ESSAYS ON ENTREPRENEURSHIP AND CLOSELY HELD FIRMS

by

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Abstract

This thesis contains three essays on entrepreneurship and close-held firms. The first essay examines the feedback role of crowdfunding, a new financing method that allows entrepreneurs to raise finance online directly from the public. Using a novel dataset from Kickstarter, I show that crowdfunding outcome signals to entrepreneurs the product market potential of their projects and guides entrepreneurs' subsequent commercialization decisions. Exploiting weather-induced variation in pledged funds within *unfunded* projects (which receive no financing), I find that entrepreneurs who received more pledging are more likely to complete and commercialize their projects. Consistent with the real option value of crowdfunding feedback, entrepreneurs on Kickstarter launch riskier projects when crowdfunding becomes more costly relative to alternative financing. These results highlight the role of crowdfunding in improving the information environment faced by early-stage entrepreneurs. The second essay, co-authored with Jan Bena, studies how product market competition affects firms' ownership structures. Using a large sample of closely held firms in eighteen European countries, we show that firms operating in more competitive environments have lower inside ownership and that the stakes of their outside shareholders are more dispersed. These results are explained by competition increasing the need to raise external equity and reducing private control benefits. Our findings suggest that, by changing corporate ownership structure, competition mitigates incentive misalignment among shareholders, leading to better firm performance and gains in economic efficiency. The third essay studies the effect of shareholder excess control rights on creditors. I show that excess control rights can benefit creditors despite its negative effect previously documented on minority shareholders. Using a sample of U.S. dual-class firms, I find that dual-class firms take less business and financial risk than similar single-class firms, consistent with controlling insiders' emphasis on long-term survival to access ongoing private benefits of control. Such risk avoidance translates into lower borrowing costs for dual-class firms. Further, lenders seem to be able to use specific covenants to prevent potential expropriations by controlling insiders. These results suggest that the overall effect of excess control rights on firm value may not be as negative as we previously thought.

Lay Summary

This thesis studies entrepreneurial and closely-held firms. The first essay studies crowdfunding, a new method entrepreneurs use to raise money for their projects. I show that crowdfunding not only provides finance, but also provides feedback, in that the funding outcome itself contains information indicative of the potential of a project. Such information can guide an entrepreneur's subsequent decisions of continuing or abandoning her project. The second essay studies how product market competition affects a firm's ownership structure, i.e. the allocation of equity stakes among shareholders. We find that more intense competition decreases the percentage of inside ownership, i.e. ownership by shareholders who are also managers, and increases the dispersion of stakes among outside shareholders. The third essay documents a positive effect of dual-class share structure on firms' creditors. It shows that giving inside shareholders control power in excess of their ownership may benefit creditors even though it hurts minority shareholders.

Preface

Chapters 2 and 4 are based solely on my own works. Chapter 3 is co-authored with Professor Jan Bena. We contributed equally to idea development, empirical analyses, and writing. A version of Chapter 3 has been published as J. Bena and T. Xu, 2017, Competition and Ownership Structure of Close Held Firms, Review of Financial Studies. The survey reported in Chapter 2 was approved by the UBC Behavioral Research Ethics Board (BREB Certificate Number: H16-02695).

Table of Contents

List of Tables

List of Figures

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Chapter 1: Introduction

This thesis is a collection of three essays on entrepreneurship and closely held firms. Although the topics are diverse, they share the common objective of understanding the economic frictions facing new firms and firms that are closely held. Such firms are economically important, yet we know much less about them compared with firms that are publicly traded. In the first essay, I focus on the informational friction in entrepreneurship and study how a new financing method, crowdfunding, can reduce uncertainty for entrepreneurs who are deciding whether to pursue a project. Using Kickstarter data, I show that crowdfunding outcome provides early feedback to entrepreneurs on the product market potential of their projects. Such feedback guides entrepreneurs' subsequent commercialization decisions and creates real option value. In the second essay, I study a unique agency problem in closely held firms, i.e., conflicts among shareholders. I use product market competition shock as a laboratory to understand how ownership structure reacts to changing agency frictions inside closely held firms. In a large sample of private European firms, I find that increasing competition due to higher import penetration reduces firms' inside ownership and the concentration of outside ownership. The results are consistent with competition substituting ownership in mitigating agency conflicts among shareholders. In the third essay, I study how excess control rights by inside shareholders, enabled by dual-class share structure, shape firms' relationship with creditors. Previous literature documents that excess control rights hurt minority shareholders. I find that such ownership arrangement may benefit creditors. I show that, compared with similar single-class firms, dual-class firms take less business and financial risk, and they have lower cost of debt. This is because inside shareholders value long-term control benefits and have incentives to

maximize firm survival by avoiding risk. Dual-class shares enable them to do so by reducing their cash flow rights and hence their exposure to the cost of risk avoidance. Dual-class share structure therefore helps align the incentives of inside shareholders and creditors. Overall, this essay suggests that the effect of dual-class share structure on firm value may not be as negative as we previously thought.

Because each essay investigates a different topic, chapters were designed to be self-contained. I thus leave a more exhaustive discussion of methodology and contribution to literature to the introduction specific to each chapter.

Chapter 2: Learning from the Crowd: The Feedback Value of Crowdfunding

2.1 Introduction

The financing of entrepreneurs has been traditionally dominated by intermediaries such as banks and venture capital firms. In recent years, this practice has been disrupted by the participation of the general public (the crowd). Crowdfunding, a new financing method for entrepreneurs, has grown exponentially in market size and attracted great attention.[1] While many tout its potential to democratize access to finance, others regard it as "dumb money" that provides no monitoring or other value-adding services to entrepreneurs.[2] Does crowdfunding bring any value to entrepreneurs beyond extending finance? What role does it play in the entrepreneurial process?

In this paper, I argue that a key role of crowdfunding is to provide entrepreneurs early feedback on the market demand for their projects. Being closer to the product market, the crowd often knows more about the potential of a project than the entrepreneur. Such information can be conveyed to the entrepreneur through the crowd's funding decisions. Compared with intermediaries, the crowd is also more accessible, especially at an early stage before entrepreneurs exercise key real options such as investment or abandonment. Crowdfunding outcome can therefore serve as a useful signal that guides entrepreneurs' decisions. Such early feedback lowers the risk and increases the (real option) value of entrepreneurial projects. The value of crowdfunding therefore goes beyond financing.

I examine the feedback role of crowdfunding using a novel dataset from the world's largest crowdfunding market, Kickstarter. I first study whether and how crowdfunding

[1] According to Massolution (2015), the global crowdfunding volume grew from $0.5 billion in 2009 to $34.4 billion in 2015. See Figure 2.1 for the trend in Google search interest for crowdfunding.

[2] See, for example, *Forbes*, 11/3/2013, "Do you really want dumb money?"; *The Economist*, 6/16/2012, "The new thundering herd"; *Inc.*, 11/1/2013, "The dark side of equity crowdfunding"; *The Wall Street Journal*, 1/31/2013, "Inventive funding deserves creative regulation"; *The Wall Street Journal*, 11/6/2015, "The Uberization of money"; *Financial Times*, 11/26/2012, "The unexpected cost of success".

feedback, as proxied by the amount of funding committed by the crowd, affects entrepreneurs' subsequent decisions such as commercialization, continuation, and project scale choice. I then examine whether the feedback value of crowdfunding is reflected in the type of entrepreneurs using Kickstarter when crowdfunding cost changes. Lastly, I survey Kickstarter entrepreneurs to extract evidence on their learning motives for accessing crowdfunding.

Testing whether and how entrepreneurs learn from crowdfunding outcomes faces two challenges. First, it is difficult to separate feedback from financing. Successful funding may prompt an entrepreneur to commercialize her project both because of the positive signal she receives from being funded and the capital she raised. Second, feedback may correlate with unobserved entrepreneurial or project qualities that also affect entrepreneurs' future decisions. To overcome the first challenge, I exploit variation in funding outcome within *unfunded* projects on Kickstarter, all of which received zero financing. Kickstarter funding is all-or-nothing based: a project is funded only if the total amount pledged by backers (the crowd) passes the funding target, in which case the entrepreneur gets all pledged money; otherwise the project is unfunded and the entrepreneur receives no funding. Examining unfunded projects therefore allows me to focus on variation in feedback (pledged amount) while shutting down the effect of financing. To overcome the second challenge, I instrument funding outcomes with local weather shocks happening over projects' funding windows. Bad weather conditions increase web traffic (Cardona et al. 2013) and therefore the amount of online attention received by projects fundraising during that time. Given the importance of local backers in funding success, such projects ultimately receive more pledges, thereby generating more positive feedback to the entrepreneurs.[3]

I document a strong effect of crowdfunding feedback on entrepreneurs' subsequent decisions. A 50% increase in pledged amount leads to a 9 percent increase in the probability of commercialization outside the crowdfunding platform.[4] I further find that more positive feedback increases entrepreneurs' chances of returning to Kickstarter and launching another

[3] A similar identification strategy is applied in Gilchrist and Sands (2016), who use weather shocks to instrument moviegoing, another indoor activity. I present evidence on the importance of local backers and the effect of weather on online activities in Section 2.2.1.1.

[4] I measure commercialization by matching Kickstarter projects to databases of launched products. Specifically, I match film projects to IMBD, PC game projects to Steam, and book projects to the OpenLibrary Database. See section 2.2.1.2 for more details on measurement.

project. Conditional on returning, those who have received better feedback are also more likely to launch a project similar to their previous projects. I then use the sample of entrepreneurs who have launched multiple similar projects on Kickstarter to study how they adjust the scale of their projects (proxied by funding target) in response to crowdfunding feedback. I find that a 50% increase in the pledged amount received by an earlier project increases the scale of the next similar project by 6 percent. These feedback effects are stronger when entrepreneurs face higher uncertainty or when the crowd is perceived to be more experienced, consistent with the basic features of Bayesian updating.

If crowdfunding allows entrepreneurs to reduce downside risks by abandoning bad projects earlier, *ex ante*, crowdfunding should contain real option value from feedback in addition to providing finance. To establish the presence of such feedback value, I examine how shocks to the cost of crowdfunding impact the type of entrepreneurs using Kickstarter. I show that when the opportunity cost of crowdfunding increases, entrepreneurs with safer projects, for whom the abandonment option is less valuable, drop out of the platform, while those with riskier projects stay, because they benefit particularly from feedback and derive higher real option value. In my sample, the main financing alternative for entrepreneurs is bank credit. Cheaper bank credit represents higher opportunity cost of crowdfunding. Using housing price movements and small business loan supply shocks as shocks to the opportunity cost of crowdfunding, I find that entrepreneurs on Kickstarter shift to riskier types, i.e., having more novel and higher fixed-costs projects, when crowdfunding becomes relatively more costly. These results suggest that the ex-ante feedback value of crowdfunding is an important consideration when entrepreneurs decide whether to access this type of financing.

I conduct a number of robustness checks. I show that the effects of crowdfunding feedback on entrepreneurs' decisions remain similar when using an alternative measure of feedback—the number of backers that have pledged funding. I also show that these results are not driven by the reputation effect of funding outcome or entrepreneurs' learning about their own abilities. Lastly, I show that my main results are robust on subsamples of more product-oriented projects.

Finally, I conduct a survey of 262 unfunded Kickstarter entrepreneurs to provide further evidence on the feedback role of crowdfunding. After failing funding on Kickstarter,

33% of the entrepreneurs continued their projects as planned, 20% scaled down or modified their projects, and the remainder abandoned their projects. Among those who did not continue their projects, 57% cite "lack of market interest (i.e., feedback from the crowd not good enough)" as the reason behind their decisions. I then ask these entrepreneurs what their decisions would have been had their projects achieved above 90% or below 5% of the funding target. This allows me to obtain variation in feedback within an entrepreneur-project. Using entrepreneur-project fixed effects, I find that entrepreneurs are 4 percent more likely to stick to their projects when the ratio of pledged amount to funding target increases by 10%. Finally, 63.4% of the surveyed entrepreneurs indicate that they chose to crowdfund their projects to "test the market and obtain feedback," with a majority believing such feedback cannot be obtained from other financiers such as banks or VC/angel investors.

The main contribution of this paper is to empirically document the feedback role of crowdfunding in the entrepreneurial entry process. Unlike managers of listed firms who have access to rich financial market feedback, early-stage entrepreneurs face a much worse information environment. Significant decisions often have to be made under extreme uncertainty. This paper suggests that crowdfunding can be a solution to entrepreneurs' information problem. By democratizing access to early feedback, crowdfunding reduces entrepreneurs' uncertainty and improves their decisions. The value of crowdfunding therefore goes beyond providing finance.

This paper adds to the literature on crowdfunding.[5] Most existing studies focus on the financing role of crowdfunding as well as incentives and mechanisms on funding platforms. My paper instead examines the informational role of crowdfunding. This paper also builds on recent studies that document the wisdom of the crowd. Iyer et al. (2015) find that lenders in debt-based crowdfunding markets predict borrower defaults with higher accuracy than do

[5] Agrawal, Catalini, and Goldfarb (2014) study how geographical distance affects investors' funding patterns; Zhang and Liu (2012), Mollick (2014), Kuppuswamy and Bayus (2014), and Li and Duan (2014) study funding dynamics; Ahlers et al. (2013), Marom and Sade (2013), and Bernstein, Korteweg, and Laws (2015) examine the determinants of funding decisions and outcomes; Li (2015), Morllick and Kuppuswamy (2014), and Mollick (2015, 2016) study project outcomes of after crowdfunding; Bellefalmme, Lambert, and Schwienbacher (2014), Cumming, Leboeuf, and Schwienbacher (2015), and Wei and Lin (2013) compare funding mechanisms; Hildebrand, Puri, and Rocholl (2016) examine investor incentives. See Agrawal, Catalini, and Goldfarb (2013) and Morse (2016) for reviews of the literature.

borrowers' exact credit scores (unobserved by the lenders). Mollick and Nanda (2015) find a high degree of agreement between the crowd's and the experts' decisions in funding Kickstarter arts projects. Mollick (2013) shows that the crowd assess entrepreneurial quality in similar ways as VCs. On the theory front, Golub and Jackson (2010) show that the crowd's opinion will converge to the truth as long as the influence of the most influential agent vanishes as the network grows. Li (2016), Chemla and Tinn (2016), and Brown and Davies (2016) examine optimal contracts and platform designs that harness the wisdom of the crowd. This paper studies whether entrepreneurs take cues from the crowd and adapt their decisions accordingly.

This paper also contributes to a recent literature that views entrepreneurship as experimentation. Kerr, Nanda, and Rhodes-Kropf (2014) and Manso (2016) argue that entrepreneurship is about experimentation and the value of entrepreneurship arises from the real options available from experimenting with new ideas. The costs and constraints on the ability to experiment can therefore impact entry into entrepreneurship (Hombert et al. 2014; Gottlieb, Townsend, and Xu 2016) and financing strategy (Ewens, Nanda, and Rhodes-Kropf 2015). This paper suggests that, by increasing the feedback value of experimentation, crowdfunding can encourage entrepreneurship through a channel other than relieving financing constraints.

Lastly, this paper ties to the literature on the informational role of financial markets (Bond, Edmans, and Goldstein 2012). Security prices from secondary markets often contain information unkown to the managers and, through managers' learning, can guide their real decisions (Luo 2005; Chen, Goldstein, Jiang 2007; Bakke and Whited 2010; Foucault and Fresard 2014; Zuo 2016). Relatedly, Allen and Gale (1999) demonstrate that markets are superior to intermediaries in evaluating projects that are subject to greater disagreement, such as those involving new technologies. This paper shows that crowdfunding allows entrepreneurs to learn from the primary financing market. By shifting financing from intermediaries to markets, crowdfunding can improve the information environment faced by entrepreneurs.

The paper proceeds as follows. Section 2.2 introduces crowdfunding and describes Kickstarter and the data. Section 2.3 examines whether and how feedback from

crowdfunding outcomes affect entrepreneurs' subsequent decisions. Section 2.4 studies the ex-ante feedback value of crowdfunding. Section 2.5 reports additional survey evidence. Section 2.6 provides further discussions, and section 2.7 concludes.

2.2 Platform and data

2.2.1 Crowdfunding

Crowdfunding is the practice of openly funding a project or venture by raising monetary contributions from a large number of people, typically via an online platform. As a new financial phenomenon, it is reshaping the financing of entrepreneurs and has garnered great public attention (see Figure 2.1). The global crowdfunding market has grown tremendously from $0.5 billion in 2009 to $34.4 billion in 2015, with now around 1250 platforms in more than 50 countries (Massolution 2015). Regulators around the world have also passed various regulations to assist the growth of crowdfunding. Crowdfunding platforms fall largely into three categories: debt-based, reward-based, and equity-based.8F[6] Debt-based crowdfunding, also known as peer-to-peer lending, is typically used to fund personal expenditures or debt consolidations, with a small proportion going to small business financing. Reward-based crowdfunding gives investors in-kind rewards for their funding and involves no financial securities. Equity-based crowdfunding issues equity shares to investors and is the most nascent of the three. In U.S., Title III of the JOBS (Jumpstart Our Business Startups) Act legalized equity crowdfunding involving non-accredited investors in 2012 and was implemented by the Securities and Exchange Commission in May 2016.

Entrepreneurs on crowdfunding platforms are typically at a very early stage, seeking small amounts of seed or pre-seed money to move their projects beyond R&D and towards commercialization. Along personal credit and money from family and friends, crowdfunding is among the earliest sources of capital entrepreneurs can access. Successful entrepreneurs

[6] Prominent reward-based crowdfunding platforms include Kickstarter (US), Indiegogo (US), and Crowdfunder (UK); examples of debt-based crowdfunding platforms include LendingClub (US), Prosper (US), and Zopa (UK); examples of equity-based platforms include Seedrs (UK), Crowdcube (UK), EquityNet (US), EarlyShares (US), and ASSOB (Australia).

will then be able to move down the funding funnel to access corporate loans or angel and VC financing.

An important distinction of crowdfunding from traditional entrepreneurial finance is the lack of intermediation. Due to high information asymmetry, the financing of early-stage ventures is traditionally heavily intermediated. Both banks and venture capitalists rely on close relationships with entrepreneurs to acquire information and to monitor. In crowdfunding, platforms mainly provide a market for investors and entrepreneurs to match; they are not actively involved in the screening, pricing, or monitoring of entrepreneurs' projects. Information asymmetry in crowdfunding markets is primarily mitigated by the crowd's collective information production, while the transparency and reputation mechanisms help curtail moral hazards.[7] Further, investors are able to achieve substantial diversification due to small investment thresholds and low transaction costs. These mechanisms, enabled mainly by internet technologies, sustain the functioning of crowdfunding markets.

2.2.2 Kickstarter

Kickstarter is the world's largest reward-based crowdfunding platform. Founded in April 2009, it has since grown rapidly (see Figure 2.2). As of October 2016, Kickstarter is open to entrepreneurs from 20 countries and backers from 224.[8] More than 322,000 projects have been launched on the platform, receiving $2.7 billion pledged funds from 11 million backers. Prominent projects funded on Kickstarter include Pebble Watch (a smartwatch), Oculus (a virtual reality gaming goggle), the film Veronica Mars, and Coolest Cooler (a multi-function cooler).[9]

On Kickstarter, an entrepreneur posts a project pitch that typically contains information on product, team, traction, use of funds, relevant risks, and promised rewards

[7] Due to the public nature of crowdfunding, when a project fails to deliver, the entrepreneur typically suffers big reputation loss. She may also face adverse legal actions from backers or the Federal Trade Commission when there is evidence of fraud or deception.
[8] Most of the projects come from U.S., with U.K. and Canada coming second and third.
[9] These project achieved great funding success on Kickstarter and subsequently received further financing from angel or VC investors. In a recent prominent deal, Oculus was acquired by Facebook for $2 billion.

(see Figure 2.3 for a sample project page). She also sets a funding target and a funding time window. After the project is launched, backers start to pledge money in return for the promise of in-kind rewards. Rewards vary across projects, ranging from gifts, early samples, product parts, to the final product eventually produced by the project. Rewards are also structured into tiers that correspond to different contributing amounts. Funding follows an all-or-nothing rule: a project is funded if, by the end of the funding window, the total pledged amount reaches or exceeds the funding target, in which case the entrepreneur gets all the pledged money; otherwise the project is unfunded and no money is transferred to the entrepreneur. Kickstarter takes 5% of the successfully raised funds. The platform does not engage in screening, pricing, or monitoring of the projects; nor does it guarantee returns or arbitrate disputes between entrepreneurs and backers.[10]

The Kickstarter platform features various social components that allow users to communicate and share information. Backers can post comments on a project's page and raise questions in the Q&A section. The entrepreneur is then able to reply to those comments and questions and post updates. Users can also follow each other on Kickstarter and observe the backing activities of their friends in social network. Most of these online interactions are publicly observable and are permanently archived on Kickstarter. These features greatly facilitate collective information production on the platform.

In reward-based crowdfunding, backers can be considered as a type of trade creditors to whom an entrepreneur owes a liability in the form of "goods deliverable." Failure to deliver the promised rewards is a violation of contract and may be subject to legal actions by backers. However, backers do not always seek financial returns when making investments. Their funding decisions are largely driven by personal interests in the proposed project, and they can sometimes be based on non-pecuniary or even altruistic considerations.[11]

[10] Kickstarter does conduct a simple vetting of submitted projects to make sure they are within Kickstarter's basic mandates before releasing them for launch. Kickstarter also features some projects on its front page and in the weekly newsletters sent to subscribers. Although Kickstarter does not guarantee the delivery of the rewards, the vast majority of projects (91%) do deliver (Mollick 2015).

[11] Though backers' funding decisions can sometimes be donation-motivated, Kickstarter explicitly requires that "projects can't promise to donate funds raised to a charity or cause, and they can't offer financial incentives like equity or repayment."

Just as their counterparts in the economy, entrepreneurs on Kickstarter exhibit substantial heterogeneity. Schoar (2010) highlights the distinction between transformational entrepreneurs and subsistence entrepreneurs. Transformational entrepreneurs seek to grow their businesses through professionalization and innovation, while subsistence ones start businesses as a means of living with no intention to grow. Entrepreneurs on Kickstarter can be described as more of transformational entrepreneurs than subsistence ones. Mollick (2016) reports that 82% of entrepreneurs on Kickstarter have a college degree. The mean annual earnings of Kickstarter entrepreneurs before Kickstarter is $48,300, and only 4% of them are unemployed. These demographics suggest that these entrepreneurs are not subsistence ones. Further, Kickstarter places great emphasis on project creativity, meaning entrepreneurs on the platform do intend to innovate. Indeed, innovativeness is an important factor in attracting funding on Kickstarter. Thirty percent of funded projects in technology and product design have filed for patents (Mollick 2016). Lastly, the fact that Kickstarter entrepreneurs are willing to seek funding and attention from the public means that they do intend to grow instead of remaining small and quiet. Mollick (2016) estimates that, on average, one dollar of funding on Kickstarter translates to $2.46 of revenue outside of Kickstarter. Nevertheless, most of the entrepreneurs on Kickstarter are still at an early stage and have yet to achieve the same level of professionalism and success as VC-backed entrepreneurs. Studying these entrepreneurs is thus important to understanding the role of crowdfunding at the earliest stage of the entrepreneurial process.

2.2.3 Data and descriptive statistics

Kickstarter claims no ownership over the projects and the information it produces. Project pages are permanently archived and accessible to the public. After funding is completed, projects and uploaded contents cannot be edited or removed from the site. This allows me to observe all historical information. To construct my dataset, I use web crawling scripts to scrape information from all project pages, including both funded and unfunded projects. I also extract entrepreneurs' biographies, entrepreneurs' and backers' locations, and the project-backer network. The final dataset contains the near universe of projects launched on Kickstarter from April 2009 to April 2014, with 137,371 project pages, 118,214 entrepreneurs, 12 million project-backer links, and 3 million posted comments. To the best of

my knowledge, this is the most comprehensive reward-based crowdfunding database compiled thus far.

Figure 2.2 plots the growth of Kickstarter over my sample period April 2009 to April 2014. There is a tremendous growth in both the number of projects and the aggregate funding amount. About 43% of projects are successfully funded and the success rate is fairly stable over time. Figure 2.4 shows the geographic distribution of funding demand on Kickstarter across U.S. Metro/Micropolitan Statistical Areas. Funding demand on Kickstarter is quite geographically dispersed and is more concentrated in regions with traditionally high entrepreneurial activities, such as the Bay Area, Seattle, Boston, and New York City.

Table 2.1 Panel A presents the summary statistics of key variables for all projects, unfunded projects, and funded projects. The average funding target is $22,669 and the median is $5,000. The funding target amount is rather skewed with a long tail of projects with large funding targets. Funded projects have lower funding targets than unfunded ones. The median pledge ratio (pledged amount divided by funding target) for a funded project is 1.13 and the mean is 3.77, suggesting a small number of projects were extremely successful and vastly over-subscribed. For unfunded projects, many received little pledging, with a mean pledge ratio of 0.11 and a median of 0.04. On average, a project attracts around 100 backers. The average pledged amount per backer is $72, and it is slightly higher for funded projects ($82) than for unfunded projects ($63). The funding window is typically around one month.

Comparing funded and unfunded projects, we can get a rough idea of what characteristics are likely associated with funding success. Funded entrepreneurs typically have a longer project pitch, provide more reward choices, and employ more videos and images on their project pages. They are also more active online than unfunded entrepreneurs, having more websites and Facebook friends. In return, funded projects receive more comments from backers. Further, more experienced entrepreneurs seem to have higher success rates. Overall, the statistics suggest that having a reasonable funding target, communicating well in the project pitch, and being active and well-connected online are important factors for funding success on Kickstarter.

Panel B breaks down the projects by project category. Kickstarter defines 13 project categories based on the nature of the projects. A large proportion of projects are in creative arts, with another sizable share in product and design, food, fashion, games, technology, and publishing. Technology projects typically have the largest funding amounts, while dance and music projects have the smallest. Success rates also differ across project categories. Fashion, publishing, and technology have the lowest success rates, while dance, theatre, and music have the highest.

2.3 Crowdfunding feedback and entrepreneurs' subsequent decisions

2.3.1 Empirical strategy

2.3.1.1 Identification

To establish the feedback role of crowdfunding, I first focus on the learning behavior of entrepreneurs. Specifically, I examine how feedback in the form of crowdfunding outcome affects entrepreneurs' follow-on decisions such as commercialization, continuation, and project scale choice.

Empirically identifying the effect of crowdfunding feedback faces two challenges. First, unlike feedback from stock prices in the secondary market, feedback from the funding outcome in the primary financing market is entangled with the monetary effect of the capital raised. A funded entrepreneur may be more likely to continue with her project than an unfunded one both because of the positive signal she receives from being funded and the capital she raised that allows her to continue. Comparing funded and unfunded entrepreneurs therefore mixes the effects of feedback and financing; so would a comparison between just funded and over-funded entrepreneurs. To overcome this challenge, I take advantage of the unique all-or-nothing feature of Kickstarter and exploit variation in pledging outcome within unfunded projects. For unfunded projects, no money is raised, yet there is still variation in the amount pledged by backers, which serves as a signal to entrepreneurs that is uncontaminated by the effect of financing.

Second, feedback can be endogenous. Even within unfunded projects, unobservables about the project or entrepreneur may correlate with the amount pledged by backers and, at the same time, affect entrepreneurs' incentive or ability to continue with their projects, leading to omitted variable bias. The direction of such bias, however, is ambiguous. Better pledging outcome may correlate with higher unobserved project quality or entrepreneurs' ability, both of which can positively predict continuation. On the other hand, entrepreneurs with higher ability likely also have higher outside options and are therefore more likely to exercise the abandonment option. To solve this omitted variable problem, I need an instrument that satisfies three conditions: 1) the instrument affects feedback, i.e. the total amount pledged by backers; 2) the instrument is exogenous to unobservables that may affect entrepreneurs' future decisions; 3) the instrument cannot be completely filtered out by entrepreneurs (imperfect learning). The first and second conditions correspond to the relevance and exclusion condition of a valid instrument. The third condition ensures that the instrumented part of feedback, though orthogonal to the quality of the project or the entrepreneur, will not be completely disregarded by entrepreneurs when updating their beliefs.[12] In what follows, I first describe the instrument I propose. I then discuss how the instrument satisfies each of the three conditions for proper identification of the causal effect of crowdfunding feedback.

On Kickstarter, thousands of projects are live for funding every day. Given people's limited attention, the competition for funding is also a competition for online attention. Well-funded projects typically receive many page visits and are actively shared by backers on social media. Online traffic is therefore an important factor for crowdfunding success. I propose an instrument that shocks online traffic to Kickstarter projects exploiting variations in local weather condition during a project's funding window. The idea is that worse weather increases online traffic, which lead to more visits and pledges from local backers. Given the importance of local backers in a project's overall funding success, projects launched in worse

[12] This identification strategy aims to test whether entrepreneurs causally react to feedback that are *perceived to be* true information, even though an econometrician with full information will consider such feedback as noise. Similar test strategies replying on imperfect learning have also been used in Morck, Shleifer, and Vishny (1990) to test the impact of investor sentiment on corporate investment and in Dessaint et al. (2015) and Yan (2016) to examine the learning behavior of peer firms and private firms.

weather conditions ultimately have better pledging outcomes, therefore generating more positive feedback to the entrepreneurs.[13]

Specifically, my instrument, *Cloudcover*, is the average deseasoned cloud cover over a project's funding window within 100 kilometers of the project. I obtain weather data from the Integrated Surface Database from the National Oceanic and Atmospheric Administration (NOAA). The NOAA database contains hourly weather observations from over 35,000 weather stations in the U.S. and abroad. I map weather stations to Kickstarter projects based on the geographic coordinates of each station and project, and only keep stations within 100 kilometers of each project. The average number of weather stations per project is 18, and the average distance between stations and a project is 56 kilometers. Cloud cover conditions are reported hourly on a nine-point scale, ranging from 0 (completely clear) to 8 (completely overcast). I use the mean score over all reported hours in a day to compute daily cloud cover at each weather station. I then deseason daily cloud cover at the station level by removing month-of-the-year means at each weather station. Finally, I average the deseasoned cloud cover across weather stations and funding window days to arrive at my instrument.

To establish the relevance of the instrument, I first show that local backers are important. Panel A of Table A.1 in Appendix A.2 reports statistics on the percentage of local backers. For each project with at least one backer, I compute the percentage of backers that are located in the same city or in the same state as the entrepreneur. I then average this percentage across projects. I do this for each of the 13 project categories, and for all projects as well as unfunded projects. On average, about 20% of backers come from the same city as the entrepreneur, and 30% from the same state. These numbers are higher for projects with a more local audience, such as those in Theater, Dance, and Food, and are lower for projects whose demand is more geographically dispersed, such as those in Technology, Games, and Design. Importantly, these numbers likely underestimate the importance of local backers in projects' overall funding success. This is because local backers tend to back early in the funding window (Agrawal, Catalini, and Goldfarb 2011; Kuppuswamy and Bayus 2014; Mollick 2014) and can influence the decisions of subsequent backers through a herding or

[13] In a similar vein, Gilchrist and Sands (2016) use weather shocks to instrument movies' viewership. Similar to moviegoing, backing Kickstarter projects online is also an indoor activity.

cascading effect (Herzenstein et. al 2011; Zhang and Liu 2012; Li and Duan 2014). Local backers are also closer to the entrepreneur in social network (Agrawal, Catalini, and Goldfarb 2011) and, as a result, are pivotal in the dissemination of the project across the network on social media (Lu et. al 2014).

I then present evidence that worse weather conditions increase Kickstarter backing through the internet usage channel. Various studies have found that worse weather increases internet traffic, online sales volume, and social media activities.[14] In Panel B of Table A.1 in Appendix A.2, I use the American Time Use Survey to show that individuals spend more time on computers for leisure when the weather is cloudier or rainier. I also show that, in my sample, worse weather conditions over a project's funding window increase the number of times the project is shared on Facebook (Panel C of Table A.1). I further find that my weather instrument predicts pledging outcome more strongly when measured over non-working hours than over working hours (Panel A of Table A.2), consistent with leisure time internet usage being the channel behind my instrument. I also find that the instrument is stronger for more local projects (Panel B of Table A.2), suggesting that the instrument works by affecting backers' activities rather than entrepreneurs' activities. Lastly, consistent with worse weather inducing more people to get online, I show that the instrument affects pledging outcome only through the number of backers, while having no effect on the intensive margins of pledging (Panel C of Table A.2) such as pledged amount per backer, number of comments per backer, or backers' sentiment (a measure constructed from text-analyzing backers' comments following the methodology in Tetlock (2007)).

In terms of the exclusion condition, weather during a project's short funding window is arguably exogenous to the fundamentals of the project and its long-term outcomes. Weather is also outside the control of an entrepreneur once her campaign is launched. It remains possible that an entrepreneur can time the launching of her campaign if weather is

[14] Using traffic data from Internet eXchange Points (IXP) located on 5 continents, Cardona, Stanojevic, and Cuevas (2013) find that precipitation increases internet traffic demand by up to 6%. Walton (2013) uses online sales data from major retailers in the greater Seattle area and finds that online sales volume is higher when weather is cloudier and rainier. Similar findings are obtained by two separate studies by Tradedoubler and Rakuten, both e-commerce companies. Using Facebook activity data from 1500 German Facebook pages and daily weather data for the year 2013, a study by Fanpage Karma, a social media analytics company, finds that Facebook activities is 42% higher when the weather is cloudy or rainy.

highly predictable. However, I fail to find any evidence of such strategic timing. Panel D of Table A.1 shows that entrepreneurs are not more likely to launch projects on days with worse weather, nor do they ask for larger amounts of funding. The instrument therefore satisfies the exclusion condition.[15]

The finding that entrepreneurs do not time their campaigns on weather also lends support to the third condition that the instrument cannot be completely filtered out by entrepreneurs in their learning process. If entrepreneurs are fully aware of the effect of weather, they would avoid launching projects on sunny days; they would also be able to filter out the part of feedback induced by weather when updating beliefs, thereby not reacting to my instrument. A further search of the internet also fails to reveal any discussion of weather as a factor contributing to funding success on Kickstarter. The absence of weather in entrepreneurs' information set, together with their bounded rationality, suggests that the third condition is likely satisfied.

2.3.1.2 Measurement

I first examine how entrepreneurs' decisions to commercialize their projects depend on the feedback they received from crowdfunding. If the amount pledged by backers is a signal for a project's potential market size, I should observe that an entrepreneur who receives more pledges will be more likely to commercialize her project, as such a project is more likely to have a positive NPV. To measure commercialization, I match three types of Kickstarter projects to external databases. This allows me to observe the outcome of a project outside of Kickstarter. Focusing on specific types of projects also allows for a clean definition of commercialization, which can vary substantially across projects of different types.

Specifically, I match film projects to the International Movie Database (IMDB), PC game projects to the Steam database, and book projects to the OpenLibrary database. IMDB is the world's largest and most comprehensive database for released and upcoming films and

[15] One may be concerned that weather also affects the time entrepreneurs spent online during the fundraising period. However, most entrepreneurs already spend substantial amounts of time online actively promoting their projects during fundraising, so the effect of weather on their online efforts will be limited. Even if such effect does exist, it is more likely to impact funding outcome, i.e., my instrumented variable, rather than the fundamentals of a project.

television programs, with a collection of 1.2 million titles. Steam is the largest digital distribution platform for PC games, with over 125 million registered users and more than 38,000 games. An estimated 75% of games bought online were downloaded through Steam. OpenLibrary is an online bibliographic database of books maintained by Internet Archive. It collects book information from the Library of Congress, other libraries, publishers, Amazon.com, and user contributions, and is one of the largest online databases of books, boasting 25 million works and 6 million authors. All three databases are current as of September 2016, allowing for at least 2.5 years to observe the commercialization of Kickstarter projects. For each type of project, I use both the project name and the name of the entrepreneur to identify matches in the respective database. Details on the matching procedure are described in variable definitions in Appendix A.1. Among unfunded projects, 9.8% of film projects are matched to IMBD, 5.1% of PC game projects are matched to Steam, and 6.3% of book projects are matched to OpenLibrary.

For a project to be listed in one of these databases, the entrepreneur should have completed the project and made the commercialization decision, i.e., exercised the continuation option. However, this does not necessarily mean that the project is successful or has positive NPV. Because the databases I use are comprehensive for their purposes and I only measure the presence of projects in these databases, I capture continuation rather than success. I do not measure projects' level of success such as box office (for films), downloads (for games), or sales revenue (for books).

Next, I measure continuation on Kickstarter. About 24% projects on Kickstarter are launched by repeat entrepreneurs.[16] I first examine whether, after an unfunded campaign, an entrepreneur comes back to Kickstarter and launches another project. If launching a campaign involves fixed costs, only entrepreneurs with positive enough beliefs, i.e. those who received very good feedback, will participate again. Those who received negative feedback would correct their beliefs and, if the correction is large enough, may decide to give up and not return to Kickstarter. I then examine, conditional on returning, how different an entrepreneur's next project is compared with her previous project. I measure similarity

[16] Repeat entrepreneurs on average have 2.5 projects each on Kickstarter. On average, an entrepreneur's two consecutive projects are launched 7 months apart from each other. Entrepreneurs typically make meaningful improvements in their projects in subsequent campaigns and sometimes switch to an entirely different project.

between two projects by looking at whether they belong to the same project type, as categorized by Kickstarter based on project content (there are 51 such refined project types). I also construct a continuous measure of project similarity by comparing the text of two projects' pitches and compute a text similarity score.[17] Conditional on participating again, launching a completely different project involves switching costs. An entrepreneur would only do so if she believes the demand for her original project is very low, so that even improving upon it would not justify a successful campaign. Note that such a comeback decision does not necessarily mean the project will be eventually commercialized. However, it does capture an entrepreneur's intention to stick to her project. It can therefore be interpreted as a weaker form of continuation than commercialization.

I then study how entrepreneurs adjust the scale of their projects in response to feedback. To this end, I employ the sample of repeat entrepreneurs that have launched multiple similar projects on Kickstarter and examine changes in funding targets over time. I use two definitions of similar projects: projects in the same project type, and projects that have a text similarity score above 0.9. The funding target reflects an entrepreneur's expectation about the scale of her project, which in turn depends on the expected demand or market size for the project.[18] In my sample, entrepreneurs typically adjust up (down) the funding target with the next similar project if the current project is funded (unfunded). This suggests that funding outcome likely provides a signal to entrepreneurs on the appropriate scale of their projects. Likewise, such adjustments should also happen within unfunded entrepreneurs—those who received more pledges should reduce their funding targets by less.

Lastly, to provide further evidence on learning, I need cross-sectional variables that measure uncertainty faced by entrepreneurs as well as the precision of crowdfunding

[17] I use the Bigram string comparison algorithm to construct the text similarity score. The Bigram algorithm compares two strings using all combinations of two consecutive characters within each string. It then returns a value between 0 and 1 computed as the total number of bigrams shared by the two strings divided by the average number of bigrams in each string. Higher score means higher similarity.

[18] The all-or-nothing funding rule gives entrepreneurs incentives to estimate the expected market demand for their projects: a target too high will reduce the chance of raising any money, while a target too low will drive away backers who fear the risk of entrepreneurs not investing due to undercapitalization (Cumming et al. 2015; Chemla and Tinn 2016). In addition, backers tend to stop funding a project after it reaches its target (Mollick 2014; Kuppuswamy and Bayus 2014). This further curtails entrepreneurs' incentives to strategically lower the target to achieve funding success.

feedback, both of which should increase entrepreneurs' sensitivity to feedback. I measure the novelty of projects to proxy for uncertainty. *Project novelty* is one minus the cosine score between the word vector of a project's pitch and the combined word vector of all projects' pitches in the same project type. Higher *Project novelty* means a project is more novel and innovative relative to the average project of the same type. Entrepreneurs of such a project therefore face higher uncertainty due to a lack of relevant information out there that informs potential returns.[19] To proxy for the precision of feedback, I measure *Backers' experience* by computing the average number of projects backers have previously backed on the platform. Backers more experienced in investing on Kickstarter should collectively provide more reliable feedback. Appendix A.1 provides further details on the construction of these measures.

2.3.1.3 Specification

I employ the following specification to test the effect of crowdfunding feedback on entrepreneurs' subsequent decisions:

$$\begin{aligned} \textit{Subsequent decision} = {} & \alpha + \beta \times \textit{ln(pledged amount)} + \gamma \times \textit{ln(funding target)} \\ & + \varphi \times \textit{project characteristics} + \delta \times \textit{entrepreneur characteristics} \\ & + \textit{project type FE} + \textit{year-quarter FE} + \textit{MSA FE} + \varepsilon. \end{aligned} \tag{2.1}$$

The dependent variable *Subsequent decision* is one of the outcome variables described in the previous section. The key independent variable is *ln(pledged amount)*, which measures crowdfunding feedback received by unfunded entrepreneurs. For robustness, I also use *ln(number of backers)* as an alternative measure of feedback. Both feedback measures are instrumented with *Cloudcover* in a 2SLS specification. I always control for the

[19] To validate this measure, I sort projects into quintiles based on *Project novelty* and tabulate the mean and standard deviation of the logarithmic pledge ratio for each quintile. As shown in Table A7 in Appendix A.2, funding outcomes exhibit lower means and higher variations for projects with higher *Project novelty*. This is consistent with risk-averse backers being more cautious and disagreeing more when funding projects with higher uncertainty.

ln(funding target) of a project to condition feedback on the asked amount.[20] Note that the coefficient on *ln(pledged amount)*, β, would be equal to the coefficient on the logarithmic pledge ratio *ln(pledged amount/funding target)* while controlling for *ln(funding target)*.[21] I also control for other project characteristics such as funding window length (in days), has website dummy, number of reward tiers, average reward price, project pitch length, number of images, and number of videos, and entrepreneur characteristics such as the number of Facebook friends, length of entrepreneur's biography, and entrepreneur's experience index (detailed definitions of these variables in Appendix A.1). In addition, I include project type fixed effects to account for heterogeneities across projects of different nature. I also include fixed effects for the year-quarter in which a project is launched to account for unobserved trends as well as the time gap between a campaign and the point I measure continuation. Lastly, I control for MSA fixed effects to absorb unobserved regional economic conditions.[22]

2.3.2 Main results

Table 2.2 presents the effect of crowdfunding feedback on entrepreneurs' continuation decisions. Panel A focuses on commercialization outside Kickstarter for three types of projects. The samples include unfunded projects by non-repeat entrepreneurs. Columns 1 to 6 present the OLS and IV results for film, PC game, and book projects separately. Columns 7 and 8 combine the three samples. Across all columns, *ln(pledged amount)* has a significantly positive effect on the probability of commercialization. The effect is also economically significant. Combining all three types of projects, column 8 implies that a 50 percent increase in pledged amount leads to a 0.73% higher probability of commercialization, which is a 9 percent increase relative to an average commercialization rate of 8.2%.

Panel B of Table 2.2 presents the effect of crowdfunding feedback on entrepreneurs' continuation on Kickstarter. Columns 1 and 2 examine how pledging outcomes of unfunded

[20] I add one dollar to all pledged amounts to account for zero pledging. For projects raising funds in other currencies, I convert both the pledged amount and target amount to U.S. dollar based on exchange rates at the end of projects' funding windows.

[21] The empirical distribution of the pledge ratio is rather skewed with both unfunded and funded projects. Many unfunded projects received very little pledging and only a few funded projects are vastly oversubscribed.

[22] MSA here includes both Metropolitan and Micropolitan Statistical Areas. For the very few projects that are in rural areas, I assign them to the nearest MSAs. For projects outside of U.S., I define MSA simply by city.

projects affect entrepreneurs' decisions to return to the platform and launch another project. Columns 3 to 6 examine, conditional on launching another project, how similar the next project is compared with the previous project. The results show that more positive feedback increases the likelihood an entrepreneur returns to Kickstarter and launches another project. Conditional on returning, it also increases the similarity between the new project and the previous project. Specifically, a 50 percent increase in pledged amount increases the probability of launching another project by 0.8%, a 4.4 percent increase relative to the base rate of 18%. Conditional on launching another project, the same increase in feedback makes an entrepreneur 7% more likely to stick to the same project type, a 9.2 percent increase relative to the base rate of 76%. It also increases the similarity score between the two projects by 0.1 standard deviation. Overall, Table 2.2 suggests that feedback received through crowdfunding does significantly impact entrepreneurs' subsequent entry decisions both on and off the crowdfunding platform.

Table 2.3 presents the effect of feedback on entrepreneurs' project scale choice. I examine how the funding target evolves over similar projects launched by the same entrepreneur. The sample includes all entrepreneurs who have launched subsequent projects similar to their previous unfunded projects. In columns 1 and 2, similar projects are defined as being in the same project type. In columns 3 and 4, similar projects are defined as projects with similarity scores above 0.9. Across all columns, I find that entrepreneurs are more likely to scale up (or less likely to scale down) their projects when feedback from the previous project was more positive. In terms of economic magnitude, a 50 percent increase in pledged amount increases the scale of the project by 5.6 to 6.4 percent.

Table 2.4 further tests for the presence of learning by examining how learning interacts with entrepreneurs' uncertainty as well as the quality of feedback. As described in section 2.3.1.2, I use *Project novelty* to proxy for uncertainty and *Backers' experience* to proxy for the quality or precision of the crowd's feedback. To facilitate interpretation and to minimize multicollinearity, I standardize (demean and divide by standard deviation) both measures before interacting them with feedback. Table 2.4 shows that, across all decision variables, entrepreneurs react more strongly to feedback when the project is more uncertain (Panel A), and when the crowd is perceived to be more experienced (Panel B). In terms of

magnitude, a one-standard-deviation increase in project novelty increases entrepreneurs' sensitivity to feedback by 10 to 42 percent; a one-standard-deviation increase in backers' experience increases entrepreneurs' sensitivity to feedback by 14 to 27 percent. These results are consistent with basic rational updating in learning.

In Panel C of Table 2.4, I further examine how learning differs across entrepreneurs of different genders. *Female* is a dummy variable indicating that an entrepreneur is female.[23] The sample is conditioned on individual entrepreneurs that are not registered as firms on Kickstarter. I find that, compared with male entrepreneurs, female entrepreneurs are more responsive to crowdfunding feedback across all decision variables. This is consistent with a large prior literature documenting that men are more overconfident than women—they tend to overestimate the precision of their information, especially in tasks perceived to be masculine or risky (Lundeberg, Fox and Puncochar (1994), Barber and Odean (2001)). In activities such as entrepreneurship, men may therefore overweight the importance of their priors and be less responsive to feedback than female entrepreneurs. Combining all cross-sectional results, Table 2.4 suggests that entrepreneurs' learning is indeed the driving mechanism behind the results in Tables 2.2 and 2.3.

Overall, based on results from Tables 2.2 to 2.4, I conclude that crowdfunding outcome does provide feedback to entrepreneurs about their projects and such feedback has real effects on entrepreneurs' subsequent decisions.

2.3.3 Robustness and additional analyses

2.3.3.1 Robustness

Recall in section 2.3.3.1 that my instrument affects the total pledged amount mainly through the number of backers rather than the amount pledged per backer. In Panel A of Table 2.5, I show that my results are robust to using *ln(number of backers)* an alternative

[23] Following Greenberg and Mollick (2016), I algorithmically identify the gender of entrepreneurs by their first names using the *genderize.io* name database. The database contains 208,631 first names from 79 countries and 89 languages. For each name, the database assigns a probability that a specific name-gender attribution is correct in the population of a country. An entrepreneur is identified to be of a specific gender if the associated probability exceeds 70%. In 94.6% of the matched cases, the probability exceeded 95%, suggesting a high degree of accuracy.

measure of feedback. A 50% increase in the number of backers increases the probability of commercialization by 1.5 percentage points, the probability of launching another project by 1.7 percentage points, the similarity between two consecutive projects by 0.14 standard deviation, and the scale of the next similar project by 8.5 percent.

I also show that my results are robust to using a subsample of projects in more product-oriented sectors, i.e., those in "Product and design", "Fashion and apparel", "Food and restaurant", "Games", "Publishing", and "Technology". These projects more closely resemble the type of projects traditionally pursued by entrepreneurs or self-employed individuals. Table A.3 reports the subsample analyses. The results remain similar.

2.3.3.2 Alternative explanations

Although my findings are most consistent with entrepreneurs learning about the market demand for their projects, it is also possible that entrepreneurs learn about their own abilities through crowdfunding. To shed light on whether this type of learning drives my results, I first conduct a placebo test relating an entrepreneur's decision about her current project to the feedback she received from an earlier *unrelated* project, i.e., a project in a *different* project type. In Panel B of Table 2.5, I fail to find any relation between an entrepreneur's entry or project scale decisions and the feedback she received on her previous non-related project. This suggests that learning about one's general ability as an entrepreneur does not drive my results, as such information should affect all of an entrepreneur's subsequent projects. To gauge whether learning about one's project-specific ability drives my results, I interact my baseline results with a variable *Jockey* that measures the extent to which a project features the entrepreneur (Marom and Sade 2013).[24] If learning is primarily about project-specific ability, belief updates should be stronger for projects that rely more on the human capital of the entrepreneur. Panel C of Table 2.5 shows that the *Jockey* measure does not interact significantly with feedback, suggesting that learning about project-specific ability is not dominant in my sample. Overall, these results are most

[24] See Appendix A.1 for detailed definition of this variable. The variable name *Jockey* comes from Kaplan, Sensoy, and Stromberg (2009), where they compare the idea to "the horse" and the entrepreneur to "the jockey". I validate this measure in Panel B of Table A.7 in Appendix A.2 by sorting project categories by *Jockey*. Consistent with intuition, projects in "Music", "Dance", and "Theater" have the highest values in *Jockey*, whereas projects in "Games", "Technology", and "Product and design" have the lowest values.

consistent with entrepreneurs learning from the crowd about market demand for their projects.

Another possible explanation of my results is the reputation effect. Although failing funding on Kickstarter is generally a negative reputation event, among unfunded entrepreneurs, those who received more pledges still have relatively better reputations, which make it easier for them to obtain funding from other financiers or resources from suppliers, thereby allowing them to continue. This explanation is unlikely to hold for several reasons. First and foremost, Kickstarter makes an intentional effort to hide the pages of unfunded projects from the public to protect the reputation of unfunded entrepreneurs. Failed Kickstarter campaign pages include meta tags to keep search engines from indexing them. In addition, Kickstarter's front page and the "Discover" interface do not show failed projects.[25] Second, it is not obvious under the reputation effect why my results are stronger when entrepreneurs face higher uncertainty, when backers are more experienced, and among female entrepreneurs. Lastly, if reputation is the driving force, my results should be weaker for projects launched by established firms, who arguably face fewer reputation concerns. This is because established firms already have a reputation out there compared with individual entrepreneurs. They also have more internal resources and face fewer constraints from financiers and suppliers if they want to continue a project. However, in Table A.4 in Appendix A.2, I fail to find such evidence: if anything, the effect of feedback on future decisions is stronger among corporate entrepreneurs.

2.4 The ex-ante feedback value of crowdfunding

If early feedback helps entrepreneurs abandon bad projects before entering the product market, *ex ante*, crowdfunding should contain option value from feedback in addition to financing value.[26] In this section, I establish the presence of such feedback value in a framework where entrepreneurs choose between crowdfunding and alternative financing.

[25] See Kickstarter's FAQ section (https://www.kickstarter.com/help/faq/creator+questions#faq_41810); "Kickstarter hides failure" by Dan Misener, Misener.org, 2012; "Failure Is Not an Option: Why Kickstarter Hides Failed Projects", by John Biggs, TechCrunch, 2012.

[26] Hereafter, I use "feedback value" to mean the option value from feedback, i.e., the value from the option to abandon bad projects upon receiving negative feedback.

2.4.1 Why crowdfunding has an advantage in providing feedback

I argue that crowdfunding provides *better* and *earlier* feedback to entrepreneurs than alternative financiers.

First, crowdfunding leverages the wisdom of the crowd and features low information production costs. Relying on internet technology, crowdfunding platforms present minimal participation costs for the crowd, each bringing his or her own piece of information. Through online social interactions, different pieces of information can be quickly updated, aggregated, and disseminated. These interactions also facilitate the production of soft information critical to early-stage financing (Iyer et al. 2015; Lin, Prabhala, and Viswanathan 2013; Morse 2015). Disintermediated markets therefore provide rich feedback to entrepreneurs by capitalizing on the collective information production of the crowd (Wolfers and Zitzewitz 2004; Golub and Jackson 2010; Mollick and Nanda 2015). In reward-based crowdfunding, such feedback is especially helpful, as backers are also potential consumers who can provide unique product market information unavailable from other traditional financiers.

Feedback from crowdfunding also comes at an earlier stage than that from traditional financiers. The removal of fixed intermediation costs lowers optimal transaction size, so that smaller investments can be financed with crowdfunding than is possible with intermediaries.[27] At the same time, online investing enables investors to diversify across a large number of projects, achieving substantial risk-sharing. It is the smaller and riskier nature of crowdfunding that makes it accessible to entrepreneurs at a much earlier stage than traditional financing sources.[28] As such, feedback from crowdfunding is more likely to arrive before entrepreneurs' key decisions such as investment or abandonment, thereby commanding extra real option value.

[27] The average fundraising size on Kickstarter is about $23,000. The U.S. Small Business Administration reports an average small business loan amount is around $330,000. Data from CrunchBase shows that the median angel investment amount is $450,000 while the median venture capital round is $4.5 million.

[28] On Kickstarter, more than 80% of the entrepreneurs are not yet incorporated. Among incorporated ventures, the median age is 1.5 years old. According to CrunchBase, the average age of firms receiving angel financing is 2 years old and the average age of firms receiving venture capital funding is 4.5 years old.

On the other hand, although VCs (and perhaps angels) have advantages in mentoring and monitoring, they are inaccessible to most entrepreneurs, especially at a very early stage. In the U.S., less than 0.5% of newly created firms have raised capital from VCs, and less than 5% have raised capital from angel investors.[29] Bank credit is the dominant external financing source for entrepreneurs (Robb and Robinson 2014; Cosh, Cumming, Hughes 2009). Banks, however, provide relatively poor feedback on entrepreneurs' projects. They are not specialized in evaluating risky startups. Most of the lendings to entrepreneurs are either in personal loans or in business loans heavily collateralized or guaranteed by personal assets (Avery, Bostic, and Samolyk 1998; Robb and Robinson 2014; Meisenzahl 2014).[30] These lending decisions are therefore largely based on entrepreneurs' personal credit conditions, such as credit score or the availability of collateral, rather than the product market potential of the projects. Further, in banks, lending decisions are typically delegated to a loan officer, while crowdfunding market engages many investors with diverse opinions. Markets are therefore more suitable than banks to finance and provide feedback to innovative projects that are subject to greater disagreement (Allen and Gale 1999).

2.4.2 Empirical strategy

The ideal setting to test whether crowdfunding contains extra feedback value is to directly compare crowdfunding and traditional financing methods. However, there is no exogenous expansion of crowdfunding that allows for such a comparison. I overcome this by instead exploiting shocks to entrepreneurs' selection into crowdfunding. Specifically, I examine how the composition of entrepreneurs on crowdfunding platform changes when the opportunity cost of crowdfunding changes. I employ a setting where entrepreneurs choose between crowdfunding and bank borrowing, the main financing alternative for early-stage entrepreneurs. When local credit becomes cheaper, the opportunity cost of crowdfunding increases. If crowdfunding provides extra feedback value, then entrepreneurs who do not benefit particularly from feedback will drop out from the platform and switch to bank credit,

[29] Based on data from U.S. Census, Small Business Administration, PWC Money Tree, and CVR Angel Report.
[30] Early-stage entrepreneurs who haven't registered their businesses can only borrow through personal loans. For sole proprietorships or partnerships, unlimited liability blurs the difference between business and personal loans. For corporations, small business lenders typically require personal guarantees or personal collaterals, effectively circumventing entrepreneurs' limited liability (Avery, Bostic, and Samolyk 1998; Mann 1998; Moon 2009).

while those deriving high option value from feedback, i.e., those facing high uncertainty, will stay on the platform. I should therefore observe entrepreneurs on Kickstarter shift to riskier types when local borrowing costs decrease. In other words, cheaper local credit attracts away entrepreneurs who crowdfund mainly for money and reveal those who crowdfund for feedback. I formalize this intuition in Appendix A.3 in a simple theoretical framework featuring learning and real options.

It is worth noting that this empirical strategy does not require every entrepreneur to respond to cheaper local credit. For example, wealthy individuals or those severely priced out by the banks may not experience any change in access to credit when local borrowing costs decrease. As long as *some* individuals react to lower borrowing costs and switch from crowdfunding to banks, I should observe a change in the *average* option value from feedback derived by the remaining entrepreneurs.

2.4.3 Empirical proxies for shocks to local borrowing costs

My first measure of shocks to local borrowing costs is instrumented MSA-level housing price movements. Robb and Robinson (2014) document that entrepreneurs rely predominantly on collateralised personal debt to finance their new ventures. Meisenzahl (2014) documents the pervasiveness of private residence as entrepreneurial collateral. Consistent with this evidence, Adelino, Schoar, and Severino (2014) and Schmalz, Sraer, and Thesmar (2015) find that local housing price appreciation leads to more entrepreneurial entry through relieving collateral constraints. A positive local housing price shock should therefore lower the costs of bank borrowing.[31] At the same time, it should not affect the financing cost on Kickstarter as crowdfunding requires no collateral. This makes crowdfunding relatively more costly. In a "difference-in-differences" setting, I can therefore compare two regions—one with housing price increases and one without—and look at the differential changes in the composition of entrepreneurs entering Kickstarter. The region that experienced greater housing price appreciation should produce crowdfunding entrepreneurs who face higher uncertainty and have projects with higher fixed costs.

[31] Constrained borrowers face an infinitely high borrowing cost at the desired borrowing amount. The relief of collateral constraint is therefore equivalent to a reduction in borrowing costs at each borrowing amount, i.e., a downward shift in the supply curve.

One potential concern is that the effect of housing prices on the composition of entrepreneurs on Kickstarter may be driven by shifts in local demands. For example, local housing price appreciations may increase the wealth of local consumers and hence their demand for products produced by Kickstarter entrepreneurs. To address this, I compare entrepreneurs who are likely renters with those who are likely homeowners. I do not observe the exact homeownership status of the entrepreneurs in my sample. However, their geographic coordinates allow me to proxy for their likelihood of homeownership with the average homeownership rates in the zipcodes they live in. Because renters and homeowners in the same region face the same local shocks, such a comparison differences out unobserved local demand shifts. I also show that my results are robust to excluding projects that may face predominantly local demands. A second concern is that higher housing prices may relieve entrepreneurs' financial constraints through a wealth effect in addition to the collateral channel (Jensen, Leth-Peterson, and Nanda 2014; Kerr, Kerr, and Nanda 2014). Although my identification uses collateralised bank debt as a financing alternative to crowdfunding, it can be easily extended to include both bank credit and personal wealth as financing alternatives. In this case, both the wealth effect and the collateral effect imply a higher opportunity cost of crowdfunding when local housing prices increase. As a result, my empirical strategy and its interpretation remain unaffected. Finally, it is possible that my results can be explained by changing risk-aversion if higher housing prices make entrepreneurs wealthier and less risk-averse. However, existing literature fails to find a significant effect of wealth changes on changes in risk aversion or risk taking (Brunnermeier and Nagel 2008). Schmalz, Sraer, and Thesmar (2015) show that firms started by wealthier homeowners are not riskier than those started by poorer individuals. They also find that housing price appreciation increases entrepreneurship only for full homeowners and not for partial homeowners though both experience the same wealth shocks, suggesting access to more valuable collateral itself does not increase risk-taking.

I also employ a second shifter of local borrowing costs that captures the supply shocks to local small business lendings. To this end, I turn to the small business loan data banks report under the Community Reinvestment Act (CRA). The granularity of the bank-county level data enables me to decompose local lending growth into bank-level supply shocks and county-level demand shocks. The decomposition method follows Amiti and Weinstein (2013),

Flannery and Lin (2015), and Greenstone, Mas, and Nguyen (2015), which is an improved variation of the fixed effect estimator used in studies such as Khwaja and Mian (2008), Jiménez et al. (2012), and Schnabl (2012) to control for credit demand.[32] I construct county-level lending supply shocks as weighted averages of bank-level shocks based on banks' lending shares in each county. The estimation procedure is elaborated in Appendix A.4. Because this measure reflects local supply shocks that originate from the bank level, it is uncorrelated with local economic conditions.

2.4.4 Results

I first validate the assumption that crowdfunding and bank credit are indeed substitutes in financing Kickstarter projects. I examine how funding demand on Kickstarter changes in response to shocks to local housing prices or small business loan supply. If bank credit is a viable alternative to crowdfunding, a decrease in local borrowing cost should trigger an outflow of entrepreneurs from Kickstarter to banks, generating a decrease in demand on Kickstarter. Table 2.6 confirms this. In Panel A, the dependent variable *MSA-level demand for finance on KS* is the logarithm of quarterly aggregate funding target amount on Kickstarter at the Metro/Micropolitan Statistical Area (MSA) level.[33] The independent variable *Local housing price index* is the quarterly MSA-level Housing Price Index (HPI) from the Federal Housing Financing Agency (FHFA). I follow Cvijanovic (2014) and instrument HPI with the interaction of MSA-level land supply elasticity (Saiz 2010) and national real estate prices (the S&P/Case-Shiller Home Price Index). The sample is at the MSA-quarter level covering 287 MSAs and from April 2009 to March 2014. In Panel B, the dependent variable *County-level demand for finance on KS* is the logarithm of quarterly aggregate funding target amount on Kickstarter at the county level. The independent variable *Local SBL supply shock* is the county-year level weighted average shocks to banks' small business

[32] This approach imposes additional adding-up constraints on the estimation of bank supply shocks. In particular, a county cannot borrow more without at least one bank lending more, and a bank cannot lend more without at least one county borrowing more. Amiti and Weinstein (2013) show that ignoring these adding-up constraints could produce estimates of bank lending growth that are widely different from the actual growth rates.

[33] I use the crosswalk files from the U.S. Department of Housing and Urban Development (HUD) to map zipcodes to CBSA (Core Based Statistical Area) codes, which is the collective of all Metropolitan Statistical Areas and Micropolitan Statistical Areas. I also use the same files to map zipcodes to FIPS (Federal Information Processing Standard) county codes.

loan supply. The sample covers 2,144 counties from April 2009 to March 2014. In both panels, I also control for local unemployment rate, population, and income per capita.

I find a significantly negative relationship between access to local credit and demand for funding on Kickstarter. A one-standard-deviation increase in *Local housing price index* (*Local SBL supply shock*) reduces demand on Kickstarter by 11% to 22% (4% to 11%) from its mean. This suggests that bank credit and crowdfunding can indeed be substitutes in financing crowdfunding projects. Cheaper access to local credit therefore increases the relative cost of doing crowdfunding.

I then test how the relative cost of crowdfunding affects the option value and therefore the uncertainty and fixed costs faced by entrepreneurs choosing crowdfunding. I apply two proxies for uncertainty. The first measure is *Project novelty* used in Section 2.3. The second measure, *Experience index,* is constructed from text-analysing entrepreneurs' biographies and measures the amount of professional or entrepreneurial experience an entrepreneur has. Holding the project constant, less experienced entrepreneurs should face higher subjective uncertainty. These two measures therefore complement each other by capturing uncertainty from the project side and the entrepreneur side respectively. The option value from learning should be higher for projects with higher *Project novelty* or for entrepreneurs with lower *Experience index*.[34] To measure fixed costs involved in a project, I follow Cumming et al. (2015) and construct a variable *Fixed costs* by counting the mentioning of fixed-costs-related words in the project's project pitch. A higher value of means a project is likely associated with higher operating leverage and therefore derives higher option value from early feedback. Detailed definitions of these variables are in Appendix A.1.

Table 2.7 presents the main results. I find that when local borrowing cost drops, as proxied by higher local housing prices (Panel A) and positive small business loan supply shocks (Panel C), entrepreneurs entering Kickstarter tend to be less experienced, choose

[34] To further validate these measures, I sort projects into quintiles based on *Project novelty* and *Experience index* and tabulate the mean and standard deviation of the logarithmic pledge ratio for each quintile. As shown in Table A.7 in Appendix A.2, funding outcomes exhibit lower means and higher variations for projects with higher *Project novelty* and lower *Experience index*. This is consistent with risk-averse backers being more cautious and disagreeing more when funding projects with higher uncertainty.

riskier projects and projects involving higher fixed costs. This is consistent with the prediction that higher relative cost of crowdfunding drives up the average option value derived by entrepreneurs choosing crowdfunding if and only if crowdfunding provides more precise feedback than banks.

To ensure that the relation between housing prices and entrepreneurial activities on Kickstarter is not driven by local demands, in Panel B of Table 2.7, I interact *Local housing price index* with *High homeownership*, a dummy variable indicating an entrepreneur's zipcode has above median homeownership rate. The main results in Panel A are significantly stronger for entrepreneurs who are likely homeowners than those who are likely renters.

In summary, the results are consistent with crowdfunding giving entrepreneurs additional option value from feedback compared with alternative financing.

2.4.5 Robustness and alternative explanation

To further ensure that my local credit shocks are not driven by changing local economic conditions, in Panel A of Table A.5 in Appendix A.2, I drop projects in "Food and restaurant", "Fashion and apparel", "Dance", and "Theatre", which may face predominantly local demands. I show that my results continue to hold. In Panel B of Table A.5, I also show that my results also hold on projects in more product-oriented sectors, i.e., those in "Product and design", "Fashion and apparel", "Food and restaurant", "Games", "Publishing", and "Technology".

One potential alternative explanation for my results is credit rationing. When local credit becomes cheaper, entrepreneurs who still choose crowdfunding may be those priced out by banks instead of those who benefit particularly from learning. If priced-out entrepreneurs also tend to have riskier projects, then credit rationing alone may explain my results without the presence of learning.

I argue that the credit rationing story unlikely explains my results. Cheaper local credit leaves behind not only priced-out entrepreneurs on Kickstarter, but also entrepreneurs who are financial unconstrained, e.g., wealthy individuals. Therefore, from a theoretical

perspective, it is unclear that entrepreneurs on Kickstarter will *on average* become more constrained and therefore riskier as local borrowing costs decrease.

I also empirically test for this. I proxy for an entrepreneur's propensity to be credit-constrained by estimating zipcode-level credit constrained probability. Following Jappelli (1990) and Morse (2011), I use the Survey of Consumer Finances (SCF) to estimate the probability that an individual is credit constrained as a function of her socioeconomic characteristics. I then project the relationship onto zipcodes by applying the SCF coefficients to Census socioeconomic variables observed at the zipcode level. Panel A of Table A.6 presents the models estimated from SCF 2010 and 2013 data. I use three proxies for credit constraint from SCF: *Denied credit*, *At credit limit*, and *Behind on payment*. I estimate the three models separately and then project them to annual Census data at the zipcode level (available from American Community Survey). I standardise each of the three estimated probabilities and take their average to arrive at my *Credit constrained likelihood* measure. Panel B of Table A.6 shows that, contrary to the prediction of the credit rationing story, the average likelihood of Kickstarter entrepreneurs being credit constrained does not vary significantly with local credit conditions. I therefore conclude that credit rationing does not drive my findings in section 2.4.3.

2.5 Survey evidence

In the last part of the paper, I conduct a survey of Kickstarter entrepreneurs to obtain direct evidence on learning from entrepreneurs themselves. The survey complements my previous analyses and provides new information on the feedback role of crowdfunding.

I construct my survey sample by applying the following steps. First, I focus on unfunded Kickstarter projects launched by non-repeat entrepreneurs. Second, I include all entrepreneurs for which I can directly obtain their email addresses or LinkedIn pages from their project pitches or biographies. Third, I randomly select a subsample of projects from "Technology", "Design", "Games", and "Fashion" and hand collect the LinkedIn pages of these

entrepreneurs.[35] I focus on projects in these four categories because their entrepreneurs are more likely to have a public profile for me to locate their LinkedIn pages. Fourth, I use RocketReach to pull out entrepreneurs' emails from their LinkedIn links. Lastly, I use the contact verification function from SurveyMonkey to remove bounced emails and emails that have opted out of SurveyMonkey. I obtained 3,936 emails for 2,677 entrepreneurs.

I administer the survey via SurveyMonkey, a large online survey company. Surveys are sent out in five waves from August 2016 to September 2016. I follow up each wave with two rounds of reminders one week and two weeks after the original email. In the end, I obtained 262 responses, out of which 258 are complete. The 9.6% response rate is in line with most survey studies such as Graham and Harvey (2001), Gompers, Kaplan, and Mukharlyamov (2016), Gompers et al. (2016), and Mollick (2014).

The survey contains six questions and respondents on average take 1.5 minutes to complete it. I first ask entrepreneurs about their continuation decisions after the project was unfunded on Kickstarter. I then ask them about the reason for their decision. I also elicit their counterfactual decisions in hypothetical scenarios where their projects achieved a very high or very low pledging outcome. This allows me to obtain variation in feedback within an entrepreneur-project pair. Lastly, I ask them about their general motives for accessing crowdfunding and whether they think feedback from crowdfunding can be obtained from other financiers.

Panel A of Table 2.8 presents the summary statistics for the survey sample. Compared with all contacted entrepreneurs and the universe of unfunded non-repeat entrepreneurs, entrepreneurs who responded to my survey are on average more experienced, have larger projects, and received more pledges. Their projects also tend to have more reward tiers, higher reward price, longer project pitches, and more images and videos. Entrepreneurs in my survey sample are therefore of higher quality than the average unfunded entrepreneur.

[35] I use the following information to locate and verify an entrepreneur's LinkedIn page: entrepreneur's name, location, education history, employment history, and picture. These information are usually obtainable from entrepreneurs' Kickstarter profile, Facebook page, Twitter page, Crunchbase page, firm website, or personal website.

Panel B of Table 2.8 reports the survey results. After failing funding on Kickstarter, 33% of the entrepreneurs continued with their projects as planned, 20% scaled down or substantially modified their projects, and 47% abandoned their projects. In Panel A of Table 2.9, I link entrepreneurs' responses to the pledging outcomes they received on Kickstarter. I find that, consistent with the main findings in Section 2.3, entrepreneurs who received better feedback from crowdfunding are more likely to continue with their projects, and are less likely to modify or scale down their project or giving up their projects. Such results hold both in an OLS specification and a multinomial logit specification.

Among the entrepreneurs who did not continue their project, 79% cite "insufficient funding" as the reason, 57% cite "lack of market interest (i.e. feedback from the crowd not good enough)", while 4.6% cite "other reasons". This suggests that feedback from crowdfunding plays an important role in affecting entrepreneurs' continuation decisions.

When asked about their counterfactual decisions in a scenario where their project achieved more than 90% of the funding target (though still unfunded), 60% of entrepreneurs say they would continue with the project, 27% would scale down or modify the project, and only 13% choose to abandon it. When the counterfactual pledging outcome changes to less than 5% of funding target, 52% of entrepreneurs say they would abandon the project or put it on hold, 25% would choose to scale down or modify the project, and 23% would choose to continue as planned. Panel B of Table 2.9 tabulates the means of pledge ratio and the decision variable for the two counterfactual scenarios and for the real scenario. On average, entrepreneurs are much more likely to continue with their projects when feedback is more positive. In Panel C of Table 2.9, I combine counterfactual decisions with real decisions and apply entrepreneur-project fixed effects to relate continuation to feedback within an entrepreneur-project. This gives strong identification as I am able to absorb all unobserved entrepreneur or project characteristics. Using this specification, I find that a 10 percentage point increase in pledge ratio increases entrepreneurs' likelihood of continuing by 4 percentage points.

Lastly, I ask entrepreneurs about their general motives for accessing crowdfunding. Unsurprisingly, obtaining funding is mentioned by most entrepreneurs. Importantly, 63.4% of entrepreneurs report that they chose to crowdfund their projects also to "test the market

and obtain feedback." Among these entrepreneurs, 60.2% believe that such feedback cannot be obtained from other financing sources such as banks, friends and family, or angel/VC investors. This suggests that obtaining market feedback is an important motive for accessing crowdfunding; to entrepreneurs, crowdfunding indeed has an advantage in providing such feedback compared with traditional financiers.

2.6 Further discussion

A point worth discussing is to what extent the results on reward-based crowdfunding can be generalized to other types of crowdfunding. Despite their differences, crowdfunding platforms share common features that contribute to the formation of rich learning opportunities. These features include the involvement of the crowd, online social interactions, and accessibility at an early stage. Nevertheless, the type of contract offered to investors will affect the kind of feedback generated in the funding process. In reward-based crowdfunding, backers are trade financiers and potential customers; their feedback is therefore more product market-oriented. In equity-based crowdfunding, funders hold equity stakes in projects and are therefore more long-term oriented. Equity crowdfunders also care about the financial viability of a project in addition to its product-market potentials. These incentive differences will in turn be incorporated into the feedback generated in the funding process, and affect what entrepreneurs will learn about. However, the key distinguishing features of crowdfunding that enable feedback provision remain the same across different crowdfunding types. The results in this paper can therefore speak to crowdfunding as a new financing method in general.

This paper focuses on information provision from the crowd to entrepreneurs who participate in crowdfunding. The informational benefit of crowdfunding, however, likely reaches beyond those who launch a campaign. Feedback generated on a platform can also be picked up by other entrepreneurs outside of the platform through observational learning. Such information spillover is possible due to the public nature of crowdfunding and its transparency. In contrast, information produced by VCs and banks is largely held within the intermediary and is not shared with other parties (Kaplan 2006, Breton 2011, Dang, Gordon, Holmström, and Ordonez 2014). Crowdfunding therefore has the potential to drastically

change the information environment faced by all entrepreneurs and influence their entry at the aggregate level.

2.7 Conclusion

In recent years, entrepreneurial finance has been experiencing a gradual disintermediation caused by the rise of crowdfunding. For the first time in history, entrepreneurs are able to raise capital online directly from the public. Our understanding of this new financing method is still very limited. What's the distinguishing feature of crowdfunding? Does it provide any benefit to entrepreneurs beyond financing? This paper advances our knowledge about crowdfunding by uncovering an important role it plays in the entrepreneurial process: the provision of early feedback to entrepreneurs. Using a novel dataset from Kickstarter, I show that the crowd's funding decisions help entrepreneurs learn about the prospects of their projects. Such feedback affects entrepreneurs' subsequent decisions such as commercialization, continuation, and project scale choice. Consistent with the feedback value of crowdfunding, entrepreneurs entering Kickstarter shift to those who face higher uncertainty when crowdfunding becomes relative more costly. Overall, my results highlight the potential of crowdfunding in reducing the uncertainty faced by early-stage entrepreneurs. My paper suggests that feedback from financial markets, traditionally only available to public firms, can become accessible to entrepreneurs as early-stage financing is disintermediated by the involvement of the crowd.

Figure 2.1 Google Search Interests for "Crowdfunding" and "Venture Capital"

This graph plots monthly Google search interests for the keywords "Crowdfunding" and "Venture capital" from January 2008 to January 2016. Data are retrieved from Google Trends.

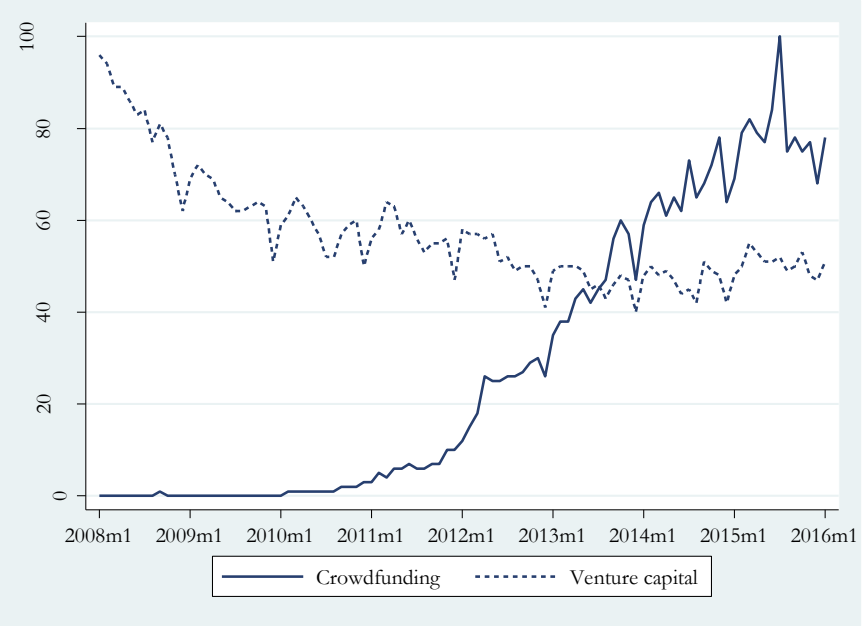

Figure 2.2 Kickstarter Growth

This figure plots Kickstarter's growth from its founding in April 2009 to April 2015. Red (blue) bar represents the cumulative number of funded (unfunded) projects. Green (yellow) line represents the cumulative amount of pledged (raised) money in U.S. dollars.

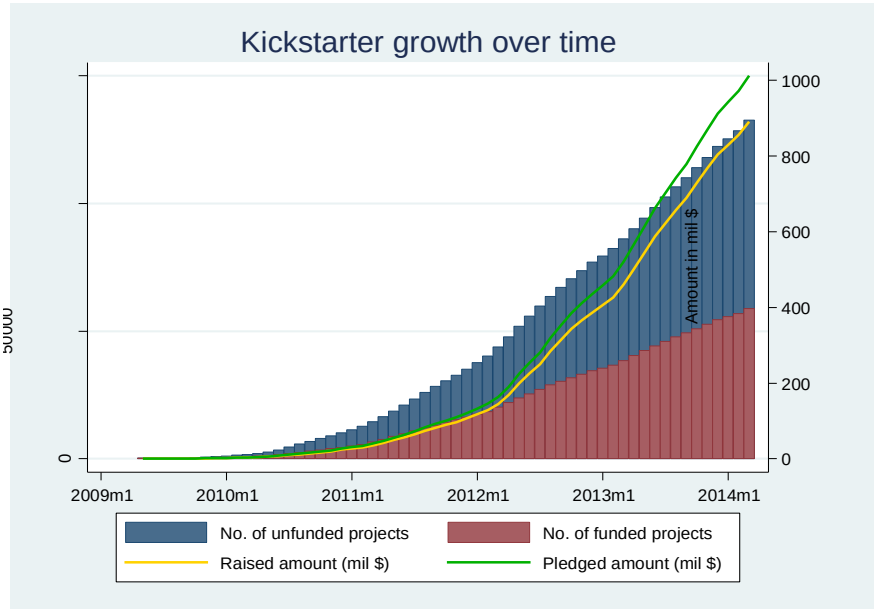

Figure 2.3 A Sample Project Page on Kickstarter

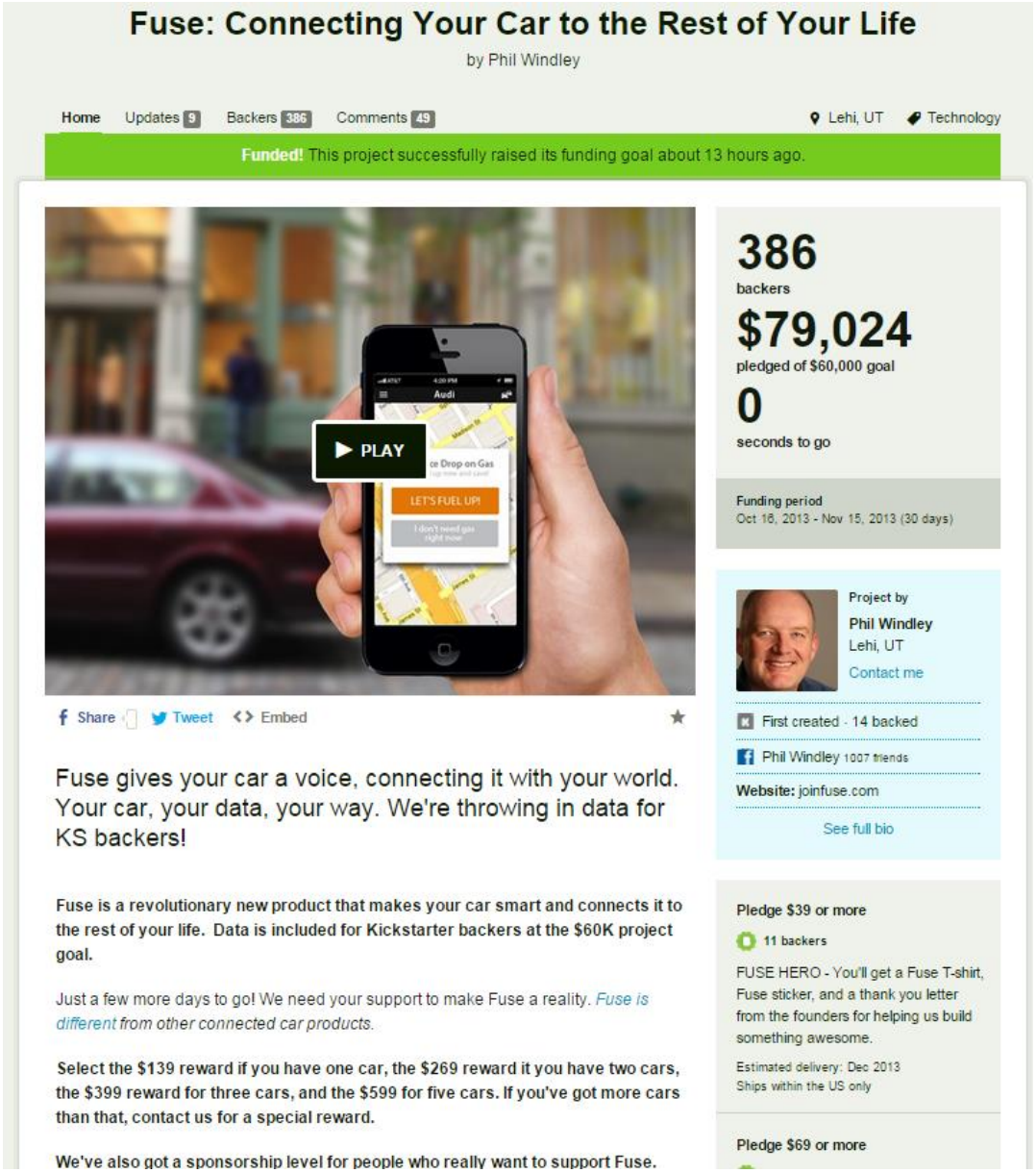

Figure 2.4 Geographic Distribution of Funding Demand on Kickstarter in U.S.

This figure plots the distribution of funding demand on Kickstarter in U.S. across Metropolitan/ Micropolitan Statistical Areas based on data from April 2009 to April 2014. Projects are assigned to MSAs based on their geographic coordinates. Funding target amounts are then aggregated to the Metropolitan/Micropolitan Statistical Area level and plotted on the map, with darker areas representing higher amounts. White areas on the map represent regions not in the MSA system. Alaska, Hawaii, Puerto Rico, and other territories are omitted to fit in the map.

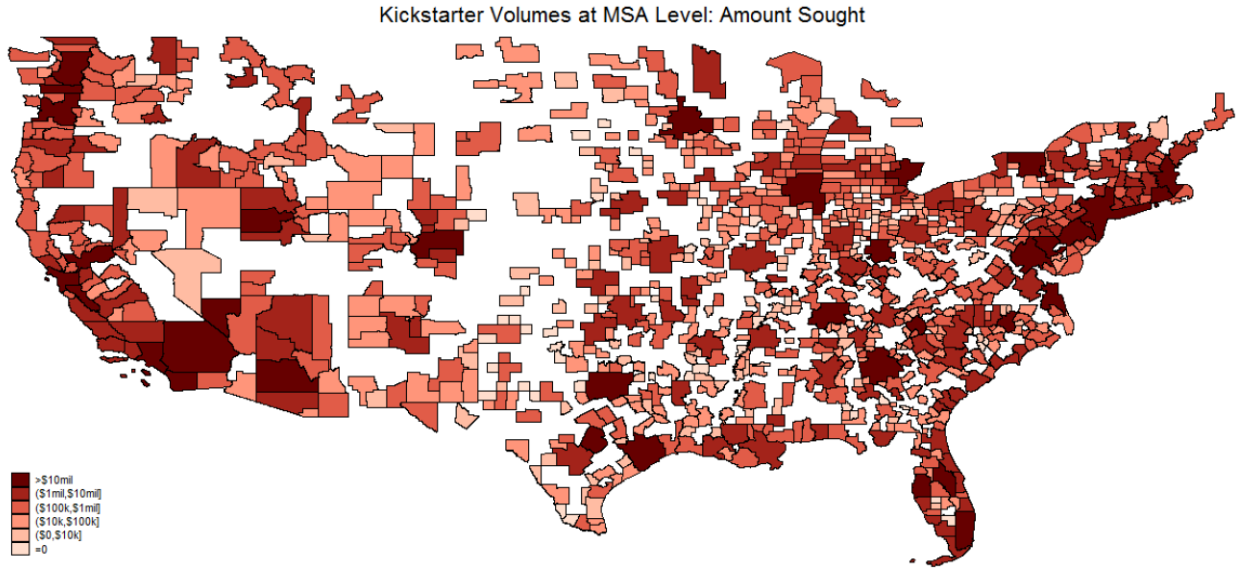

Table 2.1 Summary Statistics

Panel A presents the summary statistics for key variables for the sample of all projects (137,371 projects), unfunded projects (78,216 projects), and funded projects (59,155 projects). All variables are defined in Appendix A.1. Panel B breaks down the full sample of projects by project category and tabulates the number of projects, share of total pledged amount, average funding target, and average success rate within each category.

Panel A

	All projects		Unfunded projects		Funded projects	
Variable	Mean	Median	Mean	Median	Mean	Median
			Project characteristics			
Target amount	22,669.01	5,000.00	33,593.87	7,000.00	8,223.92	3,500.00
Pledged amount	7,336.25	1,139.00	1,602.79	212.00	14,917.16	4,250.00
Pledge ratio	1.69	0.30	0.11	0.04	3.77	1.13
Funded	0.43	0.00	0.00	0.00	1.00	1.00
Number of backers	99.49	21.00	21.62	6.00	202.45	63.00
Pledged amount per backer	72.33	50.48	63.38	40.00	82.35	61.64
Funding window (in days)	35.63	30.00	37.22	30.00	33.53	30.00
No. of words in project pitch	553.99	404.00	531.78	378.00	583.35	435.00
No. of videos	0.98	1.00	0.92	1.00	1.07	1.00
No. of images	3.78	0.00	3.54	0.00	4.11	0.00
Has website	0.83	1.00	0.79	1.00	0.87	1.00
No. of reward tiers	8.69	8.00	7.99	7.00	9.60	8.00
Average ln(reward price)	3.60	3.67	3.55	3.61	3.67	3.72
No. of comments	29.06	0.00	2.97	0.00	63.54	2.00
No. of comments per backer	0.09	0.00	0.08	0.00	0.09	0.03
			Entrepreneur characteristics			
No. of Facebook friends	466.31	138.00	393.44	81.00	562.65	263.00
Has Facebook	0.58	1.00	0.56	1.00	0.59	1.00
No. of words in biography	119.61	78.88	117.29	76.57	122.69	82.01
Experience index	1.57	1.61	1.54	1.61	1.62	1.61
Female	0.41	0.00	0.45	0.00	0.38	0.00
			Decision variables			
Commercialized_films	0.16	0.00	0.10	0.00	0.25	0.00
Commercialized_PCgames	0.09	0.00	0.05	0.00	0.20	0.00
Commercialized_books	0.08	0.00	0.06	0.00	0.12	0.00
Commercialized_combined	0.13	0.00	0.08	0.00	0.20	0.00
Launch again	0.17	0.00	0.18	0.00	0.16	0.00
Same-type project	0.78	1.00	0.76	1.00	0.80	1.00
Project similarity	0.94	0.96	0.94	0.96	0.95	0.96
			Other variables			
Project novelty	0.66	0.67	0.68	0.68	0.65	0.65
Backers' experience	1.60	1.27	1.80	1.50	1.38	1.13
Jockey	2.86	2.97	2.77	2.86	2.99	3.06
Fixed costs	1.98	2.00	1.97	2.00	1.99	2.00
Local housing price index	1.94	1.96	1.91	1.90	1.97	2.01
Local SBL supply shock	-0.07	-0.17	-0.08	-0.17	-0.06	-0.16
Cloudcover	0.06	0.03	0.03	0.01	0.08	0.05

Panel B

Project category	No. of projects	Share of total pledged amount	Avg. funding target ($)	Success rate
Art	12,265	3.7%	24,803	47%
Comics	3,802	2.5%	8,720	48%
Dance	1,802	0.6%	6,142	69%
Product and design	7,158	14.5%	25,266	37%
Fashion and apparel	5,560	3.0%	13,103	29%
Film and video	33,546	19.7%	35,818	40%
Food and restaurant	5,666	3.8%	18,071	39%
Games	9,071	21.5%	43,521	34%
Music	27,956	10.4%	9,115	55%
Photography	4,184	1.3%	10,447	36%
Publishing	16,588	4.9%	11,373	32%
Technology	4,006	11.8%	63,590	33%
Theater	5,767	2.3%	12,365	64%

Table 2.2 Crowdfunding Feedback and Continuation Decisions

This table presents the effect of crowdfunding feedback on entrepreneurs' subsequent continuation decisions. All samples include only unfunded projects. Crowdfunding feedback is measured as the logarithm of the pledged amount. Panel A examines the commercialization outcome outside Kickstarter for three types of projects: films, PC games, and books. *Commercialized_* is an indicator equal to one if a project is found in the respective database (IMDB for films, Steam for PC games, and OpenLibrary for books). The samples include unfunded projects by non-repeat entrepreneurs. Panel B examines entrepreneurs' continuation decisions on Kickstarter. *Launch again* is an indicator equal to one if an entrepreneur has launched another project after the current unfunded project before May 2013 (allowing for one year before the end of the sample period to observe entrepreneurs' comeback decisions). *Same-type project* is an indicator equal to one if an entrepreneur's next project is of the same type as her current project. *Project similarity* is the Bigram text similarity score between the pitches of an entrepreneur's two consecutive projects. The instrument *Cloudcover* is the average deseasoned cloud cover over a project's funding window within 100 kilometers of the entrepreneur's location. All specifications control for the characteristics of the current project (ln(target amount), funding window length (in days), has website dummy, number of reward tiers, average reward price, project pitch length, number of images, number of videos), characteristics of the entrepreneur (number of Facebook friends, length of entrepreneur's biography, and entrepreneur's experience index), project type fixed effects, year-quarter fixed effects, and MSA fixed effects. Standard errors are clustered at the MSA level in Panel A and at the project type level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Commercialization outside Kickstarter

	Commercialized _films		Commercialized _PCgames		Commercialized _books		Commercialized _combined	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(pledged amount)	0.006***	0.012**	0.012***	0.042***	0.009***	0.024***	0.007***	0.018***
	[0.001]	[0.006]	[0.002]	[0.016]	[0.002]	[0.009]	[0.001]	[0.005]
First stage								
Cloudcover		0.089***		0.082***		0.065***		0.083***
		[0.016]		[0.024]		[0.012]		[0.013]
F-stat of instrument		28.36		17.87		22.25		37.18
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	No	No	No	No	No	No	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,202	16,202	3,097	3,097	8,080	8,080	27,379	27,379
Adjusted R^2	0.029	0.030	0.143	0.145	0.089	0.090	0.034	0.034

Panel B. Continuation on Kickstarter

	Launch again		Same-type project *(conditional on launching again)*		Project similarity *(conditional on launching again)*	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(pledged amount)	0.002**	0.019**	0.020***	0.172***	0.002***	0.018***
	[0.001]	[0.009]	[0.003]	[0.025]	[0.001]	[0.007]
First stage						
Cloudcover		0.079***		0.080***		0.080***
		[0.010]		[0.017]		[0.017]
F-stat of instrument		39.38		20.51		20.51
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	51,861	51,861	11,175	11,175	11,175	11,175
Adjusted R^2	0.038	0.035	0.095	0.082	0.310	0.294

Table 2.3 Crowdfunding Feedback and the Adjustment of Project Scale

This table examines the effect of crowdfunding feedback on entrepreneurs' adjustment of project scale, as reflected in changes in funding target over an entrepreneur's two similar projects. The sample in columns 1 and 2 consists of unfunded entrepreneurs who have launched a subsequent project of the same type as the current unfunded project. The sample in columns 3 and 4 consists of unfunded entrepreneurs who launched a subsequent project highly similar to (project similarity score above 0.9) the current unfunded project. Crowdfunding feedback is measured as the logarithm of the pledged amount the current project receives. The dependent variable is the logarithmic funding target of an entrepreneur's next same-type project in columns 1 and 2, and that of her next highly similar project in columns 3 and 4. All specifications control for the characteristics of the current project (ln(target amount), funding window length (in days), has website dummy, number of reward tiers, average reward price, project pitch length, number of images, number of videos), characteristics of the entrepreneur (number of Facebook friends, log length of entrepreneur's biography, and entrepreneur's experience index), project type fixed effects, year-quarter fixed effects, and MSA fixed effects. Detailed variable definitions are in Appendix A.1. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Ln(target amount) of the next same-type project		Ln(target amount) of the next highly-similar project	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Ln(pledged amount)	0.052***	0.139**	0.060***	0.159**
	[0.005]	[0.059]	[0.006]	[0.072]
First stage				
Cloudcover		0.087***		0.085***
		[0.016]		[0.015]
F-stat of instrument		21.04		21.51
Other Controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	8,683	8,683	7,497	7,497
Adjusted R^2	0.384	0.378	0.388	0.332

Table 2.4 Cross-Sectional Heterogeneity in Learning

This table examines the heterogeneity in entrepreneurs' reaction to crowdfunding feedback. The samples and specifications follow those used in Tables 2.2 and 2.3. In Panel A, *Project novelty* is one minus the cosine similarity score between the word vector of a project's pitch and the combined word vector of all project pitches in the same project type. In Panel B, *Backers' experience* is the average number of prior projects a project's backers have backed. It is only available for projects with at least one backer. In Panel C, *Female* is an indicator equal to one if an entrepreneur's name is identified to be a female name. It is only available for projects whose entrepreneur is an individual rather than an institution. All three measures are standardized (removing mean and divided by standard deviation) in all regressions. All specifications control for the characteristics of the initial project (ln(target amount), funding window in days, web site dummy, number of reward tiers, average log reward price, project pitch length, number of images, number of videos), characteristics of the entrepreneur (number of Facebook friends, log length of entrepreneur's biography, and entrepreneur's experience index), project type fixed effects, year-quarter fixed effects, and MSA fixed effects. Detailed variable definitions are in Appendix A.1. In all panels, standard errors are clustered at the MSA level in column 1 and at the project type level in other columns. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Interaction with project uncertainty

	Commercialized_ combined	Launch another project	Project similarity (*conditional on launching again*)	Ln(target amount) of the next same-type project
	(1)	(2)	(3)	(4)
Ln(pledged amount)	0.007***	0.0017**	0.0019***	0.053***
	[0.001]	[0.0008]	[0.0005]	[0.005]
Ln(pledged amount)	0.003***	0.0004**	0.0002**	0.008**
× Project novelty	[0.001]	[0.0002]	[0.0001]	[0.003]
Project novelty	0.003	-0.0007	0.0021	-0.080***
	[0.004]	[0.0030]	[0.0020]	[0.026]
Other controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	27,379	51,861	11,175	8,683
Adjusted R^2	0.036	0.015	0.307	0.374

Panel B. Interaction with feedback quality

	Commercialized_combined	Launch another project	Project similarity (*conditional on launching again*)	Ln(target amount) of the next same-type project
	(1)	(2)	(3)	(4)
Ln(pledged amount)	0.011***	0.0030**	0.0022***	0.109***
	[0.001]	[0.0014]	[0.0006]	[0.007]
Ln(pledged amount)	0.003***	0.0008***	0.0003**	0.020***
× Backers' experience	[0.001]	[0.0003]	[0.0001]	[0.006]
Backers' experience	-0.014***	0.0057	0.0013	0.073*
	[0.005]	[0.0059]	[0.0016]	[0.039]
Other controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	22,159	42,884	9,176	7,121
Adjusted R^2	0.033	0.017	0.291	0.381

Panel C. Interaction with entrepreneurs' gender

	Commercialized_combined	Launch another project	Project similarity (*conditional on launching again*)	Ln(target amount) of the next same-type project
	(1)	(2)	(3)	(4)
Ln(pledged amount)	0.007***	0.0021**	0.0020***	0.065***
	[0.001]	[0.0009]	[0.0006]	[0.008]
Ln(pledged amount)	0.002***	0.0007***	0.0001	0.007**
× Female	[0.001]	[0.0002]	[0.0001]	[0.003]
Female	-0.002*	-0.0007	0.0004	-0.059**
	[0.001]	[0.0030]	[0.0013]	[0.027]
Other controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	22,978	43,044	9,219	7,172
Adjusted R^2	0.032	0.016	0.293	0.386

Table 2.5 Robustness and Additional Analyses

Panel A reproduces the main results in Tables 2.2 to 2.3 using *ln(number of backers)* as an alternative measure of feedback. The samples and specifications are the same as those used in Tables 2.2 to 2.3. Panel B conducts placebo tests examining how an entrepreneur's decisions with respect to a current project depends on the feedback she received on her previous project in a different project type (*ln(pledged amount)_difftype*). The samples include entrepreneurs who have launched at least two projects in different project types. Panel C interacts crowdfunding feedback with the variable *Jockey*, which measures the extent to which the entrepreneur is featured in a project's pitch. Samples and specifications follow those used in Table 2.4. Details on the variation definitions are provided in Appendix A.1. In all panels, standard errors are clustered at the MSA level in column 1 and at the project type level in other columns.*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Alternative measure of feedback: ln(number of backers)

	Commercialized _combined		Launch another project		Project similarity (*conditional on launching again*)		Ln(target amount) of the next same-type project	
	OLS (1)	IV (2)	OLS (3)	IV (4)	OLS (5)	IV (6)	OLS (7)	IV (8)
Ln(no. of backers)	0.019***	0.037***	0.006***	0.042***	0.003***	0.028***	0.132***	0.210**
	[0.002]	[0.007]	[0.002]	[0.016]	[0.001]	[0.008]	[0.008]	[0.101]
First stage								
Cloudcover		0.051***		0.054***		0.063***		0.069***
		[0.008]		[0.008]		[0.012]		[0.012]
F-stat of instrument		35.29		41.10		19.72		23.18
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,379	27,379	51,861	51,861	11,175	11,175	8,683	8,683
Adjusted R^2	0.038	0.038	0.038	0.036	0.310	0.295	0.393	0.393

Panel B. Placebo tests

	Commercialized _combined (1)	Ln(target amount) (2)
Ln(pledged amount)_difftype	0.004	0.014
	[0.003]	[0.009]
Other controls	Yes	Yes
Project type FE	Yes	Yes
Year-quarter FE	Yes	Yes
MSA FE	Yes	Yes
Observations	1,407	2,881
Adjusted R^2	0.028	0.169

Panel C. Interaction with the "Jockey" measure

	Commercialized _combined (1)	Launch another project (2)	Project similarity *(conditional on launching again)* (3)	Ln(target amount) of the next same-type project (4)
Ln(pledged amount)	0.007***	0.002**	0.002***	0.053***
	[0.001]	[0.001]	[0.001]	[0.005]
Ln(pledged amount)	-0.001	-0.001	0.001	-0.003
× Jockey	[0.001]	[0.001]	[0.003]	[0.004]
Jockey	0.001	-0.004	0.025***	0.049*
	[0.006]	[0.003]	[0.006]	[0.029]
Other controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	27,379	51,861	11,175	8,683
Adjusted R^2	0.035	0.016	0.311	0.373

Table 2.6 Substitution between Bank Borrowing and Crowdfunding

This table validates the assumption that crowdfunding and bank credit are substitutes in providing finance. The samples are constructed from all Kickstarter projects (funded and unfunded) located in U.S. In Panel A, the sample is at the MSA-quarter level covering 287 MSAs and 20 quarters from April 2009 to March 2014. The dependent variable *MSA-level demand for finance on KS* is the logarithm of quarterly aggregate funding target amount on Kickstarter at the Metro/Micropolitan Statistical Area (MSA) level. The independent variable *Local housing price index* is the quarterly MSA-level Housing Price Index (HPI) from the Federal Housing Financing Agency (FHFA). Following Cvijanovic (2014), I instrument *Local housing price index* with the interaction of MSA-level land supply elasticity (Saiz 2010) and national real estate prices (the S&P/Case-Shiller Home Price Index). In Panel B, the sample is at the county-quarter level covering 2,144 counties and 20 quarters from April 2009 to March 2014. The dependent variable *County-level demand for finance on KS* is the logarithm of quarterly aggregate funding target amount on Kickstarter at the county level. The independent variable *Local SBL supply shock* is the weighted average shock to banks' supply of small business loans in each county-year. In Panel A (Panel B), I also include MSA-level (county-level) *Unemployment rate*, *Population*, and *Income per capita* as local controls. Standard errors are clustered at the MSA level in Panel A and at the county level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A

Dependent variable:	MSA-level demand for finance on KS	
	OLS	IV
	(1)	(2)
Local housing price index	-0.032***	-0.069**
	[0.009]	[0.033]
First stage:		
Land supply elasticity		-0.129***
×national real estate price		[0.0271]
Local controls	Yes	Yes
MSA FE	Yes	Yes
Year-quarter FE	Yes	Yes
No. of observations	5,740	5,740
Adjusted R^2	0.723	0.721

Panel B

	County-level demand for finance on KS
	(1)
Local SBL supply shock	-0.335***
	[0.124]
Local controls	Yes
Year-quarter FE	Yes
No. of observations	42,880
Adjusted R^2	0.118

Table 2.7 Local Borrowing Costs and the Feedback Value of Crowdfunding

This table examines the effect of local borrowing cost and thus the relative cost of crowdfunding on the ex-ante uncertainty faced by entrepreneurs entering Kickstarter. The analysis is at the project level. The samples contain all Kickstarter projects (funded and unfunded) located in U.S. In Panel A, the dependent variable *Project novelty* is one minus the cosine similarity score between the word vector of a project's pitch and the combined word vector of all project pitches in the same project type; *Experience index* is a variable constructed from entrepreneurs' biographies indicating how experienced an entrepreneur is; *Fixed costs* is a variable measuring the mentioning of words related to fixed costs in a project's project pitch. See Appendix A.1 for details on the construction of these three variables. The independent variable *Local housing price index* is the quarterly MSA-level Housing Price Index (HPI) from the Federal Housing Financing Agency (FHFA). Following Cvijanovic (2014), I instrument *Local housing price index* with the interaction of MSA-level land supply elasticity (Saiz (2010) and national real estate prices (the S&P/Case-Shiller Home Price Index). Panel B follows Panel A and interact *Local housing price index* with *High homeownership*, a dummy variable indicating that the zipcode in which an entrepreneur resides has an above median homeownership rate. In Panel C, the dependent variables are the same as those in Panel A. The independent variable *Local SBL supply shock* is the weighted average shock to banks' supply of small business loans in each county-year (see Appendix A.4 for detailed definition). I also control for MSA-level (county-level) *Unemployment rate*, *Population*, and *Income per capita* in Panels A and B (Panel C). Standard errors are clustered at the MSA level in Panels A and B, and at the county level in Panel C. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A

	Project novelty		Experience index		Fixed costs	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Local housing price index	0.021***	0.045***	-0.127***	-0.362***	0.313***	0.469**
	[0.003]	[0.007]	[0.042]	[0.130]	[0.080]	[0.217]
First stage:						
Land supply elasticity		-0.304***		-0.304***		-0.303***
× national real estate price		[0.043]		[0.043]		[0.043]
Local controls	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	105,061	105,061	105,061	105,061	105,061	105,061
Adjusted R^2	0.010	0.009	0.044	0.045	0.237	0.236

Panel B

	Project novelty		Experience index		Fixed costs	
	OLS	IV	OLS	IV	OLS	IV
Local housing price index	0.018***	0.034***	-0.122***	-0.329**	0.213***	0.647**
	[0.003]	[0.007]	[0.041]	[0.133]	[0.077]	[0.263]
Local housing price index	0.006**	0.017***	-0.202**	-0.427*	0.195**	0.304***
× High homeownership	[0.003]	[0.007]	[0.100]	[0.234]	[0.097]	[0.115]
High homeownership	0.011**	0.018	-0.005	-0.009	-0.022	-0.017
	[0.006]	[0.014]	[0.010]	[0.010]	[0.019]	[0.019]
Local controls	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	105,061	105,061	105,061	105,061	105,061	105,061
Adjusted R^2	0.010	0.009	0.044	0.045	0.237	0.230

Panel C

	Project novelty	Experience index	Fixed costs
Local SBL supply shock	0.009***	-0.117***	0.140***
	[0.003]	[0.030]	[0.044]
Local controls	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes
No. of observations	120,719	120,719	120,719
Adjusted R^2	0.002	0.036	0.230

Table 2.8 A Survey of Kickstarter Entrepreneurs

This table reports the results from a survey of 262 unfunded entrepreneurs. The survey was administered via SurveyMonkey in five waves from August 2016 to September 2016. Panel A presents the summary statistics for the sample of responded entrepreneurs, contacted entrepreneurs, and all unfunded non-repeat entrepreneurs. Panel B presents the survey questions and the associated results. The questions are presented to survey participants one by one following the internal logic indicated in parentheses (words in parentheses are presented to the survey participants). Questions 2 and 5 allow multiple answers while other questions allow one answer only. Numbers in percentages indicate the percentage of respondents choosing each answer for that question.

Panel A. Summary statistics for the survey sample

	Responded entrepreneurs (N=262)	Contacted entrepreneurs (N=2,677)	All unfunded non-repeat entrepreneurs (N=56,573)
Ln(pledged amount)	7.16	6.50	4.90
Ln(funding target)	9.91	9.53	8.92
Funding window (in days)	36.00	36.32	37.18
Has website	0.59	0.58	0.45
No. of reward tiers	9.02	8.59	7.98
Average ln(reward price)	3.84	3.72	3.59
Ln(no. of words in project pitch)	6.55	6.33	5.94
Ln(no. of images)	1.61	1.45	0.78
Ln(no. of videos)	0.74	0.69	0.59
Ln(no. of Facebook friends)	3.46	3.59	3.11
Ln(bio length)	6.39	6.32	5.73
Experience index	1.90	1.80	1.54

Panel B. Survey questions and results

Q1. Did you continue to pursue this specific project after your Kickstarter campaign? (*Redirected to Q3 if answer is A*)

A.	Yes, I continued the project as originally planned	33.1%
B.	The project was substantially scaled down or modified	19.9%
C.	The project was put on hold/abandoned	47.0%

Q2. What prevented you from continuing your project as planned? (*Multiple answers allowed*)

A.	Insufficient funding	78.8%
B.	Lack of market interest (i.e. feedback from the crowd not good enough)	57.0%
C.	Other reasons	4.6%

Q3. Had your campaign achieved more than 90% of the funding goal (though still unfunded in the end), what would your answer to the first question be?

A.	I would continue the project as planned	59.9%
B.	I would scale down or modify the project	27.5%
C.	I would put the project on hold or abandon it	12.6%

Q4. Had your campaign achieved less than 5% of the funding goal, what would your answer to the first question be?

A.	I would continue the project as planned	23.6%
B.	I would scale down or modify the project	24.8%
C.	I would put the project on hold or abandon it	51.6%

Q5. In general, what's the reason you chose to crowdfund your project? (*Multiple answers allowed. Redirected to the end of the survey if answer does not include B*)

A.	To obtain funding	90.6%
B.	To test the market/obtain feedback	63.4%
C.	Other reasons	2.4%

Q6. Do you think such market feedback can be learnt from other financing sources such as bank, friends and family, or angel/VC investors?

A.	Yes	19.4%
B.	No	60.2%
C.	Not sure	20.4%

Table 2.9 Analysis of Survey Results

This table presents the results from regression analyses of respondents' answers to Questions 1, 3, and 4 of the survey. Panel A links respondents' answers to Question 1 to their actual pledge ratios obtained on Kickstarter. Dependent variable *Subsequent decisions* is equal to 1 if the respondent continued her project as originally planned, is equal to 0.5 if she substantially scaled down or modified the project, and is equal to 0 if she abandoned the project or put it on hold. Column 1 presents the OLS specification. Column 2 presents the multinomial logit specification with those that have continued their project as the base group. Pledge ratio is the ratio between the pledged amount and the funding target. Panel B compares respondents' counterfactual continuation decisions answered in Questions 3 and 4 with their actual decisions answered in Question 1. Panel C does the comparison in a multivariate setting with entrepreneur-project fixed effects. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Crowdfunding feedback and actual continuation decisions

	Subsequent decision: =1 if continue as planned =0.5 if scale down or modify =0 if abandon or put on hold	Scale down or modify	Abandon or put on hold
		Base group: Continue	
	OLS	Multinomial logit	
Pledge ratio	0.371**	-2.585**	-2.334**
	[0.178]	[1.221]	[0.923]
Other controls	Yes	Yes	
Project type FE	Yes	Yes	
Year-quarter FE	Yes	Yes	
Observations	262	262	
Adjusted/Pseudo R^2	0.122	0.063	

Panel B. Actual and counterfactual continuation decisions: univariate analysis

	Bad scenario	Actual scenario	Good scenario
Mean of pledge ratio	0.025	0.156	0.950
Mean of *Subsequent decision*	0.371***	0.469	0.737***

Panel C. Actual and counterfactual continuation decisions: multivariate analysis

	Subsequent decision: =1 if continue as planned =0.5 if scale down or modify =0 if abandon or put on hold	
Pledge ratio	0.381***	0.388***
	[0.030]	[0.034]
Other controls	Yes	No
Project type FE	Yes	No
Year-quarter FE	Yes	No
Entrepreneur-project FE	No	Yes
Observations	780	780
Adjusted R^2	0.141	0.554

Chapter 3: Competition and Ownership Structure of Closely Held Firms

3.1 Introduction

Globalization of economic activities is a topic of major political debate worldwide. Central to this debate is how intensifying competition due to growing international trade affects firms. Economists have long argued that product market competition is a positive force that provides incentives for the efficient organization of production.[36] In widely held firms, competition decreases managerial slack, which reduces inefficiencies associated with manager-shareholder agency conflicts.[37] Less is known about whether and how competition reduces inefficiencies unique to closely held firms. In such firms, the main source of inefficiency is the agency conflicts among shareholders with different incentives: those between majority and minority shareholders and those between inside and outside (non-managing) shareholders.[38] We argue that competition can mitigate conflicts among shareholders and therefore affect corporate ownership structure. Since the majority of firms around the world are closely held,[39] this mechanism by which competition enhances efficiency can be of first-order importance for public policy in many countries.

Our main finding is that product market competition affects the ownership structure of closely held firms: more intense competition lowers inside ownership and increases the dispersion of stakes among a firm's outside shareholders. We then explore several channels for this effect and find that competition changes ownership structure by increasing firms' need to raise external equity and by reducing private control benefits.

For our analyses, we compile a large panel data set of closely held manufacturing firms in eighteen European countries over 2002–11. For each firm, we know the identity and stake of each of its shareholders, as well as whether a shareholder holds a managerial position. This

[36] See, for example, Hicks (1935), Smith (1776), Nickell (1996), Matsa (2011), and Bloom, Draca, and Van Reenen (2016).

[37] Giroud and Mueller (2010, 2011), Chhaochharia et al. (forthcoming), and Cuñat and Guadalupe (2009a,b).

[38] See surveys by Shleifer and Vishny (1997), Morck (2000), Holderness (2003), Bebchuk and Weisbach (2010), or Edmans (2014).

[39] See, for example, La Porta, Lopez-de-Silanes, and Shleifer (1999), Claessens, Djankov, and Lang (2000), Faccio and Lang (2002), Holderness (2009), or Franks et al. (2012).

allows us to observe firms' entire ownership structures and to study multiple dimensions of ownership at the same time. The firms in our sample have on average 5.3 million euros in assets; four shareholders, of which two are outside; and inside ownership of about 60%. Most of our firms have an owner-manager with a controlling stake. Since 99.7% of the firms in our data are private, their governance therefore relies primarily on ownership structure. Our sample thus gives us a unique opportunity to examine how competition affects ownership structure in firms with a large scope for agency conflicts among shareholders.

Our main measure of product market competition is import penetration at the country-industry-year level. Compared with traditional measures of competition such as concentration indices, import penetration is considered as more exogenous (Bertrand 2004; Cuñat and Guadalupe 2009a; Bloom, Draca, and Van Reenen 2016). During our sample period, European manufacturing firms experienced a large increase in import penetration triggered by China's entry into the World Trade Organization in 2001. Our sample period can therefore be described as one of dramatic changes in the competitive environment driven by events outside the control of the firms in our sample.

We employ several identification strategies to address endogeneity. First, our baseline specification includes industry and country-year fixed effects and thus rely on within-industry variation in competition over time and across countries. Second, we follow Bertrand (2004), Cuñat and Guadalupe (2009a), and Hummels et al. (2014) and instrument import penetration with source-weighted foreign exchange rates and world export supply growth. Third, we use within-firm change regressions to control for time-invariant firm unobservables that may correlate with ownership. Lastly, we use the ordered probit model to account for the presence of discrete mass points in the distribution of ownership variables; we use the control function approach to address the endogeneity of import penetration in this specification.

We show that firms exposed to more intense competition have lower levels of inside ownership—the fraction of equity held by shareholders who are also part of management—and that the ownership stakes of their outside shareholders are more dispersed. The effects we estimate are economically large. A one-standard-deviation increase in competition leads to a decline in inside ownership and an increase in outside ownership dispersion that amount to about a decade of changes in these variables along a typical firm's life cycle. We also show that firms exposed to more intense competition have lower overall ownership concentration.

Competition is thus an important economic force that diffuses ownership structures of closely held firms.

We entertain four channels through which competition can affect the ownership structure of closely held firms. In the external equity channel, more intense competition increases a firm's need to raise new equity by decreasing internal funds (Katics and Petersen 1994), reducing optimal leverage (Xu 2012),[40] and encouraging investments.[41] The need to raise equity prompts existing shareholders to sell part of their stakes to new shareholders. In Pagano and Röell (1998), an owner-manager decides on the new ownership structure—the number of new shareholders and their stakes—to maximize the value of the stake she retains with the new ownership structure. This value depends on the value of the firm and the value of future private control benefits she can extract. Selling her stake to a single shareholder instead of multiple shareholders gives the new shareholder strong incentives and ability to monitor (Demsetz 1983; Shleifer and Vishny 1986, 1997), which lowers the firm's cost of capital and increases firm value. However, it may also result in excessive monitoring of the owner-manager by the large new shareholder, lowering the value of future private control benefits she can extract.[42] With more equity to be raised, the cost of having a single new shareholder outweighs the benefit, leading the owner-manager to optimally increase the dispersion of outside ownership. Through this channel, competition lowers inside ownership and increases outside ownership dispersion.

In the entrenchment channel, more intense competition reduces the amount of private control benefits entrenched corporate insiders can extract (Dyck and Zingales 2004; Guadalupe and Pérez-González 2011) and thus their incentives to stay entrenched.[43] Entrenchment occurs when shareholder-managers hold large stakes (Morck, Shleifer, and

[40] Competition leads to lower optimal leverage because it implies lower interest tax shields (through lower expected future profitability) and a higher probability of bankruptcy (Valta 2012). In Table B.1, Panel A, columns 1 and 2, in Appendix B.3, we show that import penetration increases the probability of bankruptcy in our sample, as well as using Census industry-level data.

[41] See Gilbert and Lieberman (1987), Khanna and Tice (2000), Cookson (forthcoming), or Bloom, Draca, and Van Reenen (2016). In Table B.1, Panel A, columns 3 and 4, in Appendix B.3, we show that, in our sample, import penetration increases firms' capital expenditures.

[42] Similar to the overmonitoring argument of Pagano and Röell (1998), Burkart, Gromb, and Panunzi (1997) show that concentrated outside ownership can dampen managerial initiative.

[43] This obtains because, with more competition, more informative prices make the tunneling of resources costlier, and the extraction of private control benefits is more likely to jeopardize a firm's survival.

Vishny 1988) or when the controlling coalition of shareholders has low cash-flow rights (Bennedsen and Wolfenzon 2000). A lower benefit from entrenchment reduces inside shareholders' incentives to hold large stakes and their need of monitoring by large outside shareholders; it also reduces the firm's need to prevent the formation of entrenched coalitions by limiting the number of shareholders.[44] A lower amount of extractable private control benefits therefore leads to lower inside ownership and greater dispersion of outside ownership.[45]

In addition to these two governance channels, competition can also affect ownership structure of closely held firms by changing their risk and demand for managerial skills. In the diversification channel, competition affects ownership structure by altering shareholders' optimal portfolio choices. Shareholders who own large equity stakes in firms may hold suboptimal portfolios and face underdiversification costs (Admati, Pfleiderer, and Zechner 1994; Faccio, Marchica, and Mura 2011). Since more intense competition increases these costs by increasing firms' volatility (Comin and Philippon 2006; Irvine and Pontiff 2009) and bankruptcy risk (Valta 2012), it leads to lower inside ownership and greater dispersion of outside ownership.

In the managerial skills channel, more intense competition increases firms' demand for better management, rendering managerial skills of existing inside shareholders obsolete. As a result, inside shareholders quit managerial positions to make room for new managers, and stay as outside shareholders due to the relative illiquidity of their stakes. Through this channel, competition also leads to lower inside ownership and greater dispersion of outside ownership. All channels above predict that firms facing more intense product market competition will have lower inside ownership and more dispersed ownership stakes among outside shareholders.

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[44] Bennedsen and Wolfenzon (2000) argue that entrenchment occurs when shareholders form a coalition with just enough votes to gain control, because such a coalition has the largest group of other shareholders to expropriate from. To prevent the formation of entrenched coalitions, initial owners optimally keep the number of shareholders small.

[45] Competition can also affect ownership structure by changing the incentives of professional managers. Hart (1983) and Schmidt (1997) show that competition elicits more effort, while Hermalin (1992) and Raith (2003) stress that competition has an ambiguous effect on managerial incentives. Since the average inside ownership in our sample is about 60%, which is an order of magnitude larger than the average managerial ownership in widely held firms, the underprovision of effort by managers is unlikely to be an important concern. As a result, the effect of competition on ownership structure through managerial incentives is arguably small in our setting.

We conduct several analyses to investigate the presence and importance of each channel in our sample. First, we show that the effect of competition on ownership structure is larger in industries where, due to the nature of the technology used, firms' reliance on external equity financing changes more following competition shocks. This result supports the external equity channel. Next, we show that the effect is larger in industries that, due to the nature of their business or outputs, provide a larger amount of private control benefits to corporate insiders (Demsetz and Lehn 1985). Since competition reduces the benefits of entrenchment by more in industries with a larger amount of private control benefits, this result supports the entrenchment channel. We also find that competition has a larger effect on ownership structure in countries with stronger contract enforcement, property rights, control of corruption, and rule of law. Since raising outside equity is easier in these countries, this result supports the external equity channel. Further, since the amount of private control benefits is arguably lower in countries with stronger institutions, this result suggests that the external equity channel is the driving force of ownership structure in our sample.

If competition affects ownership structure through the diversification channel, the effect should be stronger in industries where competition leads to bigger increases in bankruptcy costs or cash-flow volatility. However, we find no support for these predictions: the effect of competition on ownership structure is unrelated to the redeployability of firms' real assets, which affects liquidation values and thus the amount by which competition changes expected bankruptcy costs. We also find that the effect is unrelated to industry sensitivity of cash-flow volatility to competition. Last, if competition affects ownership structure through the managerial skills channel, competition should result in increased hiring of new professional managers, who should come from third parties outside of the firm rather than from existing insider shareholders. We find no support for these predictions: the hiring of new professional managers is unrelated to competition, and new professional managers are less likely to come from third parties outside of the firm when competition intensifies. We conclude that shareholders' portfolio risk considerations or firms' need to adjust managerial skills to more competitive environments do not drive our results.

To quantify the extent to which the external equity and entrenchment channels explain our results, we study how the status and stakes of individual shareholders change following a competition shock. We find that 19% of the effect of competition on inside ownership and 37% of the effect on outside ownership dispersion are explained by the entry of new

shareholders into firms' ownership structures, suggesting that the external equity channel is at work. We also find that 72% and 40% of the above respective effects are explained by inside shareholders becoming outside shareholders through relinquishing managerial positions. Since this finding is consistent with inside shareholders quitting managerial positions because competition reduces private control benefits associated with being in management, it corroborates the entrenchment channel. These results suggest that the external equity and entrenchment channels together explain the majority of the effect of competition on ownership structure.

Lastly, to examine whether firms' ownership adjustments to competition indeed reduce the agency conflicts among shareholders, we compare the performance of firms that reoptimized their ownership structures according to the predictions of our hypotheses with the performance of those that did not reoptimize. We find that, when competition intensifies, firms that diffused their ownership (i.e., decreased inside ownership or increased outside ownership dispersion) report higher profitability than firms that concentrated or did not change their ownership. Conversely, when competition weakens, firms that concentrated their ownership report higher profitability than firms that diffused or did not change their ownership. These results are consistent with competition inducing firms to adopt ownership structures that better align shareholders' incentives and thereby reducing inefficiencies.

Our main results hold using different measures of competition. First, we reconstruct import penetration using only imports from low-wage countries outside of Europe, because such imports are the most competitive (Bernard, Jensen, and Schott 2006; Autor, Dorn, and Hanson 2013). Second, following Cuñat and Guadalupe (2009a), we use sector-weighted import penetration to account for firms that operate in multiple sectors. Third, since import penetration focuses only on competition from abroad, we use the Lerner index to capture competition from all sources, including that stemming from domestic firms (Nickell 1996; Aghion et al. 2005).

We conduct several robustness tests on our main results. First, we show that inside shareholders are more likely to lose control of the firm as competition intensifies and that more intense competition increases the dispersion of control rights among outside shareholders. Second, our results are unaffected if we include in our definition of inside shareholders the family members of managers, who could also influence firms' decisions. Third, our results are robust to the inclusion or exclusion of firms with zero or 100% inside

ownership. Fourth, our results are unchanged if we focus on firms that are owned solely by individuals or on firms that have no ownership in other firms. Fifth, some firms may also compete abroad and face competition not captured by import penetration. Our results are similar if we exclude potential exporting firms from our sample. Last, our results are not driven by firms in the United Kingdom, the country with the largest weight in our sample, and hold for firms in the United Kingdom, where the data coverage is close to complete.

Prior studies examine the link between competition and corporate governance in widely held public firms, focusing on manager-shareholder agency conflicts. Cuñat and Guadalupe (2005, 2009a,b) show that competition increases the pay-performance sensitivity of compensation contracts. Giroud and Mueller (2010, 2011) find that external governance through takeover threats matters less in more competitive industries. Chhaochharia et al. (forthcoming) show that competition substitutes for internal governance. Bloom, Sadun, and Van Reenen (2010) and Guadalupe and Wulf (2010) find that firms flatten organizational structures and decentralize decisions as competition intensifies.

Prior work also examines determinants of corporate ownership structure, but does not study the impact of competition. Demsetz and Lehn (1985) find that ownership concentration is related to firm characteristics such as size and profit instability and to industry factors such as regulation and potential for insiders to extract rents. Nagar, Petroni, and Wolfenzon (2011) show that closely held firms with shared ownership have superior performance, highlighting shared ownership as a solution to conflicts between majority and minority shareholders. Helwege, Pirinsky, and Stulz (2007) find that stock performance and liquidity affect inside ownership following initial public offerings (IPOs). Prior work also shows that managerial ownership varies with a firm's contracting environment (Himmelberg, Hubbard, and Palia 1999) and exposure to takeover threats (Cheng, Nagar, and Rajan 2005). Lastly, other studies identify legal origin, investor protection, politics, and labor relations as country-level determinants of ownership structure.[46]

We add to the above literature in several ways. First, we study an unexplored issue—how product market competition affects corporate ownership structure in closely held firms. Second, we provide new evidence that competition not only mitigates manager-shareholder

[46] See, for example, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998), Djankov et al. (2008), Foley and Greenwood (2009), Roe (2000), and Mueller and Philippon (2011).

conflicts in widely held public firms, but also reduces agency conflicts among shareholders in closely held firms. Third, our results suggest that the agency conflicts among shareholders are an economically important driver of ownership structure decisions in closely held firms. Overall, we highlight a novel channel—the realignment of shareholder incentives through ownership structure adjustments—by which competition enhances economic efficiency.

3.2 Data, sample formation, and main variables

3.2.1 Data sources and sample formation

Our firm-level data come from the Amadeus and Orbis databases of the Bureau van Dijk (BvD). Amadeus and Orbis contain detailed financial, ownership, and management information on public and private firms. To construct an annual panel of financial data, we cumulatively combine multiple updates of these databases in order to add back firms deleted from more recent updates, which eliminates survivorship bias. Each Amadeus/Orbis update provides cross-sectional data on firms' shareholders most recently verified by BvD. The shareholder-level data contain the name, stake, and type of each shareholder, as well as the date as of which the shareholder information is valid. Using multiple Amadeus and Orbis updates, we are able to construct an annual panel of ownership data with near-complete information on all shareholders' identities and stakes. BvD databases also contain data on firms' management teams, which are collected primarily from official company registrars. Similar to ownership data, each Amadeus/Orbis update provides cross-sectional data on the names and positions of firms' executive officers and directors most recently verified by BvD. The resulting panels of financial, ownership, and management information give a unique breadth of cross-sectional coverage in 2002–11.[47]

We build our sample starting from the overlap of the above three panels and require firms to have legal forms that entail a limited liability structure. We apply the following screens. First, since our main measure of competition is import penetration, we focus on manufacturing firms—that is, firms with primary NACE (Statistical Classification of Economic Activities in the European Community) codes in 1000–3600 (industry affiliation is defined at the four-digit NACE level throughout the paper). Second, we keep firms for which

[47] The list of updates from the Amadeus and Orbis databases that we use is provided in Appendix B.2, Section 1.

the sum of recorded shareholders' stakes is at least 95% of the total equity.[48] Third, we exclude subsidiary firms—that is, those with ownership by parent companies larger than or equal to 50%. Fourth, we drop firms with less than 0.5 million euro in total assets and firms with ages between 1 and 5 years.[49] Fifth, to examine the concentration of outside ownership, we require firms to have at least one outside shareholder. We also exclude professionally managed firms—that is, firms with zero inside ownership.[50] Finally, we require that all variables used in our regressions are non-missing. Our main sample contains 194,524 firm-years from eighteen countries over 2002–11.

3.2.2 Construction of main variables

Our main measure of product market competition is import penetration. Compared with other competition measures, import penetration is more exogenous, because it is driven by the exporting decisions of foreign competitors that are largely outside the control of our sample firms. Import penetration is widely used in the literature (Bertrand 2004; Cunãt and Guadalupe 2005, 2009a,b; Guadalupe and Wulf 2010; Bloom, Sadun, and Van Reenen 2010) as a proxy for competition shocks. Moreover, with an endogenous market structure, other measures of competition, such as concentration indices, poorly capture competition (Schmalensee 1989; Raith 2003; Sutton 2007). Following Bertrand (2004) and Bloom, Sadun, and Van Reenen (2010), we compute import penetration as the ratio of imports to imports plus domestic production. We construct this variable at the country-industry-year level using trade data from Eurostat's Comext database and domestic production data from Eurostat's Structural Business Statistics (SBS) database. To mitigate the concern that firms' industry

[48] This sample screen ensures that we include only firms with close to complete shareholder structure. A potential concern is that this screen can affect our result on competition and ownership concentration if firms with a higher number of shareholders are less likely to pass the 95% threshold. This sample selection mechanism, however, works against finding the result that firms disperse their ownership in response to increasing competition because such firms are more likely to be excluded from our sample.

[49] Due to financing frictions stemming mainly from asymmetric information, the majority of newly created firms are set up with similar ownership structures—they have close to 100% inside ownership and very limited outside ownership dispersion. Seventy percent of firms in our data with ages between 1 and 5 years have no outside ownership, and, among these firms, 60% are solely owned by one inside shareholder. Age 6 is the 25th percentile of the age distribution based on all firms in BvD databases. As firms grow older, they adjust toward their respective distinct ownership structures (see Section 3.3.2 for evidence and additional discussion).

[50] Our main results are unchanged if we relax both ownership requirements. See Table B.5, Panel A, in Appendix B.3.

choices may be endogenous, we define import penetration based on each firm's industry affiliation in the first year it appears in our data and we hold this industry constant over the sample period.

As an alternative measure of competition, we construct import penetration using only imports from low-wage countries outside of Europe (Bernard, Jensen, and Schott 2006; Autor, Dorn, and Hanson 2013). This measure focuses on the most competitive imports—those that originate from countries with a large labor cost advantage. This is especially relevant for the firms in our sample, since European manufacturers experienced a significant increase in import penetration from low-wage countries over our sample period due to the structural change in international trade triggered by the entry of China into the World Trade Organization in 2001 (Bloom, Draca, and Van Reenen 2016). Following Aghion et al. (2005), we use the Lerner index as another alternative competition measure. The Lerner index captures the average profitability of firms in an industry, and thus reflects competition from all sources, both domestic and abroad. Detailed information on the construction of all our competition measures is in Appendix B.1.

We construct two main ownership variables. Inside ownership is the fraction of a firm's total equity held by shareholders who concurrently hold an executive position or directorship in the firm. To identify such inside shareholders, we match, within each firm-year, the list of individual shareholders' names with the list of executive officers' and directors' names using string matching techniques.[51] The second ownership variable, *Outside HHI*, captures the concentration of equity stakes held by outside—that is, non-managing, shareholders. In order to separate the level of inside ownership from ownership concentration, *Outside HHI* is computed as the conditional Herfindahl-Hirschman index (HHI) of equity stakes among outside shareholders. We also define overall ownership concentration, *Total HHI*, as the Herfindahl-Hirschman index of the stakes of all shareholders. As an alternative, we apply a broader definition of inside shareholders that includes their family members, and name our two ownership variables under this definition *Inside ownership_family* and *Outside*

[51] See Appendix B.2, Section 5, for a detailed description of our matching algorithm.

HHI_family.[52] Analyses using this alternative definition are reported in Table B.3 in Appendix B.3.

3.3 Sample overview

3.3.1 Sample statistics

Table 3.1 describes our sample. Panel A reports the summary statistics for ownership, competition, and control variables for our main sample and an alternative sample that includes family members in the definition of inside shareholders.[53] The average *Inside ownership* is 58.02%, and 62.25% when family members are included as inside shareholders. The concentration among outside shareholders (*Outside HHI*) is 75.13%, and 78.06% in the alternative sample. The average firm age in our main sample is 22.57 years since incorporation, and the average firm size is 5.33 million euro. Unlike prior studies of diffuse ownership structures of large public firms, our sample focuses on predominantly private firms with highly concentrated ownership structures. In Table 3.1, Panel B, we report the country averages of our ownership variables and the number of observations in each country. Ownership structure is fairly concentrated in all countries in our sample, even in such countries as the United Kingdom, France, and Germany.

In Figure 3.1 we present the histograms of shareholder-level ownership stake, and firm-level *Number of shareholders*, *Inside ownership*, *Outside HHI*, and *Total HHI* (overall ownership concertation). The distributions of these variables are discrete, with density clustered at a few key values. The most frequent stakes are 100%, 50%, 33.3%, 25%, 20%, and 10%, consistent with many firms splitting their equity equally among a small number of shareholders. Most firms have fewer than ten shareholders. *Inside ownership*, *Outside HHI*, and *Total HHI* also cluster at a few values.

The discreteness of the ownership structure variables in our sample implies that, conditional on ownership changes occurring, the changes are typically large in magnitude. For example, a transition from one to two outside shareholders is arguably a major shift in a

[52] The family members of inside shareholders are identified by matching on shareholders' last names (see Appendix B.2, Section 5, for details).

[53] The two samples have different sample sizes because we exclude professionally managed firms and require that a firm has at least one outside shareholder.

firm's outside ownership concentration. Furthermore, since ownership stakes are highly concentrated, any shareholder turnover is likely to be accompanied by large changes in inside ownership. The ownership changes in our sample will therefore lead to large changes in the incentives of shareholders and the agency conflicts among them. Our sample is thus suitable for testing our hypotheses.

3.3.2 Firm life cycle and ownership structure

To understand the life-cycle pattern of firms' ownership structure, we plot the averages of ownership characteristics against firm age 1 to 60 based on all European manufacturing firms in BvD from 2002 to 2011. Figure 3.2, Panel A, shows that, as firms grow older, the average *Inside ownership* decreases from 80% at firm creation to 60% at age 60. This decrease is accompanied by an increase in the *Number of outside shareholders*, while the *Number of inside shareholders* remains approximately constant. This evidence suggests that inside shareholders' stakes flow to outside shareholders along firms' life cycles. In line with this view, Figure 3.2, Panel B, shows that both the overall ownership concentration (*Total HHI*) and the concentration among outside shareholders (*Outside HHI*) decrease as firms grow older. To control for these life-cycle patterns, we include both firm age and size and their quadratic terms in all our regressions.

Figure 3.3 examines the cross-sectional variation of ownership structures along firms' life cycles. Panel A plots the standard deviations of *Inside ownership* and *Outside HHI* within each age group from age 1 to 60. The ownership variables exhibit greater variability as firms grow older. This finding stands in contrast to the decreasing trend in the variability of firms' financials (Panel B), where the standard deviations of firm size, tangibility, and capital expenditures (capex) all flatten out after age 20. The evidence in Figures 3.2 and 3.3 is consistent with most firms being set up with almost identical "founder-managed" ownership structures and gradually adjusting toward their optimal ownership structures over time.

3.4 Main results

3.4.1 Panel regressions

To examine the effect of competition on ownership structure, we estimate the following panel data regression:

$$Ownership\ Characteristic_{ijc,t} = \alpha + \beta \cdot Product\ Market\ Competition_{jc,t-1} + \gamma \cdot X_{ijc,t-1} + Country \times Year\ FE_{c,t} + Industry\ FE_j + Legal\ form\ FE_i + \varepsilon_{ijc,t}, \quad (3.1)$$

where *i*, *j*, *c*, and *t* denote firm, industry (four-digit NACE), country, and year, respectively. All independent variables are lagged one year relative to the dependent variable. $X_{ijc,t-1}$ is the vector of firm-year level control variables. To capture the stage of a firm's life cycle, we include firm age and size (in logarithms) and their quadratic terms as controls. We also control for asset tangibility, which can affect firms' access to external finance.[54]

We include country-by-year fixed effects to control for time-varying macroeconomic and regulatory conditions in each country, and to absorb other unobserved determinants of ownership at the country-year level. We also include four-digit NACE industry fixed effects to control for time-invariant industry unobservables that may correlate with both product market competition and ownership structure. The identification thus comes from within-industry variation in competition over time and across countries. Finally, we include legal form fixed effects to control for variation in ownership structures across firms with different forms of incorporation.

In Table 3.2, Panel A, columns 1 and 3 present the ordinary least squares (OLS) estimates of regression (1) where we measure competition using *Import penetration*. In column 1, we reject the null hypothesis that *Inside ownership* does not vary with *Import penetration* at the 1% level and show that more intense competition is associated with lower inside ownership. There is a negative, albeit concave relation between inside ownership and firm size and age, consistent with firms having more outside ownership as they grow. Further, firms with higher tangibility have higher inside ownership, consistent with these firms having higher debt capacity and thus being less reliant on outside equity.

In column 3, we reject the null hypothesis that *Outside HHI* does not vary with *Import penetration* at the 1% level and show that more intense competition is negatively associated with the concentration of outside ownership. We show that outside ownership concentration is negatively related to firm size and age, consistent with more outside shareholders entering

[54] Our results are robust to controlling for additional firm-year-level variables investment (*Capex/total assets*) and financial leverage (*Leverage*), country-industry-year-level variables M&A volume (*Industry M&A*), the average book-to-market equity ratio of listed firms (*Industry B/M*), foreign direct investment (*Industry FDI*), the propensity to export (*Export openness*), and industry business cycle (*Industry output growth*). All variables are defined in Appendix B.1. The results are provided in Table B.8 in Appendix B.3.

the ownership structure as firms grow. Less tangible firms have more concentrated outside ownership, consistent with higher information asymmetry and hence a higher need for large shareholder monitoring in these firms.

3.4.2 Addressing endogeneity

In this section, we address the possibility that the relation between competition and ownership structure is spurious due to endogeneity. For example, governments in some countries may place foreign ownership restrictions on firms in industries that are also protected from import competition, which may correlate with the firms' outside ownership. Another possible concern is reverse causality. For example, ownership structure may affect firms' ability to lobby against foreign exporters and therefore the competition they face. To establish the causal effect of competition on ownership structure, we employ two approaches: instrumental variables estimation and within-firm change regression.

3.4.2.1 Instrumental variables estimation

We employ two instruments. First, following Revenga (1992), Bertrand (2004), and Cuñat and Guadalupe (2009a), we use source-weighted industry exchange rate movements to generate exogenous variations in *Import penetration*. For each country-industry-year, we compute the weighted average of the natural logarithm of real exchange rates between the home country and foreign partner countries (expressed as the amount of foreign currency per unit of home currency), with weights being the shares of imports from each foreign country out of total imports by the home country in that industry in the pre-sample period 1998–2000 (see Appendix B.1 for details). This real exchange rate index, *Foreign exchange rate*, is positively correlated with *Import penetration* because higher exchange rates make foreign goods cheaper in the home country, which encourages imports.[55] Following Cuñat and Guadalupe (2009a), we show that the instrument is unrelated to export openness (see Table B.1, Panel B, in Appendix B.3). This evidence suggests that our instrumental variables estimates are unlikely to capture any indirect effects through changes in exports, lending support to the exclusion condition.

[55] *Foreign exchange rate* is computed using real exchange rates throughout the paper. Table B.7 in Appendix B.3 shows that our results are robust to using nominal exchange rates (i.e., unadjusted by Consumer Price Index) instead.

Second, following Autor, Dorn, and Hanson (2013) and Hummels et al. (2014), we construct an instrument that captures the variation in import penetration stemming from the world supply growth of exporting countries in each industry. The world export supply growth reflects the comparative advantage of exporting countries relative to Europe that arises from changes in production or the opening of trade in these countries, which are largely independent of home countries' local conditions that may influence the ownership structure of our sample firms. For each country-industry, we first compute the pre-sample period (1998–2000) average import penetration. We then project it into our sample years using the growth of the partner countries' weighted ex-EU world export supply in that industry, with the weights being the pre-sample-period import shares of partner countries in the country-industry. We name this instrument *Ex-EU export supply*.

In Table 3.2, Panel A, columns 2 and 4 present our instrumental variables estimation results. The sample and specifications are the same as in columns 1 and 3, except that we instrument *Import penetration* using *Foreign exchange rate* and *Ex-EU export supply*. *Import penetration* continues to have a negative and statistically significant effect on inside ownership and outside ownership concentration. A one-standard-deviation increase in *Import penetration* is associated with a 0.92-percentage-point decrease in *Inside ownership* and a 1.36-percentage-point decrease in *Outside HHI*. This finding is economically important because it corresponds to a decrease in *Inside ownership* (*Outside HHI*) over a ten-year (nine-year) period based on the estimated relation between *Inside ownership* (*Outside HHI*) and firm age.[56]

The bottom of Panel A in Table 3.2 presents the first-stage results. We find that *Foreign exchange rate* and *Ex-EU export supply* positively and significantly predict *Import penetration*. Partial F-statistics for the instruments are large, suggesting that our instruments are strong and unlikely to be biased toward the OLS estimates (Bound, Jaeger, and Baker 1995; Staiger and Stock 1997). Lastly, we conduct the Anderson-Rubin test, which provides statistical inferences on *Import penetration* that are robust to the weak instrument

[56] Our IV estimates are larger in magnitude than OLS estimates, which suggests that, in our sample, the endogeneity of import penetration introduces a bias that goes against our main findings. This can occur, for example, because industries with worse (unobserved) investment opportunities may be easier to enter by foreign competitors. At the same time, worse investment opportunities dampen the supply of external equity, leading to more concentrated ownership structure.

problem (Stock, Wright, and Yogo 2002). As shown in the last two lines of Table 3.2, Panel A, the Anderson-Rubin (A-R) χ^2-statistics strongly reject the null hypothesis that the coefficients on *Import penetration* are zero in both columns 2 and 4.

To account for the fact that some firms in our sample operate in multiple sectors, following Cuñat and Guadalupe (2009a), we reconstruct all industry-level variables (including *Import penetration* and our two instruments) as simple averages of industry-year values across the sectors in which each firm operates the first year it appears in our sample. To obtain all sectors in which each firm operates, we combine all primary and secondary NACE codes reported in BvD's Amadeus and Orbis databases. The results, reported in Table B.6 in Appendix B.3, remain qualitatively unchanged.

3.4.2.2 Within-firm change regressions

To control for time-invariant firm-specific heterogeneity, we estimate within-firm change regressions. According to Figure 3.2, ownership structure is very persistent. Using firm fixed effects would therefore likely result in biased inference.[57] For this reason, we follow Autor, Dorn, and Hanson (2013) and Bloom, Draca, and Van Reenen (2016) and employ a long-window (five-year) change regression specification. For each firm in our sample, we compute the five-year rolling window differences of all dependent and independent variables and form a panel of five-year differences. Using this approach, we ask whether temporal changes in import penetration lead to changes in ownership structure. We also include year and industry fixed effects to absorb unobservable temporal shocks and industry trends. To address any remaining endogeneity concerns, we instrument changes in import penetration with changes in our two instruments—*Foreign exchange rate* and *Ex-EU export supply*—over the same five-year windows. The within-firm change regression is

$$\Delta_{t\to t+5}\, Ownership\ Characteristic_{ijc} = \alpha + \beta \cdot \Delta_{t-1\to t+4} Product\ Market\ Competition_{jc} + \gamma \cdot \Delta_{t-1\to t+4} X_{ijc} + Year\ FE_t + Industry\ FE_j + \varepsilon_{ijc}. \quad (3.2)$$

Table 3.2, Panel B, presents the OLS and the instrumental variables estimates of regression (2). Consistent with the findings from the panel regressions, an increase in *Import penetration* decreases inside ownership and outside ownership concentration.

[57] In a panel regression with slow-moving variables such as ours, using firm fixed effects could exacerbate the measurement error problem and lead to biased estimates (Griliches and Mairesse 1995; Zhou 2001; Roberts and Whited 2012).

3.4.3 Ordered probit regressions

To account for the fact that our ownership variables have discrete non-Gaussian distributions on a bounded support (as highlighted in Section 3.3.1), we transform them into ordinal variables and employ an ordered probit specification. This transformation is also important in economic terms since, by making the variables ordinal, we explicitly acknowledge the presence of key ownership thresholds that correspond to discontinuous changes in shareholders' incentives. For example, when inside ownership increases from 49% to 51%, this increase triggers a complete shift in inside shareholders' control over the firm, while the same two-percentage-point increase from 51% to 53% leads to a negligible increase in control. We construct ordered categorical ownership variables based on the key cutoff points identified from the histograms in Figure 3.1. Specifically, for inside ownership, the new variable takes values of 1, 2, and 3, which correspond to *Inside ownership* values of (0%, 50%], 50%, and (50%, 100%), respectively. For outside ownership concentration, the new variable takes values of 1, 2, and 3, which correspond to *Outside HHI* values of (0%, 33.33%), [33.33%, 50%), and [50%, 100%), respectively.

To address the endogeneity of *Import penetration* in the ordered probit regressions, we employ the control function approach. In a two-step framework, we first regress *Import penetration* on *Foreign exchange rate*, *Ex-EU export supply*, control variables, and fixed effects to obtain the vector of residuals from this OLS regression. We then include the vector of residuals as an additional regressor in the second-stage ordered probit specification, regressing ownership characteristics on *Import penetration*, control variables, and fixed effects (see Edmans, Goldstein, and Jiang 2012 for a similar approach).

Table 3.3 presents our ordered probit estimates. Consistent with the results in Table 3.2, import penetration continues to have a negative and significant effect on both inside ownership and outside ownership concentration. In summary, combining all the results presented in Tables 3.2 and 3.3, we conclude that competition has a causal effect on corporate ownership structure: high competition causes firms to reduce their inside ownership and to bring in more diverse outside shareholders.

3.4.4 Competition and overall ownership concentration

While outside shareholders do not hold managerial positions, in closely held firms, these shareholders can be quite involved in firms' day-to-day operations without a formal title, which introduces noise in our classification of inside and outside shareholders. To evaluate whether such possible misclassification of shareholders affects our results, we also examine the effect of competition on overall ownership concentration (*Total HHI*). We show in Table 3.4 that firms exposed to more intense competition have lower overall ownership concentration. This result is statistically and economically significant, and obtains using all specifications we introduced in Tables 3.2 and 3.3 for our main results.

3.5 Channels through which competition affects ownership structure

In this section, we explore four channels through which competition can lower inside ownership and increase the dispersion of outside ownership. We first use cross-sectional tests to investigate whether our results exhibit heterogeneity that is consistent with the predictions of each of our channels. We then gauge the relative importance of these channels in explaining our results.

3.5.1 Heterogeneity of the effect of competition on ownership structure

If competition affects ownership structure through the external equity channel, the effect should be larger in industries where, due the nature of technology employed, firms' reliance on external equity increases more following a competition shock. To test this prediction, we interact competition with industry-level external finance sensitivity (*EFS*). For each industry, we estimate the relation between changes in firms' external equity use and changes in import penetration using U.S.-listed firms in 1980–99. Specifically, we obtain estimates of *External finance sensitivity*, EFS_j, for each industry j from regression $\Delta\, Equity\ capital_{ij,t} = \sum_j EFS_j \times \Delta\, Import\ penetration_{j,t-1} \times Ind_j + Year\ FEs + \varepsilon_{ij,t}$, where $\Delta\, Equity\ capital_{ij,t}$ is the change in equity capital (total common equity minus retained earnings) for firm i in industry j from year $t-1$ to year t scaled by total assets in year $t-1$,

$Import\ penetration_{j,t-1}$ is the change in import penetration in industry *j* from year *t–2* to year *t–1*, and Ind_j is an indicator variable equal to 1 if a firm-year is in industry *j* in year *t*.[58]

The logic and assumptions behind our *EFS* measure closely follow those used by Rajan and Zingales (1998) for their external finance dependence measure. Namely, we assume that large listed U.S. firms have relatively unconstrained access to external finance, and the variation in *EFS* across industries therefore reflects industries' differential technological demands for external equity following a competition shock. We also assume that such technological differences in industries' *EFS* carry over from the United States to other countries, especially to European countries that have a broadly similar economic structure. Since the estimates of *EFS* are obtained using U.S.-listed firms over a time period that precedes our sample period, this measure is arguably exogenous to our sample firms.

Table 3.5 presents the results of the regressions where we interact *Import penetration* with *EFS*. We find that the effect of competition on inside ownership and outside ownership dispersion is larger in industries with higher *EFS*. This result is consistent with the prediction of the external equity channel.

To investigate whether competition affects ownership structure through the entrenchment channel, we rely on the argument in Demsetz and Lehn (1985) that some industries provide a larger amount of private control benefits to corporate insiders due to the nature of business or outputs produced in these industries. The effect of competition on ownership structure should be larger in industries with larger amounts of private control benefits, because competition can reduce such benefits by more for firms in these industries. To test this prediction, we interact competition with an industry-level measure of private control benefits, *Entrenchment*, computed as the industry average of the firm-level entrenchment index (E-index) of U.S.-listed firms from Bebchuk, Cohen, and Ferrell (2009). The results in Table 3.6 confirm that the effect of competition on inside ownership and outside ownership dispersion is larger for firms in higher *Entrenchment* industries, which supports the entrenchment channel.[59]

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[58] The regression specification closely follows Table 8 of Xu (2012), who shows that import penetration leads U.S. firms to lower leverage by issuing equity and selling assets to repay debt. We extend her approach and estimate *EFS* at the industry level. In Panel C of Table B.1 in Appendix B.3, we also confirm her result that an increase in import penetration leads to greater net equity issuances by U.S.-listed firms.

[59] In Table B.1, Panel D, in Appendix B.3, we show that *Entrenchment* is positively associated with inside ownership and outside ownership concentration, consistent with shareholders holding concentrated stakes to enjoy

We also examine the role of country institutions in the effect of competition on ownership structure. In countries with better institutions, as measured by stronger contract enforcement, property rights, control of corruption, and rule of law, raising outside equity is relatively easier. If the external equity channel operates in our sample, the effect of competition on ownership structure should be larger for firms in countries with better institutions, because such firms are more able to raise new equity in response to larger external equity needs induced by more intense competition. At the same time, better institutions arguably limit the amount of private control benefits that entrenched corporate insiders can extract, and hence limit the extent to which competition can reduce the diversion of such benefits. If the entrenchment channel operates in our sample, the effect of competition on ownership structure should be smaller in countries with better institutions. In Table 3.7, we show that, for all country institution variables and different specifications, the effect of competition on inside ownership and outside ownership dispersion is larger in countries with better institutions. This result suggests that the external equity channel is the driving force of ownership structure in our sample.

If competition affects ownership structure through the diversification channel, the effect should be stronger in industries where competition leads to bigger increases in bankruptcy costs or cash-flow volatility. To test these predictions, we interact competition with redeployability of firms' real assets and industry-level sensitivity of firms' cash-flow volatility to competition. In Table 3.8, Panels A and B, we show that the effect of competition on ownership structure is unrelated to the redeployability of firms' real assets (Kim and Kung forthcoming), which affects liquidation values and thus the amount by which competition shocks change expected bankruptcy costs.

Next, analogous to the *EFS* measure, we estimate industry-level sensitivity of firms' cash-flow volatility to import penetration using U.S.-listed firms in 1980–99. Specifically, we obtain estimates of *Risk sensitivity*, RS_j , for each industry j from the regression $Cash-flow\ volatility_{ij,t\to t+2} = \sum_j RS_j \times Import\ penetration_{j,t-1} \times Ind_j + \sum_j Ind_j + Year\ FEs + \varepsilon_{ij,t}$, where $Cash\ flow\ volatility_{ij,t\to t+2}$ is the standard deviation of annual cash flow to total asset ratios for firm i in industry j from year t to year $t+2$, $Import\ penetration_{j,t-1}$ is the

greater private control benefits in higher *Entrenchment* industries. This result suggests that private control benefits are an important consideration for shareholders in our sample.

import penetration in industry *j* in year *t−1*, and Ind_j is an indicator variable equal to 1 if a firm-year is in industry *j* in year *t*.[60] In Table 3.8, Panels C and D, we find that the effect of competition on ownership structure is unrelated to *RS*. We conclude that shareholders' portfolio risk considerations do not drive our results.

If competition affects ownership structure through the managerial skills channel—that is, competition increases firms' demand for better management and renders the managerial skills of existing inside shareholders obsolete, it should result in increased hiring of new professional managers, who should come from third parties outside of the firm rather than from existing inside shareholders. However, we find no support for these predictions. Table 3.9 shows that the hiring of new professional managers is unrelated to competition. Moreover, professional managers are more likely to come from current inside shareholders rather than from third parties outside of the firm when competition intensifies. We conclude that the need to adjust management skills to more competitive environments does not drive our results. Overall, our cross-sectional tests support the external equity and entrenchment channels, while we find no support for the diversification or managerial skills channel.

3.5.2 Decomposition of the effect of competition on ownership structure

To assess the extent to which the external equity and entrenchment channels explain our results, we decompose the effect of competition on ownership structure by assigning our firms into four categories based on the type of shareholder-level ownership changes they experience: *Pure shareholder entry*, *Shareholder and professional manager entry*, *Incumbent shareholder switching*, and *Incumbent shareholder exit* (see Appendix B.1 for detailed definitions). We create an indicator variable for each category and interact each of these indicators with Δ *Inside ownership* and Δ *Outside HHI* to create eight new dependent variables.[61] We then use these new dependent variables in within-firm change regressions to decompose the estimated effect of competition on ownership structure into four parts.

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[60] The regression specification closely follows Table 10 of Irvine and Pontiff (2009). We extend their approach and estimate *RS* at the industry level. In Panel E of Table B.1 in Appendix B.3, we also confirm their results that an increase in import penetration leads to higher cash-flow volatilities among U.S.-listed firms in 1980–99.

[61] The four categories are mutually exclusive but not exhaustive; we focus on the main types of ownership structure changes we observe in the data. Table 3.10, Panel C, tabulates the frequencies of the four indicator variables and reports the sample means of the new interacted dependent variables.

In Table 3.10, Panels A and B, we show that ownership structure adjustments to competition are driven primarily by the entry of new shareholders into firms' ownership structures (*Pure shareholder entry*) and by existing inside (outside) shareholders becoming outside (inside) shareholders (*Incumbent shareholder switching*). These two categories together account for 91% and 77% of the within-firm decreases in inside ownership and outside ownership concentration, respectively. Specifically, 19% of the effect of competition on inside ownership and 37% of the effect on outside ownership concentration are explained by the entry of new shareholders, while 72% and 40% of the above respective effects are explained by inside shareholders becoming outside shareholders through relinquishing managerial positions. These results support the external equity channel, wherein more intense competition makes firms raise additional equity from third parties outside of the current shareholder base.[62] These results are also consistent with inside shareholders quitting managerial positions because competition reduces private control benefits associated with being in management, which corroborates the entrenchment channel.

3.6 Additional analyses and robustness tests

3.6.1 Competition, ownership structure change, and firm performance

If competition helps to align incentives of shareholders by changing firms' ownership structure, we should observe better performance for firms that, in response to competition shocks, changed their ownership structures optimally. To this end, we compare the performance of firms that experienced different types of ownership structure changes under different competition shocks. Table 3.11 employs within-firm change regressions to examine the relation between ownership changes and changes in firms' reported profitability (EBITDA divided by total assets). The independent variable *Ownership change_diffuse* is an indicator equal to 1 for firms that decreased *Inside ownership* or *Outside HHI* over a five-year window, while *Ownership change_concentrate* is an indicator equal to 1 for firms that increased *Inside ownership* or *Outside HHI*. In all regressions, the baseline group is firms that did not

[62] In Panel F of Table B.1 in Appendix B.3, we show that the entry of new shareholders is associated with equity issuance.

experience any ownership changes (i.e., *Ownership change_diffuse* = 0 and *Ownership change_concentrate* = 0).[63]

Columns 1 and 2 show that firms that changed their ownership structure on average perform better than those that did not change ownership. This result is driven by firms that reoptimized their ownership according to the predictions of our hypothesis. Specifically, when competition intensifies, firms that diffused their ownership perform better than those that did not change or concentrated their ownership (columns 3 and 4); when competition weakens, firms that concentrated their ownership perform better than those that did not change or diffused their ownership (columns 5 and 6). Although these results are associations rather than causal effects, they are consistent with competition inducing firms to reoptimize their ownership structures to better align shareholders' interests and mitigate inefficiencies associated with shareholder conflicts.

3.6.2 Competition and control structure

An important aspect of corporate ownership structure is the distribution of control rights among a firm's shareholders or shareholder coalitions. To examine the effect of competition on control structure, we employ several proxies for the strength and dispersion of control rights by inside and outside shareholders. The first proxy is an indicator variable equal to 1 if a firm's *Inside ownership* is greater than or equal to 50%. The second proxy is the Shapley-Shubik power index (SSI; Shapley and Shubik 1954) of inside shareholders.[64] Lastly, analogous to *Outside HHI*, we use the conditional Herfindahl-Hirschman index of outside shareholders' SSIs to capture the concentration of control rights among outside shareholders. In Table B.2 in Appendix B.3, we show that inside shareholders are more likely to lose control of the firm as competition intensifies. We also find that more intense competition increases the dispersion of control rights among outside shareholders. These results suggest that competition leads to changes in corporate control structure.

[63] In this analysis, we drop firms that increased (decreased) *Inside ownership* and, at the same time, decreased (increased) *Outside HHI*.

[64] SSI is defined as the fraction of all possible voting sequences in which a shareholder (or a coalition of shareholders) is pivotal in guaranteeing the passage or failure of a proposal. When computing this index, we assume that inside shareholders form a voting coalition when making decisions about the firm. Section 6 of Appendix B.2 provides more details on the computation of SSI.

3.6.3 Including family members in the definition of inside shareholders

As discussed in Section 3.2.2, we also apply a broader definition of inside shareholders that includes their family members (see Appendix B.2 for details on the identification of family members). We name our two ownership variables under this alternative definition *Inside ownership_family* and *Outside HHI_family*. We replicate our main analyses using these alternative definitions and report the results in Table B.3 in Appendix B.3. Our results remain qualitatively the same.

3.6.4 Alternative measures of competition

3.6.4.1 Import penetration from low-wage countries.

To focus on the most competitive imports (see Section 3.2.2), we reconstruct import penetration using imports from low-wage countries outside of Europe. Table B.4, Panel A, in Appendix B.3 presents the results obtained using this alternative competition measure. Our results continue to hold.

3.6.4.2 Lerner index.

We use the Lerner index as an alternative measure of competition in order to capture the full extent of competition a firm faces—that is, both domestic and foreign competition. In Table B.4, Panel B, in Appendix B.3, we estimate our main regressions using the Lerner index and find that all our results remain unchanged.[65]

3.6.5 Alternative samples

3.6.5.1 Removing ownership restrictions.

Our main sample excludes professionally managed firms and firms with no outside shareholder. We show that our findings are robust to removing these restrictions—that is, including firms with 0% and firms with 100% inside ownership. Table B.5, Panel A, in Appendix B.3 presents the results obtained using this alternative sample.

[65] Since *Foreign exchange rate* and *Ex-EU export supply* do not correlate strongly with the Lerner index, we do not instrument the Lerner index to avoid the weak instrument problem.

3.6.5.2 Excluding listed firms.

Our sample contains a very small number (502 firm-years) of listed firms. In Table B.5, Panel B, in Appendix B.3, we show the robustness of our results to excluding listed firms.

3.6.5.3 Firms owned solely by individuals.

Although our main sample excludes firms that are subsidiaries, there are still firms with ownership stakes by other firms. In Table B.5, Panel C, in Appendix B.3, we reestimate our main regressions on the subsample of firms owned exclusively by individuals or households, and confirm that firms with stakes by institutional or corporate shareholders do not drive our results.

3.6.5.4 Excluding firms with subsidiaries.

To address the possibility that the ownership structure of the ultimate company may reflect the external environment faced by its subsidiaries and thereby affect our results, we also exclude from our sample firms that have any ownership stake in other firms. Table B.5, Panel D, in Appendix B.3 shows that our results are unchanged.

3.6.5.5 Excluding potential exporters.

To the extent that some firms, due to their exporting activities, may also compete in foreign markets, import penetration may not capture the full extent of competition such firms face. To address this possibility, we exclude potential exporters from our sample. Since foreign sales coverage is sparse in BvD data, we define potential exporters as the largest 18% of our sample firms. This cutoff is based on the proportion of manufacturing firms that export in Bernard, Jensen, Redding, and Schott (2007). Table B.5, Panel E, in Appendix B.3 shows that our results continue to hold.

3.6.5.6 Excluding U.K. firms.

Due to its complete coverage of firms and close to full compliance with reporting requirements, the United Kingdom has a big weight in our sample. To ensure that this single country does not drive our results, in Table B.5, Panel F, in Appendix B.3, we present the results obtained using the subsample excluding U.K.-incorporated firms. Our results continue to hold.

3.6.5.7 U.K. firms only.

Finally, to show that our results are not driven by differential coverage of firms across countries, in Table B.5, Panel G, in Appendix B.3, we focus on firms incorporated in the United Kingdom for which the coverage is almost complete. We continue to find similar results within this single country.

3.7 Conclusion

Using a large panel of closely held firms from eighteen European countries over 2002–11, we show that product market competition has a causal effect on corporate ownership structure. Firms in highly competitive environments have lower inside ownership, and the ownership stakes of their outside shareholders are more dispersed. These results are explained by competition increasing the need to raise external equity and reducing private control benefits. Our results are consistent with theories describing ownership structure as a key internal governance mechanism that solves agency conflicts among shareholders. Our results also suggest a novel channel—the realignment of shareholder incentives through ownership structure adjustments—by which competition improves firm performance and enhances economic efficiency. Public policies aimed at reducing frictions that prevent ownership structure adjustments can be important in realizing the full benefits of competitive environments.

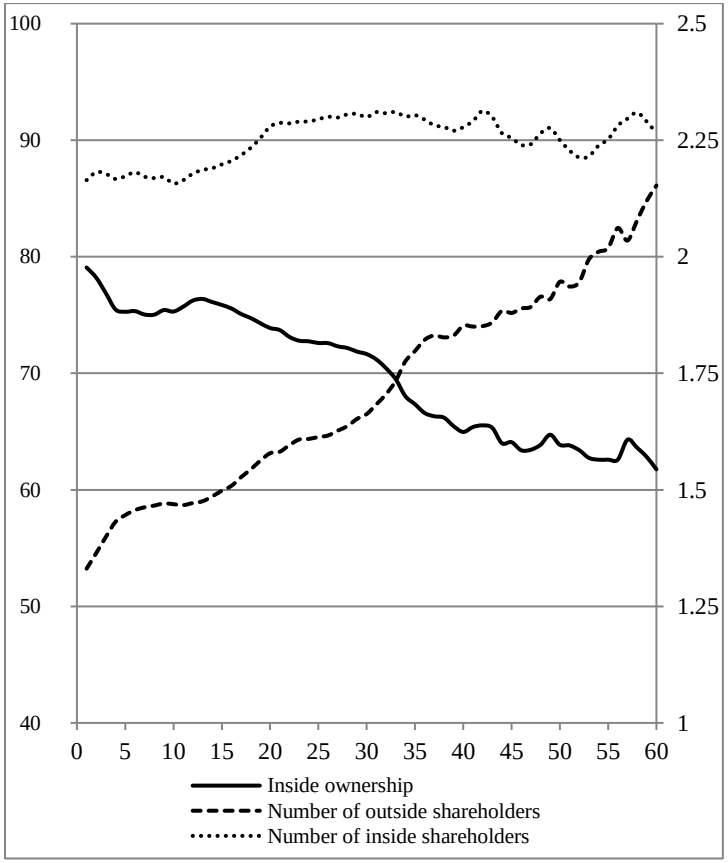
Figure 3.1 Histograms of Selected Ownership Structure Characteristics

This figure presents the histograms of selected ownership structure characteristics based on the main sample used in Table 3.2: shareholder-level ownership stake (in percent), *Number of shareholders*, *Inside ownership* (in percent), *Outside HHI* (in percent), and *Total HHI* (in percent).

Figure 3.2 Ownership Structure Characteristics by Firm Age

This figure plots averages of ownership characteristics computed for firms at different ages. The sample consists of European manufacturing firms in 2002-2011 for which we observe at least 95% ownership. The horizontal axis represents firm ages in years since incorporation from 1 to 60. In Panel A, the left vertical axis represents the average of *Inside ownership* (in percent) and the right vertical axis represents averages of the *Number of outside shareholders* and the *Number of inside shareholders*. In Panel B, the vertical axis represents averages of the conditional Herfindahl-Hirschman Index of ownership stakes (in percent) of all shareholders (*Total HHI*) and of outside shareholders (*Outside HHI*).

Panel A



Panel B

Figure 3.3 Variability of Ownership and Financial Characteristics by Firm Age

This figure plots the cross-sectional standard deviations of ownership and financial characteristics computed for firms at different ages. The sample consists of European manufacturing firms in 2002-2011 for which we observe at least 95% ownership. The horizontal axis represents firm ages in years since incorporation from 1 to 60. In Panel A, the vertical axis represents the standard deviation of *Inside ownership* (in percent) and the conditional Herfindahl-Hirschman Index of ownership stakes of outside shareholders (*Outside HHI*). In Panel B, the left vertical axis represents the standard deviation of the natural logarithm of total assets and the right vertical axis represents the standard deviation of tangibility and the capex-to-total assets ratio.

Panel A

Panel B

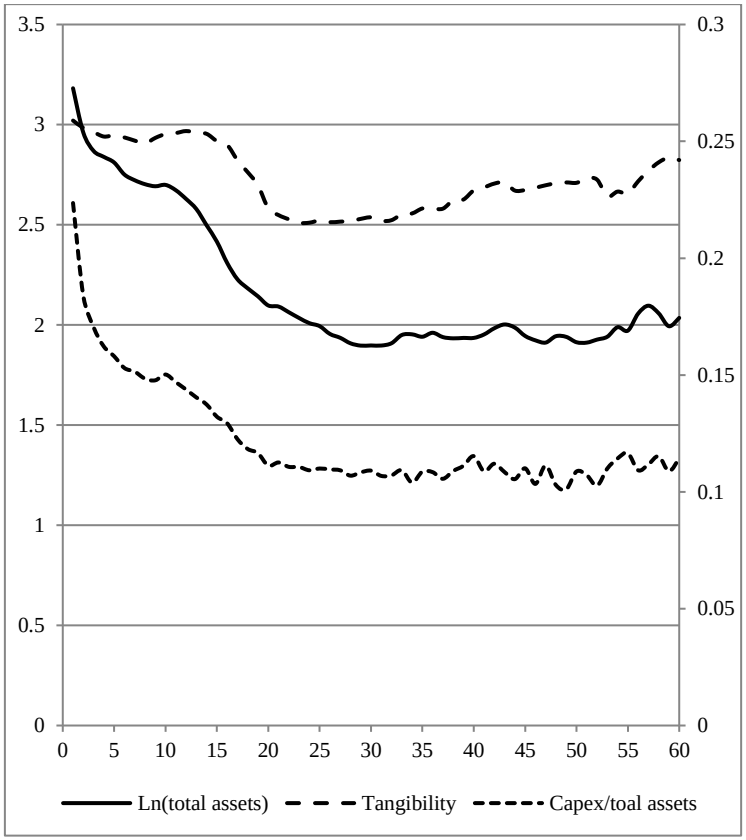


Table 3.1 Descriptive Statistics

This table presents the descriptive statistics for the sample used in Table 3.2 Panel A (the "main" sample) and the sample used in Table B.3 Panel A in Appendix B.3 (the "including-family-members" sample). The main sample has 194,524 firm-year observations from 18 European countries in 2002-2011. The including-family-members sample has 141,572 firm-year observations from the same countries and the same time period. Panel A reports the mean and standard deviation of variables defined in Appendix B.1. Ownership characteristics and firm level variables are winsorized at 1% tails. Panel B reports, for each country in the main sample, the number of firm-year observations, the average of *Inside ownership*, and the average of *Outside HHI.*

Panel A. Summary statistics

	Main sample		Including-family-members sample	
Variable name	Mean	Std. Dev.	Mean	Std. Dev.
		Ownership characteristics		
Number of shareholders	3.73	3.36	4.03	3.93
Inside ownership (%)	58.02	24.52		
Outside HHI (%)	75.13	28.97		
Number of inside shareholders	1.63	0.98		
Number of outside shareholders	2.09	3.10		
Inside ownership_family (%)			62.25	24.10
Outside HHI_family (%)			78.06	28.27
Number of inside shareholders_family			2.03	1.45
Number of outside shareholders_family			2.00	3.39
Total HHI (%)	45.20	19.86	43.75	19.92
Inside ownership ≥ 50%	0.70	0.46		
Inside ownership_SSI (%)	58.77	40.78		
Outside HHI_SSI (%)	74.04	30.17		
		Competition measures		
Import penetration	0.25	0.19	0.25	0.19
Import penetration_low wage	0.02	0.04	0.02	0.04
Lerner index	1.00	0.06	1.01	0.06
		Firm characteristics		
Age (years since incorporation)	22.57	14.86	22.63	15.23
Total assets (million Euro)	5.33	18.04	6.16	21.06
Tangibility	0.28	0.22	0.27	0.22
Capex/total assets	0.05	0.11	0.05	0.11
Leverage	0.19	0.23	0.19	0.23
Profitability	0.06	0.13	0.06	0.12
		Industry level variables		
Foreign exchange rate	0.66	1.26	0.59	1.37
Ex-EU export supply	0.49	0.51	0.49	0.52
External finance sensitivity (EFS)	0.45	2.25	0.45	2.25
Entrenchment	2.53	0.61	2.52	0.61
Asset redeployability (AR)	0.34	0.04	0.34	0.04
Industry risk sensitivity (RS)	-0.05	0.18	-0.05	0.18

Industry M&A volume	-1.34	3.41	-1.39	3.42
Industry B/M	1.11	1.82	1.11	1.67
Industry FDI	0.01	0.03	0.01	0.03
Export openness	0.37	0.29	0.37	0.29
Industry output growth	0.97	0.24	0.97	0.24
		Country level variables		
Enforceability of contracts	6.85	1.47	6.71	1.42
Property rights	4.23	0.80	4.14	0.82
Control of corruption	1.36	0.66	1.28	0.68
Rule of law	4.15	0.47	4.09	0.48

Panel B. Country distribution of sample size and ownership characteristics

Country	Number of firm-years	Inside ownership (%)	Outside HHI (%)
Austria	3,968	53.0	75.1
Bulgaria	1,230	55.4	73.4
Czech Republic	144	56.5	88.0
Estonia	591	63.5	82.1
Finland	1,157	71.0	82.7
France	18,507	53.6	74.5
Germany	31,379	58.6	78.0
Greece	10,250	64.3	75.3
Hungary	3,189	57.2	73.2
Ireland	1,589	63.0	79.8
Italy	31,415	57.8	70.2
Latvia	340	58.0	73.7
Lithuania	776	52.3	73.2
Poland	6,157	47.7	76.6
Portugal	10,912	65.8	78.8
Romania	7,892	56.5	75.7
Spain	22,882	55.5	78.4
United Kingdom	42,146	59.4	73.6

Table 3.2 Competition and Ownership Structure

This table examines the effect of competition on *Inside ownership* and *Outside HHI*. Panel A reports the results of the firm level panel OLS and instrumental variables (IV) regressions. The samples consist of manufacturing firms from 18 European countries in 2002-2011 with non-missing ownership and financial variables. We exclude firm-years with less than 0.5 million Euro in total assets, firm-years with age 1 to 5 years since incorporation, and firms that are subsidiaries of other firms. We also require that firms have at least one inside and one outside shareholder. Columns 1 and 3 present the results of OLS regressions. Columns 2 and 4 present the results of instrumental variables regressions, where *Import penetration* is instrumented with *Foreign exchange rate* and *Ex-EU export supply*. In each regression, we include country interacted with year fixed effects, industry (4-digit NACE) fixed effects, and legal form fixed effects. The bottom of the panel reports the first stage coefficients on the instruments, the partial F-statistic, and the χ^2-statistic and p-value of Anderson-Rubin weak instrument-robust test of the coefficient on *Import penetration* being different from zero. Panel B reports the results of the within-firm change regressions. To form a panel, for each firm in our sample, we compute the 5-year rolling window differences of all dependent and independent variables. Columns 1 and 3 present the results of OLS regressions. Columns 2 and 4 present the results of instrumental variables regressions, where Δ *Import penetration* is instrumented with Δ *Foreign exchange rate* and Δ *Ex-EU export supply*. The control variables are the same as in Panel A, except in 5-year rolling window differences. We also include year fixed effects and industry fixed effects. The bottom of the panel reports the first stage coefficients on the instruments, the partial F-statistic, and the χ^2-statistic and p-value of Anderson-Rubin weak instrument-robust test of the coefficient on Δ *Import penetration* being different from zero. All regressors are lagged by one year relative to the dependent variables. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and at the country-industry level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	-2.346***	-4.851***	-4.395***	-7.154***
	[0.470]	[0.885]	[0.570]	[1.017]
Ln(age)	10.217***	10.479***	22.373***	22.595***
	[0.943]	[0.955]	[1.078]	[1.081]
Ln(age)^2	-1.794***	-1.837***	-4.111***	-4.140***
	[0.153]	[0.155]	[0.176]	[0.176]
Ln(total assets)	1.325***	1.294***	-1.887***	-1.941***
	[0.112]	[0.113]	[0.127]	[0.127]
Ln(total assets)^2	-0.417***	-0.408***	-0.123***	-0.115***
	[0.038]	[0.038]	[0.042]	[0.043]
Tangibility	1.320***	1.256***	-0.702**	-0.584*
	[0.279]	[0.281]	[0.321]	[0.325]
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.048	0.048	0.046	0.045
First stage:				
Foreign exchange rate		0.016***		0.016***
		[0.004]		[0.004]
Ex-EU export supply		0.164***		0.164***
		[0.007]		[0.007]
F-stat		255.6		255.6
Weak IV robust test of Import penetration=0				
χ2-statistic		30.44***		47.99***
A-R test p-value		0.000		0.000

Panel B. Within-firm change OLS and instrumental variables regressions

	Δ Inside ownership		Δ Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Δ Import penetration	-4.172**	-22.948***	-4.419***	-9.982**
	[2.098]	[8.891]	[1.206]	[4.976]
Δ Control variables	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745
Adjusted R^2	0.041	0.037	0.010	0.009
First stage:				
Δ Foreign exchange rate		0.011***		0.011***
		[0.002]		[0.002]
Δ Ex-EU export supply		0.130***		0.130***
		[0.012]		[0.012]
F-stat		81.1		81.1
Weak IV robust test of Δ Import penetration=0				
$\chi 2$-statistic		39.16***		4.43**
A-R test p-value		0.000		0.035

Table 3.3 Competition and Ownership Structure: Ordered Probit Regressions

This table reports the results of the firm level ordered probit regressions. The samples and specifications are analogous to those used in Table 3.2 Panel A. In columns 1 and 2, the dependent variable takes values of 1, 2, and 3, which correspond to *Inside ownership* values of (0%, 50%], 50%, and (50%, 100%), respectively. In columns 3 and 4, the dependent variable takes values of 1, 2, 3, and 4, which correspond to *Outside HHI* values of (0%, 33.33%), [33.33%, 50%), [50%, 100%), and 100% respectively. Columns 1 and 3 present estimates from the ordered probit regressions assuming that *Import penetration* is exogenous. Columns 2 and 4 present control function estimates of the ordered probit regressions treating *Import penetration* as endogenous. Specifically, the vector of residuals from the first stage OLS regression of *Import penetration* on *Foreign exchange rate*, *Ex-EU export supply*, and other controls is included as an additional regressor in the second stage ordered probit regression. The bottom of the table reports the first stage coefficients on the instruments and the partial F-statistic. Standard errors (in brackets) are clustered at the country-industry-year level. Specifically, in columns 2 and 4, we block bootstrap the joint estimation of both stages (300 replications) and obtain cluster-robust standard errors from the empirical distributions of bootstrapped coefficients. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Inside ownership		Outside HHI	
	Ordered probit	Ordered probit with control function	Ordered probit	Ordered probit with control function
	(1)	(2)	(3)	(4)
Import penetration	-0.122***	-0.221***	-0.176***	-0.180***
	[0.023]	[0.044]	[0.023]	[0.040]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Pseudo R^2	0.025	0.023	0.029	0.027
First stage:				
Foreign exchange rate		0.016***		0.016***
		[0.004]		[0.004]
Ex-EU export supply		0.164***		0.164***
		[0.007]		[0.007]
F-stat		255.6		255.6

Table 3.4 Competition and Overall Ownership Concentration

This table examines the effect of competition on firms' overall ownership concentration (*Total HHI*). Panel A reports the results of firm level panel OLS and instrumental variables (IV) regressions, as well as ordered probit and ordered probit with control function regressions. The sample and specifications are the same as those in Table 3.2 Panel A and Table 3.3. In columns 3 and 4, the dependent variable takes values of 1, 2, 3, and 4, which correspond to *Total HHI* values of (0%, 25%), [25%, 33.33%), [33.33%, 50%), and [50%, 100%) respectively. Panel B reports the results of within-firm change OLS and IV regressions. The sample and specifications are the same as those in Table 3.2 Panel B. The bottom of each panel reports the first stage coefficients on the instruments, the partial F-statistic, and the χ^2-statistic and p-value of Anderson-Rubin weak instrument-robust test of the coefficient on *Import penetration* (Δ *Import penetration*) being different from zero. All regressors are lagged by one year relative to the dependent variables. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and at the country-industry level in Panel B. Specifically, in column 4 of Panel A, we block bootstrap the joint estimation of both stages (300 replications) and obtain cluster-robust standard errors from the empirical distributions of bootstrapped coefficients. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS, instrumental variables, and ordered probit regressions

	Total HHI			
	OLS	IV	Ordered probit	Ordered probit with control function
	(1)	(2)	(3)	(4)
Import penetration	-1.439***	-2.684***	-0.149***	-0.159***
	[0.420]	[0.716]	[0.023]	[0.043]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted/Pseudo R^2	0.048	0.048	0.035	0.033
First stage:				
Foreign exchange rate		0.016***		0.016***
		[0.004]		[0.004]
Ex-EU export supply		0.164***		0.164***
		[0.007]		[0.007]
F-stat		255.6		255.6

Panel B. Within-firm change OLS and instrumental variables regressions

	Δ Total HHI	
	OLS	IV
	(1)	(2)
Δ Import penetration	-2.502**	-9.312**
	[1.247]	[4.552]
Δ Control variables	Yes	Yes
Year FEs	Yes	Yes
Industry FEs	Yes	Yes
No. of observations	66,745	66,745
Adjusted R^2	0.049	0.048
First stage:		
Δ Foreign exchange rate		0.011***
		[0.002]
Δ Ex-EU export supply		0.130***
		[0.012]
F-stat		81.1

Table 3.5 Interaction with Industry External Finance Sensitivity

This table examines how the effect of competition on ownership structure depends on industries' external finance sensitivity (*EFS*). *EFS* is the industry level sensitivity of firms' external equity use to import penetration estimated using U.S. listed firms in 1980-1999. Appendix B.1 provides more detailed definition of this variable. In Panel A, we follow the specifications in Table 3.2 Panel A and interact *Import penetration* with *EFS*. We report the coefficient on the level of *Import penetration* as well as its interaction with *EFS* (the main effect of *EFS* is absorbed by industry fixed effects). In the instrumental variables regressions, we instrument *Import penetration* and its interaction with *EFS* with *Foreign exchange rate*, *Ex-EU export supply,* and the interactions of these two instruments with *EFS*. Panel B reports the results of within-firm change OLS regressions following the specifications in Table 3.2 Panel B. We interact Δ *Import penetration* with *EFS* (the main effect of *EFS* is absorbed by industry fixed effects). Following Aiken and West (1991), *EFS* is standardized in all regressions. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and at the country-industry level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	-2.587***	-3.958***	-4.155***	-6.991***
	[0.495]	[0.924]	[0.598]	[1.067]
Import penetration × EFS	-0.826*	-1.508**	-2.517***	-2.886***
	[0.486]	[0.752]	[0.581]	[0.914]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.049	0.049	0.044	0.044

Panel B. Within-firm change OLS regressions

	Δ Inside ownership	Δ Outside HHI
	(1)	(2)
Δ Import penetration	-4.529**	-4.587***
	[2.193]	[1.269]
Δ Import penetration × EFS	-2.573**	-2.433**
	[1.222]	[1.196]
Δ Control variables	Yes	Yes
Year FEs	Yes	Yes
Industry FEs	Yes	Yes
No. of observations	66,745	66,745
Adjusted R^2	0.039	0.010

Table 3.6 Interaction with Industry Level Entrenchment

This table examines how the effect of competition on ownership structure depends on the level of entrenchment across industries. We define *Entrenchment* as the industry average of firm level entrenchment index (E-index) for U.S. listed firms from Bebchuk, Cohen, and Ferrell (2009). In Panel A, we follow the specifications in Table 3.2 Panel A and interact *Import penetration* with *Entrenchment*. We report the coefficient on the level of *Import penetration* as well as its interaction with *Entrenchment* (the main effect of *Entrenchment* is absorbed by industry fixed effects). In the instrumental variables regressions, we instrument *Import penetration* and its interaction with *Entrenchment* with *Foreign exchange rate*, *Ex-EU export supply*, and the interactions of these two instruments with *Entrenchment*. Panel B reports the results of within-firm change OLS regressions following the specifications in Table 3.2 Panel B. We interact Δ *Import penetration* with *Entrenchment* (the main effect of *Entrenchment* is absorbed by industry fixed effects). Following Aiken and West (1991), *Entrenchment* is standardized in all regressions. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and at the country-industry level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	-2.498***	-4.886***	-4.563***	-7.015***
	[0.496]	[0.930]	[0.594]	[1.062]
Import penetration × Entrenchment	-0.901**	-1.702**	-1.915***	-2.465***
	[0.444]	[0.853]	[0.563]	[0.883]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.049	0.049	0.045	0.045

Panel B. Within-firm change OLS regressions

	Δ Inside ownership	Δ Outside HHI
	(1)	(2)
Δ Import penetration	-4.502***	-4.680***
	[1.614]	[1.004]
Δ Import penetration × Entrenchment	-3.435**	-1.913*
	[1.745]	[1.069]
Δ Control variables	Yes	Yes
Year FEs	Yes	Yes
Industry FEs	Yes	Yes
No. of observations	66,745	66,745
Adjusted R^2	0.041	0.010

Table 3.7 Interaction with Country Institutions

This table examines how the effect of competition on ownership structure depends on country institutions. We examine four country level variables: *Enforceability of contracts*, *Property rights*, *Control of corruptions*, and *Rule of law* (see Appendix B.1 for their definitions). In Panel A and Panel B, we follow the specifications in Table 3.2 Panel A and interact *Import penetration* with each country institution variable separately. We report the coefficient on the level of *Import penetration* as well as its interaction with the country institution variable (the main effect of the country institution variable is absorbed by country interacted with year fixed effects). In the instrumental variables regressions presented in Panel B, we instrument *Import penetration* and its interaction with the country institution variable with *Foreign exchange rate*, *Ex-EU export supply,* and the interactions of these two instruments with the country institution variable. Panels C reports the results of within-firm change OLS regressions following the specifications in Table 3.2 Panel B. We interact Δ *Import penetration* with the country institution variable. Following Aiken and West (1991), country institution variables are standardized in all regressions. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and Panel B, and at the country-industry level in Panel C. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS regressions

Country institution variable:	Enforceability of contracts		Property rights		Control of corruption		Rule of law	
Dependent variable:	Inside ownership (1)	Outside HHI (2)	Inside ownership (3)	Outside HHI (4)	Inside ownership (5)	Outside HHI (6)	Inside ownership (7)	Outside HHI (8)
Import penetration	-4.608***	-6.064***	-3.120***	-4.899***	-2.940***	-4.749***	-3.069***	-4.964***
	[0.544]	[0.641]	[0.475]	[0.573]	[0.474]	[0.575]	[0.474]	[0.571]
Import penetration × Country institution variable	-3.072***	-4.100***	-2.919***	-1.902***	-2.430***	-1.448***	-2.794***	-2.200***
	[0.341]	[0.393]	[0.406]	[0.477]	[0.412]	[0.483]	[0.405]	[0.474]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524	194,524	194,524	194,524	194,524
Adjusted R^2	0.050	0.045	0.049	0.046	0.049	0.046	0.049	0.046

Panel B. Firm level panel instrumental variables regressions

Country institution variable:	Enforceability of contracts		Property rights		Control of corruption		Rule of law	
Dependent variable:	Inside ownership (1)	Outside HHI (2)	Inside ownership (3)	Outside HHI (4)	Inside ownership (5)	Outside HHI (6)	Inside ownership (7)	Outside HHI (8)
Import penetration	-7.238***	-9.082***	-5.692***	-8.410***	-5.627***	-8.419***	-5.726***	-8.652***
	[1.003]	[1.218]	[0.905]	[1.064]	[0.894]	[1.056]	[0.894]	[1.057]
Import penetration × Country institution variable	-3.235***	-4.261***	-3.635***	-2.081***	-2.507***	-1.542**	-3.155***	-2.204***
	[0.504]	[0.605]	[0.588]	[0.721]	[0.588]	[0.727]	[0.579]	[0.715]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524	194,524	194,524	194,524	194,524
Adjusted R^2	0.050	0.045	0.049	0.045	0.048	0.045	0.049	0.045

Panel C. Within-firm change OLS regressions

Country institution variable:	Enforceability of contracts		Property rights		Control of corruption		Rule of law	
Dependent variable:	Δ Inside ownership (1)	Δ Outside HHI (2)	Δ Inside ownership (3)	Δ Outside HHI (4)	Δ Inside ownership (5)	Δ Outside HHI (6)	Δ Inside ownership (7)	Δ Outside HHI (8)
Δ Import penetration	-1.549	-3.038**	-4.510**	-4.409***	-4.798**	-2.948**	-3.523*	-3.255***
	[2.010]	[1.231]	[2.032]	[1.235]	[2.164]	[1.171]	[2.075]	[1.204]
Δ Import penetration × Country institution variable	-8.092***	-3.112***	-8.475***	-2.772**	-2.080*	-1.068**	-7.557***	-2.257**
	[2.092]	[1.201]	[1.932]	[1.172]	[1.063]	[0.514]	[1.900]	[1.093]
Country institution variable	-4.584***	-1.790***	-2.975***	-1.093***	-1.397***	-1.215***	-2.705***	-1.687***
	[0.294]	[0.181]	[0.327]	[0.175]	[0.161]	[0.081]	[0.280]	[0.163]
Δ Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745	66,745	66,745	66,745	66,745
Adjusted R^2	0.066	0.016	0.054	0.013	0.054	0.018	0.052	0.016

Table 3.8 Interaction with Industry Asset Redeployability and Risk Sensitivity

This table examines how the effect of competition on ownership structure depends on industry level asset redeployability (*AR*) and risk sensitivity (*RS*). *AR* comes from Kim and Kung (2014) and measures the extent to which assets used in an industry can be redeployed to other industries. *RS* is the industry level sensitivity of firms' cash flow volatility to import penetration estimated using U.S. listed firms in 1980-1999. Appendix B.1 provides more detailed definitions of these variables. In Panel A (Panel C), we follow the specifications in Table 3.2 Panel A and interact *Import penetration* with *AR* (*RS*). We report the coefficient on the level of *Import penetration* as well as its interaction with *AR* (*RS*) (the main effects of *AR* and *RS* are absorbed by industry fixed effects). In the instrumental variables regressions, we instrument *Import penetration* and its interaction with *AR* (*RS*) with *Foreign exchange rate*, *Ex-EU export supply,* and the interactions of these two instruments with *AR* (*RS*). Panels B and D report the results of within-firm change OLS regressions following the specifications in Table 3.2 Panel B. We interact the change in *Import penetration* with *AR* (*RS*) (the main effects of *AR* and *RS* are absorbed by industry fixed effects). Following Aiken and West (1991), *AR* and *RS* are standardized in all regressions. Standard errors (in brackets) are clustered at the country-industry-year level in Panels A and C and at the country-industry level in Panels B and D. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions: asset redeployability

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	-2.335***	-4.390***	-4.782***	-7.317***
	[0.467]	[0.569]	[0.883]	[1.015]
Import penetration × AR	0.567	-0.119	-0.302	-1.610*
	[0.411]	[0.544]	[0.740]	[0.837]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.049	0.045	0.048	0.045

Panel B. Within-firm change OLS regressions: asset redeployability

	Δ Inside ownership	Δ Outside HHI
	(1)	(2)
Δ Import penetration	-4.763**	-4.521***
	[2.138]	[1.212]
Δ Import penetration × AR	-1.764	1.224
	[1.814]	[1.214]
Δ Control variables	Yes	Yes
Year FEs	Yes	Yes
Industry FEs	Yes	Yes
No. of observations	66,745	66,745
Adjusted R^2	0.038	0.010

Panel C. Firm level panel OLS and instrumental variables regressions: risk sensitivity

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	-2.507***	-3.844***	-4.036***	-6.710***
	[0.493]	[0.916]	[0.594]	[1.077]
Import penetration × RS	0.900*	1.581*	0.601	-0.114
	[0.461]	[0.847]	[0.541]	[0.998]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.049	0.049	0.044	0.043

Panel D. Within-firm change OLS regressions: risk sensitivity

	Δ Inside ownership	Δ Outside HHI
	(1)	(2)
Δ Import penetration	-4.699**	-4.518***
	[2.280]	[1.269]
Δ Import penetration × RS	-0.560	-0.954
	[1.064]	[0.923]
Δ Control variables	Yes	Yes
Year FEs	Yes	Yes
Industry FEs	Yes	Yes
No. of observations	66,745	66,745
Adjusted R^2	0.040	0.010

Table 3.9 Competition and the Hiring of Professional Managers

This table examines the effect of changes in competition on firms' hiring of professional managers. The specification follows the within-firm change regression introduced in Table 3.2 Panel B. *Entry of prof. managers* is an indicator variable equal to one if, over a 5-year window, a firm obtains at least one new professional manager, i.e., a manager that is not a concurrent shareholder. *Entry of prof. managers from third parties* is an indicator variable equal to one if, over a 5-year window, a firm obtains at least one new professional manager who was neither a shareholder nor manager of the firm at the beginning of the 5-year window. *Entry of prof. managers from inside shareholders* (*Entry of prof. managers from outside shareholders*) is an indicator variable equal to one if, over a 5-year window, a firm obtains at least one new professional manager who was the firm's inside (outside) shareholder at the beginning of the 5-year window. The control variables are the same as those in Table 3.2 Panel B. Standard errors (in brackets) are clustered at the country-industry level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Entry of prof. managers	Entry of prof. managers from third parties	Entry of prof. managers from inside shareholders	Entry of prof. managers from outside shareholders
	(1)	(2)	(3)	(4)
Δ Import penetration	0.020	-0.097***	0.095***	-0.006
	[0.040]	[0.022]	[0.033]	[0.014]
Δ Control variables	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745
Adjusted R^2	0.046	0.020	0.053	0.009

Table 3.10 Decomposition of Ownership Structure Changes

This table decomposes changes in ownership structure induced by competition into four categories. Both panels of the table report the results of the within-firm change OLS regressions introduced in Table 3.2 Panel B. In Panel A, we interact the dependent variable *Δ Inside ownership* with four firm level indicator variables (one at a time) denoting whether, during the 5-year window over which *Δ Inside ownership* is measured, a firm i) obtains a new shareholder while, over the same period, obtains no new professional manager (*Pure shareholder entry* = 1); ii) obtains a new shareholder and, over the same period, obtains a professional manager (*Shareholder and professional manager entry* = 1); iii) does not obtain any new shareholder and, over the same period, an incumbent shareholder changes from an inside shareholder to an outside shareholder or vice versa (*Incumbent shareholder switching* = 1); iv) does not obtain any new shareholder and, over the same period, an incumbent shareholder exits the shareholder base (*Incumbent shareholder exit* = 1). In Panel B, we interact the dependent variable *Δ Outside HHI* with the four indicator variables introduced in Panel A. Panel C tabulates the means of the four indicator variables, as well as the means of the interactions of these variables with *Δ Inside ownership* and *Δ Outside HHI*. Standard errors (in brackets) are clustered at the country-industry level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Decomposition of changes in inside ownership

Dependent variable:	Δ Inside ownership × Pure shareholder entry	Δ Inside ownership × Shareholder and professional manager entry	Δ Inside ownership × Incumbent shareholder switching	Δ Inside ownership × Incumbent shareholder exit
	(1)	(2)	(3)	(4)
Δ Import penetration	-0.768	0.317	-3.010***	0.001
	[0.762]	[0.853]	[0.884]	[0.272]
Δ Control variables	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745
Adjusted R^2	0.017	0.012	0.015	0.002

Panel B. Decomposition of changes in outside ownership concentration

Dependent variable:	Δ Outside HHI × Pure shareholder entry	Δ Outside HHI × Shareholder and professional manager entry	Δ Outside HHI × Incumbent shareholder switching	Δ Outside HHI × Incumbent shareholder exit
	(1)	(2)	(3)	(4)
Δ Import penetration	-1.662***	-0.486	-1.759***	-0.179
	[0.573]	[0.613]	[0.551]	[0.291]
Δ Control variables	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745
Adjusted R^2	0.014	0.005	0.007	0.002

Panel C. Summary statistics for the indicator variables used in the decomposition and for the interactions of these variables with *Δ Inside ownership* and *Δ Outside HHI*

Variable name	Mean	Variable name	Mean	Variable name	Mean
Pure shareholder entry	0.127	Δ Inside ownership × Pure shareholder entry	1.108	Δ Outside HHI × Pure shareholder entry	-1.292
Shareholder and professional manager entry	0.147	Δ Inside ownership × Shareholder and professional manager entry	-1.595	Δ Outside HHI × Shareholder and professional manager entry	-1.262
Incumbent shareholder switching	0.090	Δ Inside ownership × Incumbent shareholder switching	-1.731	Δ Outside HHI × Incumbent shareholder switching	-0.803
Incumbent shareholder exit	0.033	Δ Inside ownership × Incumbent shareholder exit	0.281	Δ Outside HHI × Incumbent shareholder exit	0.457

Table 3.11 Competition, Ownership Structure Change, and Firm Performance

This table examines the relation between firms' ownership structure and performance. The specification follows the within-firm change regression introduced in Table 3.2 Panel B. The dependent variable *Δ Profitability* is the change in a firm's profitability (EBITDA divided by total assets) computed over 5-year windows. The independent variable *Ownership change_diffuse* is an indicator equal to one for firms that experienced a decrease in *Inside ownership* or *Outside HHI* over the same 5-year window. The independent variable *Ownership change_concentrate* is an indicator equal to one for firms that experienced an increase in *Inside ownership* or *Outside HHI* over the same 5-year window. In all regressions, the baseline group are firms that did not experience any ownership change (i.e., *Ownership change_diffuse* = 0 and *Ownership change_concentrate* = 0). We drop firms that increased (decreased) *Inside ownership* and, at the same time, decreased (increased) *Outside HHI* from the sample. Columns 1 and 2 use the full sample of firms. Columns 3 and 4 focus on firms in country-industries that experienced above median changes in *Import penetration*, while columns 5 and 6 focus on firms in country-industries that experienced below median changes in *Import penetration.* The control variables are the same as those in Table 3.2 Panel B. We include industry and year fixed effects in columns 1, 3, and 5, and industry interacted with year fixed effects in columns 2, 4, and 6. Standard errors (in brackets) are clustered at the country-industry level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Δ Profitability (1)	Δ Profitability (2)	Δ Profitability (3)	Δ Profitability (4)	Δ Profitability (5)	Δ Profitability (6)
			Δ Import penetration above median		Δ Import penetration below median	
Ownership change_diffuse	0.017*** [0.003]	0.017*** [0.003]	0.016*** [0.005]	0.014*** [0.004]	0.009 [0.005]	0.008 [0.005]
Ownership change_concentrate	0.008** [0.003]	0.008*** [0.003]	0.002 [0.004]	0.002 [0.004]	0.013*** [0.005]	0.013*** [0.005]
Δ Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	No	Yes	No	Yes	No
Industry FEs	Yes	No	Yes	No	Yes	No
Industry×year FEs	No	Yes	No	Yes	No	Yes
No. of observations	62,054	62,054	31,079	31,079	30,975	30,975
Adjusted R^2	0.038	0.048	0.043	0.060	0.045	0.056

Chapter 4: Do Excess Control Rights Benefit Creditors? Evidence from Dual-Class Firms

"Creditors have an interest in proper accountability structures, even if the formal governance mechanisms principally are concerned with accountability to shareholders as opposed to some broader stakeholder grouping that would encompass creditors. While there is substantial overlap between creditor and shareholder interests, there also are important potential conflicts…Generalized implications for creditors of companies that have controlling shareholders are not clear to us at this point…"

– Moody's Investor Service, 2003

4.1 Introduction

Corporate governance has pervasive effects on firms' real and financial decisions by shaping their contractual relationships with capital providers. The large body of corporate governance literature has traditionally focused on the determinants of different governance mechanisms and their effects on shareholders. Because these mechanisms are created primarily to protect shareholder interests, creditors are largely left out of the picture. With a few exceptions (Klock, Mansi, and Maxwell (2005), Cremers, Nair, and Wei (2007), Lin et al. (2011)), the effect of corporate governance on creditors has received limited attention. This is surprising given the importance of creditors in financing firms around the world (Ayyagari, Demirguc-Kunt, and Maksimovic (2013), Allen et al. (2013)). In this paper, I focus on one important aspect of governance, the separation of control rights and cash flow rights. I ask how the presence of large inside shareholders with excess control rights affects firms' creditors.

Using a sample of U.S. dual-class firms for which inside shareholders hold control rights in excess of their cashflow rights, I find that excess control rights have a positive effect on creditors and lead to lower cost of debt for dual-class firms compared with similar single-class firms. This is driven by the risk-avoiding behavior of dual-class firms. Dual-class firms take less risk and are less likely to default or violate debt covenants. These results stand in

contrast to the positive relation between excess control rights and cost of debt documented in Lin et al. (2011) and Aslan and Kumar (2012), whose samples consist of Asian and Eastern European firms for which excess controls are created primarily through pyramid ownership.

The above seemingly opposite results can be reconciled by recognizing that the effect of excess control rights on creditors can be two-sided. On one hand, excess control rights induce controlling insiders to take less risk due to their incentives to maximize long-term survival to access ongoing private control benefits. This comes at the expense of minority shareholders but benefit creditors. On the other hand, excess control rights give insiders the incentive and ability to pursue their own interests without bearing proportionate costs. This brings severe agency problems such as tunneling and expropriations that impair asset value (Johnson et al. (2000)), hurting both shareholders and creditors. Since creditors face concave payoffs and equity holders face convex payoffs, debt value increases in asset value and decreases in risk, while equity value increases in both asset value and risk. Therefore, while excess control rights unambiguously hurt minority shareholders (Claessens et al. (2002), Lins (2003), Masulis, Wang, and Xie (2009)), their net effect on creditors depends on the relative importance of the above two opposing forces. In less financially developed countries such as those in Asia and Eastern Europe, investor protection is poor and expropriations by large shareholders are pervasive. Lack of contractual enforcement further limits creditors' ability to use contracting tools such as covenants to protect their interests. In these countries, the negative effect of excess control rights outweighs the positive effect, consistent with the findings in Lin et al. (2011) and Aslan and Kumar (2012) that excess control rights lead to higher borrowing costs. By contrast, in developed economies such as the United States, strong investor protection limits the potential downside of excess control rights, leading to an overall positive effect of excess control rights on creditors as found in this paper. Overall, my results complement Lin et al. (2011) and Aslan and Kumar (2012) by showing that the divergence of control and cash flow rights do not necessarily hurt creditors and may have a positive effect in countries with strong investor protection.

I first hypothesize that that firms controlled by insiders with excess control rights take less risk than firms with non-controlling insiders or controlling insiders without excess control rights. The reason is as follows. Controlling insiders value long-term control of the

firm in order to access ongoing private benefits. This induces them to focus on long-term survival rather than short-term value maximization. By avoiding risk, controlling insiders reduce the probability of default or bankruptcy, thereby minimizing the chance of losing partial or full control to creditors.[66] At the same time, risk avoidance entails passing up certain valuable investments, which decreases the value the stakes insiders hold in the firm, imposing a cost on their own risk avoiding behaviors. Such a cost, however, can be reduced if insiders can lower their cash flow rights below control rights through the holding of superior voting shares, enabling them to entrench themselves by playing safe without bearing a proportionate cost. Therefore, the incentive to avoid risk comes from *both* insiders' controlling status and the presence of a control-ownership wedge. This is exactly what happens in dual-class firms. Dual-class firm insiders on average hold 60% of the firm's voting rights and 40% cash flow rights. By contrast, single-class firms have no control-ownership wedge and insiders are often non-controlling shareholders. Therefore, I hypothesize that, *ceteris paribus, dual-class firms take less risk than single-class firms.*

Consistent with this hypothesis, I find that dual-class firms are less risky than otherwise similar single-class firms: they have 11% lower ROA volatility and 6% lower asset volatility. I also find dual-class firms invest less in R&D, but not so in capital expenditure, indicating a more conservative investment profile for dual-class firms. Further, dual-class firms have lower expected default frequency (EDF) and are much less likely to violate debt covenants, consistent with their aversion to the states in which control is transferred to creditors. Overall, these findings support the hypothesis that dual-class firms avoid risk to maintain long-term control.

Another possible reason for risk-aversion by dual-class firms is that insiders in dual-class firms are more underdiversified (Anderson and Reeb (2003)). Indeed, on average, dual-class firm insiders have a higher ownership than single-class firm insiders and are therefore more likely to be underdiversified. I show that my results are not driven by this diversification effect by controlling for the insider ownership (insider' cash flow rights) of both dual-class and single-class firms in my analyses. In fact, contrary to the prediction that

[66] Default here includes technical default whereby debt covenants are violated by borrowers. See Nini, Smith, and Sufi (2012) for evidence on the prevalence of debt covenant violation and the effective transfer of control from shareholders to creditors in these states.

higher insider ownership leads to worse diversification and thus less risk-taking, I find an insignificant and sometimes positive effect of insider ownership on risk-taking in the regressions. This suggests that diversification concern of dual-class firms' controlling insiders does not explain their risk-avoiding behavior.

To creditors, controlling insiders' incentive to avoid default and maintain long-term control acts as an implicit commitment device that aligns the interests of the two parties in non-default states. I therefore hypothesize that, *ceteris paribus, dual-class firms face lower borrowing costs than single-class firms*. Consistent with this hypothesis, I find that dual-class firms enjoy 14.5% (28 basis points) lower interest rates on their bank loans than similar single-class firms. However, as argued above, potential expropriation by insiders with excess control still affect creditors. Although controlling insiders have incentives to minimize the probability of default, expropriations reduce the value of assets creditors can recover *conditional* on default. Given controlling insiders' strong incentives to avoid covenant violations in which control is lost to creditors, debt covenant is an especially effective tool for creditors to protect themselves against potential expropriations. Indeed, I find that creditors impose more expropriation-related covenants (excess cash flow sweep and asset sale sweep) on dual-class borrowers than on single-class borrowers, but not so for other types of covenants. This suggests that creditors do anticipate potential expropriating activities from dual-class borrowers, but are able to protect themselves ex ante with specific covenants in an environment where contract enforcement is good.

A potential concern for interpreting my results is endogeneity. Firms' ownership structures are by choice and are therefore endogenous. Dual-class firms may select into businesses with certain risk attributes or their ownership structure may be correlated with unobservables that also affect risk-taking and the cost of borrowing. To alleviate this concern, I apply three different approaches: treatment regression with instrumental variables, propensity-score matching, and a difference-in-differences analysis using a sample of firms that unified their dual-class shares into a single class. My first approach explicitly controls for selection bias and generates results stronger than OLS analysis. Using the presence of a person's name in firms' IPO names (Gompers, Ishii, and Metrick (2010)) and lagged industry average dilution of insider ownership upon IPOs as instruments, I find a positive selection

effect that goes against my treatment effect: dual-class firms select into riskier business ex ante but lower firm risk ex post. This is consistent with Banerjee and Masulis (2013)'s theoretical prediction that high growth firms are more likely to use dual-class shares than firms with lots of asset in place. I also find, following unification of dual-class shares into a single class, unifying firms experienced an increase in risk and loan spreads compared with matched non-unifying dual-class firms. Overall, my results remain robust after accounting for endogeneity.

In summary, by providing substantive evidence on the risk avoiding behaviors of dual-class firms and examining their borrowing costs, this paper uncovers the bright side of excess control rights from a creditor's perspective. This paper also points to an important yet previously neglected channel through which excess insider control can hurt minority shareholders: the transfer from minority shareholders to creditors that ultimately benefit controlling shareholders in the form of cheap debt. My research suggests that the effects of various governance mechanisms on other firm stakeholders may be quite different and less clear-cut than their effects on shareholders. This highlights the need to integrate other stakeholders in the study of corporate governance.

This paper adds to a growing line of research examining the effect of large shareholders on creditors. Anderson, Mansi, and Reeb (2003) and Lagaras and Tsoutsoura (2015) document that firms with family ownership enjoy lower cost of debt than non-family firms. Looking at outside shareholders, Cremers, Nair, and Wei (2007) find that firms with more institutional blockholdings face higher interest charges when issuing corporate bonds, while Klein and Zur (2011) document negative bond excess returns upon hedge fund activism. These papers focus on the identity of large shareholders and do not look at the divergence of control and cash flow rights. Lin et al. (2011) and Aslan and Kumar (2012) look at control-cash flow wedge created by pyramid ownership in firms in Eastern Asia and Western Europe and document a negative relation between the largest ultimate shareholder's excess control rights and the cost of borrowing. My paper focuses on inside shareholders of U.S. firms in which control-cash flow wedge is created through dual-class share structure rather than pyramid ownership. Also, contrary to the negative effect found in the last two papers, I find a positive net effect of excess control rights on the cost of borrowing, suggesting that the effect

of excess control rights on creditors may vary by country and depend on how excess control rights are created.

My paper also contributes to the literature on dual-class firms. Gompers, Ishii, and Metrick (2010) document separately the incentive and entrenchment effects of insider ownership by showing that firm value increases in insiders' cash-flow rights and decreases in their voting rights among U.S. dual-class firms. Masulis, Wang, and Xie (2009) find that, as the wedge between control rights and cash-flow rights of corporate insiders widens, corporate cash holdings are worth less to outside shareholders, acquisitions and capital expenditures are less likely to be value-creating, and CEO receive higher compensations. Li, Ortiz-Molina, and Zhao (2008) find that institutional investors tend to shy away from dual-class firm shares. Focusing on the amount rather than the pricing of debt, Dey, Wang, and Nikolaev (2012) find dual-class firms have higher leverage and relies more on relationship lending. My study looks at dual-class firms from creditors' perspective examining both the pricing and covenants of debt contracts. It also provides direct evidence on the risk-avoidance of dual-class firms, illuminating the reason behind dual-class firms' lower cost of borrowing.

Lastly, my paper is related to the literature on managerial entrenchment. Dual-class share structure can be thought of as an extreme case of managerial entrenchment where insiders entrench themselves with superior voting rights in excess of their equity ownership. Bertrand and Mullainathan (2003) find that entrenched managers prefer to enjoy quiet life and engage in fewer plant creations and destructions. Entrenched managers also choose lower leverages (Berger, Ofek, and Yermack (1997)) and offer higher wages to workers (Cronqvist et al. (2009)). Looking at antitakeover provisions, Klock, Mansi, and Maxwell (2005) find that, although not beneficial to stockholders, such provisions are viewed favorably in bond market. Ortiz-Molina (2009) shows that incentivised compensation schemes encourage managers to take more risk than they otherwise would, leading to higher yield spreads on corporate bonds. My paper complements this literature by showing that managers' preference for low risk and quiet life can be exacerbated when they have excess control over the firm.

The rest of the paper is organized as follows. Section 4.2 describes data and samples. Section 4.3.1 and 4.3.2 compares the risk-taking behaviors of dual-class and single-class

firms. Section 4.3.3 and 4.3.4 look at their cost of borrowing and covenant usage. I address endogeneity concerns in Section 4.4. Section 4.5 concludes.

4.2 Data and sample overview

My dual-class firms data come from Gompers, Ishii, and Metrick (2010). The authors collected a comprehensive sample of listed U.S. dual-class firms from 1994 to 2002 with information on insiders' ownership of each class of shares and their total cash flow rights and control rights. I drop year 1994 due to incomplete coverage. I also remove financials and utilities (SIC 6000-6999, 4900-4999) and firm-years with missing ownership information. My final dual-class firm sample consists of 580 unique firms and 2,501 firm-years over 1995-2002. I then combine the dual-class firms with all single-class firms (also excluding financials and utilities) during the same period to construct my *Full sample* that consists of 29,814 firm-years, among which 8.4% are dual-class firms. I also construct a matched sample by matching each dual-class firm in year *t* with a single-class firm in the same year and industry (based on Fama-French 49 industry classification) and closest in size in year *t-1*. My *Matched sample* consists of 5,002 (2,501 × 2) firm-years. I will use both the *Full sample* and *Matched sample* for my following analyses.

Following the literature on risk-taking (John, Litov, and Yeung (2008), Faccio, Marchica, and Mura (2011)), I use *ROA volatility* as my main risk measure, which is defined as the standard deviation of industry-demeaned quarterly ROA over the past eight quarters. Industry adjustment is done at SIC 4-digit level to remove industry common shocks that are beyond the control of firm insiders as well as industry-level seasonality in quarterly earnings. As an alternative, I also use a market-based measure *Asset volatility* based on Bharath and Shumway (2008) (also industry-adjusted), which is essentially an unlevered measure of stock return volatility. Both measures capture risk-taking in excess of the risk embedded in normal operational activities.

Loan-level data come from Dealscan, which provides detailed information of various terms of loans at origination. I link my two samples to Dealscan data to obtain all borrowings initiated by my sample firms in the sample period. I keep only bank loans and remove

borrowings in bonds, notes, floating-rate notes, securitization, or of undisclosed deal type. I obtain 1,215 loan facilities borrowed by my sample dual-class firms and 1,144 (13,021) by matched (all) single-class firms. My loan regressions are at the loan facility level because different facilities in the same loan package have different pricings, maturities and other provisions. Following Lin et al. (2011) and Aslan and Kumar (2012), I use all-in-spread drawn as the measure of the interest rate charged on loan facilities. This measures the basis point spread over LIBOR or LIBOR equivalent plus associated loan origination fees. Thus, it is an all-inclusive measure of loan price. To mitigate the effect of skewness in the data, I use the natural logarithm of the loan spread.

Table 4.1 Panel A presents the summary statistics for my different samples (variable defined in detail in the Appendix C.1). I define insider ownership as the percentage of shares owned by all directors and executive officers including shares identified as being under the control or influence of a director or officer.[67] This information is required to be disclosed in firm's 10-K and/or proxy statements. Insiders in dual-class firms on average hold 40% cash flow rights and 60% voting rights, with the wedge being 20%.[68] For single-class firms, insiders' cash flow rights and voting rights are the same, and are around 20% for my matched single-class sample.

Comparing columns 1 and 3, I find that dual-class firms are typically larger, more levered, lower valued, and less risky than average single-class firms. They also invest less in R&D. However, most of these differences disappear after I match on industry and size. A comparison of columns 2 and 3 shows that dual-class firms and matched single-class firms are similar in most dimensions except in risk-related measures (*Ln(asset volatility), Ln(ROA volatility), Expected Default Frequency*): dual-class firms are significantly less risky than single-class firms even after matching (see last column for mean-comparison test). I also find that dual-class firms are less tangible, consistent with the fact that intangible assets are more amenable to private benefits extraction. Dual class firms are also slightly less levered and invest less in R&D, suggesting the avoidance of financial and investment risk. In terms

[67] This includes shares hold by family members or spouses of officers and directors and shares hold through trusts and ESOPs.

[68] A more effective way to achieve control-cash flow wedge is pyramid ownership, as observed in many Asian or European countries. Through multiple layers of holdings, parent firms can control distant subsidiaries with very little cash flow rights. Such ownership arrangement typically generates more severe agency problems than observed in U.S. dual-class firms.

of industry distribution (Table 4.1 Panel B), dual-class firms cluster in sectors such as food, liquor, tobacco, publishing, and communication, in which private control benefits are abundant.

Summary statistics for loan characteristics show that dual-class firms enjoy slightly lower loan spreads despite borrowing at longer maturities. No significant difference is found in loan size, security, covenants, and use of performance pricing. I will present more evidence on loan spreads and covenants in my multivariate analysis where I am able to control various loan features and firm characteristics.

4.3 Main results

4.3.1 Risk-taking: business (unlevered) risk

My first set of tests seeks to provide evidence on the risk-taking behavior of dual-class firms vis-à-vis single-class firms. I test the effect of dual-class firms' excess control rights on firm risk by estimating the following panel regression:

$$Firm\ Risk_{i,t} = \beta_0 + \beta_1 Dual\ (or\ Wedge)_{i,t-1} + \beta_2 Cash\ flow\ rights_{i,t-1} + \beta_3 Firm\ characteristics_{i,t-1} + Industry\ \&\ year\ fixed\ effects + \varepsilon_{i,t} \quad (4.1)$$

The dependent variable *Firm Risk* is the log of industry-adjusted ROA volatility capturing firms' operational risk in excess of the industry norm. As an alternative, I also use a market-based measure, asset volatility (industry-adjusted) as the dependent variable.[69] I use two variables to proxy excess control rights. The first is a binary variable *Dual* that equals one if a firm is a dual-class firm in a year and zero if it is single-class. My second variable *Wedge* is a continuous variable equal to the difference between insiders' voting rights and cash-flow rights and is positive for dual-class firms and zero for single-class firms. Importantly, I also control for insiders' cash-flow rights (insider ownership) of both dual-class and single-class firms, so that my results are not driven by different levels of insider ownership across the two types of firms. I also control for other firm characteristics that are shown to affect firm risk: *Ln(total assets), Tobin's Q, Tangibility, Profitability, Leverage,*

[69] See Section 4.3.2 for details on the estimation of asset volatility.

Capex, R&D, and *Payout*. Definitions of these variables are detailed in the Appendix C.1. Further, I include industry (SIC 2-digit level) fixed effects and year fixed effects to absorb industry unobservables and temporal shocks.

Table 4.2 reports the regression results. In both the full sample and the matched sample, dual-class firms exhibit significantly lower risk than single-class firms regardless of the risk measure I use (columns 1 and 3 in Panels A and B). The economic magnitudes are also large. Dual-class firms are approximately 11% less risky than single-class firms in ROA volatility, and 6% so in asset volatility. Coefficients on *Wedge* are also significantly negative across different specifications (columns 2 and 4). I also repeat my regressions excluding excess control rights measures within the dual and matched single-class sample separately to see whether these two groups are significantly different in the determinants of firm risk (column 5 and 6). Cross-equation Chow test (column 7) shows that coefficients on most variables do not differ significantly across the two samples, suggesting that dual-class and matched single-class firms are similar in terms of the determinants of firm risk.

If dual-class firms are more risk-averse than single-class firms, one would expect this to show up in their investment policies. I hypothesize that conditional on investing, dual-class firms engage in less risky investments. I use three measures to capture investment risk profile: R&D, Capex, and R&D share in total investment. Table 4.3 Panel A shows that dual-class firms invest less in R&D both in absolute terms and relative to total investment than average or matched single-class firms, but do not invest less in capital expenditures. Panel B shows similar results when *Dual* is replaced by *Wedge*. Given that R&D investments are riskier than general investments in fixed assets, my results show that dual-class firms choose a more conservative investment policy, consistent with their minimization of business risks.

4.3.2 Risk-taking: financial (levered) risk

To controlling insiders, arguably the most relevant risk is the risk of losing control of a firm to creditors. This happens when borrowers are in default or in bankruptcy. To this end, I examine how financial risk differs between dual-class and single-class firms as well as its relation to excess control rights. I use annualised expected default frequency (EDF) (Bharath and Shumway (2008), Eisdorfer (2008)) to measure financial risk. This measure estimates the annual probability that a firm will default on its debt over the horizon of the debt maturity. Following Eisdorfer (2008), I estimate the following two-equation system:

$$V_E = V_A N(d_1) - Fe^{-rT} N(d_2), \tag{4.2}$$

$$\sigma_E = \frac{V_A N(d_1)\sigma_A}{V_E}. \tag{4.3}$$

where V_E is the market value of equity, σ_E is equity volatility estimated from daily stock returns, F is the total book value of firm's long-term and short-term debts.[70] I estimate debt maturity T assuming an average maturity of 5 years for long-term debt and 0.5 years for short-term debt, and take the weighted average of these two maturities to obtain the maturity of total debt. Using these inputs, I estimate the two unknown variables, asset volatility σ_A and market value of firm assets V_A, from the two equations. The annualized expected default frequency can then be expressed as

$$EDF = 1 - \sqrt[T]{1 - N\left(-\left(\frac{Ln\left(\frac{V_A}{F}\right) + (\mu - 0.5\sigma_A^2)T}{\sigma_A\sqrt{T}}\right)\right)}, \tag{4.4}$$

where μ is an estimate of the expected annual return of the firm's assets.

As shown in Table 4.4, both the dual-class status and control-cash flow wedge negatively predict expected default frequency. Specifically, dual-class firms are 1.6 (2.0) percentage points less likely to default on its debt in a given year than average (matched) single-class firms. The coefficients on *Wedge* are also significantly negative. This confirms my prediction that dual-class firms actively avoid bankruptcy risk to maintain insider's ongoing control of the firm.

It is worth discussing the role of leverage in my risk-taking analysis. *Leverage*, unsurprisingly, significantly predicts financial risk in Table 4.4. However, it does not predict unlevered business risk in Table 4.1. As shown in summary statistics, dual-class firms do not have lower leverages than single-class firms. In their multivariate analysis, Dey, Wang, and Nikolaev (2012) in fact document higher leverages for dual-class firms. This, together with my previous results, suggests that *dual-class firms minimize bankruptcy risk by reducing underlying business risk, rather than choosing lower leverage*. This is consistent with several theoretical explanations. First, dual-class firms prefer debt over equity to avoid the dilution of insiders' control even though they already have superior voting shares to achieve that

[70] Following Gompers, Ishii, and Metrick (2010), the market value of equity for dual-class firms with non-trading classes is calculated using common shares outstanding from Compustat and assuming equal prices across classes. As discussed in GIM, non-traded stock on average makes up a small part of capital structure and their premium is typically capped at 10%, so this assumption does not have a significant impact on my results.

purpose. Second, as suggested in Dey, Wang, and Nikolaev (2012), dual-class firms may use debt as a discipline device to commit themselves against agency problems associated with excess control rights so as to lower agency costs. Third, to the extent that risk-avoidance aligns the interest of dual-class firm insiders and creditors, debt financing may come at a lower cost for dual-class firms, as I will show in the next section.

A more frequent scenario in which control can be partially transferred from shareholders to creditors is when borrowers violate debt covenants. Nini, Smith, and Sufi (2012) document that 10% to 20% of firms report being in violation of a debt covenant in a given year, an incidence that is much more frequent than payment default. Upon covenant violation, creditors are shown to significantly influence firm decisions ranging from investment, financing to corporate governance, essentially taking partial control of the violating firm. Therefore, covenant violation would significantly impair controlling insider's ability to extract private benefits and maintain control. We would thus observe dual-class firms being significantly less likely to violate covenants than single-class firms. This is confirmed in Table 4.5, where I estimate a probit model of annual debt covenant violation. The results show that dual-class firms are 4% less likely to violate covenant in a given year than single-class firms. This number is economically significant compared with a 13.2% frequency of covenant violation for average single-class firms and 15.3% for matched ones. Continuous excess control rights measure *Wedge* also negatively predicts covenant violation.

Taken together, my results provide salient evidence that excess control rights are associated with lower business risk as well as financial risk.

4.3.3 Cost of borrowing

In this section, I study how dual-class firms' risk-avoiding behavior affects their cost of borrowing. I look at bank loans since it is the primary source of borrowing for my sample firms. My cost of borrowing measure is the all-in-spread drawn from Dealscan, defined as the interest rate charged on a loan facility measured in basis points over LIBOR or LIBOR equivalent. Following the literature (Lin et al. (2011), Aslan and Kumar (2012)), I use the logarithm of this spread to mitigate the effect of skewness. I estimate the following regression:

$$Ln(spread)_{i,t} = \beta_0 + \beta_1 Dual\ (or\ Wedge)_{i,t-1} + \beta_2 Cash\ flow\ rights_{i,t-1} + \beta_3 Loan\ characteristics_{i,t-1} + \beta_4\ Firm\ characteristics_{i,t-1} + Industry\ \&\ year\ FEs + \varepsilon_{i,t}. \quad (4.5)$$

The regression is at the loan facility level because interest rate spreads as well as other loan features vary across facilities within a loan package. I control for both firm characteristics and loan characteristics that include facility amount, maturity, covenant index, non-investment grade dummy, and performance pricing dummy. Detailed definitions of these variables are in the Appendix C.1.

Table 4.6 reports the estimated results of equation (4.5). We see that dual-class firms enjoy significantly lower loan spreads compared with both average and matched single-class firms. The economics magnitudes are also large. Loan spreads for dual-class firms are 8.1% (17 basis points) lower than those for single-class firms and are 14.5% (28 basis points) lower when compared with matched single-class firms. *Wedge* also negatively affects loan spreads across specifications. These results suggest that dual-class firms have access to cheaper credit than single-class firms, consistent with their conservative risk attributes.

4.3.4 Debt covenants

Interest rate, however, is not the only tool lenders can use to protect themselves. Another important aspect of a lending contract is debt covenants. Compared with explicit interest payments, debt covenants impose a more implicit cost on borrowers by restricting their behaviors and protecting lenders against unfavorable contingencies. Debt covenants also have the advantage of flexibility and specificity. Lenders can tailor covenants in type and tightness to specifically address different aspects of the credit risk they face. These aspects may include the liquidity, investment, financing, payout, and governance of the borrowing firm. By looking at the number and type of covenants used in debt contracts, we can detect, from creditors' perspective, their specific concerns over a certain borrower. This is the approach I take in this section.

In Table 4.7, I compare the frequency of usage of different types of covenants in loans borrowed by dual-class and matched single-class firms. Following Bradley and Roberts (2004), I categorize debt covenants into nine types: five sweep provisions (corresponding to proceeds from excess cash flow, asset sale, debt issuance, equity issuance, and insurance, respectively), dividend restriction, loan security, net worth covenants, and financial covenants. I then create an aggregate covenant index by summing up the nine dummies indicating the presence of each covenant type. Mean comparison t-test and rank sum test (Panel A) shows that dual-class firms have similar covenant usage in their loans as single-

class firms in most covenant types as well as in the aggregate covenant index except two types of covenants: excess cash flow sweep and asset sale sweep. These two covenants prescribe that certain percentage of the borrower's excess cash flow or proceeds from asset sale should be used to pay down the debt. Interestingly, these two covenants correspond exactly to the two types of tunneling activities—cash flow tunneling and asset tunneling—defined in Atanasov, Black, and Ciccotello (2008).[71] Atanasov, Black, and Ciccotello (2008) develop a framework for measuring tunneling and categorize tunneling activities into three types: cash flow tunneling, asset tunneling, and equity tunneling. Cash flow tunneling involves excessive executive salaries and perquisites, transfer pricing, inter-corporate loans, and pet project investments; asset tunneling involves transfer of major assets from (to) the firm for less (more) than the market value to affiliated firms; while the third type, equity tunneling, concerns the dilution of minority shareholders' stakes through dilutive offerings, freeze-outs, and insider trading, etc. From a creditor's perspective, only the first two types of tunneling matter as the third type concerns conflicts among shareholders. Cash flow and asset tunneling not only reduces borrower's ability to pay back, but also impairs collateral value and thus the amount creditors can recover in the event of default. The two types of covenants identified above protect creditors precisely against these two potential tunneling activities.

To further confirm my finding, I conduct a joint mean-comparison test (Table 4.7 Panel B) by pooling all covenants into a single regression, regressing the pooled covenant indicator on nine covenant type dummies and their interactions with the dual-class dummy. Again, I only find significance on interactions terms on cash flow and asset sale sweeps. Joint F-tests of the interaction terms also indicates that dual-class firms are only subject to more tunneling-related covenants, but not other types of covenants. In Panel C, I further conduct a multivariate probit/ordered probit controlling for other firm and loan characteristics. The results remain similar.

In summary, I find dual-class firms face lower borrowing costs on their loans. At the same time, creditors are not unconcerned about potential expropriating activities that may

[71] A good example of tunneling in US dual-class firms is Coca Cola Bottling. From 1993 to 1997, Coca Cola Bottling engaged in a variety of overpriced purchases from its parent Coca Cola in syrup, bottling plants and franchise rights (Atanasov, Black, and Ciccotello (2008)).

impair asset value, but are able to use specific covenants to protect themselves against these downside risks, especially in an institutional setting with good contract enforcement.

4.4 Addressing endogeneity

My results so far demonstrate a negative relationship between excess control rights and firm risk as well as the cost of borrowing. Firms' ownership structure is, however, by choice and therefore endogenous. Firms choose dual-class share structure to maintain control by insiders or to shield themselves from the short-term pressure from capital markets. These considerations may correlate with unobservables that also affect risk-taking and the cost of borrowing. Absent natural experiments that randomly assign dual-class share structure, I take a multi-pronged approach to alleviate endogeneity concerns as much as possible. I employ three identification strategies: 1) treatment regression with instrumental variables, 2) propensity score matching estimator, and 3) difference-in-differences analysis using a transitioning sample of dual-class firms that unified their shares into a single-class.

4.4.1 Treatment regression with instrumental variables

My first approach uses treatment regression based on Heckman's (1979) two-stage procedure. This approach explicitly controls for unobserved heterogeneity corresponding to the self-selection of both dual-class and since-class firms.[72] Specifically, I model the relation between dual-class status and risk-taking (or cost of borrowing) as follows:

$Y = \beta_0 X + \beta_1 D + \epsilon$, where Y is the outcome variable, D is the *Dual* dummy. (4.6)

$D^* = \beta_2 Z + e$ (4.7)

$D = 1$ if $D^* > 0$; $D = 0$ if otherwise. (4.8)

Assuming the error terms in the first two equations have a bivariate normal distribution with correlation of ρ, the expectation of my outcome variable Y conditional on a firm being dual-class is $E(Y|D = 1) = \beta_0 X + \beta_1 + E(\epsilon|D = 1) = \beta_0 X + \beta_1 + \rho\sigma_e\sigma_\epsilon\lambda_1(\beta_2 Z)$, where $\lambda_1(\beta_2 Z) = \frac{\phi(\beta_2 Z)}{\Phi(\beta_2 Z)}$ is the inverse-mills ratio.[73] Similarly, the expectation of Y on a firm

[72] See Maddala (1983) for more details on treatment regression and Campa and Kedia (2002), Jiang, Li, and Wang (2012), and Gao, Harford, and Li (2013) for examples of applications.

[73] All expectations are conditioned on both D and X. For ease of exposition, I omit X in conditioning variables.

being single-class is $E(Y|D=0) = \beta_0 X + E(\epsilon|D=0) = \beta_0 X + \rho\sigma_e\sigma_\epsilon\lambda_2(\beta_2 Z)$, where $\lambda_2(\beta_2 Z) = \frac{-\phi(\beta_2 Z)}{1-\Phi(\beta_2 Z)}$. The difference between dual-class and single-class firm in outcome Y is thus

$$E(Y|D=1) - E(Y|D=0) = \beta_1 + \rho\sigma_e\sigma_\epsilon(\lambda_1 - \lambda_2) = \beta_1 + \rho\sigma_e\sigma_\epsilon \frac{\phi(\beta_2 Z)}{\Phi(\beta_2 Z)(1-\Phi(\beta_2 Z))} \quad (4.9)$$

The right-hand side of equation (4.9) is the OLS estimate of β_1 without controlling for selection. It can be seen that such estimate would be biased upward (downward) if ρ is positive (negative), meaning dual-class firms select into higher-risk (lower-risk) businesses. By estimating λ_1 and λ_2 from equation (4.7) in a first-stage Probit and plug them in a second stage, we can correct for the self-selection term in equation (4.9) and estimate β_1 consistently by estimating

$$Y = \beta_0 X + \beta_1 D + \delta_\lambda\left[\lambda_1\left(\hat{\beta}_2 Z\right) * D + \lambda_2\left(\hat{\beta}_2 Z\right) * (1-D)\right] + \eta, \text{ where } \delta_\lambda = \rho\sigma_e\sigma_\epsilon. \quad (4.10)$$

Identification of β_1 comes from both the non-linearity of inverse-mills ratios and the presence of instrumental variables that are included in Z but excluded from X. I employ two instruments. My first instrument, *IV_name*, comes directly from Gompers, Ishii, and Metrick (2010) and is a dummy variable indicating the presence of a person's name in the company name at IPO. Gompers, Ishii, and Metrick (2010) show that this variable is related to founding insiders' desire to maintain control and would thus be correlated with the use of dual-class shares but uncorrelated with firm's risk-taking post-IPO after controlling for share class structure. My second instrument, *IV_dilution*, is the industry average dilution of inside ownership at IPO by single-class firms in the past 5 years, where dilution is the difference between the level of insider ownership before and after the IPO as reported in SDC Global New Issues database.[74] This is motivated by the fact that dual-class shares are created primarily at IPO to avoid the dilution of insider control when raising external equity (Arugaslan, Cook, and Kieschnick (2010)). To the extent that external financing needs and thus the amount of dilution at the IPO has an industry-common component relating to the industry's business nature, a firm's propensity to choose a dual-class structure will be positively correlated with the average dilution incurred by its industry peers who did not use dual-class structure at the IPO. On the other hand, it is hard to argue that this *lagged* industry average dilution at IPO would directly influence a particular firm's risk-taking post-

[74] These numbers are collected from IPO prospectus in which firms are required to disclose the ownership of all insiders (all directors and executive offices) both before and immediately after IPO. Firms usually disclose both the voting rights and cash flow rights of the insiders, and for single-class firms, these two numbers are the same.

IPO, except through its effect on the firm's share structure choice at the IPO. Together, these two instruments allow me to identify the causal effect of dual-class structure on firms' risk taking and costs of borrowing.

Table 4.8 presents the results from the treatment regressions. The dependent variables and specifications follow those used in Tables 4.2 through 4.6. I report the second stage coefficient on *Dual* as well as the first-stage coefficients on the two instruments. Both instruments strongly predict dual-class structure choice in the first stage. Results from the second stage show that, after correcting for selection bias, dual-class status has an even stronger effect on risk-taking and cost of borrowing. This suggests that the selection bias in fact goes against my OLS results. As confirmed from the bottom of Table 4.8, the estimated correlation between the first stage and second stage errors, ρ, is significantly positive, implying a positive selection effect. This means that *dual-class firms select into risker businesses ex ante, but reduce firm risk ex post to avoid the risk of losing control*. This is consistent with the finding in Lehn, Netter, and Poulsen (1990) and Banerjee and Masulis (2013), who argue that high growth firms, rather than firms with many assets in place, tend to choose dual-class structure. As shown in Banerjee and Masulis (2013), when founders fear dilution associated with external equity and are unwilling to take debt to avoid bankruptcy risk, an underinvestment problem occurs. Issuance of non-voting shares arises as a solution to this problem. Since the cost of underinvestment is particularly large for firms with high growth options, such firms are more likely to choose a dual-class share structure.

Other columns of Table 4.8 also show that, after controlling for selection, may main results remain robust, and in many cases, become stronger. I continue to find that dual-class firms invest less in R&D but not so in Capex, exhibit lower expected frequency of default, and are less likely to violate debt covenants.[75]

[75] I resort to bivariate probit (Wooldridge (2010) Chapter 15.7.3) for my covenant violation regression where both the outcome variable and the endogenous explanatory variable are binary.

4.4.2 Propensity-score matching estimator

In this section, I take a step further and employ propensity score matching to estimate the differences in firm risk and cost of debt between dual-class and single-class firms. For each dual-class firm-year observation, I match it to a single-class firm-year observation based on the predicted propensity to adopt dual-class share structure estimated from probit regressions. I employ one-to-one nearest neighbor matching with replacement (Heckman, Ichimura, and Todd (1997)) and use different sets of matching variables that are related to both treatment assignment and the outcome (Stuart (2010)). Compared with other matching methods and parametric regressions, propensity-score matching allows matching on a rich set of observables without imposing any functional form on the true economic model. However, unlike treatment regression, propensity-score matching does not control for selection on unobservables, which I address with the other two approaches in section 4.4.

Table 4.9 presents the propensity-score matching estimates. For all outcome variables, I employ two sets of matching variables: a parsimonious set that includes *Cash flow rights*, *Ln(total assets)*, and *industry and year fixed effects*, and a complete set that includes all control variables used in the respective OLS specification. I find that for both models and across all outcome variables, propensity-score matching estimators give results consistent with my prior findings.

4.4.3 Difference-in-differences

My third identification strategy exploits time variation in dual-class status for a group of firms that unified their dual-class shares into a single class. I use difference-in-differences (DD) estimation to compare the risk of unifying and matched non-unifying dual-class firms before and after the unification. I further employ firm fixed effects to absorb time-invariant heterogeneity between and within the two groups of firms.[76] To identify unifying firms, I start from all dual-class firms that exit my dual-class sample before the end of the sample period (271 cases). I then manually read SEC filings to verify that these exits are due to unification of dual-class shares into a single class. In this process, I drop 26 cases that are unrelated to

[76] I do not include firm fixed effects in my previous regressions since absent unification, dual-class status (and wedge) is highly persistent, making fixed effects estimates very imprecise in finite samples (see Cameron and Trivedi (2005), page 718).

unification. I also eliminate unifications due to M&As (119 cases), going private transactions (20 cases), or bankruptcy or Chapter 11 events (33 cases) as these events can severely confound my analysis. This yields 73 cases of pure unifications. To account for possible endogeneity in the unification decision, I carefully match each unifying firm to a control firm that remained dual-class in my sample period and are in the same industry and closest in size, insiders' cash flow rights and wedge in the year prior to unification. I also require both treatment and control firms to have at least three years of financial data before and after the unification year. I end up with 45 firm pairs entering my regressions. Because my risk-taking variable ROA volatility is a two-year rolling measure at the quarter level, it will be serially correlated in a quarterly panel, which could bias the standard errors of the DD estimator. I therefore follow Bertrand, Duflo, and Mullainathan (2002) and collapse my panel into two single cross-sections, one before and one after the treatment year. My final sample consists of 180 observations.

Before proceeding to regressions, I validate that my treatment and control samples exhibit parallel trends in outcome variable before the treatment, a necessary identifying condition for DD estimation. Figure 4.1 Panel A plots the trends of the mean ROA volatility for both the treatment and control sample. We can see that the two groups exhibit similar trends in risk before the treatment and only start to diverge after it. I also check whether my two samples are similar along various observables before the treatment. The idea is that if the two samples differ significantly along observables, they may also differ in unobservables, which, in the case that these unobservables are time-varying, cannot be absorbed by firm fixed-effect. Panel A of Table 4.10 shows that the two samples are quite balanced along various firm characteristics before the treatment. The only remaining concern is that firms may choose to unify in anticipation of future risk changes. However, this is quite unlikely given that most unifications are motivated by the decline in control benefits to insiders or their personal needs to cash out to gain liquidity (Howell (2011)).[77] I also check that my unifying firms do not change industry after unification to rule out the possibility that unification occurs in anticipation of firms' move into riskier new businesses that also provide less private benefits to insiders.

[77] Indeed, as shown in Table 4.10 Panel A, insiders' cash flow rights (voting rights) decrease from 34% (43%) pre-unification to 21% post-unification, a level similar to the average insider ownership of my matched single-class firms (20%).

Table 4.10 Panel B presents my DD results. *After* is a dummy equal to one if risk is measured after the unification year. *Treat* is a dummy indicating unifying firms and is zero for non-unifying firms. Our main variable of interest is the interaction term *Treat* × *After* (the level term of *Treat* is absorbed by firm fixed effects). I also include calendar year fixed effects to absorb common temporal shocks. To account for potential sensitivity of DD estimator to functional form assumptions (Roberts and Whited (2012)), I use both the level and the logarithm of ROA volatility. As is shown in columns 1 and 2, *Treat* × *After* is significantly positive, indicating that unifying firms significantly increase their risk after unification compared with matched non-unifying firms. In columns 3 and 4, I further conduct a falsification test where I falsely assume the treatment occurs three years before the actual unification years and repeat the analysis. The results, as expected, are insignificant.

I also conduct the same analysis for loan spreads on loan facilities borrowed by my treatment and control firms before and after unification. I start from my 73 unifying firms and their matched non-unifying firms and link them to Dealscan loan data using a [-3 years, 3 years] window relative to unification years. I obtain 121 loan facilities for 36 treatment firms and 80 facilities for 25 control firms (not all firms initiated new borrowings within my sample window). Figure 4.1 Panel B first validates the identifying assumption that loan spreads for treatment and control firms exhibit parallel trends before the treatment. Panel C presents the results as well as the placebo test where treatment is assumed to be three years earlier the actual unification years. Corroborating my previous findings, dual-class firms saw their borrowing costs increased significantly after unification compared with non-unifying firms, consistent with their increased risk-taking after unification.

Overall, by exploiting different sources of identification, I show that my results are robust to endogeneity concerns and can be interpreted as causal.

4.5 Conclusion

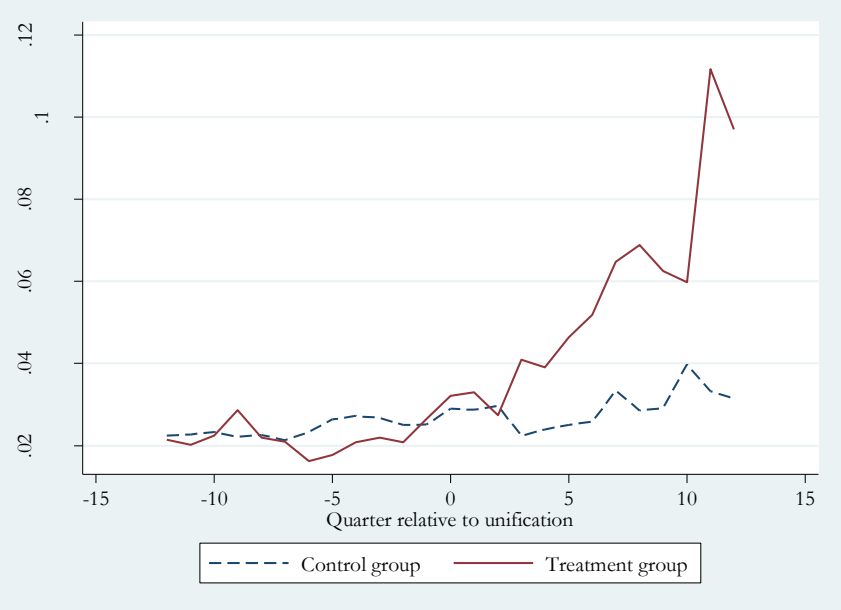
This paper examines the effect of shareholder excess control rights on firms' risk-taking behavior as well as its implication for creditors. Inside shareholders' excess control rights enabled by dual-class share structure give them incentives to paly safe in order to maximize long-term survival and to access ongoing private control benefits. I find that, compared with similar single-class firms, dual-class firms undertake safer investments and are much less

likely to default on debt or violate covenants. Risk-avoiding incentives translate into lower borrowing costs for dual-class firms, as evidenced in the interest rates charged on bank loans. Nevertheless, creditors anticipate potential expropriation activities by dual-class borrowers that could impair asset value in the event of default, and in turn employ more expropriation-related covenants in loan contracts to curb these activities ex ante. Overall, I find a positive net effect of excess control rights on creditors, in contrast to the negative effect widely documented on minority shareholders. My paper suggests that certain governance mechanisms can have drastically different impacts on different stakeholders. More broadly, this paper points to a need to integrate other stakeholders into future corporate governance studies.

Figure 4.1 Trends in Risk and Loan Spreads for Treatment and Control Firms

The treatment group includes dual-class firms that, at some point in the sample period, unified their shares into a single-class. The control group includes matched dual-class firms that did not unify their shares over the sample period. Panel A plots, for both the control and treatment sample, the trend of quarterly mean *ROA volatility* measured over a 2-year rolling window from 3 years before to 3 years after the unification year. Panel B plots, for both the control and treatment sample, the trend of annual mean *Ln(spread)* from 3 years before to 3 years after the unification year.

Panel A. ROA volatility



Panel B. Loan spread

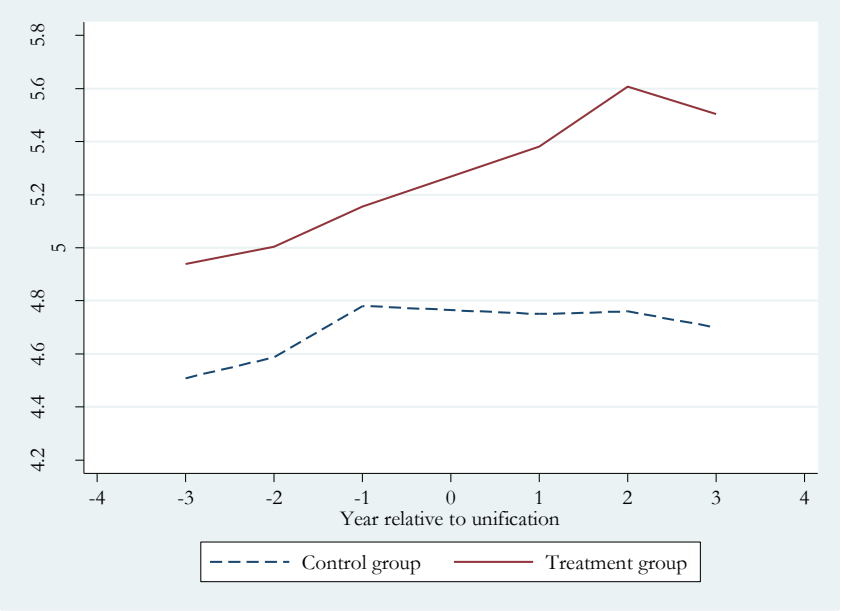


Table 4.1 Summary Statistics

Panel A presents summary statistics for my samples. Columns 1 to 3 report the sample means of various firm and loan characteristics for all single-class firms, matched single-class firms, and matched dual-class firms respectively. Column 4 presents the p-values of mean comparison tests (t-test) testing the differences of sample means in columns 1 and 3. Column 5 presents the p-values of mean comparison test (t-test) testing the differences of sample means in columns 2 and 3. Panel B presents the percentage of dual-class firms in the *Full sample* by industries.

Panel A

	All single-class [1]	Matched single-class [2]	Dual-class [3]	P-val. of t-test [4]	P-val. of t-test [5]
			Insider Ownership		
Cash flow rights	0.168	0.204	0.392	0.000	0.000
Voting rights	0.168	0.204	0.609	0.000	0.000
Wedge	0.000	0.000	0.213	0.000	0.000
			Firm Financials		
Ln(Asset volatility)	0.014	-0.089	-0.148	0.000	0.000
Ln(ROA volatility)	-3.342	-3.712	-3.791	0.000	0.003
Expected Default Frequency	0.159	0.155	0.136	0.000	0.001
Ln(total assets)	4.793	5.848	5.915	0.000	0.121
Tobin's Q	2.260	1.824	1.799	0.000	0.314
Tangibility	0.275	0.310	0.291	0.000	0.001
Profitability	-0.012	0.077	0.075	0.000	0.366
Leverage	0.262	0.337	0.321	0.000	0.018
Capex	0.151	0.156	0.142	0.160	0.128
R&D	0.189	0.088	0.068	0.000	0.048
R&D share	-1.090	-2.260	-2.230	0.000	0.308
Payout	0.019	0.021	0.021	0.124	0.380
No. of firm-years	28,134	2,562	2,562		
			Loan Characteristics		
Spread (in basis points)	205.0	193.9	188.5	0.000	0.150
Facility amount (in million $)	244.0	255.0	252.0	0.235	0.427
Maturity (in months)	43.15	48.60	51.80	0.000	0.003
Secured dummy	0.564	0.531	0.540	0.005	0.316
Covenant Index (from 0 to 9)	3.045	3.312	3.417	0.000	0.161
Performance pricing dummy	0.435	0.554	0.557	0.000	0.446
No. of loan facilities	17,114	1,238	1,268		

Panel B

Fama-French 30 industries	Percentage of dual-class firms
Food Products	15.3%
Beer & Liquor	29.8%
Tobacco Products	13.2%
Recreation	9.2%
Printing and Publishing	31.0%
Consumer Goods	11.4%
Apparel	14.9%
Healthcare, Medical Equipment, Pharmaceutical	4.1%
Chemicals	2.7%
Textiles	23.1%
Construction and Construction Materials	11.6%
Steel Works	8.0%
Fabricated Products and Machinery	4.2%
Electrical Equipment	8.2%
Automobiles and Trucks	11.3%
Aircraft, ships, and railroad equipment	15.1%
Metal and Industrial Metal Mining	10.7%
Coal	0.0%
Petroleum and Natural Gas	2.3%
Utilities	0.0%
Communication	30.6%
Personal and Business Services	5.1%
Business Equipment	4.8%
Business Supplies and Shipping Containers	8.3%
Transportation	10.1%
Wholesale	9.1%
Retail	11.3%
Restaurants, Hotels, Motels	6.1%
Banking, Insurance, Real Estate, Trading	2.1%
Everything Else	7.2%
Average	8.4%

Table 4.2 Risk-Taking of Dual-Class vs Single-Class Firms

This table reports the results of panel regressions where the dependent variable is *Ln(ROA volatility)* in Panel A and *Ln(asset volatility)* in Panel B. *Ln(ROA volatility)* is the logarithm of the standard deviation of industry-adjusted quarterly ROA in the past 8 quarters. *Ln(asset volatility)* is the logarithm of average monthly asset volatility as defined in Baharath and Shumway (2008). *Dual* is a dummy equal to one if the firm is a dual-class firm in that year. *Wedge* is the difference between firm insiders' control rights and cash flow rights. *Full sample* (columns 1 and 2) contains dual-class firms and all single-class firms from 1995 to 2002. *Matched sample* (columns 3 and 4) contains dual-class firms and industry-size matched single-class firms over the same period. Columns 5 and 6 present the within sample regression for single and dual firms respectively excluding excess control rights variable *Dual* or *Wedge*. The last column reports the F-statistic of Chow test testing cross-equation equality of each coefficient in columns 5 and 6. All control variables are lagged one year. All regressions include industry (SIC 2-digit) and year fixed effects. Standard errors are clustered at firm level and are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. Dependent variable: ln(ROA volatility)

	Full sample		Matched sample		Matched single-class	Dual-class	F-stat of Chow test
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Dual	-0.109***		-0.109***				
	[0.028]		[0.038]				
Wedge		-0.444***		-0.382***			
		[0.092]		[0.100]			
Cash flow rights	-0.04	-0.045	0.089	0.026	-0.041	0.195*	1.47
	[0.031]	[0.031]	[0.084]	[0.080]	[0.135]	[0.109]	
Ln(total assets)	-0.141***	-0.142***	-0.111***	-0.111***	-0.120***	-0.101***	0.11
	[0.005]	[0.005]	[0.011]	[0.011]	[0.017]	[0.015]	
Tobin's Q	0.047***	0.047***	0.067***	0.065***	0.074***	0.061***	0.14
	[0.003]	[0.003]	[0.013]	[0.013]	[0.013]	[0.019]	
Tangibility	-0.637***	-0.639***	-0.432***	-0.442***	-0.607***	-0.330**	1.92
	[0.047]	[0.047]	[0.112]	[0.112]	[0.172]	[0.156]	
Profitability	-0.524***	-0.524***	-0.811***	-0.808***	-0.720***	-0.984***	0.82
	[0.023]	[0.023]	[0.119]	[0.118]	[0.127]	[0.209]	
Leverage	-0.076***	-0.076***	-0.159**	-0.156*	-0.187*	-0.190*	0.47
	[0.029]	[0.029]	[0.079]	[0.080]	[0.112]	[0.108]	
Capex	0.094***	0.093***	0.121***	0.118**	0.120*	0.120	0.27
	[0.017]	[0.017]	[0.046]	[0.046]	[0.062]	[0.077]	
R&D	0.075***	0.076***	0.017	0.019	0.078	-0.068	1.49
	[0.013]	[0.013]	[0.044]	[0.044]	[0.054]	[0.075]	
Payout	0.029	0.029	0.443**	0.438**	0.297	0.493*	0.19
	[0.103]	[0.103]	[0.220]	[0.221]	[0.347]	[0.281]	
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	29,814	29,814	5,002	5,002	2,501	2,501	
Adjusted R^2	0.442	0.443	0.329	0.331	0.341	0.327	

Panel B. Dependent variable: ln(asset volatility)

	Full sample		Matched sample		Matched single-class	Dual-class	F-stat of Chow test
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Dual	-0.066***		-0.060**				
	[0.019]		[0.024]				
Wedge		-0.194***		-0.134**			
		[0.064]		[0.063]			
Cash flow rights	0.041**	0.026	0.039	-0.006	0.077	0.047	0.39
	[0.018]	[0.018]	[0.055]	[0.049]	[0.079]	[0.074]	
Ln(total assets)	-0.133***	-0.134***	-0.113***	-0.114***	-0.113***	-0.108***	0.29
	[0.003]	[0.003]	[0.007]	[0.007]	[0.009]	[0.012]	
Tobin's Q	-0.004***	-0.004***	0.004	0.004	0.015**	-0.003	1.76
	[0.001]	[0.001]	[0.006]	[0.006]	[0.007]	[0.007]	
Tangibility	-0.089***	-0.089***	-0.084	-0.084	-0.137	-0.056	0.03
	[0.028]	[0.028]	[0.069]	[0.069]	[0.083]	[0.103]	
Profitability	-0.110***	-0.110***	-0.272***	-0.268***	-0.287***	-0.252***	0.18
	[0.012]	[0.012]	[0.054]	[0.054]	[0.077]	[0.070]	
Leverage	0.008	0.008	-0.053	-0.051	0.011	-0.144**	4.15**
	[0.017]	[0.017]	[0.046]	[0.046]	[0.057]	[0.072]	
Capex	0.049***	0.049***	0.076***	0.075***	0.072***	0.075***	0.02
	[0.008]	[0.008]	[0.017]	[0.017]	[0.020]	[0.028]	
R&D	-0.025***	-0.025***	-0.064***	-0.063***	-0.051**	-0.065**	0.06
	[0.006]	[0.006]	[0.019]	[0.019]	[0.024]	[0.031]	
Payout	-0.256***	-0.256***	-0.052	-0.058	-0.325	0.148	4.05**
	[0.058]	[0.058]	[0.147]	[0.145]	[0.244]	[0.138]	
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	29,814	29,814	5,002	5,002	2,501	2,501	
Adjusted R^2	0.324	0.324	0.222	0.221	0.279	0.209	

Table 4.3 Investment Risk Profile of Dual-Class vs Single-Class Firms

This table reports the results of various investment regressions. *Full sample* (columns 1-3) contains dual-class firms and all-single class firms from 1995 to 2002. *Matched sample* (columns 4-6) contains dual-class firms and industry-size matched single-class firms over the same period. In Panel A, *Dual* is a dummy equal to one if the firm is a dual-class firm in that year. In Panel B, *Wedge* is the difference between firm insiders' control rights and cash flow rights. Dependent variable *R&D* is ln[(1+R&D expense)/(1+net sales)], *Capex* is ln[(1 + capital expenditure)/(1+net sales)], and *R&D share* is ln[(1+R&D expense)/(1+R&D expense+capital expenditure)]. All control variables are lagged one year and are defined in the Appendix C.1. All regressions include industry (SIC 2-digit) and year fixed effects. Standard errors are clustered at firm level and are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A

	Full sample			Matched sample		
	[1]	[2]	[3]	[4]	[5]	[6]
Dep. var.:	R&D	Capex	R&D share	R&D	Capex	R&D share
Dual	-0.210***	-0.037	-0.140***	-0.235***	-0.053	-0.188**
	[0.061]	[0.040]	[0.051]	[0.090]	[0.052]	[0.082]
Cash flow rights	-0.172***	-0.048	0.003	-0.245*	0.017	-0.132
	[0.057]	[0.039]	[0.044]	[0.148]	[0.110]	[0.136]
Ln(total assets)	-0.502***	-0.110***	-0.434***	-0.629***	-0.076***	-0.574***
	[0.014]	[0.006]	[0.012]	[0.031]	[0.017]	[0.027]
Tobin's Q	0.049***	0.040***	-0.007*	0.069***	0.042***	-0.003
	[0.006]	[0.003]	[0.004]	[0.025]	[0.014]	[0.013]
Tangibility	-0.607***	1.949***	-2.115***	-0.259	2.551***	-2.561***
	[0.096]	[0.066]	[0.078]	[0.185]	[0.171]	[0.201]
Profitability	-1.003***	-0.888***	0.152***	-1.270***	-1.336***	0.328***
	[0.049]	[0.029]	[0.027]	[0.241]	[0.131]	[0.117]
Leverage	-0.873***	-0.506***	-0.122***	-0.454***	-0.216**	-0.04
	[0.056]	[0.038]	[0.039]	[0.113]	[0.107]	[0.114]
Payout	-0.375***	-0.270***	0.028	-0.187	-0.402	0.206
	[0.128]	[0.093]	[0.099]	[0.373]	[0.281]	[0.341]
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,814	29,814	29,814	5,002	5,002	5,002
Adjusted R^2	0.671	0.468	0.655	0.671	0.470	0.693

Panel B

	Full sample			Matched sample		
	[1]	[2]	[3]	[4]	[5]	[6]
Dep. var.:	R&D	Capex	R&D share	R&D	Capex	R&D share
Wedge	-0.736***	-0.168	-0.501**	-0.312**	-0.145	-0.351**
	[0.239]	[0.159]	[0.199]	[0.127]	[0.128]	[0.137]
Cash flow rights	-0.664***	-0.219***	-0.182***	-0.415***	-0.042	-0.108
	[0.064]	[0.043]	[0.045]	[0.154]	[0.115]	[0.134]
Ln(total assets)	-0.545***	-0.126***	-0.455***	-0.640***	-0.059***	-0.611***
	[0.015]	[0.006]	[0.012]	[0.032]	[0.019]	[0.028]
Tobin's Q	0.085***	0.053***	0.005	0.123***	0.067***	0.013
	[0.007]	[0.003]	[0.004]	[0.034]	[0.017]	[0.014]
Tangibility	-0.718***	2.170***	-2.453***	-0.407**	2.428***	-2.608***
	[0.088]	[0.065]	[0.064]	[0.162]	[0.166]	[0.128]
Profitability	-1.170***	-0.944***	0.088***	-1.744***	-1.477***	0.149
	[0.055]	[0.031]	[0.028]	[0.295]	[0.146]	[0.122]
Leverage	-1.089***	-0.573***	-0.206***	-0.545***	-0.188*	-0.168
	[0.063]	[0.041]	[0.039]	[0.135]	[0.112]	[0.109]
Payout	-0.499***	-0.306***	-0.013	-0.969*	-0.611**	-0.232
	[0.156]	[0.099]	[0.104]	[0.507]	[0.268]	[0.345]
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,814	29,814	29,814	5,002	5,002	5,002
Adjusted R^2	0.582	0.399	0.595	0.578	0.399	0.634

Table 4.4 Expected Default Frequency of Dual-Class vs Single-Class Firms

This table reports the regressions where the dependent variable is annualised *Expected Default Frequency (EDF)* computed following Eisdorfer (2008). *Full sample* (columns 1-3) contains dual-class firms and all-single class firms from 1995 to 2002. *Matched sample* (columns 4-6) contains dual-class firms and industry-size matched single-class firms over the same period. *Dual* is a dummy equal to one if the firm is a dual-class firm in that year. *Wedge* is the difference between firm insiders' control rights and cash flow rights. All independent variables are lagged one year and are defined in the Appendix C.1. All regressions include industry (SIC 2-digit) and year fixed effects. Standard errors are clustered at firm level and are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Dep. var.: EDF	Full sample		Matched sample	
	[1]	[2]	[3]	[4]
Dual	-0.015***		-0.020***	
	[0.006]		[0.008]	
Wedge		-0.053***		-0.054***
		[0.016]		[0.019]
Cash flow rights	0.014*	0.011	0.029	0.015
	[0.007]	[0.007]	[0.018]	[0.016]
Ln(total assets)	-0.031***	-0.032***	-0.028***	-0.028***
	[0.001]	[0.001]	[0.002]	[0.002]
Tobin's Q	-0.018***	-0.018***	-0.020***	-0.020***
	[0.001]	[0.001]	[0.003]	[0.003]
Tangibility	0.002	0.002	0.073***	0.072***
	[0.010]	[0.010]	[0.024]	[0.024]
Profitability	-0.097***	-0.097***	-0.210***	-0.209***
	[0.007]	[0.007]	[0.028]	[0.028]
Leverage	0.289***	0.289***	0.259***	0.260***
	[0.008]	[0.008]	[0.017]	[0.017]
Capex	-0.010***	-0.010***	-0.014	-0.015
	[0.004]	[0.004]	[0.010]	[0.010]
R&D	-0.014***	-0.014***	-0.019	-0.018
	[0.003]	[0.003]	[0.012]	[0.012]
Payout	-0.067**	-0.067**	0.014	0.012
	[0.031]	[0.030]	[0.064]	[0.063]
Industry FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	29,814	29,814	5,002	5,002
Adjusted R^2	0.311	0.311	0.349	0.348

Table 4.5 Covenant Violation by Dual-Class vs Single-Class Firms

This table presents the average marginal effect of Probit regression of covenant violation for both dual-class and single-class firms. The dependent variable, *Covenant violation*, is an indicator equal to one if the firm violates any debt covenant at least once in a specific year. All regressions include industry (SIC 2-digit) and year fixed effects. Standard errors (reported in brackets) are adjusted for clustering at firm level. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A

Dep. var.: Covenant violation	Full sample		Matched sample	
	[1]	[2]	[3]	[4]
Dual	-0.041***		-0.042***	
	[0.012]		[0.015]	
Wedge		-0.097**		-0.095**
		[0.041]		[0.046]
Cash flow rights	0.000	-0.011	0.016	-0.001
	[0.013]	[0.013]	[0.032]	[0.030]
Ln(total assets)	-0.029***	-0.029***	-0.030***	-0.030***
	[0.002]	[0.002]	[0.004]	[0.004]
Tobin's Q	-0.023***	-0.023***	-0.022**	-0.022**
	[0.003]	[0.003]	[0.011]	[0.011]
Tangibility	-0.005	-0.005	0.029	0.03
	[0.018]	[0.018]	[0.036]	[0.036]
Profitability	0.008	0.008	-0.082**	-0.081**
	[0.009]	[0.009]	[0.038]	[0.038]
Leverage	0.209***	0.209***	0.220***	0.222***
	[0.011]	[0.011]	[0.024]	[0.024]
Capex	0.012*	0.012*	0.019	0.019
	[0.007]	[0.007]	[0.016]	[0.016]
R&D	-0.064***	-0.063***	-0.100**	-0.099**
	[0.009]	[0.009]	[0.042]	[0.042]
Payout	-0.235***	-0.235***	-0.068	-0.068
	[0.077]	[0.077]	[0.100]	[0.100]
Industry FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	29,814	29,814	5,002	5,002
Pseudo R^2	0.090	0.090	0.138	0.138

Panel B

	Full sample		Matched sample	
Annual probability of covenant violation	Dual-class	Single-class	Dual-class	Single-class
Sample frequency	12.09%	13.18%	12.09%	15.34%
Average predicted probability	12.35%	13.57%	12.48%	16.34%

Table 4.6 Loan Spreads of Dual-Class vs Single-Class Firms

This table presents panel regressions of loan spreads on dual-class status at the loan facility level for both the *Full sample* and the *Matched sample*. The *Full sample* (columns 1-2) contains 14,236 loan facilities borrowed by dual-class firms and all-single class firms from 1995 to 2002. The *Matched sample* (columns 3-4) contains 2,359 loan facilities borrowed by dual-class firms and industry-size matched single-class firms over the same period. Dependent variable, *Ln(spread)*, is the log of all-in-spread drawn measured in basis points over LIBOR or LIBOR equivalent for the drawn portion of the loan facility. Other loan characteristics and firm control variables are defined in Appendix C.1. All independent variables are lagged one year. All regressions include industry (SIC 2-digit) and year fixed effects. Standard errors are clustered at firm level and are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Dep. var: Ln(spread)	Full sample		Matched sample	
	[1]	[2]	[3]	[4]
Dual	-0.081***		-0.145**	
	[0.026]		[0.063]	
Wedge		-0.188**		-0.180*
		[0.079]		[0.097]
Cash flow rights	0.023	-0.005	0.218	0.071
	[0.039]	[0.038]	[0.154]	[0.125]
Ln(facility amount)	-0.113***	-0.113***	-0.019	-0.014
	[0.007]	[0.007]	[0.018]	[0.018]
Ln(maturity)	0.034***	0.033***	-0.042	-0.043
	[0.009]	[0.009]	[0.029]	[0.029]
Covenant Index	0.084***	0.085***	0.032***	0.033***
	[0.003]	[0.003]	[0.011]	[0.011]
Non-investment grade	0.747***	0.745***	0.096	0.086
	[0.027]	[0.027]	[0.062]	[0.061]
Performance pricing	-0.209***	-0.210***	-0.162***	-0.163***
	[0.014]	[0.014]	[0.040]	[0.039]
Ln(total assets)	-0.088***	-0.088***	-0.084***	-0.093***
	[0.008]	[0.008]	[0.024]	[0.024]
Tobin's Q	-0.052***	-0.052***	-0.075**	-0.072**
	[0.006]	[0.006]	[0.029]	[0.030]
Tangibility	-0.109**	-0.108**	0.126	0.159
	[0.048]	[0.048]	[0.133]	[0.132]
Profitability	-0.628***	-0.629***	-1.521***	-1.563***
	[0.070]	[0.070]	[0.352]	[0.354]
Leverage	0.541***	0.541***	0.708***	0.727***
	[0.040]	[0.040]	[0.162]	[0.162]
Capex	0.054***	0.053***	0.119	0.131
	[0.020]	[0.020]	[0.105]	[0.110]
R&D	-0.091***	-0.090***	-0.449	-0.441
	[0.034]	[0.034]	[0.334]	[0.344]
Payout	-0.238***	-0.236***	0.113	0.094
	[0.088]	[0.088]	[0.217]	[0.217]
Industry FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	14,236	14,236	2,359	2,359
Adjusted R^2	0.670	0.670	0.426	0.420

Table 4.7 Debt Covenant Analysis: Dual-Class vs Matched Single-Class Firms

Panel A reports the sample means of various covenant dummies indicating the presence of the respective covenant type in loans borrowed by dual-class firms and matched single-class firms from 1995 to 2002. Rows 1 to 9 correspond to the nine types of covenants constituting the covenant index. Their definitions are in the Appendix C.1. *Covenant Index* is the sum of the nine dummies indicating the presence of each type of covenant. The last two columns report the p-values of mean-comparison tests and Wilcoxon rank-sum tests. Panel B presents the pooled OLS regression of the nine covenant dummies on covenant type indicators and their interactions with the dual-class dummy. Last column reports the F-statistics testing the joint significance of interaction terms. Panel C reports the average marginal effects of probit regressions of covenant dummies and ordered probit regressions of (sub-) covenant indices. *Tunneling-related covenants* is the sum of the first two covenant dummies: excess cash flow sweep and asset sale sweep; *Other covenants* is the sum of the other seven covenant dummies. All columns include loan characteristics and firm characteristics controlled in Table 4.6 as well as industry and year fixed effects. Robust standard errors are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A. Univariate comparison

	Matched Single-class firms	Dual-class firms	P-value of t-test	P-value of rank-sum test
Excess cash flow sweep	0.201	0.238	**0.013**	**0.025**
Asset sale sweep	0.355	0.399	**0.011**	**0.022**
Debt issuance sweep	0.246	0.253	0.347	0.695
Equity issuance sweep	0.221	0.233	0.249	0.499
Insurance proceeds sweep	0.158	0.174	0.142	0.283
Dividend restriction	0.624	0.607	0.201	0.401
Secured	0.531	0.540	0.316	0.633
Net worth covenant	0.301	0.279	0.111	0.223
Financial covenant	0.674	0.693	0.157	0.362
Covenant Index	3.312	3.417	0.161	0.236
Observations	1,238	1,268		

Panel B. Joint tests of differences in coefficients

Variables		(continued)		F-Test of interaction terms	
Excess cash flow	0.201*** [0.013]	Dual × Excess cash flow	**0.037**** **[0.018]**	F(2, 22536)=5.20 p-val=0.005	F(9, 22536)=1.72 p-val=0.080
Asset sale	0.355*** [0.013]	Dual × Asset sale	**0.044**** **[0.018]**		
Debt issuance	0.246*** [0.013]	Dual × Debt issuance	0.007 [0.018]	F(7, 22536)=0.72 p-val=0.654	
Equity issuance	0.221*** [0.013]	Dual × Equity issuance	0.011 [0.018]		
Insurance	0.158*** [0.013]	Dual × Insurance	0.016 [0.018]		
Dividend	0.624*** [0.013]	Dual × Dividend	-0.016 [0.018]		
Secured	0.531*** [0.013]	Dual × Secured	0.010 [0.018]		
Net worth	0.301*** [0.013]	Dual × Net worth	-0.022 [0.018]		
Financial	0.674*** [0.013]	Dual × Financial	0.019 [0.018]		
		Observations	22,554		
		Adjusted R^2	0.460		

Panel C. Multivariate Probit (ordered Probit) regressions

	Excess cash flow sweep	Asset sale sweep	Tunneling-related covenants	Other covenants	Covenant Index
	[1]	[2]	[3]	[4]	[5]
Dual	0.055** [0.026]	0.062*** [0.022]	0.058** [0.024]	-0.006 [0.022]	0.011 [0.015]
Loan controls	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes
Observations	2,354	2,354	2,354	2,354	2,354
Pseudo R^2	0.651	0.703	0.686	0.539	0.432

Table 4.8 Two-Stage Treatment Regressions

This table presents the results of treatment regressions estimated with maximum likelihood. All variables and specifications follow the baseline OLS regressions in Tables 4.2 to 4.6. The last column is estimated using the bivariate probit model in which both the dependent and the endogenous independent variables are binary. *IV_name* is a dummy indicating the presence of a person's name in the company name at IPO. *IV_dilution* the industry average reduction of inside ownership upon IPO by single-class firms in the past 5 years. For ease of exposition, I report only the coefficient on the instrumented variable *Dual* as well as the first stage coefficients on the two instruments. ρ is the estimated correlation between the first stage and second stage error terms.

Dependent variable:	Ln(ROA volatility) [1]	Ln(spread) [2]	R&D [3]	Capex [4]	R&D share [5]	EDF [6]	Covenant violation [7]
Model	Treatment regression	Treatment regression	Treatment regression	Treatment regression	Treatment regression	Treatment regression	Bivariate Probit
Dual	-0.405***	-0.446***	-0.790***	0.205*	-0.375***	-0.038**	-0.291***
	[0.060]	[0.156]	[0.200]	[0.116]	[0.080]	[0.018]	[0.076]
IV_name in 1st stage	0.317***	0.265***	0.311***	0.311***	0.311***	0.317***	0.317***
	[0.060]	[0.083]	[0.064]	[0.064]	[0.064]	[0.060]	[0.060]
IV_dilution in 1st stage	0.008***	0.007**	0.008***	0.008***	0.008***	0.008***	0.008***
	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]	[0.003]
ρ	0.178	0.375	0.240	-0.147	0.130	0.067	0.123
Wald Test of ρ=0							
Chi-sq(1)	30.17***	5.38**	8.55***	5.74**	22.03***	1.94	5.18**
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,814	14,236	29,814	29,814	29,814	29,814	29,814

Table 4.9 Propensity-Score Matching

This table presents the propensity-score matching estimators for different outcome variables used in Tables 4.2 to 4.6. Model 1 includes *Cash flow rights*, *Ln(total assets)*, *industry and year fixed effects* as the matching variables. Model 2 includes all variables in Model 1 plus all the control variables used in the respective regression from Tables 4.2 to 4.6. All estimators are based on one-to-one nearest neighbor matching with replacement. Standard errors are bootstrapped based on 200 replications. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	Ln(ROA volatility)		Ln(spread)		R&D		Capex	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Dual	-0.114***	-0.137***	-0.109**	-0.107**	-0.219***	-0.189***	-0.021	-0.079
	[0.039]	[0.036]	[0.046]	[0.043]	[0.091]	[0.086]	[0.058]	[0.055]

continued

	R&D share		EFD		Covenant violation	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Dual	-0.153**	-0.162**	-0.027***	-0.027***	-0.035**	-0.046***
	[0.076]	[0.071]	[0.008]	[0.009]	[0.015]	[0.014]

Table 4.10 Difference-in-Differences Analysis of Unification of Dual-Class Shares.

This table reports the results of difference-in-differences analysis where the treatment is the unification of dual-class shares into a single class. The treatment sample contains 45 unifying firms that transitioned from dual-class to single-class in my sample period. For each unifying firm, I match it (with replacement) with a dual-class firm that remained dual-class throughout the sample period and in the same industry (SIC 1-digit) and closest in size, insiders' cash flow right and wedge based on Mahalanobis distance in the year prior to unification. Panel A compares the sample means of various firm characteristics for both the treatment (unifying) and control (non-unifying) firms. All variables are measured in the year prior to the unification year except variables with suffix *_after*, which are measured in the year after unification. Panel B columns 1 and 2 present the difference-in-differences regression where the dependent variable is *ROA volatility* (or *Ln*(*ROA volatility*)) measured using quarterly industry-adjusted ROA over the 2 years before and after the unification year. *After* is a dummy equal to 1 if the observation is measured after unification. *Treat* is a dummy equal to 1 if the firm is a unifying firm. Columns 3 and 4 presents the same difference-in-differences regression as in Panel B assuming the treatment (unification) occurs three years prior to the actual treatment year. Control firms are rematched to treatment firms based on the same variables in the year prior to the falsely assumed treatment year. Panel C presents the difference-in-differences regression for loan spreads on loan facilities borrowed from three years before to three years after unification. Falsification test falsely set the treatment year to three years before the actual unification year. All regressions include firm and calendar year fixed effects. Standard errors are clustered at SIC2 level and are reported in brackets. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Pre-treatment sample means

Pre-treatment variable	Treatment Sample	Control Sample	P-value of t-test
ROA volatility	0.047	0.049	0.417
Ln(ROA volatility)	-3.675	-3.483	0.194
Cash flow rights	0.337	0.388	0.144
Cash flow rights_after	0.215	0.387	0.001
Voting rights	0.431	0.505	0.104
Voting rights_after	0.215	0.503	0.000
Wedge	0.095	0.117	0.253
Wedge_after	0.000	0.116	0.000
Ln(total assets)	5.579	5.591	0.489
Tobin's Q	1.933	1.868	0.419
Tangibility	0.260	0.234	0.290
Profitability	0.088	0.061	0.272
Leverage	0.285	0.229	0.119
Capex/sales	0.113	0.228	0.152
R&D/sales	0.058	0.163	0.182
Payout	0.020	0.018	0.424
No. of observations	45	45	

Panel B: Difference-in-differences: firm risk

	Difference-in-differences		Falsification test	
	ROA volatility [1]	Ln(ROA volatility) [2]	ROA volatility [3]	Ln(ROA volatility) [4]
After	0.0153	0.248	-0.0402	0.211
	[0.0334]	[0.554]	[0.127]	[0.863]
Treat*After	0.0615**	0.526**	0.0274	-0.164
	[0.0256]	[0.261]	[0.0355]	[0.242]
Firm FEs and year FEs	Yes	Yes	Yes	Yes
No. of observations	180	180	188	188
No. of treatment firms	45	45	47	47
No. of control firms	45	45	47	47
Adjusted R^2	0.487	0.527	0.317	0.554

Panel C: Difference-in-differences: loan spreads

	Difference-in-differences		Falsification test	
	Ln(spread) [1]	Spread [2]	Ln(spread) [3]	Spread [4]
After	-0.122	-18.50	0.216*	26.62*
	[0.115]	[22.41]	[0.122]	[15.35]
Treat*After	0.452***	90.69***	-0.185	-25.55
	[0.155]	[29.43]	[0.254]	[31.77]
Firm FEs and year FEs	Yes	Yes	Yes	Yes
No. of observations	201	201	156	156
No. of treatment facilities	121	121	77	77
No. of control facilities	80	80	79	79
Adjusted R^2	0.780	0.703	0.849	0.868

Chapter 5: Conclusion

This thesis is a collection of three essays that seek to broaden our understanding of the frictions facing entrepreneurs and closely held firms. The first essay shows that a new financing method, crowdfunding, can reduce uncertainty for entrepreneurs by allowing them to access the wisdom of the crowd at an early stage. This essay highlights the informational role of crowdfunding and suggests that the current disintermediation of early-stage financing can improve the information environment faced by entrepreneurs. The second essay shows that, when external competitive environment changes, firms' internal shareholder structure adapts accordingly. Specifically, ownership diffuses from inside shareholders to outside shareholders when product market competition intensifies. This essay sheds light on the determinants of the ownership structure of closely held firms. It also highlights a new channel through which competition improves efficiency: the realignment of shareholder incentives. The third essay challenges the view that shareholder excess control rights destroys firm value. I show that although excess control rights hurt minority shareholders, it can benefit creditors by curtailing insiders' risk-taking incentives. It implies that asset managers can hedge their investment risk in dual-class firms by investing in these firms' equity and debt at the same time.

More questions remain along the line of research covered in this thesis. For example, what are the other frictions surrounding the birth of firms? Do such frictions have long-lasting effects that persist through the later stages of firms' life cycle? How do these frictions interact with the institutional environment firms operate in? What kind of financial and labor market policies can mitigate these frictions? These will be interesting avenues for future research.

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Appendices

Appendix A Appendix for Chapter 2

A.1 Variable Definitions

Variable Name	Definition
Target amount	The funding target amount (in $) set by the entrepreneur. Amount in other currencies are converted to US dollar based on the exchange rates in the month the project is launched.
Pledged amount	Amount (in $) pledged by the backers by the end of the project's funding window.
Pledge ratio	The ratio between *Target amount* and *Pledged amount*. This ratio is larger than or equal to one for funded projects and less than one for unfunded projects.
Funded	A dummy indicating the project is successfully funded. This happens when the pledged amount reaches or exceeds the target amount, i.e., pledge ratio equal to or larger than one.
Number of backers	The number of backers that have pledged funding for the project.
Pledged amount per backer	The average dollar amount pledged by each backer.
Funding window (in days)	The number of days over which a project raises funding. Funding window length is set by the entrepreneur.
Project pitch length	The logarithm of the number of words in a project's main pitch.
Number of videos	The number of videos used in a project pitch.
Number of images	The number of images used in a project pitch.
Has website	A dummy equal to one if there is a dedicated website for the project.
Number of rewards tiers	The number of reward tiers offered to backers. Each reward tier corresponds to a price.
Average log(reward price)	The average of the logarithm of reward price across all reward tiers offered by a project.
Number of comments	The number of comments posted by backers on a project's wall.
Number of comments per backer	The number of comments posted divided by the number of backers.
Number of Facebook friends	The number of Facebook friends an entrepreneur has. For entrepreneurs who do not have Facebook, this variable is set to zero.
Has Facebook	A dummy equal to one if an entrepreneur has Facebook.
Biography length	The logarithm of the number of words in an entrepreneur's biography.

Experience index	The log number of times experience-related keywords appear in an entrepreneur's biography. To create this index, I first construct a text bank combining the biography texts of all entrepreneurs. This text bank is then transformed into a dictionary of words with associated frequency scores. From this dictionary, I manually identify 85 keywords most commonly associated with professional or entrepreneurial experience. I then compute the number of times these keywords appear in entrepreneurs' biographies and define the log of this frequency number as the *Experience Index*.
Incorporated	A dummy equal to one if the entrepreneur is not an individual. I identify incorporated entrepreneurs as those whose names are not persons' names (i.e., cannot be matched to the Genderize name database) and who have a .com website.
Female	A dummy indicating the gender of the entrepreneur. Following Greenberg and Mollick (2016), gender is algorithmically coded using the *genderize.io* tool by comparing entrepreneurs' first names with a database of 208,631 distinct names across 79 countries and 89 languages. For each name, the database assigns a probability that a specific name-gender attribution (male or female) is correct in the population of a country. An entrepreneur is identified to be of a specific gender if the associated probability exceeds 70%. This variable is only defined for non-firm individual entrepreneurs.
Commercialized_films	A dummy equal to one if a film project is found in the IMDB database. I match film projects on Kickstarter to the IMBD database based on project name and the name of the entrepreneur. I first keep only titles in IMBD that were released since 2009. I then match project names with title names based on string matching algorithm and manual checks. I further require that the name of the entrepreneur to match to at least one of the following fields in IMBD: director name, writer name, and producer name. Finally, I require the film release date to be after the project launch date on Kickstarter.
Commercialized_PCgames	A dummy equal to one if a PC game project is found in the Steam database. I match PC game projects on Kickstarter to the Steam database based on project name and the name of the entrepreneur. I first keep only games on Steam that were released since 2009. I then match project names with game names based on string matching algorithm and manual checks. I further require the name of the entrepreneur to match to either the developer name or the publisher name on Steam. Finally, I require the game release date to be after the project launch date on Kickstarter.
Commercialized_books	A dummy equal to one if a book project is found in the OpenLibrary database. I match book projects on Kickstarter to the OpenLibrary database based on project name and the name of the entrepreneur. I first keep only books in OpenLibrary that were published since 2009. I then match project names with book names based on string matching algorithm and manual checks. I further require the name of the entrepreneur to match to the author name in OpenLibrary. Finally, I require the book publishing date to be after the project launch date on Kickstarter.
Commercialized_combined	A dummy equal to one if the either of the three commercialization indicators above is equal to one.
Launch again	A dummy equal to one if the entrepreneur launches another project after the current project. This variable is only defined for projects launched

	before May 2013 to allow for enough time to observe re-launching.
Same-type project	An indicator equal to one if an entrepreneur's next project is of the same project type as the current project.
Project similarity	The Bigram similarity score between the pitch texts of two projects. The Bigram algorithm compares two strings using all combinations of two consecutive characters within each string. The score, valued between 0 and 1, is computed as the total number of bigrams shared by the two strings divided by the average number of bigrams in each string
Cloudcover	The average deseasoned cloud cover over a project's funding window within 100 kilometers of the entrepreneur's location. I obtained hourly weather station data from the Integrated Surface Database of the National Oceanic and Atmospheric Administration (NOAA). For each project, I keep weather stations that are within a 100 kilometer radius. I first calculate the mean cloud cover score over all reported hours in a day to compute daily cloud cover at each weather station. I then deseason daily cloud cover at the station level by removing month of the year averages at each weather station. Finally, I average the deseasoned cloud cover across weather stations and funding days.
Project novelty	One minus the cosine similarity score between the word vector of a project's pitch and the combined word vector of all project pitches in that project type. To construct this variable, I first clean all project pitch texts by removing numbers, non-text symbols, and common prepositions, articles, pronouns, auxiliaries, and conjunctions. I then create a word vector for each project pitch by collapsing the text into unique words with corresponding frequencies. I do the same for each project type based on the pooled text of all projects' pitches in that project type. I then compute the cosine similarity score between the word vector of a project and the combined word vector of all projects in the same project type. The project novelty measure is one minus the cosine similarity score
Backers' experience	The average number of projects a project's backers have previously backed on Kickstarter before backing this project.
Jockey	Following Marom and Sade (2013), I construct *Jockey* as the number of times the entrepreneur's name (entrepreneurs' names) or pronouns and possessive adjectives ("I", "my", "we", "our", "he", "his", "she", "her", etc.) are mentioned in the project pitch.
Fixed costs	A variable that counts the mentioning of words related to fixed costs in a project's project pitch. The word list related to fixed costs is based on Cumming et al. (2015) and includes: acquire, building, construct-, develop-, equipment, fixed cost(s), legal fees, license, machine, manufactur-, mold, overhead cost(s), patent, permit, produced, production, prototype, purchas-, rent, R&D, research and development, and tool.
Local housing price index	MSA-quarter level Housing Price Index (HPI) published by the Federal Housing Finance Agency (FHFA), scaled by 1/100. The index is based on transactions involving conforming, conventional mortgages purchased or securitized by Fannie Mae or Freddie Mac.
Local SBL supply shock	The county-year level weighted average shocks of bank supply of small business loans with origination amount less than $100k. See Appendix A.4

	for details on the construction of this variable.
Land supply elasticity × national real estate price	The instrument for the *Local housing price index*. Following Cvijanovic (2014), it is constructed as the interaction between Saiz (2010) land supply elasticity and the S&P/Case-Shiller national home price index. This variable is at the MSA-quarter level.
MSA-level demand for finance on KS	The logarithm of quarterly aggregate funding target amount on Kickstarter at the Metro/Micropolitan Statistical Area (MSA) level.
County-level demand for finance on KS	The logarithm of quarterly aggregate funding target amount on Kickstarter at the county-level.
Unemployment rate	Annual MSA- and county-level unemployment rates. Obtained from the Local Area Uemployment Statistics (LAUS) database of the Bureau of Labor Statistics.
Population	Annual MSA- and county-level population (in logarithm) obtained from the Beaurea of Economic Analysis (BEA) Regional Economic Accounts.
Income per capita	Annual MSA- and county-level income per capital (in logarithm) obtained from the Beaurea of Economic Analysis (BEA) Regional Economic Accounts.
High homeownership	A dummy variable indicating that the zipcode in which an entrepreneur resides has above median homeownership rate. Zipcode level homeownership rates are obtained from American Community Survey 2009-2013 5-year Data Release.
Credit constrained likelihood	The likelihood that individuals in a zipcode are credit constrained. Following Jappelli (1990) and Morse (2011), I use the 2010 and 2013 Survey of Consumer Finances (SCF) to estimate the probability that an individual is credit constrained as a function of her socioeconomic characteristics. I then project the relationship onto zipcodes by applying the SCF coefficients to Census socioeconomic variables observed at the zipcode level. This variable is at the zipcode-year level.

A.2 Additional Tables

Table A.1 Validating the Instrument

Panel A. The importance of local backers

This table presents the average percentage of backers in the same city or state as the entrepreneur. For each project, I compute the percentages of backers who are located in the same city or the same state as the entrepreneur. I then average this percentage across projects for projects in different categories.

Project category	All projects		Unfunded projects	
	same state	same city	same state	same city
Art	34.0%	23.9%	35.8%	24.7%
Comics	18.6%	13.6%	23.0%	16.0%
Dance	38.1%	24.6%	40.0%	26.5%
Product and design	18.1%	12.7%	20.8%	14.4%
Fashion and apparel	27.3%	18.3%	30.3%	20.2%
Film and video	30.6%	20.1%	33.2%	21.7%
Food and restaurants	36.8%	25.7%	37.8%	26.2%
Games	14.4%	10.8%	19.2%	13.8%
Music	31.2%	19.8%	34.1%	21.5%
Photography	28.5%	19.4%	29.1%	20.1%
Publishing	27.5%	18.8%	29.8%	20.1%
Technology	16.1%	12.3%	18.3%	14.5%
Theater	38.1%	26.0%	39.1%	25.2%
Total	29.2%	19.5%	30.3%	20.2%

Panel B. Weather and time on computer for leisure: Evidence from American Time Use Survey

This table uses the American Time Use survey to study the effect of weather on individuals' time spent on the computer for leisure. The sample includes all individuals in American Time Use Survey from 2003 to 2015 with non-missing MSA information and weather data on the interview day. Weather is measured on the interview day at the MSA level. Weather data are from the Integrated Surface Database (ISD) from the National Oceanic and Atmosphere Administration (NOAA). Standard errors are clustered at the MSA level.

	Time spent on computer for leisure	
Cloudcover	0.061***	
	[0.018]	
Precipitation		0.362**
		[0.140]
Controls	*House hold size, number of kids, house hold type FE, family income, age, age^2, gender FE, race FE, marital status FE, immigration status FE, education FE, labor status FE, occupation FE, year FE, MSA × month FE, day of week FE.*	
Observations	49,396	48,357
Adjusted R^2	0.264	0.264

Panel C. Weather and Facebook sharing of Kickstarter projects

This table presents the effect of weather on the number of Facebook shares received by Kickstarter projects. The first column includes all unfunded projects. The second column includes both funded and unfunded projects. *Cloudcover* is the average deseasoned cloud cover over a project's funding window within 100 kilometers of the entrepreneur's location. Control variables are the same as those used in Table 2.3. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Ln(1+no. of Facebook shares)	
	Unfunded projects	All projects
Cloudcover	0.017***	0.044***
	[0.005]	[0.004]
Other controls	Yes	Yes
Project type FE	Yes	Yes
Year-quarter FE	Yes	Yes
MSA FE	Yes	Yes
Observations	70,722	127,317
Adjusted R^2	0.266	0.295

Panel D. Weather and strategic timing of project launch.

This table examines whether entrepreneurs strategically time the launch of their projects on days with certain weather conditions. The sample is at the MSA-day level from May 1st 2009 to April 1st 2014 covering 885 MSAs in USA. Dependent variables are the logarithmic number of projects launched and total funding target amount asked on each MSA-day. Standard errors are clustered at the MSA level.

	Ln(1+no. of projects)	Ln(1+aggregate target amount)
Cloudcover	-0.007	-0.082
	[0.006]	[0.065]
Day of week FE	Yes	Yes
Year-quarter FE	Yes	Yes
MSA FE	Yes	Yes
Observations	1,416,315	1,416,315
Adjusted R^2	0.429	0.307

Table A.2 First Stage Results for the Instrument

Panel A. Weather measured over working and non-working hours

This table presents the first stage effect of the weather instrument (and its variants) on the pledging outcome of all unfunded projects on Kickstarter for which I have non-missing weather data. *Cloudcover* is constructed from weather reported in all hours of a day. *Cloudcover_nonworktime* is constructed from weather reported from 6pm to 12am on Monday to Friday and from 9am to 12am on weekends. *Cloudcover_worktime* is constructed from weather reported from 9am to 5pm on Monday to Friday. Control variables are the same as those used in Tables 2.2 and 2.3. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Ln(pledged amount)			Ln(no. of backers)		
Cloudcover	0.088***			0.065***		
	[0.010]			[0.006]		
Cloudcover_nonworktime		0.091***			0.067***	
		[0.010]			[0.007]	
Cloudcover_worktime			0.058***			0.045***
			[0.007]			[0.005]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	70,722	70,722	70,722	70,722	70,722	70,722
Adjusted R^2	0.295	0.295	0.294	0.310	0.310	0.309

Panel B. More local and less local projects

This table presents the effect of the instrument on subsamples of unfunded projects that are more local and less local based on the average percentage of local backers presented in Panel A of Table A.1. More local projects include Theater, Dance, Food and restaurants, Music, Films and videos, and Art. Less local projects include Games, Technology, Product and design, Fashion, Comics, Publishing, and Photography. Specification is the same as that used in Panel A of Table A.2. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Ln(pledged amount)	
	More local projects	Less local projects
Cloudcover	0.101***	0.067***
	[0.008]	[0.010]
Other controls	Yes	Yes
Project type FE	Yes	Yes
Year-quarter FE	Yes	Yes
MSA FE	Yes	Yes
Observations	29,875	40,849
Adjusted R^2	0.247	0.377

Panel C. Weather and the intensive margins of backing

This table presents the effect of weather on the intensive margins of backing, i.e. the average amount pledged by per backer, the average number of comments posted per backer, and a backers' sentiment measure constructed from text-analyzing their comments following the methodology in Tetlock (2007). Specification is the same as that used in Panel A of Table A.2. Columns 1 and 2 include all unfunded projects that received a positive pledged amount. Column 3 includes all unfunded projects that have received comments from the backers. Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Ln(pledged amount per backer) (1)	Ln(no. of comments per backer) (2)	Backers' sentiment (3)
Cloudcover	-0.000	-0.001	0.003
	[0.003]	[0.001]	[0.010]
Other controls	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes
Observations	59,880	59,880	17,974
Adjusted R^2	0.178	0.046	0.029

Table A.3 Continuation on Kickstarter and Project Scale Adjustment: Alternative Sample

This table reproduces Table 2.2 Panel B and Table 2.3 on the subsample of projects in more product-oriented sectors, i.e. projects in "Product and design", "Fashion and apparel", "Food and restaurant", "Games", "Publishing", and "Technology". Standard errors are clustered at the project type level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Launch again		Project similarity (conditional on launching again)		Ln(target amount) of the next same-type project	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Ln(pledged amount)	0.007***	0.029***	0.002**	0.025**	0.066***	0.541**
	[0.001]	[0.010]	[0.001]	[0.013]	[0.008]	[0.251]
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Project type FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FEs	Yes	Yes	Yes	Yes	Yes	Yes
MSA × month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,565	18,565	4,459	4,459	3,410	3,410
Adjusted R^2	0.015	0.015	0.301	0.300	0.374	0.372

Table A.4 Interaction of Learning with Incorporation Status

This table examines how learning differs between individual entrepreneurs and corporate entrepreneurs. *Incorporated* is a dummy equal to one if the entrepreneur is a company. I identify incorporated entrepreneurs as those who have a .com website and whose names are not persons' names (i.e., cannot be matched to the Genderize database, a comprehensive name database that contains 208,631 distinct names from 79 countries). The samples and specifications are the same as those in Table 2.4. Standard errors are clustered at the MSA level in column 1 and at the project type level in other columns. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Commercialized_combined	Launch another project	Project similarity (*conditional on launching again*)	Ln(target amount) of the next same-type project
	(1)	(2)	(3)	(4)
Ln(pledged amount)	0.008***	0.0016**	0.0019***	0.052***
	[0.001]	[0.0008]	[0.0005]	[0.005]
Ln(pledged amount)	0.001*	0.0014**	-0.0002	0.009**
× Incorporated	[0.001]	[0.0006]	[0.0003]	[0.004]
Incorporated	0.016***	0.0096**	0.0001	-0.023
	[0.004]	[0.0038]	[0.0019]	[0.028]
Other controls	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Observations	27,379	51,861	11,175	8,683
Adjusted R^2	0.035	0.016	0.307	0.375

Table A.5 Local Borrowing Costs and the Feedback Value of Crowdfunding: Alternative Subsamples

Panel A reproduces Table 2.7 dropping projects that likely face predominantly local demands, i.e. projects in "Food and restaurant", "Fashion and apparel", "Dance", and "Theatre". Panel B reproduces Table 2.7 focusing on projects in more product-oriented sectors such as "Product and design", "Fashion and apparel", "Food and restaurant", "Games", "Publishing", and "Technology". All specifications are the same as those used in Table 2.7. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Excluding projects with local demand

	Project novelty		Experience index		Fixed costs	
	OLS	IV	OLS	IV	OLS	IV
Local housing price index	0.017***	0.034***	-0.084**	-0.359***	0.296***	0.453**
	[0.003]	[0.007]	[0.036]	[0.124]	[0.075]	[0.205]
First stage:						
Land supply elasticity		-0.332***		-0.332***		-0.332***
×national real estate price		[0.054]		[0.054]		[0.054]
Local controls	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	89,075	89,075	89,075	89,075	89,075	89,075
Adjusted R^2	0.016	0.016	0.036	0.036	0.257	0.257

	Project novelty	Experience index	Fixed costs
Local SBL supply shock	0.013***	-0.128***	0.137***
	[0.004]	[0.032]	[0.047]
Local controls	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes
No. of observations	102,557	102,557	102,557
Adjusted R^2	0.001	0.026	0.250

Panel B. Projects in more product-oriented sectors

	Project novelty		Experience index		Fixed costs	
	OLS	IV	OLS	IV	OLS	IV
Local housing price index	0.023***	0.042***	-0.100**	-0.232*	0.269**	0.382*
	[0.004]	[0.011]	[0.048]	[0.130]	[0.136]	[0.218]
First stage:						
Land supply elasticity		-0.374***		-0.374***		-0.374***
×national real estate price		[0.048]		[0.048]		[0.048]
Local controls	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	35,968	35,968	35,968	35,968	35,968	35,968
Adjusted R^2	0.018	0.018	0.040	0.040	0.278	0.278

	Project novelty	Experience index	Fixed costs
Local SBL supply shock	0.014***	-0.130***	0.232**
	[0.005]	[0.050]	[0.093]
Local controls	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes
Project type FE	Yes	Yes	Yes
No. of observations	40,744	40,744	40,744
Adjusted R^2	0.002	0.027	0.269

Table A.6 Local Borrowing Costs and Kickstarter Entrepreneurs' Likelihood of Being Credit Constrained

Panel A. Constructing zipcode-level likelihood of credit constraint

Following Jappelli (1990) and Morse (2011), I use the Survey of Consumer Finances (SCF) to estimate the probability that an individual is credit constrained as a function of her socioeconomic characteristics. I then project the relationship onto zipcodes by applying the SCF coefficients to Census socioeconomic variables observed at the zipcode level. I use SCF data from 2010 and 2013. I use three proxies for credit constraint available in SCF: *Denied credit*, *At credit limit*, and *Behind on payment*. I estimate the three models separately and then project them to annual Census data at the zipcode level (available from American Community Survey). I standardize each of the three estimated probabilities and then take their average to arrive at my final *Credit constrained* likelihood measure.

	Census: Proportion in Zipcode	SCF Logit: *Denied*	SCF Logit: *At credit limit*	SCF Logit: *Behind on payments*
$ 0 ≤ household income < $ 10,000	0.075	0.326***	0.214***	0.194***
$ 10,000 ≤ household income < $ 15,000	0.060	0.340***	0.315***	0.218***
$ 15,000 ≤ household income < $ 25,000	0.120	0.313***	0.276***	0.200***
$ 25,000 ≤ household income < $ 35,000	0.114	0.322***	0.307***	0.218***
$ 35,000 ≤ household income < $ 50,000	0.147	0.302***	0.334***	0.224***
$ 50,000 ≤ household income < $ 75,000	0.189	0.236***	0.256***	0.196***
$ 75,000 ≤ household income < $100,000	0.119	0.202***	0.262***	0.156***
$100,000 ≤ household income < $150,000	0.108	0.152***	0.135***	0.110***
$150,000 ≤ household income < $200,000	0.035	0.087***	0.118***	0.041***
$200,000 ≤ household income	0.033	--	--	--
Unemployed persons	0.089	0.037***	0.003	0.032***
0 ≤ persons' age < 20	0.249	0.251***	0.115***	0.028
20 ≤ persons' age < 25	0.060	0.278***	0.116***	0.134***
25 ≤ persons' age < 35	0.112	0.361***	0.077***	0.160***
35 ≤ persons' age < 45	0.122	0.379***	0.059***	0.198***
45 ≤ persons' age < 55	0.152	0.311***	0.063***	0.171***
55 ≤ persons' age < 65	0.140	0.286***	0.046***	0.116***
65 ≤ persons' age < 75	0.092	0.132***	0.036***	0.046***
75 ≤ persons' age	0.072	--	--	--
Less than high school	0.148	0.073***	0.012***	0.019***
High school graduate	0.343	0.083***	0.019***	0.042***
Attend some college	0.223	0.108***	0.032***	0.080***
Associate degree	0.084	0.047***	0.036***	0.050***
Bachelor's degree	0.131	0.026***	0.012***	0.012**
Graduate degree	0.071	--	--	--
Homeowning households	0.739	-0.074***	-0.009***	-0.015***
$ 0 ≤ Shelter costs < $ 300	0.163	-0.102***	-0.015***	-0.042***
$ 300 ≤ Shelter costs < $ 500	0.163	-0.066***	-0.007***	-0.013**
$ 500 ≤ Shelter costs < $ 700	0.144	-0.053***	0.003	-0.011**
$ 700 ≤ Shelter costs < $1,000	0.173	-0.057***	0.003	-0.007
$1,000 ≤ Shelter costs < $2,000	0.257	-0.045***	0.002	-0.003
$2,000 ≤ Shelter costs	0.100	--	--	--
Owns 1+ Vehicles	0.787	0.009**	0.004***	0.003
Female persons	0.499	0.012***	0.008***	0.010***
Non-white persons	0.159	0.057***	0.001	0.010***
Person per household = 1	0.265	-0.069***	-0.007***	-0.054***
Person per household = 2	0.371	-0.044***	-0.007***	-0.031***
Person per household = 3	0.150	-0.000	0.001	-0.001
Person per household ≥ 4	0.215	--	--	--
Married persons	0.533	-0.041***	0.000	-0.015***
Observations in SCF		62,485	62,485	62,485
Percentage correctly predicted by logit		0.767	0.939	0.854
Adjusted R^2		0.155	0.105	0.098

Panel B. Local borrowing costs and crowdfunding entrepreneurs' likelihood of being credit constrained

This table examines the effect of local borrowing costs on Kickstarter entrepreneurs' likelihood of being credit constrained. *Credit constrained likelihood* is at the zipcode-year level and is the average of the three estimated probabilities in Panel A: *Denied credit*, *At credit limit*, and *Behind on payments*. Samples and specifications are the sample as those used in Table 2.7.

	Credit constrained likelihood	
	OLS	IV
	(1)	(2)
Local housing price index	0.004	-0.011
	[0.003]	[0.010]
First stage:		
Land supply elasticity		-0.304***
× national real estate price		[0.043]
Local controls	Yes	Yes
MSA FE	Yes	Yes
Year-quarter FE	Yes	Yes
Project type FE	Yes	Yes
No. of observations	105,061	105,061
Adjusted R^2	0.585	0.573

	Credit constrained likelihood
Local SBL supply shock	0.014
	[0.016]
Local controls	Yes
Year-quarter FE	Yes
Project type FE	Yes
No. of observations	120,719
Adjusted R^2	0.011

Table A.7 Validation of Key Measures

In Panel A, projects (both funded and unfunded) are sorted into quintiles based on the value of *Project novelty* and *Experience index*, respectively. Higher quintile number correspond to a higher value of these measures. I then tabulate the mean and the standard deviation of the funding outcome *ln(pledge ratio)* in each quintile for each sorting variable. Panel B sorts project categories by the average of the *Jockey* measure and the average of the *Fixed costs* measure.

Panel A. Validating uncertainty measures

Quintiles	Sorting variable: *Project novelty*		Sorting variable: *Experience index*	
	Mean of ln(pledge ratio)	Std. dev. of ln(pledge ratio)	Mean of ln(pledge ratio)	Std. dev. of ln(pledge ratio)
1	-1.390	1.880	-1.683	1.997
2	-1.449	1.900	-1.516	1.966
3	-1.523	1.921	-1.532	1.936
4	-1.639	1.963	-1.497	1.906
5	-1.725	2.020	-1.441	1.859

Panel B. Mean of *Jockey* and *Fixed cost* by project categories

Project category in descending order	Mean of *Jockey*	Project category in descending order	Mean of *Fixed costs*
Music	1.949	Technology	4.325
Dance	0.573	Product and design	4.154
Theater	0.206	Games	2.953
Fashion and apparel	0.094	Food and restaurant	2.735
Food and restaurant	-0.021	Fashion and apparel	2.260
Film and video	-0.140	Film and video	2.162
Publishing	-0.270	Theater	1.967
Art	-0.286	Art	1.707
Photography	-0.494	Dance	1.608
Comics	-0.588	Photography	1.448
Product and design	-1.473	Publishing	1.273
Technology	-2.292	Comics	1.267
Games	-2.315	Music	1.114

A.3 Identifying the Feedback Value of Crowdfunding: Theoretical Framework

In this appendix, I demonstrate how I identify the feedback value of crowdfunding in simple theoretical framework featuring learning and real option.

Entrepreneur i has a prior belief μ_i about the profit of her project, which is equal to an uncertain gross profit (revenue minus variable cost), s_i, minus a constant fixed cost, I_i. Following earlier work on learning (Jovanovic 1979), I assume s_i is normally distributed with mean $\bar{s}$ and precision h_0: $s_i \sim N\left(\bar{s},\ \frac{1}{h_0}\right)$. Therefore $\mu_i \sim N\left(\bar{\mu},\ \frac{1}{h_0}\right)$, where $\bar{\mu} = \bar{s} - I_i$. I also assume that, on average, a project is profitable, i.e., $\bar{\mu} > 0$. The entrepreneur chooses between crowdfunding and bank borrowing to finance her project. The crowd provides a feedback f_i^c that is an imperfect signal of μ_i with precision h_c: $f_i^c|\mu_i \sim N\left(\mu_i,\ \frac{1}{h_c}\right)$. The bank also provides a feedback f_i^b with the same mean but a different precision h_b: $f_i^b|\mu_i \sim N\left(\mu_i,\ \frac{1}{h_b}\right)$. After receiving feedback from either the bank or the crowd, the entrepreneur updates her belief and makes her commercialization decision. Crowdfunding gives the entrepreneur an ex-ante value of

$$V_i^c = E\{Max[0,\ E(\mu_i|f_i^c)] - R_i^c\}, \tag{A1}$$

and bank borrowing gives her an ex-ante value of

$$V_i^b = E\{Max[0,\ E(\mu_i|f_i^b)] - R_i^b\}. \tag{A2}$$

Both values are equal to the expected maximum of the outside option (assumed to be zero) and the *updated* expected profit $E(\mu_i|f_i)$, minus the cost of accessing the respective type of finance, R_i.

[78] The entrepreneur chooses crowdfunding over bank borrowing if and only if $V_i^c > V_i^b$, i.e.,

$$O_i = E\{Max[0,\ E(\mu_i|f_i^c)] - Max[0,\ E(\mu_i|f_i^b)]\} > E[R_i^c - R_i^b] = F_i, \tag{A3}$$

where O_i is the (relative) feedback value of crowdfunding, and F_i is the (relative) financing cost of crowdfunding.

It can be proven that the following predictions obtain if and only if crowdfunding provides more precise feedback than the bank, i.e., $h_c > h_b$:

i) The feedback value of crowdfunding O_i is positive;

ii) The feedback value of crowdfunding O_i decreases in entrepreneur's prior precision h_0;

[78] Crowdfunding costs include, among other things, the 5% fee to Kickstarter, 3% to 5% payment processing fee to Amazon Payment, overheads from preparing for the campaign, costs of procuring, producing, and shipping the rewards, as well as the price discount of rewards relative to their future market value.

iii) The feedback value of crowdfunding O_i increases in the project's fixed costs I_i;

iv) Let $E_i(.)$ denote the average across individuals. A decrease in bank borrowing cost R_i^b for a non-empty set of individuals $\{i\}$ will increase the average feedback value for entrepreneurs who *choose* crowdfunding $E_i[O_i|O_i > F_i]$, leading to an increase in these entrepreneurs' prior precisions $E_i[h_0|O_i > F_i]$ or their projects' fixed costs $E_i[I_i|O_i > F_i]$.

Prediction iv) says that entrepreneurs who *choose* crowdfunding on average derive higher option value from feedback when the local borrowing cost decreases. This is because, as crowdfunding becomes relatively more costly, only entrepreneurs who benefit enough from learning select into crowdfunding, i.e., those who face higher uncertainty or higher fixed costs. In other words, cheaper local credit attracts away entrepreneurs who crowdfund mainly for money and teases out those who crowdfund for feedback. This therefore generates the following testable hypothesis: When local borrowing costs decrease so that crowdfunding becomes relatively more costly, entrepreneurs who remain using crowdfunding will shift to those facing higher uncertainty or proposing projects with higher fixed costs.

Proofs:

i) Following DeGroot (1970), the entrepreneur's posterior expectation after receiving feedback from crowdfunding is $\mu_f = E(\mu_i|f_i^c) = \frac{h_0}{h_0+h_c} \times \bar{\mu} + \frac{h_c}{h_0+h_c} \times f_i^c$, with a posterior variance $Var(\mu_i|f_i^c) = \frac{1}{h_0+h_c}$. By variance decomposition, the variance of her posterior expectation is

$$\mathrm{Var}[\mathrm{E}(\mu_i|f_i^c)] = \mathrm{Var}[\mu_i] - E[\mathrm{Var}(\mu_i|f_i^c)] = \frac{1}{h_0} - \frac{1}{h_0+h_c} = \frac{h_0}{(h_0+h_c)h_0} \quad \text{(A4)}$$

Therefore we have $E(\mu_i|f_i^c) \sim N(\bar{\mu}, \sigma_c^2)$ and $E(\mu_i|f_i^b) \sim N(\bar{\mu}, \sigma_b^2)$, where $\sigma_c^2 = \frac{h_c}{(h_0+h_c)h_0}$ and $\sigma_b^2 = \frac{h_b}{(h_0+h_b)h_0}$.

Writing σ_c as $\sigma_c = [(\frac{h_0}{h_c} + 1)h_0]^{-\frac{1}{2}}$, it can be shown that

$$\frac{\partial \sigma_c}{\partial h_0} < 0, \frac{\partial \sigma_c}{\partial h_c} > 0. \quad \text{(A5)}$$

Using the equation for the expectation of a truncated normal distribution (Greene 2008), it can be shown that

$$E\{Max[0,\ E(\mu_i|f_i^c)]\} = F(\bar{\mu}, \sigma_c) = \bar{\mu} + \sigma_c \lambda\left(\frac{\bar{\mu}}{\sigma_c}\right), \quad \text{(A6)}$$

where $\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) = \phi(\frac{\bar{\mu}}{\sigma_c})/\Phi(\frac{\bar{\mu}}{\sigma_c})$ is the inverse Mill's ratio, $\phi(.)$ is the probability density function of standard normal distribution, and $\Phi(.)$ is the cumulative density function of standard normal distribution.

Taking the first order derivative of $F(\bar{\mu}, \sigma_c)$ w.r.t. σ_c, we have

$$\frac{\partial F(\bar{\mu},\sigma_c)}{\partial \sigma_c} = \lambda(\frac{\bar{\mu}}{\sigma_c})[1 + \frac{\bar{\mu}}{\sigma_c}\left(\frac{\bar{\mu}}{\sigma_c} + \lambda\left(\frac{\bar{\mu}}{\sigma_c}\right)\right)]. \quad \text{(A7)}$$

Applying the Mill's ratio inequality from Gordon (1941): $\frac{x}{x^2+1}\frac{1}{\sqrt{2\pi}}e^{\frac{-x^2}{2}} \leq \frac{1}{\sqrt{2\pi}}\int_x^\infty e^{\frac{-t^2}{2}} \leq \frac{1}{x}\frac{1}{\sqrt{2\pi}}e^{\frac{-x^2}{2}}$ for $x > 0$, it is immediate that $1 + \frac{\bar{\mu}}{\sigma_c}\left(\frac{\bar{\mu}}{\sigma_c} + \lambda\left(\frac{\bar{\mu}}{\sigma_c}\right)\right) > 0$. Since $\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) > 0$, we have $\frac{\partial F(\bar{\mu},\sigma_c)}{\partial \sigma_c} > 0$. Given $\frac{\partial\, \sigma_c}{\partial h_c} > 0$, we also have $\frac{\partial F(\bar{\mu},\, \sigma_c)}{\partial h_c} > 0$. I therefore proved that $O_i = F(\bar{\mu}, \sigma_c) - F(\bar{\mu}, \sigma_b) > 0$ if and only if $h_c > h_b$.

ii) Writing O_i as

$$O_i = F(\bar{\mu}, \sigma_c) - F(\bar{\mu}, \sigma_b) \approx [\sigma_c - \sigma_b]\frac{\partial F(\bar{\mu},\sigma_c)}{\partial \sigma_c} \quad \text{(A8)}$$

Since $\frac{\partial\, \sigma_c}{\partial h_0} < 0$, and $\sigma_c - \sigma_b > 0$ if and only if $h_c > h_b$, to prove that O_i decreases in h_0 if and only if $h_c > h_b$, I only need to prove $\frac{\partial^2 F(\bar{\mu},\sigma_c)}{\partial {\sigma_c}^2} > 0$.

It can be shown that

$$\frac{\partial^2 F(\bar{\mu},\sigma_c)}{\partial {\sigma_c}^2} = \left(\frac{\bar{\mu}}{\sigma_c}\right)^2 \frac{1}{\sigma_c}\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right)[\left(\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) + \frac{\bar{\mu}}{\sigma_c}\right)\left(2 * \lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) + \frac{\bar{\mu}}{\sigma_c}\right) - 1] \quad \text{(A9)}$$

Using the Mill's ratio inequality from Sampford (1953): $\lambda(x)[(\lambda(x) + x)(2\lambda(x) + x) - 1] > 0$ for all finite x, it immediately follows that $\frac{\partial^2 F(\bar{\mu},\sigma_c)}{\partial {\sigma_c}^2} > 0$.

iii) Since $\bar{\mu} = \bar{s} - I$, and $\sigma_c - \sigma_b > 0$ if and only if $h_c > h_b$, to prove that O_i increase in I_i if and only if $h_c > h_b$, I only need to prove $\frac{\partial^2 F(\bar{\mu},\sigma_c)}{\partial \sigma_c\, \partial \bar{\mu}} < 0$.

It can be shown that

$$\frac{\partial^2 F(\bar{\mu},\sigma_c)}{\partial \sigma_c\, \partial \bar{\mu}} = -\frac{\bar{\mu}}{{\sigma_c}^2}\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right)[\left(\lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) + \frac{\bar{\mu}}{\sigma_c}\right)\left(2 * \lambda\left(\frac{\bar{\mu}}{\sigma_c}\right) + \frac{\bar{\mu}}{\sigma_c}\right) - 1] \quad \text{(A10)}$$

Applying the Mill's ratio inequality from Sampford (1953), it follows that $\frac{\partial^2 V(\bar{\mu},\sigma_c)}{\partial \sigma_c\, \partial \bar{\mu}} < 0$ when $\bar{\mu} > 0$.

iv) A decrease in R_i^b for a non-empty set of $\{i\}$ increases the (relative) financing cost of crowdfunding F_i and therefore the lower bound in the conditional expectation $E_i[O_i|O_i > F_i]$. This increases the value of $E_i[O_i|O_i > F_i]$. Given (ii) and (iii), a decrease in $E_i[h_0|O_i > F_i]$ will be observed if and only if $h_c > h_b$, and an increase in $E_i[I_i|O_i > F_i]$ will be observed if and only if $h_c > h_b$.

References:

Gordon, Robert D., 1941, Values of Mills' Ratio of Area to Bounding Ordinate and of the Normal Probability Integral for Large Values of the Argument, *The Annals of Mathematical Statistics* Vol. 12, No. 3, 364-366.

Greene, William H., 2008, *Econometric Analysis*, 6th Edition, Prentice Hall.

Sampford, M. R., 1953, Some Inequalities on Mill's Ratio and Related Functions, *The Annals of Mathematical Statistics* Vol. 24, No. 1, 130-132.

A.4 Estimating Local Small Business Loan Supply Shocks

As an alternative measure of shocks to local borrowing costs of entrepreneurs, I use detailed bank-county level small business lending data to estimate local lending supply shocks that are separate from local demand shocks. I employ a decomposition method developed by Amiti and Weinstein (2013) (see Flannery and Lin (2015) and Greenstone, Mas, and Nguyen (2015) for recent applications).

The small business loan data come from the Federal Financial Institutions Examination Council (FFIEC).[79] Under the Community Reinvestment Act (CRA), all financial institutions regulated by the Office of the Comptroller of the Currency, Federal Reserve System, Federal Deposit Insurance Corporation, and the Office of Thrift Supervision that meet the asset size threshold are subject to data collection and reporting requirements. Each bank reports its small business lending data in each county it operates. The loan data is further decomposed into four categories based on the loan amount at origination: \$250K to \$1 million, \$100K to \$250K, and below \$100K. I focus on loans smaller than \$100K as 97% Kickstarter projects have funding targets lower than this amount.

I start by writing the growth in bank-county level lending as the following.

$$g_{c,b,t} = \alpha_{c,t} + \beta_{b,t} + \varepsilon_{c,b,t} \tag{A11}$$

, where $g_{c,b,t}$ is the growth rate of small business loans extended by bank b to county c from year $t-1$ to year t, $\alpha_{c,t}$ captures credit demand shocks in county c, and $\beta_{b,t}$ captures credit supply shocks for bank b. $\varepsilon_{c,b,t}$ is the error term and $E(\varepsilon_{c,b,t}) = 0$.

Aggregating equation (A4) to county level by weighted-averaging across banks yields

$$GC_{c,b,t} = \alpha_{c,t} + \sum_{b} \theta_{c,b,t-1}\beta_{b,t} \,. \tag{A12}$$

Aggregating equation (A4) to bank level by weighted-averaging across counties yields

$$GB_{c,b,t} = \beta_{b,t} + \sum_{c} \varphi_{c,b,t-1}\alpha_{c,t} \,. \tag{A13}$$

$GC_{c,b,t}$ is the growth rate of borrowing of county c from all of its banks from year $t-1$ to year t, $GB_{c,b,t}$ is the growth rate of lending of bank b to all of its counties from year $t-1$ to year t,

[79] CRA defines a small business loan as any loan to a business in an original amount of \$1 million or less, excluding loans to farms or secured by farm or any residential properties.

$\theta_{c,b,t-1}$ is the share of bank b's loans obtained by county c in year $t-1$, and $\varphi_{c,b,t-1}$ is the share of county c's loans obtained from bank b in year $t-1$.[80]

Equations (A5) and (A6) provide a system of $C+B$ equations and $C+B$ unknowns in each time period that enables solving for a unique set of county ($\alpha_{c,t}$) and bank shocks ($\beta_{b,t}$) (up to a numéraire) in each period, where C is the total number of counties and B is the total number of banks.[81] The estimated bank shocks ($\beta_{b,t}$) can then be aggregated to the county-level based on banks' lending shares in each county to form an estimate of county-level local small business loan supply shocks:

$$Local\ SBL\ supply\ shock_{c,t} = \sum_{b} \theta_{c,b,t-1} \beta_{b,t} \tag{A14}$$

In solving the system of equations in (A5) and (A6), I follow Flannery and Lin (2015) and drop, for each year, banks and counties whose total growth in small business loans are above the 99th percentile to minimize the influence of extreme values. To efficiently solve the system, I also ignore, for each bank, the counties whose loans account for less than 1% of lending by this bank, and for each county the banks whose lending account for less than 1% of the loans to that county. Eventually, I end up with estimates of local demand shocks for 3,054 counties and estimates of credit supply shocks for 2,328 banks from 2002 to 2013. The correlation between estimated loan supply shocks and the actual growth rate in lending in my sample is 0.56, which is close to the correlation of 0.62 reported in Flannery and Lin (2015). To put the local supply shock measure in perspective, Figure A1 in Appendix A.5 plots the median, 5th percentile, and 95th percentile of *Local SBL supply shock* over 2002-2013. Figure A2 in Appendix A.5 shows the geographic distribution of average *Local SBL supply shock* over financial crisis years 2008-2010. The temporal and spatial distributions of *Local SBL supply shock* are largely consistent with our knowledge of bank lending during the financial crisis.

[80] Since $\theta_{c,b,t-1}$ and $\varphi_{c,b,t-1}$ are predetermined variables, we can impose the following moment conditions on the data. $E[\sum_b \theta_{c,b,t-1}\, \varepsilon_{c,b,t}] = \sum_b \theta_{c,b,t-1} E[\varepsilon_{c,b,t}] = 0$, and $E[\sum_c \varphi_{c,b,t-1}\, \varepsilon_{c,b,t}] = \sum_c \varphi_{c,b,t-1} E[\varepsilon_{c,b,t}] = 0$.

[81] For detailed illustration of the decomposition and the estimation method, see Appendix 1.1 of Amiti and Weinstein (2013).

A.5 Additional Figures

Figure A.1 Temporal Distribution of Local Small Business Loan Supply Shocks

This graph plots the median and the 5th and 95th percentile of county-level small business loan supply shocks for each year over the period 2002-2013.

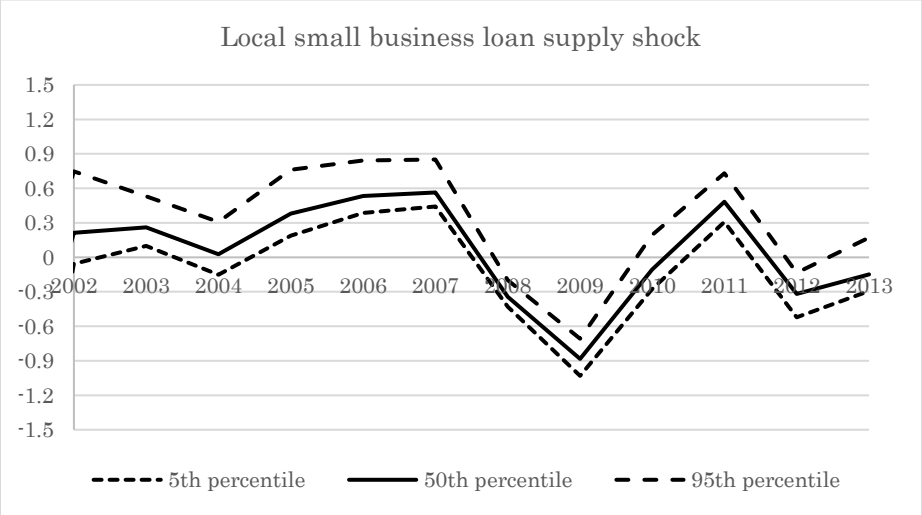
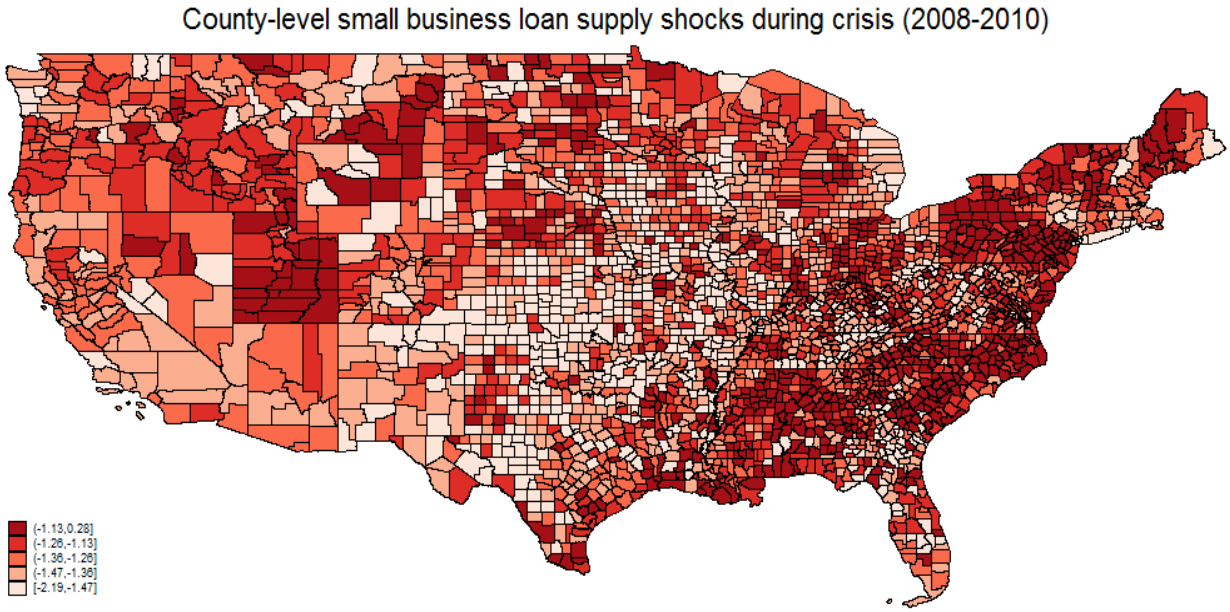


Figure A.2 Geographic Distribution of Small Business Loan Supply Shocks during Financial Crisis Years (2008-2010)

This map plots the county-level distribution of small business loan supply shocks over the financial crisis years 2008 to 2010. For each county, I compute the average small business loan supply shock over 2008-2010. Counties are then divided into five quintiles, with darker-colored counties associated with more positive supply shocks and lighter-colored counties associated with more negative supply shocks.



Appendix B Appendix for Chapter 3

B.1 Variable Definitions

- Ownership characteristics

Variable	Definition
Inside ownership	The percentage of outstanding shares owned by inside shareholders. Inside shareholders are defined as the shareholders who serve as company executive officers or directors, as listed in the management file of Bureau van Dijk's (BvD) Amadeus/Orbis database. The shareholder level data come from BvD's Amadeus/Orbis shareholders files.
Inside ownership_family	Same as *Inside ownership* except that inside shareholders are more broadly defined to include the family members of company executive officers and directors. Family members are identified as the shareholders that have the same surname as company executive officers and directors.
Outside HHI	The concentration of outside ownership stakes measured as the conditional Herfindahl-Hirschman Index (in percent) of outside shareholders $100 \times \sum_{i \in \{Outside\ shareholders\}} \left(\frac{Stake_i}{\sum_{i \in \{Outside\ shareholders\}} Stake_i} \right)^2$. Outside shareholders are defined as the shareholders who do not serve as company executive officers or directors, i.e., the shareholders that are not inside shareholders.
Outside HHI_family	Same as *Outside HHI* except that outside shareholders are defined to exclude the family members of company executive officers and directors.
Total HHI	The concentration of ownership stakes among shareholders measured as the Herfindahl-Hirschman Index (in percent) of all shareholders: $100 \times \sum_i \left(\frac{Stake_i}{\sum_i Stake_i} \right)^2$.
Number of shareholders	Total number of a firm's shareholders.
Number of inside shareholders	Number of a firm's inside shareholders. Inside shareholders are defined as the shareholders who serve as company executive officers or directors, as listed in the management file of Bureau van Dijk's (BvD) Amadeus/Orbis database.
Number of inside shareholders_family	Same as *Number of inside shareholders* except that inside shareholders are more broadly defined to include the family members of company executive officers and directors.
Number of outside shareholders	Number of a firm's outside shareholders. Outside shareholders are defined as the shareholders who do not serve as company executive

	officers or directors, i.e., the shareholders that are not inside shareholders.
Number of outside shareholders_family	Same as *Number of outside shareholders* except that outside shareholders are defined to exclude the family members of company executive officers and directors.
Inside ownership ≥ 50%	An indicator variable equal to one if *Inside ownership* is larger than or equal to 50% and equal to zero otherwise.
Inside ownership _SSI (%)	The Shapley–Shubik Power Index (SSI) of inside shareholders computed assuming that inside shareholders form a fully coordinated voting coalition.
Outside HHI_SSI (%)	The conditional Herfindahl-Hirschman Index (in percent) of outside shareholders' SSIs $100 \times \sum_{i \in \{Outside\ shareholders\}} \left(\frac{SSI_i}{\sum_{i \in \{Outside\ shareholders\}} SSI_i} \right)^2$.
Pure shareholder entry	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one 'new shareholder' (i.e., a shareholder of the firm at the end of the period who was neither a shareholder nor a manager/director of the firm at the beginning of the period) and, over the same period, the firm does not obtain any 'new professional manager' (i.e., a manager/director of the firm at the end of the period who is not a shareholder at the end of the period and who was neither a shareholder nor a manager/director of the firm at the beginning of the period). The variable is defined at the firm-5-year window level.
Shareholder and professional manager entry	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one 'new shareholder' and, over the same period, the firm obtains at least one 'new professional manager'. The variable is defined at the firm-5-year window level.
Incumbent shareholder switching	An indicator variable equal to one if, over a 5-year window period, at least one 'incumbent shareholder' of a firm (i.e., a shareholder of the firm at the beginning of the period) switches his/her status from being an inside shareholder to being an outside shareholder or vice versa and, over the same period, the firm does not obtain any 'new shareholder'. The variable is defined at the firm-5-year window level.
Incumbent shareholder exit	An indicator variable equal to one if, over a 5-year window period, at least one 'incumbent shareholder' of a firm exits the firm's shareholder base and, over the same period, no 'incumbent shareholder' of the firm switches his/her status from being an inside shareholder to being an outside shareholder or vice versa, as well as, the firm does not obtain any 'new shareholder'. The variable is defined at the firm-5-year window level.
Entry of prof. managers	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one new professional manager, i.e., a manager/director that is not a concurrent shareholder.

Entry of prof. managers from third parties	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one new professional manager who was neither a shareholder nor manager of the firm at the beginning of the 5-year window period.
Entry of prof. managers from inside shareholders	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one new professional manager who was the firm's inside shareholder at the beginning of the 5-year window period.
Entry of prof. managers from outside shareholders	An indicator variable equal to one if, over a 5-year window period, a firm obtains at least one new professional manager who was the firm's outside shareholder at the beginning of the 5-year window period.
Ownership change_diffuse	An indicator variable equal to one if, over a 5-year window period, a firm experiences a decrease in *Inside ownership* or *Outside HHI*.
Ownership change_concentrate	An indicator variable equal to one if, over a 5-year window period, a firm experiences an increase in *Inside ownership* or *Outside HHI*.

- Competition measures

Variable	Definition
Import penetration	Import penetration is defined as *Import value / (Import value + Domestic production value)* for each country-industry-year (industry defined at 4-digit NACE level throughout this appendix). *Import value* comes from Eurostat's Comext database and it is measured as the aggregate import (Euro thousands) from all partner countries around the world. *Domestic production value* is obtained from Eurostat's Structural Business Statistics database (SBS). *Import value* data are aggregated from the product level to the industry level using correspondences described in Appendix B.2. We match this variable to our firm-year panel based on the industry each firm is in at the first year it appears in our data and we hold the industry constant over the sample period.
Import penetration _low wage	Following Bernard, Jensen, and Schott (2006), we classify a country as a low-wage in year *t* if its per capita GDP (in constant 2005 USD) is less than 5 percent of the U.S. per capita GDP in the same year. We also require that low-wage countries be outside of Europe. We then define import penetration from low-wage countries as *Import value from low-wage countries / (Import value + Domestic production value)* for each country-industry-year. *Import value from low-wage countries* and *Import value* come from Eurostat's Comext database. *Domestic production value* is obtained from Eurostat's SBS Database. We match this variable to our firm-year panel based on the industry each firm is in at the first year it appears in our data and we hold the industry constant over the sample period.

Lerner index	Following Aghion et al. (2005), the Lerner index is defined as $1 - \frac{1}{N_{jct}} \sum_{i \in jct} PCM_{it}$, where $PCM_{it} = \frac{operating\ profit_{it} - financial\ cost_{it}}{sales_{it}}$ is the price-cost margin of firm i that is incorporated in country c and operates in industry j in year t. PCM_{it} is then averaged across all firms that operate in the same country-industry-year as reported in BvD's Amadeus/Orbis database as firm i. The average price cost margin is then subtracted from one so that a higher value means more intense competition. We match this variable to our firm-year panel based on the industry each firm is in at the first year it appears in our data and we hold the industry constant over the sample period.

- Control variables

Variable	Definition
Firm level:	
Ln(age)	Natural logarithm of firm age measured in years since incorporation. All firm level control variables are obtained from BvD's Amadeus/Orbis databases.
Ln(total assets)	Natural logarithm of total assets (Euro million).
Tangibility	Tangible fixed assets divided by total assets.
Capex/total assets	Capital expenditure divided by total assets. Capital expenditure is computed as the change in the net fixed assets plus depreciation. For firm-years with missing depreciation data, we impute depreciation values from firms' total assets using the industry median depreciation-to-total assets ratio in the same year.
Leverage	Bank loans plus long term debt divided by total assets.
Profitability	EBITDA (Earnings before interest, taxes, depreciation, and amortization) divided by total assets.
Legal form dummies	0/1 indicator variables for four types of incorporation: LTD, LTD-one, PLC, and PLC-one. Public Limited companies (PLC) are limited-liability companies that issue shares that can be listed. Private Limited companies (LTD) are limited-liability companies whose shares cannot be listed. LTD-one and PLC-one denote legal forms that allow for only one shareholder. We assign multiple different legal forms of incorporation allowed by corporate law in countries in our sample into these four types of incorporation.
Industry level:	
External finance sensitivity (EFS)	Industry level sensitivity of firms' external equity use to import penetration estimated using U.S. listed firms in 1980-1999. Specifically, following Xu (2012), we obtain estimates of EFS_j for each industry j (4-digit

	NACE) from regression $\Delta\, Equity\ capital_{ij,t} = \sum_j EFS_j \times \Delta\, Import\ penetration_{j,t-1} \times Ind_j + Year\ FEs + \varepsilon_{ij,t}$, where $\Delta\, Equity\ capital_{ij,t}$ is the change in equity capital (total common equity minus retained earnings) for firm *i* in industry *j* from year *t−1* to year *t* scaled by total assets in year *t−1*, $\Delta\, Import\ penetration_{j,t-1}$ is the change in import penetration in industry *j* from year *t−2* to year *t−1*, and Ind_j is an indicator variable equal to one if a firm-year is in industry *j* in year *t*. U.S. import penetration is computed using trade data from UN Comtrade database and industry output data come from NBER-CES Manufacturing Industry Database.
Entrenchment	Industry average of firm-level entrenchment index (Bebchuk, Cohen, and Ferrell (2009)) for U.S. listed firm from 1990 to 2000. For each firm in the data, we assign a NACE code based on the NAICS-to-NACE concordance table available from Eurostat. Finally, we take the industry weighted average (weighted by log size) of this measure in each 4-digit NACE industry to create the industry level measure of entrenchment.
Asset redeployability (AR)	From Kim and Kung (2014). They use the Bureau of Economic Analysis (BEA) capital flow table to compute the asset-level redeployability score as the proportion of industries by which a given asset is used. The industry-level asset redeployability score is the value-weighted average of each asset's redeployability score. We use the NAICS-to-NACE concordance table from Eurostat to map this measure from NAICS-level to NACE-level. Source: Kim and Kung (2014).
Risk sensitivity (RS)	Industry level sensitivity of firms' cash flow volatility to import penetration estimated using U.S. listed firms in 1980-1999. Specifically, following Irvine and Pontiff (2009), we obtain estimates of RS_j for each industry *j* (4-digit NACE) from regression $Cash\ flow\ volatility_{ij,t\to t+2} = \sum_j RS_j \times Import\ penetration_{j,t-1} \times Ind_j + \sum_j Ind_j + Year\ FEs + \varepsilon_{ij,t}$, where $Cash\ flow\ volatility_{ij,t\to t+2}$ is the standard deviation of annual cash flow to total asset ratios for firm *i* in industry *j* from year *t* to year *t+2*, $Import\ penetration_{j,t-1}$ is the import penetration in industry *j* in year *t−1*, and Ind_j is an indicator variable equal to one if a firm-year is in industry *j* in year *t*. U.S. import penetration is computed using trade data from UN Comtrade database and industry output data come from NBER-CES Manufacturing Industry Database.
Industry M&A volume	Natural logarithm of the ratio of the sum of merger and acquisition (M&A) bid values to the sum of firms' total assets computed for each country-industry-year. We exclude bids involving less than 10% ownership change. For repeated bids for the same target firm, we include only the first bid. M&A data come from BvD's Zephyr database.
Industry B/M	Average (weighted by the natural logarithm of sales) of the book-to-market equity ratios of all listed firms active in each country-industry-year. The data come from BvD's Amadeus/Orbis databases.

Industry FDI	The value of foreign direct investments (FDI) in the form of equity and reinvested earnings in each country-industry-year normalized by the sum of total assets of all firms active within that country-industry-year. The FDI data are from Eurostat.
Export openness	Computed as *Export value / (Export value + Domestic production value)* for each country-industry-year. *Export value* comes from Eurostat's Comext database and it is measured as the aggregate import (Euro thousands) from all partner countries around the world. *Domestic production value* is obtained from Eurostat's Structural Business Statistics database (SBS).
Industry output growth	Year-to-year growth rate of *Domestic production value* at the country-industry-year level. *Domestic production value* is obtained from Eurostat's Structural Business Statistics database (SBS).
Country level:	
Enforceability of contracts	The relative degree to which contractual agreements are honored and complications presented by language and mentality differences. The scale runs from 0 to 10, with higher scores indicating a higher enforceability. Source: Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003).
Property rights	The degree to which a country's laws protect private property rights and the degree to which its government enforces those laws. Source: The Heritage Foundation Index of Economic Freedom.
Control of corruptions	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Source: The World Bank Worldwide Governance Index.
Rule of law	Based on the assessment of the law and order tradition in a country as produced by the country risk-rating agency International Country Risk (ICR). The variable reflects the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes. The scale runs from 0 to 6, with lower scores indicating a lower level of law and order. Higher scores indicate sound political institutions, a strong court system, and provisions for an orderly succession of power. Source: La Porta et al. (1998).

- Instruments

Variable	Definition
Foreign exchange rate	The real exchange rate index is computed at the country-industry-year level. Following Bertrand (2004), it is defined as the source-weighted average of the natural logarithm of real exchange rates. The source-weights are the shares of imports from each partner (foreign) country out of total imports in a given industry of the reporting (home) country in the

	pre-sample period (1998-2000 average). Real exchange rates are nominal exchange rates (expressed in foreign currency per unit of home currency) multiplied by the home country's Consumer Price Index (CPI) and divided by the foreign country's CPI. Nominal exchange rates and CPIs are from International Financial Statistics of the International Monetary Fund. We match this variable to our firm-year panel based on the industry each firm is in at the first year it appears in our data and we hold the industry constant over the sample period.
Ex-EU export supply	Following Hummels et al. (2014), for each country-industry, we first compute the pre-sample period (1998-2000 average) import penetration and then project it into our sample years using the growth of the partner countries' weighted ex-EU world export supply in that industry. Each partner country's weight is the import share of the partner country in a given country-industry in the pre-sample period (1998-2000 average). Trade data come from Eurostat's Comext database and UN Comtrade database. We match this variable to our firm-year panel based on the industry each firm is in at the first year it appears in our data and we hold the industry constant over the sample period.

B.2 Details on Data Sources and the Construction of Variables

1. Firm level data

The primary source of firm level data for our study is the Amadeus database compiled by the Bureau van Dijk (BvD). Amadeus provides harmonized financial, ownership, and management information on 7 million private and public companies spanning all industries in 38 European countries. BvD collects data from approximately 50 vendors across Europe (e.g., the business registrars of national statistical offices, credit registries, stock exchanges, and the databases of regulatory filings). The coverage is limited in some countries, but in 23 countries it is comparable to and representative of the population of firms as reported in aggregate data published by the European Commission (Arellano, Bai, and Zhang (2012)). While Amadeus covers firms incorporated in Europe, BvD's Orbis database, only recently available, has worldwide coverage.

A firm appears in Amadeus as long as it files its financial statements, but is typically kept in the database for only four years after its last filing. Also, each update of Amadeus contains only the most recent ten years of financial data for each firm (if available). To construct the annual panel of financial data that is free of this attrition bias, we therefore start with financial data obtained from the Amadeus DVD updates dated May 2002 and May 2004. We supplement these data with the more recent updates of Amadeus downloaded from the WRDS in July 2007, April 2008, August 2009, February 2010, November 2010, and January 2012. Finally, we also add financial data from the Orbis database dated July 2012. This way, we also extend firms' financials beyond the most recent 10 years.

To construct the annual panel of ownership data, we use the Amadeus DVD updates dated May 2002, July 2003, May 2004, October 2005, September 2006, and May 2007, together with the more recent updates of Amadeus downloaded from the WRDS in July 2007, April 2008, August 2009, February 2010, and Nov 2010. Finally, we also add ownership data from the Orbis updates dated November 2008 and June 2011.

2. Domestic production data

We obtain domestic production data from Eurostat's Structural Business Statistics database (SBS). SBS provides detailed industry statistics for each EU member country at the 4-digit

NACE level. We use the variable Turnover (value of production sold) as the *Domestic production value* measure.

3. International trade data

We obtain international trade data from Eurostat's Comext database. Comext provides detailed statistics on the trade of goods between 27 EU Member States (the intra-EU trade) and between EU Member States and non-EU countries (the extra-EU trade). The statistics are available for each EU Member State at the Combined Nomenclature (CN) product level. We use the CN-Prodcom concordance tables provided by Eurostat to aggregate data from the product to industry level. The industry is defined as the 4-digit NACE that corresponds to the first 4 digits of the 8-digit Prodcom code.

4. Construction of industry codes

Throughout the paper, we use the NACE codes (the Statistical Classification of Economic Activities in the European Community) maintained by the European Commission as our industry classification. Over our sample period, the European Commission revised the NACE system twice to reflect the changing composition of the economy. Specifically, NACE was changed from Revision 1 to Revision 1.1 in 2003, and from Revision 1.1 to Revision 2 in 2008. NACE codes available in databases from both Eurostat (the primary source of data for the construction of our import penetration measures) and BvD reflect these changes. For this reason, we can assign the import penetration measures to the firms' primary industries based on the NACE codes the firms report in each year without converting across the NACE revisions. This approach also achieves a correct assignment of the import penetration measures to firms in cases where firms change their industries over time.

For industry fixed effects, however, we need a consistent version of NACE codes across all years in our sample. Since most firms in our sample report industry affiliation based on NACE Revision 1.1, we convert both NACE Revision 1 and NACE Revision 2 codes to NACE Revision 1.1 codes using conversion tables provided by Eurostat. In cases where the conversion using the tables is not one-to-one and a firm reports NACE Revision 1 codes in the early years in our sample (or NACE Revision 2 codes in the more recent years in our sample) as well as NACE Revision 1.1 codes, we use NACE Revision 1.1 codes from adjacent

years for all years of the same firm. In a very few cases where this approach is not possible, we assign a firm the most likely NACE Revision 1.1 codes based on the empirical frequencies of cross-NACE revision mappings that we observe in the data.

5. Identification of inside shareholders

We take the following steps to identify inside shareholders.

i) From BvD's Amadeus/Orbis shareholder files, we take all individual shareholders, i.e., those with reported shareholder type "Family/Individual" and "Manager/Employees".

ii) BvD's Amadeus/Orbis management files contain the full names and positions of executive officers and directors, which firms are required to disclose by law. First, we use string parsing techniques to identify all non-individual executive officers and directors reported in BvD's Amadeus/Orbis management files. (This is because in some countries in our sample, for example, an incorporated entity can assume the position of a firm's director.) Second, since some firms also report executive officers with positions other than those required by law, to achieve consistency in the coverage of positions across firms in our sample, we drop those executive officers with positions reported by less than 1% of firms in the same country-legal form cell.

iii) We then standardize the individuals' names identified from the above two sources using regular expression language. This involves eliminating the titles (we use 31 different regular expressions to perform these removals), pedigrees (we use 15 different regular expressions to perform these removals), and educational and professional degrees (we use 200 different regular expressions to perform these removals) from the individuals' names. Next, we standardize the individuals' names according to the Bibtex name rules (we follow Hufflen (2006)).

iv) We match the standardized names of shareholders with the standardized names of executive officers and directors using the Bigram string comparison algorithm. [82] Specifically, within the same firm, we create a list of all possible combinations of

[82] The Bigram algorithm compares two strings using all combinations of two consecutive characters within each string. For example, the word "bigram" contains the following bigrams: "bi", "ig", "gr", "ra", and "am". The Bigram comparison function returns a value between 0 and 1 computed as the ratio of the total number of bigrams that are in common between the two strings divided by the average number of bigrams in the strings. The Bigram algorithm is very effective for our purposes, since it handles misspellings and abbreviations/omissions of middle names, as well as cases where the first name and the last name are swapped, very well.

shareholders-executive officers (directors) name pairs. From this list, shareholders whose names that are the same or very similar (to account for misspellings, character omissions, and other errors) to those of executive officers and directors are identified as inside shareholders.

To create an alternative definition of inside shareholders, we additionally denote those shareholders that have the same last names, but different first names, as inside shareholders. Using this approach, we broaden the definition of inside shareholders to include the relatives and family members of firms' executive officers and directors. In matching on last names, we apply a set of country-specific rules to account for female surname suffixes used in several countries in our sample (Bulgaria, the Czech Republic, Greece, Hungary, Latvia, Lithuania, and Poland).

To evaluate the quality of our string matching algorithm of the individual shareholders' names to those of the executive officers and directors, we construct a random subsample (stratified by country) of firms for which we manually match the names. We then compute the Type I and Type II error rates of our string matching algorithm. We verify that both the Type I and Type II error rates are below 0.1%.

We verify that the use of different Bigram algorithm cut-offs in the range from 0.90 to 0.99 has no material impact on our results. We also define inside shareholders to be only those shareholders who have the same standardized names as those of firms' executive officers and directors (i.e., the Bigram cut-off is equal to one). This alteration again leads to results analogous to those reported in the paper.

v) Finally, a shareholder is an inside shareholder if it is of the shareholder type "Manager/Employees" or if its name contains key words such as "management", "executive offices", "board of directors", etc. (We use 25 different regular expressions to identify such collective shareholder types).

6. Computation of the Shapley–Shubik Power Index

We compute the Shapley–Shubik Power Index (Shapley and Shubik (1954)) following the methodology of Shapiro and Shapley (1978) and Massa and Zaldokas (2013). We make three assumptions. First, we assume that full control over a firm is ensured by the ownership of ≥50% of equity. Second, we assume that inside shareholders fully coordinate their voting and therefore can be treated as a single entity in all voting games. Third, we treat the remaining

unknown ownership stakes (at most 5% of a firm's total equity in our sample) as being owned by atomistic (or "oceanic") shareholders, each of whom holds a negligible ownership stake and who together are unable to form and influence the formation of coalitions.

Under these assumptions, when the entire firm's ownership is known, the Shapley–Shubik Power Index of shareholder i is given by

$$SSI_i = \sum_{S \subseteq T_i} \frac{s!\,(n-s-1)!}{n!},$$

where T_i is the set of all coalitions S for which shareholder i is the pivotal shareholder, i.e., T_i is the set of all coalitions S for which $w_S < 50\%$ and $w_S + w_i \geq 50\%$, w_i is the size of the stake of shareholder i, w_S is the size of the combined ownership stake of coalition S, s is the number of shareholders in the set S, and n is the number of all shareholders of the firm.

When there are unknown oceanic shareholders, the Shapley–Shubik Power Index of shareholder i is given by

$$SSI_i = \sum_{S \subseteq M} \int_b^a u^s (1-u)^{n-s-1} du,$$

where $a = \max\left(\min\left(\frac{0.5-w_S}{w_0}, 1\right), 0\right)$, $b = \max\left(\min\left(\frac{0.5-w_S-w_i}{w_0}, 1\right), 0\right)$, w_0 is the size of the combined ownership stakes of oceanic shareholders, and M is the set of known (i.e., non-oceanic) shareholders.

B.3 Supplementary Tables

Table B.1 Validation Tests

Panel A examines the relation between import penetration and firms' exit (columns 1 and 2) and investment (columns 3 and 4). Column 1 presents firm level panel OLS regression results obtained using all manufacturing firms available in BvD's Amadeus database in our sample countries for which we have non-missing financials and import penetration measure. Dependent variable *Exit* is an indicator variable equal to one if a firm exits from the sample in the next year. The sample period is 2001–2008; we exclude the last three years of data (2009–2011) to allow for enough time to identify exits. As firm level controls, we include *Tangibility* as well as *Ln(age)* and *Ln(total assets)* and their squared terms. The regression in column 2 is at the country-industry-year level and uses the industry business demography data from Eurostat's Structural Business Statistics (SBS) database in 2001–2011. Dependent variable *Death rate* is, for each country-industry-year, the number of enterprise deaths in year *t* divided by the number of enterprises active in year *t−1*. Columns 3 and 4 present firm level panel OLS regression results on the relation between import penetration and firms' investment. The sample includes all manufacturing firms available in BvD's Amadeus database in our sample countries for which we have non-missing financials. The sample period is 2001–2011. In column 3 (column 4), the dependent variable is a firm's capital expenditure divided by total assets in year *t+1* (growth in capital expenditure from year *t* to year *t+1*). The control variables are the same as in column 1. All independent variables in regressions in Panel A are measured in year *t*. Panel B examines the relation between *Foreign exchange rate* instrument and export openness using OLS regressions at the country-industry-year level in 2001–2011. Dependent variable *Export openness* is defined as the ratio of *Export value* to *Domestic production value* in each country-industry-year. *Export value* comes from Eurostat's Comext database and *Domestic production value* comes from the SBS database. Panel C examines the relation between the change in import penetration and the change in firms' equity capital among U.S. listed firms in 1980–1999. The specification follows Xu (2012) Table 8. Δ *Equity capital* is the change in equity capital (total common equity (Compustat item "CEQ") minus retained earnings (Compustat item "RE")) from year *t* to *t*+1 scaled by total assets in year *t*. Δ *Import penetration* is the change in import penetration (4-digit SIC) from year *t−1* to *t*. U.S. import penetration is computed using trade data from UN Comtrade database and industry output data from NBER-CES Manufacturing Industry Database. Panel D examines the relation between industry-level entrenchment and ownership structure. *Entrenchment* is defined as the industry average of firm-level entrenchment index (E-index) of U.S. listed firms from Bebchuk, Cohen, and Ferrell (2009). The sample and specification are the same as those in Table 3.2 Panel A columns 1 and 3. Panel E examines the relation between firms' cash flow volatility and import penetration among U.S. listed firms in 1980–1999. The specification follows Irvine and Pontiff (2009) Table 10. *Cash flow volatility* is the standard deviation of cash flow to total assets ratios from year *t* to *t+2*. *Import penetration* is import penetration (4-digit SIC) in year *t−1*. Panel F examines the relation between shareholder entry and equity issuance using the within-firm 5-year change regression introduced in Table 3.2 Panel B. *Shareholder entry* is an indicator variable equal to one if a firm obtains at least one new shareholder over a 5-year window. Δ *Equity capital* is the change in equity capital (BvD item "CAPI") over a 5-year window divided by total assets at the beginning of the 5-year window. The regression includes year and industry fixed effects. Standard errors (in brackets) are clustered at the country-industry level in Panel A column 2 and Panel B, at the country-industry-year level in Panel A columns 1, 3, 4, Panel D, and Panel F, and at the firm level in Panels C and E. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Competition and firms' exit and investment

Dependent variable:	Exit (BvD sample)	Death rate (SBS sample)	Capex / total assets	Capex growth
	(1)	(2)	(3)	(4)
Import penetration	0.012***	0.013**	0.008***	0.187***
	[0.004]	[0.006]	[0.002]	[0.053]
Firm level controls	Yes	No	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	949,573	33,758	1,431,893	1,104,144
Adjusted R^2	0.220	0.654	0.111	0.011

Panel B. Foreign exchange rate and export openness

	Export openness	
	(1)	(2)
Foreign exchange rate	0.0017	0.0022
	[0.0015]	[0.0039]
Country×year FEs	No	Yes
Industry FEs	Yes	Yes
No. of observations	45,304	45,304
Adjusted R^2	0.354	0.531

Panel C. Competition change and change in equity capital

	Δ Equity capital
Δ Import penetration	0.280**
	[0.120]
Year FEs	Yes
No. of observations	40,517
Adjusted R^2	0.032

Panel D. Industry level entrenchment and ownership structure

	Inside ownership	Outside HHI
	(1)	(2)
Entrenchment	0.627***	0.652***
	[0.101]	[0.135]
Control variables	Yes	Yes
Country×year FEs	Yes	Yes
Industry FEs	Yes	Yes
Legal form FEs	Yes	Yes
No. of observations	194,524	194,524
Adjusted R^2	0.044	0.038

Panel E. Competition and cash flow volatility

	Cash flow volatility
Import penetration	0.028**
	[0.014]
Industry FEs	Yes
Year FEs	Yes
No. of observations	42,505
Adjusted R^2	0.010

Panel F. Entry of new shareholders and change in equity capital

	Δ Equity capital
Shareholder entry	0.006***
	[0.001]
Year FEs	Yes
Industry FEs	Yes
No. of observations	66,745
Adjusted R^2	0.010

Table B.2 Competition and Control Structure

This table examines the effect of competition on control structure. Panel A reports the results of the firm level panel OLS and instrumental variables regressions following the specifications introduced in Table 3.2 Panel A. Panel B presents the results of the within-firms change OLS and instrumental variables regressions following the specifications introduced in Table 3.2 Panel B. *Inside ownership ≥ 50%* is an indicator variable equal to one if a firm's *Inside ownership* is greater than or equal to 50%. *Inside ownership_SSI* is the Shapley–Shubik Power Index (SSI) of inside shareholders, which we compute assuming that inside shareholders form a voting coalition when making decisions about the firm. *Outside HHI_SSI* is the conditional Herfindahl-Hirschman Index of outside shareholders' SSIs. Standard errors (in brackets) are clustered at the country-industry-year level in Panels A and at the country-industry level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions

	Inside ownership ≥ 50%		Inside ownership_SSI		Outside HHI_SSI	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration	–0.066***	–0.108***	–3.548***	–7.189***	–6.453***	–8.276***
	[0.009]	[0.017]	[0.761]	[1.534]	[0.790]	[1.419]
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524	105,651	105,651
Adjusted R^2	0.029	0.029	0.046	0.045	0.051	0.052
First stage:						
Foreign exchange rate		0.016***		0.016***		0.016***
		[0.004]		[0.004]		[0.003]
Ex-EU export supply		0.164***		0.164***		0.167***
		[0.007]		[0.007]		[0.006]
F-stat		255.6		255.6		345.6
Weak IV robust test of Import penetration=0						
χ2-statistic		40.41***		31.21***		33.96***
A-R test p-value		0.000		0.000		0.000

Panel B. Within-firm change OLS and instrumental variables regressions

	Δ Inside ownership ≥ 50%		Δ Inside ownership_SSI		Δ Outside HHI_SSI	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Import penetration	–0.071**	–0.287**	–4.378***	–16.604*	–3.510**	–12.772**
	[0.030]	[0.129]	[1.681]	[10.045]	[1.414]	[5.510]
Δ Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	66,745	66,745	66,745	66,745	31,661	31,661
Adjusted R^2	0.032	0.030	0.020	0.019	0.016	0.015
First stage:						
Δ Foreign exchange rate		0.011***		0.011***		0.014***
		[0.002]		[0.002]		[0.003]
Δ Ex-EU export supply		0.130***		0.130***		0.136***
		[0.012]		[0.012]		[0.015]
F-stat		81.1		81.1		56.0
Weak IV robust test of Δ Import penetration=0						
$\chi 2$-statistic		33.50***		40.51***		18.88***
A-R test p-value		0.000		0.000		0.000

Table B.3 Alternative Definition of Inside Shareholders: Including Family Members

This table replicates our main results using an alternative definition of inside ownership and outside ownership concentration. Specifically, when constructing the two variables, shareholders who are family members of inside shareholders are also considered to be inside shareholders. Panel A reports the results of the firm level panel OLS and instrumental variables (IV) regressions following the specifications introduced in Table 3.2 Panel A. Panel B reports the results of within-firm change OLS and instrumental variables (IV) regressions following the specifications introduced in Table 3.2 Panel B. Standard errors (in brackets) are clustered at the country-industry-year level in Panel A and at the country-industry level in Panel B. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Firm level panel OLS and instrumental variables regressions

	Inside ownership_family		Outside HHI_family	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–1.276**	–2.757***	–5.721***	–7.068***
	[0.534]	[0.956]	[0.641]	[1.194]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	141,572	141,572	141,572	141,572
Adjusted R^2	0.072	0.075	0.044	0.044
First stage:				
Foreign exchange rate		0.015***		0.015***
		[0.003]		[0.003]
Ex-EU export supply		0.164***		0.164***
		[0.007]		[0.007]
F-stat		250.7		250.7
Weak IV robust test of Import penetration=0				
χ2-statistic		14.57***		32.83***
A-R test p-value		0.001		0.000

Panel B. Within-firm change OLS and instrumental variables regressions

	Δ Inside ownership_family		Δ Outside HHI_family	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Δ Import penetration	–2.380**	–19.795***	–3.621***	–10.399**
	[1.102]	[3.565]	[1.146]	[4.142]
Δ Control variables	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
No. of observations	44,512	44,512	44,512	44,512
Adjusted R^2	0.031	0.025	0.012	0.011
First stage:				
Δ Foreign exchange rate		0.011***		0.011***
		[0.002]		[0.002]
Δ Ex-EU export supply		0.132***		0.132***
		[0.012]		[0.012]
F-stat		80.3		80.3
Weak IV robust test of Δ Import penetration=0				
$\chi 2$-statistic		36.25***		10.18***
A-R test p-value		0.000		0.006

Table B.4 Alternative Measures of Competition

This table reports the results of the firm level panel OLS and instrumental variables (IV) regressions of Table 3.2 Panel A obtained using alternative measures of competition. Panel A employs the import penetration from low-wage countries outside of Europe. Panel B measures competition using the Lerner index. Both alternative competition measures are defined in Appendix B.1. Standard errors (in brackets) are clustered at the country-industry-year level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Import penetration from low-wage countries outside of Europe: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration_low wage	–8.061***	–31.036***	–13.011***	–39.179***
	[1.905]	[7.581]	[2.339]	[9.395]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.049	0.049	0.047	0.046
First stage:				
Foreign exchange rate		0.012***		0.012***
		[0.001]		[0.001]
Ex-EU export supply		0.010***		0.010***
		[0.001]		[0.001]
F-stat		120.8		120.8

Panel B. Lerner index: OLS regressions

	Inside ownership	Outside HHI
	(1)	(2)
Lerner index	–3.704***	–4.206***
	[1.102]	[1.231]
Control variables	Yes	Yes
Country×year FEs	Yes	Yes
Industry FEs	Yes	Yes
Legal form FEs	Yes	Yes
No. of observations	244,310	244,310
Adjusted R^2	0.051	0.048

Table B.5 Alternative Samples

This table reports the results of the firm level panel OLS and instrumental variables (IV) regressions of Table 3.2 Panel A obtained using alternative samples. Panel A uses the sample where we remove the ownership restrictions imposed when creating our main sample; specifically, we no longer drop firm-years with zero and full inside ownership. Panel B excludes listed firms. Panel C uses the subsample of firms with only individual shareholders. Panel D excludes firms with any ownership stake in other firms. Panel E excludes firms that are potential exporters (i.e., the largest 18% of the firms in our sample). Panel F excludes firms incorporated in the UK. Panel G includes only firms incorporated in the UK. Standard errors (in brackets) are clustered at the country-industry-year level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Sample without ownership restrictions: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–3.212***	–4.768***	–3.309***	–5.406***
	[0.452]	[0.895]	[0.453]	[0.841]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	470,544	470,544	249,245	249,245
Adjusted R^2	0.112	0.112	0.092	0.093
First stage:				
Foreign exchange rate		0.020***		0.016***
		[0.003]		[0.003]
Ex-EU export supply		0.162***		0.161***
		[0.007]		[0.006]
F-stat		297.3		331.5

Panel B. Excluding listed firms: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–2.267***	–4.931***	–4.375***	–7.251***
	[0.469]	[0.886]	[0.570]	[1.020]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,022	194,022	194,022	194,022
Adjusted R^2	0.048	0.048	0.045	0.044
First stage:				
Foreign exchange rate		0.016***		0.016***
		[0.004]		[0.004]
Ex-EU export supply		0.164***		0.164***
		[0.007]		[0.007]
F-stat		254.8		254.8

Panel C. Firms with only individual shareholders: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–2.125***	–4.423***	–4.138***	–6.428***
	[0.489]	[0.914]	[0.602]	[1.054]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	170,159	170,159	170,159	170,159
Adjusted R^2	0.056	0.055	0.034	0.034
First stage:				
Foreign exchange rate		0.017***		0.017***
		[0.004]		[0.004]
Ex-EU export supply		0.165***		0.165***
		[0.008]		[0.008]
F-stat		243.4		243.4

Panel D. Excluding firms with an ownership stake in other firms: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–1.914***	–4.436***	–4.551***	–7.548***
	[0.548]	[0.962]	[0.712]	[1.244]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	138,197	138,197	138,197	138,197
Adjusted R^2	0.056	0.056	0.035	0.035
First stage:				
Foreign exchange rate		0.020***		0.020***
		[0.004]		[0.004]
Ex-EU export supply		0.165***		0.165***
		[0.008]		[0.008]
F-stat		235.1		235.1

Panel E. Excluding potential exporting firms: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–1.668***	–3.489***	–4.688***	–7.103***
	[0.524]	[0.927]	[0.633]	[1.173]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	157,865	157,865	157,865	157,865
Adjusted R^2	0.053	0.053	0.034	0.034
First stage:				
Foreign exchange rate		0.019***		0.019***
		[0.004]		[0.004]
Ex-EU export supply		0.166***		0.166***
		[0.008]		[0.008]
F-stat		249.2		249.2

Panel F. Excluding UK firms: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–1.393***	–4.041***	–3.583***	–7.903***
	[0.503]	[0.986]	[0.616]	[1.102]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	152,378	152,378	152,378	152,378
Adjusted R^2	0.053	0.053	0.034	0.034
First stage:				
Foreign exchange rate		0.008**		0.008**
		[0.003]		[0.003]
Ex-EU export supply		0.163***		0.163***
		[0.007]		[0.007]
F-stat		242.7		242.7

Panel G. UK firms only: OLS and IV regressions

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–5.838***	–10.357**	–5.061***	–2.406*
	[1.911]	[5.216]	[0.866]	[1.237]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	42,146	42,146	42,146	42,146
Adjusted R^2	0.074	0.074	0.054	0.053
First stage:				
Foreign exchange rate		0.106***		0.106***
		[0.013]		[0.013]
Ex-EU export supply		0.103***		0.103***
		[0.019]		[0.019]
F-stat		69.7		69.7

Table B.6 Robustness to Using Sector-Weighted Industry Variables

This table presents the results of the firm level panel OLS and instrumental variables (IV) regressions obtained using the sample and specifications introduced in Table 3.2 Panel A. Following the methodology of Cuñat and Guadalupe (2009a), for firms that are active in multiple industries, all industry level variables in the regressions—including the two instrumental variables—are computed as simple averages of values of respective industry variables taken across industries in which each firm is active the first year it appears in our sample. We obtain firms' sectoral information from the primary and secondary NACE codes reported in BvD's Amadeus/Orbis database. Standard errors (in brackets) are clustered at the country-industry-year level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–0.969**	–4.611***	–3.435***	–7.099***
	[0.492]	[0.880]	[0.579]	[1.029]
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.048	0.048	0.045	0.045
First stage:				
Foreign exchange rate		0.009***		0.009***
		[0.003]		[0.003]
Ex-EU export supply		0.158***		0.158***
		[0.008]		[0.008]
F-stat		201.5		201.5

Table B.7 Robustness to Using the Foreign Exchange Rate Instrument Computed Using Nominal Exchange Rates

This table presents the results of the firm level panel instrumental variables regressions obtained using the sample and specifications introduced in Table 3.2 Panel A columns 2 and 4. Instrument *Foreign exchange rate_nominal* is computed using nominal exchange rates (i.e., exchange rates not adjusted by CPI) rather than real exchange rates. Standard errors (in brackets) are clustered at the country-industry-year level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Inside ownership (1)	Outside HHI (2)
Import penetration	–4.728***	–7.262***
	[0.897]	[1.024]
Control variables	Yes	Yes
Country×year FEs	Yes	Yes
Industry FEs	Yes	Yes
Legal form FEs	Yes	Yes
No. of observations	194,524	194,524
Adjusted R^2	0.049	0.046
First stage:		
Foreign exchange rate_nominal	0.007***	0.007***
	[0.003]	[0.003]
Ex-EU export supply	0.158***	0.158***
	[0.007]	[0.007]
F-stat	248.3	248.3

Table B.8 Robustness to Including Additional Control Variables

This table presents the results of the firm level panel OLS and instrumental variables (IV) regressions obtained using the sample introduced in Table 3.2 Panel A. The specifications are the same as in Table 3.2 Panel A except that we include additional control variables: *Capex/total assets* and *Leverage* at the firm-year level, as well as *Industry M&A*, *Industry B/M*, *Industry FDI*, *Export openness*, and *Industry output growth* at the country-industry-year level. All additional control variables are defined in Appendix B.1. Standard errors (in brackets) are clustered at the country-industry-year level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Inside ownership		Outside HHI	
	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Import penetration	–2.853***	–5.450***	–4.499***	–7.142***
	[0.499]	[0.978]	[0.623]	[1.142]
Additional control variables	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Country×year FEs	Yes	Yes	Yes	Yes
Industry FEs	Yes	Yes	Yes	Yes
Legal form FEs	Yes	Yes	Yes	Yes
No. of observations	194,524	194,524	194,524	194,524
Adjusted R^2	0.050	0.050	0.045	0.045
First stage:				
Foreign exchange rate		0.016***		0.016***
		[0.004]		[0.004]
Ex-EU export supply		0.157***		0.157***
		[0.008]		[0.008]
F-stat		218.1		218.1

Appendix C Appendix for Chapter 4

C.1 Variable Definitions

Variable names	Variable definitions
Ownership variables	
Dual	A dummy equal to one if the firm is a dual-class firm in that year.
Cash flow rights	Insiders' cash flow rights. Insiders include all directors and executive directors as disclosed in firm's 10-K or proxy statement.
Voting rights	Insiders' voting rights.
Wedge	Cash flow rights minus voting rights. This variable is zero for all single-class firms.
Firm characteristics	
Ln(ROA volatility)	Logarithm of the standard deviation of industry-adjusted quarterly ROA in the past 8 quarters.
Ln(asset volatility)	Logarithm of yearly asset volatility (averaged over 12 months) as defined in Eisdorfer (2008), adjusted by industry (SIC 4-digit) means.
Ln(total assets)	Logarithm of total assets in millions of USD (deflated to 2000 USD)
Tobin's Q	(Total assets + market capitalization − book equity − deferred taxes and investment tax credit)/ total assets.
Tangibility	Total net property, plants, and equipment/ total assets.
Profitability	EBITDA/ total assets.
Leverage	(Long-term debt + debt in current liabilities)/ total assets.
Capex	Ln[(1 + capital expenditure) / (1 + net sales)].
R&D	Ln[(1 + R&D expense) / (1 + net sales)].
R&D share	Ln[(1 + R&D expense) / (1 + R&D expense + capital expenditure)]
Payout	(Dividends + net repurchases)/ total assets.
IV_name	A dummy variable equal to one if the company's IPO name contains a person's name.
IV_dilution	Industry (SIC 3-digit) average dilution of insider ownership for single-class IPOs over the past 5 years. Dilution is measured as the difference between the level insider ownership before and after IPO as disclosed in S-1 filings.
Expected Default Frequency (EFD)	Annualised expected default frequency estimated from Merton's model based on Eisdorfer (2008).
Covenant violation	A dummy variable equal to one if a firm violates any debt covenant at least once in a specific year.
Loan Characteristics	

Ln(spread)	Logarithm of the loan spread. Loan spread is the all-in-drawn, defined as the amount the borrower pays in basis points over LIBOR or LIBOR equivalent for the drawn portion of the loan facility.
Ln(facility amount)	Logarithm of the loan facility amount measured in USD (deflated to 2000 USD).
Ln(maturity)	Logarithm of loan maturity measured in number of months.
Non-investment grade	A dummy equal to one if the loan facility's market segment is non-investment grade.
Performance pricing	A dummy equal to one if the loan facility uses performance pricing.
Loan Covenants	
Secured	A dummy equal to one if the loan facility is secured.
Excess cash flow sweep	A dummy equal to one if the loan package contains a covenant specifying the percentage amount of net proceeds a borrower receives from excess cash flow that must be used to pay down any outstanding loan balance.
Asset sale sweep	A dummy equal to one if the loan package contains a covenant specifying the percentage amount of net proceeds a company receives from an asset sale that must be used to pay down any outstanding loan balance.
Debt issuance sweep	A dummy equal to one if the loan package contains a covenant specifying the percentage amount of net proceeds a company receives from the issuance of debt that must be used to pay down any outstanding loan balance.
Equity issuance sweep	A dummy equal to one if the loan package contains a covenant specifying the percentage amount of net proceeds a company receives from the issuance of equity that must be used to pay down any outstanding loan balance.
Insurance proceeds sweep	A dummy equal to one if the loan package contains a covenant specifying the percentage amount of net proceeds a company receives from insurance settlements that must be used to pay down any outstanding loan balance.
Dividend restriction	A dummy that equals to one if the loan package contains a covenant restricting the borrower from paying dividends to its shareholders.
Net worth covenant	A dummy equal to one if the loan package has at least one net worth covenant.
Financial covenant	A dummy equal to one if the loan package has at least one financial covenant.
Covenant Index	An index of values 0 to 9 summing up the above nine dummy variables indicating the presence of each type of covenants.