

Mood Swings and Money:

The Role of Financial Technology in Household Credit Demand

Ran Duchin, Paul Freed, and John Hackney*

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Abstract

Fintech lending allows borrowers to apply for loans anytime and from anywhere, complete their applications within minutes, and obtain immediate credit decisions. As such, transient mood swings that would be mitigated in a traditional loan setting can play an important role in modern household credit demand. Using hourly fluctuations in local sunshine as an instrument for sentiment, we find that positive sentiment leads to higher loan demand both at the extensive margin (more loan applications) and the intensive margin (higher loan amounts and loan-to-income ratios). The effects lead to higher default rates, especially for lower-income and inexperienced borrowers. We also find evidence consistent with self-corrective actions where individuals later withdraw their applications, suggesting that “cooling-off” periods can be an effective consumer protection mechanism. Overall, we provide some of the cleanest estimates to date that sentiment affects the demand for consumer credit.

Key Words: FinTech, Consumer Credit Demand, Sentiment, Marketplace Lending, Default

JEL Classifications: D12, D14, G4, G21, G23, O33

* Contact: Ran Duchin, Carroll School of Management, Boston College, e-mail: duchinr@bc.edu; Paul Freed, Darla Moore School of Business, University of South Carolina, e-mail: Paul.Freed@grad.moore.sc.edu; John Hackney, Darla Moore School of Business, University of South Carolina, e-mail: john.hackney@moore.sc.edu. We thank seminar participants at the University of Washington, Old Dominion University, and the University of South Carolina for helpful comments.

1. Introduction

The advent of financial technology has fundamentally changed the landscape of households' financial decision-making. Borrowers on online marketplace platforms can apply for loans from the comfort of their homes, day or night, complete their loan applications within minutes using their smartphone or computer, and never speak to a banker or a loan officer. Such developments, in turn, can have a material effect on overall financial decision-making. At the extensive margin, lower transaction costs can increase the consumption of credit. The unsecured consumer loan market has grown dramatically in the last decade, from \$57.7 billion in 2009 to \$156 billion in 2019, with marketplace lenders responsible for roughly 40% of the market.¹ At the intensive margin, they can affect the quality of credit decisions and subject them to influences that more traditional settings would mitigate.

In this paper, we use micro-level data from an online marketplace lending platform to study the role of sentiment and financial technology in households' credit demand. The analyses utilize 1.4 million timestamped loan applications from 2007-2021 to study the effects of transitory emotional states on households' borrowing decisions, the real consequences of those decisions, and the efficacy of features such as "cooling-off" periods in mitigating the emotional effects.

As a source of exogenous variation in consumers' sentiment that matches the high frequency of loan applications, we exploit hourly variation in local sunshine across 2,482 counties during the period 2007-2021. This approach is grounded in prior evidence on the effect of sunshine on an agent's mood from psychology (Schwarz and Clore, 1983), experimental economics (Bassi, Colacito, and Fulghieri, 2013), and financial markets (Hirshleifer and Shumway, 2003; Goetzmann, Kim, Kumar, and Wang, 2015).

¹ Based on TransUnion data – see: <https://www.supermoney.com/studies/personal-loans-industry-study/>

A key empirical challenge is to separate the effect of sentiment on households' borrowing decisions, or credit demand, from its effect on credit supply and local economic conditions. Indeed, prior studies have shown that sunshine affects both credit supply (Cortès et al., 2016) and economic expectations (Chhaochharia et al., 2019). Our empirical setting has several features that allow us to overcome this challenge. First, the data contain loan applications irrespective of their eventual origination or funding status, thus capturing households' credit demand rather than credit supply. Second, the test specifications match each application's granular time stamp with *hourly* variation in sunshine within a *county-week*, thus holding constant local economic conditions and removing seasonal variation in sunshine for a given county. Third, by design, all credit decisions on the online marketplace lending platform are based on an algorithmic credit model, and the investors are nonlocal and institutional. As such, the supply of credit on the platform is unrelated to variation in local sunshine.

We confirm that hourly variation in sunshine does not affect credit supply by studying loan pricing, risk assessment, and funding. Consistent with our identifying assumption, we find that sunshine is uncorrelated with loan interest rates, the platform's estimated loss rate, or the proportion of the application that is funded. These results suggest that variation in local sentiment does not affect loan origination or loan terms, nor is it accounted for by the platform or investors.

Our main findings can be summarized as follows. First, positive sentiment, attributable to hourly variation in local sunshine, corresponds to higher credit demand both at the extensive and intensive margins. At the extensive margin, we find that the number of applications is 2% higher during sunny hours compared to cloudy hours. At the intensive margin, we find that requested loan amounts, loan-to-income ratios, and monthly payment-to-income ratios increase by 1.3%, 1.3%, and 1.1%, respectively, during sunny hours. Combined, these results suggest that sentiment operates through both the extensive and intensive margins.

The above findings hold after the inclusion of county-by-week fixed effects, which absorb weekly variation in economic conditions specific to each county, as well as credit rating, loan purpose, hour, and day-of-week fixed effects, which absorb variation across borrower credit quality, loan type, time-of-day, and weekday, respectively. The analyses also control for a wide range of borrowers' characteristics, such as employment duration, income level, prior platform experience, and participation on the platform as a lender.

As such, we provide novel causal estimates of a behavioral credit demand channel, augmenting recent studies that have mostly focused on the implications of behavioral factors for credit supply, including personal connections (Engelberg, Parsons, and Yao, 2012), the perception of borrower trustworthiness (Duarte, Siegel, and Young, 2012), and most related to our study, sunshine-induced sentiment (Cortès et al., 2016).² In contrast, we focus on credit demand in a setting that holds constant credit supply and economic conditions. Our finding, that sentiment has considerable implications for credit demand in the FinTech consumer loan marketplace, differs from prior evidence that sentiment does *not* affect credit demand in more traditional credit markets (e.g., Cortès et al., 2016). These findings highlight the role of traditional loan market features, such as live interactions with loan officers, in mitigating the impact of sentiment on credit demand.

Second, we find that loan applications initiated on sunny hours are significantly more likely to be charged-off compared to those initiated on overcast hours during the same week in the same county. In particular, loan applications initiated during sunny hours are 0.39 percentage points more likely to be charged-off, or 1.49% relative to the sample standard deviation, compared to those initiated during cloudy hours. These findings show that sentiment has real effects on households' financial outcomes.

² A related literature examines the effect of sunshine-induced sentiment on other consumer decisions such as car choice (Busse et al., 2015) housing prices (Hu and Lee, 2020), and credit card spending (Agarwal et al., 2020).

Third, we find considerable demographic differences in the effects of sentiment on credit outcomes across income groups. Specifically, we find that loans initiated by low-income individuals during sunny hours are roughly 1.4 percentage points more likely to be charged-off, or about 5.3% relative to the sample standard deviation, compared to those initiated during cloudy hours. In contrast, we do not find strong sentiment effects for high-income borrowers. The results suggest that low-income borrowers are less capable of bearing the financial burden of sentiment-driven loans, and subsequently experience negative economic consequences.³

Fourth, we investigate the role of previous experience and cooling-off periods in mitigating the effect of sentiment on credit demand. Consumer protection advocates point to behavioral research to justify regulations in financial markets. One such regulation is a “cooling-off period”, which allows borrowers to withdraw from financial contracts within a certain time window. Thaler and Sunstein (2008) note that cooling-off periods “make best sense, and tend to be imposed, when two conditions are met: (a) people make the relevant decisions infrequently and therefore lack a great deal of experience and (b) emotions are likely to be running high.”

Consistent with the Thaler and Sunstein (2008) view, we find that the effect of sunlight on requested loan amounts, loan-to-income ratios, and charge-offs is concentrated in first-time borrowers, and disappears for borrowers with prior platform experience. In particular, loan applications initiated during sunny hours by first-time borrowers are 1.3% larger and have 1.12-1.4% higher loan-to-income ratios compared to applications initiated during cloudy hours. We also find substantial negative outcomes for inexperienced borrowers, who experience a 0.62 percentage points, or 2.4%, increase in charge-off rate when they begin their application during sunny hours. In contrast, sunny-hour applications initiated by experienced borrowers are indistinguishable from cloudy-hour applications.

³ These individuals may also be the least financially literate and hence most susceptible to sentiment (see, i.e., Campbell, 2006; Thaler and Sunstein, 2008; Lusardi and Mitchell, 2014; Ru and Schoar, 2016).

We also find that experienced applicants are considerably more likely than first-time applicants to withdraw a sunny-hour loan listing before accessing the funds. While experienced borrowers are 1.78% more likely to withdraw a sunny-hour loan application compared to a cloudy-hour loan application, first-time borrowers are not economically or statistically significantly more likely to withdraw such applications. Further, experienced applicants whose previous application was initiated during a sunny hour are more likely to withdraw a current loan listing compared to those whose previous application was initiated during a cloudy hour. As such, our results suggest that individuals learn from previous experience, and that mandating a cooling-off period provides benefits in the consumer credit market by potentially protecting households from irrational, sentiment-based decisions.

Lastly, we find that sentiment influences the composition of loans. Local sunshine increases the demand for discretionary loans such as those for large purchases, vacations, or home improvement by 1.1%. In contrast, it does not affect business loan applications and reduces the demand for debt consolidation by 1.63%. These results are consistent with a shift toward “impulse” credit expansion for households when sentiment is high. This effect, however, does not spill over to business credit demand. These findings complement research in experimental economics that studies consumption composition in consumer markets (see, e.g., Busse et al., 2015).

Our paper contributes to the growing literature on the real effects of FinTech. On the positive side, technology may improve financial education (Breza, Kanz, and Klapper, 2020), enhance consumption-smoothing and risk sharing (Jack and Suri, 2014; Suri, 2017), increase financial attention (Stango and Zinman, 2014; Karlan, Morten, and Zinman, 2017; Bursztyn, 2019; Medina, 2021), or relieve information frictions (Carlin, Olafsson, and Pagel, 2023). Several studies specifically examine future outcomes of FinTech borrowers and find mixed results. Balyuk (2023)

finds that FinTech borrowing provides information spillovers that facilitate future credit access from banks. Conversely, Chava et al. (2021) and Di Maggio and Yao (2021) find negative long-term consequences of FinTech borrowing in terms of lower credit scores, higher costs of credit, and higher default rates. Wang and Overby (2022) find that FinTech borrowers overconsume loans from marketplace lenders, leading to bankruptcy. Our results suggest that the ease of accessing consumer credit heightens the effect of transitory sentiment on financial decisions, potentially leading to overconsumption of credit and negative future outcomes.

Our paper also contributes to the literature on household participation in debt markets. Prior studies rely primarily on surveys, and provide evidence on socio-demographic variables, economic variables, and deviations from optimal choice (e.g., Cox and Jappelli, 1993; Duca and Rosenthal, 1993; Gropp, Scholz, and White, 1997; Lea and Webley, 1995; Leece, 2000; Graham and Isaac, 2002; Karlsson, Dellgran, Klingander, and Garlin, 2004; Brown, Taylor, and Wheatley Price, 2005; Easterlin, 2005; Magri, 2007; Siemens, 2007; Del Rio and Young, 2006, 2008; Ranyard et al., 2006; Meier and Sprenger, 2007, 2010; Rohde, 2009; Etzioni, 2010.). We add to this literature by providing evidence from micro-level observational data on high frequency credit demand decisions of households. As such, our work is related to Ben-David and Bos (2021), who use observational Swedish data, and find that an increase in the availability of liquor increases credit demand, default, welfare dependence, and crime.

Lastly, we also add to the growing literature on the role of sentiment in financial markets. Early work in this field examines the effect of sunshine-induced mood on the stock market and on trading behavior (Suanders, 1993; Kamstra, Kramer, and Levi, 2003; Hirshleifer and Shumway, 2003; Goetzmann et al., 2015). We add to this literature by studying household credit demand.

2. Institutional Details and Data

This section describes the institutional details of the loan application process of the marketplace lender (Prosper Marketplace), as well as the theoretical motivation for sunshine as a mood primer. Additionally, this section details the data sources and variables we use in this study.

2.1. *Prosper Marketplace*

The empirical analyses focus on FinTech consumer loan applications from the universe of listings provided by Prosper Marketplace, the second largest online consumer lender in the United States.⁴ To initiate a loan application, individuals state their desired loan amount (up to \$40,000) and the purpose of the loan.⁵ The applicant must then provide her name, address, and date of birth, along with her occupation, income, homeownership status, employment status, and other general credit history terms. The platform then performs a soft credit inquiry, and generates a set of potential loan packages with either a 3- or 5-year term from which the borrower chooses. Once the applicant accepts the desired loan terms, the platform conducts a hard credit inquiry, and uses a proprietary credit-scoring model to evaluate the riskiness of each loan. The platform may also request additional documentation to verify certain items on the borrower's credit profile and provided information. The listing then goes public on the Prosper platform and is available to be funded by investors. The entire application process takes only minutes, and the platform approves most loans and provides funding within 1 day.

Upon going public, a listing has two weeks to be funded, and may be funded by individuals or institutional investors. In practice, the loans are overwhelming funded by institutional investors

⁴ Prosper has issued over \$21 billion in loans to over 1.2 million people since 2005.

⁵ Loan purpose is separated into 10 main categories. The most common loan purpose is debt consolidation, which makes up roughly 70% of the applications in our data.

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