The Marginal Cost of Borrowing Stock

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ABSTRACT

Equity lending is a search market in which identical shares trade at different fees. We document asymmetric price adjustment: when new-loan fees rise, incumbent borrowers retain cheaper legacy loans. When fees fall, existing borrowers replace expensive loans. Within a month, outstanding fees absorb 67 percent of a decrease in new-loan fees but only 30 percent of an increase. This asymmetry creates a persistent wedge between the average fee paid by incumbents and the marginal fee faced by new borrowers. This wedge matters for asset pricing: valuing short positions at the marginal, rather than average, fee reduces the returns to shorting high-fee stocks by roughly one-third on a value-weighted basis and eliminates them on an equal-weighted basis.

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I. Introduction

Equity lending is a search market. Borrowers do not trade at a single centralized price. They locate shares through intermediaries and negotiate bilateral loans. Search frictions and bargaining allow identical shares to be lent at different fees (Duffie, Gârleanu, & Pedersen, 2002).

Equity loans are open contracts. Either side may terminate or renegotiate at any time. In practice, the option is exercised asymmetrically. When fees fall, borrowers quickly close out expensive loans and reopen at the lower rate. When fees rise, lenders slowly recall and reprice cheap legacy loans. The loan portfolio therefore tracks the market on the way down and lags it on the way up, and a borrower arriving today pays at or above the average fee of the loans already outstanding.

This asymmetry matters because the fee that researchers and traders observe is the average fee on outstanding loans, and when shares are scarce, that average is a price no arriving borrower can obtain. The distinction speaks to a longstanding puzzle: shorting high-fee stocks appears profitable even net of fees, raising the question of why arbitrageurs fail to trade the mispricing away. Our results help answer this longstanding question.

We study fee dispersion in the U.S. equity lending market using daily data from FIS Astec Analytics for U.S. equities. The data have a feature other equity lending databases lack: fees and quantities on newly initiated loans, reported separately from outstanding loans each day, alongside the quantity of shares lent within each fee range. We can therefore observe the marginal price of borrowing next to the full distribution of prices on existing loans, and we can infer which loans are returned or recalled as conditions change. The data thus separate what every earlier database blended together: the marginal price of borrowing and the average price already being paid. That separation is what lets us revisit the puzzle.

The profits that appear available are measured at the average fee, but the trades that would capture them must be done at the marginal fee.

We document several findings. First, consistent with Kolasinski, Reed, and Ringgenberg (2012), we find there is substantial dispersion in the fees, both across and within stocks, and this dispersion increases with utilization. For stocks below 40 percent utilization, nearly all loans have monthly fees concentrated within an eight-basis-point range. For stocks with utilization above 90 percent, the interquartile range is approximately 32 basis points.

Second, we define the "new loan spread" as the average monthly fee on newly initiated loans minus the average monthly fee on all loans. The spread is low when utilization is low but substantial among hard-to-borrow stocks. Above 90 percent utilization, a quarter of stocks have new loan spreads above 36 basis points, and 5 percent have spreads above 4 percentage points.

Third, we use data on fees in different bins to investigate how the new loan spread arises. We show that above-average loans leave the outstanding distribution more rapidly than loans near or below the average, consistent with borrowers replacing unfavorable loans.

Fourth, we define the fee beta as the sensitivity of the average fee on outstanding loans to the fee on new loans. A fee beta of one indicates full pass-through to incumbent borrowers, while a beta of zero indicates no adjustment. Fee betas are substantially higher when new-loan fees fall than when they rise. A structural vector autoregression that uses the full sample and accounts for delayed repricing quantifies this asymmetry: within a month, the outstanding fee absorbs 67 percent of a decline in the new-loan fee but only 30 percent of an increase. Thus, when market fees fall, expensive loans either disappear or reprice quickly; when market fees rise, cheaper legacy loans remain in place and the outstanding average adjusts more gradually.

Fifth, we return to the question posed above. We replicate the well-known result that stocks with high average lending fees earn low returns and that the resulting strategy returns remain significant even after subtracting average lending fees (e.g., Drechsler and Drechsler (2016), Engelberg, Evans, Leonard, Reed, and Ringgenberg (2025)). This apparent profitability is puzzling. A trader initiating a short position, however, cannot borrow at the average fee on outstanding loans. When we instead evaluate these strategies using the fee on new loans—the economically relevant cost for such a trader—the puzzle largely disappears. New-loan fees are materially higher: accounting for them substantially reduces value-weighted strategy returns and renders equal-weighted returns statistically indistinguishable from zero. At the fee actually available to an arriving borrower, there is little mispricing left to trade away.

Our paper contributes to the literature on price dispersion in search markets. Stigler (1961) argues that costly search can sustain differences in the prices of otherwise identical goods. Diamond (1971), Burdett and Judd (1983), and Varian (1980) formalize how search frictions, heterogeneous information, and differences in the number of price offers generate equilibrium price dispersion. In financial markets, Duffie, Gârleanu, and Pedersen (2005) show how search and bilateral bargaining shape prices in decentralized over-the-counter markets. Our focus is not only why identical assets trade at different prices, but also how the selective continuation and termination of contracts cause the distribution of prices to evolve over time.

A separate empirical literature documents asymmetric price adjustment, often called "rockets and feathers" after Bacon (1991): retail gasoline prices rise like rockets when costs increase but fall like feathers when costs decline (Borenstein, Cameron, & Gilbert, 1997), a pattern Peltzman (2000) finds across a broad range of markets. Municipal bond prices

exhibit the same asymmetry, rising faster than they fall (Green, Li, & Schürhoff, 2010). Bank deposit rates show the mirror-image pattern, falling quickly and rising slowly (Hannan & Berger, 1991; Neumark & Sharpe, 1992). In every case, adjustment favors the price-setter. Equity lending is the rare market where the asymmetry runs the other way: fees on outstanding loans fall like rockets and rise like feathers, in favor of the customer. Our data let us observe the mechanism behind this asymmetry directly, in the entry and exit of individual loans from the fee distribution.

Our paper also contributes to the literature on equity lending as a decentralized market. Geczy, Musto, and Reed (2002) and D'Avolio (2002) provide early evidence on the availability and cost of borrowing shares, while Duffie et al. (2002) model how search and bargaining determine lending fees. Jones and Lamont (2002) connect borrowing costs and constraints to stock returns. More recent work examines how the organization of the lending market affects price formation. Kolasinski et al. (2012) show that search costs and lender competition influence loan fees; Chague, De-Losso, Genaro, and Giovannetti (2017) find that better-connected borrowers obtain lower fees; and Cereda, Chague, Genaro, and Giovannetti (2022) show that greater price transparency reduces fee dispersion.

Finally, we contribute to the literature on shorting costs and the returns to short-sale strategies. A large literature, dating to Seneca (1967), finds that short interest and lending fees predict stock returns (Boehmer, Jones, & Zhang, 2008; Rapach, Ringgenberg, & Zhou, 2016), even after accounting for borrowing costs. Drechsler and Drechsler (2016), for example, document a shorting premium that remains large net of average fees, while Engelberg, Reed, and Ringgenberg (2018) emphasize the risks created by future fee increases and loan recalls. Our results identify a distinct consideration: even when future fees are known with certainty, the average fee on outstanding loans may not be available to an investor initiating

a short position. Accounting for this distinction substantially reduces the apparent profitability of short-interest strategies and, among stocks with large marginal-average spreads, eliminates it.

The remainder of the paper proceeds as follows. Section II describes the data. Section III.A documents price dispersion and the wedge between new-loan and average fees. Section III.B studies the adjustment of outstanding loans through repricing, return, and replacement. Section IV evaluates its implications for the returns to short-interest strategies. Section V concludes.

II. Data and Summary Statistics

A. Data

We obtain equity lending data from the FIS Astec Analytics Short Lending Data, distributed by NASDAQ. FIS Astec collects the data daily from major global custodians and banks in the securities lending market and reports it aggregated to the stock-day level. As with other securities lending data sources, FIS Astec reports the average fee on loans on the retail side of the market, the supply of shares available to be lent, and the quantity of shares on loan.

Two features of the FIS Astec data distinguish it from other equity lending data sources, and both are central to our analysis. First, FIS Astec reports the average fee and the quantity lent separately for all outstanding loans, for newly initiated loans, and for loans that are recalled or returned. New loans include existing loans that were marked to a new rate during the day.

Second, FIS Astec reports the daily dispersion of rates across the loans on a given stock.

For each stock and day, the data give the quantity of shares on loan within each of several fee ranges, along with the quantity of new loans in each range. Combining the quantity in a range with the quantity in that range on the previous day allows us to infer the quantity of loans that were recalled or returned within it. These fields let us observe the range of fees that short sellers pay to borrow the same stock on the same day, and how that range evolves as fees change.

We supplement the lending data with CRSP, from which we take daily returns, trading volume, share prices, and shares outstanding. We link the two datasets by CUSIP.

B. Sample and Summary Statistics

Our sample runs from July 2013 through December 2019 and includes all common U.S. equities (i.e., CRSP share codes of 10 or 11) that trade on the NYSE, NASDAQ, or NYSE Amex (i.e., CRSP exchange codes of 1, 2, or 3). We exclude extremely small stocks, those below the 5^{th} percentile of the NYSE market capitalization break-points, using data provided on Kenneth French's website. In robustness checks, we find that our main conclusions are unchanged if we instead exclude all stocks below the 20^{th} percentile of NYSE size breakpoints, following Fama and French (2008).

We apply three further filters based on the availability of loan fee data. We remove stocks within 180 days of their IPO to account for the IPO lock-up period which often restricts securities lending. We require that a stock have non-missing fee data in FIS Astec at the end of the month and over the subsequent month, so that we can calculate fee-adjusted returns. Finally, we exclude stocks with extremely high loan fees exceeding 10% per month; this filter that removes fewer than two stocks per month on average.

Table I reports summary statistics by calendar year for the six full years of our sample.

A typical year contains slightly more than 2,500 stocks. All loans in the sample have an overnight term. Most stocks are cheap to borrow: the median fee is 0.05% per month, and the bottom 90% of stocks fall within a narrow band running from roughly zero to slightly more than 0.1% per month.[1] The fee then climbs steeply through the right tail. Stocks in the top 1% typically cost more than 1.5% per month to borrow.

III. Loan Fee Dispersion and Dynamics

A. Loan Fee Dispersion

We start by investigating how fee dispersion varies systematically with utilization, defined as the number of shares lent divided by the number of shares available to be lent. As utilization rises, lendable shares become scarce and the fee to borrow them increases.

We sort stocks into utilization bins of ten percentage points. Within each bin and each month, we calculate the cross-sectional distribution of the average monthly loan fee, and we then average that distribution across the months of our sample. Figure 1 shows the results as a box and whisker plot. In this figure and in those that follow, the box spans the interquartile range and the whiskers extend to the 5^{th} and 95^{th} percentiles.

The top panel of Figure 1 shows how the average fee varies across stocks. Ninety percent of stocks with utilization below 10% pay an average fee of between 0.01% and 0.08% per month. The fee rises with utilization throughout, and its dispersion rises faster still. Among stocks with utilization above 90%, the median stock pays an average fee of 0.79% per month, but 5% of these stocks pay less than 0.17% and 5% pay more than 4.00%.

The top panel compares fees across stocks. We next ask how far apart the fees paid

[1] All of our analysis use loan fees measured on a per month basis.

to borrow the *same* stock on the *same* day are from one another. For each stock and day we take the distribution of fees across outstanding loans and subtract the average fee on that stock that day, so that each observation measures the distance between an individual borrower's rate and the average rate. We then average these distributions within utilization bins as before.

The bottom panel of Figure 1 shows that identical shares are lent at nearly identical fees when a stock is easy to borrow. For stocks with utilization below 40%, ninety percent of loans are priced within about eight basis points of one another. Dispersion widens sharply as lendable shares become scarce: above 90% utilization, the interquartile range of the fees paid on a single stock is 0.32% per month and the 5^{th}-to-95^{th} percentile range is 1.28%. In other words, when stocks are hard to borrow, different borrowers are often charged significantly different fees.[2]

The FIS Astec data also report the average fee on newly initiated loans separately from the fee on all outstanding loans. For each stock and day we define the *new loan spread* as the difference between the two, and we average its distribution within utilization bins as above.

Figure 2 shows that this spread widens asymmetrically as utilization rises. Below 50% utilization, the fee on new loans is almost always within eight basis points above, or two basis points below, the average fee. As shares become scarce the spread opens up, but in one direction only. Above 90% utilization, a quarter of stocks have a new loan fee more than 36 basis points above the average fee and 5% have one more than 4 percentage points above it. Borrowers arriving when shares are scarce often pay substantially more than the incumbents who already hold loans, and they rarely pay less.

[2]While Kolasinski et al. (2012) provide the first evidence of price dispersion in the securities lending market, we provide new evidence that this finding is concentrated in hard-to-borrow stocks.

B. Loan Fee Dynamics

The dispersion documented above points to an asymmetry in the way outstanding loans are re-rated. That the fee on new loans frequently exceeds the fee on all loans suggests that lenders are slow to recall or reprice loans struck below the prevailing rate. That the fee on new loans rarely falls below the average suggests that borrowers move quickly to replace loans struck above it. This section presents three pieces of evidence for that asymmetry: a direct estimate of pass-through, the behavior of individual loans within the fee distribution, and a structural vector autoregression.

We begin with the pass-through of changes in the fee on new loans into the average fee. We restrict attention to stocks whose new loan fee is within five basis points of the average fee at the beginning of the month. Starting from a spread of roughly zero isolates the response to the current month's change, rather than contaminating the estimate with the delayed re-rating of loans struck in earlier months. The vector autoregression at the end of this section relaxes the restriction and controls for those dynamics directly.

For each stock, we calculate the *average fee beta* as a measure of how closely the fee on existing loans tracks the fee on new loans. Formally, it is the change in the average fee across all outstanding loans over the month divided by the change in the fee on new loans that month. A beta of one indicates that the average fee moved one-for-one with the new loan fee; a beta of zero indicates that the average fee did not respond at all.

The top panel of Figure 3 shows a sharp asymmetry between increases and decreases. When the fee on new loans falls by more than 0.30 percentage points, the overwhelming majority of stocks have an average fee beta above 0.6, and many reprice one-for-one. When the fee rises by the same amount, most stocks have a beta below 0.6, and the median is 0.25.

The bottom panel plots the new loan spread at the end of the month for the same set of

stocks. Because the spread began the month near zero, it measures how much of the change went unabsorbed. When the fee on new loans falls, the average fee also declines and the spread remains near zero. When the fee on new loans rises, only a small fraction passes through and the spread widens.

We next use the FIS Astec rate dispersion data to ask which individual loans leave the outstanding book. Because FIS Astec reports fees in ranges whose width varies across stocks, we first standardize the data. For each stock and day we measure the distance of each reported fee range from the average fee on that stock, and we allocate the quantity on loan within a reported range uniformly across bins of 0.05% around the average. We express the quantity in each bin as a fraction of shares outstanding, average across stocks each day, and then average across the days of the sample.

The top panels of Figure 4 show the resulting distribution of fees around the average, separately for stocks in the bottom 90% of loan fees and for stocks with elevated fees. In both groups the distribution is roughly symmetric about the average, but it is far wider for expensive stocks: about 10% of the loans outstanding on high-fee stocks are priced more than 0.25% from the average, whereas more than 95% of the loans on low-fee stocks fall within 0.05% of it. Turnover is similar across the two groups, at roughly 6% of loans per day.

The bottom panels of Figure 4 report the fraction of loans in each bin that are new or recalled/returned. In both groups, loans priced above the average fee are about twice as likely to be recalled or returned as loans priced below it.

To isolate the asymmetry between fee increases and decreases, we split the sample by the change in the fee on new loans over the previous month, again restricting attention to stocks whose new loan fee began the month within five basis points of the average. Figure 5

shows the result. Following a decline in the fee on new loans, loans priced above the average are re-rated intensely: 19% to 23% of the loans more than 0.10% above the average fee are recalled or returned each day. On the other hand, following an increase, only 4% to 9% of loans priced below the average are re-rated per day. Moreover, the asymmetry also survives within the increase sample: even when the fee on new loans is rising, below-average loans are recalled or returned less often than above-average loans, which turn over at 12% to 18% per day.

The FIS Astec data do not separately identify recalls from returns. Put differently, the data do not state whether a loan was closed by the lender or the borrower, they simply show it was closed. The incentives, however, point in a clear direction. A loan priced above the average is one the borrower wants to replace, while a loan priced below the average is one the lender wants back. Read this way, the evidence says that borrowers return their unfavorable loans faster than lenders recall theirs.

Finally, using a structural vector autoregression we test whether the average fee on all loans responds differently to increases and decreases in the fee on new loans across the full sample of stocks. If every loan were re-rated in response to a change in the fee on new loans, the average fee would move one-for-one with that change in both directions. Partial re-rating implies a response of less than one-for-one, and asymmetric re-rating implies responses that differ between increases and decreases.

Our baseline specification is a structural vector autoregression of order one (SVAR(1)). Motivated by the results above, we assume that the average fee on all loans responds contemporaneously to shocks in the fee on new loans, but not the reverse; this recursive ordering is why the second equation below contains no contemporaneous regressor. We also rearrange the lagged terms of the standard VAR representation, replacing the lagged fee on new

loans with the lagged *New Loan Spread*, defined above as the average monthly fee on newly initiated loans minus the average monthly fee on all loans. This reparameterization is algebraically equivalent to the standard VAR but lets the coefficients on the spread terms be interpreted directly as the response to a gap between new and existing loan pricing, which is the quantity of interest. Formally, we estimate the following equations:

$$\begin{aligned}\text{Fee All Loans}_t = \beta_0 &+ \beta_1 \text{Fee All Loans}_{t-1} + \beta_2 \Delta \text{Fee New Loans(+)}_t \\ &+ \beta_3 \Delta \text{Fee New Loans(-)}_t + \beta_4 \text{New Loan Spread(+)}_{t-1} \\ &+ \beta_5 \text{New Loan Spread(-)}_{t-1} + \epsilon_t,\end{aligned} \tag{1}$$

$$\begin{aligned}\text{Fee New Loans}_t = \gamma_0 &+ \gamma_1 \text{Fee New Loans}_{t-1} + \gamma_2 \text{New Loan Spread(+)}_{t-1} \\ &+ \gamma_3 \text{New Loan Spread(-)}_{t-1} + \eta_t,\end{aligned} \tag{2}$$

where Δ indicates the change in the variable, and otherwise we examine the level of the variable. A (+) or (-) indicates that the variable is interacted with an indicator equal to one when the variable takes the corresponding sign, so that the coefficients are free to differ between positive and negative values. This is what allows us to detect an asymmetric response to fee increases and decreases in new-loan pricing.

We estimate the SVAR(1) separately by equation via pooled OLS, using monthly data with end-of-month loan fees. We first run cross-sectional regressions for each month and then average the coefficient estimates across months, as in a Fama and MacBeth (1973) regression. As in the rest of the paper, we exclude observations with extreme loan fees (i.e., those with a fee on all loans, or a change in the fee on new or all loans, greater than 10%).

Table II reports the estimates. In column (1) the dependent variable is the average fee on all loans. We find that the coefficient on a contemporaneous increase in the new loan fee is 0.30. In other words, the average fee absorbs 30% of an increase within the month.

In contrast, the coefficient on a contemporaneous decrease is 0.67. Thus, the average fee is more than twice as sensitive to a fall in the fee on new loans than it is to a rise.

The remaining coefficients fill in the dynamics. Both the average fee and the fee on new loans are highly persistent, with coefficients on lagged values close to one. The coefficients on the lagged new loan spread indicate that incumbent loans are gradually re-rated toward the fee on new loans, and that the fee on new loans itself reverts toward the level of average fees. All coefficients are statistically significant, and the results are robust to a structural vector autoregression of order two.

Figure 6 traces the impulse responses to a ten basis point increase and decrease in the fee on new loans, and gives a visual representation of the asymmetry in the coefficient estimates. We find the average fee responds sluggishly to an increase and rapidly to a decrease, with the two fees converging over the subsequent months.

IV. Implications for Short-Selling Strategies

A. Fee-Adjusted Returns to Short Selling

Short-sale constraints can prevent pessimistic investors from fully incorporating their information into prices, allowing overvaluation to persist (Miller (1977); Jones and Lamont (2002)). Consistent with this idea, stocks that are expensive to borrow earn low subsequent returns (Cohen, Diether, and Malloy (2007), Drechsler and Drechsler (2016), and Engelberg et al. (2018).). More puzzlingly, this underperformance remains substantial even after subtracting average borrowing costs. We begin by confirming both results in our sample.

Each month we sort stocks on their end-of-month average loan fee and form long-short portfolios that are long stocks with low fees and short stocks with high fees, evaluating

performance over the following month. We form portfolios from the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10% of the fee distribution in order to study how performance varies with the level of the loan fee.

Table III reports the results, with Panel A using value-weighted returns and Panel B using equal-weighted returns. The loan fee is a strong predictor of returns. On an equal-weighted basis, the Top/Bottom 10% portfolio earns 1.06% per month, and returns rise monotonically as the portfolios concentrate in higher-fee stocks, reaching 4.42% per month for the Top/Bottom 1%. CAPM alphas exceed raw returns by 0.30 to 0.59 percentage points. The same conclusions hold for value-weighted portfolios, although the magnitude of the return predictability is smaller.

We next adjust the return on the short leg for the cost of borrowing. For each stock in the short leg we subtract the daily loan fee from the daily return, taking into account the applicable settlement delay.[3] We convert the annualized fee reported by FIS Astec to a daily fee using an Actual/360 day count convention,[4] and we compound daily fee-adjusted returns to a monthly return. We do not credit the portfolio with the revenue earned from lending the stocks in the long leg.[5]

The middle columns of Table III show that short sellers earn economically and statistically significant returns even after paying loan fees. The realized fee consumes about two-thirds of the gross return in the equal-weighted portfolios, yet fee-adjusted returns still range from 0.38% per month for the Top/Bottom 10% to 1.49% per month for the Top/Bottom 1%. The fee-adjusted return is statistically significant for the Top/Bottom 1% portfolio and

[3]Prior to September 5, 2017 the settlement delay was T+3; after that date it was T+2.

[4]See Faulkner (2008) for details on securities lending market conventions.

[5]This choice is conservative. Because our goal is to test whether the return to shorting high-fee stocks remains positive net of fees, we omit any lending revenue from the long leg so that the portfolio's profit, if any, is driven by the short side. Moreover, the stocks in the long leg (by definition) have low loan fees, so any securities lending revenue would be minimal.

marginally so for the Top/Bottom 2%, and the fee-adjusted CAPM alphas are significant for every portfolio. This is the puzzle: short sellers appear to leave money on the table.

To date, existing studies have focused on the average return earned by short sellers after fees. Importantly, the FIS Astec data let us explore this at a deeper level. Because we observe the distribution of fees paid on the same stock on the same day, and Section III.A shows that this distribution is wide, we can estimate the *distribution* of the returns short sellers earn.

We calculate the 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} percentiles of the loan fee distribution for each stock on each day. We then calculate the fee-adjusted return a short seller would earn by borrowing at a given percentile of that distribution on every day of the month, using the same procedure as above. To calculate the 5^{th} percentile of fee-adjusted returns, for example, we assume the short seller pays the 5^{th} percentile fee each day throughout the month.

Figure 7 suggests that short sellers earn widely varying fee-adjusted returns from shorting the same stocks. In the Top/Bottom 10% portfolio, a quarter of borrowed shares earn a fee-adjusted return above 0.47% per month, against a portfolio average of 0.38%. The spread is starker for the Top/Bottom 1% portfolio: a quarter of borrowed shares earn more than 2.12% per month, while another quarter earn less than 1.42%. One limitation of the dispersion data is that they do not link multiple loans to the same borrower, so we cannot say which short sellers sit on which side of this distribution. What is clear is that there is substantial heterogeneity in after-fee returns, which implies that some short sellers earn returns well above the already high average return.

B. A New Explanation: The Marginal Loan Fee

We now re-examine these fee-adjusted returns in light of the dispersion and dynamics documented in Section III. The fee that matters to a short seller opening a position is not the average fee on loans already outstanding; it is the fee on a loan that can be obtained today. Figure 2 showed that the two differ, and that they differ most for the stocks that are hardest to borrow. An investor shorting one of those stocks would pay the elevated rate charged on new loans, not the lower blended rate paid by incumbent borrowers.

The rightmost columns of Table III evaluate the same strategies at the average rate on new loans. That fee is roughly 27% higher than the fee on all loans. Charging it to the short leg approximately halves equal-weighted fee-adjusted returns and leaves none of them statistically distinguishable from zero. Value-weighted returns survive among the most expensive stocks – the Top/Bottom 1% and 2% portfolios remain economically and statistically significant – but they fall by roughly a quarter. Much of the apparent profitability of shorting high-fee stocks is therefore an artifact of valuing the position at a price the short seller could not have obtained, and the wedge between the marginal and average fee goes a significant way toward explaining why short sellers do not short overvalued stocks more aggressively.

C. Alternative Explanations

The literature has proposed other reasons why short sellers might appear to earn profits at the margin on their short positions. In this section we evaluate how much of the fee-adjusted return these alternative mechanisms explain.

The first is that short sellers face a liquidity cost from having to close a position quickly. Hong, Li, Ni, Scheinkman, and Yan (2016) use days-to-cover, short interest divided by average daily trading volume, to proxy for this cost. We calculate days-to-cover as the

number of shares lent at the end of the month according to the FIS Astec data, divided by the average daily trading volume over the preceding quarter.

We test the channel with a conditional double sort on loan fees and days-to-cover, splitting the stocks in the short leg of each long-short portfolio in half. If short sellers trade less aggressively when the potential liquidation cost of their position is high, then the portfolios with high days-to-cover should earn higher fee-adjusted returns.

Table V shows no such pattern. In the Top/Bottom 10% and 5% portfolios the high days-to-cover stocks earn slightly more; in the Top/Bottom 2% and 1% portfolios they earn slightly less. In every case the two halves are within 0.20 percentage points of one another. There is little evidence that liquidity cost is the primary factor governing how aggressively short sellers trade on mispricing.

The second explanation is that short sellers bear under-diversification risk from the concentrated positions they take (e.g., Hanson and Sunderam (2014) and Drechsler and Drechsler (2016)). If short sellers are risk averse, they must be compensated for bearing it. We use idiosyncratic volatility as our proxy and estimate it following Ang, Hodrick, Xing, and Zhang (2006).[6]

Table VI repeats the double sort using idiosyncratic volatility, and again no clear pattern emerges. The high-volatility portfolio earns higher fee-adjusted returns in some cases, which is consistent with the under-diversification explanation, but not in others, including the Top/Bottom 5% and 1% portfolios. Under-diversification cost is not the primary explanation for why short sellers appear to leave profits on the table either.

[6]Specifically, we regress daily returns on the factors from the Fama-French five-factor model ("FF5") of Fama and French (2015) over the prior quarter. Idiosyncratic volatility is the standard deviation of the residuals from that regression.

V. Conclusion

We show there is a persistent wedge between the average fee paid on outstanding equity loans and the marginal fee faced by a borrower initiating a new loan. The wedge is small when shares are easy to borrow and grows significantly as utilization increases, exceeding two percentage points per month for a quarter of hard-to-borrow stocks. It arises because outstanding loans are repriced asymmetrically: when the fee on new loans rises, outstanding fees absorb only 30 percent of the increase within the next month, but when the fee on new loans falls, outstanding fees absorb 67 percent of the decrease. In other words, borrowers retain cheap legacy loans and exit expensive ones. As a result, the average fee on outstanding loans understates the true marginal cost of shorting precisely when fees are highest.

This distinction matters for the long-standing puzzle of why short sellers appear to earn abnormal returns net of borrowing costs. Much of the apparent profitability to shorting reflects mismeasured borrowing costs. Valuing short positions at the marginal rather than the average fee reduces the returns to shorting high-fee stocks by roughly one-third on a value-weighted basis and eliminates the returns entirely on an equal-weighted basis.

Our results show that future work should consider the marginal loan fee when evaluating the profitability of strategies that use short selling. Studies of short-sale constraints and arbitrage costs that use average fees will tend to understate the frictions facing traders entering new positions, particularly in high-utilization stocks. The same distinction between marginal and average pricing may also be relevant in other markets characterized by search frictions with selective contract continuation, including corporate bonds markets and repo markets.

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Figure 1. Dispersion of Loan Fee by Utilization Level

Note: This figure shows the dispersion of monthly loan fees within 10% increments of utilization. The monthly loan fee is the end-of-month annualized loan fee reported in the FIS Astec data divided by 12. Utilization is the number of shares lent divided by the number of shares available to be lent. The box spans the 25^{th} to 75^{th} percentiles and the "whiskers" show the 5^{th} to 95^{th} percentile range. Percentiles are calculated each month and then averaged across the full sample period. The two panels are drawn on different vertical scales.

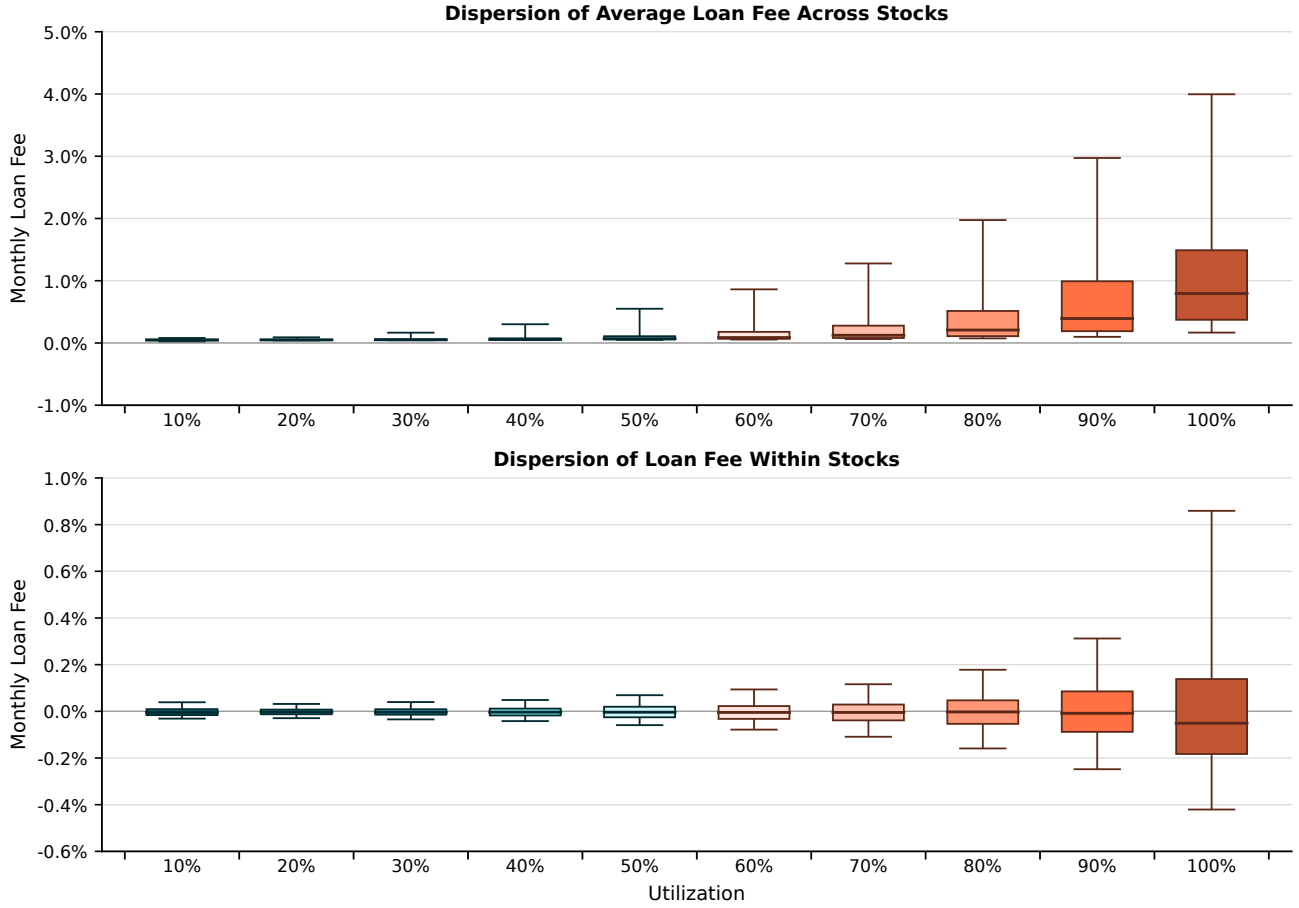


Figure 2. Spread of Fee on New Loans Over Fee on All Loans by Utilization

Note: This figure shows the distribution of the spread of the fee on new loans over the fee on all loans within 10% increments of utilization. The loan fee on all loans is the end-of-month annualized loan fee on all loans reported in the FIS Astec data divided by 12. The loan fee on new loans is the end-of-month annualized loan fee on new loans reported in the FIS Astec data divided by 12. The spread is the fee on new loans minus the fee on all loans. If no new loans are reported on the last day of the month, we use the fee on new loans from the most recent date with new loans. Utilization is the number of shares lent divided by the number of shares available to be lent. The box spans the 25th to 75th percentiles and the "whiskers" show the 5th to 95th percentile range. Percentiles are calculated each month and then averaged across the full sample period.

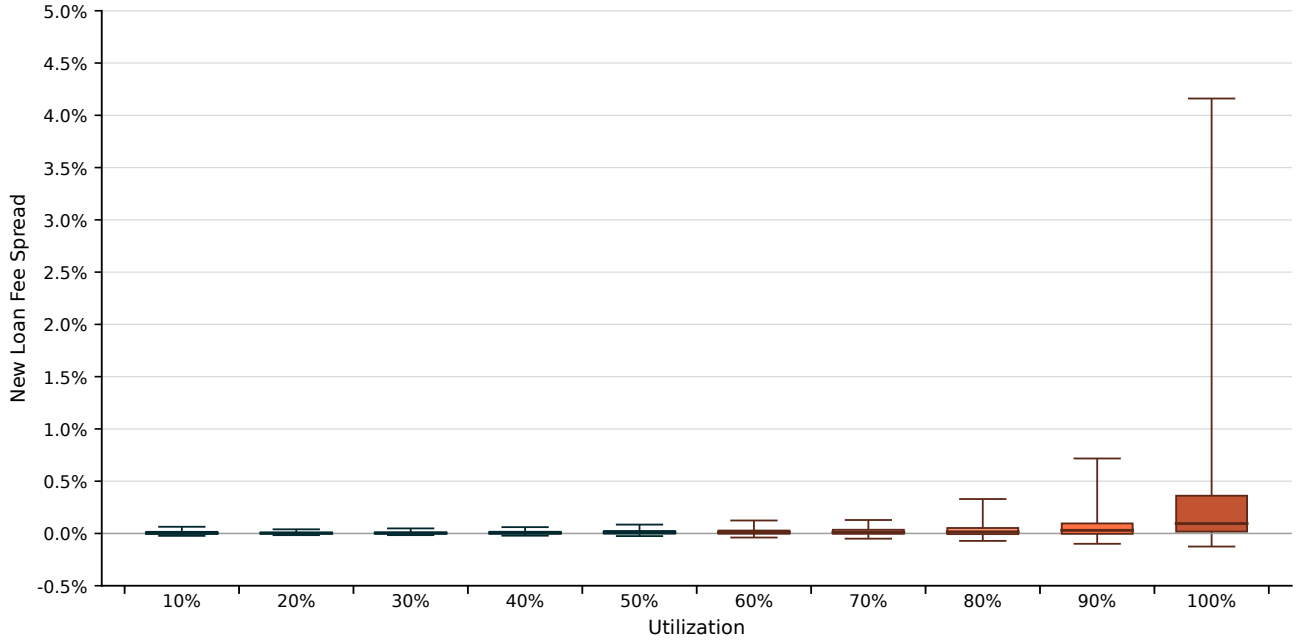


Figure 3. Response of Average Fee on All Loans to Change in Fee on New Loans

Note: This figure shows how the average fee on all loans responds to changes in the average fee on new loans. The figure includes stock-months for which the new loan fee was within 0.05% of the average loan fee at the end of the previous month and the magnitude of the change in the new loan fee was greater than 0.05% but less than 1%. The top panel plots the distribution of the beta of average fee for various changes in the fee on new loans. The "Beta of Average Fee" measures the fraction of the change in the new loan fee that is passed through to the average fee. We calculate this beta for each stock-month in the sample and plot the cross- sectional average of the distribution of beta. The bottom panel repeats the analysis using the end-of-month new loan spread rather than the beta of average fee. In each panel the box spans the 25^{th} to 75^{th} percentiles and the "whiskers" show the 5^{th} to 95^{th} percentile range.

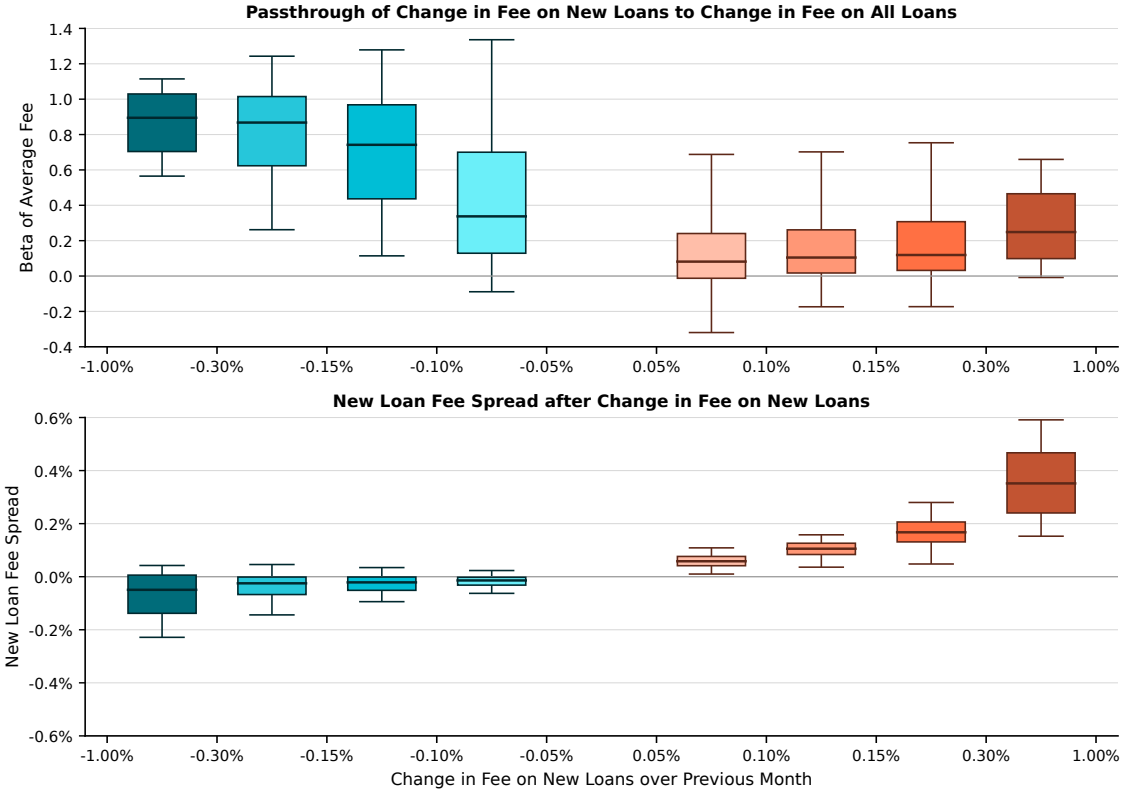


Figure 4. Dispersion of Within Stock Loan Fees by Loan Fee Level

Note: This figure shows the within stock dispersion in loan fees. The top panels show the histogram of how many loans fall within a given range from the average monthly fee, expressed as a fraction of shares outstanding (i.e., the short interest ratio). The bottom panels show the fraction of loans that are new or returned/recalled as a fraction of the total quantity of loans. The left and right panels split the sample each month into the bottom 90% and top 10% of loan fees according to the end-of-month loan fee. The figure is constructed using FIS Astec data on the quantity of loans and quantity of new loans within a given loan fee range. The number of recalled and returned loans is determined implicitly from the number of new loans and the number of loans in the bin on the day prior. The total quantity in the FIS Astec data is pro-rated across bins in instances in which the FIS Astec bin overlaps two of the bins reported in the figure. Frequencies are calculated each day and then averaged across the full sample period. The first and last bars of each graph include all loans that are more than 0.25% from the average loan fee.

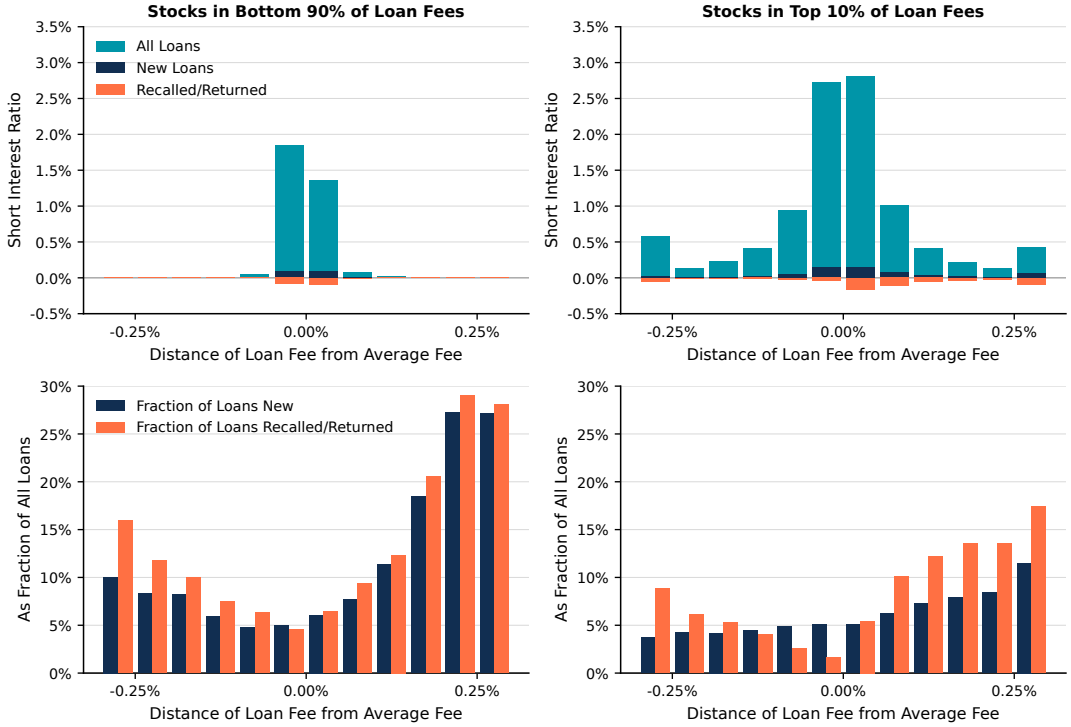


Figure 5. Dispersion of Within Stock Fees by Change in Fee on New Loans

Note: This figure shows the within stock dispersion in loan fees. The top panels show the histogram of how many loans fall within a given range from the average monthly fee, expressed as a fraction of shares outstanding (i.e., the short interest ratio). The bottom panels show the fraction of loans that are new or returned/recalled as a fraction of the total quantity of loans. The left and right panels split the sample of stocks by the change in the fee on new loans over the prior month. The figure includes stock-months for which the new loan fee was within 0.05% of the average loan fee at the end of the previous month. The figure is constructed using FIS Astec data on the quantity of loans and quantity of new loans within a given loan fee range. The number of recalled and returned loans is determined implicitly from the number of new loans and the number of loans in the bin on the day prior. The total quantity in the FIS Astec data is pro-rated across bins in instances in which the FIS Astec bin overlaps two of the bins reported in the figure. Frequencies are calculated each day and then averaged across the full sample period. The first and last bars of each graph include all loans that are more than 0.25% from the average loan fee.

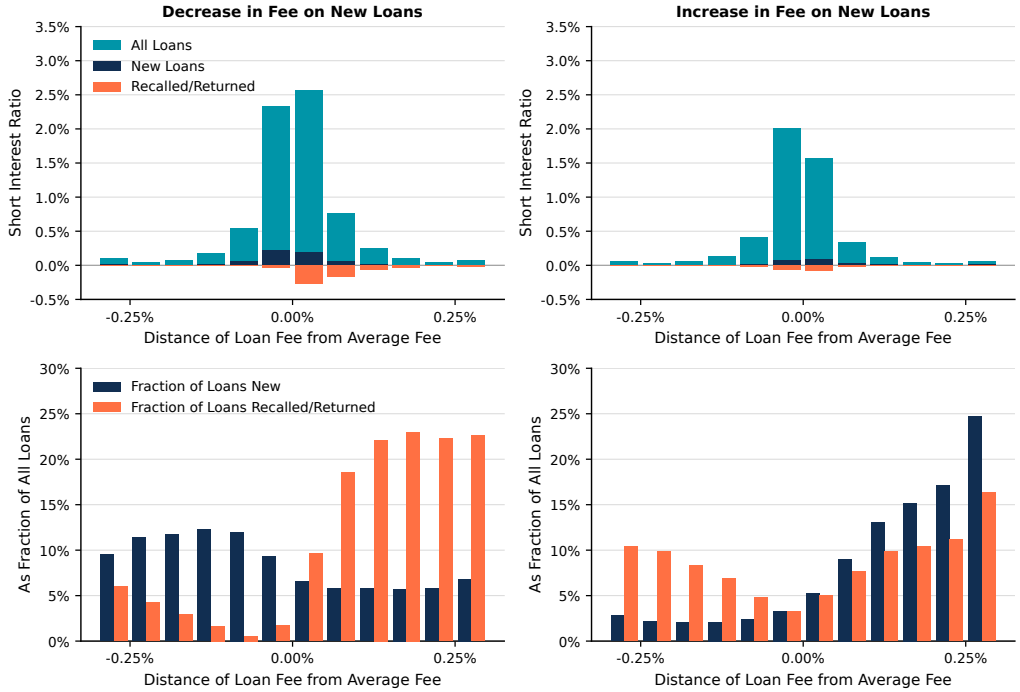


Figure 6. Impulse Response Functions for Shock to New Loan Fee

Note: This figure shows the impulse response functions for a 0.1% increase and decrease of the fee on new loans from regression specifications (3) and (4).

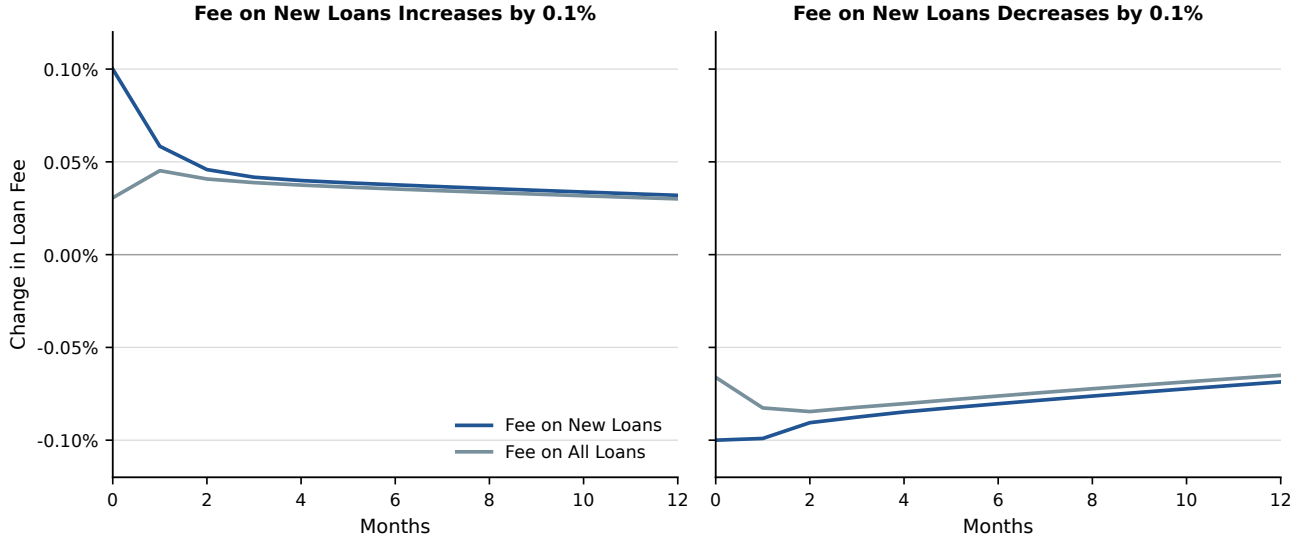


Figure 7. Within Stock Dispersion of Returns Earned by Short Sellers

Note: This figure shows the within stock dispersion in returns earned by short sellers forming long-short portfolios sorted on monthly loan fees. Portfolios are formed by sorting stocks on the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10% of loan fees. Stocks are sorted by the end-of-month loan fee on all loans reported in the FIS Astec data. The portfolios are long stocks with low loan fees and short stocks with high loan fees. The performance of the long-short portfolio is measured over the subsequent month. For fee- adjusted returns, we adjust the return on the short leg of the portfolio by subtracting the daily loan fee from the daily short return on each stock using an Actual/360 day count convention and the applicable settlement delay. The box-and-whiskers plot shows the returns calculated if shares are borrowed at the 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} percentile of the distribution of loan fees for the stock; the box therefore spans the 25^{th} to 75^{th} percentiles of the resulting return distribution and the whiskers its 5^{th} and 95^{th} percentiles.

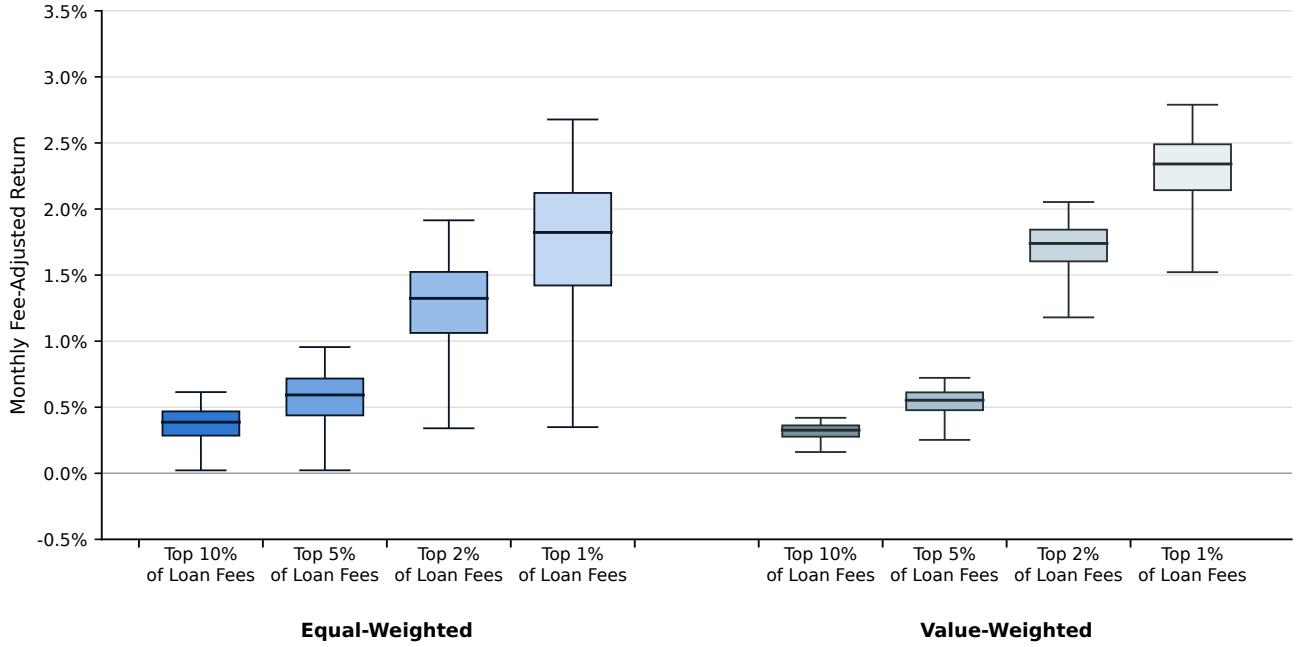


Table I
Summary Statistics

Note: The "Total" column reports the number of U.S. common stocks (CRSP SHRCD 10 or 11) traded on the NYSE, NASDAQ, or AMEX (CRSP EXCHCD 1, 2, or 3) with an end-of-month market capitalization above the fifth percentile NYSE size breakpoint. The "Included in Sample" column reports the number of U.S. common stocks that meet the additional criteria for inclusion in the sample: non-missing fee data at the end of the month, non-missing fee data over the subsequent month, at least 180 days past the IPO for the stock, and a monthly loan fee less than 10%. The next column shows the number of stocks that are excluded based on this additional criterion. The "Market Cap Threshold" column reports the market capitalization threshold corresponding to the fifth percentile NYSE size break point. The monthly loan fee is the end-of-month annualized loan fee reported in the FIS Astec data divided by 12. All statistics reported in the table are averaged across the twelve months of the year.

	Number of U.S. Common Stocks				Monthly Loan Fee Percentile				
Year	Total	Included in Sample	Monthly Loan Fee > 10%	Market Cap Threshold (mn)	1st	10th	Median	90th	99th
2014	2,578	2,465	0.2	$221	-0.01%	0.03%	0.05%	0.09%	1.47%
2015	2,732	2,640	1.2	$157	-0.01%	0.03%	0.05%	0.13%	1.58%
2016	2,679	2,580	1.2	$139	-0.00%	0.04%	0.05%	0.18%	1.82%
2017	2,583	2,475	2.2	$182	0.00%	0.04%	0.05%	0.14%	1.59%
2018	2,562	2,445	2.2	$212	0.01%	0.04%	0.05%	0.12%	1.45%
2019	2,644	2,516	2.5	$167	0.02%	0.04%	0.05%	0.09%	1.66%

Table II
Structural VAR for the Fee on All Loans and the Fee on New Loans

Note: OLS regressions are run using the Fama and MacBeth (1973) method, in which first cross-sectional regressions are run for each month and then the coefficient estimate is averaged across months. The loan fee on all loans is the end-of-month annualized loan fee on all loans reported in the FIS Astec data divided by 12. The loan fee on new loans is the end-of-month annualized loan fee on new loans reported in the FIS Astec data divided by 12. If no new loans are reported on the last day of the month, we use the fee on new loans from the most recent date with new loans. The "New Loan Spread" is the fee on new loans minus the fee on all loans. The coefficient on all lagged variables, except for the fee on all loans and new loans, is allowed to differ between positive (+) and negative (−) values of the variable. Stock-months with a loan fee on all loans greater than 10% and a change in the fee on new or all loans greater than 10% are excluded. Newey-West standard errors are reported.

	Fee on All Loans$_t$	**Fee on New Loans$_t$**	**Fee on All Loans$_t$**	**Fee on New Loans$_t$**
Explanatory Variable	(1)	(2)	(3)	(4)
Fee on All Loans$_{t-1}$	0.95	–	0.96	–
	(0.01)	–	(0.01)	–
Fee on New Loans$_{t-1}$	–	0.90	–	1.01
	–	(0.02)	–	(0.02)
Change in Fee on New Loans$_t$ (+)	0.30	–	0.31	–
	(0.03)	–	(0.03)	–
Change in Fee on New Loans$_t$ (−)	0.67	–	0.66	–
	(0.02)	–	(0.02)	–
New Loan Spread$_{t-1}$ (+)	0.63	-0.44	0.56	-0.42
	(0.02)	(0.06)	(0.03)	(0.09)
New Loan Spread$_{t-1}$ (−)	0.48	-0.61	0.45	-0.76
	(0.04)	(0.12)	(0.04)	(0.10)
Change in Fee on All Loans$_{t-1}$ (+)	–	–	-0.07	-0.20
	–	–	(0.03)	(0.12)
Change in Fee on All Loans$_{t-1}$ (−)	–	–	0.04	0.20
	–	–	(0.02)	(0.07)
Change in Fee on New Loans$_{t-1}$ (+)	–	–	0.07	-0.07
	–	–	(0.02)	(0.10)
Change in Fee on New Loans$_{t-1}$ (−)	–	–	0.01	0.11
	–	–	(0.01)	(0.03)

Table III
Performance of Portfolios Sorted on Loan Fee

Note: This table examines the performance of long-short portfolios sorted on monthly loan fees. Portfolios are formed by sorting stocks on the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10% of loan fees. Stocks are sorted by the end-of-month loan fee on all loans reported in the FIS Astec data. The portfolios are long stocks with low loan fees and short stocks with high loan fees. The performance of the long-short portfolio is measured over the subsequent month. For fee-adjusted returns, we adjust the return on the short leg of the portfolio by subtracting the daily loan fee from the daily short return on each stock using an Actual/360 day count convention and the applicable settlement delay. For "Monthly Fee-Adjusted Return – New Loans," we use the annualized loan fee on new loans reported in the FIS Astec data. If no new loans are reported on a given date, we use the fee on new loans from the most recent date with new loans. t-statistics are calculated using Newey-West standard errors.

	Monthly Return		**Monthly Fee-Adjusted Return – All Loans**			**Monthly Fee-Adjusted Return – New Loans**		
	Raw Return	α_{CAPM}	**Realized Fee**	**Raw Return**	α_{CAPM}	**Realized Fee**	**Raw Return**	α_{CAPM}
Panel A: Value-Weighted								
Top/Bottom 1%	3.78%	4.08%	1.71%	2.07%	2.40%	2.21%	1.57%	1.90%
	(6.70)	(7.38)		(3.50)	(4.26)		(2.61)	(3.40)
Top/Bottom 2%	2.56%	2.97%	1.16%	1.39%	1.82%	1.51%	1.05%	1.47%
	(4.78)	(5.10)		(2.63)	(3.19)		(2.02)	(2.66)
Top/Bottom 5%	0.95%	1.20%	0.55%	0.40%	0.66%	0.69%	0.26%	0.51%
	(2.48)	(3.03)		(1.03)	(1.66)		(0.66)	(1.30)
Top/Bottom 10%	0.55%	0.65%	0.24%	0.31%	0.42%	0.29%	0.25%	0.37%
	(2.05)	(2.54)		(1.12)	(1.59)		(0.93)	(1.39)
Panel B: Equal-Weighted								
Top/Bottom 1%	4.42%	5.02%	2.94%	1.49%	2.12%	3.72%	0.70%	1.34%
	(6.82)	(8.51)		(2.15)	(3.37)		(0.99)	(2.10)
Top/Bottom 2%	3.09%	3.59%	2.06%	1.03%	1.56%	2.62%	0.47%	1.00%
	(5.95)	(7.16)		(1.88)	(2.96)		(0.85)	(1.90)
Top/Bottom 5%	1.72%	2.13%	1.16%	0.56%	0.98%	1.47%	0.25%	0.67%
	(3.99)	(5.33)		(1.26)	(2.38)		(0.56)	(1.66)
Top/Bottom 10%	1.06%	1.36%	0.68%	0.38%	0.69%	0.86%	0.20%	0.51%
	(3.01)	(3.97)		(1.06)	(1.98)		(0.56)	(1.49)

Table IV

Portfolios of Hard-to-Borrow Stocks Sorted by the Spread on Fees of New Loans over All Loans

Note: This table examines the performance of long-short double-sorted portfolios. Stocks are first sorted by the end-of-month loan fee into the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10%. Stocks in the short leg of the portfolio (i.e., the top 1%, 2%, 5%, and 10% of loan fees) are then sorted by the spread of the monthly fee on new loans over the monthly fee on all loans (the "New Loan Spread"). The monthly fee on all loans is the end-of-month annualized loan fee on all loans reported in the FIS Astec data divided by 12. The monthly fee on new loans is the end-of-month annualized loan fee on new loans reported in the FIS Astec data divided by 12. The "New Loan Spread" is the fee on new loans minus the fee on all loans. If no new loans are reported on the last day of the month, we use the fee on new loans from the most recent date with new loans. The portfolios are long stocks with low loan fees and short stocks with high loan fees. The performance of the long-short portfolio is measured over the subsequent month. For fee-adjusted returns, we adjust the return on the short leg of the portfolio by subtracting the daily loan fee from the daily short return on each stock using an Actual/360 day count convention and the applicable settlement delay. For "Monthly Fee-Adjusted Return – New Loans," we use the annualized loan fee on new loans reported in the FIS Astec data. If no new loans are reported on a given date, we use the fee on new loans from the most recent date with new loans. t-statistics are calculated using Newey-West standard errors.

	Average Value for Stocks on Special			Monthly Long/ Short Return		Monthly Fee-Adjusted L/S Return – All Loans			Monthly Fee-Adjusted L/S Return – New Loans		
	Monthly Fee	New Loan Fee Spread	Change in New Fee Prior Month	Raw Return	α_{CAPM}	Realized Fee	Raw Return	α_{CAPM}	Realized Fee	Raw Return	α_{CAPM}
Panel A: Value-Weighted											
Top/Bottom 10% of Loan Fee											
Low Spread	0.19%	-0.03%	-0.08%	0.49%	0.58%	0.17%	0.32%	0.41%	0.18%	0.31%	0.40%
				(2.00)	(2.43)		(1.27)	(1.70)		(1.23)	(1.65)
High Spread	0.36%	0.19%	0.11%	0.56%	0.79%	0.37%	0.19%	0.42%	0.50%	0.06%	0.29%
				(1.46)	(2.03)		(0.50)	(1.09)		(0.16)	(0.75)
Top/Bottom 5% of Loan Fee											
Low Spread	0.48%	-0.04%	-0.25%	0.56%	0.84%	0.42%	0.14%	0.42%	0.47%	0.09%	0.37%
				(1.20)	(1.92)		(0.30)	(0.95)		(0.20)	(0.84)
High Spread	0.68%	0.38%	0.25%	1.33%	1.63%	0.72%	0.61%	0.92%	1.00%	0.33%	0.64%
				(3.20)	(3.26)		(1.45)	(1.86)		(0.79)	(1.31)
Top/Bottom 2% of Loan Fee											
Low Spread	1.08%	-0.05%	-0.62%	2.86%	3.31%	0.94%	1.92%	2.38%	1.06%	1.80%	2.25%
				(4.42)	(4.72)		(3.02)	(3.47)		(2.84)	(3.32)
High Spread	1.36%	0.85%	0.60%	2.42%	2.79%	1.43%	0.99%	1.37%	2.00%	0.42%	0.79%
				(4.15)	(4.57)		(1.72)	(2.31)		(0.74)	(1.36)
Top/Bottom 1% of Loan Fee											
Low Spread	1.64%	-0.07%	-1.01%	3.92%	4.25%	1.42%	2.49%	2.86%	1.63%	2.28%	2.65%
				(5.71)	(6.01)		(3.62)	(4.12)		(3.31)	(3.86)
High Spread	1.97%	1.42%	1.07%	3.41%	3.77%	2.05%	1.36%	1.73%	2.89%	0.52%	0.88%
				(5.72)	(6.59)		(2.12)	(2.86)		(0.77)	(1.41)
Panel B: Equal-Weighted											
Top/Bottom 10% of Loan Fee											
Low Spread	0.58%	-0.04%	-0.29%	1.05%	1.32%	0.53%	0.51%	0.80%	0.59%	0.46%	0.74%
				(2.76)	(3.60)		(1.32)	(2.12)		(1.19)	(1.99)
High Spread	0.76%	0.40%	0.24%	1.07%	1.40%	0.81%	0.26%	0.59%	1.12%	-0.05%	0.29%
				(2.93)	(3.83)		(0.69)	(1.61)		(-0.15)	(0.80)
Top/Bottom 5% of Loan Fee											
Low Spread	1.03%	-0.06%	-0.53%	1.89%	2.38%	0.94%	0.95%	1.45%	1.03%	0.86%	1.36%
				(3.79)	(5.31)		(1.85)	(3.17)		(1.69)	(2.99)
High Spread	1.27%	0.69%	0.45%	1.56%	1.90%	1.37%	0.19%	0.54%	1.90%	-0.34%	0.02%
				(3.32)	(4.16)		(0.40)	(1.17)		(-0.72)	(0.05)
Top/Bottom 2% of Loan Fee											
Low Spread	1.90%	-0.09%	-1.07%	3.11%	3.66%	1.73%	1.38%	1.97%	1.92%	1.19%	1.77%
				(4.96)	(6.13)		(2.12)	(3.15)		(1.81)	(2.82)
High Spread	2.23%	1.40%	0.98%	3.18%	3.60%	2.36%	0.82%	1.27%	3.27%	-0.09%	0.36%
				(5.28)	(6.07)		(1.31)	(2.06)		(-0.14)	(0.59)
Top/Bottom 1% of Loan Fee											
Low Spread	2.79%	-0.12%	-1.84%	4.40%	4.89%	2.48%	1.92%	2.45%	2.71%	1.69%	2.21%
				(5.64)	(6.54)		(2.35)	(3.11)		(2.04)	(2.76)
High Spread	3.19%	2.31%	1.71%	4.62%	5.33%	3.31%	1.31%	2.06%	4.62%	0.00%	0.77%
				(6.01)	(7.85)		(1.60)	(2.84)		(0.00)	(1.05)

Table V
Portfolios of Hard-to-Borrow Stocks Sorted by Days-to-Cover

Note: This table examines the performance of long-short double-sorted portfolios. Stocks are first sorted by the end-of-month monthly loan fee into the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10%. The monthly fee on all loans is the end-of-month annualized loan fee on all loans reported in the FIS Astec data divided by 12. Stocks in the short leg of the portfolio (i.e., the top 1%, 2%, 5%, and 10% of loan fees) are then sorted by days-to-cover. Days-to-cover is the number of shares lent at the end of the month according to the FIS Astec data divided by the average daily trading volume from the preceding quarter. The portfolios are long stocks with low loan fees and short stocks with high loan fees. The performance of the long-short portfolio is measured over the subsequent month. For fee-adjusted returns, we adjust the return on the short leg of the portfolio by subtracting the daily loan fee from the daily short return on each stock using an Actual/360 day count convention and the applicable settlement delay. t-statistics are calculated using Newey-West standard errors.

	Average Value for Stocks on Special		Monthly Long/ Short Return		Monthly Fee-Adjusted L/S Return – All Loans		
	Monthly Fee	Days-to-Cover	Raw Return	α_{CAPM}	Realized Fee	Raw Return	α_{CAPM}
Panel A: Value-Weighted							
Top/Bottom 10% of Loan Fee							
Low DTC	0.20%	2.7	0.39%	0.45%	0.17%	0.22%	0.28%
			(1.23)	(1.45)		(0.67)	(0.88)
High DTC	0.36%	13.0	0.75%	0.99%	0.37%	0.38%	0.63%
			(2.44)	(3.41)		(1.22)	(2.11)
Top/Bottom 5% of Loan Fee							
Low DTC	0.51%	3.9	0.66%	0.95%	0.48%	0.18%	0.47%
			(1.31)	(1.76)		(0.36)	(0.89)
High DTC	0.64%	15.3	1.28%	1.52%	0.65%	0.64%	0.88%
			(3.36)	(3.77)		(1.62)	(2.13)
Top/Bottom 2% of Loan Fee							
Low DTC	1.27%	5.0	3.14%	3.78%	1.20%	1.94%	2.58%
			(4.54)	(5.76)		(2.80)	(3.97)
High DTC	1.16%	16.8	2.24%	2.53%	1.14%	1.10%	1.40%
			(4.56)	(4.37)		(2.26)	(2.48)
Top/Bottom 1% of Loan Fee							
Low DTC	1.96%	5.3	4.02%	4.64%	1.82%	2.20%	2.84%
			(5.02)	(7.12)		(2.62)	(4.24)
High DTC	1.67%	17.2	3.69%	3.87%	1.64%	2.05%	2.25%
			(5.97)	(5.47)		(3.27)	(3.20)
Panel B: Equal-Weighted							
Top/Bottom 10% of Loan Fee							
Low DTC	0.59%	3.7	0.83%	1.22%	0.57%	0.25%	0.65%
			(1.88)	(2.99)		(0.58)	(1.59)
High DTC	0.75%	16.5	1.29%	1.50%	0.77%	0.51%	0.74%
			(3.71)	(4.18)		(1.44)	(2.00)
Top/Bottom 5% of Loan Fee							
Low DTC	1.14%	4.8	1.65%	2.24%	1.12%	0.54%	1.14%
			(3.03)	(4.86)		(0.96)	(2.40)
High DTC	1.16%	18.5	1.79%	2.03%	1.20%	0.60%	0.85%
			(4.32)	(4.80)		(1.40)	(1.97)
Top/Bottom 2% of Loan Fee							
Low DTC	2.17%	5.2	3.55%	4.25%	2.08%	1.48%	2.19%
			(5.35)	(7.21)		(2.10)	(3.53)
High DTC	1.97%	18.8	2.76%	3.06%	2.01%	0.75%	1.07%
			(5.10)	(5.39)		(1.33)	(1.84)
Top/Bottom 1% of Loan Fee							
Low DTC	3.17%	5.2	5.13%	6.00%	2.97%	2.16%	3.06%
			(4.98)	(6.74)		(2.02)	(3.30)
High DTC	2.83%	18.0	3.96%	4.30%	2.83%	1.14%	1.52%
			(5.73)	(5.90)		(1.57)	(2.01)

Table VI
Portfolios of Hard-to-Borrow Stocks Sorted by Idiosyncratic Return Volatility

Note: This table examines the performance of long-short double-sorted portfolios. Stocks are first sorted by the end-of-month monthly loan fee into the top and bottom 1% ("Top/Bottom 1%"), 2%, 5%, and 10%. The monthly fee on all loans is the end-of-month annualized loan fee on all loans reported in the FIS Astec data divided by 12. Stocks in the short leg of the portfolio (i.e., the top 1%, 2%, 5%, and 10% of loan fees) are then sorted by idiosyncratic volatility. We calculate idiosyncratic volatility for each month as the standard deviation of the residual return for the stock according to the Fama-French three factor model. The portfolios are long stocks with low loan fees and short stocks with high loan fees. The performance of the long-short portfolio is measured over the subsequent month. For fee-adjusted returns, we adjust the return on the short leg of the portfolio by subtracting the daily loan fee from the daily short return on each stock using an Actual/360 day count convention and the applicable settlement delay. *t*-statistics are calculated using Newey-West standard errors.

	Average Value for Stocks on Special		**Monthly Long/ Short Return**		**Monthly Fee-Adjusted L/S Return – All Loans**		
	Monthly Fee	**Idiosyncratic Return Volatility**	**Raw Return**	α_{CAPM}	**Realized Fee**	**Raw Return**	α_{CAPM}
Panel A: Value-Weighted							
Top/Bottom 10% of Loan Fee							
Low Volatility	0.17%	1.04%	0.41%	0.41%	0.16%	0.26%	0.26%
			(1.75)	(1.92)		(1.08)	(1.18)
High Volatility	0.45%	3.19%	0.81%	1.26%	0.45%	0.36%	0.83%
			(1.58)	(2.58)		(0.70)	(1.68)
Top/Bottom 5% of Loan Fee							
Low Volatility	0.44%	1.39%	0.77%	0.87%	0.42%	0.35%	0.45%
			(2.01)	(2.18)		(0.89)	(1.11)
High Volatility	0.77%	3.70%	1.26%	1.77%	0.77%	0.49%	1.01%
			(2.33)	(3.19)		(0.89)	(1.83)
Top/Bottom 2% of Loan Fee							
Low Volatility	1.05%	1.66%	2.10%	2.08%	0.97%	1.13%	1.11%
			(3.65)	(3.27)		(2.02)	(1.80)
High Volatility	1.42%	4.18%	3.12%	4.00%	1.43%	1.69%	2.60%
			(4.16)	(5.50)		(2.20)	(3.58)
Top/Bottom 1% of Loan Fee							
Low Volatility	1.59%	1.81%	3.71%	3.59%	1.47%	2.24%	2.14%
			(5.72)	(5.18)		(3.39)	(3.11)
High Volatility	2.00%	4.25%	3.53%	4.24%	1.97%	1.56%	2.32%
			(4.61)	(6.30)		(1.90)	(3.36)
Panel B: Equal-Weighted							
Top/Bottom 10% of Loan Fee							
Low Volatility	0.50%	1.54%	0.74%	0.77%	0.49%	0.24%	0.28%
			(2.97)	(2.77)		(0.96)	(1.00)
High Volatility	0.84%	3.95%	1.38%	1.95%	0.85%	0.53%	1.10%
			(2.71)	(4.21)		(1.02)	(2.36)
Top/Bottom 5% of Loan Fee							
Low Volatility	0.95%	1.77%	1.60%	1.80%	0.93%	0.67%	0.87%
			(4.90)	(5.15)		(2.00)	(2.44)
High Volatility	1.35%	4.36%	1.85%	2.48%	1.38%	0.47%	1.12%
			(3.01)	(4.60)		(0.75)	(2.03)
Top/Bottom 2% of Loan Fee							
Low Volatility	1.84%	2.05%	2.81%	3.10%	1.78%	1.03%	1.35%
			(5.04)	(5.37)		(1.81)	(2.27)
High Volatility	2.30%	4.72%	3.51%	4.18%	2.31%	1.20%	1.90%
			(5.41)	(6.74)		(1.74)	(2.95)
Top/Bottom 1% of Loan Fee							
Low Volatility	2.79%	2.24%	4.58%	5.03%	2.68%	1.89%	2.39%
			(6.37)	(7.71)		(2.65)	(3.66)
High Volatility	3.19%	5.13%	4.40%	5.15%	3.12%	1.28%	2.06%
			(4.86)	(6.18)		(1.32)	(2.33)