

The digital credit divide

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The Digital Credit Divide: Marketplace Lending and Entrepreneurship

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Abstract

We conjecture that marketplace lending provokes an increase in the quantity of entrepreneurship, particularly in more regionally disadvantaged areas, albeit at lower average quality. Using a fuzzy regression discontinuity design that exploits exogenous variation in borrowers' access to marketplace loans along U.S. state borders, we estimate a 10% increase in marketplace lending causes a 0.44% increase in business establishments per capita. The effects are more pronounced for less experienced entrepreneurs, for small and less profitable firms, firms more dependent upon external finance, in industries with lower sunk costs of entry, and for low-income regions with inferior access to financial institutions.

I. Introduction

Over the past decade, online marketplace lenders have become a vital source of credit for businesses. Marketplace lenders originate approximately \$6 billion of business loans each year in the USA and are an important source of finance for new entrepreneurs (Fenwick, McCahery, and Vermeulen (2017), Claessens, Frost, Turner, and Zhu (2018)). In other countries online marketplaces account for 15% of business lending (CCAF (2017)). For entrepreneurs, key advantages of marketplaces over traditional financial intermediaries are they provide faster and cheaper access to credit which enables start-up and business growth. However, despite accounting for a rapidly increasing share of lending to businesses, little attention has been paid to whether online marketplaces systematically affect entrepreneurship.

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This issue is important for assessing the implications of the financial technology (Fintech) lending expansion, and the ramifications of marketplaces either displacing or substituting for traditional financial intermediaries (Buchak et al. (2018), Cornaggia, Wolfe, and Yoo (2018), Tang (2019), and Allen, Gu, and Jagtiani (2021)).

Marketplace lending may increase the number of business establishments by expanding credit supply through two channels. First, whereas banks rely on soft information obtained through customer relationships, the informational advantages of digital algorithms in credit modeling allow marketplace lenders to identify borrowers with observably poor but actually good credit quality (Petersen and Rajan (2002)). While banks may adopt similar Fintech technology, bank-lending criteria do not enable them to lend to these observably poor but good credit quality borrowers. Marketplace lending therefore increases the aggregate supply of credit by removing credit constraints among borrowers that are excluded by banks.¹ Tang (2019) suggests that marketplace borrowers move from traditional banks to online marketplaces when banks restrict lending, and that marketplace lenders attract borrowers with observably poor credit quality. Second, marketplace lenders' digital technologies reduce origination costs, resulting in lower interest rates compared to banks. Cornaggia et al. (2018) find the origination cost of marketplace loans is 164 basis points lower relative to commercial banks' origination costs. By reducing the cost of credit, marketplace lenders reduce potential entrepreneurs' expected operating costs, leading those that were previously unprofitable at the margin to enter. Overall, relative to traditional banks, there are reasons to expect that marketplace lending has a disproportionately positive impact on entrepreneurship, particularly for constrained entrepreneurs that might be viewed as lower quality based on ex ante quality proxies.

In this article, we present evidence that these effects are present, and economically important. Marketplace lending causes a significant increase in entrepreneurship, as measured using the number of establishments per capita.² However, these businesses are concentrated within less productive and innovative sectors, arguably those that find raising capital more challenging. Our findings contribute to a rapidly evolving body of literature that documents the remarkable growth of the Fintech sector over the past decade (Claessens et al. (2018), Cumming and Schwienbacher (2018)). Whereas existing contributions document complementary or substitution links between Fintech and the banking industry (Cornaggia et al. (2018), Tang (2019)), or features of marketplace platforms (Zhang and Liu (2012), de Roure, Pelizzon, and Thakor (2019), Cumming and Hornuf (2022)), we provide evidence on the real effects of marketplace lending on business formation.

Our tests exploit a quasi-experiment in the USA where states impose varying restrictions on borrowing from Lending Club or Prosper. As we document below, state-level borrowing restrictions derive from lending platforms' operating practices violating state securities regulations and are exogenous with respect to entrepreneurship (Cornaggia et al. (2018)). However, by preventing

¹Underlying this effect is the assumption that marketplace lending is not a perfect substitute for lending by other financial intermediaries (Hauswald and Marquez (2006)). Section III of this article discusses further the differences between banks and marketplace lending.

²We follow several existing contributions to the literature by defining entrepreneurship in this way. For example, Cetorelli and Strahan (2006), Cumming and Li (2013), and Popov (2014) use this measure.

borrowing from Lending Club, Prosper, or both platforms, the restrictions have a dramatic effect on the supply of marketplace credit across states (Danisewicz and Elard (2018)).

We isolate causality using a fuzzy regression discontinuity design that exploits the exogenous discontinuities in the supply of marketplace credit along U.S. state borders. Our tests revolve around industries located in zip codes within a 10-mile distance of the threshold (border). Within this narrow neighborhood macroeconomic factors, access to bank credit, demand conditions, and broader socioeconomic fundamentals are observationally equivalent on either side of the threshold. Focusing on areas just to the left and right of the threshold eliminates confounding omitted variables that likely contaminate comparisons between distant areas where the operating environment differs substantially.

We find the state-level restrictions cause a discrete jump in the supply of marketplace lending per capita at the threshold. The volume of marketplace credit per capita is approximately 120% greater in zip codes within the treatment group compared to the control group. Subsequent tests confirm that this variation in credit supply translates into differences in the number of establishments. A 10% increase in the supply of marketplace lending leads to a 0.44% increase in the number of establishments per capita. The effects are statistically significant at conventional levels and comparable in magnitude across various specifications. One would anticipate larger treatment effects where credit constraints are more severe. Indeed, we observe this pattern in the data. The treatment effects are larger within industries that are more dependent upon external finance, in regions with inferior access to financial institutions, and in low-income areas where banks are more reluctant to extend credit.

However, further tests reveal the treatment effects reflect an increase in micro businesses, those with less than 20 employees. Subsample analyses indicate that marketplace lending has a larger effect on entrepreneurship within industries that are less productive, with lower R&D intensities, and that are mature with lower sales growth rates. For example, the industries where marketplace lending has the largest effect on entrepreneurship include vending machine operators and convenience stores. There are also important differences in the economic magnitude of the effects across geographical areas. The data show the increase in entrepreneurship is concentrated within regions with small populations and higher unemployment rates. Together these inferences are consistent with marketplace credit spurring the creation of lower-quality businesses.

A series of robustness tests confirm that our findings are not driven by confounding factors. Placebo tests show that the supply of marketplace credit only jumps at the threshold and not at other borders where there are no differences in marketplace borrowing restrictions. In addition, there are no discontinuities in the supply of other types of credit at the threshold, and diagnostic checks show no discontinuities in a host of socioeconomic, and banking-industry covariates. Meanwhile, sensitivity checks demonstrate that our inferences are robust to other features of the lending environment, taxation, elements of the legal framework, and many other plausible confounds. In essence, our findings are not contaminated by omitted variables. This is consistent with evidence reported by Cornaggia et al. (2018) that state-level marketplace borrowing restrictions are exogenous with respect to

contemporary financial markets and the real economy. Rather, variation in the law derives from how state regulators classify securities that predates the advent of online marketplaces. Further analyses using difference-in-difference estimation corroborates our findings.

Our article relates to three distinct strands of literature. One area of research documents links between Fintech, the banking industry, and the real economy. Danisewicz and Elard (2018) show that reductions in marketplace lending cause an increase in personal bankruptcy among low-income households. Another set of studies examine whether marketplace loans act as a substitute for bank loans. Within the unsecured consumer loans market segment, Cornaggia et al. (2018) find that high risk marketplace loans substitute bank credit whereas low risk loans complement bank lending. A related study by Tang (2019) shows that marketplace lending is a substitute for bank lending among marginal bank borrowers. However, marketplace loans complement bank lending among consumers that already have access to bank credit. In contrast to these studies, we present novel evidence of how marketplace loans influence the rate of entrepreneurship. This research is important because the Fintech sector has begun to displace traditional financial institutions and is an important conduit of credit to both individuals and businesses (Claessens et al. (2018)). A unique contribution of our article is that it demonstrates the dramatic growth in online marketplaces has impacted the real economy by expanding credit supply.

Our article also relates to studies on the finance-entrepreneurship nexus. Prior research investigates the effect of banking deregulation episodes on entrepreneurship and creative destruction (Black and Strahan (2002), Cetorelli and Strahan (2006), Bertrand, Schoar, and Thesmar (2007), and Kerr and Nanda (2009), (2010)). Broadly, this literature shows that relaxing bank branching restrictions leads to an increase in the rate of incorporations, firm entry, changes to industry dynamics, and an increase in the equilibrium number of firms. These effects are attributed to deregulation leading to more intense competition provoking an increase in the supply of bank credit to credit-constrained entrepreneurs. We complement this body of research by showing the Fintech sector has similar effects on entrepreneurship, although marketplaces appear to expand credit to businesses and potential entrepreneurs that banks are unwilling to lend to. In addition, the general equilibrium effects we document suggest that marketplace lending induces responses by other financial intermediaries.

A related area of research documents the rise of the Fintech industry. Cumming and Schwienbacher (2018) present evidence that Fintech venture capital (VC) investments occur more frequently in countries that have limited institutions governing regulatory enforcement and that these investments grew faster in countries that lack a major financial center following the financial crisis. Claessens et al. (2018) document the growth of Fintech lending around the world and identify cross-country drivers behind its development. Other papers in this literature document that the risk-adjusted rates on marketplace loans are lower than those on bank loans (de Roure et al. (2019)), present evidence of herding by investors (Zhang and Liu (2012)), and investigate information production and efficiency in the Fintech market (Iyer, Khwaja, Luttmer, and Shue (2015)).

The article proceeds as follows: In [Section II](#), we describe the institutional details of marketplace lending platforms. [Section III](#) briefly discusses differences between banks and marketplace loans, explains why peers lend on these platforms and in addition, whether peer-to-peer lending is able to overcome frictions that banks cannot. [Section IV](#) outlines the data set. [Section V](#) discusses the identification strategy and [Section VI](#) reports and discusses the econometric results. [Section VII](#) presents robustness tests. We draw conclusions in [Section VIII](#).

II. Institutional Details of Marketplace Loans

Marketplace lending platforms emerged in the USA during the mid-2000s. Lending Club and Prosper are the largest platforms and have a combined market share of approximately 75%, and originate a large volume of business loans as well as unsecured medical, home improvement, auto refinancing, and debt consolidation loans.³ The maximum (average) loan amount is \$40,000 (\$14,570) on Prosper and \$50,000 (11,744) on Lending Club, respectively. Loan maturities typically range between 3 and 5 years. Applications are first screened and those that meet the platforms' credit standards are listed on the online marketplace. Investors may then choose which loans to fund.

Lending Club and Prosper do not make loans directly to borrowers. Rather they issue loans through an issuing bank, and payment dependent notes are sold to platform investors. The notes in this model constitute securities under Section 2(a)1 of the Securities Act of 1933 and Section 3(a)10 of the Securities Exchange Act of 1934. Section 18(b) of the Securities Act of 1933 mandates that notes that may be listed and traded on a national market may be federally registered with the Securities and Exchange Commission. If this condition is not met, notes must be registered with state regulators who are also granted authority to regulate both borrowing and investing in the securities. This is the case for marketplace loans because they do not trade on a national exchange.

The Consumer Financial Protection Bureau (CFPB) and state banking authorities (Nemoto, Storey, and Huang (2019)) regulate the borrowing side of the platforms.⁴ The CFPB's mandate is federal in nature, and focuses on prescribing rules and imposing disclosure requirements to help consumers understand the terms, benefits, costs, and risks of marketplace loans (GAO (2011)).⁵

³Lending Club has a 45% market share whereas Prosper's market share is approximately 30%. Together the two platforms provide an accurate picture of marketplace lending across the USA. Other smaller platforms that entered the market later include CommonBond, Funding Circle, Fundrise, OnDeck, RealtyMogul, and SoFi.

⁴The Federal Trade Commission (FTC) has some supervision responsibilities under the financial privacy provisions of the Gramm–Leach–Bliley Act of 1999. The FTC has the authority to enforce Section 5 of the act, which prohibits unfair or deceptive acts or practices. The FTC also has primary enforcement responsibility under the Fair Debt Collection Practices Act of 1977 which prohibits abusive, unfair, or deceptive acts or practices by third party debt collectors. This authority is also federal in nature. The investing side of marketplace platforms is regulated by the Securities and Exchange Commission and state securities regulators.

⁵This Dodd Frank Act of 2010 grants this authority. The CFPB has the power to make rules defining acts or practices pertaining to consumer financial products that are deceptive or abusive. Marketplace loans fall under this umbrella.

State banking regulators have the power to impose regulatory barriers that prevent platforms from entering that market. The extent of regulatory restrictions varies widely between states. In some states, marketplace lenders must meet the same state-level banking and consumer finance standards that bank entrants are subject to before individuals and businesses can borrow through the platform. This includes acquiring licenses covering lending, loan brokering and supervising, money transfers, and collection licenses (Cornaggia et al. (2018)). Obtaining licenses from state governments requires substantial effort by the platform and is “costly and laborious” (GAO (2011)). States can impose additional barriers that make marketplace lending less attractive. For example, Iowa state law mandates rebates of origination fees in the event of loan prepayment. This makes it difficult for lenders to operate an originate-to-distribute (OTD) model by reducing profitability. Other states have no license requirements and only regulate the bank that issues the platform’s notes (e.g., WebBank).

The state-level borrowing restrictions are motivated by concerns surrounding borrower welfare and idiosyncratic regulatory issues. Cornaggia et al. (2018) highlight state banking regulators’ skepticism about financial innovations’ potentially adverse effects on borrowers who do not understand platforms’ lending conditions. In the case of Iowa, marketplaces lending is effectively prohibited due to historic measures that aim to limit the OTD model in the mortgage market.⁶ However, most states impose no barriers on marketplace borrowing. In these cases, platforms must meet the same conditions that an entering bank would. These bank licensing requirements were determined before the advent of marketplace lending.

III. Differences Between Bank and Marketplace Lending

To aid the framing and interpretation of the evidence offered herein, in this section, we briefly discuss some of the main similarities and differences between bank and marketplace lending. First, while we do not have data on marketplace lender motivations here, there is information from extant research that shows motivations to lend in both markets is extremely similar and a direct function of risk and return. For example, Pierrakis (2019) provides survey evidence from 630 Funding Circle investors and explains that the data show expected returns are the main motivation to invest in marketplace loans, while “intrinsic motives such as geographical location, personal relationship or knowledge of the company are of significantly less importance.” Similarly, Chen, Huang, and Shaban (2022) show that marketplace lenders are attracted mainly by financial profits, albeit they sometimes make mistakes, which ties into our second category.

The second difference between marketplace loans and bank loans is the extent to which there is mispricing and accuracy in the decision to lend. Bank loans are

⁶See Section 537.2510 of the Iowa Consumer Credit Code. Other examples include Mississippi where Lending Club was issued a cease and desist order following expiry of its loan broker license. The state securities regulator only permitted Lending Club to resume operations within the state after it addressed the order’s mandates (Cornaggia et al. (2018)).

screened by professional loan officers that have years of experience with due diligence. Marketplace investors are potentially less sophisticated, and of course, involve a wider pool of lenders relative to the number of potential lending banks. Marketplace loans are sometimes mispriced (Caglayan, Pham, Talavera, and Xiong (2020)) due to investor disagreement and inattention. An entrepreneur borrowing through a marketplace platform does not need to convince everyone in the crowd to fund him or her; rather, the borrower only needs to convince those lenders in the right tail that value the opportunity the highest. As such, we expect to see a higher proportion of lower quality projects to be funded with marketplace loans. But the extant survey evidence from Pierrakis (2019) does not allow us to go so far as to suggest that lenders get carried away with lending to a “cool” company or make an investment for purely intrinsic reasons.⁷

The third difference between banks and marketplace loans is that there is a friction of distance in bank loans, particularly in more rural border areas in the data examined in our article. Banks may have a geographic preference to not carry out proper due diligence and make loans to entrepreneurs that are more remote due to their reliance on relationship lending technologies. Similarly, entrepreneurs may prefer the online convenience offered by marketplace solutions without the travel to a physical bank. This distance friction may lead some banks to miss some lower value but positive NPV projects. Petersen and Rajan (1995), (2002) and Degryse and Ongena (2005) show that access to credit and the terms of bank credit are a function of distance because this affects banks’ monitoring and screening costs. Proximity to banks reduces these frictions by allowing banks to build relationships with their customers leading to increased credit supply and lower interest rates. While this may lead banks to miss some positive NPV projects, this does not necessarily mean these investments are disproportionately risky: Tang (2019) finds borrowers who rely on small loans from banks use marketplace credit as well.

The fourth difference between banks and marketplace loans involves resolving frictions other than those related to distance. These differences include low transaction costs, the absence of time restrictions on when investment can take place, and historical data transparency updated daily (Caglayan et al. (2020)). Further, data enable informational advantages of digital algorithms in credit modeling relative to the soft information obtained through customer banking relationships (Petersen and Rajan (2002)). These factors potentially allow marketplace lenders to find positive NPV projects that banks have overlooked.

IV. Data Description

A. Dependent Variables

To measure entrepreneurial activity, we follow Cetorelli and Strahan (2006) and Cumming and Li (2013) and use the number of establishments per 1,000

⁷Relatedly, the legal changes identified above in Section II are independent with respect to investor preferences. The law gives investors opportunities to invest in different areas. Whether or not investors actually invest is a function of their preferences.

population. This provides a measure of the equilibrium level of entrepreneurship rather than measures of churning as exemplified by entry and exit rates.

Our data set contains industry-level information drawn from 2010 to 2016 vintages of the County Business Patterns (CBP) database. This source provides annual data on the number of establishments operating in each 4-digit North American Industry Classification System (NAICS) industry within each 3-digit zip code.⁸ To ensure comparability we weight the number of establishments by population. The key dependent variable therefore captures the number of establishments per 1,000 population in each industry-zip code.

The CBP also provides information on the size distribution of firms. For each industry-zip code, data is available on the number of establishments with less than 10 employees, between 10 and 19 employees, between 20 and 49 employees, between 50 and 99 employees, and 100 or more employees. We again weight these variables by 1,000 population.

B. Sampling

To sharpen identification, we restrict the sample to observations of industries in zip codes within 10 miles of the border between states that enforce marketplace borrowing restrictions and contiguous states that do not. For example, during the sample period Idaho, Indiana, Maine, Mississippi, Nebraska, North Dakota, and West Virginia prohibit borrowing from either Lending Club or Prosper, the largest online marketplaces in the USA. Iowa does not allow borrowing through either platform.⁹ States that enforce marketplace borrowing restrictions form the control group whereas contiguous states with no restrictions comprise the treatment group. Including observations within a narrow neighborhood of the threshold ensures the treatment and control groups are highly comparable, thereby purging omitted variables.

Our second sample screen excludes observations of industries from outside the manufacturing and service sectors where public provision is more likely. This results in a sample containing 129,255 zip code-industry observations.

C. Independent Variables and Summary Statistics

We measure marketplace lending using data provided by Lending Club and Prosper. Each platform reports loan-level information on each loan application. This provides detailed information on the borrower (e.g., the 3-digit zip code where they live), loan (loan amount, debt-to-income ratio, interest rate, term structure, whether the borrower subsequently defaults, origination status), and the purpose of the loan (business loan, debt consolidation). We restrict the sample

⁸Four-digit NAICS industries are narrow. For example, convenience stores, pet food stores, motor vehicles parts and supplies, wholesalers, shoe stores, and florists.

⁹Four states (Idaho, Indiana, Mississippi, and Nebraska) remove marketplace borrowing restrictions during the sample window. We therefore only include observations from these states prior to deregulation.

to funded business loans and aggregate the data to the zip code level. This provides annual 3-digit zip code level data on the volume of marketplace credit per 1,000 population.

Next, we merge the entrepreneurship and marketplace lending data. We supplement the data set with a range of additional variables taken from various sources. Panel A of Table 1 provides a description of each variable in the data set, while Panel B reports summary statistics.

TABLE 1
Variable Description and Descriptive Statistics

In Panel A of Table 1, BEA denotes the Bureau of Economic Analysis. ASE denotes the Annual Survey of Entrepreneurs; FHFA denotes the Federal Housing Finance Agency; NY Fed denotes the New York Federal Reserve Bank. We construct external financial dependence using data from Compustat in the year 2005. In Panel B, Obs. indicates the number of observations; Std. Dev. denotes standard deviation; 5th (95th) is the fifth (ninety-fifth) percentile value. MP loans, equity crowdfunding, and VC funds are measured in thousands of 2016 US\$. Population is measured in thousands. C&I lending and bank size are measured in natural logarithms. Homestead exemptions are measured in millions of 2016 US\$.

Panel A. Variable Description

Variable	Description	Source
ESTABS	The number of establishments per 1,000 population in industry i in zip code z in state s in year t	County business patterns
ESTABS <10	The number of establishments with less than 10 employees per 1,000 population in industry i in zip code z in state s in year t	County business patterns
ESTABS 10–19	The number of establishments with between 10 and 19 employees per 1,000 population in industry i in zip code z in state s in year t	County business patterns
ESTABS 20–49	The number of establishments with between 20 and 49 employees per 1,000 population in industry i in zip code z in state s in year t	County business patterns
ESTABS 50–99	The number of establishments with between 50 and 99 employees per 1,000 population in industry i in zip code z in state s in year t	County business patterns
ESTABS 100+	The number of establishments with 100 or more employees per 1,000 population in industry i in zip code z in state s in year t	County business patterns
MP_LOANS	Marketplace loans to businesses per 1,000 population in zip code z in state s in year t	Lending Club and Prosper
TREATMENT	A dummy variable equal to 1 if zip code z is in a state that does not restrict borrowing through Lending Club or Prosper, 0 otherwise	Authors' calculations
EQUITY_CROWDFUNDING	Equity crowdfunding per 1,000 population in state s in year t	
UNEMPLOYMENT_RATE	The unemployment rate in state s in year t	BEA
POPULATION	Population in zip code z in state s in year t	US Census
ETHNICITY	The ratio of the non-white population to total population in state s in year t	US Census
DEGREE	The share of the population with at least a College degree in state s in year t	US Census
LATITUDE	Latitude at the midpoint of in zip code z in state s	Opendatasoft
LONGITUDE	Longitude at the midpoint of in zip code z in state s	Opendatasoft
VC_FUNDS	Venture capital funding per 1,000 population in state s in year t	PwC Moneytree Report
BANK_BRANCH_DENSITY	The number of bank branches per square mile in zip code z in state s in year t	
C&I_LENDING	Commercial and industrial loans per 1,000 population originated by banks headquartered in zip code z in state s in year t	Chicago Fed

(continued on next page)

TABLE 1 (continued)
Variable Description and Descriptive Statistics

Panel A. Variable Description (continued)

Variable	Description	Source
C&I_INTEREST_RATE	The mean ratio of interest income on commercial and industrial loans to total commercial and industrial loans among banks headquartered in zip code z in state s in year t	Chicago Fed
BANK_SIZE	Mean total assets of banks headquartered in zip code z in state s in year t	Chicago Fed
CAPITAL_RATIO	Mean ratio of equity to total assets of banks headquartered in zip code z in state s in year t	Chicago Fed
SMALL_BANK_SHARE	The share of banks with assets less than \$250 billion in zip code z in state s in year t	Chicago Fed
MANUFACTURING	A dummy variable equal to 1 if industry i has a NAICS code between 3,100 and 3,399, 0 otherwise	Authors' calculations
EXTERNAL_FINANCIAL_DEPENDENCE	External financial dependence in industry i calculated following Rajan and Zingales (1998)	Authors' calculations
BUSINESS_EXPERIENCE	The ratio of entrepreneurs that have previously operated businesses to total entrepreneurs in state s in year t	ASE
EDUCATION	The share of entrepreneurs with at least a Bachelor's degree in state s in year t	ASE
MANAGERIAL_INTENSITY	The mean number of hours per week entrepreneurs spend managing their business in state s in year t	ASE
MANAGERIAL_ABILITY	The structured management score reported by the Management and Organizational Practices Survey (MOPS) for industry i	US Census
PRIMARY_INCOME_SOURCE	The share of entrepreneurs whose primary income source comes from their business in state s in year t	ASE
PROFITABILITY	An index of the profitability of entrepreneurship in state s in year t	ASE
CORPORATE_TAX_RATE	The top marginal corporate tax rate in state s in year t	Tax Foundation
PERSONAL_INCOME_TAX_RATE	The top marginal personal income tax rate in state s in year t	Tax Foundation
SALES_TAX_RATE	An index between 0 and 10 of the average sales tax in state s in year t	Heritage Foundation
PAYROLL_TAX	An index between 0 and 10 of the payroll tax rate in state s in year t	Heritage Foundation
PROPERTY_TAX	An index between 0 and 10 of the property tax rate in state s in year t	Heritage Foundation
MINIMUM_WAGE	An index between 0 and 10 of the stringency of minimum wage law in state s in year t	Heritage Foundation
UNION_DENSITY	An index between 0 and 10 of the degree of workforce unionization in state s in year t	Heritage Foundation
LABOR_MARKET_FRICTIONS	An index between 0 and 10 of the severity of labor market frictions in state s in year t	Heritage Foundation
HOMESTEAD_EXEMPTIONS	The total value of individual's homestead exemptions in bankruptcy in state s in year t . Where the homestead exemption value is unlimited we follow Corradin, Gropp, Huizinga, and Laeven (2016) and use a value of \$500,000	State governments
HOUSE_PRICES	House price index in zip code z in state s in year t	FHFA
USURY_RATE	Top lending interest rate permitted in state s in year t . Where state do not impose a maximum interest rate we use a value of 50%	State governments
AUTO_LOANS_DELIQUENCY_RATE	Share of auto loans 90+ days delinquent in state s in year t	NY Fed
CREDIT_CARD_DELIQUENCY_RATE	Share of credit card loans 90+ days delinquent in state s in year t	NY Fed
MORTGAGE_DELIQUENCY_RATE	Share of mortgage loans 90+ days delinquent in state s in year t	NY Fed
STUDENT_LOANS_DELIQUENCY_RATE	Share of student loans 90+ days delinquent in state s in year t	NY Fed

(continued on next page)

TABLE 1 (continued)
Variable Description and Descriptive Statistics

Panel B. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	5th	95th
ESTABS	129,255	0.5292	6.2708	0.0311	1.3908
ESTABS <10	129,255	0.1524	0.6481	0.0011	0.6410
ESTABS 10–19	129,255	0.0748	1.1099	0.0100	0.2306
ESTABS 20–49	129,255	0.0500	1.0978	0.0100	0.1238
ESTABS 50–99	129,255	0.0256	0.8134	0.0100	0.0415
ESTABS 100+	129,255	0.0209	0.7020	0.0100	0.0230
MP_LOANS	129,255	5.8199	19.2171	1.0000	35.000
TREATMENT	129,255	0.4381	0.4962	0	1
EQUITY_CROWDFUNDING	129,255	0.0279	0.1406	0.0100	0.0480
UNEMPLOYMENT_RATE	129,255	0.0641	0.0236	0.0308	0.1038
POPULATION	129,255	16.2063	13.1352	0.8340	42.8760
ETHNICITY	129,255	0.1272	0.0791	0.0510	0.2857
DEGREE	129,255	0.1992	0.0380	0.1521	0.2785
LATITUDE	129,255	40.7519	2.9717	35.1000	46.8700
LONGITUDE	129,255	-88.4717	9.0784	-97.0700	-70.9700
VC_FUNDS	129,255	0.03566	0.0486	0.0002	0.0138
BANK_BRANCH_DENSITY	129,255	0.0427	0.0330	0.0064	0.0983
C&I_LENDING	129,255	2.9942	10.5160	-4.6052	18.8026
C&I_INTEREST_RATE	129,255	0.0186	0.0141	0.0100	0.0419
BANK_SIZE	129,255	4.4372	6.0087	0.0100	13.7777
CAPITAL_RATIO	129,255	0.0486	0.0690	0.0100	0.1294
SMALL_BANK_SHARE	129,255	0.0932	0.2542	0	1
MANUFACTURING	129,255	0.1653	0.3714	0	1
EXTERNAL_FINANCIAL_DEPENDENCE	129,255	1.6680	2.1633	0.1369	8.6299
BUSINESS_EXPERIENCE	129,255	0.2258	0.3229	0	0.7130
EDUCATION	129,255	0.1545	0.2215	0	0.4940
MANAGERIAL_INTENSITY	129,255	0.1959	0.2802	0	0.6260
MANAGERIAL_ABILITY	129,255	0.5598	0.0178	0.5240	0.5810
PRIMARY_INCOME_SOURCE	129,255	0.2169	0.3103	0	0.6970
PROFITABILITY	129,255	0.2682	0.3834	0	0.8400
CORPORATE_TAX_RATE	129,255	0.0730	0.0316	0	0.1200
PERSONAL_INCOME_TAX_RATE	129,255	0.0616	0.0197	0.0307	0.0898
SALES_TAX_RATE	129,255	4.9627	1.4871	2.9000	8.8000
PAYROLL_TAX	129,255	5.8367	1.5923	3.8000	9.3000
PROPERTY_TAX	129,255	5.3186	2.3468	0.9000	8.8000
MINIMUM_WAGE	129,255	5.2418	2.0485	1.9000	8.6000
UNION_DENSITY	129,255	5.9276	1.5951	3.2000	8.2000
LABOR_MARKET_FRICTIONS	129,255	5.6948	1.0432	3.9200	7.5500
HOMESTEAD_EXEMPTIONS	129,255	0.1284	0.1781	0.0005	0.5000
HOUSE_PRICES	129,255	0.1706	0.0212	0.1397	0.2144
USURY_RATE	129,255	0.1699	0.1608	0.0475	0.5000
AUTO_LOANS_DELIQUENCY_RATE	129,255	0.0309	0.0114	0.0164	0.0512
CREDIT_CARD_DELIQUENCY_RATE	129,255	0.0779	0.0202	0.0477	0.1149
MORTGAGE_DELIQUENCY_RATE	129,255	0.0283	0.0167	0.0084	0.0571
STUDENT_LOANS_DELIQUENCY_RATE	129,255	0.1011	0.0307	0.0612	0.1722

V. Identification Strategy

OLS regressions of entrepreneurship on marketplace lending volumes are likely to yield biased estimates for two reasons. First, marketplace borrowers tend to disproportionately comprise customers who are unable to obtain credit from banks. Such borrowers are also more likely to live in areas where the incidence of entrepreneurship is lower such that OLS estimates are downward biased. Second, there may exist a number of omitted determinants of entrepreneurship that may systematically correlate with marketplace lending.

Our identification strategy obviates these threats to identification by exploiting exogenous variation in marketplace borrowing restrictions between states. Figure 1 illustrates the essence of our econometric strategy. The volume of marketplace credit originated in zip codes just to the left of the threshold (the control group) is notably lower compared to zip codes just to the right of the threshold (the treatment group). Indeed, there is a clear jump in the local regression functions at the threshold. In contrast, there are no discontinuities in the supply of marketplace finance at other points away from the threshold. Hence, the state-level restrictions create exogenous variation in the supply of marketplace loans across space.

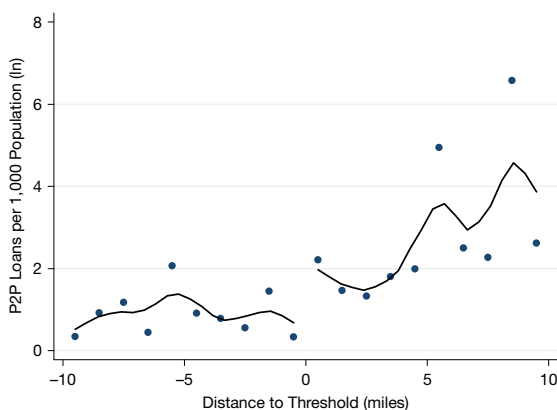
Our identification strategy exploits this institutional feature using a fuzzy regression discontinuity design. In the first stage, we estimate

$$(1) \quad \text{MP_LOANS}_{zst} = \alpha + \beta \text{TREATMENT}_{zs} + \gamma \mathbf{X}_{zst} + \delta_t + \varepsilon_{zst},$$

where MP_LOANS_{zst} is the volume of marketplace loans per 1,000 population originated in zip code z in state s in year t ; TREATMENT_{zs} is a dummy variable

FIGURE 1
Marketplace Loan Supply at the Threshold

Figure 1 reports the average level of marketplace credit supplied to businesses in zip codes within a 10-mile distance of the threshold (the border between states that do and do not restrict borrowers from accessing marketplace loans). Optimal bin width is calculated following Lee and Lemieux (2010). The figure reports the average level of marketplace lending per capita within each bin. Bins with a negative distance to the threshold are the control group (i.e., states with marketplace borrowing restrictions) whereas bins with a positive distance to the threshold are the treatment group (i.e., states with no marketplace borrowing restrictions). We fit nonparametric local regression functions either side of the threshold using a triangular kernel.



equal to 1 if marketplace borrowing is unrestricted within state s , 0 if borrowers are prohibited from accessing at least one of Lending Club or Prosper; \mathbf{X}_{zst} is a vector of control variables; δ_t denotes year fixed effects; ε_{zst} is the error term.

In the second stage, we estimate

$$(2) \quad \text{ESTABS}_{izst} = \theta + \varphi \text{MP_LOANS}_{zst} + \mu X_{izst} + \sigma_i + \sigma_t + \epsilon_{izst},$$

where ESTABS_{izst} is the number of establishments per 1,000 population in industry i in zip code z in state s in year t ; MP_LOANS_{zst} is the instrumented volume of marketplace loans per 1,000 population; σ_i and σ_t denote industry and year fixed effects, respectively; ϵ_{izst} is the error term.

Treatment status is time invariant in [equation \(1\)](#). This prevents us from including zip code fixed effects in the estimating equation. To capture time-invariant heterogeneity, X_{izst} includes the latitude and longitude midpoints of each zip code. We bootstrap the standard errors using 50 replications.

Diagnostic Tests

While TREATMENT_{zs} is exogenous with respect to the number of establishments per capita, our tests hinge upon the identifying continuity assumption that underlies regression discontinuity designs. This assumption states that apart from marketplace borrowing restrictions, there exist no discontinuities in other covariates at the threshold. A breakdown of the continuity assumption raises a red flag as our estimates may derive from omitted variables rather than the instrument.

To address this issue, we use the approach outlined by McCrary (2008). Specifically, we use t -tests to isolate whether there are level differences in other covariates at the threshold. The results of these tests are presented in [Table 2](#). We find the characteristics of marketplace borrowers and loans are similar on either side of the threshold. There are no statistically significant differences in the average loan amount, interest rate, annual income, and duration of current employment between the treatment and control groups. Macroeconomic conditions, as measured using the unemployment rate, are also highly similar. The population within the treatment and control groups resemble each other in terms of the share of people with at least a bachelor's degree and from an ethnic minority. Importantly, there are no significant banking-industry differences between the treatment and control groups. For example, there are no significant differences in the supply of commercial and industrial (C&I) loans per capita, the interest rate on C&I loans, bank capital ratios, and bank size. There are also no statistically significant differences in the density of bank branches, indicating that the treatment and control groups have similar access to bank credit. Finally, the share of employment in the manufacturing sector and the dependence of industries on external finance are even across the threshold. These patterns suggest that other covariates do not systematically “jump” at the threshold.

The second element of the continuity assumption is that borrowers do not have precise control over treatment status (Lee (2008)). That is, they cannot systematically choose which side of the border they reside on in order to apply for marketplace loans. This assumption appears to hold because borrowers face frictions that prevent them from choosing exactly where they live (e.g., home moving costs). These frictions are likely to be even larger among marketplace borrowers who

TABLE 2
Continuity of Other Covariates at the Threshold

Table 2 presents the results of *t*-tests on the equality of loan-level and economic condition variables between the treatment and control groups. TREATMENT (CONTROL) denotes the mean of a variable within the treatment (control) group. DIFFERENCE is the difference in means between the treatment and control groups. Std. Error is the standard error of the difference in means. *t*-statistic is the *t*-statistic. The sample contains observations from within 10 miles of the threshold.

	Variable				
	TREATMENT	CONTROL	DIFFERENCE	Std. Error	<i>t</i> -Stat
	1	2	3	4	5
<i>Loan-Level Variables</i>					
LOAN_AMOUNT	14.5569	14.6162	-0.0593	0.0813	-0.73
INTEREST_RATE	13.4126	13.4654	-0.0528	0.0430	-1.23
ANNUAL_INCOME	70.1452	67.4909	2.6543	1.9886	1.33
EMPLOYMENT_DURATION	6.1073	6.0932	0.0141	0.0364	0.39
<i>Economic Variables</i>					
UNEMPLOYMENT_RATE	0.0657	0.0586	0.0071	0.0074	0.96
ETHNICITY	0.1585	0.1688	-0.0103	0.0155	-0.66
DEGREE	0.2175	0.2018	0.0157	0.0130	1.21
BANK_BRANCH_DENSITY	0.0413	0.0402	0.0110	0.0100	1.10
C&I_LENDING_PER_CAPITA	15.1732	15.1024	0.0708	0.2082	0.34
C&I_INTEREST_RATE	5.3108	5.3117	-0.0009	0.0301	-0.03
BANK_SIZE	2.4458	2.6950	-0.2491	1.6897	-1.06
CAPITAL_RATIO	0.1157	0.1143	0.0014	0.0570	0.02
SMALL_BANKS	0.7413	0.7389	0.0024	0.0587	0.04
MANUFACTURING	0.1691	0.1956	-0.0264	0.0227	-1.16
EXTERNAL_FINANCIAL_DEPENDENCE	1.6391	1.5892	0.0499	0.0875	0.57
BUSINESS_EXPERIENCE	0.6730	0.6779	-0.0049	0.0137	-0.36
EDUCATION	0.4845	0.4935	-0.0090	0.0102	0.88
HOURS_MANAGING	0.5884	0.6036	-0.0152	0.0155	-0.98
MANAGERIAL_ABILITY	0.5610	0.5550	0.0061	0.0099	0.62
PRIMARY_INCOME_SOURCE	0.6532	0.6802	-0.0271	0.0162	-1.67
PROFITABILITY	0.8138	0.8191	-0.0054	0.0113	-0.48
HOUSE_PRICES	5.1727	4.8585	0.3142	0.3031	1.04
USURY_RATE	2.5440	2.8888	-0.3448	0.3636	-0.95
AUTO_LOAN_DELIQUENCY_RATE	0.9332	1.1184	-0.1852	0.1475	-1.26
CREDIT_CARD_DELIQUENCY_RATE	1.9670	2.0573	-0.0903	0.0934	-0.97
MORTGAGE_DELIQUENCY_RATE	0.7974	0.9387	-0.1413	0.2040	-0.69
STUDENT_LOAN_DELIQUENCY_RATE	2.3137	2.2520	0.0617	0.0995	0.62

typically have inferior credit histories and are more financially constrained. Moreover, marketplace loans are typically small, making it implausible that agents would incur high expenses to access relatively small loan amounts.

Nevertheless, we test for manipulation of treatment status using the approach outlined by Lee and Lemieux (2010). Specifically, we use a regression discontinuity design to establish whether there are significant differences in the density of marketplace loan applications on either side of the threshold. A higher density of applications per capita within the treatment group would be consistent with manipulation as borrowers move to the treated side of the threshold. However, the evidence in column 1 of Table 3 refutes this conjecture. Rather there are no discontinuities in the application rate on either side of the threshold.

We take further steps to check for manipulation of treatment status. To manipulate treatment status, borrowers would have to move to areas within the treatment group. Population dynamics therefore provide insights into whether the continuity assumption holds. We first examine whether counties in the treatment group experience disproportionately higher rates of net migration. Column 2 of Table 3 shows this is not the case. Second, we investigate whether the rate of population growth is systematically faster within the treatment group relative to the control group. The estimates in column 3 of Table 3 indicate this is not the case.

TABLE 3
Tests for Manipulation of Treatment Status

Table 3 presents estimates of the equation $y_{zst} = \alpha + \beta \text{TREATMENT}_{zs} + \delta_z + \delta_t + \varepsilon_{zst}$, where y_{zst} is either application density, net migration, or the population growth rate. In columns 1 and 2, the sample contains zip code level data. In column 3, the sample contains bilateral county-level data. Application density is the number of marketplace loan applications per 1,000 population in zip code z in year t . Population growth is the annual rate of population growth rate in zip code z in year t . Net migration is the rate of net migration between county c and county k in year t . Throughout all columns the dependent variable is measured in natural logarithms. Standard errors are bootstrapped using 50 replications. t -statistics are reported in parentheses.

	Dependent Variable		
	Application Density 1	Population Growth 2	Net Migration 3
TREATMENT	-0.0620 (-0.71)	-0.0000 (-0.01)	0.0012 (0.12)
Zip code FE	Yes	Yes	No
Year FE	Yes	Yes	Yes
County FE	No	No	Yes
No. of obs.	964	964	464,003
R^2	0.1700	0.0911	0.2465

The evidence consistently shows borrowers do not have precise control over treatment status. Our estimates are therefore unlikely to be biased upward by strategic manipulation.

Finally, we inspect whether the adoption of marketplace borrowing restrictions correlates with entrepreneurship. For example, states may remove restrictions based on the level or trends in entrepreneurship to stimulate entrepreneurship in future. In this case, the exogeneity assumption would no longer hold due to simultaneity. To inspect whether marketplace borrowing restrictions are linked to entrepreneurship we therefore follow the approach of Danisewicz, McGowan, Onali, and Schaeck (2018) and estimate

$$\text{TREATMENT}_{st} = \alpha + \beta \text{ESTAB}_{st} + \delta_s + \delta_t + \varepsilon_{st},$$

where TREATMENT_{st} is a dummy variable equal to 1 if state s permits marketplace borrowing during year t ; ESTAB_{st} is either the level or change in the number of establishments per capita within the state; δ_s and δ_t indicate state and year fixed effects, respectively; ε_{st} is the error term. This regression relies on annual state-level data for the years 2010–2016.¹⁰ Column 1 of Supplementary Material Table A.1 shows no significant relationship between the level of entrepreneurship and whether a state enforces marketplace borrowing restrictions. In column 2 of the table, we find that changes in entrepreneurship are not significantly related to marketplace borrowing restrictions. It thus appears the removal of the restrictions is not linked to entrepreneurship within the state, suggesting the restrictions are exogenous with respect to entrepreneurship.

VI. Results

Column 1 of Table 4 reports first-stage estimates of equation (1). We find that state-level restrictions have a large effect on the supply of marketplace credit.

¹⁰In these tests, we include the District of Columbia as a “state” because it has jurisdiction over marketplace borrowing and lending.

TABLE 4
Baseline Results

Table 4 presents estimates of equations (1) and (2). Variables definitions are reported in Panel A of Table 1. The dependent and independent variables are measured in natural logarithms, except TREATMENT, which is a dummy variable. IV-FS (IV-SS) denotes first (second) stage instrumental variables estimation. IV-RF denotes the reduced form instrumental variables estimator. IA indicates the sample includes observations within 10 miles of the border between Iowa and surrounding states. NON-IA indicates the sample does not contain observations from within 10 miles of the border between Iowa and surrounding states. In column 6 (7), the sample contains observations from the years 2010–2013 (2014–2016). The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Estimator	Dependent Variable						
	MP_LOANS	ESTAB	ESTAB	ESTAB	ESTAB	ESTAB	ESTAB
	IV-FS	IV-SS	IV-RF	IV-SS	IV-SS	IV-SS	IV-SS
Sample	All	All	All	IA	NON-IA	2010–2013	2014–2016
	1	2	3	4	5	6	7
MP_LOANS		0.0426*** (10.22)		0.0668*** (7.08)	0.0282*** (4.10)	0.0305*** (6.36)	0.1274*** (10.96)
TREATMENT	0.7970*** (75.98)		0.0850*** (13.89)				
EQUITY_CROWDFUNDING	-0.1572*** (-24.32)	0.0047* (1.91)	-0.0020 (-1.06)	0.0561*** (6.67)	-0.0361*** (-5.75)	0.0438*** (10.21)	-0.0860*** (-11.78)
UNEMPLOYMENT_RATE	-1.7639*** (-34.04)	-0.0692*** (-4.65)	-0.1443*** (-10.07)	0.8972*** (10.27)	-0.1217*** (-4.51)	-0.0384* (-1.65)	-0.0318 (-1.21)
POPULATION	0.2668*** (30.85)	-0.2320*** (-26.64)	-0.2206*** (-29.25)	-0.3384*** (-24.06)	-0.1630*** (-22.60)	-0.2486*** (-23.31)	-0.2253*** (-22.57)
ETHNICITY	-1.1422*** (-56.66)	-0.0359*** (-4.99)	-0.0845*** (-12.65)	-0.5099*** (-9.40)	-0.0680*** (-5.99)	0.0167 (1.39)	-0.0017 (-0.13)
DEGREE	5.2327*** (59.56)	-0.1525*** (-3.91)	0.0703*** (2.70)	-1.1060*** (-9.02)	0.3831*** (11.09)	-0.2164*** (-3.66)	-0.0596 (-1.10)
LATITUDE	-0.6879*** (-148.33)	0.0520*** (15.80)	0.0227*** (17.37)	0.2338*** (17.01)	0.0108* (2.43)	0.0506*** (10.26)	0.0817*** (13.19)
LONGITUDE	-0.1226*** (-93.04)	0.0077*** (13.59)	0.0025*** (6.83)	-0.0296*** (-11.31)	0.0034*** (4.86)	0.0077*** (9.44)	0.0109*** (9.66)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	129,255	129,255	129,255	44,734	84,521	59,750	69,505
R ²	0.2976	0.2999	0.3366	0.4139	0.2984	0.3172	0.1877
Kleibergen–Paap <i>F</i> -statistic	—	2,744	—	585	1,145	1,043	1,716

Economically, the treatment coefficient implies that marketplace lending is approximately 120% higher within the treatment group relative to the control group. Moreover, the coefficient is precisely estimated and is statistically significant at the 1% level.

Next, we study whether the discontinuity in marketplace lending translates into higher rates of entrepreneurship. In column 2 of Table 4, we find this is indeed the case. We estimate the marketplace loans coefficient to be 0.0426 and highly statistically significant. This implies that a 10% increase in marketplace loans per capita causes a 0.44% increase in the equilibrium number of business establishments. Diagnostic tests also confirm the validity of the instrument set. The Kleibergen–Paap *F*-statistic comfortably exceeds the Stock–Yogo critical threshold of 10, implying that the instrument is relevant.¹¹

¹¹To assess whether the effect of marketplace lending on entrepreneurship is substantive, we estimate dynamic year-by-year difference-in-difference models. The estimates reported in Supplementary Material Table A.2 show marketplace lending increased the number of establishments within the average 4-digit industry by 3.24% in 2012, 3.90% in 2013, 4.77% in 2014, 5.17% in 2015, and 10.53% in 2016. These are economically important magnitudes and indicate that entrepreneurship tends to increase as marketplace lending to businesses grows through time.

We also find positive and significant associations between entrepreneurship and other sources of alternative finance. For example, in column 2 of Table 4 a 10% increase in equity crowdfunding is associated with a 0.05% increase in the number of business establishments per capita. Among the remaining control variables, we find significant negative correlations between entrepreneurship and the unemployment rate, population, and the ethnic minority population share, whereas the correlation between entrepreneurship and the share of the population with at least a college degree is positive. The latitude and longitude coefficients are both positive, implying that the rate of entrepreneurship varies across locations.

To investigate whether the observed increase in entrepreneurship derives from the state borrowing restrictions, we follow Angrist and Krueger (1991) and estimate a reduced form IV model. The treatment coefficient in column 3 of Table 4 is statistically significant, implying that entrepreneurship is also a discontinuous function of the threshold. Hence, the reduced-form relation parallels the pattern we observe in marketplace lending around the threshold. As borrowing restrictions are exogenous with respect to entrepreneurship, it appears credible to assert the only reason why entrepreneurship is higher within the treatment group is due to access to more marketplace lending.

An advantage of our economic laboratory is that the discontinuity in marketplace lending restrictions is more severe along some borders. Iowa imposes restrictions that prevent both Lending Club and Prosper from operating within the state. In contrast, the other states within the control group restrict just one platform from operating. The discontinuity in marketplace lending is therefore plausibly larger along the Iowa border than at the borders along other treated states.

These differences in treatment intensity allow us to perform validation checks. If our hypothesis is correct, one would anticipate larger LATEs within the sample where the discontinuity in marketplace credit across the threshold is largest. Column 4 of Table 4 presents estimates using observations within 10 miles of the Iowa border. In this sample, the LATE of marketplace loans is 0.0668. In comparison, the LATE based on observations drawn from 10 miles around non-Iowan borders in column 5 of Table 4 is 0.0282. While the marketplace loans coefficient is statistically significant in each column, the findings suggest that increasing the intensity of treatment induces larger responses in entrepreneurship.

To reflect further on the causal nature of the evidence in Table 4, it is worth remembering that Table 4 considers two types of variables. One type is a dummy variable, $TREATMENT_{2S}$, that captures how many online marketplaces borrowers are legally allowed to borrow from in a state. The evidence from Table 4 indicates that the increase in marketplace loans is attributable to the law. The second variable is the amount of marketplace loans per population in a state (“MP Loans”). Without instrumenting this variable, it would be harder to infer a causal relationship between the amount of capital running through marketplace marketplaces and the increase in businesses as causal, since the amount of money is the realized supply of capital, which itself is a function of demand and lender preferences, opportunity costs, among other things. It is for that reason we instrument MP Loans using the $TREATMENT_{2S}$ indicator. This allows us to isolate exogenous variation in MP loans. The data indicate that the legal discontinuity allowing marketplace lending platforms in a state had a positive causal impact on the supply of marketplace

loans in the counties, which in turn was associated with an increase in businesses in those counties. In our framework, the law is an exogenous shifter of the supply of capital. Owing to the exogeneity of the law, it does not correlate with credit demand; it only affects how many marketplaces exist within the treatment group relative to the control group. In this way it affects the availability of credit; if there are two platforms operating entrepreneurs potentially have access to more funding opportunities because there are a greater number of potential investors than if only one platform is present. In essence, the law affects the level of the supply curve (the number of potential investors) without shifting the demand curve.

Our final validation check exploits a different source of variation in treatment intensity. Marketplace lending has grown rapidly over time. Borrowers' awareness and understanding of online marketplaces has also improved. Intuitively, marketplace lending should have a more pronounced effect on entrepreneurship at the end of the sample period relative to the start. In column 6 of Table 4 we report estimates based on a sample containing observations from 2010 to 2013. The marketplace loans coefficient estimate is 0.0305 and is statistically significant. In contrast, when we use data from 2013 to 2016 in column 9 of Table 4 the point estimate is 0.1274.

Does the increase in entrepreneurship reflect an increase in the entry rate, a fall in the exit rate, or a combination of both margins? To investigate this issue, we retrieve state-level data on the entry and exit rate in 2-digit industries between 2010 and 2016 from the U.S. Business Dynamics Statistics database. Supplementary Material Table A.3 reports second-stage estimates. Column 1 shows that marketplace loans significantly increase the firm entry rate. In column 2 of the table, we estimate that marketplace lending also provokes a significant increase in the firm exit rate. However, the economic magnitude of the marketplace lending coefficient is larger for entry compared to exit. Column 3 of Supplementary Material Table A.3 reports estimates using the net entry rate (the difference between the entry and exit rate). The MP loans coefficient is 0.0104 and significant at the 5% level. The increase in the equilibrium number of firms therefore reflects an increase in entry that is not offset by a higher exit rate.¹²

A. Entrepreneurial Quality

So far, our results imply that marketplace lending increases the level of entrepreneurship. The next set of tests hone in on the quality of these establishments.

Prior research frequently links firm quality to size as larger firms are more productive and innovative (Acs and Audretsch (1987), Helpman, Melitz, and Rubinstein (2008)). We therefore ask whether marketplace lending affects entrepreneurship differently across the firm size distribution.

The evidence in Table 5 suggests marketplace lending primarily leads to the creation of small businesses. We find that marketplace lending only causes a

¹²The simultaneous increase in entry and exit rates is consistent with theoretical models of industry dynamics (Hopenhayn (1992), Melitz (2003), and Asplund and Nocke (2006)). Increasing the entry rate into an industry provokes greater competition for market share and falling revenue. For some firms, the decline in revenue leaves them unable to cover fixed operating costs leading them to become loss making and exit the industry. Hence, by raising the entry rate, marketplace lending triggers the displacement and exit of some incumbent firms leading to higher exit rates.

TABLE 5
Effects Across the Firm Size Distribution

Table 5 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent and independent variables are measured in natural logarithms. The dependent variable in column 1 is the number of establishments with less than 10 employees per 1,000 population. The dependent variable in column 2 is the number of establishments with between 10 and 19 employees per 1,000 population. The dependent variable in column 3 is the number of establishments with between 20 and 49 employees per 1,000 population. The dependent variable in column 4 is the number of establishments with between 50 and 99 employees per 1,000 population. The dependent variable in column 5 is the number of establishments with at least 100 employees per 1,000 population. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Firm Size (Employees)	Dependent Variable: ESTAB				
	<10	10–19	20–49	50–99	100+
	1	2	3	4	5
MP_LOANS	0.0654*** (12.14)	0.0329*** (6.27)	0.0004 (0.12)	0.0008 (0.32)	0.0018 (1.01)
EQUITY_CROWDFUNDING	0.0085*** (2.79)	0.0025 (0.97)	0.0025 (1.19)	-0.0009 (-0.74)	0.0006 (0.63)
UNEMPLOYMENT_RATE	0.0557*** (2.64)	-0.1170*** (-8.11)	-0.1994*** (-16.08)	-0.0822*** (-11.01)	-0.0776*** (-10.71)
POPULATION	-0.6711*** (-63.94)	0.0188*** (7.26)	0.0207*** (11.79)	0.0098*** (8.03)	0.0062*** (7.39)
ETHNICITY	-0.0680*** (-6.66)	-0.0046 (-0.52)	-0.0209*** (-3.76)	-0.0120*** (-2.98)	0.0022 (0.64)
DEGREE	-0.1501*** (-2.84)	-0.3297*** (-5.81)	-0.0411 (-1.06)	0.0196 (0.72)	0.0072 (0.35)
LATITUDE	0.0832*** (18.00)	0.0217*** (5.05)	-0.0085*** (-3.37)	-0.0067*** (-3.59)	-0.0025* (-1.66)
LONGITUDE	0.0148*** (16.86)	0.0036*** (4.64)	-0.0011** (-1.96)	-0.0014*** (-4.00)	-0.0004 (-1.36)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. of obs.	129,255	129,255	129,255	129,255	129,255
R ²	0.3937	0.0876	0.0589	0.0767	0.0831
Kleibergen–Paap <i>F</i> -statistic	5,706	5,706	5,706	5,706	5,706

significant increase in the number of establishments with less than 20 employees and that the effects are concentrated among the smallest firms. In column 1 of the table, we report estimates of equation (2) using the number of establishments with less than 10 employees as the dependent variable. The marketplace lending coefficient is equal to 0.0654 and is statistically significant at the 1% level. When we estimate equation (2) using the number of establishments with between 10 and 19 employees, the marketplace lending coefficient remains statistically significant. However, the magnitude of the effect in column 2 of Table 5 is smaller than before at 0.0329. In columns 3–5 of Table 5, we report estimates of equation (2) using the per capita number of establishments with 20–49, 50–99, and 100+ employees, respectively. In all instances, the marketplace lending coefficient is economically close to zero and statistically insignificant.

Next, we use turn to sample splits to examine in which industries the LATEs are most pronounced. If marketplace lending triggers the creation of high-quality firms, one would anticipate larger responses in more productive industries, and sectors where R&D intensity is greater.

In columns 1 and 2 in Panel A of Table 6, we split the sample at the median of industry-level total factor productivity (TFP). The results show marketplace lending has a larger effect on establishments per capita within industries where

TABLE 6
Entrepreneurial Quality: Industry Tests

Table 6 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. In Panel A, the dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. Panel A reports estimates from samples split at the median of industry-level variables. TFP denotes total factor productivity, estimated using the methods outlined by Levinsohn and Petrin (2003). R&D intensity is R&D expenditure per employee. Sales growth denotes the annual rate of sales growth. TFP, R&D intensity, and Sales Growth are calculated for each industry using firm-level data taken from Compustat. In column 1 (2), the sample contains observations from industries with TFP less than or equal to (above) the median level of TFP within the sample. In column 3 (4), the sample contains observations from industries with R&D intensity less than or equal to (above) the median level of R&D intensity within the sample. In column 5 (6), the sample contains observations from industries with sales growth less than or equal to (above) the median rate of sales growth within the sample. Panel B presents estimates of equation (2) on an industry basis. We estimate equation (2) for each 4-digit NAICS industry separately. Coef denotes the estimate of ϕ in equation (2); *t*-stat is the corresponding *t*-statistic; R^2 is the *R*-squared statistic. We report estimates only for industries where ϕ is estimated to be statistically significant at least at the 10% level. The estimations include the unreported control variables equity crowdfunding, unemployment rate, population, ethnicity, degree, latitude, and longitude. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Industry Splits

Sample Split	Dependent Variable: ESTAB					
	TFP		R&D Intensity		Sales Growth	
	≤ Median	> Median	≤ Median	> Median	≤ Median	> Median
	1	2	3	4	5	6
MP_LOANS	0.0500*** (8.13)	0.0350*** (6.38)	0.0471*** (9.43)	0.0349*** (6.41)	0.0431*** (7.10)	0.0409*** (7.09)
EQUITY_CROWDFUNDING	0.0088** (2.45)	0.0024 (0.75)	-0.0015 (-0.53)	0.0106*** (3.61)	0.0018 (0.63)	0.0067** (2.43)
UNEMPLOYMENT_RATE	-0.1209*** (-4.78)	-0.0312* (-1.82)	-0.0290 (-1.40)	-0.1119*** (-7.54)	-0.0743*** (-3.70)	-0.0683*** (-3.62)
POPULATION	-0.1553*** (-16.52)	-0.3256*** (-26.77)	-0.2705*** (-22.50)	-0.1982*** (-26.21)	-0.3016*** (-26.50)	-0.1781*** (-20.14)
ETHNICITY	-0.0686*** (-6.16)	-0.0053 (-0.54)	-0.0089 (-1.09)	-0.0636*** (-6.09)	-0.0343*** (-3.23)	-0.0316*** (-3.14)
DEGREE	-0.1392*** (-2.79)	-0.1583*** (-3.16)	-0.2744*** (-5.59)	-0.0047 (-0.09)	-0.2165*** (-4.66)	-0.0936* (-1.78)
LATITUDE	0.0588*** (10.94)	0.0443*** (9.99)	0.0589*** (13.56)	0.0424*** (10.56)	0.0568*** (12.46)	0.0481*** (10.75)
LONGITUDE	0.0060*** (6.91)	0.0084*** (11.09)	0.0073*** (8.98)	0.0074*** (8.75)	0.0065*** (7.29)	0.0088*** (10.96)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	59,611	69,644	63,403	65,852	59,387	69,868
R^2	0.2690	0.3545	0.3052	0.2534	0.3545	0.2601
Kleibergen-Paap <i>F</i> -statistic	2.595	3.120	2.979	2.745	2.639	3.067

Panel B. Industry-Level Regressions

Dependent Variable: ESTAB	ϕ	<i>t</i> -Statistic
Apparel accessories and other apparel manufacturing	0.3889	3.07
Farm product raw material merchant wholesalers	0.3093	2.70
Newspaper, periodical, book, and directory publishers	0.2388	3.23
Scientific research and development services	0.1617	2.34
Vending machine operators	0.1584	2.15
Other motor vehicle dealers	0.1549	2.86
Other miscellaneous store retailers	0.1423	4.02
Specialized design services	0.1386	1.99
Wholesale electronic markets and agents and brokers	0.1208	3.14
Grocery stores	0.1165	4.42
Nondepository credit intermediation	0.1068	2.08
Activities related to credit intermediation	0.1025	3.58
Specialty food stores	0.1018	2.04
Activities related to real estate	0.1013	2.76
Lessors of real estate	0.0949	2.84
Building material and supplies dealers	0.083	2.06
Architectural, engineering, and related services	0.0826	2.09
Depository credit intermediation	0.0776	3.08
Other textile product mills	0.0704	2.05
Soap, cleaning compound, and toilet prep manufacturing	0.0695	2.40
Sporting goods, hobby, and musical instrument stores	0.0672	2.37
Beer, wine and liquor stores	0.064	2.42
Gasoline stations	0.064	3.02
Health and personal care stores	0.0619	1.98

TFP is less than or equal to the median compared to industries with above median TFP.

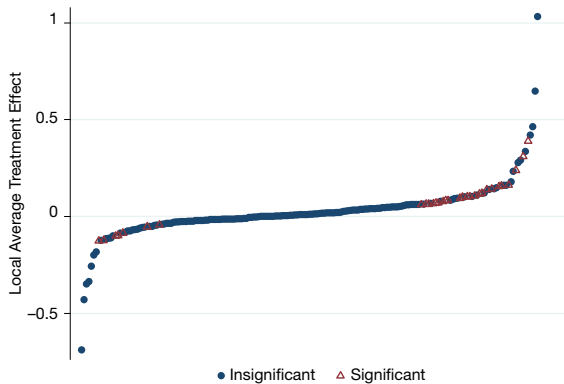
The findings are similar when we repeat the analysis but split the sample at the median of R&D intensity. In column 3 of Table 6, the marketplace lending coefficient is 0.0471 when we focus on industries with R&D intensity less than or equal to the median whereas in column 4 the coefficient is 0.0349 within industries with above-median R&D intensity.

Finally, we estimate that marketplace lending causes a significant increase in per capita establishments across both growing and mature industries, proxied using the rate of sales growth. However, the effects are somewhat more pronounced within mature sectors. The LATE is somewhat larger in column 5 of Table 6 when we focus on industries with less than or equal to the median rate of sales growth relative to column 6 which focuses on industries with above-median sales growth.

To dig deeper into which industries marketplace lending has the largest effect on entrepreneurship, we estimate equation (2) on an industry-by-industry basis. Figure 2 reports the estimate of ϕ for each industry, and whether the coefficient is statistically significant at the 5% level. For most industries, the LATE is statistically insignificant. In a limited number of cases, the LATE is negative and significant, although the economic magnitude tends to be small.¹³ Figure 3 also shows the positive effect of marketplace lending on entrepreneurship is confined to just 24 of the 198 industries in our data set.

FIGURE 2
Treatment Effects Across Industries

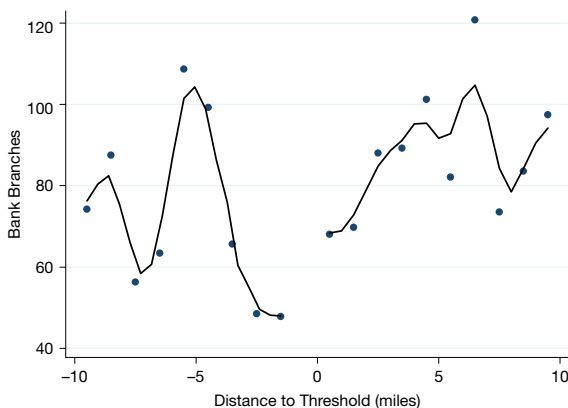
Figure 2 presents estimates of ϕ in equation (2) on an industry-by-industry basis. The estimations include the unreported control variables equity crowdfunding, unemployment rate, population, ethnicity, degree, latitude, and longitude. Coefficients that are insignificant at the 10% level are reported in (blue) circles. Coefficients that are significant at least at the 10% level are reported in (red) triangles.



¹³ A potential explanation for this effect is that the firms in negatively affected industries tend to be large and capital intensive (e.g., animal slaughtering and processing, department stores, and cement and concrete product manufacturing). Since marketplace loans are relatively small this creates incentives for entrepreneurs to start small businesses in other sectors where firm size is smaller and less startup capital is required. In this case, the level of entrepreneurship in these industries will fall relative to the control group as potential entrepreneurs in the treatment group create firms in other industries.

FIGURE 3
Access to Bank Branches

Figure 3 reports the number of bank branches in zip codes within 10 miles of the threshold (the border between states that do and do not restrict borrowers from accessing marketplace loans). Optimal bin width is calculated following Lee and Lemieux (2010). The figure reports the number of branches within each bin. Bins with a negative distance to the threshold are the control group (i.e., states with marketplace borrowing restrictions) whereas bins with a positive distance to the threshold are the treatment group (i.e., states with no marketplace borrowing restrictions). We fit nonparametric local regression functions either side of the threshold using a triangular kernel.



Panel B of Table 6 provides more detailed insights into the industries where entrepreneurship is most influenced by marketplace lending. We list the industries and LATE for the industries where φ is estimated to be positive and statistically significant. Among the list of industries are some that could be viewed as innovative sectors such as scientific research and development services.¹⁴ However, the overwhelming majority are low value-added industries, Mom “n Pop” stores, and those where self-employment is common. For example, vending machine operators, convenience stores, gasoline stations, and architectural services.

Our final means of inferring the quality of businesses established using marketplace credit exploits cross-sectional differences in demographics and regions’ economic characteristics. We first test for heterogeneity in the LATE depending on

¹⁴ An explanation for why marketplace lending affects the number of establishments in the scientific research and development service industry is that inventors create firms in this industry to hold their patents and inventions. Data from the UP Patent Office show small firms in the industry filed 0.39 patents per firm during 2016. Marketplace loans are a potential source of funding for patent applications, but may also be used to cover startup capital, R&D and labor costs. Modal firm size in the industry is 1–4 employees, indicating that these may be microbusinesses or sole proprietorships, and 60% of firms in the industry during the sample period have between 1 and 4 employees. Data from the US Census Annual Capital Expenditures Survey and the Microbusiness R&D and Innovation databases show that for firms with between 1 and 4 employees in the scientific research and development service industry the average annual expenditure on capital investment and R&D expenses is approximately \$128,000 and \$57,000, respectively. Data from the Bureau of Labor Statistics show average annual earnings are \$94,940 although the value for technicians and production workers is between \$45,000 and \$70,000. The start-up capital for these firms is therefore likely to be low and, despite their small size, marketplace loans may be sufficient to overcome the sunk costs of entry and to provide finance for capital, R&D investments, and patents despite loan amounts being capped at \$40,000 and \$50,000 on Prosper and Lending Club, respectively.

TABLE 7
 Entrepreneurial Quality: Regional Characteristics

Table 7 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. In column 1 (2), the sample contains observations from zip codes with unemployment less than or equal to (above) the median unemployment rate within the sample. In column 3 (4), the sample contains observations from zip codes with a population less than or equal to (above) the median population level in the sample. In column 5 (6), the sample contains observations from zip codes with business experience less than or equal to (above) the median level of business experience in the sample. In column 7 (8), the sample contains observations from zip codes with profitability less than or equal to (above) the median level of profitability in the sample. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample Split	Dependent Variable: ESTAB							
	Unemployment Rate		Population		Business Experience		Profitability	
	≤ Median	>Median	≤ Median	>Median	≤ Median	>Median	≤ Median	>Median
	1	2	3	4	5	6	7	8
MP_LOANS	0.0291*** (8.20)	0.1040*** (6.80)	0.4489*** (9.77)	-0.0102*** (-3.02)	0.0576*** (11.90)	0.0283 (1.11)	0.0949*** (13.42)	0.0109 (1.54)
EQUITY_CROWDFUNDING	0.0144*** (4.88)	-0.1187*** (-8.55)	-0.0155*** (-2.70)	-0.0027 (-0.95)	-0.0461*** (-12.23)	0.0459* (1.82)	-0.0631*** (-13.38)	0.0071 (1.11)
UNEMPLOYMENT_RATE	0.3501*** (11.81)	-0.5265*** (-10.94)	-1.0680*** (-12.04)	-0.0859*** (-5.41)	0.0156 (0.89)	0.0202 (0.17)	0.0183 (0.98)	0.3936*** (3.48)
POPULATION	-0.3149*** (-25.58)	-0.1459*** (-14.84)	-0.3677*** (-25.79)	-0.1698*** (-19.83)	-0.2074*** (-25.63)	-0.4078*** (-17.00)	-0.2147*** (-25.72)	-0.3784*** (-16.08)
ETHNICITY	-0.0695*** (-6.78)	0.0432*** (3.40)	0.0308 (1.60)	-0.1075*** (-12.41)	-0.0154* (-1.89)	-0.0716 (-0.93)	0.0185** (1.98)	0.0163 (0.51)
DEGREE	0.1281*** (2.60)	0.0466 (0.94)	0.0781 (1.10)	0.1816*** (3.85)	0.0540 (1.54)	-0.5603*** (-2.74)	-0.1566*** (-3.76)	-0.4983*** (-3.92)
LATITUDE	0.0477*** (12.51)	0.0707*** (8.97)	-0.0126*** (-3.12)	0.0257*** (7.62)	0.0503*** (14.85)	0.0735*** (3.08)	0.0723*** (16.27)	0.0283*** (3.64)
LONGITUDE	-0.0016** (-2.15)	0.0148*** (10.09)	0.0057*** (3.62)	0.0025*** (4.03)	0.0076*** (12.50)	0.0064 (1.04)	0.0096*** (13.28)	0.0083*** (3.80)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	68,450	60,805	43,908	85,347	110,080	19,175	108,608	20,647
R ²	0.3700	0.1902	0.3757	0.3108	0.2719	0.4542	0.2205	0.4374
Kleibergen-Paap F-statistic	6,295	499	4,079	198	2,277	1,631	221	6,549

the unemployment rate in a region. Column 1 of Table 7 presents estimates of equation (2) using observations from areas with unemployment rates less than or equal to the median. The marketplace lending coefficient is equal to 0.0291 and is statistically significant at the 1% level. When we focus on areas with above-median unemployment rates in column 2 of Table 7 we find marketplace lending has a much larger effect on entrepreneurship. Specifically, the LATE is equal to 0.1040 and is highly significant. These findings suggest that marketplace lending either provides agents with a route out of unemployment (Block, Kohn, Miller, and Ullrich (2015)) or this type of credit is primarily provided to businesses in more deprived locations.

Next, we split the sample based on the population density of each zip code. Evidence shows that higher-quality firms are clustered in more densely populated areas due to agglomeration effects and tougher Schumpeterian selection (Combes, Duranton, Gobillon, Puga, and Roux (2012)). The results in column 3 of Table 7 indicate that marketplace lending has a considerably larger effect on entrepreneurship in sparsely populated areas. The LATE is larger in zip codes where population density is less than or equal to the median population density (column 4) relative to above-median population density (column 5). In the latter, the marketplace lending coefficient is actually negative, although it remains close to 0.

The remaining columns in [Table 7](#) examine how entrepreneurship responds to marketplace lending across areas with different entrepreneurial characteristics. We first split the sample at the median level of business experience, measured as the average number of years entrepreneurs in a state have operated a business. The marketplace lending coefficient is only positive and statistically significant in regions with business experience less than or equal to the median. This suggests, that marketplaces primarily encourage the creation of firms by first-time entrepreneurs.

In columns 7 and 8 of [Table 7](#), we examine the size of the LATE across areas with different levels of profitability. Consistent with our previous findings, we find the marketplace lending coefficient to be positive and statistically significant only in regions with profitability less than or equal to the median.

The findings in [Tables 5–7](#) paint a consistent picture. Marketplace lending appears to disproportionately affect small firms in unproductive and low value-added industries. Moreover, online marketplaces primarily facilitate lifestyle entrepreneurship and provide individuals in economically deprived regions where entrepreneurship is less common an opportunity to start a business. This suggests that increasing access to marketplace credit facilitates the formation of more but potentially lower-quality businesses. However, this ignores the fact that marketplaces increase the equilibrium number of firms, which may benefit consumers by raising competition leading to lower prices, markups, and the provision of new goods and services.

B. Credit Constraints

Underlying our hypothesis is the assumption that the supply of marketplace credit influences entrepreneurship by relaxing credit market frictions. To provide additional insights into this mechanism we perform a number of additional tests.

If credit constraints are binding, one would anticipate larger entrepreneurship responses to marketplace lending within industries where firms are more reliant upon external finance for investment (Rajan and Zingales (1998)). We therefore split the sample at the median level of external financial dependence and report the results in columns 1 and 2 of [Table 8](#). In both columns, the marketplace lending coefficient is positive and statistically significant. However, the magnitude of the LATE is larger within industries that rely more heavily upon external finance to make investments.

Prior research shows that online marketplaces may expand the provision of credit to borrowers' banks that choose not to lend (Cornaggia et al. (2018), Tang (2019)). This implies that online marketplaces are likely to have the greatest effect on entrepreneurship in areas with inferior access to bank branches. The evidence in columns 3 and 4 of [Table 8](#) reinforces the previous finding. When we constrain the sample to observations from areas with bank branch density less than or equal to the median in column 3, the LATE is equal to 0.5280. In contrast, the LATE is 0.0508 in regions where bank branch density is above the median. These findings are consistent with online marketplaces expanding opportunities to borrowers that find it difficult to access bank services.

TABLE 8
 Financing Requirements and Access to Other Sources of Finance

Table 8 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. In column 1 (2), the sample contains observations from industries with less than or equal to (above) the median level of external financial dependence within the sample. In column 3 (4), the sample contains observations from zip codes with less than or equal to (above) the median level of bank branch offices per square mile within the sample. In column 5 (6), the sample contains observations from zip codes with less than or equal to (above) the median level of debt crowdfunding within the sample. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample Split	Dependent Variable: ESTAB					
	External Financial Dependence		Bank Branches		Debt Crowdfunding	
	≤ Median	> Median	≤ Median	> Median	≤ Median	> Median
	1	2	3	4	5	6
MP_LOANS	0.0287*** (4.78)	0.0545*** (11.05)	0.5280*** (8.51)	0.0508*** (9.05)	0.5079*** (5.21)	0.0813*** (11.21)
EQUITY_CROWDFUNDING	0.0043 (1.57)	0.0043 (1.42)	-0.1115*** (-7.28)	-0.0335*** (-9.20)	-0.2552*** (-4.36)	-0.0366*** (-10.56)
UNEMPLOYMENT_RATE	-0.1204*** (-7.01)	-0.0204 (-1.02)	2.0240*** (8.38)	-0.6564*** (-22.45)	4.1839*** (5.28)	-0.1715*** (-9.74)
POPULATION	-0.2535*** (-22.04)	-0.2127*** (-17.66)	-0.3595*** (-23.04)	-0.2152*** (-22.05)	-0.3898*** (-9.59)	-0.2372*** (-30.25)
ETHNICITY	-0.0519*** (-5.96)	-0.0208** (-2.19)	1.0551*** (7.89)	0.1379*** (12.03)	1.0790*** (4.87)	-0.0012 (-0.13)
DEGREE	-0.0593 (-1.01)	-0.2275*** (-4.81)	-3.7534*** (-7.97)	-0.4495*** (-8.50)	-4.7577*** (-4.84)	-0.2237*** (-4.27)
LATITUDE	0.0460*** (8.68)	0.0570*** (14.56)	0.4007*** (8.48)	0.0865*** (15.81)	0.6297*** (5.05)	0.0690*** (15.86)
LONGITUDE	0.0063*** (6.82)	0.0089*** (12.51)	0.0671*** (8.36)	0.0042*** (6.39)	0.0729*** (5.02)	0.0085*** (11.10)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	61,712	67,543	56,172	73,083	20,897	108,358
R ²	0.3328	0.2491	0.7046	0.3070	0.6851	0.2625
Kleibergen-Paap <i>F</i> -statistic	2.574	3.138	150	2,225	25	2,485

Finally, we test whether the LATE effect sizes differ according to access to other types of alternative finance. In columns 5 and 6 of Table 8, we estimate equation (2) based on access to debt crowdfunding provided by platforms such as Kickstarter. Consistent with our previous results, marketplace lending has a greater effect on entrepreneurship in areas that receive less debt crowdfunding per capita.

VII. Robustness Tests and External Validity

In this section, we first rule out alternative explanations for our findings. We then proceed to check the sensitivity of the results to potential omitted variables, and test for external validity and general equilibrium effects.

A. Alternative Explanations

An alternative explanation for our results could be that the quantity of marketplace credit in a region may systematically correlate with the supply of other types of lending. To ensure VC funding does not confound our inferences we therefore append equation (2) with per capita VC funding. Our key finding in

TABLE 9
Alternative Financial Intermediation Channels

Table 9 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ESTAB			
	1	2	3	4
MP_LOANS	0.0491*** (11.23)	0.0478*** (11.67)	0.0506*** (11.63)	0.0547*** (6.22)
EQUITY_CROWDFUNDING	0.0058*** (2.93)	0.0040** (2.50)	0.0027 (1.08)	0.0139*** (3.52)
UNEMPLOYMENT_RATE	-0.0106 (-0.76)	-0.1221*** (-7.24)	-0.0872*** (-5.55)	1.3015*** (22.68)
POPULATION	-0.2337*** (-28.36)	-0.2335*** (-29.26)	-0.2344*** (-31.35)	-0.1689*** (-21.62)
ETHNICITY	-0.0224** (-2.48)	-0.0645*** (-6.97)	-0.0652*** (-7.03)	-0.3640*** (-13.18)
DEGREE	-0.0733** (-2.03)	-0.1057*** (-3.06)	-0.1405*** (-3.98)	1.2185*** (18.10)
LATITUDE	0.0581*** (14.08)	0.0593*** (16.48)	0.0606*** (16.13)	0.1473*** (13.94)
LONGITUDE	0.0085*** (11.27)	0.0045*** (7.25)	0.0059*** (10.83)	-0.0087*** (-4.08)
VC_FUNDS	-0.0217*** (-7.60)			
BANK_BRANCH_DENSITY		0.1100*** (12.64)		
C&I_LENDING			0.0643*** (31.08)	
C&I_INTEREST_RATE			-0.1241*** (-17.52)	
BANK_SIZE			-0.0940*** (-7.25)	
CAPITAL_RATIO			-0.2705*** (-17.82)	
SMALL_BANK_SHARE			0.0622*** (22.76)	
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of obs.	129,255	129,255	129,255	88,897
<i>R</i> ²	0.2928	0.2956	0.3034	0.2553
Kleibergen–Paap <i>F</i> -statistic	4,829	4,775	5,059	1,035

column 1 of Table 9 remains robust. Interestingly, VC funds are negatively associated with the number of business establishments per capita. This may reflect that venture capitalists primarily fund large firms located in regions outside the geographical areas in our sample (see, e.g., Tykvova (2017), Bubna, Das, and Prabhala (2019)).

Another concern may be that access to bank branches is discontinuous at the threshold. The patterns in Figure 3 indicate this is not the case. Moreover, the estimates in column 2 of Table 9 show the marketplace lending coefficient is unaffected by controlling for bank branch density per square mile.

A related concern is that the supply and price of bank loans and market structure within the banking industry drive our inferences (Cetorelli and Strahan (2006)). Column 3 of Table 9 shows that despite including the per capita volume of

commercial and industrial (C&I) loans, average interest rate on C&I loans, bank size, capital ratio, and the small bank share our findings endure.

During our sample period, some states prohibit Lending Club and Prosper from soliciting funds from investors resident in that state. This may present a problem if investors on one side of the threshold are restricted from lending through a platform. We therefore remove states that impose investing restrictions on either platform from the sample and reestimate equation (2). We continue to find marketplace lending has a positive and significant effect on entrepreneurship in column 4 of Table 9.

Another potential explanation for our results could be that marketplace investors are able to identify better entrepreneurs and extend more loans to them. This will corrupt our inferences if entrepreneurial ability is systematically higher on the treated side of the threshold. To alleviate this concern we append equation (2) with controls for entrepreneurs' ability and incentives taken from the Annual Survey of Entrepreneurs.

Columns 1 and 2 of Table 10 report estimates that condition on past business experience and entrepreneurs' educational attainment to capture the quality of entrepreneurs operating businesses on either side of the threshold. We continue to find marketplace lending causes a positive and significant increase in the number of establishments per capita.

A separate possibility is that investors direct more marketplace lending to individuals with superior management skills. We therefore control for the quantity and quality of managerial inputs in columns 3 and 4 of Table 10 using the share of entrepreneurs that spend at least 40 hours per week managing their business and managerial ability provided by the MOPS survey, respectively. While both managerial variables' coefficients enter as significant determinants of entrepreneurship, they do not confound the effect of marketplace lending.

The remainder of Table 10 addresses entrepreneurs' incentives. In a principal-agent framework, lenders may extend more credit to entrepreneurs with greater incentives to exert effort as the expected default rate is lower. We therefore control for the share of entrepreneurs who report that their business is their primary income source and the average profitability of entrepreneurship in columns 5 and 6 of Table 10, respectively. Our main finding remains robust.

B. Placebo Tests

We conduct falsification exercises to ensure our findings are not due to spurious jumps in marketplace lending at the threshold. Intuitively, one would expect to find the supply of marketplace credit to only jump at the threshold, and not at the border between states where borrowers can access funds through both Lending Club and Prosper. We therefore constrain the sample to observations within 10 miles of the border between states that allow both platforms to originate loans. We then randomly assign one side of the border to be the placebo treatment group and the other side to the placebo control group and estimate the equation

$$(3) \quad \text{MP_LOANS}_{zst} = \alpha + \beta \text{PLACEBO_TREATMENT}_{zs} + \gamma \mathbf{X}_{zst} + \delta_t + \varepsilon_{zst},$$

TABLE 10
Entrepreneurial Ability

Table 10 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. The sample contains observations from within 10 miles of the threshold. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ESTAB					
	1	2	3	4	5	6
MP_LOANS	0.0504*** (11.63)	0.0406*** (12.63)	0.0367*** (9.17)	0.0630*** (16.73)	0.0341*** (10.06)	0.0453*** (10.43)
EQUITY_CROWDFUNDING	0.0035* (1.78)	0.0076*** (3.51)	0.0020 (0.91)	0.0121*** (6.71)	-0.0013 (-0.68)	0.0045** (2.21)
UNEMPLOYMENT_RATE	-0.0427*** (-2.90)	-0.1047*** (-6.80)	-0.0480*** (-3.73)	-0.0006 (-0.04)	-0.0839*** (-6.71)	-0.0829*** (-6.54)
POPULATION	-0.2337*** (-29.67)	-0.2310*** (-30.66)	-0.2301*** (-34.90)	-0.2366*** (-29.03)	-0.2288*** (-28.26)	-0.2325*** (-26.36)
ETHNICITY	-0.0350*** (-4.63)	-0.0438*** (-6.63)	-0.0501*** (-7.88)	0.0025 (0.36)	-0.0520*** (-7.94)	-0.0324*** (-4.98)
DEGREE	-0.2483*** (-5.56)	-0.2065*** (-5.90)	-0.1878*** (-4.78)	0.1257*** (3.91)	-0.1940*** (-5.34)	-0.1573*** (-3.88)
LATITUDE	0.0610*** (15.91)	0.0522*** (17.36)	0.0478*** (16.35)	0.0795*** (22.47)	0.0440*** (14.93)	0.0532*** (14.35)
LONGITUDE	0.0091*** (13.55)	0.0071*** (13.09)	0.0056*** (10.46)	0.0132*** (19.12)	0.0055*** (9.53)	0.0077*** (12.05)
BUSINESS_EXPERIENCE	1.6648*** (10.09)					
EDUCATION		0.7061*** (9.46)				
MANAGERIAL_INTENSITY			1.5563*** (14.51)			
MANAGERIAL_ABILITY				3.5690*** (20.28)		
PRIMARY_INCOME_SOURCE					2.0763*** (17.10)	
PROFITABILITY						-0.6448*** (-3.06)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	129,255	129,255	129,255	129,255	129,255	129,255
<i>R</i> ²	0.2912	0.3026	0.3074	0.2757	0.3113	0.2968
Kleibergen-Paap <i>F</i> -statistic	5,195	5,736	5,861	4,525	6,498	5,021

where all variables are defined as in equation (1), except PLACEBO_TREATMENT₂₅, which is a dummy variable equal to 1 if an observation is in the placebo treatment group, 0 for the placebo control group. The placebo coefficient in column 1 of Table 11 is statistically insignificant. Hence, the supply of marketplace lending only jumps at the actual threshold.

Next, we test whether the supply of other types of credit also jumps at the threshold. The results presented in columns 2–5 of Table 11 show this is not the case. Rather, the supply of auto, credit card, mortgage, and student loans are continuous across the threshold.

C. Sensitivity Checks

Previous research has documented links between entrepreneurship and taxation (Keuschnigg and Nielsen (2003), Cagetti and Denardi (2009)), homestead

TABLE 11
Placebo Tests

Table 11 presents estimates of equation (2). In column 1, the sample contains observations from borders between states where both Lending Club and Prosper originate loans. In columns 2–5, the sample contains observations from the original sample. The unreported control variables are equity crowdfunding, unemployment rate, population, ethnicity, degree, latitude, and longitude. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Sample	Dependent Variable				
	Other Borders	All	All	All	All
	MP Loans	Auto	Credit Card	Mortgage	Student
	1	2	3	4	5
PLACEBO_TREATMENT	0.0560 (1.04)				
TREATMENT		0.0263 (1.49)	-0.0083 (-0.42)	0.0109 (0.83)	0.0069 (0.24)
Control variables	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
No. of obs.	21,238	357	357	357	357
R ²	0.33	0.98	0.99	0.99	0.98

exemptions (Fan and White (2003)), and labor market frictions (Cumming and Li (2013)). The estimates reported in columns 1–5 of Table 12 show these factors do not confound the effect of marketplace lending on entrepreneurship.

Entry into entrepreneurship may depend on the collateral an individual can provide. As housing equity is the most common form of collateral, we append equation (2) with house prices. The marketplace lending coefficient in column 6 of Table 12 is invariant to this change.

Marketplace lenders avoid state usury limits by issuing notes through WebBank, a national chartered bank headquartered in Utah. Platforms can therefore export the uncapped Utah usury limit to other states. Where local usury rates limit bank credit supply, marketplace lending may fill the gap such that our findings are driven by usury rates. The evidence in column 7 of Table 12 shows this is not the case.

Another possibility is that credit supply differs on either side of the threshold due to the riskiness of the population. We therefore control for the delinquency rate on four different types of credit: auto loans, credit cards, mortgages, and student loans. The evidence in column 8 of Table 12 shows that none of these factors affect our inferences.

During the sample period, regulations on equity crowdfunding were relaxed through enactment of the JOBS Act of 2012 and the introduction of Regulation A by the SEC in 2015 (Coakley and Lazos (2021), Rossi, Vanacker, and Vismara (2021)). Both measures are federal and apply across the threshold. Nevertheless, we restrict the sample to the years 2010 and 2011 to ensure deregulation of equity crowdfunding does not contaminate our findings. The effect of marketplace lending on entrepreneurship remains robust in column 1 of Supplementary Material Table A.4. Moreover, in column 2 of Supplementary Material Table A.4, we find marketplace lending significantly affects entrepreneurship in the years following implementation of the JOBS Act. Finally, some states deregulated crowdfunding at different points in time. Column 3 of Supplementary Material Table A.4 therefore excludes observations from states that have lifted crowdfunding restrictions. Our main finding remains.

TABLE 12
Sensitivity Checks

Table 12 presents estimates of equation (2). Variables definitions are reported in Panel A of Table 1. The dependent variable in all regressions is ESTAB. The dependent and independent variables are measured in natural logarithms. The sample contains observations from within 10 miles of the threshold. The unreported control variables are EQUITY_CROWDFUNDING, UNEMPLOYMENT_RATE, POPULATION, ETHNICITY, DEGREE, LATITUDE, and LONGITUDE. Standard errors are bootstrapped using 50 replications and the corresponding *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: ESTAB							
	1	2	3	4	5	6	7	8
MP_LOANS	0.0477*** (7.89)	0.0443*** (10.97)	0.0436*** (11.61)	0.0419*** (11.10)	0.0528*** (12.46)	0.0326*** (7.62)	0.0420*** (10.78)	0.0276*** (3.74)
CORPORATE_TAX_RATE	0.0167*** (8.87)							
PERSONAL_INCOME_TAX_RATE	-0.0947*** (-21.21)							
SALES_TAX_RATE	0.1946*** (11.68)							
PAYROLL_TAX	-0.5151*** (-17.40)							
PROPERTY_TAX	-0.0080* (-1.85)							
HOMESTEAD_EXEMPTIONS		0.0006 (0.29)						
MINIMUM_WAGE			0.0230* (1.71)					
UNION_DENSITY				-0.0543*** (-3.90)				
LABOR_MARKET_FRICTIONS					-0.2823*** (-9.85)			
HOUSE_PRICES						0.7415*** (21.26)		
USURY_RATE							-0.0361*** (-7.36)	
AUTO_LOANS_DELIQUENCY_RATE								-0.3586*** (-8.51)
CREDIT_CARD_DELIQUENCY_RATE								0.2984*** (5.56)
MORTGAGE_DELIQUENCY_RATE								0.0949*** (3.42)
STUDENT_LOANS_DELIQUENCY_RATE								-0.1780*** (-5.07)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	129,255	129,255	129,255	129,255	129,255	129,255	129,255	129,255
<i>F</i> ²	0.3044	0.2979	0.2988	0.3008	0.2878	0.3186	0.3010	0.3178
Kleibergen-Paap <i>F</i> -statistic	4,053	4,974	5,248	5,538	3,748	4,531	5,504	1,484

D. General Equilibrium Effects and External Validity

So far, our inferences pinpoint the link between the supply of marketplace credit and entrepreneurship. However, the entry of digital platforms may spur competition in the financial intermediation market, leading banks and other lenders to increase credit supply. These forces would reinforce the direct effect of marketplace lending such that the overall effect on entrepreneurship is larger than in our baseline estimates.¹⁵

¹⁵Cetorelli and Strahan (2006) and Amore, Schneider, and Zaldokas (2013) present evidence supporting a competition-credit supply mechanism. They show the removal of geographical restrictions on bank branching improved access to credit and provoked an increase in lending.

To test this prediction, we exploit the staggered, cross-state deregulation of marketplace borrowing restrictions. Cornaggia et al. (2018) argue these time-varying changes are plausibly exogenous with respect to economic conditions such as entrepreneurship. We therefore expand the sample to include all U.S. zip codes between 2010 and 2016 and use difference-in-differences to estimate the equation

$$(4) \quad \text{ESTAB}_{izst} = \alpha + \beta D_{st} + \gamma X_{izst} + \sigma_i + \sigma_{zs} + \sigma_t + \epsilon_{izst},$$

where D_{st} is a dummy equal to 1 for observations from states where borrowing through at least one marketplace lending platform is permitted in year t , 0 otherwise; all other variables are defined as before.¹⁶ A further advantage of this approach is it provides insights into whether our findings hold generally, and not just in the 10-mile neighborhood around a limited number of state borders.

The results of this test are reported in Supplementary Material Table A.5. Column 1 of the table presents estimates of equation (3) based on a sample of observations from all 50 states. The results show that removing marketplace borrowing restrictions causes a significant increase in the number of establishments per capita. Deregulation of borrowing restrictions therefore increases the number of establishments per 1,000 population relative to the counterfactual.

In column 2, we restrict the sample to observations from within 10 miles of the threshold used in our previous results. However, we extend the sample to contain observations from the years following deregulation in the four states that lift marketplace borrowing restrictions. The average treatment effect is highly statistically significant. Consistent with our hypothesis that the general equilibrium effects of marketplace lending are greater than our baseline estimates suggest, we find deregulation triggers a 29.8% increase in the number of establishments per capita.

Together, these findings suggest that i) our findings are externally valid, and ii) the net effects of marketplace lending on entrepreneurship exceed the direct effects of marketplace credit supply because other lenders adjust their behavior to this new source of competition.

VIII. Conclusions

Financial technology now plays an important role in allocating credit. Across developed and emerging markets, entrepreneurs frequently rely on loans supplied by online marketplaces. Our article presents the first evidence that marketplace credit causes a significant increase in the level of entrepreneurship. Using a fuzzy RD design, we show a 10% increase in the supply of marketplace loans leads to a 0.44% increase in the number of establishments per capita. Patterns in the data show the effects are more pronounced in regions with inferior access to traditional bank credit, and in industries where firms' investment relies more heavily upon external finance.

Interestingly, the effects we detect are concentrated within small firms, and in mature industries with relatively low productivity and R&D intensities. For

¹⁶In these regressions, X_{izst} does not include latitude and longitude as they are captured by the zip code fixed effects.

example, the industries with the highest elasticity of entrepreneurship with respect to marketplace lending include agricultural raw material wholesalers, vending machine operators, and convenience stores. This finding is quite different from studies of the banking sector that show banks direct credit toward more innovative firms (Amore et al. (2013)). One explanation could be that online marketplaces disproportionately serve borrowers who are denied credit by banks or start businesses for lifestyle reasons. Indeed, we find marketplace credit provokes larger entrepreneurial responses in more deprived, less populous regions and where individuals have less prior experience of operating a business. Marketplaces also cap loans to between \$40,000 and \$50,000, which may disproportionately favor small service sector startups where the sunk costs of entry are relatively low.

Supplementary Material

To view supplementary material for this article, please visit <http://doi.org/10.1017/S0022109022000357>.

References

- Acs, Z. J., and D. Audretsch. "Innovation, Market Structure, and Firm Size." *Review of Economics and Statistics*, 69 (1987), 567–574.
- Allen, F.; Z. Gu; and J. Jagtiani. "A Survey of Fintech Research and Policy Discussion." *Review of Corporate Finance*, 1 (2021), 259–339.
- Amore, M.; C. Schneider; and A. Zaldokas. "Credit Supply and Corporate Innovation." *Journal of Financial Economics*, 109 (2013), 835–855.
- Angrist, J., and A. B. Krueger. "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 106 (1991), 979–1014.
- Asplund, M., and V. Nocke. "Firm Turnover in Imperfectly Competitive Markets." *Review of Economic Studies*, 73 (2006), 295–327.
- Bertrand, M.; A. Schoar; and D. Thesmar. "Banking Deregulation and Industry Structure: Evidence from the French Banking Reforms of 1985." *Journal of Finance*, 62 (2007), 597–628.
- Black, S., and P. Strahan. "Entrepreneurship and Bank Credit Availability." *Journal of Finance*, 57 (2002), 2807–2833.
- Block, J. H.; K. Kohn; D. Miller; and K. Ullrich. "Necessity Entrepreneurship and Competitive Strategy." *Small Business Economics*, 44 (2015), 37–54.
- Bubna, A.; S. R. Das; and N. Prabhala. "Venture Capital Communities." *Journal of Financial and Quantitative Analysis*, 55 (2019), 621–651.
- Buchak, G.; G. Matvos; T. Piskorski; and A. Seru. "Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks." *Journal of Financial Economics*, 130 (2018), 453–483.
- Cagetti, M., and M. De Nardi. "Estate Taxation, Entrepreneurship, and Wealth." *American Economic Review*, 99 (2009), 85–111.
- Caglayan, M.; T. Pham; O. Talavera; and X. Xiong. "Asset Mispricing in Peer-to-Peer Loan Secondary Markets." *Journal of Corporate Finance*, 65 (2020), 101769.
- Cambridge Centre for Alternative Finance. "The Americas Alternative Finance Industry Report: Hitting Stride." Mimeo (2017).
- Cetorelli, N., and P. Strahan. "Finance as a Barrier to Entry: Bank Competition and Industry Structure in the Local U.S. Markets." *Journal of Finance*, 61 (2006), 437–461.
- Chen, X.; B. Huang; and M. Shaban. "Naïve or Sophisticated? Information Disclosure and Investment Decisions in Peer to Peer Lending." *Journal of Corporate Finance*, forthcoming (2022).
- Claessens, S.; J. Frost; G. Turner; and F. Zhu. "Fintech Credit Markets Around the World: Size, Drivers and Policy Issues." *BIS Quarterly Review*, (2018), 1–49.
- Coakley, J., and A. Lazos. "New Developments in Equity Crowdfunding: A Review." *Review of Corporate Finance*, 1 (2021), 341–405.

- Combes, P.-P.; G. Duranton; L. Gobillon; D. Puga; and S. Roux. "The Productivity Advantages of Large Cities: Distinguishing Agglomeration from Firm Selection." *Econometrica*, 80 (2012), 2543–2594.
- Cornaggia, J.; B. Wolfe; and W. Yoo. "Crowding Out Banks: Credit Substitution by Peer-to-Peer Lending." Mimeo (2018).
- Corradin, S.; R. Gropp; H. Huizinga; and L. Laeven. "The Effect of Personal Bankruptcy Exemptions on Investment in Home Equity." *Journal of Financial Intermediation*, 25 (2016), 77–98.
- Cumming, D. J., and D. Li. "Public Policy, Entrepreneurship, and Venture Capital in the United States." *Journal of Corporate Finance*, 23 (2013), 345–367.
- Cumming, D. J., and A. Schwienbacher. "Fintech Venture Capital." *Corporate Governance: An International Review*, 26 (2018), 374–389.
- Cumming, D.J., and L. Hornuf. "Marketplace Lending of Small- and Medium-Sized Enterprises." *Strategic Entrepreneurship Journal* 16 (2022), 32–66. <https://doi.org/10.1002/sej.1411>
- Danisewicz, P., and I. Elard. "The Real Effects of Financial Technology: Marketplace Lending and Personal Bankruptcy." Mimeo (2018).
- Danisewicz, P.; D. McGowan; E. Onali; and K. Schaeck. "Debt Priority Structure, Market Discipline and Bank Conduct." *Review of Financial Studies*, 31 (2018), 4493–4555.
- de Roure, C.; L. Pelizzon; and A. V. Thakor. "P2p Lenders Versus Banks: Cream Skimming or Bottom Fishing?" SAFE Working Paper Series 206, Research Center SAFE - Sustainable Architecture for Finance in Europe, Goethe University Frankfurt (2019).
- Degryse, H., and S. Ongena. "Distance, Lending Relationship and Competition." *Journal of Finance* 55 (2005), 231–266.
- Fan, W., and M. J. White. "Personal Bankruptcy and the Level of Entrepreneurial Activity." *Journal of Law and Economics*, 46 (2003), 543–567.
- Fenwick, M.; J. McCahery; and E. Vermeulen. "Fintech and the Financing of Entrepreneurs." ECGI Working Paper Number 369/2017 (2017).
- GAO. "Person-to-Person Lending: New Regulatory Challenges Could Emerge as the Industry Grows." Government Accountability Office Report to Congressional Committees (2011).
- Hauswald, R., and R. Marquez. "Competition and Strategic Information Acquisition in Credit Markets." *Review of Financial Studies*, 19 (2006), 967–1000.
- Helpman, E.; M. Melitz; and Y. Rubinstein. "Estimating Trade Flows: Trading Partners and Trading Volumes." *Quarterly Journal of Economics*, 123 (2008), 441–487.
- Hopenhayn, H. "Entry, Exit, and Firm Dynamics in Long Run Equilibrium." *Econometrica*, 60 (1992), 1127–1150.
- Iyer, R.; A. I. Khwaja; E. Luttmer; and K. Shue. "Screening Peers Softly: Inferring the Quality of Small Borrowers." *Management Science*, 62 (2015), 1554–1577.
- Kerr, W., and R. Nanda. "Democratizing Entry: Banking Deregulation, Financing Constraints, and Entrepreneurship." *Journal of Financial Economics*, 94 (2009), 124–149.
- Kerr, W., and R. Nanda. "Banking Deregulations, Financing Constraints, and Firm Entry Size." *Journal of the European Economic Association*, 8 (2010), 582–593.
- Keuschnigg, C., and S. B. Nielsen. "Tax Policy, Venture Capital, and Entrepreneurship." *Journal of Public Economics*, 87 (2003), 175–203.
- Lee, D. S. "Randomized Experiments from Non-Random Selection in U.S. House Elections." *Journal of Econometrics*, 142 (2008), 675–697.
- Lee, D. S., and T. Lemieux. "Regression Discontinuity Designs in Economics." *Journal of Economic Literature*, 48 (2010), 281–355.
- Levinsohn, J., and A. Petrin. "Estimating Production Functions Using Inputs to Control for Unobservables." *Review of Economic Studies*, 70 (2003), 317–341.
- McCrary, J. "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test." *Journal of Econometrics*, 142 (2008), 698–714.
- Melitz, M. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica*, 71 (2003), 1695–1725.
- Nemoto, N.; D. Storey; and B. Huang. "Optimal Regulation of p2p Lending for Small and Medium-Sized Enterprises." ADBI Working Paper Series No. 912 (2019).
- Petersen, M., and R. G. Rajan. "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics*, 110 (1995), 407–443.
- Petersen, M., and R. G. Rajan. "Does Distance Still Matter? The Information Revolution in Small Business Lending." *Journal of Finance*, 57 (2002), 2533–2570.
- Pierrakis, Y. "Peer-to-Peer Lending to Businesses: Investors' Characteristics, Investment Criteria and Motivation." *International Journal of Entrepreneurship and Innovation*, 20 (2019), 239–250.

- Popov, A. "Venture Capital and Industry Structure: Evidence from Local US Markets." *Review of Finance*, 18 (2014), 1059–1096.
- Rajan, R. G., and L. Zingales. "Financial Dependence and Growth." *American Economic Review*, 88 (1998), 559–586.
- Rossi, A.; T. Vanacker; and S. Vismara. "Equity Crowdfunding: New Evidence from US and UK Markets." *Review of Corporate Finance*, 1 (2021), 407–453.
- Tang, H. "Peer-to-Peer Lenders Versus Banks: Substitutes or Complements?" *Review of Financial Studies*, 32 (2019), 1900–1938.
- Tykvová, T. "When and Why Do Venture-Capital-Backed Companies Obtain Venture Lending?" *Journal of Financial and Quantitative Analysis*, 52 (2017), 1049–1080.
- Zhang, J., and P. Liu. "Rational Herding in Microloan Markets." *Management Science*, 58 (2012), 892–912.