactions[280] or requiring that an issuer only makes payment authorization decisions on an individual transaction basis.[281] In addition, card networks invest heavily in payment security protocols. For example, Visa, MasterCard, American Express, Discover, JCB, and Union Pay collectively own a technical body, EMVCo, with the stated goal to create interoperability across countries and promote adoption of security technology to limit card fraud.[282] The body supports a suite of technologies through EMV Specifications and programs such as EMV Chip, which attempts to reduce fraud when the card is physically present.[283] Card networks maintain Bouncer's Right with the ability to sanction, fine, or exclude users for violating the service rules placed on their network.[284]

Additional Considerations for Credit Card Market: Price Coherence and Surcharging

Price coherence and allowing merchants to surcharge for card transactions has been extensively discussed in the economic literature on credit cards,[285] as well as in legal proceedings.[286] The concept of price coherence is defined as when the purchase of a good or service from a seller via an intermediary is required to be the same price as the purchase of that same good or service via a competing intermediary (or alternative method).[287] In a credit card market, this idea is specifically referred to as no-surcharging, or the requirement that a purchase of a good or service has the same price regardless if the consumer uses a credit card, cash, or an alternative payment method.[288]

In some theories, allowing merchants to surcharge renders interchange fees neutral, or there are no consumer, merchant, or total surplus effects due to the interchange fee.[289] The basic idea is that, when surcharging can occur, an increase (decrease) in the interchange fee is offset by an decrease (increase) in the fee paid by a consumer[290] for the use of a credit card, an increase (decrease) in the merchant discount fee, and an increase (decrease) in the price of the good *if the consumer uses a credit card*.[291] The theory assumes that credit cards and cash are substitutable, so the number of transactions between consumers and merchants will not change but some consumers will substitute to using cash for a larger portion of payments.[292] Although this theory of interchange fees is illustrative, it would suggest that *all* merchants would surcharge if able to, which is not seen in practice.[293]

On the opposite side of the spectrum, if a platform can enforce complete price coherence (*i.e.*, no surcharging is allowed), then there is the potential for a two-sided platform to engage in "excessive intermediation."[294] By excessive intermediation, the theory suggests that the two-sided platform may invest and over incentivize a side of the market to transact with the other side via the intermediary leading the incentivized side to inefficiently transaction through the intermediary.[295] However, increased competition, in this model, has the counter-intuitive effect that competition between intermediaries actually worsens the excessive intermediation effect due to a competitive bottleneck equilibrium effect.[296] Increased competition to sign up single-homing users further incentivizes two-sided platforms to overinvest in single-homing user benefits to attract users to their platform, which could lead to inefficient user incentive-benefits *over that* of the price distortions under a monopoly market structure.[297]

Notice that the previous paragraphs suggest two opposite situations – full price coherence or zero price coherence (merchants cannot surcharge or all merchants surcharge). In practice, some merchants surcharge and some do not, if there are no legal restrictions.[298] Rochet and Tirole 2011 discuss a related concept called "must-take cards,"[299] or that merchants are required to accept cards despite that the cost of accepting cards (via card fees) outweighs the convenience benefit from card payments.[300] This could occur due to a merchant potentially internalizing the consumer's benefit of using a credit card, which could lead to high interchange fees and merchant discount fees.[301] Rochet and Tirole 2011 also provide a test on if merchant discount fees are too high, which they call the "tourist test."[302] The tourist test asks the question: Would a merchant prefer to refuse a card payment if a tourist (*i.e.*, a consumer who is a non-repeat customer) has sufficient cash to complete the transaction?[303] If the answer is that the merchant would prefer to refuse the card payment because the merchant discount exceeds the merchant's convenience benefit from accepting a card payment, then the merchant is inefficiently internalizing the consumer's card benefits and the merchant discount fee (and thus the interchange fee) is set above the socially optimal level.[304]

Competition Between Two-Sided Platforms

Accounting for the effects discussed above, competition between two-sided platforms is ambiguous and depends on several factors such as:

- If users derive benefits of use of the two-sided platforms mainly through interaction benefits or membership benefits *and* do users receive heterogeneous benefits.[305]
- If users single-home (are only on one platform) or multi-home (are on multiple platforms).[306]
- The cost that users face to join one two-sided platform, or multiple two-sided platforms.[307]
- Whether the two-sided platform, either voluntarily or via legal decisions, allow for price-coherence, surcharging, or cash discounts.[308]
- Preferences to transact through one two-sided platform over alternative two-sided platforms or use a different payment method entirely.[309]
- Differentiation between users within a side of the market. For example, whether merchants are differentiated from each other in a credit card market.[310]

In some cases, theoretical predictions show that increased competition between two-sided platforms can lead to lower prices for both sides of the market, so total prices received by the two-sided platform is lower.[311] In others, competition can increase prices and further distort from the socially optimal prices.[312] Therefore, it is ambiguous in two-sided markets, unlike in the standard case of competitive one-sided markets, whether increased competition will increase or decrease prices.

APPENDIX B. PREVIOUS PAYMENT CARD POLICIES AND LITIGATION

In assessing the potential impacts of the CCCA, it could be instructive to consider the empirical economic literature on the effects of other policies targeted at the debit and credit card ecosystems and analyses of various features of credit cards. Further, this appendix discusses the takeaways from various legal cases associated with payment cards.

Durbin Amendment

In light of the potential impacts of the CCCA on interchange fees, studying the Durbin Amendment provides an analogous natural experiment as it capped debit card interchange fees for large issuers in the U.S. Various authors have found that the Durbin Amendment is associated with an increase in deposit account fees and have found little evidence of pass through of reductions in interchange fees to consumer prices.

The Durbin Amendment to the Dodd-Frank Act capped interchange fees for debit card issuers with assets over $10 billion as the sum of a $0.21 base component and a 5 bps of transaction value *ad valorem* component.[313] The Federal Reserve set this cap as "a standard for assessing whether the amount of any interchange transaction fee that an issuer receives or charges with respect to an electronic debit transaction is reasonable and proportional to the cost incurred by the issuer with respect to the transaction for purposes of EFTA Section 920(a)(2)."[314] The Durbin Amendment took effect on October 1, 2011 with a general compliance date of April 1, 2012 with certain exceptions.[315]

Several economic research papers have studied the effects of the Durbin Amendment on consumers, merchants, and bank profitability. In particular, Kay et al. 2018[316] and Mukharlyamov and Sarin 2022[317] directly examine the effects of the Durbin Amendment on consumers and affected banks based on analysis of data from regulatory Call Reports and the Federal Deposit Insurance Corporation's Summary of Deposits as well as additional data sources on bank account pricing, interchange rates, and other prices, and consumer surveys.[318] The results of both groups of authors are qualitatively aligned: both papers find that bank interchange income decreases and bank deposit fees increase, which is consistent with banks offsetting the decrease in interest income with other fees.[319] Specifically, Kay et. al 2018 find that "treated banks offset more than 90% of the lost interchange income through increases in deposit fees for account holders."[320] Further, Kay et al. 2018 find that banks covered by the Durbin Amendment do not experience changes in operational expenses or full-time equivalent employees, which is consistent with banks not reducing the quality of service through actions such as reducing personnel.[321] Mukharlyamov and Sarin 2022 estimate that the Durbin Amendment caused a 7 percent increase in deposit fees, reduction of the share of free checking accounts from 61 to 28 percent, an increase in monthly maintenance fees from $3.07 to $5.92, and a 21 percent increase in the minimum account balance required before waiving fees for consumer checking accounts.[322] Mukharlyamov and Sarin also find that the Durbin Amendment

is associated with a shift of low-income individuals from non-rewards credit cards to rewards credit cards, and higher propensity to carry unpaid credit card balances.[323]

A consideration with the Durbin Amendment is whether (1) the Durbin Amendment would decrease debit merchant discount fees for merchants and (2) if there were debit merchant discount fee savings for merchants, whether merchants would pass these savings on to consumers through lower retail prices. While the Durbin Amendment sets a cap on debit interchange, the impact of the cap was not uniform across transactions. In a cost study inspired by the tourist test,[324] Layne-Farrar 2013 find that the Durbin Amendment cap on debit interchange may be too high for small transactions at merchants whose customers pay with cash as an alternative to debit and too low for large transactions at merchants whose customers pay with checks as an alternative to debit.[325] Wang et al. 2014 observe similar patterns in a survey that asked merchants if they have experienced a change in debit acceptance costs after the Durbin Amendment came into effect: two-thirds of merchants report either no change or not knowing if there was a change, one quarter report an increase in costs, and 10 percent report a decrease in costs.[326] The papers reviewed provide scant evidence on pass-through of merchant cost reductions to retail prices: first, Wang et al. 2014 find that few merchants decrease prices after a debit cost increase while debit cost increases have significant effects on merchant prices,[327] and second, in a study of the impacts of the Durbin Amendment on gas prices, Mukharlyamov and Sarin 2022 find that it is "virtually impossible to quantify the extent of pass-through with statistical significance" as the relative magnitude of interchange-fee savings per gallon are too small relative to standard deviation of per-gallon gas prices.[328]

Another consideration to take into account when examining the effects of the Durbin Amendment is its impact in terms of consumer payment choice. Koulayev et al. 2016 run a two-stage structural model of payment adoption and payment choice using the 2008 Survey of Consumer Payment Choice designed by the Consumer Payments Research Center at the Federal Reserve Bank of Boston and administered by the RAND Corporation.[329] The authors run simulations of a policy through which debit cards would become more expensive to consumers (*e.g.*, through reduced rewards), and find (1) a welfare decrease of $0.78 per month (between 1.3 percent and 2.8 percent) per consumer, (2) that lower income consumers lose proportionally more, and (3) that low income or low education consumers are more likely to substitute to cash and high income or high education consumers are more likely to substitute to credit.[330] The potential for consumers to substitute to other methods of payment, which prior to the policy change were not the consumers' preferred method of payment, suggests that a policy could also have impacts on the mix of payments used throughout the economy.

Analysis of the Durbin Amendment demonstrates that a policy that reduces bank revenues through one channel may affect fees along other dimensions. Further, empirical evidence does not appear to support the hypothesis that the Durbin Amendment led to decreases in retail prices through decreases in interchange fees.

CARD Act

While the Durbin Amendment serves as a natural experiment in which to study the impacts of a change in interchange fees, debit cards do differ from credit cards, and the CARD Act provides a natural experiment to study the effects of policies that potentially adversely affect profitability of credit cards for issuers. As the CCCA likely imposes additional costs on covered issuers, responses to the CARD Act could be helpful in assessing channels through which changes induced by the CCCA would potentially impact downstream consumers.

The Credit Card Accountability Responsibility and Disclosure Act of 2009 ("CARD Act") was signed into law on May 22, 2009 and was implemented through a final rule that was published by the Board of Governors of the Federal Reserve System in the Federal Register on February 22, 2010.[331] The CARD Act was implemented in three phases:[332]

- August 20, 2009: "[P]rovisions generally requiring that consumers receive 45 days' advance notice of interest rate increases and significant changes in terms […] and provisions regarding the amount of time that consumers have to make payments;"[333]

- February 22, 2010: Provisions that limit interest rate increases (both in the first year and on rates that apply to existing balances) and prohibitions on creditors form issuing cards to borrowers under 21 years old unless they demonstrate an ability to repay or have a cosigner with an ability to repay.[334] Further, prohibitions were imposed on charging fees that constitute the majority of the initial credit limit within the first year of account opening, double-cycle billing, and fees for making a payment.[335] The requirement for disclosures on periodic statements stating the total cost of making only minimum payments as well as the monthly payment required to pay off the balance in 36 months and the associated total cost were also introduced.[336]

- August 22, 2010: Provisions "addressing the reasonableness and proportionality of penalty fees and charges […] and reevaluation by creditors of rate increases."[337]

Various authors have analyzed the effects of the CARD Act, both with respect to its impacts on issuer and consumer behavior. As Nelson 2023 puts it, "[t]he CARD Act restricted lenders' ability to discretionarily raise credit card borrowers' interest rates over time and also restricted fees that could otherwise substitute for such interest rate increases. Lenders therefore became substantially less able to respond to new information by adjusting borrowers' pricing."[338]

The literature finds various issuer responses to the introduction of the CARD Act. Jambulapati and Stavins 2014 consider whether banks responded to the announcement of the CARD Act by restricting access to credit or closing consumer accounts in anticipation of the CARD Act.[339] Using credit bureau data from Equifax and data from the Consumer Finance Monthly survey of U.S. Consumers,[340] the authors find that a higher fraction of credit card terms—measured as over the limit fees and credit limits—deteriorated after the signing of the CARD Act and before its provisions took effect.[341] In particular, the authors "find evidence that banks were more likely to lower credit limits

between the time when the CARD Act was signed and when it took effect."[342] Further, while they did not find evidence that banks closed accounts at a higher rate prior to the effective date of the CARD Act, the authors do find an increase in consumer initiated account closures,[343] which the authors state "did not seem to be directly related to the economic recession, although the data do not allow [the authors] to determine whether account closures by cardholders are attributable to the economic recession or to the regulatory changes."[344]

Issuers are also found to have responded to the CARD Act through their lending behavior. Using data from the Consumer Financial Protection Bureau's Credit Card Database (de-identified credit card account data from 17 to 19 credit card issuers from 2008 to present accounting for approximately 90 percent of outstanding general-purpose US credit card balances) and the Consumer Financial Protection Bureau's Consumer Credit Panel (a randomly sampled panel off consumer credit reports), Nelson 2023 finds a move towards pooled pricing, that is, less price dispersion.[345] He finds descriptive patterns consistent with some consumers, particularly those who "saw the greatest price increases in the left (cheap) tail of their price distribution," leaving the market for credit cards.[346] Based on a structural model calibrated to data from a pre-CARD Act period, Nelson 2023 finds that the CARD Act restrictions "lead to partial market unraveling, especially among subprime consumers, where prices newly exceed willingness to pay for up to 30% of the privately safest borrowers."[347] He does find that despite this impact on subprime consumers, consumer surplus increases, partly from lender profits being reduced and partially from the insurance value of the CARD Act restrictions on interest rate changes for consumers who are at risk of deterioration of their risk profiles over time.[348]

Elliehausen and Hannon 2018[349] similarly consider potential effects of the CARD Act through a risk management perspective: the authors state that the CARD Act limited issuers' risk management alternatives by (1) limiting risk-based penalty pricing through prohibiting raising the interest rate on an outstanding balance except for under certain circumstances, (2) limiting penalty fees for late payments or exceeding credit limits, and (3) restricting fees (both initial and periodic) to a percentage of a credit limit.[350] The authors reason that "issuer responses likely would affect nonprime consumers' credit card accounts more than prime consumers' accounts."[351] Further, the authors reason that non-prime consumers might turn to consumer finance loans as substitutes to credit cards, particularly in states with no or high rate ceilings, as they expect that "consumer finance loans are more readily available to higher risk nonprime consumers in states with high rate ceilings than states with low rate ceilings."[352] Using the Federal Reserve Bank of New York's quarterly Consumer Credit Panel, which is drawn from Equifax's credit bureau records,[353] and applying a quasi-experimental methodology using prime accounts as a control group, the authors find (1) that the CARD Act "contributed to a large decline in bank card holding by higher risk, nonprime consumers but had little effect on prime consumers," and (2) after the implementation of the CARD Act, "greater reliance on [consumer finance] loans by nonprime consumers in states with high consumer finance rate ceilings following the CARD Act than by nonprime consumers in states with low rate ceilings or by prime consumers."[354]

Agarwal et al. 2015 state that the CARD Act was successful at reducing borrowing costs[355] and "estimate that the CARD Act saved consumers $11.9 billion a year."[356] This estimate is based on: (1) an estimate of overall borrowing costs, (2) assessment of the impact of CARD Act on credit volume, and

(3) point-in-time outstanding U.S. credit card borrowing for the first quarter of 2010 as estimated by the Federal Reserve Bank of New York.[357] The authors' estimates of impacts on borrowing costs and credit volume are based on applying a difference-in-differences estimation strategy applied to data spanning March 2008 to December 2011 from the Office of the Comptroller of the Currency's ("OCC") Credit Card Metrics dataset.[358] First, the authors "estimate that regulatory limits on credit card fees reduced overall borrowing costs by an annualized 1.6% of average daily balances, with a decline of more than 5.3% for consumers with FICO scores below 660."[359] Second, the authors state that they "find no offsetting increase in interest charges or a reduction in the volume of credit,"[360] even though the measures of volume of credit do not include number of active accounts.[361] Third, the $11.9 billion estimate is obtained from multiplying the $744 billion of outstanding U.S. credit card borrowing in 2010Q1 by the 1.6 percent of average daily balances estimate.[362] In contrast to other papers discussed in this section, the Agarwal et al. 2015 claim to "find no evidence of an anticipatory increase in interest charges prior to the CARD Act, no evidence of a sharp or gradual increase following the CARD Act implementation periods,"[363] and a "precise zero effect on credit limits and [average daily balance]."[364] Further, they find that the disclosure component of the CARD Act increased repayment within 36 months by 0.4 percentage points (base of 5.3 percent) and that an upper bound of that effect on aggregate interest payments would be 0.01 percent of average daily balance.[365] Note that the estimates based on the OCC's Credit Card Metrics dataset do not adjust for potential account closures, so there may be potential selection issues or understatement of the impact of the regulation on credit limits and average daily balances.

These analyses of the impacts of the CARD Act raise issues about issuer responses to credit card policy, and the potential of policy to affect the pricing and take up of credit, particularly for groups of borrowers who are considered higher credit risk, *i.e.*, subprime borrowers. As Elliehausen and Hannon 2018 demonstrate, borrowers can be shifted to other forms of credit by policy.[366] In addition, as Jambulapati and Stavins 2014 and Nelson 2023 show, deterioration of credit card terms can be associated with consumer-initiated account closures and exits from the credit card market.[367] Agarwal et al. 2015, in contrast, find that limits on credit card fees imposed by the CARD Act were associated with a reduction in borrowing costs and "find no evidence of offsetting increase in interest charges or a reduction in the volume of credit."[368]

Litigation

To better understand the context of the CCCA, it could be helpful to better understand litigation that affects how merchants and issuers interact with networks, particularly through interchange fees.

- Exclusivity of Networks: *U.S. v. Visa* prohibited Visa and Mastercard from prohibiting issuers from issuing general purpose or debit cards on any other card network. This provides context with respect to issuers' present choice of network. The dismissal of the associated case, *Discover v. Visa*, which was brought by Discover against Visa and Mastercard considering the same bylaws as *U.S. v. Visa*, is consistent with a focus on potential harm to consumers but not necessarily harm to competitors.

- **Level of Interchange Fees**: The ongoing *In Re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation* alleges that Visa and MasterCard adopted rules and practices that injured merchants through supracompetitive interchange fees. There have been various settlements in the case, with some of the proposed settlement amounts affirmed by the courts, but the case remains ongoing.

- **Steering Between Payment Methods**: The allegations in *Ohio v. Amex* claim that merchants were impeded from promoting or encouraging the use of competing credit cards with lower acceptance fees. Visa and Mastercard settled out of the case the day it was filed, agreeing to allow merchants to offer discounts for using alternative forms of payment, including other credit cards. The case was ultimately decided in favor of Amex: it was decided that Amex's antisteering provisions do not violate federal antitrust law. Consequently, merchants can offer discounts for using alternatives to Visa or Mastercard, but cannot offer discounts for using alternatives to Amex.

The remainder of this subsection provides additional procedural detail on the cases discussed above.

U.S. v. Visa

U.S. v. Visa was an antitrust suit filed by the U.S. Department of Justice against Visa U.S.A. Inc., Visa International Corp., and Mastercard International Incorporated on October 7, 1998 in U.S. District Court for the Southern District of New York.[369] The allegations centered on two counts associated with the following topics:[370]

- **Count One**: Governance rules that allowed members of one association to sit on the board of the other (although not both at once).

- **Count Two**: Exclusionary rules that allowed members of each association to issue both Visa and Mastercard cards but not cards associated with competitors.

The court found in favor of Defendants in the first count.[371] The court ordered that the exclusionary rules described in the second count be repealed as they (1) restricted competition between networks and (2) denied consumers access to innovative and varied products.[372] More specifically, the final order in *U.S. vs. Visa* specifies that "[e]ach Defendant is enjoined from enacting, maintaining, or enforcing any by-law, rule, policy or practice that prohibits its issuers from issuing general purpose or debit cards in the United States on any other general purpose card network."[373]

Discover v. Visa

Discover Financial Services, Inc. v. Visa U.S.A. Inc. et al. ("*Discover v. Visa*") was an antitrust suit filed on October 4, 2004 by Discover Financial Services, Inc. ("Discover") against Visa U.S.A., Inc. Visa International Services Association, MasterCard Incorporated, and MasterCard International Incorporated in the United States District Court for the Southern District of New York.[374] The Complaint alleges that the exclusionary rules addressed in Count Two of *U.S. v. Visa* caused harm to Discover, for which it sought treble damages.[375] The case was dismissed without prejudice in accordance with an October 27, 2008 Release and Settlement Agreement.[376]

In Re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation

Starting in 2005, various antitrust lawsuits were filed against Visa and MasterCard that alleged "the Visa and MasterCard interchange fees, and associated rules, were anticompetitive and violated the Sherman Act, 15 U.S.C. §§1 and 2, and California's Cartwright Act, Bus. & Prof. Code § 16700 et seq."[377] These lawsuits were consolidated into *In Re Payment Card Interchange Fee and Merchant Discount Antitrust Litigation*.[378] The putative class consists of over 12 million merchants and Defendants include Visa U.S.A. Inc., MasterCard International Inc., and various payment card issuers.[379] "Plaintiffs alleged that Visa and MasterCard adopted and enforced rules and practices relating to payment cards that had the combined effect of injuring merchants by allowing Visa and MasterCard to charge supracompetitive fees (known as 'interchange fees') on each payment card transaction."[380]

A $7.25 billion settlement was reached between Visa, MasterCard, and retailers in 2012, which was subsequently overturned by the Second Circuit in 2016.[381] The settlement would have allowed merchants to impose surcharges on consumer payments with Visa or MasterCard cards.[382] The Second Circuit also affirmed a $5.6 billion settlement in March 2023,[383] which plaintiffs Jack Rabbit LLC and 280 Station LLC filed a second renewed motion to intervene against in May 2023.[384] There have been various settlements in the case, including with opt-out plaintiffs: "in an April [2023] status report, Visa estimated that the opt-out settlements made up 70% of its sales volume for those opt-outs and 65% of the combined interchange for those opt-outs between Visa and Mastercard."[385]

Ohio v. Amex

Ohio et al. vs. American Express Company, et al. ("*Ohio v. Amex*") was as an antitrust suit initially filed on October 4, 2010 by the United States, the State of Connecticut, the State of Iowa, the State of Maryland, the State of Michigan, the State of Missouri, the State of Ohio, and the State of Texas against American Express Company, American Express Travel Related Services Company, Inc., MasterCard International Incorporated, and Visa, Inc. in U.S. District Court for the Eastern District of New York.[386] The Complaint was amended on December 21, 2010 in which the State of Arizona, the State of Hawaii, the state of Idaho, the State of Illinois, the State of Montana, the State of Nebraska, the State of New Hampshire, the State of Rhode Island, the State of Tennessee, the State of Utah, and the State of Vermont joined as additional plaintiffs.[387] The Amended Complaint alleged that Defendants imposed rules, policies, and practices that "impede[d] merchants from promoting or encouraging the use of a competing credit or charge card with lower card acceptance fees,"[388] and violated Section 1 of the Sherman Act, *i.e.*, constituted a contract, combination, or conspiracy that restrained trade.[389]

Mastercard and Visa exited the case through a proposed settlement prior to the U.S. District Court in the Eastern District of New York's decision,[390] as announced in the Department of Justice's press release on the same day the initial Complaint was filed.[391] "Under the settlement, Visa and MasterCard would allow merchants to offer discounts if they use alternate forms of payment, including other credit cards with lower merchant fees."[392]

The District Court found in favor of Plaintiffs,[393] a decision which was appealed to the United States Court of Appeals for the Second Circuit on May 21, 2015 by American Express ("Amex").[394] The Second Circuit reversed the District Court's judgment on September 26, 2016.[395] The Second Circuit's decision was appealed to the Supreme Court, which issued a decision in the matter on June 25, 2018.[396]

The Supreme Court's June 25, 2018 decision in *Ohio v. Amex* was a five-to-four decision in favor of American Express, upholding the Second Circuit's decision.[397] The Supreme Court found "Amex's antisteering provisions do not violate federal antitrust law."[398] The Supreme Court's explanation for its decision focused on two-sided markets, stating that "both sides of the two-sided credit-card market—cardholders and merchants—must be considered."[399] It determined that while the government showed anticompetitive impacts on merchants, it did not prove such effects on cardholders.[400]

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NOTES

1 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

2 Discussed in more detail in the body of the paper, but here the "consumer side" refers to issuers and individual consumers, while the "merchant side" refers to merchants (inclusive of small businesses), third-party firms (such as payment processors and payment facilitators), and acquirers.

3 "Credit Cards – General Overview," *FDIC Risk Management Examination Manual for Credit Card Activities*, March 2007, accessed September 28, 2023, available at https://www.fdic.gov/regulations/examinations/credit_card/pdf_version/ch2.pdf ("Credit Cards Overview"), p. 10. For ease of exposition, the terms "customer" and "consumer" are used interchangeably in this report.

4 See, *e.g.*, Morse, Edward, *Electronic Payment Systems*, (American Bar Association, 2018) ("Electronic Payment Systems"), p. 33; Credit Cards Overview, p. 10.

5 Benson, Carol, et al. *Payment Systems in the U.S.*, (Third Edition), (Glenbrook Partners, 2017) ("Payment Systems in the U.S."), pp. 85, 92, 105-106.

6 "Merchant Processing," *FDIC Risk Management Examination Manual for Credit Card Activities*, March 2007, accessed September 28, 2023, available at https://www.fdic.gov/regulations/examinations/credit_card/pdf_version/ch19.pdf ("Merchant Processing"), p. 164.

7 Merchant Processing, pp. 164-165.

8 See, *e.g.*, Rysman, Marc and Julian Wright, "The Economics of Payment Cards," *Review of Network Economics*, Vol. 13, No. 3 (2015), pp. 303-353.

9 Payment Systems in the U.S., p. 74.

10 Rochet, Jean-Charles and Jean Tirole, "Platform Competition in Two-sided Markets," *Journal of the European Economic Association*, Vol. 1, No. 4 (2003), pp. 990-1029.

11 Credit Cards Overview, p. 10.

12 See, *e.g.*, Koulayev, Sergei, et al., "Explaining Adoption and Use of Payment Instruments by US Consumers," *The RAND Journal of Economics*, Vol. 47, No. 2 (2016), pp. 293-325.

13 Payment Systems in the U.S., p. 92; "Underwriting and Loan Approval Process," *FDIC Risk Management Examination Manual for Credit Card Activities*, March 2007, accessed November 6, 2023, available at https://www.fdic.gov/regulations/examinations/credit_card/pdf_version/ch7.pdf p. 40.

14 "Deserve® EDU Cardholder Agreement," *Consumer Financial Protection Bureau*, May 31, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/Celtic_Bank/Deserve_EDU_Cardholder_Agreement.pdf

15 Credit Cards Overview, p. 10; Electronic Payment Systems, p. 33.

16 *E.g.*, credit card, debit card, cash, payment apps. See Section II.C.4 for a more comprehensive discussion of consumer payment alternatives.

17 Rochet, Jean-Charles and Jean Tirole, "Platform Competition in Two-sided Markets," *Journal of the European Economic Association*, Vol. 1, No. 4 (2003), pp. 990-1029.

18 See, *e.g.*, Koulayev, Sergei, et al., "Explaining Adoption and Use of Payment Instruments by US Consumers," *The RAND Journal of Economics*, Vol. 47, No. 2 (2016), pp. 293-325.

19 Merchant Processing, p. 164. We understand that accepting additional methods of payment can involve integration and ongoing costs.

20 Merchants can buy card acceptance from independent sales associations ("ISO") who sell merchant services on behalf of acquirers or serve a broker function for processors and acquiring banks. Merchants, particularly small merchants, can also contract with payment facilitators such as PayPal, Square, or Stripe. Payment Systems in the U.S., pp. 106-110.

21 In the case of some larger merchants, the network may contract directly with a merchant, as is the case for co-branded cards that carry branding from both the card network as well as the merchant. See, *e.g.*, Payment Systems in the U.S., p. 94; "Costco Enters Into a Long Term Co-Brand Credit Card Agreement With Citi and an Acceptance and Co-Brand Agreement With Visa," *Visa*, March 2, 2015, accessed October 13, 2023, available at https://investor.visa.com/news/news-details/2015/Costco-Enters-Into-a-Long-Term-Co-Brand-Credit-Card-Agreement-With-Citi-and-an-Acceptance-and-Co-Brand-Agreement-With-Visa/default.aspx.

22 Payment Systems in the U.S., p. 105.

23 Payment Systems in the U.S., pp. 91-92.

24 Payment Systems in the U.S., p. 92.

25 Payment Systems in the U.S., p. 93.

26 Payment Systems in the U.S., p. 92; Electronic Payment Systems, p. 28.

27 Payment Systems in the U.S., pp. 74-75.

28 Payment Systems in the U.S., p. 81.

29 Payment Systems in the U.S., p. 86.

30 Payment Systems in the U.S., p. 105; Electronic Payment Systems, p. 23. In the case of some larger merchants, the network may contract directly with a merchant, as is the case for co-branded cards that carry branding from both the card network as well as the merchant. See, *e.g.*, Payment Systems in the U.S., p. 94; "Costco Enters Into a Long Term Co-Brand Credit Card Agreement With Citi and an Acceptance and Co-Brand Agreement With Visa," *Visa*, March 2, 2015, accessed October 13, 2023, available at https://investor.visa.com/news/news-details/2015/Costco-Enters-Into-a-Long-Term-Co-Brand-Credit-Card-Agreement-With-Citi-and-an-Acceptance-and-Co-Brand-Agreement-With-Visa/default.aspx.

31 Payment Systems in the U.S., p. 85; Electronic Payment Systems, p. 23.

32 Payment Systems in the U.S., pp. 87-88.

33 Payment Systems in the U.S., p. 111.

34 Visa Inc. Form 10-K for the Period Ended September 30, 2022, p. 27.

35 Payment Systems in the U.S., pp. 75, 105.

36 Payment Systems in the U.S., p. 105.

37 See, *e.g.*, "Solutions for Retail," *Chase for Business*, accessed October 13, 2023, available at https://www.chase.com/business/payments/pos-solutions/retail.

38 Payment Systems in the U.S., p. 106.

39 Payment Systems in the U.S., pp. 106-108.

40 Payment Systems in the U.S., p. 109.

41 "Demystifying payfacs," *Stripe*, accessed November 9, 2023, available at https://stripe.com/guides/payfacs?

42 "Demystifying payfacs," *Stripe*, accessed November 9, 2023, available at https://stripe.com/guides/payfacs?

43 "The Visa Payment Facilitator Model," *Visa*, accessed November 9, 2023, available at https://usa.visa.com/content/dam/VCOM/global/support-legal/documents/visa-payment-facilitator-model.pdf.

44 "PayFac," *National Processing*, accessed November 9, 2023, available at https://nationalprocessing.com/payment-processing-partnerships/payfac.

45 POS stands for Point of Sale. "Square Point of Sale," Square, accessed November 29, 2023, available at https://squareup.com/us/en/point-of-sale/software/pricing.

46 "Payment facilitators (payfacs) vs independent sales organizations (ISOs): How they're different and how to choose one," *Stripe*, accessed November 9, 2023, available at https://stripe.com/sv-br/resources/more/payment-facilitators-payfacs-vs-independent-sales-organizations-isos-how-they-are-different-and-how-to-choose-one.

47 "Service Provider Categories and PCI," *Mastercard*, accessed November 9, 2023, available at: https://www.mastercard.com/content/dam/public/mastercardcom/globalrisk/pdf/Service%20Provider%20Categories%20and%20PCI%20(28%20Nov.%202022).pdf.

48 An incomplete, but extensive list includes Data Storage Entity, Staged Digital Wallet Operator (*e.g.*, Apple Pay or Google Wallet), Terminal Servicer, Installment Service Provider, or Merchant Payment Gateway. "Service Provider Categories and PCI," *Mastercard*, accessed November 9, 2023, available at https://www.mastercard.com/content/dam/public/mastercardcom/globalrisk/pdf/Service%20Provider%20Categories%20and%20PCI%20(28%20Nov.%202022).pdf.

49 We understand that these processes can flow in reverse for refunds, returns, or disbursements.

50 "Mastercard interchange rates and fees," *Mastercard Incorporated*, accessed October 12, 2023, available at https://www.mastercard.us/en-us/business/overview/support/merchant-interchange-rates.html ("Mastercard Interchange Explainer").

51 See, *e.g.*, "Visa USA Interchange Reimbursement Fees: Visa Supplemental Requirements," *Visa Inc.*, accessed October 4, 2023, available at https://usa.visa.com/content/dam/VCOM/download/merchants/visa-usa-interchange-reimbursement-fees.pdf ("Visa Interchange Schedule").

52 Mastercard Interchange Explainer. In the special case of co-branded cards, the MDF for use of that card may be directly negotiated with the card network by a merchant. "Visa Core Rules and Visa Product and Service Rules", *Visa Inc.*, April 15, 2023, accessed October 5, 2023. p. 869. ("Visa Core Rules")

53 See, *e.g.*, "Understanding Square Payments Fees," *Square*, accessed November 9, 2023, available at https://squareup.com/us/en/payments/our-fees.

54 Visa Interchange Schedule; Mastercard Interchange Explainer.

55 Mastercard Interchange Explainer.

56 Visa Interchange Schedule; "Mastercard 2022-2023 U.S. Region Interchange Programs and Rates," *Mastercard Incorporated*, accessed October 4, 2023, available at https://www.mastercard.us/content/dam/public/mastercardcom/na/us/en/documents/merchant-rates-2022-2023-apr22.pdf ("Mastercard Interchange Schedule"). We understand that these rates do not include interchange fees for certain large merchants.

57 Mastercard Interchange Schedule.

58 See, *e.g.*, Visa Inc. Form 10-K for the Period Ended September 30, 2022, p. 6.

59 Rysman, Marc and Julian Wright, "The Economics of Payment Cards," *Review of Network Economics*, Vol. 13, No. 3 (2015), pp. 307, 311.

60 See, *e.g.*, Mastercard Incorporated Form 10-K for the Period Ended December 31, 2022, pp. 80-81.

61 See, *e.g.*, Mastercard Incorporated Form 10-K for the Period Ended December 31, 2022, p. 80.

62 Rysman, Marc and Julian Wright, "The Economics of Payment Cards," *Review of Network Economics*, Vol. 13, No. 3 (2015), p. 307.

63 See, *e.g.*, "Chase Freedom Unlimited Cash Back Rewards & Benefits," *Chase Credit Cards*, accessed October 12, 2023, available at https://creditcards.chase.com/cash-back-credit-cards/freedom/unlimited?CELL=6288; "Discover it Cash Back Credit Card," *Discover*, accessed October 12, 2023, available at https://www.discover.com/credit-cards/cash-back/it-card.html?ICMPGN=ALL_CC_CB_CARD.

64 See, *e.g.*, "Ultimate Rewards," *Chase*, accessed October 12, 2023, available at https://www.chase.com/personal/credit-cards/ultimate-rewards; "Credit Card Rewards," *Capital One*, accessed October 12, 2023, available at https://www.capitalone.com/credit-cards/rewards/.

65 Koulayev, Sergei, et al., "Explaining Adoption and Use of Payment Instruments by US Consumers," *RAND Journal of Economics*, Vol. 47, No. 2 (2016), p. 304.

66 Payment Systems in the U.S., p. 75.

67 Payment Systems in the U.S., p. 75.

68 Rysman, Marc and Julian Wright, "The Economics of Payment Cards," *Review of Network Economics*, Vol. 13, No. 3 (2015), pp. 303-353. By transfer-priced, we mean that fees are implicitly transferred between departments within one corporate structure; the only outwardly facing fees that a closed network must set are to the consumer and merchant.

69 Payment Systems in the U.S., pp. 74-75, 85

70 The closed card network also acts as the issuer of the card, and in doing so must manage credit exposures and interface with consumers. Payment Systems in the U.S., pp. 75, 92, 110.

71 Credit Cards Overview, p. 10.

72 Payment Systems in the U.S. p. 72.

73 Payment Systems in the U.S. p. 72.

74 See, *e.g.*, "Deserve® EDU Cardholder Agreement," *Consumer Financial Protection Bureau*, May 31, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/Celtic_Bank/Deserve_EDU_Cardholder_Agreement.pdf; "American Express® Gold Card: Cardmember Agreement," *Consumer Financial Protection Bureau*, June 30, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/QCCA2Q2023/AMERICAN_EXPRESS_NATIONAL_BANK/American_Express_Gold_Card_Cardmember_Agreement-255468.pdf.

75 Credit Cards Overview, p. 12; see, *e.g.*, "Deserve® EDU Cardholder Agreement," *Consumer Financial Protection Bureau*, May 31, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/Celtic_Bank/Deserve_EDU_Cardholder_Agreement.pdf, p. 7.

76 See, *e.g.*, "American Express® Gold Card: Cardmember Agreement," *Consumer Financial Protection Bureau*, June 30, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/QCCA2Q2023/AMERICAN_EXPRESS_NATIONAL_BANK/American_Express_Gold_Card_Cardmember_Agreement-255468.pdf.

77 Payment Systems in the U.S., p. 92.

78 See, *e.g.*, the variety of Card Holder Agreements that are collected by the Consumer Financial Protection Bureau at https://www.consumerfinance.gov/credit-cards/agreements/. Accessed October 13, 2023.

79 Payment Systems in the U.S., p. 93.

80 "Report to Congress: Profitability of Credit Card Operations of Depository Institutions," *Board of Governors of the Federal Reserve System*, July 2022, accessed October 11, 2023, available at https://www.federalreserve.gov/publications/files/ccprofit2022.pdf ("Fed Profitability Report"), p. 5. The Fed Profitability report indicates that Visa and Mastercard networks "accounted for nearly 642 million cards, or about 85 percent of general-purpose credit cards, in 2021" and "the American Express and Discover networks accounted for another 117 million." This implies that in 2021 the total number of general-purpose credit cards in circulation is nearly 642 million ÷ 85% ≈ 755 million. Thus, the four major credit card networks account for approximately (642 million + 117 million) / 755 million ≈ 100%.

81 At least 785 banks report consumer credit card amounts outstanding. "Call Reports – Single Period," *Federal Financial Institutions Examination Council Central Data Repository's Public Data Distribution*, reports for June 30, 2023, accessed October 11, 2023, available at https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx.

82 Total assets for a given bank and its affiliates are given by the total assets of the Bank Holding Company associated with the bank issuer according to the Federal Financial Institutions Examination Council's National Information Center list of large holding companies. "Large Holding Companies," *Federal Financial Institutions Examination Council National Information Center*, June 30, 2023, accessed October 27, 2023, available at https://www.ffiec.gov/npw/Institution/TopHoldings. We understand that CCCA covers issuers other than bank issuers and use Bank Holding Company total assets as a proxy for the CCCA's definition of a "card issuer that [...] together with the affiliates of the card issuer" (Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023)).

83 Commerce Bancshares, Inc., which is Commerce Bank's holding company, has total assets of about $32.9 billion.

84 "Call Reports – Single Period," *Federal Financial Institutions Examination Council Central Data Repository's Public Data Distribution*, reports for June 30, 2023, accessed October 11, 2023, available at https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx. See RSSD-ID 601050.

85 "Find an Acquirer and Start Accepting Payments," *Mastercard*, accessed October 11, 2023, available at https://www.mastercard.us/en-us/business/overview/start-accepting/find-an-acquirer.html; "Find a Payment Provider," *Visa*, accessed October 11, 2023, available at https://usa.visa.com/supporting-info/merchant-payment-providers.html.

86 "2022 Survey and Diary of Consumer Payment Choice," *Federal Reserve Bank of Atlanta*, June 2023, accessed October 11, 2023, available at https://www.atlantafed.org/banking-and-payments/consumer-payments/survey-and-diary-of-consumer-payment-choice/2022-survey-and-diary ("SDCPC").

87 Cubides, Emily and Shaun O'Brien, "2023 Findings from the Diary of Consumer Payment Choice," *The Federal Reserve Financial Services*, accessed November 21, 2023, available at https://www.frbsf.org/cash/wp-content/uploads/sites/7/2023-Findings-from-the-Diary-of-Consumer-Payment-Choice.pdf, p. 9.

88 Cubides, Emily and Shaun O'Brien, "2023 Findings from the Diary of Consumer Payment Choice," *The Federal Reserve Financial Services*, accessed November 21, 2023, available at https://www.frbsf.org/cash/wp-content/uploads/sites/7/2023-Findings-from-the-Diary-of-Consumer-Payment-Choice.pdf, p. 10.

89 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

90 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

91 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

92 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

93 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

94 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

95 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

96 The two largest networks by number of credit cards issued are currently Visa and Mastercard. See Exhibit 4.

97 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

98 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

99 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

100 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

101 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

102 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

103 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

104 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

105 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

106 With respect to fraud fighting efforts, "the card networks play a primary role." Payment Systems in the U.S., p. 111.

107 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

108 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

109 For example, both Visa and Mastercard currently have lower interchange fees for credit card transactions at supermarkets with larger volume of transactions that are routed over their networks. Visa Interchange Schedule, pp. 7, 10; Mastercard Interchange Schedule, pp. 2-3.

110 Virtually 100 percent of credit card transactions are processed in three-party systems or on one of two four-party system networks. See Exhibit 4 and Exhibit 5, Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

111 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

112 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

113 Merchants may delegate the implementation of routing rules to acquirers or payment facilitators (*e.g.*, Square, PayPal, Stripe). Payment Systems in the U.S., p. 110.

114 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

115 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

116 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

117 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

118 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

119 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

120 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

121 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

122 See, *e.g.*, Visa Inc. Form 10-K for the Period Ended September 30, 2022, p. 6.

123 See, *e.g.*, Mastercard Incorporated Form 10-K for the Period Ended December 31, 2022, p. 81.

124 See, *e.g.*, Visa Inc. Form 10-K for the Period Ended September 30, 2022, p. 6.

125 See the discussion on characteristics that define a two-sided platform in Appendix A. (page 35, Characteristics that Define a Two-Sided Platform).

126 Cross-network effects occur because the extent of the benefits that a user receives from participation in a two-sided platform depends on if users participate on the other side of the market. See the discussion on characteristics that define a two-sided platform in Appendix A. (page 35, Characteristics that Define a Two-Sided Platform).

127 See the discussion on socially optimal pricing compared to monopoly pricing on two-sided platforms in Appendix A. (page 38, Considerations for Platform Price and Participation Optimization).

128 Weyl, Glen E., "A Price Theory of Multi-Sided Platforms," *American Economic Review*, Vol. 100, No. 4 (2010), pp. 1649-1650.

129 Visa Interchange Schedule, p. 1.

130 Mastercard Interchange Explainer.

131 Specifically, holding network fees fixed.

132 See discussion on page 8, Fees Associated with a Four-Party System Credit Card Transaction.

133 See discussion on page 8, Fees Associated with a Four-Party System Credit Card Transaction.

134 See discussion in Appendix A. (page 37, Decision to Join, Participate, and Interact by Users).

135 See *e.g.*, distortions of prices that arise under competition between two-sided platforms discussed by Guthrie and Wright (2007) discussed in Appendix A. (page 45, Competition Between Two-Sided Platforms).

136 See *e.g.*, distortions of prices that arise under competition between two-sided platforms discussed by Guthrie and Wright (2007) discussed in Appendix A. (page 45, Competition Between Two-Sided Platforms).

137 See Tan and Wright (2018) discussed in Appendix A. (page 38, Considerations for Platform Price and Participation Optimization).

138 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

139 Even if merchants or their delegates create decision rules for how to route transactions, networks would still be competing at the transaction level as the decision rules could send some transactions from a card over one network and other transactions for the same card over another network.

140 As the merchant discount fee is paid to the acquirer who retains a portion of the merchant discount fees and pays the interchange fee and network fees to the network, the acquirer might not completely pass through a change in interchange fees or network fees to the merchant. If the market for acquiring services is competitive, then the pass-through of interchange fees and network fees is likely high.

141 See *e.g.*, the seesaw principle in Appendix A. (page 42, Seesaw Principle).

142 Hayashi, Fumiko, "Do U.S. Consumers Really Benefit from Payment Card Rewards?" *Federal Reserve Bank of Kansas City Economic Review*, Vol. 94, No. 1 (2009), p. 42.

143 Payment Systems in the U.S., p. 111.

144 See, *e.g.*, Gabaix, Xavier and David Laibson, "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets," *The Quarterly Journal of Economics*, Vol. 121, No. 2 (2006), pp. 505-540.

145 Teh, Tat-How, et al., "Multihoming and Oligopolistic Platform Competition," *American Economic Journal: Microeconomics*, Vol. 15, No. 4 (2023), p. 85.

146 As an aside, a consumer's choice between using a credit card or an alternative form of payment can be seen as a choice between the credit card and what that consumer decides is *the next best alternative in a given choice problem*. This is particularly important in the applied economic theory discussed in Appendix A when applied to modern payments ecosystems. A rational consumer's (standard, continuous, strictly increasing) utility function in models without uncertainty can be normalized up to a constant, without loss of generality. The applied theory above normalizes this choice to be participate on the two-sided platform or do not participate. When applied to credit cards, it is common to standardize the outside option of using a credit card to cash (see *e.g.*, Rochet and Tirole (2011) or Bourguignon et al. (2019)). However, in the modern economy there are many forms of payments as discussed in Section II.D.4, thus the consumer can substitute to many different forms of payment such as debit cards, checks, or other electronic payments depending on the context of the transaction. Although a full analysis of these substitution patterns or *cross-price elasticities* is outside of the scope of our analysis here, it remains interesting, at least to the authors of this paper, how this added choice (or outside option) affects the credit card industry.

147 See the discussion of the effect of competition with price coherence from Edelman and Wright (2015) in Appendix A. (page 44, Additional Considerations for Credit Card Market: Price Coherence and Surcharging).

148 Hayashi, Fumiko, "The New Debit Card Regulations: Initial Effects on Networks and Banks," *Federal Reserve Bank of Kansas City Economic Review*, Vol. 97, No. 4 (2012), p. 93.

149 Visa Interchange Schedule, p. 3; Mastercard Interchange Schedule, pp. 4-5.

150 See Appendix B (page 46).

151 See, *e.g.*, "Deserve® EDU Cardholder Agreement," *Consumer Financial Protection Bureau*, May 31, 2023, accessed October 13, 2023, available at https://files.consumerfinance.gov/a/assets/credit-card-agreements/pdf/Celtic_Bank/Deserve_EDU_Cardholder_Agreement.pdf, pp. 1-2.

152 Truth in Lending, 75 Fed. Reg. 34, 7658 (12 CFR Part 226).

153 Kay, Benjamin S., et al., "Competition and Complementarities in Retail Banking: Evidence from Debit Card Interchange Regulation," *Journal of Financial Intermediation*, Vol. 34 (2018).

154 Mukharlyamov, Vladimir and Natasha Sarin, "Price Regulation in Two-Sided Markets: Empirical Evidence from Debit Cards" (2022), accessed September 25, 2023, available at https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3328579.

155 Kay, Benjamin S., et al., "Competition and Complementarities in Retail Banking: Evidence from Debit Card Interchange Regulation," *Journal of Financial Intermediation*, Vol. 34 (2018); Mukharlyamov, Vladimir and Natasha Sarin, "Price Regulation in Two-Sided Markets: Empirical Evidence from Debit Cards" (2022), accessed September 25, 2023, available at https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3328579.

156 Note that the CARD Act requires 45-day advance notice for changes in credit limits. Truth in Lending, 75 Fed. Reg. 34, 7658 (12 CFR Part 226). For some transactors, changes to credit limits may not be binding, but a reduction in credit made available by an issuer could increase a consumer's credit utilization, which may adversely affect credit score. Louis DeNicola, "What Is a Credit Utilitzation Rate?" Experian, November 5, 2023, accessed December 5, 2023, https://www.experian.com/blogs/ask-experian/credit-education/score-basics/credit-utilization-rate/

157 Hayashi, Fumiko, "The New Debit Card Regulations: Initial Effects on Networks and Banks," *Federal Reserve Bank of Kansas City Economic Review*, Vol. 97, No.4 (2012), pp. 102-103.

158 Schuh, Scott, et al., "Who Gains and Who Loses from Credit Card Payments? Theory and Calibrations," *Federal Reserve Bank of Boston Public Policy Discussion Papers*, No. 10-03 (2010).

159 Felt, Marie-Hélène, et al., "Regressive Effects of Payment Card Pricing and Merchant Cost Pass-Through in the United States and Canada," *Journal of Banking & Finance*, Vol. 154, (2023), p. 106968.

160 Agarwal, Sumit, et al., "Who Pays for Your Rewards? Redistribution in the Credit Card Market," *Finance and Economics Discussion Series*, 2023-007 (2023).

161 Ching, Andrew T. and Fumiko Hayashi, "Payment Card Rewards Programs and Consumer Payment Choice," *Journal of Banking & Finance*, Vol. 34, No. 8 (2010), pp. 1773-1787.

162 Hayashi, Fumiko, "Do U.S. Consumers Really Benefit from Payment Card Rewards?" *Federal Reserve Bank of Kansas City Economic Review*, Vol. 94, No. 1 (2009), pp. 37–63.

163 See, *e.g.*, "Compare Credit Cards," *Chase Credit Cards*, accessed November 15, 2023, available at https://creditcards.chase.com/compare-credit-cards/?list=4%2C37.

164 SDCPC.

165 "The Consumer Credit Card Market," *Consumer Financial Protection Bureau*, October 2023, accessed November 21, 2023, available at https://files.consumerfinance.gov/f/documents/cfpb_consumer-credit-card-market-report_2023.pdf, pp. 172-175.

166 Koulayev, Sergei, et al., "Explaining Adoption and Use of Payment Instruments by US Consumers," *The RAND Journal of Economics*, Vol. 47, No. 2 (2016), p. 319.

167 Hayashi, Fumiko, "The New Debit Card Regulations: Initial Effects on Networks and Banks," *Federal Reserve Bank of Kansas City Economic Review*, Vol. 97, No. 4 (2012), pp. 102-103.

168 This is analogous to the finding that subprime consumers increased their usage of personal loans due to the implementation of the Durbin Amendment. Elliehausen, Gregory and Simona M. Hannon, "The Credit Card Act and Consumer Finance Company Lending," *Journal of Financial Intermediation*, Vol. 34 (2018), pp. 109-119.

169 Stiglitz, Joseph E. and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, No. 3 (1981), pp. 393-410.

170 Stiglitz, Joseph E. and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, No. 3 (1981), pp. 393-410.

171 This is consistent with Agarwal et al. (2010)'s experimental findings that "support the argument that higher risk consumers, assuming consumers are aware of their own credit risk type, have fewer options for acquiring funds to smooth consumption…And therefore, they have higher reservation credit card interest rate." Agarwal, Sumit et al., "The Importance of Adverse Selection in the Credit Card Market: Evidence from Randomized Trials of Credit Card Solicitations," *Journal of Money, Credit and Banking*, Vol. 42, No. 4 (2010), p. 744.

172 Stiglitz, Joseph E. and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, Vol. 71, No. 3 (1981), pp. 393-410.

173 See Exhibit 7.

174 "Single-homing" is defined as a user is a user that only interacts with the other side using one of the competing platforms, which is contrasted with a "multi-homing" user who interacts with the other side across several platforms. See Appendix A. (page 42, Competitive Bottleneck Equilibrium).

175 See Appendix A. (page 42, Competitive Bottleneck Equilibrium).

176 Market power is "the ability of a single economic actor (or small group of actors) to have a substantial influence over market prices." Mankiw, N. Gregory, *Principles of Microeconomics* (Third Edition), (Thomson South-Western, 2004), p. 498.

177 Four-party networks could continue to be the exclusive networks on cards issued by non-covered issuers, *i.e.*, issuers under $100 billion in covered assets. Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

178 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

179 See Exhibit 4: 8 percent+7 percent=15 percent.

180 See Exhibit 5: 4 percent+19 percent=23 percent.

181 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

182 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

183 Pass-through is the extent to which a firm passes through changes in its input costs to the price of its output. See, *e.g.*, Tirole, Jean, *The Theory of Industrial Organization* (The MIT Press, 1988), pp. 173-175.

184 See, *e.g.* Genakos, Christos and Mario Pagliero, "Competition and Pass-Through: Evidence from Isolated Markets," *American Economic Journal: Applied Economics*, Vol. 14, No. 4 (2022), pp. 35-57.

185 Genakos, Christos and Mario Pagliero, "Competition and Pass-Through: Evidence from Isolated Markets," *American Economic Journal: Applied Economics*, Vol. 14, No. 4 (2022), pp. 35-57.

186 "Merger Guidelines," *U.S. Department of Justice and the Federal Trade Commission*, December 18, 2023, accessed January 20, 2024, available at https://www.ftc.gov/system/files/ftc_gov/pdf/2023_merger_guidelines_final_12.18.2023.pdf, p. 6.

187 "Merger Guidelines," *U.S. Department of Justice and the Federal Trade Commission*, December 18, 2023, accessed January 20, 2024, available at https://www.ftc.gov/system/files/ftc_gov/pdf/2023_merger_guidelines_final_12.18.2023.pdf, p. 6.; "Merchant Acquirers in the U.S.," *The Nilson Report Issue 1238*, March 2023, accessed November 10, 2023. NERA is not taking a position on merchant acquirers in the U.S. as an antitrust market.

188 Tirole, Jean, *The Theory of Industrial Organization* (The MIT Press, 1988), pp. 174-175.

189 Payment facilitators Square and Stripe's fees depend on transaction size but not on method of payment. For example, Stripe charges a standard fee of $0.30 + 2.9% on online transactions and $0.10 + 2.6% on in-person transactions. "Understanding Square Payments Fees," *Square*, accessed November 17, 2023, available at https://squareup.com/us/en/payments/our-fees; "Pricing Built for Businesses of All Sizes," Stripe, accessed November 17, 2023, available at https://stripe.com/pricing?.

190 For example, large merchants may have more bargaining power versus acquirers than smaller merchants. See, *e.g.*, Gaudin, Germain, "Pass-Through, Vertical Contracts, and Bargains," *Economics Letters*, Vol. 139 (2016), pp.: 1-4.

191 The authors also find that increases of merchants' costs are associated with increases in debit restrictions. Wang, Zhu, et al., "The Impact of the Durbin Amendment on Merchants: A Survey Study," *Federal Reserve Bank of Richmond Economic Quarterly*, Vol. 100, No. 3 (2014), p. 184.

192 Mukharlyamov and Sarin 2022, p. 24.

193 We note that the Federal Reserve's Proposed Rule to update the Durbin Amendment cites the non-peer reviewed article, Berkovich and He 2022, which runs a regression without controls of net sales on interchange with store and year fixed effects without describing their sample other than to say it is confidential. Debit Card Interchange Fees and Routing, 88 Fed. Reg. 218, 78100-78132 (12 CFR Part 235); Berkovich, Efraim and Zheli He, "Rewarding the Rich: Cross Subsidies from Interchange Fees," *Hispanic Leadership Fund*, May 3, 2022, accessed November 17, 2023, available at https://hispanicleadershipfund.org/wp-content/uploads/2022/05/HLF_Report_RewardingTheRich-InterchangeFees_03May22.pdf, pp. 27-29.

194 See Appendix B. (page 52, *Ohio v. Amex)*.

195 Stavins 2018 finds that "given cash discounts, the probability that a cash transaction is conducted by a consumer who prefers other payment methods increased by 19.2 percent, after controlling for merchant category and dollar value of the transaction." Stavins, Joanna, "Consumer Preferences for Payment Methods: Role of Discounts and Surcharges," *Journal of Banking & Finance*, Vol. 94 (2018), p. 35.

196 "Review of Card Surcharging: A Consultation Document," *Reserve Bank of Australia*, June 2011, accessed November 21, 2023, available at https://www.rba.gov.au/publications/consultations/201106-review-card-surcharging/pdf/201106-review-card-surcharging.pdf, pp. 2, 3.

197 Bourguignon, Hélène, et al., "Shrouded Transaction Costs: Must-Take Cards, Discounts and Surcharges," *International Journal of Industrial Organization*, Vol. 63 (2019), p. 122.

198 Bourguignon, Hélène, et al., "Shrouded Transaction Costs: Must-Take Cards, Discounts and Surcharges," *International Journal of Industrial Organization*, Vol. 63 (2019), p. 129.

199 Bourguignon, Hélène, et al., "Shrouded Transaction Costs: Must-Take Cards, Discounts and Surcharges," *International Journal of Industrial Organization*, Vol. 63 (2019), pp. 101, 104.

200 See Section II. (page 13, Consumer Payment Alternatives).

201 Chakravorti, Bhaskar. "The Hidden Costs of Cash," *Harvard Business Review*, June 26, 2014, available at https://hbr.org/2014/06/the-hidden-costs-of-cash.

202 Opinion, March 29, 2017, *Expressions Hair Design et al. v. Schneiderman, Attorney General of New York, et al.*, No. 15-1391 (U.S. 2017).

203 Credit Card Competition Act of 2023, S. 1838, 118th Cong. §1 (2023).

204 See, *e.g.*, "Ultimate Rewards," Chase, accessed October 12, 2023, available at https://www.chase.com/personal/credit-cards/ultimate-rewards; "Credit Card Rewards," *Capital One*, accessed October 12, 2023, available at https://www.capitalone.com/credit-cards/rewards/.

205 "Report to Congress on Credit Scoring and Its Effects on the Availability and Affordability of Credit," *Board of Governors of the Federal Reserve System*, August 2007, accessed November 21, 2023, available at https://www.federalreserve.gov/boarddocs/rptcongress/creditscore/creditscore.pdf, p. S-4.

206 Agarwal, Sumit, et al., "Who Pays for Your Rewards? Redistribution in the Credit Card Market," *Finance and Economics Discussion Series*, 2023-007 (2023).

207 Wright, Julian, "One-Sided Logic in Two-Sided Markets," *Review of Network Economics*, Vol. 3, No. 1 (2004) ("Wright 2004"), p. 47.

208 Wright 2004, pp. 47-48.

209 "Predatory or Below-Cost Pricing," *Federal Trade Commission*, accessed October 24, 2023, available at https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/single-firm-conduct/predatory-or-below-cost-pricing.

210 Wright 2004, p. 48; Evans, David and Richard Schmalensee, "The Antitrust Analysis of Multi-Sided Platform Businesses" (Working Paper, *NBER*, February 2013), 18783, accessed October 24, 2023, available at https://www.nber.org/papers/w18783, p. 4.

211 Early contributions that define two-sided platforms can be attributed to Caillaud, Bernard and Bruno Jullien, "Competing Cybermediaries," *European Economic Review*, Vol. 45, No. 4-6 (2001), pp. 797-808; Rochet, Jean-Charles and Jean Tirole, "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association*, Vol. 1, No. 4 (2003), pp. 990-1029; Baye, Michael R. and John Morgan, "Information Gatekeepers on the Internet and the Competitiveness of Homogeneous Product Markets," *American Economic Review*, Vol. 91, No. 3 (2001), pp. 454–474. A survey of the early literature can be found in Jullien, Bruno, et al., "Two-Sided Markets, Pricing, and Network Effects," in *Handbook of Industrial Organization*, Vol. 4 (2021), ed. Kate Ho, Ali Hortacsu, and Alessandro Lizzeri ("Jullien et al. 2021").

212 An overview of the literature is found in Jullien et al. 2021.

213 Evans, David and Richard Schmalensee, "The Antitrust Analysis of Multi-Sided Platform Businesses" (Working Paper, *NBER*, February 2013), 18783, accessed October 24, 2023, available at https://www.nber.org/papers/w18783, pp. 7-8.

214 Note that various papers have used credit card markets as motivating examples, but do not necessarily reflect all of the institutional details of these markets. See e.g., Rochet, Jean-Charles and Jean Tirole, "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association*, Vol. 1, No. 4 (2003) ("Rochet and Tirole 2003"), pp. 990-1029; Weyl, Glen E., "A Price Theory of Multi-Sided Platforms," *American Economic Review*, Vol. 100, No. 4 (2010) ("Weyl 2010"), pp. 1642-1672.

215 The economic literature also refers to these markets as "multi-sided markets" or the intermediary firm as a "multi-sided platform," when an intermediary provides goods and services to more than two distinct sides. The exact definition of two-sided (or multi-sided) markets and platforms is at times up for debate (*e.g.*, see the discussion on pp 491-493 of Jullien et al. 2021). To describe the framework used to analyze potential impacts of the CCCA we use the definition of two-sided platforms from Weyl (2010), and similar definitions are used in Rochet, Jean-Charles and Jean Tirole, "Two-Sided Markets: A Progress Report," *The RAND Journal of Economics*, Vol. 37, No. 3 (2006) ("Rochet and Tirole 2006") and Armstrong, Mark, "Competition in Two-Sided Markets," *The RAND Journal of Economics*, Vol. 37, No. 3 (2006) ("Armstrong 2006").

216 Weyl 2010, p. 1644; Rochet and Tirole 2003, pp. 994-996; Armstrong 2006, p. 668.

217 Weyl 2010, p. 1644. To avoid confusion, we use the term "users" when referring broadly to both sides of a two-sided platform. The terms consumer, issuer, acquirer, and merchant are reserved in reference to the credit card market specifically.

218 In some cases, the acquirer is replaced by the merchant as discussed in Section II. (page 6, Actions Performed and Decisions Made by Participants in a Four-Party Credit Card System).

219 See *e.g.*, Rochet and Tirole 2003, pp. 995-1014.

220 Jullien, Bruno, et al.2021, p.488. Weyl 2010, p. 1644.

221 Weyl 2010 calls this "Bilateral Market Power," in reference to the two-sided platform's ability to set prices and not necessarily the legal application of the term of "market power." For this reason, we distinguish the terminology used here. Weyl 2010, 1644.

222 The uniform price assumption is restrictive relative to the current credit card market which can be seen by different types of transactions having different interchange fees in the Mastercard Schedule of Interchange Fees or the Visa Schedule of Interchange Fees. In particular, uniform pricing restricts price discrimination or market segmentation, which is discussed below when discussing competitive bottlenecks. Weyl 2010, 1657-1658.

223 This is a simplification made that conforms with the current economic literature. Rysman and Wright note that understanding why the interchange fee and network fee (or in their terminology "switch fees") are separate is a potential area for future research. Rysman, Marc and Julian Wright, "The Economics of Payment Cards," *Review of Network Economics*, Vol. 13, No. 3 (2015) ("Rysman and Wright 2015"), pp. 350-351.

224 An exact definition of two-sided platforms is at times controversial in the economics literature, and some authors argue that a clean distinction between two-sided platforms and non-platforms is not binary. Further discussion on the definition of a two-sided market can be found in Jullien, Bruno, et al. 2021.

225 Weyl 2010, p. 1644.

226 Weyl 2010, p. 1644.

227 Jullien et al. 2021.

228 Jullien, Bruno, et al. 2021.

229 For ease of exposition, we consider the decision of an individual consumer who interacts with merchants, which deliberately abstracts from the complexities of a four-party system. This abstraction is made to conform with basic, widely cited models of two-sided platforms, that also make this simplification. However, these institutional details are key to the analysis, and this simplification is only considered in this section to illustrate what makes the optimization problem that a card network faces explicit. See, *e.g.*, Weyl 2010, p. 1644; Rochet and Tirole 2003, pp. 994-996; Armstrong 2006, p. 668.

230 See, *e.g.*, Jullien et al. 2021, p. 495. The model which incorporates both interaction benefits and the membership benefits are characterized in Weyl 2010, which analyzes a model that unifies and generalizes prior literature on two-sided platforms from Rochet and Tirole 2006 and Armstrong 2006. Weyl 2010, pp. 1645-1647.

231 Rochet, Jean-Charles and Jean Tirole, "Must-Take Cards: Merchant Discounts and Avoided Costs," *Journal of the European Economic Association*, Vol. 9, No. 3 (2011) ("Rochet and Tirole 2011"), p. 463-466, Weyl 2010, p. 1643.

232 Weyl 2010, pp. 1645-1646.

233 Weyl 2010,, pp. 1642-1672, 1643. Note that the membership benefit is clearer in the case of newspaper advertising. A consumer receives a large portion of benefit from reading the content of the newspaper that is independent of viewing the advertisements, which would be captured by the interaction benefit.

234 Weyl 2010, p. 1647.

235 This assumes that all users on one side of the market derive positive benefits from interacting with the other side. In Appendix Exhibit 1 through Appendix Exhibit 3 we abstract from the bi-variate distribution that defines the distribution of users' interaction and membership benefits and make the simplifying assumption that users are distributed uniformly. This makes it such that we can simply compare shaded areas in Appendix Exhibit 2 and Appendix Exhibit 3.

236 Papers such as Weyl 2010 and Tan and Wright 2018 present this monopoly model as a basis for more detailed analysis. Weyl 2010, pp. 1651-1653; Tan, Hongru and Julian Wright, "A Price Theory of Multi-Sided Platforms: Comment," *American Economic Review*, Vol. 108, No. 9 (2018) ("Tan and Wright 2018"), pp. 2758-2760.

237 Socially optimal price in standard one-sided markets is defined as the total utility generated from the consumption of a good minus the costs of production, assuming quasilinear preferences. In the context of two-sided platforms, Weyl 2010 defines the socially optimal (two) prices as the point at which marginal revenue for the platform equals marginal *cost after accounting for cross-network effects of facilitating the interactions between the two sets of users*. The socially optimal price is the price that maximizes the total surplus (in utility terms which is defined in units of the numeraire due to quasilinear utility) for each group of users. Mas-Colell, Andreu, et al., *Microeconomic Theory*, (Oxford University Press, 1995), p. 326; Weyl 2010, pp. 1642-1672, 1650.

238 Rochet and Tirole 2003, p. 995.

239 Weyl 2010, pp. 1642-1656.

240 Weyl 2010, pp. 1642-1672, 1649; Jullien, Bruno, et al. 2021, pp. 496-497.

241 Payment Systems in the U.S., p. 85-86.

242 Jullien et al. 2021, p. 500.

243 Mas-Colell, Andreu, et al., *Microeconomic Theory*, (Oxford University Press, 1995), p. 385.

244 Weyl 2010, p. 1658.

245 Weyl 2010, p. 1657.

246 An overview of the literature is found in Jullien, Bruno, et al. 2021, p. 500.

247 Tan, Hongru and Julian Wright, "Pricing Distortions in Multi-Sided Platforms," *International Journal of Industrial Organization*, Vol. 79 (2021) ("Tan and Wright 2021"), p. 4; Jullien et al. 2021, p. 501.

248 A thorough overview of the large literature is found in Jullien, Bruno, et al., "Two-Sided Markets, Pricing, and Network Effects," in *Handbook of Industrial Organization*, Vol. 4 (2021), ed. Kate Ho, Ali Hortacsu, and Alessandro Lizzeri, pp. 500-501

249 Tan, Hongru and Julian Wright, "Pricing Distortions in Multi-Sided Platforms," *International Journal of Industrial Organization*, Vol. 79 (2021), pp. 6-7.

250 Tan, Hongru and Julian Wright, "Pricing Distortions in Multi-Sided Platforms," *International Journal of Industrial Organization*, Vol. 79 (2021), p. 8.

251 Evans, David and Richard Schmalensee, "The Antitrust Analysis of Multi-Sided Platform Businesses" (Working Paper, *NBER*, February 2013), 18783, accessed October 24, 2023, available at https://www.nber.org/papers/w18783, p. 19.

252 A market failure is "a situation in which a market left on its own fails to allocate resources efficiently." Mankiw, N. Gregory, *Principles of Microeconomics* (Third Edition), (Thomson South-Western, 2004), p. 498.

253 Rochet and Tirole 2003, p. 990.

254 Caillaud, Bernard and Bruno Jullien, "Chicken & Egg: Competition Among Intermediation Service Providers," *The RAND Journal of Economics*, Vol. 34, No. 2 (2003), pp. 309-328; Rochet and Tirole 2003, p. 990; Weyl 2010 , p. 1647.

255 See *e.g.*, "Where Are Discover Credit Cards Accepted?" *Discover Financial Services, Inc.*, November 26, 2023, accessed November 30, 2023, available at https://www.discover.com/credit-cards/card-smarts/discover-cards-acceptance/.

256 Fiserv, Inc. Form 10-K for the Period Ended December 31, 2022, p. 8; Payment Systems in the U.S., p. 106.

257 Implicitly, we are also referring to a separate benefit of the card networks in this example which is the reduction of search costs. Given the reputation of the card networks listed above, it is well known among consumers that these card networks are accepted at many different merchants. Therefore, consumers (and merchants) are less likely to incur search costs in having to research what card networks are accepted at what merchants. This related benefit is discussed in Evans, David and Richard Schmalensee, "The Antitrust Analysis of Multi-Sided Platform Businesses" (Working Paper, *NBER*, February 2013), 18783, accessed October 24, 2023, available at https://www.nber.org/papers/w18783, p. 7.

258 More formally, the insulating tariff is defined as the two-sided platform setting a price function for one side. The *price function* is defined on the domain of *participation* of the other side, or the price faced by a user change with participation by construction. Therefore, the multiplicity of equilibrium problem is overcome by "insulating" the risk of non-participation on the other side of the market. At first glance, this may appear to be an overly complicated mathematical nuance; however, this highlights the importance of why users "trust" that the other side will also participate. Weyl 2010, p. 1648.

259 Weyl 2010, p. 1648.

260 Gans, Joshua S., "Are We Too Negative on Negative Fees for Payment Cardholders?" (Working Paper, *Rotman School of Management*, April 2018), 3162627, accessed October 12, 2023, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3162627, p. 11.

261 Rochet and Tirole 2006, p. 659.

262 However, we caution that the seesaw principle holds in two-sided platforms where the participation of users is substitutable from the point of the platform, which depends on heterogeneity within the other side. Specifically, this does not hold in a model where users on both sides differ only in membership benefits or have the same interaction benefit as in Armstrong (2006). Weyl 2010, pp. 1659-1661.

263 Armstrong 2006, p. 669; Jullien, Bruno, et al. 2021, p. 489.

264 Armstrong, Mark and Julian Wright, "Two-Sided Markets, Competitive Bottlenecks and Exclusive Contracts," *Economic Theory*, Vol. 32 (2007) ("Armstrong and Wright 2007"), p. 354.

265 Armstrong and Wright 2007, pp. 354-355.

266 Armstrong and Wright 2007, pp. 353-380, 354.

267 Belleflamme, Paul and Martin Peitz, "Platform Competition: Who Benefits From Multihoming?" *International Journal of Industrial Organization*, Vol. 64 (2019) ("Belleflame and Peitz 2019"), p. 3.

268 Jullien, Bruno, et al. 2021, pp. 530-531.

269 Belleflamme and Peitz 2019, p. 20.

270 Belleflamme and Peitz 2019, p. 14.

271 Evans, David S., "Governing Bad Behavior by Users of Multi-Sided Platforms," *Berkeley Technology Law Journal*, Vol. 27, No. 2 (2012) ("Evans 2012"), pp. 1220-1221.

272 Evans 2012, p. 1221.

273 Evans 2012, pp. 1220-1222.

274 Evans 2012, pp. 1226-1231.

275 "Furthering Our Commitment to Trust and Safety," *Airbnb*, June 4, 2021, accessed November 14, 2023, available at https://news.airbnb.com/furthering-our-commitment-to-trust-and-safety/.

276 See *e.g.*, ."How star ratings work," *Uber*, accessed December 10, 2023, available at https://www.uber.com/us/en/drive/basics/how-ratings-work/.

277 "Uber Is Now Kicking Low-Rated Passengers Out of Its Cars," *CNET*, May 29, 2019, accessed October 23, 2023, available at https://www.cnet.com/tech/mobile/uber-is-deactivating-passengers-with-low-ratings-now/.

278 See *e.g.*, Visa Core Rules lists a sequence of required content that a merchant must provide if they want to include an "up-selling" transaction. An up-selling transaction is defined as, "[t]he sale of goods and services different from, and not affiliated with or a subsidiary of, the Initial Merchant with whom the Cardholder initiates the Transaction." Visa Core Rules state that the merchant must provide disclosures that, among other things, clearly differentiate the up-selling merchant and the initial merchant, describe the cancellation policy, and provide consumers an easy way to cancel the subsequent transaction. Visa Core Rules, pp. 472-473.

279 See *e.g.*, Mastercard has a "Questionable Merchant Audit Program" that identifies merchants that do not meet minimum standards of acceptance and defines potential fines or remedies. "Security Rules and Procedures: Merchant Edition," *Mastercard*, August 1, 2023, accessed October 26, 2023, available at https://www.mastercard.us/content/dam/public/mastercardcom/na/global-site/documents/SPME-Manual.pdf, pp. 79-80.

280 Visa Core Rules, p. 97.

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303 The "tourist" terminology refers to the non-repeat consumer requirement in the test, which is to avoid the consideration of whether the merchant will lose *future* business from denying the credit card. Rochet and Tirole 2011, p. 467.

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RELATED EXPERTS

Ling Ling Ang, PhD
Managing Director
Washington, DC: +1 202 466 9259
lingling.ang@nera.com

Alan Grant, PhD
Director
Washington, DC: +1 202 466 3510
alan.grant@nera.com

Peter Traber
Consultant
Chicago: +1 312 573 2817
peter.traber@nera.com

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