The Role of Regulation and Technology in Segmenting Primary Markets and Security Flipping

Shyam Venkatesan
Western University
svenkatesan@ivey.ca

Jun Yang
Indiana University
jy4@indiana.edu

Brian Wolfe
The University of Texas at San Antonio
brian.wolfe@utsa.edu

Woongsun Yoo
Central Michigan University
yoo1w@cmich.edu

Abstract

Flipping is when traders purchase an asset in the initial offering of a security and immediately sell the asset for a higher price in a secondary market. Flipping is the natural result when segmentation exists in the primary market (initial offering) and investors have heterogenous price beliefs. We provide empirical evidence for two novel types of segmentation caused by regulation and technology in the primary market for FinTech debt securities. Our results show both forms of segmentation increase flipping activity. Additional tests suggest platforms include an interest premium, potentially encouraging flipping and circumventing the investor regulatory restrictions that cause segmentation. Welfare benefits accrue to traders engaging in flipping activity. We estimate that borrowers pay an additional 63 BP in interest to allow platforms to resolve regulatory segmentation and secondary market investors concede an average 201 BP in yield to investors flipping notes.

JEL Classifications: G21, G23, L81, D53, G28

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Introduction

During the initial public offering of a security, some primary investors are allocated the asset and immediately sell it at a premium in a secondary market. The industry term for such a short-horizon strategy is "flipping," and contrary to some media anecdotes (Maher, 1990), there is empirical evidence that underwriters who price and allocate the primary offering may desire such trading strategies.[1] As Boehmer and Fishe (2000) point out, without the existence of some traders flipping assets into the secondary market, post-IPO secondary markets would be illiquid. The existence of secondary market traders willing to take assets at a higher price indicates that these traders were excluded from the initial offering, either because underwriters find strategic allocation necessary to incentivize the production of information (Benveniste and Spindt 1989) or because of search frictions as seen in the municipal bond market (Li and Schürhoff, 2019). Exclusion in either form creates segmentation in the primary market and combined with heterogenous private beliefs on the asset price should result in secondary market flipping activity.

Recent technological advances in financial technology (FinTech) have broadened access to financial markets and altered traditional intermediation. For example, peer-to-peer lending platforms match individual borrowers with groups of investors to create individual debt contracts. In this disintermediated setting, the marketplace lending platform replaces the traditional underwriter by using technology to match borrowers and investors.[2] However, because the marketplace lending funding market for investors is a competitive process (first come-first served), it is impossible for the platform to strategically allocate the assets. The fractional funding process of marketplace lending notes and the regular issuance of new assets (four times a day) both suggest that active investors may have access to notes without any rationing or segmentation.[3] Since flipping activity requires some sort of segmentation, one

[1] Boehmer and Fishe (2000) suggest that firms value a liquid secondary market to allow founder exit and secondary equity offerings which requires some amount of flipping. Other articles show the value in broad investor bases (Booth and Chua, 1996) and blockholder monitoring (Stoughton and Zechner, 1998) which require underpricing and preferential allocation that leads to flipping activity.

[2] It also screens borrowers through an application process and assigns credit scores to approved borrowers.

[3] In March 2015, Monja, a third party industry expert on marketplace lending, suggests that "many loans are still available 30 seconds after the start of the auction, which is enough time for non-API investors to choose. LendingClub has implemented several measures to ensure the fractional market is still accessible for retail, non-automated investors. It clearly works." https://www.monjaco.com/blog/3-types-of-loans-algorithmic-investors-buy/

might expect a relative absence of flipping activity in the secondary market for peer-to-peer lending notes. Instead, we observe a substantial amount of flipping activity in the peer-to-peer lending market. We establish that the volume of flipping activity in the FinTech debt secondary market varies from 2 BPS relative to the origination volume in A grade notes to 7.01% of the origination volume in G grades. We also document that it decreases over time in our sample from December 2012 through 2016.

In equity offerings, exclusion of investors from the primary offering is standard practice and one of the key features necessary to observe flipping activity. Search costs in municipal bond markets prevent primary market retail investors from purchasing municipal bonds directly from the issuing dealer. A unique element of the FinTech debt market we study is the removal of the underwriter's ability to select investors in the initial offering and the centralized nature of the primary market's offering online should drastically reduce search frictions. Yet the presence of flipping activity suggests some sort of segmentation occurring in the primary market that is unique from traditional segmenting frictions. We investigate two potential sources of segmentation, regulation and technology, and find that both influence the flipping activity in this emerging FinTech debt market.

First, in the United States, retail investors are restricted from purchasing some FinTech debt assets by state regulators, which creates segmentation in the primary market offering of FinTech debt assets. Drawing from Cornaggia et al. (2018), we use a staggered series of investor participatory regulation changes that alter primary market segmentation and find that flipping activity declines (increases) by an average of 7.98% following a state repealing (enacting) of investor participation restrictions.

Second, we recognize from the microstructure literature that technology may also segment markets by speed of access (Biais et al., 2015; Foucault et al., 2016; Hendershott et al., 2011). Technology such as application program interfaces (APIs) allows investors electronic access to markets and the ability to trade algorithmically. Algorithmic trading could create primary market segmentation between technologically skilled API-algorithmic investors (fast) and unskilled manual investors (slow). Depending on the proportion of fast investors with long-term horizons versus short-term horizons, the amount of flipping may increase or decrease upon the introduction of API access. Consistent with more fast-API investors having short investment

horizons, we find evidence of an increase in flipping activity following the introduction of an API to the primary market. Accessing the peer-to-peer lending platform via API and writing algorithms to trade requires an elevated level of human capital that may exclude many traders from executing fast trading strategies. We also show that when API access and algorithmic trading are offered broadly to investors as a third-party service, leveling the technological playing field for more investors to algorithmically trade over the API, flipping activity in the secondary market falls consistent with the removal of primary market segmentation.

In our main set of results, we demonstrate the existence of flipping activity and two segmenting frictions in the primary market that appear to influence the level of flipping. From the marketplace lending platform's perspective, flipping helps to unlock primary market capital trapped by regulation and it may be optimal to encourage flipping activity to circumvent investor restrictions. Underpricing, might provide one avenue for underwriters to increase flipping activity and unwind some of the regulatory-driven segmentation. Consistent with this notion, we show that platforms lower interest rates on notes (increase prices and decrease underpricing) following the lifting of investor restrictions. Yet, such a platform response, the lowering of interest rates as primary market access is increased, could be an artifact of increased demand. Lower interest rates allow more borrowers to participate in the lending process, more borrowers bring more fees to the platform; and thus, our observed outcome may simply be an equilibrium response to the increase in primary market investor demand. However, we show that when the FinTech platform allows prices to be set by an auction process, instead of the platform setting the price/interest rate, the repeal of investor restrictions does not result in a change in interest rates. That is, interest rate adjustments only occur when the platform controls the interest rate, suggesting the interest rate adjustments are not likely due to changes in supply and demand in the primary market. This also highlights the unintended consequence of segmented primary markets; borrowers pay an average premium of 63 BP over the loans in our sample because of regulatory segmentation.[4]

Marketplace lending began prior to the financial crisis and spread rapidly across the globe. Rau (2021) shows that by 2019, crowdfunding or peer-to-peer financing raised $305 billion in capital across 191 countries. In the FinTech market used in this study, U.S. peer-to-peer lending

[4] This equates to an additional $52 million in interest over 1,153,623 loans.

began in 2006 and quickly grew, originating over 30% of personal unsecured term loans in the U.S. market by 2016, according to TransUnion. However, in 2020 U.S. retail investors were dropped from LendingClub's peer-to-peer market, and primary market access was closed to retail investors. A fair question, given the sun setting of such a market, is if the behavior of the FinTech underwriters captured in this study still mater. We would argue that the broader implication of our results extends beyond peer-to-peer lending markets. Indeed, one of the key aspects of technology emerging in finance is the repeated attempt to democratize access to capital markets. Yet, while technology appears to be the instrument to offer access to higher-risk assets to retail investors, it appears that traditional high-risk assets such as startups are staying private more often (longer), providing fewer opportunities to invest in early-stage firms (Doidge et al., 2017, 2018; Ewens and Farre-Mensa, 2020; Lattanzio et al., 2022). Seen through such a lens, peer-to-peer lending represents one of the first attempts to use technology to broaden access to retail investors. Reward crowdfunding, equity crowdfunding, digital tokens, and non-fungible tokens all represent similar attempts of technology to open investor access to asset offerings. In all of these emerging asset classes, investor access and regulatory restrictions are open topics.[5] Additionally, the ability to access markets via technology like APIs becomes more mainstream every day. These segmenting frictions appear to be repeating themes in emerging asset classes and our work highlights the unintended consequences of investor regulation and trading technology change.

Our work draws from three distinct strands of literature. The first is the literature examining secondary market trading activity following municipal and corporate bond offerings. Municipal (Corporate) bonds are issued through arrangements with dealers who underwrite notes and place them with investors. Because bond markets are relatively decentralized, long-term investors are informationally distant from the originating dealer forcing dealers to create interdealer networks to reach enough long-term investors to support the note issuance (Goldstein et al., 2021; Li and Schürhoff, 2019; Schultz, 2012).[6] Underpricing arises as an incentive

[5] For example, access to initial coin offerings continues to be restricted at the country level. China opted for a complete ban of ICOs, while the U.S. and Japan have included coin offerings under their current regulatory framework. Other jurisdictions such as Australia, Ukraine, Portugal, and Switzerland remain more open to ICOs.
[6] Hauswald and Marquez (2006) use the phrase "informationally distant" to describe the amount of informational asymmetry between borrowers and lending institutions. In our setting, we think of the informational distance as the amount of informational asymmetry between municipalities and long-term investors created through search frictions.

mechanism, with each dealer in the network marking up notes as they are passed along the chains to the ultimate long-term investor.[7] In other words, the underwriting dealer incorporates a pricing discount to overcome the *informational* segmentation of the initial offering and facilitate the distribution of notes through the interdealer chain. The underwriting platform in our study faces a similar distribution problem because of *regulatory* segmentation in the initial offering, and the marketplace lending platform discounts notes to encourage them to be passed to long-term investors through flipping in the secondary market. In the municipal bond market, some uninformed buy-and-hold retail investor at the end of dealer chains appear to absorb the largest markup while other savvy retail investors maintain markups similar to the institutional investors in the dealer chain (Green et al., 2007). Primary market investors acting as market makers, flipping notes to the secondary market quote an average markup for flipped notes of 3.84%. Our results on technological segmentation further illustrate that generically any type of primary market segmentation generates flipping in the presence of heterogenous private price signals.

Second, our results also link to the vast literature on underwriter/dealer incentives and behavior. Market features such as information exchange or reputation often motivate underwriter behaviors such as underpricing (Rock, 1986) and strategic allocation (Benveniste and Spindt, 1989; Booth and Chua, 1996; Cornelli and Goldreich, 2001; Habib and Ljungqvist, 2001; Ljungqvist and Wilhelm, 2002; Loughran and Ritter, 2004; Sherman, 2000; Sherman and Titman, 2002; Stoughton and Zechner, 1998). Underwriters can also directly benefit from market-making activity in the secondary market for both equities (Boehmer and Fishe, 2000; Ellis et al., 2000; Fishe, 2002) and corporate bonds (Bessembinder et al., 2021) by encouraging some amount of flipping activity. In the marketplace lending market, there is a distinct lack of information exchange between investors and the marketplace lending platform, platform market making in the secondary market, and platform ability to allocate assets to specific retail investors. Indeed, the disintermediation invoked by the marketplace lending platforms negates the typical forces that accelerate flipping activity. Our context allows the unique opportunity to examine other primary market segmenting forces driving redistribution in the secondary market.

[7] The lack of transparency (pre-trade) makes it possible that some portion of the markup in the interdealer chain is actually too large resulting in uninformed investors overpaying for municipal bond assets

Finally, the literature on marketplace lending and, more generally, FinTech platforms is relatively new and growing. Early work on marketplace lending focused on borrower characteristics that influence lending outcomes (Lin and Viswanathan, 2016; Ravina, 2019; Senney, 2016), investor bias/behavior (Agrawal et al., 2015; Lin et al., 2015), and more recently drivers for platform growth (Buchak et al., 2018; Butler et al., 2017; Havrylchyk et al., 2016). Reward-based crowdfunding, such as capital raised on platforms like Kickstarter, has also been studied for characteristics that influence funding outcomes and entrepreneurial success (Mollick and Nanda, 2015). Our paper is unique relative to the above papers in that it examines the behavior of the marketplace lending platform and tries to understand incentives that may produce unique platform behavior.

1 Marketplace Lending Background

Generically, marketplace lending platforms (MLPs) use technology to match individual borrowers/firms with investors. MLPs serve as underwriters and are responsible for screening borrowers. They earn origination fees and servicing fees on loans. MLPs generally do not supply capital or bear credit risk on the notes originated. We summarize the process of marketplace lending in Figure 1. Borrowers submit a loan request to an MLP and the MLP provides initial screening based on hard information in the applicant's credit file and other private information collected by the lending platform (Berg et al., 2020). If the loan request passes an initial credit screening, the MLP passes on the loan request for investors to fund. Funding mechanisms vary by platform and investor type ranging from active markets where investors race to fund loan requests to passive markets where allocation among investors is determined completely by the platform. Once capital is committed to fund the loan request, the borrower receives the funds, and investors receive either the loan contract or a separate promissory note tied to the borrower's loan contract. Retail investors may choose to sell the promissory note in a secondary market after its primary offering on the MLP.

1.1 Primary Market structure

Marketplace lending platforms emerged in the United States just prior to the financial crisis

of 2008. During the initial years, retail investors provided all the capital to fund loans. Investors could partially fund a loan in $25 increments. Investors were pooled in one active (competitive) market and would race to fund loans. In 2008, both major U.S. MLPs reorganized the origination process. Following the reorganization, the MLPs would continue to match borrowers and investors but allowed an industrial chartered bank to originate the loan to the borrower (Rigbi, 2013). The MLP would purchase the loan 2-3 days following origination and hold the loan on its balance sheet. Instead of selling the loan to the investors that had elected to fund the borrower, MLPs would issue a separate set of notes to those investors. These new securities issued by the MLP funneled payments from the original loan to investors. In this way, the platforms technically held the loan assets on their balance sheets but offset the credit risk such that the MLPs should not bear any of the credit risk of the loans originated on the platforms. In conjunction with the reorganization, MLPs created secondary markets for the notes so that retail investors could liquidate their holdings before maturity. The reorganization allowed MLPs to export the interest rates of the originating industrial bank nationwide and avoid the usury caps that restricted origination activity in some states.

The majority of our study uses data from a major U.S. MLP called LendingClub. Interest rates on LendingClub were set based on hard information collected from the borrower's credit profile during the initial screening process. For a few tests, we also utilize data from the other major U.S. MLP called Prosper. Initially, interest rates on Prosper were set via auction, with investors competing down the interest rate on a borrower loan request (Wei and Lin, 2017). One tradeoff for the potential interest rate reduction was that borrowers would not receive funds for their loan request until the auction is completed, often 7-14 days after the initial request. Because of this delay and other problems with the auction design (Franks et al., 2021), Prosper changed the interest rate setting mechanism to mirror LendingClub's process.

In early 2013, the major U.S. MLPs began to attract institutional investors to fund loans. Because of the technological advantage of institutional investors and their appetite for entire loans versus fractions of a loan, institutional investors were separated into their own funding market on the MLPs. The major difference in the institutional market was that while retail investors could contribute as little as $25 toward a particular loan, the institutional market required investors to fund loans in their entirety.[8]

[8] We find some exceptions where loans appear to be institutionally funded but report 2-3 investors.

As the platforms evolved, so did the technology providing access to the marketplace lending platforms. Initially, retail investors would log into a website and pour through hundreds of loan requests to select assets to fund. While the platform provided search filters, the search process for investment was time-consuming. Sophisticated (retail) investors might use clumsy web-scraping techniques to automate investing, but the practice was not widespread because of its low reliability. Eventually, MLPs added application program interfaces (APIs) which allowed a few sophisticated investors the ability to automate the accessing of primary market data and order execution. Prosper created an API access as early as 2008. However, LendingClub did not add a primary market API until much later in April/May of 2013.[9] As we will show in Section 4, this search/execution technology created segmentation in the primary market, with sophisticated retail investors using technology to restrict access to the primary market to their advantage. Eventually, third parties partnered with the MLP to provide broader access to the API, leveling the playing field among retail investors in October/November 2013 in LendingClub's primary market.

1.2 Secondary Market for retail MLP notes

The secondary markets for promissory notes purchased on the MLPs were launched in 2008 (LendingClub) and 2009 (Prosper). The markets were operated by an outside alternative trading system (ATS) called FolioFN. Each secondary market operated as a single sided limit order book. The secondary market allowed retail holders of promissory notes to list them for sale. The market did not possess the technology to allow bids to be placed on notes.[10] Honigsberg et al. (2017) use data from 2015 from the secondary markets of both LendingClub and Prosper to show roughly 1.45 million trades were executed worth approximately $47 million in 2015. This compares to the roughly 4-5 billion USD in loans outstanding at the time.[11] The ATS would

[9] A search of retail investor forums suggests that retail investors were anticipating the release. See https://webcache.googleusercontent.com/search?q=cache:KAp6Rbw_c18J:https://www.nsrinvest.com/lending-club-api-thoughts/+&cd=3&hl=en&ct=clnk&gl=us and https://finovate.com/p2p_lender_prosper_closes_marketplace_to_lenders_loanio_unaffected_for_now/ and https://andrewchen.com/prospercom-and-peer-to-peer-lending-in-the-economic-downturn/

[10] Consider the non-fungibility of the notes. Each note was a portion of a loan for a particular borrower. In order to place a bid, investors would need to specify a particular note held by a particular investor or have the ability to describe a set of parameters defining a note they were willing to purchase for a particular price.

[11] Note this is less than to total volume of origination by the MLPs because only retail funded notes could be traded on the secondary market.

deduct a flat transaction fee of 1% of the traded price from the proceeds of executed trades. There were no fees associated with quoting a note for sale.

1.3 Marketplace Lending Regulatory Background

The change in the origination process in early 2008 by both Prosper and LendingClub was precipitated by conversations between the MLPs, the SEC, and state security regulators beginning in late 2007. Under the new structure, MLPs issued new, separate securities to retail investors. The MLPs were forced to (federally) register the promissory notes with the SEC. This process resembles the registration procedure that firms undergo during an IPO of equity. However, because the promissory notes did not trade on a national market exchange, MLPs could not benefit from the blue sky (state security registration) exemptions that typically come with the federal security registration. Instead, MLPs were forced to seek security registration from each state before investors residing in the state could participate in the funding process.

Effectively, the need to register promissory notes at the state level divided the primary market. Following the SEC-mandated quiet periods, both MLPs emerged in 2009 with a more restricted investor pool. Even though both MLPs applied for security registration with individual states during the quiet period, many states delayed security registration approval while state-level regulators reviewed the platforms' operations. We note that states did not uniformly approve MLPs, and the timing of security registration approval during the period between 2008 and 2014 is different for each platform. This suggests MLPs had little influence on the timing of security registration approval other than compliance with the regulatory requests. We take advantage of the staggered regulatory approvals in our empirical design as groups of investors were permitted to renew participation in the primary offering of promissory notes.

While the IPO of LendingClub likely occurred for multiple reasons (e.g., better access to capital, founder exit, etc.), the offering of a national market system traded security allowed LendingClub to circumvent most of the remaining states' security registration requirements.[12] LendingClub obtained a legal opinion suggesting its publicly traded equity preempted state

[12] Even though the initial public offering was of LendingClub equity securities, separate from the promissory notes offered to platform investors, security laws are designed to grandfather in senior claims if junior claims are traded on a National Market System exchange. Manbeck and Franson (2015) provides a more detailed discussion of national security registration and tiered asset claims.

security registration requirements and should clear the way for investors in all states to invest on the platform. The majority of states accepted the legal opinion, although a few states refuted this interpretation according to LendingClub's prospectus filings with the SEC. In internet Appendix Table A1 and A2, we report the timeline for the state-level registrations used in our staggered event study for LendingClub and Prosper, respectively. We embed the MLPs' major changes in the timeline.

2 Hypothesis

As mentioned in the marketplace lending regulatory background section, state security regulators create/remove investor participation restrictions in the primary market for investment in marketplace lending notes. Investor participation restrictions exclude retail investors from participating in the initial offering of these assets creating segmentation in the primary market. If individuals still wish to invest in the asset class, they are forced to purchase notes in the secondary market. This segmentation of the primary market and unfettered access to the secondary market should create demand for flipping activity.[13] It also implies that as state security regulators relax investor participation restrictions, flipping activity should fall in the secondary market. Our first testable implication is thus:

Hypothesis 1: As regulatory-driven primary market segmentation decreases, the amount of flipping activity in the secondary market should decrease.

Regulation is not the only source of segmentation in the primary market for marketplace lending notes. Trading technology may cause segmentation in the primary market by creating fast traders that can effectively exclude slower traders from investing in notes in the primary market. By providing API access to certain investors or broadly through third-party services, the potential for primary market segmentation occurs if only a portion of investors accesses such technology, and segmentation in the primary market is created. Anecdotes suggest that such segmentation occurred in the primary market for retail investment. More formally, if competition to fund notes in the primary market occurs between buy-and-hold investors and flipping

[13] Assuming investors have heterogenous price signals

investors, the impact of access to primary market segmenting technology will depend on the relative adoption of the trading technology within the investor groups. For example, if a larger proportion of buy-and-hold investors adopt the trading technology relative to the flipping traders, the volume of flipping activity in the secondary market will fall.[14] Conversely, if a larger proportion of flipping traders adopt the segmenting technology, the volume of flipping activity should increase. Ex-ante, it is unclear which group may dominate, which creates our second set of hypotheses:

Hypothesis 2a: If the proportion of buy-and-hold investors that use primary market segmenting technology is larger than the proportion of investors that flip notes and use primary market segmenting technology, the volume of flipping activity will fall in the secondary market following a change in primary market segmenting technology.

Hypothesis 2b: If the proportion of buy-and-hold investors that use primary market segmenting technology is equal to the proportion of investors that flip notes and use primary market segmenting technology, the volume of flipping activity will be unchanged in the secondary market following a change in primary market segmenting technology.

Hypothesis 2c: If the proportion of buy-and-hold investors that use primary market segmenting technology is smaller than the proportion of investors that flip notes and use primary market segmenting technology, the volume of flipping activity will increase in the secondary market following a change in primary market segmenting technology.

Given the existence of regulatory restrictions preventing investors from participating in the primary offering, we consider how the incentives of the MLP may influence platform behavior. If marketplace lending platforms could encourage flipping activity through primary market underpricing, platforms may be able to issue more primary market securities. Underpricing becomes a tool to increase issuance volume. Tension arises though as higher interest rate premiums (loan underpricing) may dampen borrower demand for loans. This leads us to our third hypothesis:

[14] This also implicitly assumes traders are capital constrained and atomistic – i.e. no one large trader can crowd out the market. Given the retail nature of investors in this market, we feel this is a reasonable assumption.

Hypothesis 3: When primary market regulatory segmentation is removed, the interest rate of notes issued in the primary market by a posted price platform should decrease.

Hypothesis 3 should hold true when the platform retains pricing control. As mentioned in the primary market structure background section, one of the competing U.S. marketplace lending platforms initially launched with an auction pricing mechanism and later switched to a posted price mechanism (Wei and Lin, 2017). Under an auction price mechanism, the platform lacks the ability to adjust interest rates following the removal of regulatory segmentation. If the primary market is competitive, it is unlikely investors could collude to adjust prices (otherwise, they would do so already). This implies that under the auction pricing mechanism, the reduction in primary market segmentation will not influence interest rates on the platform. Formally,

Hypothesis 4: When primary market segmentation is removed, the interest rate of notes issued in the primary market by an auction price platform should not change.

3 Data Description

3.1 Secondary Market data

To analyze flipping activity in the secondary market, we obtain secondary market data for LendingClub promissory notes from Interest Radar.[15] Interest Radar was a third-party service that enabled retail investors to automate investment on marketplace lending platforms. When the secondary markets were created in 2008-2009, Interest Radar added tools to help guide pricing decisions. As a result, Interest Radar began collecting data on the notes available for sale in the secondary market starting in December 2012 and continued past the end of our sample in May 2016.

The secondary market for promissory notes is a single-sided limit order book allowing investors to submit market buy orders and non-marketable limit sell orders on the trading platform. Sellers would select a price for the note and an expiration period with a maximum of 7 days. Secondary market investors seeking to purchase notes were presented with the original

[15] see https://www.interestradar.com/ on https://archive.org/

information on the loan origination in addition to updates on credit score and payment information. See Figure 2 and Figure 3 for images of the secondary market and the details provided on a promissory note listed for sale. Interest Radar collected information on all available notes every 2 hours over this period. Thus, as notes were purchased/expired/canceled, Interest Radar would mark their removal date, but the nature of the note's exit is unknown. We refer to this data as the quote data from Interest Radar.

In addition to quote data collected by Interest Radar, we also have a sample of executed trades. The trade files are self-reported by users of the Interest Radar platform and divided into purchases of notes and sales of currently held notes. The sales file consists of 117,386 trades, while the purchase file contains 43,792 purchases. We estimate that Interest Radar trades represent less than 1% of all the executions in the market based on Honigsberg et al. (2017), and given the potential selection issues with self-reported trades, we only employ this data (trade data) for validity checks on the quote data. Later in Section 6 we investigate the use of quote data as a proxy for transaction volume.

The quote data contains identifiers corresponding to: the loan id linking to the loan on the marketplace lending platform (*loanid*), the note id which identifies which one of the promissory notes in a particular loan is being sold, i.e., each loan is funded through multiple notes – one note for each funding investor (*noteid*), and the order id corresponding to a unique investor attempting to sell a particular note (*orderid*). Each loan-note-order is also assigned a listing date and exit date. In the quote data, Interest Radar provides an asking price range, last payment range, loan status, credit score trend, yield-to-maturity (YTM), and the markup over the outstanding principal and accrued interest. Using the *loanid*, we link each observation to the primary market data (below) to obtain the origination date and the note's term. Using the origination date and term in combination with loan status and asking price range, we estimate the note asking price assuming a standard amortization schedule and the listed markup amount.[16] We verify the accuracy of this procedure with the sample of executed trades from Interest Radar. Price estimates for notes less than a month old, i.e., flipped notes, are underpriced by a median (average) price difference of \$0.02 (\$9.78), while the median (average) price difference for the

[16] Assuming no late payments, we use the note age to estimate the amount of remaining principal and days since last payment. For current notes, this should accurately estimate the outstanding principal and accrued interest which can be combined with the markup percent to estimate asking price. Our procedure will naturally tend to underestimate price because of the no late payment assumption.

full sample is $1.42 ($6.78) under the actual price. The price estimate depends on the size of the note because the asking price range buckets become coarser as the asking price range (0-25, 25-50, 50-100, 100+) increases, making errors larger as the note price increases. For example, the average price difference between the estimated price and actual price in the 25-50 asking price range (for notes <30 days old) is $0.12 (overpriced), while the 50-100 asking price range (<30 days old) exhibits bimodality with a mean underpricing of $12.47 and a median underpricing of $0.13.[17] See the internet appendix for more details on price estimate accuracy and other validity tests using the trade data. The above tests suggest our estimate of asking price is a conservative measure of transaction volume, with median and mean pricing errors that suggest we under report transaction volume.[18]

Of the 8,870,966 unique notes in the quote data, notes appear an average of 1.2 times. This suggests that the secondary market is relatively efficient for helping notes find long-term investors that are seeking to buy and hold the asset through maturity.[19] In other words, notes do not appear to change hands between investors multiple times in the secondary market. We impose five filters on the raw 195 million quote observations. First, we drop observations that we cannot match to the LendingClub primary market data (31 obs). Second, we drop quotes that, after matching to the primary market information, do not have term or interest rate information (11,989 obs.). Third, we drop observations with a missing asking price range (13,886 obs.) from the Interest Radar data. Fourth, we omit observations that fail to report loan status/credit score trend. Finally, we drop 48,311,598 observations that have estimated asking prices (described below) outside the asking price range in Interest Radar. That results in a final sample of 147,074,952 quote observations.

[17] The 50-100 price range (<30 days old) consists of notes with a face values of $50 or $75. When estimating a price for notes in this price range (and <30 days), our estimation algorithm assumes a $50 note face value. The median underpricing of $0.13 suggests more of this sample is issued at $50, yet it is clear we will underprice a significant portion of the sample that is issued as a $75 note. For the $50 note portion of the sample, our price error is very similar to the 25-50 price range (<30 days), i.e. the median pricing error is 0.13. However, the lower quartile pricing error statistics center around a $25, and with the sample average of underpricing 12.47 likely represents the average of a ~$0 and ~$25 pricing error.

[18] While our pricing error may vary systematically with observable characteristics of an individual note, our main tests are aggregated to the term-subgrade-age-day level (across multiple notes). It is not clear how the systematic underpricing at the *note* level would translate to any systematic correlation at the *aggregate* level that might bias our estimation results.

[19] Compare this to the municipal bond literature that suggests bonds issued make 2-7 transactions in about 23% of municipal bond chains before finding the ultimate buy-and-hold investor at issuance (Li and Schurhoff 2019).

Summary statistics on the aggregate quote data are provided in Table 1 Panel A for the yield-to-maturity, mark up, age, and estimated asking price. Table 1 panels B and C present the means by grade and term. Summary statistics on the asking price range, last payment rage, loan status indicator, and credit score trend are presented in Panels D-G. Panels H and I present the credit score trend and last payment information by credit grade.

In the full sample Panel A, we see notes are quoted with a mean markup of 1.36%, which is larger than the 1% transaction fee. The average age of a note that is quoted is just under a year old (330 days), but there is substantial variation in the age of the notes quoted. The average interest rate at issuance of the notes quoted is 16.74%, while the YTM is 16.45%.[20] The lower yield combined with the positive markup is suggestive that traders extract a portion of the value as intertemporal dealer rents or that notes, on average, improve in credit worthiness over time. We see in Panel G that the credit score trend improves in 47% of the observations, declines in 39.7%, and is unchanged in 13.29% of the quote observations. Panels B and C show the sample is weighted toward the 60 month notes and the note distribution is centered around credit grades C-D. Average markup appears to move inversely with credit grade for 36 month notes but is u-shaped for 60 month notes. Riskier notes appear to be quoted for sale at an earlier age. Panel D suggests the majority of notes, 80.66%, are priced below $25. Panels E and F suggest that while a portion of the quoted notes are delinquent/late, 82.39% of the quoted notes are current/on-time. The proportion of notes falling behind in payments appears to be heavier weighted toward the riskier credit grades in Panel I. Interestingly though, the credit score trend categories appear to move in the opposite direction with riskier credit grades more likely to have a credit score improvement or no change as shown in Panel H.

Using the quote data, we calculate the daily (t) dollar volume of quotes by term (i), subgrade (j), and age (k) of the note relative to its origination date and label this $DolVol_{ijkt}$. We aggregate age into 30-day buckets for notes that are 0-30 days "old," 31-60 days "old," etc... Figure 4 (5) uses the entire time series of quote data for 36 (60) month notes, about 11 (16) million quotes, to show the aggregate age distribution of notes quoted on the secondary market. While not monotonically decreasing, it is clear that traders in the secondary market are most likely to quote more recently issued notes for sale. Figures 4 and 5 do not account for differences

[20] We obtain the interest (coupon) rate and loan size from matching to the primary market data described in the next section

in outstanding notes driven by prepayment, default, or origination activity, which we will address later in Section 4.

Using the origination date, we are able to calculate the age of notes quoted in the secondary market. We define a flipped note as any note quoted in the first 30 days after origination and distinguish it using the variable *Flip*.[21] We believe this is a reasonable approximation of flipping activity from an information perspective as no new information on the borrower arrives until their first payment. Its possible investors sell some of these notes due to liquidity shocks even within the first 30 days. It is also possible that borrowers make their first payment prior to the first payment due date (30 days after origination), and investors selling in the secondary market are trading on information resulting from an early borrower payment.

Table 2 presents summary statistics on the sample of notes identified as flipped notes. Relative to the full sample, the average interest rate is higher (18.15%), and the YTM is substantially lower (15.32%). The average (median) age of the flipped notes is 14.52 days (14 days), and the average estimated asking price is substantially higher than the main sample ($40.40). The latter is, in part, tautological because the younger age mechanically increases the remaining principal. Approximately 82.85% of the flipped notes that are less than 30 days old carry a loan status of "Issued," while 17.13% are "Current," implying the borrower makes an early payment. Most flipped notes, 80.63%, have no credit score trend changes, while the remainder is nearly evenly split among up (8.22%) and down (11.15%) movements. Critically, the average markup for flipped notes is 3.84% substantially higher than the main sample. Within the flipped note sample, we would also note that greater than 95% of the flipped notes have a markup of 1% or greater (the transaction fee of the secondary market ATS).

Table 2 Panel B splits the sample by originating loan term. Loans issued for a 60-month term appear to be riskier, carrying a larger loan size, interest rate, YTM, and markup. Interestingly the average number of days since origination is similar for both the 36- and 60-month term subgroups.

3.2 Primary Market data

[21] This indicator will be perfectly correlated with our age group identifier for the 0-30 day age group when we include age group fixed effects in the regression specifications. In those cases, we will simply separate and rename the age group fixed effect for that group.

We gather data on loans issued on the marketplace lending platforms from a variety of sources. First, we obtain loan and borrower information directly from the marketplace lending platforms. Both LendingClub and Prosper provide a wealth of information on the borrower's creditworthiness, including characteristics such as income (*LnIncome*), years of employment (*EmpLength*), debt-to-income ratio (*DTI*), monthly debt payments (*LnDebtPmt*), credit inquiries in the last six months (*InqLast6mths*), the number of open credit lines (*OpenCreditLines*), the number of derogatory public records (*PubRec*), public records in the past ten years (*PubRec10yrs*), public records in the last year (*PubRec12mths*), delinquencies in the past seven years (*Delinq7yrs*), delinquencies in the past two years (*Delinq2yrs*), current delinquencies, (*CurrentDelinq*), total revolving credit (*LnRevolving*), an employment status indicator, an indicator if the borrower's income was verified, and the borrower's state of residence. Additionally, we obtain information on the loan contract that describes borrower interest rate (*Interest Rate*), loan size (*Loan Amount*), credit grade, credit subgrade, and term. For Prosper, we are also able to collect the date of loan origination from the platform data. To get a similar variable on LendingClub loans, we use the information provided by LendingClub to the SEC in form 424(b)3 "sold" filings and match them to loan data. Using the origination date, we aggregate the dollar volume of origination activity on LendingClub each day by credit grade and term for each of the 30-day age buckets (*Issuance*). Loan and borrower information are collected for the period 2008 until 2016. Summary statistics on the primary market loans are available in the internet appendix Table A3.

In our main empirical tests, we are interested in the volume of notes quoted on the secondary market platform, and we use the age of the notes as a proxy for flipped notes. When comparing the volume of flipped notes to the rest of the distribution of notes on the secondary market, it will be important to remove mechanical differences. For example, fewer notes will trade on the secondary platform if a large portion of the originated notes has defaulted or prepaid. To address this, we also gather loan outcome data from LendingClub's website. The platform provides monthly updates on the payment history for each loan originated on the platform. Following the structure of the quote data above, we calculate the daily amount of originated notes in each term-subgrade-age bucket that defaults (*Delinquency*) or prepays (*Prepayment*). Starting with the daily dollar volume of notes originating in each term-subgrade-age bucket, we

also calculate the net dollar volume of notes that remain outstanding by subtracting the prepayment and defaulted volume (*Net float*). We also calculate the difference in average interest rate between the notes in each term-subgrade-age bucket and the average interest rate of notes in the same term-subgrade category that are currently being issued on day *t (Interest Rate Difference*).

Summary statistics for the daily subgrade-age level variables such as *DolVol*, *Net Float*, and its components are provided in Table 3 for 36-month (Panel A) and 60-month (Panel B) loans. Across the full sample, the average dollar volume of new quoting activity on day *t* in each subgrade-age group is $1,053 (ex. 0-30 day old, A1 notes) for the 36-month and $549 in the 60 -month notes. The average *Net Float* is approximately $35 million for 36-month loans, i.e. for each subgrade-age bucket there is an average of $35 million in outstanding loans that could be offered for sale on the secondary market. This suggests that each day approximately 0.3 BP of the total float of any given subgrade-age is newly offered for sale.

3.3 Segmentation Event Data

As described in Section 1.3, retail investors were only permitted to invest in the primary market origin process if state-level security regulators approved the security registration filed by the marketplace lending platform. These approval dates represent shifting access to the primary market, which should reduce the demand for secondary market flipping activity. We obtain security registration data from Cornaggia et al. (2018), who interview state security regulators to obtain registration dates.[22] We use the registration dates to construct event windows around changes in primary market investor participation.

Later in the paper, when we examine the likelihood of underpricing, we obtain benchmark interest rate data on commercial bank-issued 24-month unsecured personal loans from the St. Louis Federal Reserve (*CBPL24*). The data is published monthly and characterizes the average interest rate for banks surveyed on a two-year personal loan, which is the "most common rate charged during the first calendar week of the middle month of each quarter" issued by the bank.[23]

Finally, we collect data on changes in primary market access from a third-party peer-to-

[22] See Appendix B of Cornaggia et al. (2018) for more details on the registration process
[23] See Footnote 5 of https://www.federalreserve.gov/releases/g19/current/default.htm

peer lending forum hosted by NickelSteamRoller (NSR). NSR provided a similar service to Interest Radar and regularly posted news content on marketplace lending platform changes. In an informational post from August 2011, NSR co-founder Michael Philips discusses the desire for an API tool on the LendingClub primary market platform.[24] Years later, a user (JGillick) comments on the post on 5/12/13, discussing his newly created API tool. Cross-referencing the user's GitHub repository shows multiple versions of an API tool to access LendingClub's primary market. The earliest version of his code was posted on 5/15/13. A second NSR informational post suggests LendingClub's primary market API was still in its beta testing phase on 5/28/13.[25] From this, we can infer that API access to the primary market existed by May 2013 but was not widely accessible. In that same post, NSR announced an upcoming premium service allowing members of NSR to use an API to connect to the LendingClub primary market for search and execution. The service appears to be made publicly available between October and November of 2013 based on additional NSR posts and user comments. Thus, widespread API access, for a service fee, appears to be available around the October/November 2013 timeframe.[26] Broad access to the secondary market via API does not appear to be available until 8/3/16, although a large increase in average markup rates in June 2016 suggests early access for some users may have been available as a beta program similar to the launch of the API access in the primary market.[27]

[24] http://www.nickelsteamroller.com/blog/2011/08/lending-club-api-thoughts

[25] http://www.nickelsteamroller.com/blog/2013/05/the-next-evolution-in-p2p-investing-nsr-premium

[26] On 9/5/13 MattG commented "Okay, was just wondering. I was watching LC last night @ 5pm EST, and watched as 220 loans came on, and within seconds, it was down to almost 180 loans. I think API investing is going to be the only way to do LC in the near future."

[27] https://www.nsrinvest.com/introducing-nsr-platform-release-3-1/ suggests that secondary market access via API was launched in the summer of 2016. However, on Jul 10, 2017 it appears that secondary market access via API was terminated https://debanked.com/p2pforum/index.php?topic=4490.msg41526#msg41526 for LendingRobot. Note LendingRobot and NSRInvest merged shortly afterwards on 8/10/17 https://www.lendacademy.com/nsr-invest-and-lendingrobot-merge/ . As Internet Appendix Figure A1 suggests, API secondary market access may have contributed to an increase in the use of algorithms to post notes in the secondary market and skyrocketing average markup. Note Prosper closed its secondary market on October 27, 2016. LendingClub discontinued the secondary market on August 28, 2020. They later discontinued the primary market for retail investment on December 31, 2020.

4 Empirical Results

4.1 Raw Evidence of Flipping Activity

Our first objective is to show evidence of security flipping in the secondary market for promissory notes. We begin by looking at the raw age distribution of notes on the secondary market. Classifying notes quoted for sale by term and age distribution, we see in Figure 4 the 36-month age distribution and in Figure 5 the 60-month age distribution. Both figures present a few interesting stylized facts. A significant proportion of the number of notes quoted in the secondary market consists of loans 0-30 days old. In the 36 (60) month age distribution, approximately 0.8 (1.4) million quotes occur within the first 0-30 days of a note's existence in our sample.

4.2 Regulatory impact on flipping activity

After showing that there is a significant presence of flipping activity in the secondary market in Section 4.1, we examine if there is evidence that flipping activity decreases following regulatory changes in the primary market investor participation that grants broader access to the primary market. Cornaggia et al. (2018) collect state-level investor registration that mark changes in retail investors' ability to participate in the primary market. See Internet Appendix Table A1 for the timing and list of states that open/reopen investor registration.[28] The sample includes 12 events expanding investor access to the primary market and 8 events where registration lapses and primary market investors are temporarily restricted again from the primary market. We anticipate that as retail investor restrictions preventing access to the primary market are lifted (reenacted), the amount of flipping activity in the secondary market will fall (increase) if it is driven by primary market restrictions. Using a stacked panel of registration changes with 20-day windows (+/- 10 days around each registration change), we interact the set of age distribution indicators with an indicator equal to one following each registration change event (*OpenAccess*). The dollar volume of notes quoted would then be estimated by:

$$DolVol_{ijkt} = \beta_1 Flip_k + \gamma_1 Event_t + \beta_2 (Flip_k * Event_t) + \overrightarrow{\alpha_j} + \vec{\gamma}\overrightarrow{\alpha_j} * Event_t + \gamma_3 NetFloat_{ijkt} + \varepsilon_{ijkt} \quad (1).$$

[28] We thank Cornaggia et al. for sharing the registration timing data

In Table (4), *Event* is the *OpenAccess* indicator and is equal to one when a state allows investors access to the primary market. In columns (1) – (4) we only include events that allow clean identification of a pre/post period without any overlap in event windows. In columns (5) – (8) we relax this design choice to include the full set of events with the tradeoff that some pre/post events overlap in the panel.[29] Table 4 displays the interaction coefficient between *OpenAccess* and *Flip*, which is negative and statistically significant at the 1% level, suggesting a decrease in flipping activity following the investor registration changes. The average daily dollar volume of flip age group new quoting activity for each note term (2 total) and subgrade (35 total) unit of observation during this period is $1015. Thus, the coefficient of 0.081 in column (1) suggests an average decrease in new quoting activity of 7.98% per regulatory event.[30] This is broadly consistent with Hypothesis 1, suggesting that regulatory segmentation of the primary market exists and as a result of regulatory segmentation, we observe an increase in the amount of flipping activity in the secondary market.

4.3 Technological impact on flipping activity

In Section 4.2, we show that flipping activity changes around regulatory-driven segmentation changes in the primary market. Technology can also create segmentation in the primary market, absent any regulatory restrictions, if the trading technology creates a wedge between fast and slow traders. Fast traders can effectively exclude some portion of the slow traders from the primary market, forcing slow traders to seek notes in the secondary market. Since flipped notes in the secondary market are marked up in price, all traders would have a preference for the primary market offerings, but only the fast traders and some portion of the slow traders would be able to participate in the primary market.[31] We use two exogenous shocks to primary market access to show technology changes also create segmentation in the primary market.

[29] For example, Mississippi's registration lapse on 10/10/14 would require 9/30-10/9 be coded as a pre-event period while 10/11-10/20 as a post event period. South Dakota's registration lapse on 10/18 would require 10/8-10/17 as a pre-event period and 10/19-10/28 as the post event period. These events are omitted in Table 4 columns (1) – (4) while in columns (5) – (8) we repeat the overlapping observations with event indicators of opposite sign (0/1) corresponding to their primary market restriction status.

[30] The sample average DolVol in this window is 0.219, thus 0.081/(0.219 + 0.796) = 0.0798

[31] This assumes fast traders are capital constrained and cannot purchase the entire set of primary market offerings. Given investment in the primary market is limited to retail investors, this would seem to be a reasonable assumption.

For the first shock, as mentioned in Section 3.3, API access to the primary market was granted on a small scale in the second quarter of 2013. Using information from third-party announcements, we create an indicator, *API*, equal to one following the introduction of the API to this small group of investors. Using the same event window structure as Table 4, we examine the age distribution of secondary market notes before and after the API by using *API* as the *Event* in Equation (1). Table 5 presents the interaction of *API* with the *Flip* indicator. In three of the four columns, columns (1), (2), and (4), the API indicator is positive, suggesting a general increase in secondary market quoting activity following the API introduction. In all four columns, the interaction of *API* with the *Flip* indicator is positive and statistically significant, suggesting the relative increase in "flippable" note quotes was still larger. The results suggest the segmentation in the primary market caused by select access to the API results in more quoting activity in the secondary market, but especially in the flipped note section of the age distribution. This is consistent with Hypothesis 2c, that traders employing a flipping strategy are more likely to use trading technology than buy-and-hold investors and that this technology change results in primary market segmentation.

For the second exogenous change in primary market access, we use the public sale of third-party access to the API via Nickel Steamroller (NSR). NSR provided access to the primary market API for a membership fee in the Fall of 2013. Given the results in the API test above suggest that buy-and-hold investors are excluded from the primary market following the introduction of the API, access to this third-party service may alleviate some of the segmentation in the primary market. We again define an indicator *3rdParty* that is equal to one following the introduction of the third-party API service. Using the same event window empirical design to see if flipping activity changes following the NSR service launch, Table 6 presents the results with the *3rdParty* and *Flip* indicator interactions. While the sign on the 3rdParty indicator is mixed in direction and significance across the four specifications, the interaction of *3rdParty* and *Flip* is consistently negative and statistically significant. Given the average flipping quote activity is $18,835 in the event window (August-November 2013), the coefficients in columns (1)-(4) suggest a 4.0% decrease in flipping quotes following the introduction of the third-party API.

4.4 Robustness exercises

We conduct a series of exercises to ensure our main results in Tables 4-6 are robust. As mentioned in Section 3.1, we define the flip indicator as any note quoted for sale within the first 30 days beyond origination. A more conservative definition might impose additional filters such as loan status as "Issued", credit score trend as "no change", and a markup of at least 1%. We repeat Tables 4 through 6 with these additional filters and find the results economically and statistically similar. We also repeat Tables 4 through 6 using a Tobit model with a lower bound of zero to account for the truncation of the dependent variable. Again, our results remain robust economically and statistically. We also include credit grade fixed effects and month fixed effects in the longer window tests and find the results remain statistically and economically significant with very similar coefficient magnitudes. [32]

As an additional robustness exercise, we repeat Tables 4, 5, and 6 using three additional criteria to define the *Flip* indicator. First, we identify notes with a markup greater than 1%, ensuring the note seller has a profit above the secondary market transaction cost. This reduces the likelihood that note sellers are exiting due to liquidity shocks, as higher markups will increase the time it takes to liquidate the position.[33] Second, quotes on the secondary market have a loan status indicator that is labeled "Issued" until the first payment is received, at which point it changes to "Current." Finally, we restrict the *Flip* indicator to those notes with a credit score trend of "No Change." Using this more restrictive definition yields results with almost identical magnitude and statistical significance to those presented in the main tables. [34]

5 Evidence of Underpricing to Accelerate Flipping Activity

In Section 4, we provide evidence that flipping activity exists in the secondary market. It decreases following the removal of primary market regulatory restrictions and increases (decreases) with technology changes that create (remove) segmentation in the primary market.

[32] Results are available upon request.
[33] We note that over 95% of the notes listed within the first 30 days have a markup greater than one percent
[34] Results available upon request

Underpricing of the primary offering by the MLP may help resolve some of the observed regulatory segmentation if it encourages more traders to pursue a short term flipping strategy over a buy-and-hold strategy. However, proving the underpricing of an asset presents a number of empirical challenges. First, the market price of risk is time-varying and specific for unsecured consumer assets such as LC loans. Benchmark interest rates such as revolving consumer credit are notoriously sticky (Ausubel, 1991; Stango, 2000, 2002) and often represent changes in the distribution of consumers granted access to such credit more than the actual market price of risk. To mitigate issues related to the time-varying market price of risk, we use the unsecured consumer credit benchmark rate published by the St. Louis Federal Reserve (*CBL24*). This monthly data provided by commercial banks represents the annual interest rate on a two-year personal, unsecured loan. In addition to *CBPL24*, we also incorporate the loan data provided by the platform, which contains many borrower characteristics to help evaluate the systematic risks for borrowers.

Second, we have used the changing regulatory environment to show increased flipping activity with primary market segmentation. Presumably, as more investors are added to the primary market, the need to underprice loans (price with an interest rate premium) decreases if the platform is attempting to encourage flipping activity to unlock excluded retail investor capital. If we were to continue to use investor registration changes to capture the platform's changing incentive to underprice, our shock might be confounded as the regulatory change also represents a capital supply increase. Given that platform revenue (profit) is tied to origination volume, the rational platform may lower borrower interest rates to increase borrower demand when capital supply increases. Thus, if we were to find that following investor restriction changes, interest rates fall, it could be driven by the unwinding of an underpricing premium, an increase in capital supply, or both.

To address this issue, we include data from a competing platform, Prosper Marketplace. One of the unique features of the development in marketplace lending is that some platforms, such as LendingClub, priced loans using a credit model. In this case, the platform sets the interest rate on the loans. However, other platforms, such as Prosper, initially priced loans via auction (Wei and Lin, 2017). Eventually, Prosper switched their pricing mechanism to a fixed interest rate pricing mechanism similar to LendingClub. Importantly for our study, investor

restriction changes occurred during both the auction pricing period and during the fixed interest rate pricing period. If investor registration changes simply represent a supply of capital change, one would expect to see a decrease in interest rates under both the auction and the fixed rate pricing mechanisms. However, if we were to find a decrease in interest rates following investor registration changes only during the fixed interest rate pricing mechanism, it suggests that at least a proportion of the interest rate decreases are driven by an unwinding of underpricing. We model the loan interest rates using the following equation:

$$Rate_{ijt} = OpenAccess_t + Borrower_i + Loan_i + CreditGrade_j x\ CBPL_t + \varepsilon_{ijt} \quad (2).$$

In Table 7, we show that after controlling for a wealth of borrower risk characteristics and the time-varying price of risk with the *CBPL*, interest rates appear to decrease by an average of 7.8 BPs on LendingClub following each investor registration event. We show a similar result in column (2) for Prosper Marketplace during its fixed interest rate period, with an average decrease in interest rates of 16.7 BPs following each registration event. Columns (1) and (2) are thus consistent with both the regulatory circumvention and the increased primary market demand explanations. However, in column (3), we show that during the period when investors set the interest rate via an auction process and the platform could not control the interest rate, interest rates do not appear to change following the investor registration events. This suggests that at least some portion of the interest rate decreases in columns (1) and (2) are driven by the unwinding of underpricing discounts as retail investors are granted access to the primary market, and platforms have less incentive to encourage flipping activity to unlock retail capital in the secondary market. The results in columns (1) and (2) are consistent with Hypothesis 3 suggesting platforms underprice marketplace lending notes when they employ a pricing mechanism controlled by the platform. Column (3) also supports Hypothesis 4 by suggesting that when pricing is outside the control of the marketplace lending platform, interest rates do not adjust to primary market access changes driven by the lifting of investor participation restrictions.

6 Quote Data Robustness Tests

Ideally, we would use trade data to conduct our analysis of flipping activity. Given the lack of trade data, we proxy trading activity in the secondary market with quoting activity in the

previous sections. This approach presents two concerns that we attempt to address here. First, quoting activity can overstate the level of transactions. If notes are quoted multiple times by an investor, aggregating quoting volume at the term-subgrade-age-day level as we do in the previous sections will overstate the level of trading activity in the secondary market. A second concern is that notes that are repeatedly quoted may be systematically different than notes that are only quoted once. For example, given two notes, we may find that notes quoted only once by an investor exit the sample because of a transaction, while notes that are quoted multiple times are notes that never result in a trade (only expirations and cancellations). This systematic difference in quotes/final exit may correlate with characteristics (such as age group indicators) included in the regression and confound our results. We present analysis and discussion below to mitigate these concerns.

6.1 Multiple Quotes per Exit and Quotes without Exit

First, at the extreme, quotes would be a poor proxy for transactions if notes are quoted and cancelled/expire without ever having an associated execution. If this were the case, our quote approximation would be completely unrelated to trading activity. From Honigsberg et al. (2017) we know that the aggregate volume of transactions on the two main peer-to-peer lending secondary markets was approximately 1.45 million transactions in 2015.[35] For the LendingClub sample, we observe approximately 15.5 million quotes in 2015. LendingClub origination activity was comparable to Prosper Marketplace, the other marketplace lending platform in Honigsberg et al. (2017), suggesting it is unlikely that vast majority of transactions observed in Honigsberg et al. (2017) are Prosper transactions. To see if our quote data is related to transactions, we match the Interest Radar sales file against the quote data and find a 96+%

[35] Li and Schurhoff (2019) report approximately 72 million trades over a 15 year sample of municipal bonds from 1998-2012. This is an average of 4.8 million transactions per year. While peer-to-peer lending markets are smaller in terms of dollar volume of activity, they are roughly a third of the size of the municipal bond market in terms of the number of transactions.

matching rate after removing three days from the sample.[36, 37] Thus, it is unlikely that quoting activity in our sample is completely unrelated to trades. The main concern with multiple quotes becomes the degree to which the level of quoting activity overstates transactions.[38]

We present three pieces of evidence to minimize the degree to which quotes overstate transactions. First, the orderid-listdate corresponds to a particular investor's attempt to sell an asset. We can count the unique number of times a note is posted for sale by an investor, by counting orderid-listdate pairs, to sense how much our quote proxy overstates trading activity.[39] During the period prior to the introduction of the primary market API (May 2013), the median number of quotes per final exit (includes execution, cancellation, and expiration) is 1.0 with an average of 2.66. Between introduction of primary market API and the end of our sample in May 2016 the median number of quotes per final exit is 2.0, with an average of 5.70.[40] Among the orders that are flipped transactions, the average is 2.86 in this later period. Thus, the degree to which multiple quotes exist is relatively low, although increasing with time.

Second, one way to reduce the possible impact of multiple quotes overinflating the level of activity is to remove quotes that are less likely to result in a trade. Secondary market quotes have a maximum duration of seven days after which they are automatically cancelled. Looking at the summary statistics of quote exits, out of the raw 195,412,425 quotes we find that 193,627,907 quotes exit in days 0-7.[41] Of the eight possible exit days, 12.7% exit on the

[36] The matching of trade data against the quote data turns out to be a useful filter that we can impose on the analysis in the previous tables. After removing the three days identified as poor quote capturing days, our results are almost identical to those presented above in terms of statistical significance and economic magnitude. The results are available upon request.

[37] We also compare the purchase file from Interest Radar against the quote data. The matching rate is relatively lower compared to the sales file. As the Interest Radar platform's purpose was to help examine and aggregate trading activity we find it odd that purchases would occur without the platform data containing information on the secondary market available notes. This suggests that the nature of the lower match rate may be due to the self reporting aspect of the purchase data.

[38] Generically, if the average quote string does not end in a transaction the daily measure would be inflated by the number of cancelled/expired quotes times the average estimated sales price. If the string of quotes ends in a transaction, the degree of inflation would be the number of quote attempts minus one, times the estimated sales price. For example, if the average investor quotes a note one time and it executes, our daily measure of activity is a perfect proxy of transaction volume using quotes. If the average investor quotes a note two times and the quote executes on the last quote, our volume estimate will be inflated by 100%.

[39] Listings on the secondary market have a seven-day expiration.

[40] We end our sample in May 2016 to avoid the introduction of the secondary market API. With the introduction of the secondary market API, the number of quotes at the OrderID-SalesDate level increases dramatically presumably because of the ability to offer/cancel orders in quick succession via algorithm.

[41] This uses our full sample of quote data that extends to May 2, 2018

7th day. Figure 6 shows that exit time (i.e. days on the secondary market) is not uniformly distributed. Most quotes exit on day 0 (same day as entry) or day 1. Day 7 is the third most frequent exit time suggesting an oversized proportion of notes exiting on day 7 may be due to expirations. If one were to assume all 7th day exiting quotes are expirations, we might eliminate the upward bias in the level of transactions caused by expiring quotes by dropping the 7th day exiting quotes from the sample. While this almost certainly drops some transactions from the sample, it can help to provide a lower bound for our results. In Table 8, we repeat the first column of Table 4 for reference and then in column (2) omit all the quotes that exit on the 7th day in the secondary market. The results maintain their statistical significance and direction. In column (2), the interaction coefficient is actually larger in magnitude suggesting quote expiration does not appear to dramatically inflate the level of flipping activity.

Third, as orders can be quoted multiple times by an investor before exit, using quotes will overstate transaction volume by the number of times a note is quoted for sale. We can omit quotes that exit and are subsequently requoted by the same investor so that our sample of quotes consists only of the "last quote" in each notedid-orderid string. The benefit of such an approach is that we eliminate any upward bias on the level of transactions from multiple "hollow" quotes that do not result in transactions. However, as we will address in section 6.2, the number of quote attempts may itself carry information that may need to be included in order to avoid omitted variable bias. In column (3) of Table 8, we repeat the regulatory change test from Table 4 column (1) again with only the last quote in each noteid-orderid string. The interaction coefficient on *Flip* and *OpenAccess* falls to -0.024, while the sample mean for *DolVol* falls to $215.4 for the flipped group compared to $1015 for column (1). Column (3) suggests the relative impact of removing regulatory restrictions is relatively stable, i.e. it decreases flipping activity by 11.1% as investors are included in the primary market.

In column (4), we remove both the 7th day exiting quotes to address inflation caused by expiration, and the "hollow" quotes that are not the last quote and the results are similar to column (3). Note that the results in column (4) should only be inflated to the extent that traders submit and cancel a quote on their final attempt to sell a note while also avoiding quote expiration (7th day) concerns.

6.2 Quote exit correlation with observables

A second concern with the main analysis is that not all exit quotes convey identical information. A note exiting on first quote may be systematically different than a note exiting on its fifth quote. If we filter the sample to only the last observed quote for each trader, we might ignore a systematic variable influencing that exit. For example, if executions exit on the first quote while the second (plus) quote represent only cancelations and expirations. Alternatively, if young notes tend to have a final exit on the first quote while older notes have a final exit on subsequent quotes.[42] To address such concerns we include additional control variables on the notes offered for sale at the term-subgrade-age-day level such as mean quote number (investors 1st, 2nd, 3rd, etc… attempt to sell a note), *Quote Number*, and the daily average markup of notes in a term-subgrade-age group, *Markup*. In Table 9 we repeat the main tests in Tables 4-6 and show they are robust to such concerns.

7 Conclusion

We provide evidence that retail investors flip FinTech debt assets from a primary market, where notes are initially offered, to a separate secondary market within the first thirty days following issuance. The immediate resale of FinTech debt notes is curious in in that it suggests some type of segmentation in the primary market of retail investors.

We show that segmentation in the primary market appears to be driven by both regulation and technology in this emerging asset class. State security regulators restrict investor participation in the primary market but not the secondary market. As a result, primary market investors flip notes from the primary market to the secondary market. We use the staggered deregulation of primary market access to show that flipping activity falls (increases) with increased (decreased) access to the primary market. Technology changes can also cause

[42] The concern here is similar to saying the quote-to-trade ratio is not constant across some variable (age, credit grade, markup, markup/price trend, etc…). Our main tests would have an identification problem using all quotes as a proxy for trades if before and after events, the quote-to-trade multiple changes AND changes differently for age groups. Differences in the time series of quote-to-trade would be captured in the event dummy (not an identification issue). Differences in the cross section of quote-to-trade multiple would be captured in the age (flip) dummy. However, if some omitted characteristic causes quote-to-trade to change in the time series (timing with our events) AND changes quote-to-trade more for old notes than new notes then we would have an omitted variable problem. It is not clear why this would be the case.

segmentation in the primary market. Consistent with this, we show that the opening of API access to the primary market appears to create segmentation between fast and slow traders and increases the flipping activity in the secondary market substantially. Broadening access to the API via a third-party service decreases the volume of notes quoted for flipping, consistent with a technology-driven segmentation in the primary asset market.

Given the observed regulatory segmentation, we consider if the marketplace lending platform upwardly adjusts interest rate premiums to encourage flipping activity that would unwind segmentation. We provide evidence consistent with FinTech debt platforms underpricing the initial offering of the debt notes. Again, using the staggered investor participation deregulation, we compare marketplace lending platforms that are able to set interest rates to one that cannot (because of an auction pricing mechanism). Our results show that interest rates fall as primary markets open to more investors, but only when the platform controls the interest rates (platform pricing mechanism). Interest rates remain unchanged when an auction process dictates the interest rate on notes. Combined, this suggests the observed shift in interest rates around investor participation changes is not entirely driven by supply/demand and that marketplace lending platforms likely consider such regulatory frictions when setting interest rates.

Technology continues to democratize access to capital markets. Our results reveal the importance of understanding intermediary incentives. The main tables point to the unintended consequences of investor regulation and technology improvements. In the case of the FinTech debt markets under study, the interest rate premiums from platform underpricing amount to a relatively modest wealth transfer from borrowers to primary market investors over the life of the loans originated by the platform. Secondary market investors appear to pay a hefty 3.84% markup over the primary market which equates to a substantial loss in the average yield to maturity of 201 BP. Both wealth transfers accrue to the traders flipping the notes from the primary market to the secondary market. The implications of our results suggest that investor restrictions and technology segmentation likely contribute to flipping activity more broadly, we anticipate our findings should scale with market size which may have much more substantial wealth transfers for emerging markets such as digital tokens where country level primary market

restrictions are common but international exchanges may allow similar secondary market transactions.

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8 Variable Appendix

Aggregate Secondary Market

Variable	Definition	Source
$DolVol_{ijkt}$	Aggregate dollar volume of quotes (in thousands USD) in term-age group-subgrade on day *t*	Interest Radar calculated from Estimated Asking Price
$Flip_{k}$	1 if the observation is in the 0-30 day age group	EDGAR / LendingClub
Net $float_{ijkt}$	Dollar volume (in millions USD) of loans originated in each subgrade, term, and age group less the amount of principal repaid (including prepayment) and principal in default as of day *t*	LendingClub Primary Market Loan Listing Data
$Issuance_{ijkt}$	Dollar volume (in millions USD) of loans originated in a subgrade-term-age group as of day *t*	LendingClub Primary Market Loan Listing Data
$Default_{ijkt}$	Dollar volume (in millions USD) of loans in default for each subgrade-term-age group as of day *t*	LendingClub Payment History Data
$Prepaid_{ijkt}$	Dollar volume (in millions USD) of loans that have been prepaid for each subgrade-term-age group as of day *t*	LendingClub Payment History Data
Interest Rate Diff. $_{ijkt}$	Difference between the average coupon rate for a term-subgrade-age group on day t and the average coupon rate of loans issued on day t in the same subgrade	LendingClub Primary Market Loan Listing Data
$OpenAccess_{t}$	Indicator equal to one in the 30 days following an investor registration approval event	State Security Regulators
API_{t}	Indicator equal to one in the 30 days following the introduction of an application program interface (API) for the primary funding market	NSR Invest (API launched between April 29, 2013 and May 28, 2013)
$3rdParty_{t}$	Indicator equal to one in the 30 days following the introduction of a paid 3rd party service accessing the primary market API	NSR Invest (API became available on third party websites from Nov. 2013)
Markup $_{ijkt}$	The daily average asking price divided by the sum of all remaining principal payments	Interest Radar

	and accrued interest at the term-subgrade-age group level.	
Quote Number $_{ijkt}$	The daily average at the term-subgrade-age group level of the number of times a noteid-orderid has occurred in the secondary market	Interest Radar

Individual Note Level

Age_i	Give date t, the number of days since a note was issued using the issue date provided for the note on EDGAR or the individual loan's LendingClub page	EDGAR / LendingClub
$Markup_i$	The asking price divided by the sum of all remaining principal payments and accrued interest.	Interest Radar
YTM_i	Yield to maturity assuming the note is purchased at the asking price, is held to maturity, all payments are received in full / on schedule, and LendingClub collects a 1% service fee.	Interest Radar
Estimated Asking $Price_i$	The price assumed by the note's age given the sum of all remaining payments, accrued interest, markup, and assumed current status	Calculated from issue date and Markup
Asking Price $Range_i$	Asking price range groups of a quote broken into 0-25, 25-50, 50-100, 100+, or N/A	Interest Radar
Last Payment $Range_i$	Group indicator reporting if the last full payment made from the borrower was made in the past 1-31 days, 31+ days, or N/A	Interest Radar
Loan $Status_i$	Group indicator identifying a loan as Current, In grace period, Issued, Late 16-30 days, Late 30-120 days, N/A	Interest Radar
Credit Score $Trend_i$	Indicator if the borrower's credit score has gone up, had no change, or gone down in the past 30 days	Interest Radar

Individual loan level data

$LnAmount_i$	Log of the loan amount (in $US)	LendingClub\Prosper
DTI_i	Debt-to-income ratio of the borrower of loan *i.* Reported in percent	LendingClub\Prosper
$LnIncome_i$	Natural log of annual income of the borrower of loan *i*	LendingClub\Prosper
$LnDebtPmt_i$	Natural log of debt payment of the borrower of loan *i*. It is monthly (annual) debt payment if the loan is listed by Prosper (LendingClub).	LendingClub\Prosper
$InqLast6mths_i$	Number of credit inquiries on the borrower of loan *i*'s credit report in the six months before listing	LendingClub\Prosper
$OpenCreditLines_i$	Number of borrower's open credit lines when borrower's applies for loan *i*	LendingClub\Prosper
$Delinq2yrs_i$	Number of delinquencies (defined as "over 30 days past-due incidences") of LendingClub borrower of loan *i* in the last 2 years	LendingClub
$CurrentDelinq_i$	Number of delinquent credit accounts when borrower's applies for loan *i* (Prosper)	Prosper
$Delinq7yrs_i$	Number of delinquent credit accounts in the last 7 years when borrower's applies for loan *i* (Prosper)	Prosper
$PubRec_i$	Number of public records when the borrower applies for loan *i* (LendingClub)	LendingClub
$PubRec10yrs_i$	Number of public records in the past 10 years when the borrower applies for loan *i* (Prosper)	Prosper
$PubRec12mths_i$	Number of public records in the past 12 months when the borrower applies for loan *i* (Prosper)	Prosper
$EmpLength_i$	Employment length, in years, of borrower for loan *i* (LendingClub). Possible values are the integer values from 0 to 10. Employment length less than one year is set to 0, and employment length greater than 9 years is set to 10.	LendingClub

$LnRevolving_i$	Log of the amount of borrower's revolving credit balance when borrower's loan *i* is listed by the platform	LendingClub\Prosper
$RevolUtil_i$	Revolving line utilization rate (%) (i.e., the amount of credit the borrower is using relative to all available revolving credit)	LendingClub
$CBPL24_i$	St. Louis Federal Reserve survey data characterizes the average interest rate each month on a two year personal loan that is the "most common rate charged during the first calendar week of the middle month of each quarter" issued by the bank	St. Louis Federal Reserve
$TotalAccounts_i$	The total number of credit lines currently in the borrower's credit file	LendingClub
$Term60month_i$	1 if loan term is 60 months, 0 otherwise	LendingClub

9 Appendix

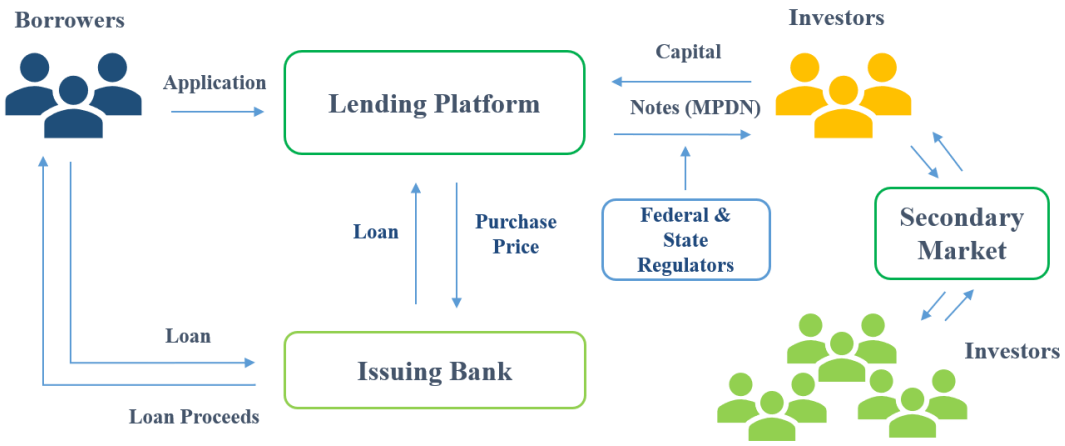

Figure 1: Marketplace Lending Process Overview

The figure above provides an overview of the marketplace lending process. Borrowers submit a loan request to the platform, and the platforms provide an initial screening based on the applicant's creditworthiness. After a loan request passes a credit screen, the platform posts the loan request for investors to fund. Investors choose to fund the loan, the borrower receives funds, and investors receive a promissory note tied to the payments of the borrower. Investors may then hold the note to maturity or choose to sell the note in a secondary market (FolioFN). The primary market is restricted by state security regulators and only investors of certain states may participate in the primary offering (lending platform). The secondary market is open to all investors regardless of state of residency (state regulator stance).

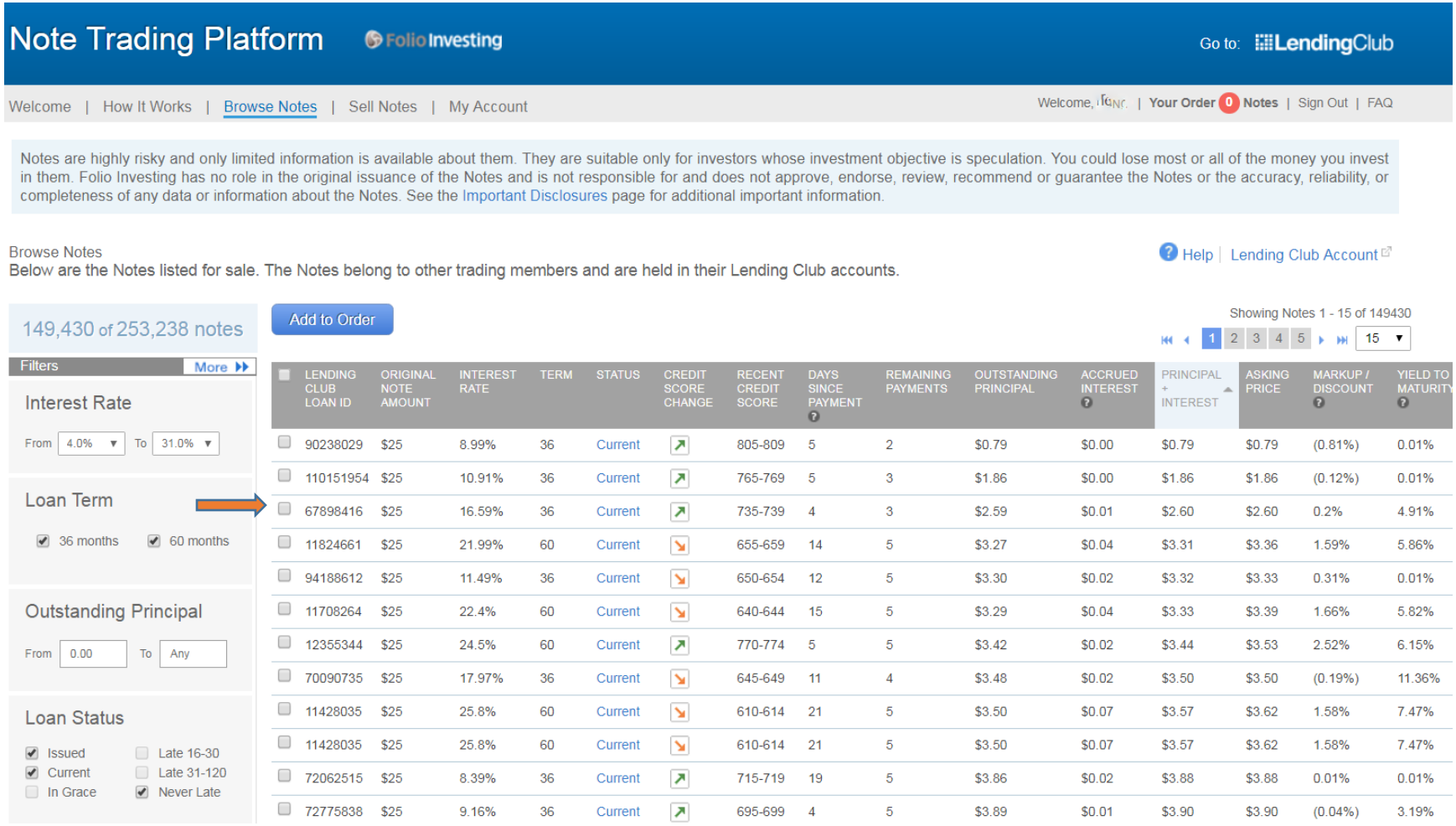

Figure 2 – FolioFN Secondary Market for LendingClub Promissory Notes on 10/9/2018

The figure above provides a screenshot of the secondary market note trading platform user interface as of October 9, 2018. Investor notes were posted as non-marketable limit sell offers. Buyers submit market orders. On this day, there were 253,238 notes available for purchase. As shown, the platform's interface provided basic filtering features for buyers on term, interest rate, loan status, and outstanding principal.

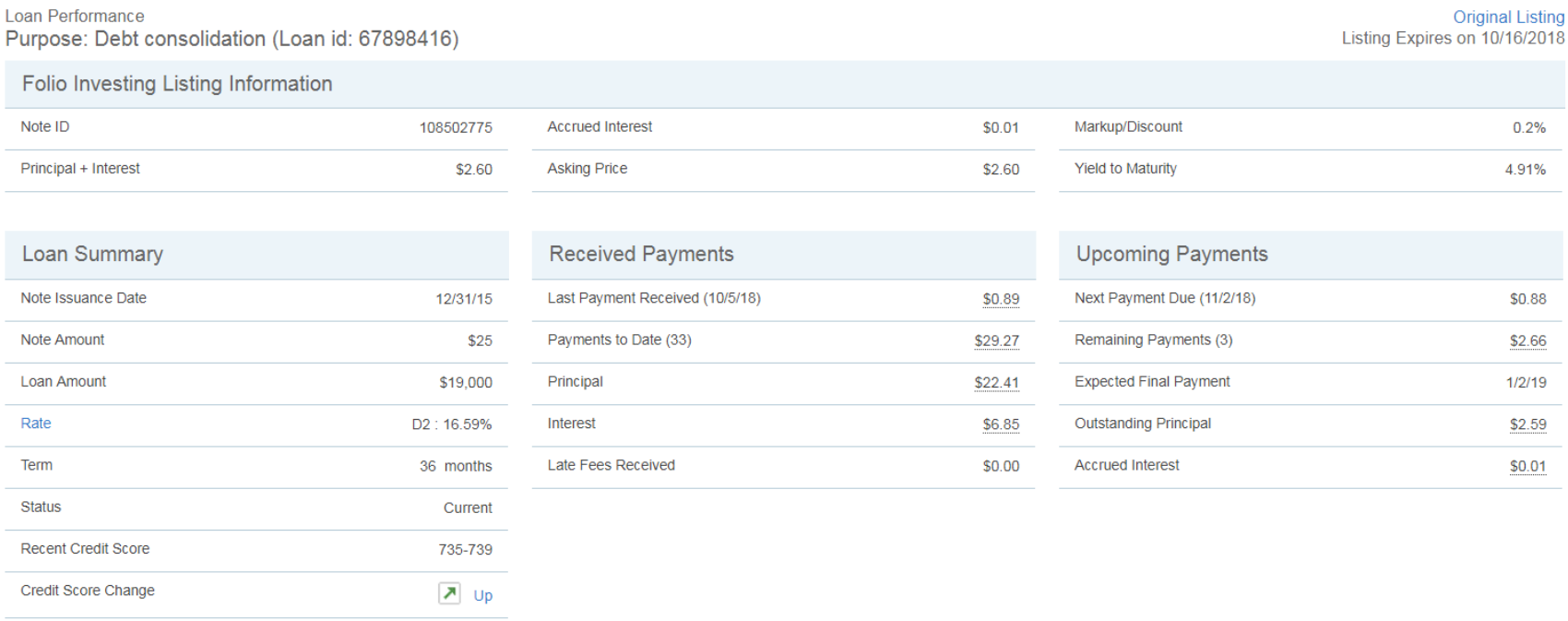

Figure 3 - Example of Detailed Promissory Note Listing on FolioFN Secondary Market

For each listing on the secondary market, additional information was available after selecting a particular note. The figure above is an example of the detailed information available for each note. In the detailed description, additional features such as the issuance date, original loan amount, recent credit score, credit score change direction, payments made to date, and even collection logs in the case of delinquent notes were available for investors. The above example links to the note listed in the third line of Figure 2.

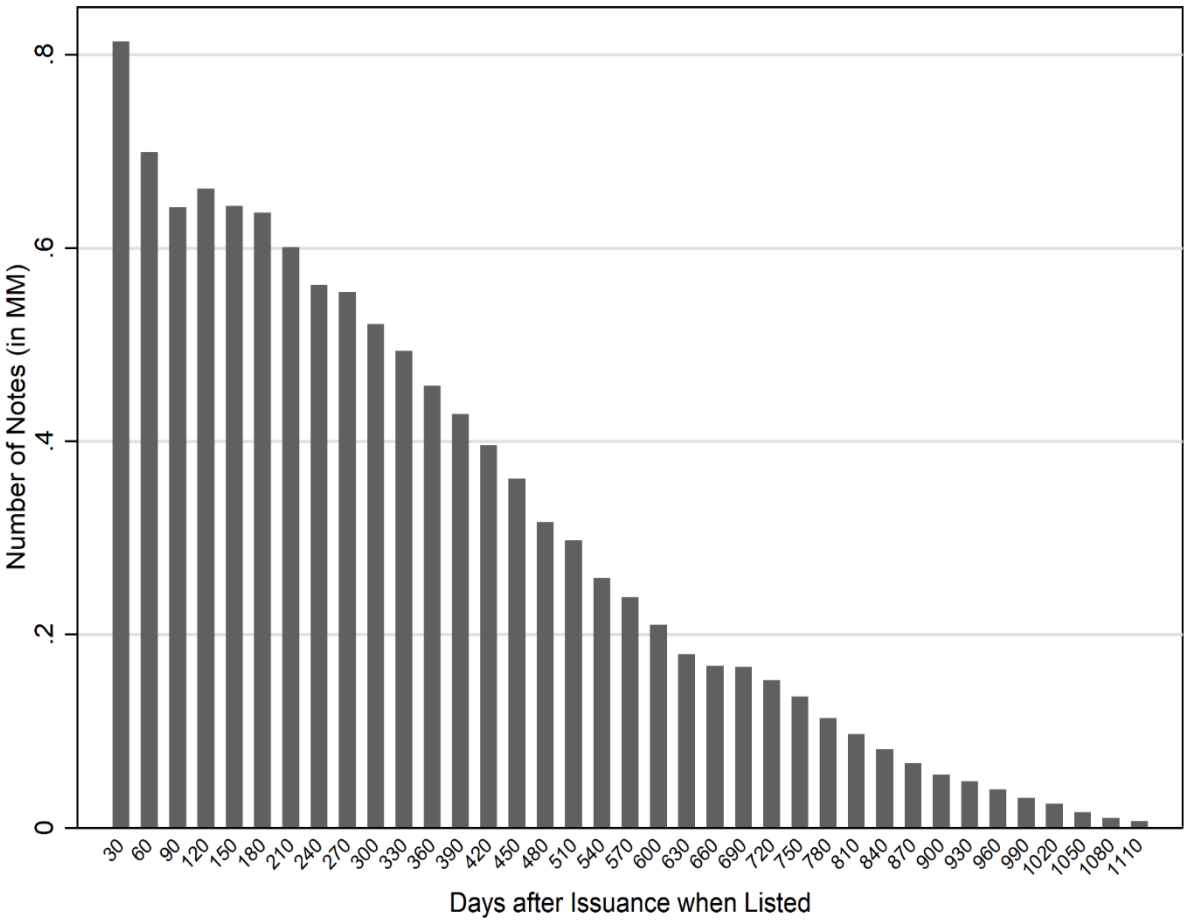

Figure 4 – Age Distribution of 36-month Notes on the Secondary Market Platform

This figure shows the distribution of the age of the 36-month notes quoted for sale on the secondary market platform in 30-day groups. The sample of 36-month notes consists of 11,191,893 quotes of notes during the period 12/11/2012 to 05/31/2016.

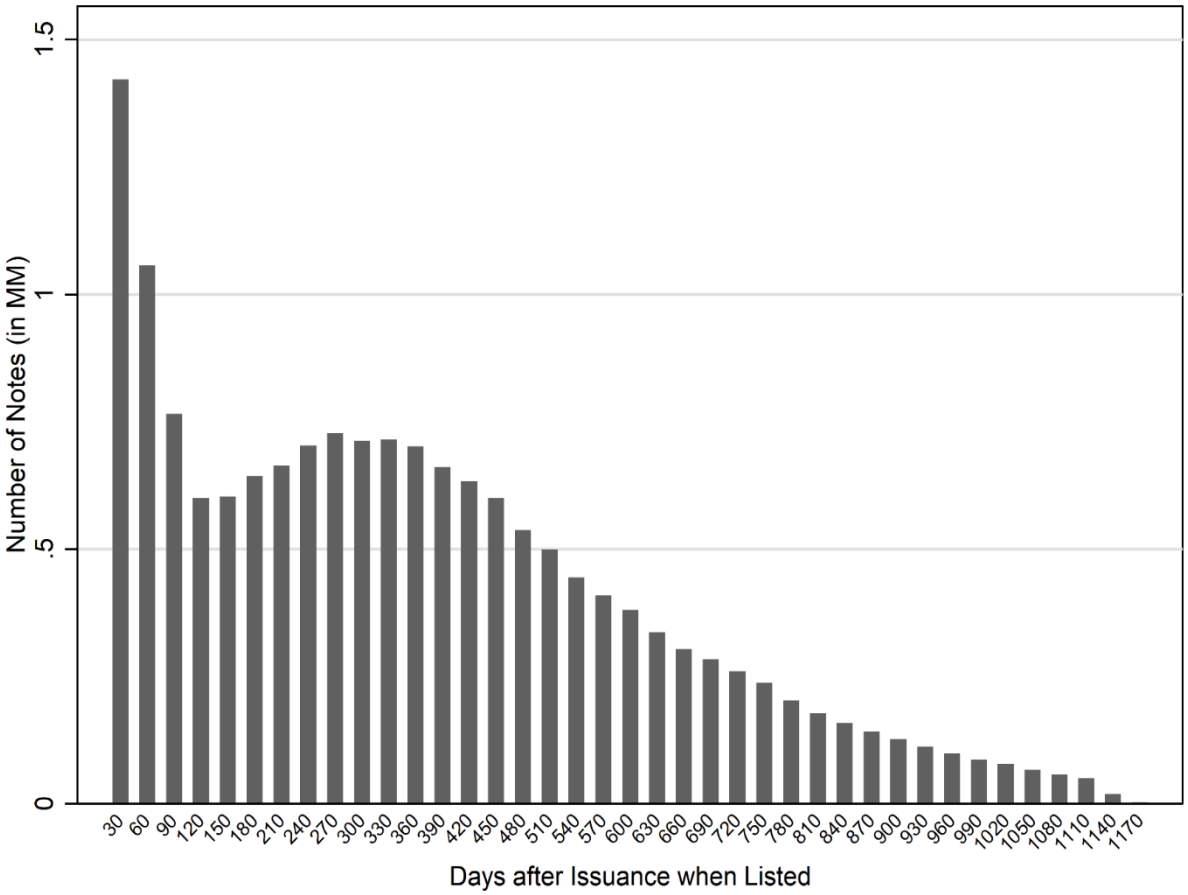

Figure 5 – Age Distribution of 60-month Notes on the Secondary Market Platform

This figure shows the distribution of the age of the 60-month notes quoted for sale on the secondary market platform in 30-day groups. Our sample consists of 16,258,871 quotes of notes during the period 12/11/2012 to 05/31/2016.

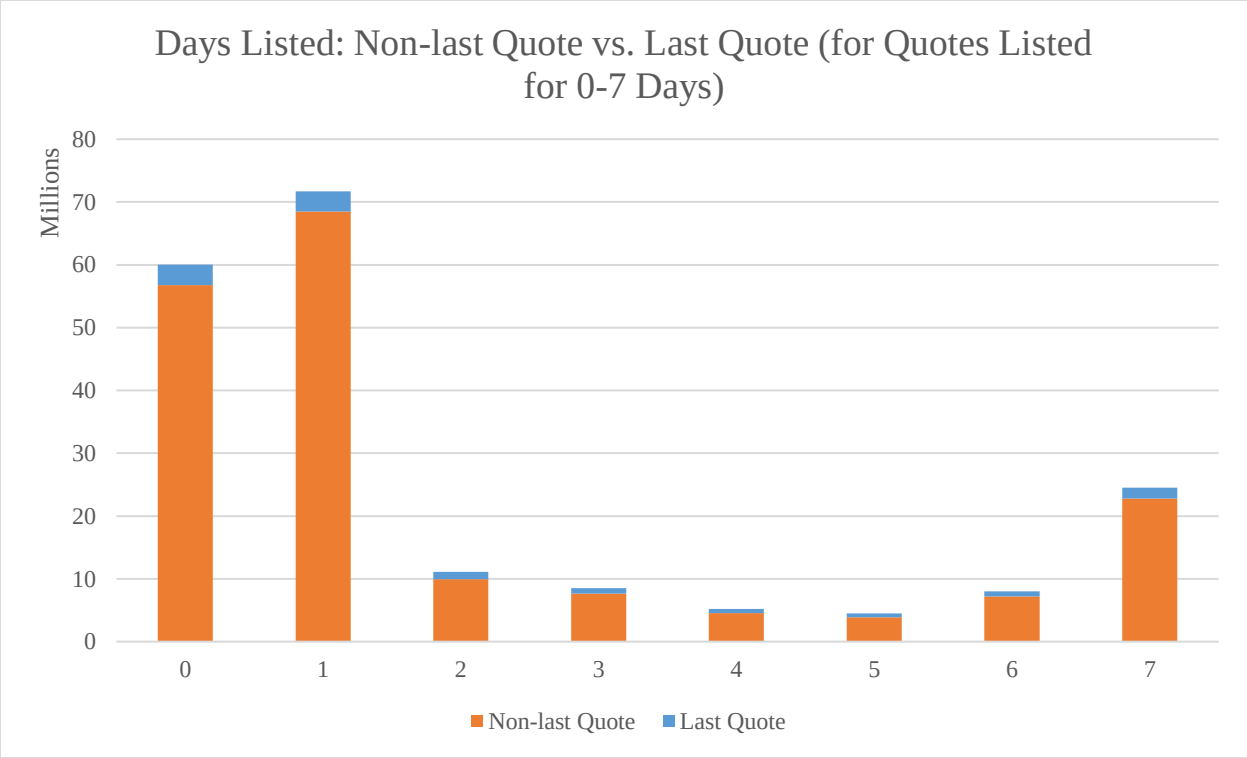

Figure 6 – Distribution of Quote age on the Secondary Market

This figure shows the distribution of days listed, i.e. the number of days a non-marketable limit order rests on the secondary market. Quotes expire after 7 days. If an investor submits a limit order that is cancelled or expires and then relists the note, the subsequent limit order bears the same orderid (but a new start date). Non-last quotes are limit orders that have subsequent limit orders while last quote orders are the final observation of a particular loanid-noteid-orderid in the sample.

Table 1 – Secondary Market Quote Summary Statistics

This table presents summary statistics for the secondary market quote data provided by Interest Radar. Panel A presents summary statistics for the full sample on yield to maturity (YTM), the markup, note age, and estimated asking price. YTM assumes the note is purchased at the asking price, is held to maturity, all payments are received in full / on schedule, and LendingClub collects a 1% service fee. Markup is the asking price divided by the sum of all remaining principal payments and accrued interest. The estimated asking price is the price assumed by the note's age, given the sum of all remaining payments, accrued interest, markup, and assumed current status. Panels B and C provide the sample means of YTM, Markup, Age, and Estimated Asking Price after splitting the sample by term and credit grade. Panels D, E, F, and G provide sample distribution statistics for the Asking Price Range, Last Payment Range, Loan Status, and Credit Score Trend, respectively. Panels H and I provide Credit Score Trend and Last Payment Range by grade.

Panel A. Full sample

Variable	N	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
YTM (%)	27,450,764	16.45	20.26	-1.40	9.30	13.55	17.69	167.80
Markup\Discount (%)	27,450,764	1.36	12.19	-73.96	0.84	2.62	5.20	22.39
Age (Days)	27,450,764	330.40	247.86	0	127	288	483	2,087
Est. Asking Price ($)	27,450,764	21.72	14.77	2.26	15.92	20.38	23.70	103.54
Loan Amount ($)	27,450,764	20,013.67	9,050.37	1,000	12,375	20,000	27,575	40,000
Interest Rate (%)	27,450,764	16.74	4.91	5.32	13.33	16.99	20.20	30.99

Panel B. 36 month Means by Grade

36 Month	N	YTM (%)	Markup (%)	Age (Days)	Est. Asking Price ($)	Loan Amount ($)	Interest Rate (%)
A	1,718,499	5.39	1.49	369.68	18.75	16,016.26	7.35
B	3,264,364	9.73	1.45	340.10	20.05	14,992.29	11.13
C	2,980,907	13.73	1.19	294.65	21.43	15,350.59	14.20
D	2,133,292	17.70	0.98	265.84	22.63	15,810.51	17.35
E	869,823	20.60	0.87	220.13	25.73	16,941.16	20.09
F	192,059	27.07	-0.66	197.21	27.07	14,951.14	23.94
G	32,949	30.11	-1.21	205.73	26.77	18,375.02	26.34

Total	11,191,893

Panel C. 60 month Means by Grade

60 Month	N	YTM (%)	Markup (%)	Age (Days)	Est. Asking Price ($)	Loan Amount ($)	Interest Rate (%)
A	75,981	7.53	1.09	424.76	17.63	18,956.29	8.47
B	917,770	10.63	1.60	413.70	18.67	21,367.05	11.33
C	3,013,279	13.84	2.12	389.44	19.47	21,613.77	14.82
D	3,908,262	17.02	1.76	347.96	20.92	22,893.66	17.48
E	4,812,714	20.45	1.53	333.78	22.74	23,652.29	20.40
F	2,621,803	24.85	0.74	314.25	24.92	24,047.73	23.84
G	909,062	28.13	-0.27	293.81	26.65	24,963.24	25.89
Total	16,258,871						

Panel D. By Asking Price

Asking Price Range	Freq.	Pct.
0-25	22,142,100	80.66
25-50	3,913,222	14.26
50-100	754,781	2.75
> 100	640,661	2.33
Total	27,450,764	100

Panel E. By Last Payment Range

Last Payment Range	Freq.	Pct.
1-30	22,616,263	82.39
31+	2,489,450	9.07
N/A	2,345,051	8.54
Total	27,450,764	100

Panel F. By Loan Status

Loan Status	Freq.	Pct.
Current	23,297,206	84.87
In Grace Period	539,675	1.97
Issued	1,866,093	6.8
Late (16-30 days)	312,913	1.14
Late (31-120 days)	1,434,877	5.23
Total	27,450,764	100

Panel G. Credit Score Trend

CreditScoreTrend	Freq.	Percent
Up	12,903,140	47
No Change	3,649,321	13.29
Down	10,898,303	39.7
Total	27,450,764	100

Panel H. Credit Score Trend by Grade

Credit Score Trend	A	B	C	D	E	F	G	Total
Up	2.90%	7.11%	10.14%	10.33%	9.67%	5.08%	1.78%	47.00%
No Change	0.59%	1.59%	2.72%	2.96%	3.03%	1.74%	0.67%	13.29%
Down	3.05%	6.54%	8.98%	8.72%	8.00%	3.43%	0.98%	39.70%
Total	6.54%	15.24%	21.84%	22.01%	20.70%	10.25%	3.43%	100.00%

Panel I. Last Payment Range by Grade

Last Payment Range	A	B	C	D	E	F	G	Total
1-30	5.94%	13.23%	18.42%	18.06%	16.64%	7.70%	2.41%	82.39%
31+	0.34%	1.18%	1.81%	2.04%	2.00%	1.22%	0.48%	9.07%
N/A	0.25%	0.83%	1.60%	1.92%	2.07%	1.33%	0.55%	8.54%
Total	6.54%	15.24%	21.84%	22.01%	20.70%	10.25%	3.43%	100.00%

Table 2 – Flipped Note Summary Statistics

We define a note as being flipped if it is quoted for sale with an *Age* of less than 30 days (and non-missing *Age*). We present summary statistics on the original *loan* amount (not note amount), interest (coupon) rate, YTM, Age, and Markup of notes that meet the flipped definition in Panel A. Panel B presents the same summary statistics after splitting the flipped note sample by term.

Panel A. Flipped Notes

Variable	N	Mean	Std.Dev.	Min	Q1	Median	Q3	Max
YTM (%)	2,235,113	15.32	5.26	-1.40	11.73	15.53	19.22	167.80
Markup\Discount (%)	2,235,113	3.84	3.20	-73.96	1.84	2.98	5.00	22.39
Age (Days)	2,235,113	14.52	9.12	0	7	14	22	30
Est. Asking Price ($)	2,235,113	40.40	26.41	2.26	25.71	26.30	51.13	103.54
Loan Amount ($)	2,235,113	21,269	9,243	1,000	14,000	20,350	29,950	40,000
Interest Rate (%)	2,235,113	18.15	4.96	5.32	14.65	18.25	21.99	30.99

Panel B. Flipped Notes: By Term

Variable	N	Mean	Std.Dev.	Min	Q1	Median	Q3	Max
Term: 36 Month								
YTM (%)	813,655	12.02	4.80	-1.40	8.73	11.96	15.38	167.80
Markup\Discount (%)	813,655	3.39	2.98	-73.96	1.66	2.75	4.52	22.39
Age (Days)	813,655	14.67	8.97	0	7	15	22	30
Est. Asking Price ($)	813,655	37.42	24.02	3.80	25.63	26.05	28.45	103.54
Loan Amount ($)	813,655	16,600	9,652	1,000	9,000	15,000	24,000	40,000
Interest Rate (%)	813,655	15.23	4.63	5.32	11.99	15.31	18.25	30.99
Term: 60 Month								
YTM (%)	1,421,458	17.22	4.53	-1.40	14.15	17.28	20.73	167.80
Markup\Discount (%)	1,421,458	4.10	3.30	-73.96	1.95	3.20	5.42	22.39
Age (Days)	1,421,458	14.43	9.21	0	7	14	22	30
Est. Asking Price ($)	1,421,458	42.10	27.53	2.26	25.77	26.48	51.72	103.54
Loan Amount ($)	1,421,458	23,941	7,835	1,000	17,600	24,000	30,000	40,000
Interest Rate (%)	1,421,458	19.82	4.33	6.00	16.99	19.89	23.43	30.99

Table 3 Daily Term-Subgrade-Age Summary Statistics

This table presents summary statistics by term for the daily subgrade-age buckets. See the variable appendix for definitions.

Panel A. 36-month loans

Variable	*N*	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
DolVol (in Thousand $)	1,671,502	1.053	4.393	0.000	0.031	0.148	0.630	811.442
Net Float (in MM$)	1,671,502	34.819	28.308	-17.065	11.468	27.902	52.162	125.713
Issuance (in MM$)	1,671,502	36.465	29.018	0.000	12.136	29.395	54.999	127.008
Prepayment (in MM$)	1,671,502	1.258	1.826	0.000	0.115	0.467	1.635	29.579
Delinquency (in MM$)	1,671,502	0.388	0.561	0.000	0.035	0.151	0.504	5.338
Interest Rate Diff (%)	1,671,502	-0.003	0.017	-0.250	-0.007	0.000	0.005	0.249
OpenAccess	467,455	0.517	0.500	0	0	1	1	1
API	75,189	0.518	0.500	0	0	1	1	1
3rdParty	78,775	0.531	0.499	0	0	1	1	1

Panel B. 60-month loans

Variable	*N*	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
DolVol (in Thousand $)	2,314,495	0.549	2.299	0.000	0.005	0.070	0.350	209.496
Net Float (in MM$)	2,314,495	56.567	51.182	-5.953	13.538	39.762	90.131	210.922
Issuance (in MM$)	2,314,495	57.587	51.750	0.000	13.958	40.814	91.712	211.944
Prepayment (in MM$)	2,314,495	0.641	0.845	0.000	0.096	0.282	0.839	7.677
Delinquency (in MM$)	2,314,495	0.378	0.524	0.000	0.047	0.159	0.486	4.336
Interest Rate Diff (%)	2,314,495	-0.009	0.021	-0.248	-0.020	-0.003	0.005	0.225
OpenAccess	640,788	0.522	0.500	0	0	1	1	1
API	83,011	0.522	0.500	0	0	1	1	1
3rdParty	103,667	0.503	0.500	0	0	1	1	1

Table 4 – Flipping Activity Following the Removal of Investor Restrictions

The table below presents the ordinary least square coefficients from Equation (1). The panel consists of stacked 20-day (+/- 10 days around an event) windows around *OpenAccess* events. *OpenAccess* is an indicator equal to one in the 10 days following the removal of a state's investor restrictions or in the ten days preceding a relapse in investor restrictions. See IA Table 1 for the list and timing of state investor restriction changes. Columns (1) – (4) only include events with nonoverlapping ("Clean") 20-day windows while columns (5)-(8) include all events but allow observations to be repeated with alternate values of the *OpenAccess* indicator when pre/post periods overlap. The dependent variable in this table is $DolVol_{ijkt}$, the aggregate daily (*t*) dollar volume of quotes in the secondary market by term (*i*), subgrade (*j*), and age group (*k*). The table below uses 36-month term loans and secondary market data drawn from 12/11/2012 to 05/31/2016. Indicators for each 30-day age group are included in all specifications. We rename the age group indicator for the 0-30 day age group *Flip*. In the odd columns, *Net float* is the net dollar amount of notes originated in an age group–subgrade minus the dollar amount of loans defaulted or prepaid as of day *t*. In the even columns, we split *Net float* into its components: *Issuance* is the dollar amount of loans issued in a term-subgrade in each age group as of day *t*, *Prepayment* is the dollar amount of loans prepaid in a term-subgrade-age group as of day *t*, *Delinquency* is the dollar amount of loans defaulted in a term-subgrade-age group as of day *t*. *Interest Rate Diff* is the difference in the average interest (coupon) rate of notes in each term-subgrade-age group and the interest (coupon) rate for loans issued on day *t* in that same term-subgrade. Variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	Clean Windows				Overlapping Windows			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$OpenAccess_t$	0.001**	-0.003**	0.001	-0.004	0.000	-0.002**	-0.012**	-0.015***
	(2.00)	(-2.00)	(0.16)	(-0.81)	(0.70)	(-2.12)	(-2.31)	(-3.17)
$Flip_k$	0.796***	0.797***	0.797***	0.814***	0.780***	0.781***	0.782***	0.797***
	(22.73)	(22.44)	(22.62)	(22.80)	(23.75)	(23.44)	(23.65)	(23.81)
$OpenAccess_t$ x $Flip_k$	-0.081**	-0.078**	-0.080**	-0.075*	-0.103***	-0.101***	-0.091**	-0.088**
	(-2.09)	(-2.00)	(-2.05)	(-1.93)	(-2.88)	(-2.80)	(-2.50)	(-2.42)
$Net\ float_{ijkt}$	0.004***		0.005***		0.004***		0.005***	
	(135.26)		(135.54)		(147.00)		(146.11)	
$Issuance_{ijkt}$		0.004***		0.005***		0.004***		0.005***

		(86.32)		(106.01)		(93.66)		(115.66)
$Prepayment_{ijkt}$		0.049***		0.048***		0.052***		0.050***
		(34.44)		(34.62)		(38.37)		(37.64)
$Delinquency_{ijkt}$		-0.178***		-0.085***		-0.190***		-0.096***
		(-20.86)		(-9.56)		(-23.69)		(-11.37)
Interest Rate Diff. $_{ijkt}$			-5.476***	-5.707***			-5.278***	-5.452***
			(-99.09)	(-86.51)			(-105.58)	(-91.06)
Constant	0.007***	0.002	-0.003	-0.026***	0.007***	0.002*	-0.003	-0.025***
	(33.85)	(1.55)	(-0.66)	(-6.49)	(35.14)	(1.67)	(-0.77)	(-6.74)
Age Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Group x OpenAccess FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	226,588	226,588	226,588	226,588	257,967	257,967	257,967	257,967
R-squared	0.159	0.161	0.168	0.171	0.162	0.164	0.172	0.174
Adj. R-squared	0.158	0.160	0.168	0.170	0.162	0.164	0.171	0.174

Table 5 – Flipping Activity Following the Addition of an API to the Primary Market

The table below presents the ordinary least square coefficients from Equation (1). The panel consists of a 120-day (+/- 60 days around an event) window around the *API* event. *API* is an indicator equal to one in the 60 days following the initial release of an API for the primary market. The dependent variable in this table is $DolVol_{ijkt}$, the aggregate daily (*t*) dollar volume of quotes in the secondary market by term (*i*), subgrade (*j*), and age group (*k*). The table below uses 36-month term loans and secondary market data. Indicators for each 30-day age group are included in all specifications. We rename the age group indicator for the 0-30 day age group *Flip*. In columns (1) and (3), *Net float* is the net dollar amount of notes originated in an age group–subgrade minus the dollar amount of loans defaulted or prepaid as of day *t*. In columns (2) and (4), we split *Net float* into its components: *Issuance* is the dollar amount of loans issued in a term-subgrade in each age group as of day *t*, *Prepayment* is the dollar amount of loans prepaid in a term-subgrade-age group as of day *t*, *Delinquency* is the dollar amount of loans defaulted in a term-subgrade-age group as of day *t*. *Interest Rate Diff* is the difference in the average interest (coupon) rate of notes in each term-subgrade-age group and the interest (coupon) rate for loans issued on day *t* in that same term-subgrade. Variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	$DolVol_{ijkt}$			
	(1)	(2)	(3)	(4)
API_t	0.001**	0.005***	-0.002***	0.007***
	(2.01)	(5.13)	(-4.49)	(6.06)
$Flip_k$	0.334***	0.344***	0.327***	0.348***
	(27.90)	(28.58)	(27.14)	(28.09)
API_t x $Flip_k$	0.130***	0.133***	0.133***	0.132***
	(7.09)	(7.27)	(7.24)	(7.18)
$Net\ float_{ijkt}$	0.003***		0.003***	
	(49.89)		(47.60)	
$Issuance_{ijkt}$		0.002***		0.002***
		(25.67)		(25.68)
$Prepayment_{ijkt}$		0.088***		0.095***
		(12.98)		(11.32)
$Delinquency_{ijkt}$		0.330***		0.327***
		(11.87)		(11.74)
Interest Rate Diff. $_{ijkt}$			0.299***	-0.174***
			(7.96)	(-2.96)
Constant	0.005***	-0.021***	0.012***	-0.026***
	(24.58)	(-13.57)	(13.07)	(-9.69)
Age Group FE	Yes	Yes	Yes	Yes

Age Group x API FE	Yes	Yes	Yes	Yes
Observations	75,189	75,189	75,189	75,189
R-squared	0.240	0.243	0.240	0.243
Adj. R-squared	0.239	0.242	0.239	0.242

Table 6 – Flipping Activity Following Addition of Third-Party Access to Primary Market API

The table below presents the ordinary least square coefficients from Equation (1). The panel consists of a 120-day (+/- 60 days around an event) window around the *3rdParty* event. *3rdParty* is an indicator equal to one in the 60 days following the release of a third-party service providing paid access to the primary market API to all retail investors. The dependent variable in this table is $DolVol_{ijkt}$, the aggregate daily (*t*) dollar volume of quotes in the secondary market by term (*i*), subgrade (*j*), and age group (*k*). The table below uses 36-month term loans and secondary market data. Indicators for each 30-day age group are included in all specifications. We rename the age group indicator for the 0-30 day age group *Flip*. In columns (1) and (3), *Net float* is the net dollar amount of notes originated in an age group–subgrade minus the dollar amount of loans defaulted or prepaid as of day *t*. In columns (2) and (4), we split *Net float* into its components: *Issuance* is the dollar amount of loans issued in a term-subgrade in each age group as of day *t*, *Prepayment* is the dollar amount of loans prepaid in a term-subgrade-age group as of day *t*, *Delinquency* is the dollar amount of loans defaulted in a term-subgrade-age group as of day *t*. *Interest Rate Diff* is the difference in the average interest (coupon) rate of notes in each term-subgrade-age group and the interest (coupon) rate for loans issued on day *t* in that same term-subgrade. Variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	$DolVol_{ijkt}$			
	(1)	(2)	(3)	(4)
$3rdParty_t$	0.001***	-0.010***	0.001	-0.005*
	(2.98)	(-4.38)	(0.82)	(-1.92)
$Flip_k$	1.203***	1.210***	1.202***	1.247***
	(27.18)	(27.33)	(26.78)	(27.63)
$3rdParty_t$ x $Flip_k$	-0.764***	-0.754***	-0.764***	-0.757***
	(-15.32)	(-15.08)	(-15.31)	(-15.16)
$Net\ float_{ijkt}$	0.006***		0.006***	
	(76.03)		(65.42)	
$Issuance_{ijkt}$		0.005***		0.006***
		(47.08)		(46.71)
$Prepayment_{ijkt}$		0.151***		0.175***
		(15.37)		(14.69)
$Delinquency_{ijkt}$		-0.183***		-0.189***
		(-6.65)		(-6.81)
Interest Rate Diff. $_{ijkt}$			0.033	-1.269***
			(0.19)	(-5.83)
Constant	0.004***	-0.014***	0.005	-0.055***
	(15.45)	(-6.16)	(0.96)	(-7.11)
Age Group FE	Yes	Yes	Yes	Yes

Age Group x 3rdParty FE	Yes	Yes	Yes	Yes
Observations	78,775	78,775	78,775	78,775
R-squared	0.230	0.231	0.230	0.231
Adj. R-squared	0.229	0.230	0.229	0.230

Table 7 – Interest Rate Changes Following the Removal of Investor Restrictions

The table below presents the ordinary least square coefficients from Equation (2). The panel consists of stacked 120-day (+/- 60 days around an event) windows around *OpenAccess* events. *OpenAccess* is an indicator equal to one in the 60 days following the removal of a state's investor restrictions. See IA Table 1 for the list and timing of state investor restriction relaxation. The unit of observation is at the loan level, and the dependent variable in this table is the interest rate on loan *i*. The table below uses only 36-month term loans. In column (1), the sample consists of loans inside the event windows issued by LendingClub, which uses a pricing model to set interest rates before offering to investors to fund. In column (2), the sample is loans issued inside the event windows by Prosper during the period when the platform used a pricing model to set interest rates before offering to investors to fund (similar to column (1)). In column (3), the sample is loans issued inside the event windows by Prosper during the period when interest rates were set through an auction process. Variable definitions for the borrower and loan characteristics are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Standard errors are provided in parenthesis and clustered at the borrowers' state level.

	LC Fixed Interest Rate (1)	Prosper Fixed Interest Rate (2)	Prosper Auction Interest Rate (3)
$OpenAccess_t$	-0.07889***	-0.16748***	0.25654
	(-16.849)	(-15.399)	(1.423)
$LnAmount_i$	0.01733***	-0.19150***	1.13202***
	(4.137)	(-18.404)	(14.292)
DTI_i	0.00061	-0.00000**	-0.00000
	(1.141)	(-2.193)	(-0.447)
$LnIncome_i$	-0.21044***	0.07535***	0.08287
	(-30.739)	(6.568)	(0.852)
$LnDebtPmt_i$	0.03762***	-0.06856***	0.01645
	(5.469)	(-7.656)	(0.308)
$InqLast6mths_i$	0.12693***	-0.03566***	0.06991
	(41.256)	(-4.641)	(1.057)
$OpenCreditLines_i$	-0.00810***	-0.01438***	0.00355
	(-21.278)	(-12.255)	(0.276)
$Delinq2yrs_i$	0.02670***		
	(11.292)		
$CurrentDelinq_i$		0.01308*	0.12067***
		(1.727)	(2.708)
$Delinq7yrs_i$		-0.00494***	0.01902***
		(-5.195)	(3.686)
$PubRec_i$	0.00858**		
	(2.090)		

$PubRec10yrs_i$		-0.06261***	0.17829*
		(-5.138)	(2.009)
$PubRec12mths_i$		0.29373***	0.97301**
		(2.973)	(2.082)
$EmpLength_i$	0.00202***	-0.00074	-0.00391
	(3.254)	(-1.067)	(-0.506)
$LnRevolving_i$	0.00522***	-0.01491**	0.06977*
	(3.268)	(-2.409)	(1.681)
Constant	5.64128***	9.25474***	-20.21349*
	(60.457)	(35.405)	(-1.863)
Borrower State FE	Yes	Yes	Yes
Employment Status	Yes	Yes	Yes
Income Verification Status	Yes	Yes	Yes
Credit Grade FE	CBPL24 × Credit Grade	CBPL24 × Credit Grade	CBPL24 × Credit Grade
Time FE	None	None	None
SE clustered	Borrower State	Borrower State	Borrower State
R^2	0.915	0.962	0.892
Adj. R^2	0.915	0.962	0.890
Obs.	362,566	57,686	3,131
Number of States	50	48	48

Table 8 – Robustness Exercises Around Quote Inflation of Transaction Volume

In this table we repeat the first column of Table 4 column (1) with additional sample filters and fixed effects in columns (2) through (4). Quotes exiting on the 7th day could potentially be expiring quotes instead of transactions. In columns (2) and (4) we remove all quotes exiting on the 7th day from the sample. When a quote is cancelled or expires and an investor requotes the order, we observe repeated noteid-orderid observations (with different start dates). In columns (3) and (4) we only include orders that are the last order in the noteid-orderid string. Variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	(1)	(2)	(3)	(4)
$OpenAccess_t$	0.001**	-0.000	-0.000	0.000
	(2.00)	(-0.34)	(-0.65)	(0.29)
$Flip_k$	0.796***	0.635***	0.160***	0.162***
	(22.73)	(17.80)	(14.18)	(13.97)
$OpenAccess_t$ x $Flip_k$	-0.081**	-0.102***	-0.024*	-0.034***
	(-2.09)	(-2.62)	(-1.89)	(-2.71)
$Net\ float_{ijkt}$	0.004***	0.003***	0.001***	0.000***
	(135.26)	(118.65)	(69.99)	(66.10)
Constant	0.007***	0.006***	0.003***	0.003***
	(33.85)	(33.65)	(30.96)	(33.41)
Age Group FE	Yes	Yes	Yes	Yes
Age Group x OpenAccess FE	Yes	Yes	Yes	Yes
7th Day exit included	Yes	No	Yes	No
Last Quote Only	No	No	Yes	Yes
Observations	226,588	210,117	151,995	149,154
R-squared	0.159	0.116	0.075	0.072
Adj. R-squared	0.158	0.116	0.0749	0.0715

Table 9 – Robustness Exercises Around Quote Correlation with Observable

In this table, we repeat the first column from Tables 4, 5, and 6 and include daily average values by term-subgrade-age group of the *Markup* and *Quote Number*. The dependent variable in this table is $DolVol_{ijkt}$, the aggregate daily (*t*) dollar volume of quotes in the secondary market by term (*i*), subgrade (*j*), and age group (*k*). The table below uses 36-month term loans and secondary market data. Indicators for each 30-day age group are included in all specifications. We rename the age group indicator for the 0-30 day age group *Flip*. Additional variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	$DolVol_{ijkt}$		
	OpenAccess	API	3rdParty
	(1)	(2)	(3)
$Event_t$	0.002***	-0.015***	-0.007
	(3.21)	(-6.29)	(-1.50)
$Flip_k$	0.937***	0.355***	1.245***
	(46.41)	(29.12)	(27.51)
$Event_t$ x $Flip_k$	-0.201***	0.144***	-0.750***
	(-8.91)	(7.80)	(-14.99)
$Net\ float_{ijkt}$	0.004***	0.003***	0.006***
	(183.09)	(49.76)	(72.82)
Markup	0.001	0.000***	0.000
	(1.62)	(3.44)	(1.28)
Quote Number	-0.001***	0.005***	0.005***
	(-25.97)	(31.53)	(36.62)
Constant	0.013***	-0.026***	-0.060***
	(5.31)	(-10.51)	(-6.56)
Age Group FE	Yes	Yes	Yes
Age Group x OpenAccess FE	Yes	Yes	Yes
Observations	467,455	75,189	78,775
R-squared	0.190	0.255	0.240
Adj. R-squared	0.190	0.254	0.239

10 Internet Appendix

We conduct multiple tests to investigate the data quality of our secondary market data.

10.1 Price Estimate Accuracy

The data received from Interest Radar includes an asking price range for the secondary market quotes in our sample. Asking price ranges are 0-25, 25-50, 50-100, 100+, and N/A. To estimate the actual asking price of the notes on the secondary market, we match secondary market information on the loan id to primary market information on the loan (interest rate, origination date, term). Using the primary market information and assuming the borrower makes all payments on time up to the quote date on the secondary market, we estimate the remaining principal of the note. Using the markup percent provided by the secondary market data from Interest Radar, we estimate the asking price in the secondary market. As an additional filter, we use the asking price range to drop notes that have price estimates outside the asking price range. Table A4 below compares the price difference between the estimated price and the actual price in the trade file. Panel A compares the full sample of trades while Panel B compares only the flipped trades. Table A5 repeats main Table 4 using only the sample of notes that are less than $50. Signs and statistical significance are similar if not identical to Table 4.

Table A1. Security Registration and Platform Design Changes for LendingClub Corporation
For retail investors to fund loans on the lending platform, the platform must receive security registration approval in each state from the state security regulator. This table presents security registration approval dates collected from interviews with state security regulators. Registration dates represent the first date LendingClub is granted registration within that state. The following states had already approved security registration at the beginning of our sample on July 13, 2009: WA, CT, AZ, GA, SC, WI, WY, NY, DE, FL, IL, MN, MO MS, NV, SD, WV, UT, VA. The following states had not approved security registration for LendingClub as of August 1, 2016: AK, AR, CO, HI, IA, IN, KS, MA, MD, MI, NC, ND, NE, NJ, NM, OH, OK, OR, and PA.

Initial Registration

State	Date
MT	3/17/2014
RI	4/15/2014
VT	8/20/2014
CA	6/5/2015
DC	10/26/2015
AL	11/18/2015
NH	12/15/2015

Registration Lapse

	Start	End
LA	2/14/2012	12/12/2014
SC	2/16/2012	3/6/2013
ME	2/22/2012	5/12/2014
MN	4/13/2012	12/12/2014
TX	2/18/2013	12/12/2014
NV	4/5/2013	3/17/2014
MO	6/01/2013	12/12/2014
UT	6/25/2013	7/19/2013
SC	3/6/2014	12/12/2014
WA	3/6/2014	12/12/2014
MS	10/10/2014	12/12/2014
SD	10/18/2014	12/12/2014
WV	11/20/2014	12/12/2014

Table A2. Security Registration and Platform Design Changes for Prosper

For retail investors to fund loans on the lending platform, the platform must receive security registration approval in each state from state security regulators. This table presents security registration approval dates collected from interviews with state security regulators. Initial registration dates represent the first date Prosper is granted registration within that state. Some registrations are perpetual, while others require renewal. As a result, registration lapses can occur, and we report registration lapses in the right column. The following states had not approved security registration for Prosper as of August 1, 2016: AL, AR, HI, IA, KS, KY, MA, MD, NC, ND, NE, NJ, NM, OH, OK, PA, and TX.

Initial Registration

State	Date
ID	12/27/2012
IL	12/27/2012
UT	12/27/2012
VA	1/3/2013
NH	1/4/2013
MI	1/8/2013
DC	10/29/2013
VT	8/20/2014
IN	6/11/2015
MT	9/29/2015

Registration Lapses

	Start	End
CA	7/11/2012	1/7/2013
MO	8/30/2012	12/27/2012
CO	2/15/2013	9/29/2015
SD	2/15/2013	7/13/2015
LA	4/30/2013	11/6/2013
SC	6/8/2013	7/13/2015
RI	7/10/2013	12/27/2014
DC	10/29/2014	
WV	10/22/2015	

Table A3 Summary statistics: Primary Market Loans

Variable	N	Mean	Std. Dev.	Min.	Q1	Median	Q3	Max.
Loan Amount ($)	1,153,623	15,091.03	8,658.53	1,000	8,200	13,600	20,000	40,000
Interest Rate (%)	1,153,623	13.19	4.60	5.32	9.75	12.79	15.88	30.99
Annual Income ($)	1,153,623	78,697.78	71,280.81	2,000	48,000	66,000	94,000	9,573,072
Debt-to-Income Ratio (%)	1,153,623	18.47	8.43	-1.00	12.18	17.95	24.38	553.33
Employment Length (yrs.)	1,153,623	6.16	3.56	1	3	6	10	10
Revolving Credit Balance ($)	1,153,623	17,296.64	23,494.00	0	6,474	11,889	20,970	2,904,836
Delinquency Amount ($)	1,153,623	16.69	838.03	0	0	0	0	185,408
Number of Delinquency in the Last 2 Years	1,153,623	0.35	0.92	0	0	0	0	39
Number of Credit Inquiries in the Last 6 Months	1,153,623	0.63	0.93	0	0	0	1	7
Number of Open Credit Lines	1,153,623	11.86	5.53	1	8	11	15	97
Number of Public Records	1,153,623	0.22	0.63	0	0	0	0	86
Revolving Line Utilization Rate (%)	1,153,623	53.81	23.81	0	36.2	54.3	72.1	892.3
Total Number of Credit Lines	1,153,623	25.28	11.95	2	17	24	32	176

Table A4. Summary Statistics of the Estimated Quote Prices and Executed Trades on Interest Radar

The data received from Interest Radar includes an asking price range for the secondary market quotes in our sample. Asking price ranges are 0-25, 25-50, 50-100, 100+, and N/A. To estimate the actual asking price of the notes on the secondary market, we match secondary market information on the loan id to primary market information on the loan (interest rate, origination date, term). Using the primary market information and assuming the borrower makes all payments on time up to the quote date on the secondary market, we estimate the remaining principal of the note. Using the markup percent provided by the secondary market data from Interest Radar, we estimate the asking price in the secondary market. As an additional filter, we use the asking price range to omit observations that are outside the asking price range. To gauge the accuracy of our estimation procedure, we obtain a small sample of executed trades from Interest Radar members. Our sample of trades includes 58,374 executed sell orders that contain sales price information. In the table below, we show summary statistics on the difference (estimated – actual price) for the matched pairs.

Panel A. – All Trades

Asking price range	N	Mean	Std. Dev.	Min.	P25	P50	P75	Max.
0-25	42,442	-3.25	5.14	-40.69	-5.67	-2.24	-0.113	33.529
25-50	8,546	2.12	6.94	-37.29	-0.18	-0.01	0.84	170.82
50-100	4,264	-5.92	15.84	-45.44	-23.58	-0.20	2.10	61.83
> 100	3,108	-80.74	78.31	-821.86	-113.29	-83.43	-34.167	1504.95
All	58,374	-6.78	26.14	-821.86	-5.80	-1.42	0	1504.95

Panel B. – Flipped Trades

Asking price range	N	Mean	Std. Dev.	Min.	P25	P50	P75	Max.
0-25	46	-0.52	1.19	-3.48	-0.21	-0.01	0.00	0.78
25-50	2,701	0.12	1.99	-25.00	-0.02	-0.01	-0.00	26.24
50-100	1,108	-12.47	12.74	-28.90	-25.45	-0.13	-0.02	7.28
> 100	417	-67.87	85.73	-712.42	-102.27	-51.45	-0.05	1.77

Table A5 – Flipping Activity Following the Removal of Investor Restrictions – $50+ note sizes removed

This is a repetition of Table 4 in the main portion of the paper. We remove all notes that are larger than $50 in asking price range to see how quote pricing accuracy may influence our main results. The table below presents the ordinary least square coefficients from Equation (1). The panel consists of stacked 120-day (+/- 60 days around an event) windows around *OpenAccess* events. *OpenAccess* is an indicator equal to one in the 60 days following the removal of a state's investor restrictions. See IA Table 1 for the list and timing of state investor restriction relaxation. The dependent variable in this table is $DolVol_{ijkt}$, the aggregate daily (*t*) dollar volume of quotes in the secondary market by term (*i*), subgrade (*j*), and age group (*k*). The table below uses 36-month term loans and secondary market data from 12/11/2012 to 05/02/2018. Indicators for each 30-day age group are included in all specifications. We rename the age group indicator for the 0-30 day age group *Flip*. In columns (1) and (3), *Net float* is the net dollar amount of notes originated in an age group–subgrade minus the dollar amount of loans defaulted or prepaid as of day *t*. In columns (2) and (4), we split *Net float* into its components: *Issuance* is the dollar amount of loans issued in a term-subgrade in each age group as of day *t*, *Prepayment* is the dollar amount of loans prepaid in a term-subgrade-age group as of day *t*, *Delinquency* is the dollar amount of loans defaulted in a term-subgrade-age group as of day *t*. *Interest Rate Diff* is the difference in the average interest (coupon) rate of notes in each term-subgrade-age group and the interest (coupon) rate for loans issued on day *t* in that same term-subgrade. Variable definitions are in the variable appendix. Statistical significance at the 10%, 5%, and 1% levels are represented by *, **, and ***, respectively. Heteroscedasticity robust standard errors are provided in parenthesis.

	$DolVol_{ijkt}$			
	(1)	(2)	(3)	(4)
$OpenAccess_t$	0.001***	-0.006***	0.034***	0.025***
	(5.90)	(-4.69)	(8.00)	(6.40)
$Flip_k$	0.428***	0.431***	0.358***	0.368***
	(60.52)	(59.96)	(45.37)	(46.94)
$OpenAccess_t$ x $Flip_k$	-0.034***	-0.027***	-0.067***	-0.060***
	(-3.86)	(-3.08)	(-6.90)	(-6.19)
$Net\ float_{ijkt}$	0.003***		0.005***	
	(221.66)		(236.14)	
$Issuance_{ijkt}$		0.003***		0.004***
		(154.53)		(187.71)
$Prepayment_{ijkt}$		0.054***		0.040***
		(79.31)		(60.01)
$Delinquency_{ijkt}$		-0.176***		-0.121***
		(-49.24)		(-33.74)
Interest Rate Diff. $_{ijkt}$			-7.375***	-6.971***

			(-142.39)	(-132.74)
Constant	0.006***	-0.001	0.069***	0.056***
	(49.37)	(-0.97)	(19.66)	(16.81)
Age Group FE	Yes	Yes	Yes	Yes
Age Group x OpenAccess FE	Yes	Yes	Yes	Yes
Observations	458,553	458,553	458,553	458,553
R-squared	0.222	0.229	0.244	0.247
Adj. R-squared	0.222	0.228	0.244	0.247