

A Note on Broader Credit Card Literature and Credit Card Regulation

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1 Broader Literature Relating to Credit Markets

Through [Matcham \(2024\)](#), I contribute to the vast literature in economics and finance studying credit card markets. Several research articles, books, and reports on credit card markets are noteworthy. [Agarwal and Zhang \(2015\)](#) surveys the literature, and [Knight \(2010\)](#) extensively summarizes the UK credit card market. The Financial Conduct Authority produced a UK credit card market study in 2015 ([FCA, 2015](#)), and the Consumer Finance Protection Bureau (CFPB) produce a biennial report on the US credit card market, most recently in 2023 ([CFPB, 2023](#)). [Evans and Schmalensee \(2005\)](#) offers a comprehensive account of the history of credit cards in the US.

The fundamental idea in [Matcham \(2024\)](#) is the risk-based credit limit. Underpinning risk-based credit limits are lenders' use of statistical credit scoring models for measuring risk. [Einav, Jenkins, and Levin \(2012; 2013\)](#) and [Paravisini and Schoar \(2015\)](#) document significant profit increases for lenders following the adoption of risk-scoring methods. A large segment of the literature focuses on the predictive, *statistical* quality of credit scores ([Khandani, Kim, and Lo, 2010](#); [Lessmann, Baesens, Seow, and Thomas, 2015](#); [Butaru, Chen, Clark, Das, Lo, and Siddique, 2016](#); [Albanesi and Vamosy, 2019](#); [Fuster, Goldsmith-Pinkham, Ramadorai, and Walther, 2022](#)). However, [Einav, Finkelstein, Kluender, and Schrimpf \(2016\)](#) takes a different approach, focusing on the *economic* content of risk scores. The paper notes that if risk scores determine contractual terms, then risk scores confound underlying default risk with endogenous responses to those terms. [Matcham \(2024\)](#) contributes to this literature by estimating the underlying screening technologies of lenders, which provide a signal of the underlying unobservable risk on a harmonized scale. By estimating these harmonized scores off credit limits at origination rather than ex-post default, my measure is not confounded with the potential endogeneity of origination contractual terms and lender-borrower relationship.

Recent work by [Grodzicki \(2023\)](#) argues that over the last 40 years, credit cards have evolved from a simple line of credit to a complex lending product, offering rewards, balance transfers, and 0% promotional deals. These new features create positive opportunities and additional benefits for consumers, but their complexity may confuse consumers and leave them open to exploitation through, for example, obfuscation ([Gabaix and Laibson, 2006](#)). It is an open question whether the evolving complexity of credit cards is good or bad for cardholders on net.

2 Modeling Choices in Matcham (2024)

My demand model of card origination, borrowing, and default can be microfounded in a typical consumption-savings setup (see Grodzicki, Alexandrov, Bedre-Defoile, and Koulayev (2022) for an example of this approach). That model specifies an underlying dynamic utility of the cardholder, linking card choice, borrowing, and default through a set of structural parameters. However, given that my focus is lenders' credit limit decisions, I prefer to specify the demand-side estimating equations as a set of linearized equations agnostic to the behavior that generates them. This is like the approach of Einav, Jenkins, and Levin (2012), which focuses on a set of linearized estimating equations derived from their model of consumer choice in the auto loan market. The benefit of this approach is that the econometric model becomes a valid approximation of several underlying consumer choice models, not just the standard intertemporal optimization model. Though this can limit the extent of welfare analysis, it is a worthwhile concession in modeling credit card borrowing, where standard assumptions about revealed preference, rational expectations, and consumer sophistication are subject to deserved scrutiny. In what follows, I describe the various departures from rational utility-maximizing agents with standard intertemporal preferences that have been taken in the credit card market literature.

Many papers explore the impact of behavioral biases on the credit card market. The biases include **time inconsistency and present bias** (Ausubel and Shui, 2005; Ausubel, 1991; 1999; Laibson, Repetto, and Tobacman, 2000; Meier and Sprenger, 2010; Kuchler and Pagel, 2021), **self-control and naivete** (Heidhues and Köszegi, 2010), **anchoring** (Keys and Wang, 2019; Stewart, 2009), **exponential growth bias** (Stango and Zinman, 2009; Adams, Guttman-Kenney, Hayes, Hunt, Laibson, and Stewart, 2022), **over-optimism** (Exler, Livshits, MacGee, and Tertilt, 2021; Yang, Markoczy, and Qi, 2007), **shrouding** (Ru and Schoar, 2016), and **repayment heuristics** (Gathergood, Mahoney, Stewart, and Weber, 2019). Though my model does not explicitly account for these features, I base my estimation on a set of linearized equations that are not inconsistent with behavioral biases. Future research can explore the interaction between consumer behavioral biases and lenders' risk-based credit limits and interest rates.

Other papers stress the importance of **search** (Galenianos and Gavazza, 2022; Stango, 2002; Stango and Zinman, 2015; Drozd and Nosal, 2011; Calem and Mester, 1995), **promotional deals** (Drozd and Kowalik, 2019), **learning** (Agarwal, Driscoll, Gabaix, and Laibson, 2008), **minimum repayments** (Druehdahl and Jørgensen, 2018), and **information frictions** (Ausubel, 1999; Karlan and Zinman, 2009) in credit card markets. These topics are relevant features of credit card markets, and, like behavioral biases, further work can explore how they interact with risk-based prices and credit limits. In particular, when lenders have to advertise an APR, search becomes less costly for consumers, so the role of consumer search is particularly important.

3 Summary of EU and US APR Regulation

This section provides a brief and non-technical overview of Annual Percentage Rates (APR) regulations in the EU, UK, and the US. For precise details, the interested researcher can consult the Consumer Credit Sourcebook (CONC) section 3.5 for the UK case and the Code of Federal Regulations (CFR) §1022.70

for the US case.¹

3.1 Definitions and EU Advertised APR Regulation

A credit card's *purchase balance* is the total amount spent on the card relating to non-cash transactions yet to be repaid.² A *purchase interest rate* for a credit card is the percentage rate at which interest is added to a credit card purchase balance.

As a prelude to defining the annual percentage rate (APR), I first describe the daily interest compounding method, which many lenders use to add interest to credit cards. At the end of a statement cycle, lenders may give individuals a grace period of interest-free days to pay their balance. This period is typically between 20 and 40 days. Lenders charge interest for the statement cycle if the total balance is not paid within the grace period. Lenders compound interest on unpaid balances daily by taking each day's average balance and multiplying it by the daily periodic purchase rate. The *daily periodic purchase rate* is the percentage rate at which interest is added to an unpaid balance daily. The consumer is notified of the interest charged on their monthly statement, where the monthly interest charge is the sum of daily interest across all the days in the month.

The *annual purchase rate* is the daily periodic rate multiplied by 365. For example, if the daily periodic rate is 0.0005, the annual purchase rate is 0.1825, or 18.25%. An *annual percentage rate* is similar to the annual purchase rate, except it also accounts for all mandatory fees that an individual must pay each year on the card so that it represents the total cost of revolving a balance on a credit card each year. If a card has no compulsory fees or charges, its APR equals the annual purchase rate.

Accounting for fees when calculating the total cost of borrowing on a card requires a representative credit limit. The calculation of APR assumes that the individual pays the fees, spends the entire representative credit limit on the first day of the year, and then pays it back in equal, regular installments over a year without spending anything else. The sum of the charges and interest accruing over a year (as a percentage) when an individual follows this spending pattern and pays the fees defines the APR.

The *representative* or *advertised APR* is defined as “an APR at or below which the firm communicating or approving the financial promotion reasonably expects, at the date on which the promotion is communicated or approved, that credit would be provided under at least 51% of the credit agreements which will be entered into as a result of the promotion”. Credit card lenders must include a representative APR on all promotional materials for a credit card, and by definition, most consumers each month must obtain the representative APR or lower. Before February 2011, the proportion of customers on a given credit card required to obtain the advertised APR or lower in the UK was 66%. After February 2011, the UK harmonized regulation with the EU and the proportion changed from 66% to 51%.

¹<https://www.handbook.fca.org.uk/handbook/CONC/3/5.html> and <https://www.consumerfinance.gov/rules-policy/regulations/1022/70/>, last accessed 26 July 2024.

²The withdrawal of cash counts towards the cash advance balance and cash advance interest rates are typically higher than purchase interest rates. Transfers of balances from a previous credit card counts towards the balance transfer balance, which also can have a different interest rate to the purchase rate and cash advance rate.

3.2 US Regulation

US credit card lenders do not have to provide one representative APR for each credit card, but they are still subject to regulation should they use risk-based pricing. Since the Truth in Lending Act in 1998, credit card agreements must include a “Schumer” Box: a table showing basic information about the card’s rates and fees. The box on purchase APR must contain either a list of values or a range of values for APR that the lender will use. The APR values must be in at least an 18-point font size.

Further, lenders must provide a consumer with a “risk-based pricing notice” if they (i) use a consumer credit report in connection with a credit application and (ii) grant or extend credit to that consumer on “material terms that are materially less favorable than the most favorable material terms available to a substantial proportion of consumers from or through the lender.” The risk-based pricing notice must inform the consumer that a consumer report includes information about their credit history, that the terms offered have been set based on information from the consumer report, and that the terms offered may be less favorable than the terms offered to consumers with better credit histories, among other information.

Another major piece of recent US credit card regulation is the 2009 Credit Card Accountability Responsibility and Disclosure Act of 2009. This Act limited lenders’ ability to change interest rates after origination and is the subject of Nelson (2022) and Agarwal, Chomsisengphet, Mahoney, and Stroebel (2014).

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The numbers at the end of every reference link to the pages citing the reference.

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