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## The interaction between security lending market and security trading market<sup>☆</sup>

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### A B S T R A C T

We develop a parsimonious model to address the interaction between security lending market and security trading market. When a security is easy to borrow, short-selling leads to a lower spot price. When a security is hard to borrow, any CHANGE in shorting supply/demand should be largely absorbed by the lending market, and thus has minimal impact on the spot price. A positive lending fee implies that the negative opinion of short sellers is offset by the opposite view of security lenders, leaving the equilibrium security price that reflects only the perception of those who neither lend nor short.

### 1. Introduction

Due to regulations, most short sellers have to borrow shares to fulfill trade orders. This forms a security lending market in which lenders provide shorting supply and earn lending fees. This paper establishes a simple equilibrium model to study the interaction between the security trading market and the security lending market. We distinguish between two different scenarios: (1) when the security is easy to borrow, the presence of excess shorting supply and competition among potential lenders should reduce the lending fee to zero if we ignore any brokerage transaction cost, and a lower degree of exogenous short selling constraints eventually leads to a lower spot price, which is consistent with the results of classical studies on short selling constraints; (2) when the security is hard to borrow (a.k.a. “Special”), the lending fee becomes positive under certain condition, which implies that any exogenous shock on shorting supply/demand is mostly absorbed by the lending market and has minimal impact on the spot price.<sup>1</sup> The second scenario explains a recent puzzling experimental finding by Kaplan et al. (KMS hereafter) (2013) that a sizable shock in the shorting supply has no significant impact on the stock return. The two scenarios are also consistent with the empirical findings by Kolasinski et al. (KRR hereafter) (2013) that (1) when demand is not high, lending fees are insensitive to demand shock (2) when demand is high, lending fees rise significantly with further increases in demand.

Theoretically, with heterogeneous beliefs on security valuation, the security lending market may affect the spot security price in various channels. The seminal work by Miller (1977) shows that short-selling constraints exclude the opinion of pessimists and leave the stock price upward-biased, which implies low future returns. Duffie et al. (DGP hereafter) (2002) provide a search model to prove that the security price may be even higher when the short-selling constraints are partially relaxed and lenders have more bargaining power to charge a high lending fee; thus, the expectation of high lending fee income may lead potential lenders to bid up the security price in the spot market; but their cases are special and limited to IPOs and firms with small float where shorting supply is very small.

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<sup>1</sup> Here, we consider shorting supply/demand shocks without changing fundamental information content.

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**Table 1**  
Three types of market segmentation in the security lending market.

	Unrestricted	Restricted
Lending	Potential lenders	Non-lenders
Borrowing	Short-permitted investors	Short-banned investors
Rebate	Institutional investors	Retail investors

More recently, assuming that a given exogenous proportion of shares are lent out in the stock lending market and investors ignore the lending fee income when they decide whether to long a stock, Blocher et al. (2013) find that stocks that are hard to borrow experience higher price. In contrast, we incorporate the lending fee income into investors' valuation and endogenize the lending quantity, given the fact that only some optimistic potential lenders actually lend out their shares.

According to the data provided by MARKIT Securities Finance and International Securities Lending Association, the global average balance of securities on loan was nearly US\$2 trillion from January 2010 to January 2012, approximately US\$12 trillion of lendable securities from more than 20,000 potential lenders were in the database by 2012, and European investors earned at least €1 billion securities lending revenue during 2011. Although the security lending profit is substantial, the market size of the security lending industry is still quite small compared with the vast number of securities held worldwide. Intuitively, if there is no restriction, optimistic shareholders are always willing to lend their shares to earn incremental lending fees without changing their long position.<sup>2</sup> As a result, competition among potential lenders should decrease the lending fee to a low level (their marginal cost).

We identify three types of market segmentation in short-selling and security lending that may lead to a small aggregate short interest but a positive lending fee (see Table 1). The first is on the supply side: only a portion of investors are qualified to be security lenders, while the remaining investors (non-lenders) are largely prevented from lending securities. Potential lenders are usually large institutions. They hold a considerable number of shares in their inventory and pursue a passive buy-and-hold strategy so that they can provide idle lendable shares. Typical examples of potential lenders include pension funds, index funds, and insurance companies. In contrast, speculators, arbitrageurs and small investors, rarely participate in security lending. Most shareholders do not engage in security lending due to small inventory size, a short holding period, legal restrictions, voting right protection, or knowledge limitations. Typical examples of non-lenders include hedge funds, retail investors, shareholders who want to keep their voting right, and fund managers who fear that security lending will allow short sellers to push the price down.<sup>3</sup> Under certain condition, the scarcity of lendable shares may lead to relatively small aggregate short interest and a positive lending fee.

The second type of market segmentation is on the demand side. According to Almazan et al. (2004), more than 70% of mutual funds and almost all pension funds are prohibited from short-selling by their formal investment policy. These investors are excluded from the borrowing side of the lending market. This exogenous constraint also results in small aggregate short interest but a low lending fee. If the scope of the prohibitions is sufficiently large such that the effective demand for short-selling is too low, then the spot price cannot reflect the view of pessimistic investors. This is consistent with the popular viewpoint put forward by Miller (1977) that short-selling constraints lead to upward-biased stock price. Furthermore, we show that as long as the scope of prohibition does not exceed a threshold in which the lending fee reduces to zero, this kind of short-selling constraint does not have much impact on the spot price.

The third type of market segmentation is between institutional and retail investors. When there is competition in the security lending market, lenders usually have to rebate part of the interest generated from the cash collateral (short-selling proceeds plus the extra margin) to short sellers. The rest of the interest is obtained by lenders as their lending income. However, retail investors are not eligible to receive any interest rebate because their shares are registered under the "street name" of the brokerage firm. This reduces retail investors' interest to engage in short-selling and leads to small aggregate short interest.

With these types of market segmentation, the size of the lending market should be small and a positive lending fee may arise, which implies that the short sellers' negative opinion is mostly offset by the positive opinion of lenders who incorporate the lending fee income into their valuation, leaving the spot price determined only by those who neither lend nor short. When an exogenous shock on shorting supply/demand occurs without affecting the valuation of optimistic non-lenders, the security lending market acts as a buffer to absorb the shock but has little extra impact on the spot price. In other words, the shock affects only the lending fee, which is the equilibrium price of the security lending market, but the spot price is still determined by those who do not participate in security lending and short-selling. This buffering effect increases with the seriousness of the lending-side (or supply-side) market segmentation and decreases with the seriousness of the borrowing-side (or demand-side) market segmentation. However, if the exogenous shock is too large for the security lending market to buffer, then the shock will affect the spot price.

We carry out a set of static analyses of how the security price, lending fee, and short interest are affected by each of the following exogenous driving factors in our model: (1) the scope of the short-selling prohibition, (2) the population mass of potential lenders, (3) the degree of heterogeneity in beliefs, (4) institutional ownership, and (5) the margin requirement ratio for short-selling. These analyses can potentially provide a comprehensive explanation for the mixed empirical findings regarding the relationship between

<sup>2</sup> Security lenders usually cover their loan exposures with enough collateral and have the right to recall their shares at any time. For an equity loan, borrowers also have the obligation to pay dividends to the lenders if the company pays dividends during the loan period.

<sup>3</sup> In some cases, brokers may lend the shares of their clients to fulfill the small shorting orders of other clients. However, brokers play the role of security lenders and gain lending fee income in these non-substantial cases. Extant literature (e.g. DGP, 2002) usually ignores all retail investors and focus on institutional investors who are sophisticated enough to participate in the security lending market.

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