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**Introduction**

Credit cards are one of the most ubiquitous consumer financial products in the United States, with more than 75 percent of households owning at least one general purpose credit card in 2019.1 According to the G.19 Consumer Credit Statistical release, revolving consumer credit, which mainly consists of credit cards and related plans, stood at over one trillion dollars at the end of 2021. Over the past 40 years, the profitability of the credit card industry has received much attention from both academic research and regulatory reports.2 Most of these analyses of credit cards rely on bank-level regulatory data, which allow only the calculation of bank-level profitability, rather than the profitability of just the credit card portfolio.

In this note, we contribute to the analysis of credit card profitability by examining the drivers of profitability. We overcome issues that plagued many of the past analyses by using detailed data on the credit card portfolios of some of the largest credit card lenders. Our analysis focuses on the business model of credit cards from the perspective of both issuers and borrowers. Specifically, we break down profitability based on the two main functions of credit cards: a transaction function and a credit function. The transaction, or payment, function allows the user to purchase goods without using cash, whereas the credit function allows the user to borrow by carrying balances on their credit cards, resulting in interest charges accruing on the account.3

This distinction is important because the main sources of revenue differ for the two functions. The main source of revenue for the transaction function is interchange, which is the network fee paid by the acquiring bank (the merchant's bank) to the issuing bank (the cardholder's bank).4 For the credit function, interest income is the main source of revenue. The last source of credit card revenue is usage fees, including late fees, over-limit fees, foreign exchange fees, and so on. These fees are not directly related to either the credit or transaction functions; instead, these fees pertain to certain aspects of credit card usage, and only some credit card accounts incur these fees.

Using this framework, we decompose credit card profitability into its main sources— the credit function, the transaction function, and fees—and present three main findings. First, we find that, on average, the credit function makes up approximately 80 percent of the credit card profitability, whereas the contribution of the transaction function is slightly negative, as rewards and other expenses on credit card transactions outpace banks' interchange revenues.5 In addition, fees—in particular late fees—comprise approximately 15 percent of credit card profitability.

Second, we show that the net interest margin on revolving balances—that is, balances that are carried from previous months—has been increasing in recent years. At the same time, the net transaction margin (NTM)—that is, the credit card lender's net income on credit card purchases per dollar of purchase volume—has declined due to increasing rewards expenses, which has coincided with increasing credit card spending on rewards cards.

Third, we group credit card customers based on their usage of the transaction and credit functions and find that "revolvers," accounts that carry a balance from month to month, pay the majority of both interest charges and usage fees, including both late and annual fees. This suggests that although fees are not directly related to either the credit or transaction functions of credit cards, in practice, the same accounts that use credit cards for their credit function also end up paying the bulk of credit card usage fees.

**Measuring Credit Card Profitability Using the FR Y-14M Data**

We begin with an overview of credit card profitability, using two datasets from the Capital Assessments and Stress Testing Report (FR Y-14M) for the time period of January 2014 to December 2021. These data provide detailed information on the credit card operations of stress-tested banking organizations.

The first is a portfolio-level dataset that reports, for each bank, granular monthly information on the balances, revenues, and expenses of the credit card portfolio, including interest income, interchange income, fee income by type of fee, interest expenses, noninterest expenses, and provisions for loan losses. The second is an account-level dataset that provides information on how the account is used, including balances, total purchases made during the month, finance charges, and fees accrued.6 We use a constant sample of 13 banks during our sample period. As the Y-14M data include all of the largest credit card issuers, our sample covers about 80 percent of credit card balances reported in the regulatory Reports of Condition and Income (Call Reports).

**The Drivers of Credit Card Profitability**

We next decompose the return on credit card assets into several components, corresponding to the different uses of credit cards. To do so, we first note that the ROA on credit card balances is defined as total income on credit card balances minus total expenses. Income includes interest income, as well as non-interest income such as interchange income, annual fees, late fees and other fees. Total expenses include interest expense, loan loss provisioning, and noninterest expense such as collections expense, fraud expense, interchange expense, and rewards expense.

(1) $$ \begin{align} ROA = \frac{{Interest\ Inc}+{Noninterest\ Inc}-{Interest\ Exp}-{Noninterest\ Exp}-{Loan\ Loss\ Provisions}}{Balances} \end{align}$$

In turn, total credit card balances at a given time can be written:

(2) $$ {Balances}(Bal) = {Revolving\ Balances}(RB) + {Purchases}(PV) + {Other}$$

Where $${Revolving\ Balances}$$ are the previous month's balances less any payments, and $${Other}$$ includes balance transfers, prepayments (that is, new purchases that are paid down before the statement closes), finance charges, fees, and any other charges that post to the account. Essentially, equation (2) states that the current month's balances are composed of revolving balances that were carried over from previous months, new purchases, and a small set of other charges.11 Note that balances and revolving balances are stocks, while purchase volume is a flow.

Equations (1) and (2) allow us to subsequently decompose the return on credit card assets into its components, focusing on the two main functions of a credit card. We do so by substituting in for balances in the definition of ROA and making the following assumptions: (1) the interest expense of funding each component of balances is proportional to the share of that component in balances; (2) collections expenses and loan loss provisioning are associated with the credit function of the credit cards, and fraud expenses are associated with the transaction function; and (3) annual fees are part of the income related to the transaction function of credit cards, because they allow customers the opportunity to use the card, and because credit cards with annual fees often have ancillary benefits that increase rewards expenses.

Thus, the return on credit card assets can be decomposed as follows:

(3) $$ \begin{align} {ROA} &= \frac{{Interest\ Inc}+{Noninterest\ Inc}-{Interest\ Exp}-{Noninterest\ Exp}-{Loan\ Loss\ Provisions}}{Balances}\\ &= \frac{{Interest\ Inc} - {Interest\ Exp}\left(\frac{{Rev\ Bal}}{Bal}\right)-{Collections\ Exp} - {Loan\ Loss\ Provisioning}}{{Rev\ Bal}}\left(\frac{{Rev\ Bal}}{Bal}\right)\\ & + \frac{{Interchange\ Inc}+{Annual\ Fees}-{Interchange\ Exp}-{Rewards\ Exp}-{Fraud\ Exp}-{Interest\ Exp}\left(\frac{PV}{Bal}\right)}{PV}\left(\frac{PV}{Bal}\right)\\ & + \frac{{Late\ and\ Other\ Fees}}{Bal} + \frac{Other}{Bal}\\ &= \left({Net\ Credit\ Margin}\right)\left(\frac{{Rev\ Bal}}{Bal}\right) + \left({Net\ Transaction\ Margin}\right)\left(\frac{PV}{Bal}\right) + \frac{Fees}{Bal} + \frac{Other}{Bal} \end{align}$$

The primary component of profitability is net credit margin (NCM), which is the profitability of revolving balances.12 Credit card lenders receive revenues in the form of finance charges borrowers pay and fund the revolving balances with interest expense. On average, the credit function of credit cards—that is, NCM multiplied by the share of balances that are revolving balances—makes up around 80 percent of aggregate credit card profitability.13

The second component of profitability is the net transaction margin (NTM). Credit card lenders receive interchange income and annual fees, which give the consumer the opportunity to use the card, while their expenses include interchange expense and rewards expense. On average, the transaction function of credit cards—that is, NTM multiplied by the share of balances that are purchases— comprises approximately negative 4 percent of aggregate credit card profitability, depending on the quarter.14 The third main component of profitability is late and other fees (excluding annual fees which are part of NTM), which comprise approximately 16 percent of aggregate credit card profitability. The remainder of profitability arises from balance transfers, prepayments, and other miscellaneous factors, as we discuss below.

This increase in rewards expenses in recent years is associated with higher usage of rewards cards. In figure 3C, we plot aggregate purchase volume, scaled to 2014:Q1, by the type of rewards the credit card bestows: cash, miles, none, and other (which includes bank points, hotel points, and other noncash rewards). The figure shows that between 2015 and 2019, average purchase volume increased the most for miles and other types of rewards.17 Purchase volume on cards with no rewards grew the least during the period. Note that figure 3C plots total purchase volume, which combines the extensive margin of a borrower applying for new cards with the intensive margin of how much a borrower spends on the card.

Finally, in figure 4, we turn to the last major component of profitability: late and other usage fees (in red). Late and other usage fees include overlimit fees, foreign exchange fees, cash advance fees, and other fees associated with using a credit card. As mentioned before, annual fees are included in NTM.18 On average, late and other fees comprise 16 percent of profitability.19 This makes fees the second largest driver of profitability, after the credit function. The decline in fees starting in 2020:Q2 was due to many lenders implementing fee waivers as part of the pandemic response. The Other component of credit card profitability (in gray), which includes balance transfer income, prepayments, and other miscellaneous factors, increased gradually during the sample period and comprises approximately 7 percent of profitability, on average.20

**Who Pays Interest Charges and Credit Card Fees?**

We next group accounts into revolvers and transactors based on how they use their credit cards. Specifically, we examine the number of times an account had a revolving balance in the preceding 12 months.21 We call accounts with a revolving balance every month in the past 12 months "heavy revolvers," accounts with a revolving balance in 1 to 11 of the past 12 months "light revolvers," and accounts that did not have a revolving balance "transactors." The remaining accounts are either new, and thus do not have the twelve-month history we require, or inactive and have not had a balance or made any purchases in six months.

Table 1 presents summary statistics by the different types of accounts during the 2014–19 period.22 In all, revolvers comprise almost half of all accounts, with about 20 percent as heavy revolvers and 25 percent as light revolvers. Transactors comprise 21 percent of accounts. Of the remaining 32 percent of accounts, half are inactive, and half do not have a twelve-month history. As discussed in Adams and Bord (2020), credit scores and income are decreasing in revolving behavior; on average, heavy revolvers tend to have lower credit scores and income than light revolvers who tend to have lower credit scores and income than transactors.

**Table 1. Costs of Using a Credit Card**

As expected, heavy revolvers use their cards less for purchases than light revolvers or transactors, with the average heavy revolver spending just $200 a month on their credit card. The average light revolver (transactor) spends $640 ($825). In all, transactors account for 40 percent of credit card purchases, light revolvers account for 35 percent, and heavy revolvers account for less than 10 percent. The average heavy revolver has an end of statement balance of almost $4,500, of which more than $4,100 is revolving balance. By contrast, the average light revolver (transactor) has a balance of about $1,700 ($750), of which almost $1,000 (0) is revolving balance. In all, more than 50 percent of total balances and about two-thirds of total revolving balances are held by heavy revolvers. Light revolvers hold about 22 percent of total revolving balances.23

The bottom half of Table 1 examines how the costs of using a credit card vary with account usage type. The average heavy revolver pays more than $60 per month in interest charges, and more than 70 percent of all interest is paid by heavy revolvers. Light revolvers pay $15 of interest a month, making up about 20 percent of all interest. Similarly, heavy and light revolvers pay almost 50 percent and 30 percent of all late fees, respectively. By comparison, a higher burden of annual and other fees falls on transactors and light revolvers. Transactors pay almost 30 percent of all annual fees, whereas light revolvers pay 37 percent and heavy revolvers pay less than 20 percent.24 Nevertheless, the majority of annual fees are paid by revolver accounts. The summary statistics are broadly consistent with previous survey-based evidence of the costs of credit cards (for example, Stango and Zinman, 2009) and the biannual report on the credit card market issued by the Consumer Financial Protection Bureau.25

It is notable that heavy and light revolvers pay not only the bulk of interest charges, but also the majority of credit card usage fees. Although usage fees are distinct from both the credit and transaction functions of credit cards, in practice, they appear to be paid mainly by the same accounts that use credit cards for their credit function. Since the credit function of credit cards comprises approximately 80 percent of profitability and fees comprise most of the remaining 20 percent, this suggests that the majority of credit card revenues are paid by revolvers.

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1. The estimate is based on data from the 2019 Survey of Consumer Finances. This figure only includes general purpose credit cards and excludes charge cards and private-label cards. Return to text  
2. The Federal Reserve Board produces an annual report on the profitability of depository institutions' credit card operations, and the Consumer Financial Protection Bureau produces a biannual report that details many aspects of the consumer credit card market, including the cost of credit cards. A large academic literature, starting with Ausubel (1991), also seeks to explain the prevalence of high and steady credit card interest rates. Much of this literature has focused on liquidity constraints as well as biases and lack of optimization by credit card borrowers. See, for example, Gross and Souleles (2002); Gathergood et. al. (2019); Ponce, Seira, and Zamarripa (2017); and Stango and Zinman (2016). Return to text  
3. Our study is closely linked to Agarwal et al (2015), who use account and portfolio data from Credit Card Metrics data assembled by the OCC. While minor differences exist in how interchange and rewards expenses are calculated, Agarwal et al (2015) mainly focus on profitability measures over the spectrum of FICO scores. They also focus on the cost to the consumer rather than bank profitability. Return to text  
4. Because our data focus on issuing banks, we do not have information on revenues from merchant discounts, which are the prices banks charge merchants to process credit card transactions. These prices are typically some markup over interchange. Interchange from American Express and Discover more closely aligns with the merchant discount, as both have a more integrated business model with a single major issuer and acquirer (only a small percent of cards is issued by other banks on these networks). Return to text  
5. The transaction function contributes negatively to profitability in recent years due to high rewards expenses, as we discuss below. Return to text  
6. For computational simplicity, we use a 1 percent random sample of the account-level data, which corresponds to about 3 million accounts, and almost 280 million observations, for the January 2014 to December 2021 period. Return to text  
7. The pandemic also coincided with the largest banks implementing the current expected credit loss methodology (CECL) as of January 2020. Part of the trend in provisioning might be attributed to this change. For more information, see the July 2021 Report to the Congress on the Profitability of Credit Card Operations of Depository Institutions, which is available at https://www.federalreserve.gov/publications/files/ccprofit2021.pdf. Return to text  
8. Credit card banks are defined as banks with more than $200 million in assets that have at least 50 percent of assets as consumer loans and at least 90 percent of their consumer loans are credit card loans or related plans. For more information, see the July 2022 Report to the Congress on the Profitability of Credit Card Operations of Depository Institutions, which is available at https://www.federalreserve.gov/publications/files/ccprofit2022.pdf. Return to text  
9. This is in-line with other estimates, such as Agarwal et al (2015). Return to text  
10. As first discussed by Ausubel (1991) and noted by Agarwal et al (2015), among others, credit card bank profitability is significantly higher than the return on other banking activities. Although our Y-14M data start in 2014, extending the Call Report data to prior years shows that credit card profitability is also more volatile than the profitability of other banks. Return to text  
11. Previous literature such as Agarwal et al (2015) uses average daily balances (ADB) to measure how much a credit card user who pays finance charges borrows. Credit card lenders use ADB when calculating interest charges. We use revolving balances to more easily decompose total balances as in equation (2), since both balances and revolving balances are snapshots at a single point in time. The correlation between revolving balances and ADB is more than 0.99. Return to text  
12. Both NCM and NTM are measures of the average amount earned per dollar (of revolving balances or purchases), rather than the marginal amount earned per dollar. Return to text  
13. NCM ranged from 65 percent to 92 percent of ROA during the 2014-2021 period. Return to text  
14. NTM ranged from negative 20 percent to positive 12 percent of ROA during the 2014-2021 period. Return to text  
15. The decline in the share of purchases in 2020 was the result of households drastically cutting spending due to the COVID-19 pandemic. The subsequent rebound in share purchases followed as spending recovered while revolving balances continued to decline. Return to text  
16. The short-term rebound in NTM in 2020 is mainly driven by the decline in interest expense due to a fall in interest rates. As transaction volume began to increase in mid-2021, NTM declined to approximately its pre-pandemic levels. Return to text  
17. More than 47 percent of credit card customers who switched to a new card over the past 12 months did so for a better rewards program; see https://www.jdpower.com/system/files/legacy/assets/2018135\_u.s.\_credit\_card\_study\_v2.pdf. Return to text  
18. Balance transfer fees are included in the Other component of profitability. Return to text  
19. Late and other fees ranged from 7 percent to 28 percent of ROA during the 2014-2021 period. Transfers, which are included in the Other component of profitability make up 2 percent of ROA on average, with a range of 1 to 4 percent, depending on the quarter. Return to text  
20. The increase in the Other component in 2021 is driven in part by prepayments, which are credit card purchases paid down prior to the statement close. Higher prepayments increase credit card profitability because the lender receives interchange income on the purchases, but since they are paid down soon, does not need fund them for long. See Adams, Bord, and Katcher (2021) for more on the role of prepayments. Return to text  
21. We exclude instances of revolving due to a forgotten payment. For example, if a borrower does not make a payment before the due date but subsequently pays off the entire balance, we do not count this as an instance of revolving. Return to text  
22. We use the 2014–19 period to avoid contaminating our results with pandemic-related changes in usage. Return to text  
23. See Adams and Bord (2020) and Grodzicki and Koulayev (2021) for more information on the differences between revolvers and transactors. Return to text  
24. Note that annual fees are expressed as a monthly charge, to be consistent with finance charges and other fees. Return to text  
25. The latest report is The Consumer Credit Card Market from September 2021 and is available at https://files.consumerfinance.gov/f/documents/cfpb\_consumer-credit-card-market-report\_2021.pdf Return to text

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