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Is proprietary trading detrimental to retail investors?

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Non-technical summary

In this paper, we study a conflict of interest faced by universal banks that conduct proprietary trading alongside their retail banking services. We examine this issue by using the 'Security Deposits Statistics' provided by Deutsche Bundesbank. The dataset contains - on a security-by-security basis - the stock holdings of each and every German bank and the stock holdings of the corresponding retail clients.

We use this dataset to investigate three questions. First, we ask whether banks push stocks that they sell from their proprietary portfolios into the portfolios of their private customers. We argue that, in the absence of perfect 'Chinese Walls' within banks, banks may steer retail customers through their agents towards stocks that they intend to remove from their proprietary trading books and thereby avoid direct (i.e., exchange and brokerage commissions) and indirect (i.e., market impact) transaction costs of such sales, as well as avoid disclosure to the market of their possible informational advantages. Using both univariate analysis and a series of panel regressions, we find that a portion of the stocks that banks sell from their proprietary trading portfolios appear to end up in the stock portfolios of their retail customers. This effect is significantly more pronounced for illiquid stocks, for those stocks in which banks hold a relatively large block, and for stocks held in the period after the failure of Lehman Brothers when financial markets were more illiquid. These findings support the notion that banks push stocks to their retail customers to avoid adverse market impacts. By contrast, the alternative hypothesis that banks sell off stocks to their customers to conceal private information about a stock is not supported by the data.

The first stage of our analysis suggests that banks appear to push stock that they sell from their proprietary portfolios to their private customers. Whether this has any negative implications for their retail customers remains an open question. For example, banks might buy larger positions in stocks that they expect to outperform the market simply to pass some of those to their retail customers. Therefore, the observation that banks move stocks from their proprietary trading portfolio into the portfolios of their customers can actually be an indication that banks share their market knowledge with their customers. To address this possibility, in the second step of our analysis, we compare the performance of those stocks that flow from bank portfolios to client portfolios with the performance of other stocks in the portfolios of banks and their retail customers. Using a variety of performance measures, we find that the stocks that banks appear to sell to their retail customers not only underperform other stocks in the bank portfolios subsequently to the transaction but significantly underperform also other stocks held by retail customers themselves.

While the latter finding suggests that banks take advantage of their retail customers in specific trades, it does not necessarily imply that retail investors cannot generally benefit from the proprietary trading activities of their banks. Customers take a loss when they are sold underperforming stocks out of their banks' proprietary trading portfolios, but they might still benefit on other trades when banks share their market knowledge with their retail customers. To test whether such possible beneficial effects outweigh the detrimental agency conflict, in the final step of our analysis, we compare the stock portfolio performance of customers of banks with proprietary trading units with that of the customers of banks without proprietary trading units. Based on several performance

indicators, we find that in our sample the stock portfolio performance of customers at banks with proprietary trading desks falls significantly short of that of customers at banks without proprietary trading desks.

Overall, the results of this paper provide clear evidence that retail investors do not benefit from the proprietary trading activities of their banks. On the contrary, the conflict of interest occasioned by the combination of proprietary trading and advising retail customers and managing their portfolios appears to negatively affect the stock portfolio performances of retail investors.

The findings of this paper have important implications for the ongoing discussion about splitting up universal banks and separating their investment banking activity (particularly, proprietary trading) from their commercial and retail banking businesses. Proposals suggesting this separation have been brought forward in the U.S.A. as a key part of the Dodd-Frank Act, in the Vickers Report in the U.K., and in the Liikanen Report in the European Union, respectively. Of course, the main aim of these regulatory initiatives is to prevent possible moral hazard problems, i.e., to prohibit banks from using implicit and explicit guaranteed deposits and other bank liabilities to engage in excessive risk-taking in their proprietary trading. While our study does not directly contribute to the discussion of this moral hazard problem, our results suggest that the possible costs of regulations that prevent banks from realizing economies of scope between proprietary trading and retail banking are not significant. In fact, it is quite the opposite. The evidence presented in this paper suggests that such regulation might have the positive side-effect of protecting retail investors.

Nicht-technische Zusammenfassung

In diesem Papier untersuchen wir, ob sich bei Universalbanken ein Interessenkonflikt aus der Kombination von aktivem Eigenhandel in Aktien und Privatkundengeschäft ergibt und ob hieraus möglicherweise finanzielle Nachteile für Privatkunden erwachsen. Wir nutzen hierfür die Depotstatistik der Deutschen Bundesbank, in der für jede deutsche Bank die aggregierten Wertpapierdepots sowohl der Privatkunden als auch der Bank selbst enthalten sind, und zwar auf Einzelwertpapierebene.

Unsere Analyse gliedert sich in drei Schritte. Zunächst wenden wir uns der Frage zu, ob Banken systematisch Aktien aus ihrem Eigenhandelsportfolio an ihre Kunden verkaufen. Banken könnten aus zwei Gründen einen Anreiz haben, Aktien, die sie abstoßen wollen, nicht am Markt zu platzieren, sondern direkt an ihre Kunden zu verkaufen. Erstens, weil beim 'internen Verkauf' weniger direkte Transaktionskosten anfallen und beim Verkauf größerer Blöcke die Marktpreise nicht nachteilig beeinflusst werden (indirekte Transaktionskosten). Zweitens mag einer Bank daran gelegen sein, dass nicht durch Marktverkäufe ihre schlechte Einschätzung über die zukünftige Kursentwicklung einer Aktie für andere Marktteilnehmer erkennbar wird und sie somit kaum Gewinn aus ihrem Informationsvorsprung schlagen kann. Tatsächlich finden wir eindeutige Belege dafür, dass Banken systematisch Aktien aus dem eigenen Depot in die Depots ihrer Kunden leiten, und zwar insbesondere 1) bei illiquiden Eigenkapitaltiteln, 2) bei Aktien, von denen die betreffende Bank einen großen Block hält und 3) nach dem Lehman Kollaps, als die Marktliquidität generell deutlich geringer war. Diese Ergebnisse sind mit der Hypothese vereinbar, dass Banken gezielt Aktien aus ihren eigenen Depots in die Depots ihrer Privatkunden leiten, um direkte und indirekte Transaktionskosten einzusparen. Für die Annahme, dass Banken Aktien an ihre Kunden direkt verkaufen, um Informationsvorteile zu wahren, finden wir keine Belege.

Banken scheinen also Aktienpositionen zu liquidieren, indem sie sie an ihre Privatkunden verkaufen. Dass dies für die Kunden von Nachteil ist, lässt sich hieraus allerdings nicht unmittelbar schlussfolgern. Letztlich könnte man auch vermuten, dass Banken Aktien aufgrund ihrer (unter Umständen auf privater Information aufbauender) Marktmeinung zunächst in ihr eigenes Depots nehmen, Teile davon aber kurze Zeit später ihren Kunden verkaufen, damit auch die Kunden von der Marktkenntnis der Bank profitieren. Insofern wäre unser Ergebnis nur ein Indiz dafür, dass Privatkunden von der Eigenhandelsaktivitüt ihrer Bank profitieren. Daher vergleichen wir in einem zweiten Schritt die Rendite der Aktien, die Banken an ihre Kunden weitergereicht haben, mit der Rendite von anderen Aktien im Portfolio der jeweiligen Bank bzw. der Kunden. Unsere Ergebnisse sind sehr eindeutig: Die von Banken an ihre Kunden weitergereichten Aktien rentieren nach Verkauf aus den Bankdepots und dem Kauf durch Kunden im Schnitt nicht nur schlechter als die anderen Aktien im Portfolio der jeweiligen Bank, sondern auch als die anderen Aktien im Portfolio der Privatkunden.

Diese Ergebnisse deuten daraufhin, dass Privatkunden immer dann eine Einbuße erleiden, wenn ihnen ihre im Eigenhandel aktive Bank eine Aktienposition verkauft, die die Bank selbst liquidieren möchte. Allerdings könnten diese Nachteile letztlich kompensiert oder sogar überkompensiert werden, wenn im Eigenhandel aktive Banken auf Basis ihrer Marktkenntnis ihren Kunden wertvolle Kauf- oder Verkaufsempfehlungen für solche Aktien geben, die die Bank selbst nicht zeitgleich abstoßen will. Insofern kännten Privat-

kunden trotz des Interessenkonfliktes in der Summe von der Eigenhandelsaktivität ihrer Bank profitieren. Um zu untersuchen, inwieweit dies der Fall ist, vergleichen wir in einem dritten Schritt die aggregierte Portfolioperformance von Kunden bei Banken mit und ohne Eigenhandel. Unabhängig von den zugrunde gelegten Performance-Maßen finden wir eine signifikant geringere Rendite für die aggregierten Kundenportfolios bei Banken mit Eigenhandel.

Insgesamt betrachtet zeigen unsere Resultate somit, dass Privatkunden bei Wertpapierinvestments unter dem Strich nicht von den Eigenhandelsaktivitäten ihrer Bank profitieren, sondern dass etwaige positive Effekte durch Interessenkonflikte zwischen dem Privatkundengeschäft und dem Eigenhandel überkompensiert werden und im Schnitt zu finanziellen Nachteilen führen.

Diese Forschungsergebnisse haben wichtige Implikationen für die aktuelle Debatte zur Abtrennung des Investmentbankings (und hier insbesondere des Eigenhandels) vom Retailgeschäft. Entsprechende Vorschläge finden sich im Dodd-Frank Act für die USA, im britischen Vickers Report und im Liikanen Bericht der EU. Natürlich ist die Hauptstoßrichtung aller drei Vorschläge nicht der in diesem Papier untersuchte Interessenkonflikt. Es soll vielmehr ausgeschlossen werden, dass Banken implizite und explizite Einlagensicherungen nutzen, um exzessive Risiken im Eigenhandel einzugehen. Unsere Untersuchung trägt zwar nicht zu dieser Fragestellung bei. Sie zeigt aber, dass etwaige Kosten einer solchen Trennung durch den Wegfall positiver Verbundeffekte zwischen Eigenhandel und Privatkundengeschäft nicht signifikant sind. Im Gegenteil, unsere Ergebnisse deuten darauf hin, dass eine solche Regulierung den positiven Nebeneffekt eines besseren Kundenschutzes hätte.

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Abstract

We study a conflict of interest faced by universal banks that conduct proprietary trading alongside their retail banking services. Our dataset contains the stock holdings of each and every German bank and of their corresponding retail clients. We investigate (i) whether banks deliberately push stocks from their proprietary portfolios into their retail customer portfolios, (ii) whether those stocks subsequently underperform, and (iii) whether retail customers of banks with proprietary trading earn lower long-term portfolio returns than their peers. We present affirmative evidence on all three questions and conclude that proprietary trading can, in fact, be very detrimental to retail investors.

Keywords: Conflict of interests, universal banks, proprietary trading, retail investment, retail banking.

JEL classification: G30, G32.

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1 Introduction

Increasing life expectancies and demographic changes have forced households in many developed countries to make their own provisions for retirement financing. Additionally, these changes imply that households must become actively involved in managing their personal finances. However, owing to their limited financial literacy (Lusardi and Mitchell, 2007; van Rooij, Lusardi, and Alessie, 2011), retail investors often depend on financial advice in making investment decisions.[1] Banks - particularly universal banks - should be well suited to provide such advice. Playing a key role in many financial markets, they dispose of and process information that is crucial to the provision of relevant financial advice and support of retail investors in their investment decisions. Thus, there should be economies of scope, particularly between banks' proprietary trading and portfolio management units and the financial advice they offer to their retail customers.

At the same time, however, financial advice provided to retail investors resembles a 'credence good': Because of their limited financial literacy, households can often neither ex-ante nor ex-post assess the quality of financial products or services.[2] This gives rise to several potential agency problems, such as misselling, between advisors and their retail customers.[3] Given their diverse lines of business, such agency problems might be particularly severe for universal banks. For example, when actively trading on their own account, banks may have incentives to take advantage of their uninformed retail customers and 'missell' them stocks. If such misbehavior becomes publicly known, at least ex-post, reputational considerations might sufficiently discipline the banks (Bolton, Freixas, and Shapiro, 2007).

Thus, whether retail investors benefit from banks' greater abilities to provide financial advice, based on the fact that such institutions can draw on market knowledge from proprietary trading, or whether banks are incentivized to take advantage of their retail customers through misselling of stocks, given that they trade stocks on their own account, is an empirical question. However, dearly needed empirical evidence in this area is limited. Recent studies that touch on this issue, such as Hackethal, Haliassos, and Jappelli (2012) and Karabulut (2012), find evidence that the involvement of bank advisors, despite some benefits, negatively affects individual portfolio performance. However, these studies only use data from a single advisor.

In this paper, we study a unique dataset that comprises the stock investments of each German bank and of its respective retail customers at the individual security level. We use this dataset first to analyze whether banks have any tendency to push stocks that they sell from their proprietary portfolios into the portfolios of their private customers. Specifically, in the absence of perfect 'Chinese Walls' within banks, it is conceivable that

[1] Recent survey evidence suggests that the use of financial advice is pervasive. For instance, a survey in the EU shows that 80 percent of the respondents seek professional advice before purchasing any investment products (Chater, Huck, and Inderst, 2010). In another survey in the U.S., Hung et al. (2008) document that 73 percent of all investors make use of financial advice when making investment decisions.

[2] Malmendier and Shanthikumar (2007) provide evidence that small investors indeed have a tendency to trust analysts too much and to follow their recommendations exactly, implying that individual investors are not aware of possible distortions in analysts' recommendations.

[3] Misselling is generally understood as the practice of misdirecting customers into buying a product that does not suit their specific needs (Inderst and Ottaviani, 2009). This, of course, also includes selling securities with an inferior risk-return-profile to customers.

banks may steer retail customers through their agents towards stocks that they intend to remove from their proprietary trading books and thereby avoid direct (i.e., exchange and brokerage commissions) and indirect (i.e., market impact) transaction costs of such sales, as well as avoid disclosure to the market of their possible informational advantages. Using both univariate analysis and a series of panel regressions, we first show that a portion of the stocks that banks sell from their proprietary trading portfolios appear to end up in the stock portfolios of their retail customers. This effect is significantly more pronounced for illiquid stocks, for those stocks in which banks hold a relatively large block, and for stocks held in the period after the failure of Lehman Brothers when financial markets were more illiquid. These findings support the notion that banks push stocks to their retail customers to avoid adverse market impacts.

In the second step of our analysis, we compare the performance of stocks that flow from bank portfolios to client portfolios with the performance of other stocks in the portfolios of banks and their retail customers. Using a variety of performance measures, we find that the stocks that banks appear to sell to their retail customers not only underperform other stocks in the bank portfolios but significantly underperform other stocks held by retail customers themselves. This finding strongly suggests that banks systematically push underperforming stocks to their retail customers.

While the latter finding suggests that banks take advantage of their retail customers in specific trades, it does not necessarily imply that retail investors cannot generally benefit from the proprietary trading activities of their banks. Customers take a loss when they are sold underperforming stocks out of their banks' proprietary trading portfolios, but they might still benefit on other trades when banks share their market knowledge with their retail customers. For example, banks may take long positions in future 'winners' while also advising their customers to invest in those stocks, thereby improving the portfolio performance of their retail investors. To test whether such possible beneficial effects outweigh the detrimental agency conflict, in the final step of our analysis, we compare the stock portfolio performance of customers of banks with proprietary trading units with that of the customers of banks without proprietary trading units. Based on several performance indicators, we find that the stock portfolio performance of customers at banks with proprietary trading desks falls significantly short of that of customers at banks without proprietary trading desks.

Overall, our results provide clear evidence that retail investors do not benefit from the proprietary trading activities of their banks. On the contrary, the conflict of interest occasioned by the combination of proprietary trading and advising retail customers and managing their portfolios appears to negatively affect the stock portfolio performances of retail investors. If present at all, the possible gains of retail investors from the banks' market knowledge are clearly offset by the detrimental effects of this conflict of interest.

These findings have important implications for the ongoing discussion about splitting up universal banks and separating their investment banking activity (particularly, proprietary trading) from their commercial and retail banking businesses. Proposals suggesting this separation have been brought forward in the U.S.A. as a key part of the Dodd-Frank Act,[4] in the Vickers Report[5] in the U.K., and in the Liikanen Report[6] in the European

[4] Dodd-Frank Wall Street Reform and Consumer Protection Act, enacted on July 21, 2010.

[5] Final Report of the UK's Independent Commission on Banking from 2011, chaired by John Vickers

[6] Final Report of the High-level Expert Group on reforming the structure of the EU banking sector,

Union, respectively. Of course, the main aim of these regulatory initiatives is to prevent possible moral hazard problems, i.e., to prohibit banks from using implicit and explicit guaranteed deposits and other bank liabilities to engage in excessive risk-taking in their proprietary trading. While our study does not directly contribute to the discussion of this moral hazard problem, our results suggest that the possible costs of regulations that prevent banks from realizing economies of scope between proprietary trading and retail banking are not significant. In fact, it is quite the opposite. The evidence presented in this paper suggests that such regulation might have the positive side-effect of protecting retail investors.

From this perspective, our paper contributes to an important strand of the literature on conflicts of interest within financial institutions. This literature has mainly focused on the agency problems that may arise due to the rampant sharing of information between different divisions of financial institutions.[7] For example, Massa and Rehman (2008) study the possible information spillovers between the lending and asset management divisions of financial conglomerates, finding that mutual funds that belong to bank families exploit their informational advantage (which they acquire through the lending relationship of their affiliated bank) by investing in the stocks of the borrowing firms. Similarly, Acharya and Johnson (2007) and Ivashina and Sun (2011) provide evidence of how banks use private information gained from lending activities when trading credit derivatives or equities of the borrowing companies, respectively. Other studies of information sharing within financial institutions also document conflicts of interest between different divisions of banks, for example, between analysts and investment banking divisions (e.g., Michaely and Womack, 1999; Ljungvist et al., 2007; Agrawal and Chen, 2008; Kadan et al., 2009; Haushalter and Lowry, 2011).

This literature is closely related to the debate about the benefits of universal banks, which culminated in the Gramm-Leach-Bliley Act in the U.S. in 1999. Puri (1996) shows that, in the pre-Glass-Steagall period, U.S. investors paid significantly more for IPOs underwritten by banks rather than by investment houses that could not establish credit relations with firms.[8] Similarly, Ber, Yafeh, and Yosha (2001) provide evidence for Israeli banks that IPO underpricing is reduced if the underwriting bank is also a major lender to the firm. This suggests that universal banks are efficiency enhancing. At the same time, however, Ber, Yafeh, and Yosha (2001) find that bank managed investment funds pay too much for equities offered in IPOs that are underwritten by the respective bank. However, no paper thus far has investigated the link between the proprietary trading activities of banks and their retail banking divisions. We contribute to this literature by directly examining the stock investments of banks and those of their respective retail customers and show that banks tend to take advantage of their uninformed private customers. Thus, our results suggest that combining proprietary trading and retail banking in universal banks generates a substantial conflict of interests and therefore might not be efficiency enhancing.

Our work also relates to the budding literature on financial advice and household

chaired by Erkii Liikanen and initiated by EU Commissioner Michel Barnier.

[7] For a recent comprehensive survey of this literature, see, for example, Mehran and Stulz (2007).

[8] For a theoretical model illustrating the benefits of universal banks in this context, see Puri (1999). Kroszner and Rajan (1997) show that banks' organizational structures helped to contain potential conflicts of interest and played a role in IPO underpricing.

investment decisions (Bergstresser, Chalmers, and Tufano, 2009; Hackethal, Haliassos, and Jappelli, 2012; Karabulut, 2012). We contribute to this literature by broadening the analysis to take account of the larger organizations to which bank advisors are tied. Our results suggest that possible agency problems between advisors and their clients are not limited to the monetary incentives of advisors. In addition, we find that the pressure financial advisors may face from their firms to sell certain products can also drive possible conflicts of interest between customers and advisors.

The remainder of the paper is organized as follows. In Section 2, we introduce the data and provide summary statistics. Our empirical analysis follows a three-stage approach. In section 3, we attempt to shed light on the issue of whether banks have any tendency to push stocks that they sell from their proprietary portfolios to their retail customers. To address this concern, we start with a simple correlation analysis in subsection 3.1 and then, in the subsequent subsections, conduct panel regressions, controlling for bank and time fixed effects under different specifications. In the second stage, reported in section 4, we analyze how the stocks that appear to be moved from bank portfolios into customer portfolios perform relative to other stocks in the bank and customer portfolios. In section 5, we compare the stock portfolio performance of customers at banks that have proprietary trading units to the stock portfolio performance of retail customers of banks that do not have proprietary trading units. Section 6 concludes the paper.

2 Data, Variable Definitions, and Descriptive Statistics

The original dataset employed in this study comprises the portfolio holdings of each German bank and those of its respective retail customers (aggregated at the bank level) on a security-by-security basis for the period from December 2005 to September 2009. This information is directly collected by the Deutsche Bundesbank from financial institutions at the end of each quarter to compile the so-called 'Security Deposits Statistics'.[9]

The original dataset provides security-by-security information for different asset classes, such as bonds, equities, and mutual funds. In our analysis, however, we restrict our attention to single stock investments of banks and their retail customers. Our motivation for this choice is as follows: Single stocks are more information sensitive than bonds or mutual funds. Therefore, possible information asymmetries are more crucial in the case of single stocks, giving rise to potential conflicts of interest between banks and their retail customers, which is the main focus of this paper.

As of December 2005, a total of 2,047 monetary financial institutions in Germany (i.e., commercial banks, investment banks, real-estate credit institutions, etc.) were required to report their portfolio holdings to the Bundesbank. Of these 2,047 monetary financial institutions, 813 had no direct stock investments over the sample period. We therefore exclude these firms from our sample. In addition, there are many small regional banks, mainly the so-called *Sparkassen* and *Volksbanken*, with very limited stock holdings in their portfolios. Therefore, we consider the banks in the top 10 percentile, according to the

[9]Prior to December 2005, monetary financial institutions in Germany were only required to report their own portfolio holdings on an annual basis and not at the individual security level. Therefore, our sample period begins in December 2005, as no data are available from the previous time period.

time-series average of the quarterly stock portfolio value. Finally, we exclude from our sample those banks that have no retail banking unit, which leaves us with a final sample of 102 banks.

Our final sample represents a subset of German banks, albeit the total stock holdings of these banks cover almost 58 percent of the stock investments made by all monetary financial institutions in Germany during the observation period. In addition, the banks in our sample seem to be fairly representative of the entire German banking sector when we examine their portfolio compositions. Table 1 contrasts the shares of different asset classes in the bank portfolios in the final sample with the average portfolio shares of all German banks. As the Table indicates, the portfolio shares of both long-term and short-term bonds as well as the mutual funds share held by banks in our sample do not substantially diverge from those held by German banks as a whole. It is only the stock share that differs systematically in the sampled banks compared to the average German bank. Specifically, the average weight of listed stocks in the bank portfolios in our sample is almost 6 times larger than the stock share in the portfolio of the average monetary financial institution in Germany (5.6% versus 1%).[10]

In this paper, we are interested in the possible interdependence between stock investment decisions of banks and those of their retail customers. To analyze this relationship, we focus on all stock holdings of the banks in the final sample and match them with the stock portfolios of their respective retail customers. In other words, we exclude from the sample those stock observations that appear in the customer portfolios but not in the bank portfolios. Overall, in the final sample, we have a total of $8,375$ different stock positions and $132,059$ observations.

In Table 2, we first present some descriptive statistics on the stock investments of banks and their retail customers in the final sample. The average holding of a bank in a given stock amounts to 2.8 million Euro, whereas this number is 2.1 million Euro in the aggregated customer portfolios of a bank. Similarly, the mean stock portfolio for the banks is 481 million Euro, while the mean aggregated customer portfolio accounts for 871 million Euro.

Moreover, we collect, from Thomson Reuters Datastream, daily information on price, return index, free float market capitalization, trading volume and market-to-book ratio for each stock in the sample for the entire sample period. We then match this information with the stocks in the bank and customer portfolios in our sample.[11] Table 2 also contains summary statistics for the performance measures and other characteristics of the stocks in the final sample.

The main variables of interest in our analysis are the changes in the normalized stock holdings of banks and their respective retail customers. These variables capture how banks and individuals change their holdings in a given stock. More specifically, we first calculate the percentage of the company shares held by the banks and their customers in a given quarter:

[10] It is also important to note that our sample captures the major parts of the German banking sector, as there are banks from all three main banking groups in Germany, i.e., private banks, savings banks, and cooperative banks. In unreported analysis, we compare the stock portfolio values of the sampled banks with the total stock portfolio value of all banks in a given banking group. The banks in our final sample cover most of the stock holdings of the banks in the corresponding banking group.

[11] Note that we fail to find the stock characteristics for some of the stocks in our sample (specifically, for 726 stocks). Thus, we drop these stocks from our sample.

$$Share^B_{ijt} = \frac{Holdings^B_{ijt}}{FFMC_{it}} \quad \text{and} \quad Share^C_{ijt} = \frac{Holdings^C_{ijt}}{FFMC_{it}}$$

where $Holdings^B_{ijt}$ ($Holdings^C_{ijt}$) refers to the Euro value of holdings of a bank (its private customers) in a given stock, and $FFMC$ denotes the free float market capitalization of a particular stock in a given quarter.

Analogously, we then compute the changes in the normalized stock holdings of banks and those of their respective customers as:

$$\Delta Share^B_{ijt} = \frac{Holdings^B_{ijt}}{FFMC_{it}} - \frac{Holdings^B_{ijt-1}}{FFMC_{it-1}} \quad \text{and} \quad \Delta Share^C_{ijt} = \frac{Holdings^C_{ijt}}{FFMC_{it}} - \frac{Holdings^C_{ijt-1}}{FFMC_{it-1}}.$$

It is important to note that we convert both of these measures to basis points by multiplying by 10,000. Furthermore, to ensure that our results are not driven by outliers, we treat the extreme observations at the first and ninety-ninth percentile as missing.[12]

The motivation for the choice of normalizing the euro stock holdings of banks and their customers by the free float market capitalization is threefold. First, it eliminates possible valuation effects, which could generate a spurious positive correlation between the portfolio changes of the banks and their retail customers. In other words, we ensure that changes in portfolio holdings are not driven by stock price increases or decreases. Second, our holdings measures account for possible stock splits and the like, which would not be the case, for instance, if we were to use the number of stocks in the bank (customer) portfolio. Finally, our holdings measures place nominal changes in portfolio holdings in relation to the respective stock market depth. Thus, it accounts for possible differences in the market impact (e.g., the market impact of a sell trade in a small and illiquid stock versus a large and liquid stock).

3 Stock Shifts between Bank and Retail Customer Portfolios

3.1 Univariate Analysis

As a first step towards understanding the interaction between the stock investments of banks and those of their retail customers, we examine the univariate relationship between our two key variables. Table 3 reports the Pearson correlation coefficients. In Column 1, we first look at the relationship between $\Delta Share^B_{ijt}$ and $\Delta Share^C_{ijt}$ for the full sample. We find the unconditional correlation to be positive (0.128) and statistically highly significant (p-value¡0.01). In other words, when a bank changes its position in a given stock in one direction, the retail customers of this bank on average adjust their positions in the same direction.

As we are interested in studying whether banks push stocks that they sell from their proprietary portfolios to their retail customers, we next restrict our attention to the sell trades of banks. As shown in column (ii) of Table 3, the sign of the correlation coefficient

[12] The reason for treating the extreme observations as missing instead of setting them to the upper/lower boundary of the sample is that these observations are most likely to represent erroneous data.

reverses when we only consider those stocks in which banks partially or fully sell off a position: The conditional correlation is now negative (-0.139) and statistically significant at all conventional levels (p-value¡0.01). The negative relationship between bank and customer portfolios suggests that when a bank sells a stock from its proprietary portfolio, its customers tend to buy this particular stock.

Finally, we turn to the relationship between $\Delta Share^B_{ijt}$ and $\Delta Share^C_{ijt}$, conditional on the buy trades of the banks. We now observe that the correlation coefficient is positive (0.165) and statistically highly significant (p-value¡0.01). It appears that retail customers increase their portfolio holdings in stocks in which their banks take long positions. Whether banks share their possible private information with their customers or whether this finding reflects front-running of banks is, however, unclear.

In short, the univariate statistics show both statistically and economically significant relationships between stock investments of banks and those of their retail customers. The correlation between the direction of investment flows of banks and their customers in a particular stock is positive when the banks buy this stock, whereas the sign of the correlation coefficient reverses when the sample is restricted to sell trades of the banks. To analyze the asymmetry in this relationship in more detail, we turn to more formal tests in the next section.

3.2 Multivariate Analysis

To analyze the possible interdependence between the stock investment decisions of banks and those of their retail customers, we employ an interaction model.[13] More specifically, our baseline model has the following form:

$$\Delta Share^C_{ijt} = \beta_1 \cdot \Delta Share^B_{ijt} + \beta_2 \cdot \text{Sell}^B_{ijt} + \beta_3 \cdot \Delta Share^B_{ijt} \times \text{Sell}^B_{ijt} + \beta_4 \cdot \text{Controls}_{it-1} + \gamma_j + \alpha_t + \epsilon_{ijt} \tag{1}$$

$$Sell^B_{ijt} = \begin{cases} 1 & \text{if } \Delta Share^B_{ijt} < 0 \\ 0 & \text{if otherwise} \end{cases}$$

Here, i refers to a publicly traded stock, j is the index to the sampled bank, and t refers to the quarterly time period. $Sell^B_{ijt}$ is a dummy variable that takes a value of 1 if bank j reduces its holdings of stock i in quarter t and 0 otherwise. $\Delta Share^B_{ijt}$ and $\Delta Share^C_{ijt}$ represent changes in the percentages of particular company shares held by banks and their retail customers, respectively. Controls_{it-1} includes stock specific characteristics such as performance, volatility, market-to-book ratio, and trading volume, which are measured in quarter $t-1$. In the following, we discuss in detail why these stock characteristics are relevant and matter in the analysis. γ_j represents the time-invariant bank-specific unobserved heterogeneity that is assumed to be correlated with the regressors. We control

[13] An alternative approach is to split the sample and study separately the portfolio changes of retail customers in those cases were banks did or did not reduce their own portfolio holdings of the respective stock. However, as noted by Brambor et al. (2005), this procedure is not associated with any gains in interpreting the coefficients, but rather induce efficiency losses because of the smaller sample sizes. Nevertheless, we ran the full set of regressions on the the split samples to check the robustness. The results are, however, both qualitatively and quantitatively very similar.

for bank fixed effects by including dummy variables for each sampled bank in the model.[14] In other words, we estimate the pooled panel regressions with bank fixed effects, using the ordinary least squares method. α_t denotes the time-fixed effects that we also control for by including quarter dummies. As noted by Brunnermeier and Nagel (2008), including such time dummies would de-mean the aggregate shocks cross-sectionally, leaving only the idiosyncratic changes (which are for us the relevant part). Finally, ϵ_{ijt} is a random disturbance term that is uncorrelated with the dependent variables. Given the panel structure of our data, the error term can be correlated both serially and cross-sectionally. To address this concern, we employ the Driscoll and Kraay (1998) standard errors while computing the t-statistics.

The regression model given in Equation 1 allows us to analyze whether and to what extent the investment decisions made by a bank in a given stock affect the holdings of its retail customers in that particular stock. Moreover, by incorporating the interaction term, i.e., $\text{Sell}^B_{ijt} \times \Delta Share^B_{ijt}$, we also test for asymmetries between when a bank sells a stock and when it buys a stock.

Obviously, the interaction term is the main variable of interest in our model. Specifically, if the banks in the sample have any tendency to push stocks that they sell from their proprietary portfolios to their retail customers, the sum of the coefficient estimates (i.e., β_1 and β_3) on the interaction term and the stand-alone variable ($\Delta Share^B_{ijt}$) should have a negative sign.

In Table 4, we present the results for the baseline regressions. Column (i) reports the coefficient estimates of the baseline model without any control variables. The estimated coefficient on $\Delta Share^B_{ijt}$ is positive and statistically significant. This suggests that changes in the stock holdings of banks and their retail customers relative to the free float market capitalization move in the same direction. This may simply be due to the changes in the free float market capitalization of stocks, which generate a spurious positive correlation between $\Delta Share^B_{ijt}$ and $\Delta Share^C_{ijt}$. However, it may also indicate that banks and their retail investors trade on similar information or even that banks share some of their information with their customers. The estimated coefficient on the interaction term, however, is negative and statistically significant. This implies that the effect of a decrease in a given stock share in the bank portfolio is associated with an increase in the share of that particular stock in its customer portfolios (i.e., $\beta_1 + \beta_3 < 0$). The larger the position that a bank sells off, the stronger is the tendency of its customers to increase their holdings in this particular stock, which is also consistent with findings from the univariate analysis.

One shortcoming of the baseline model is that we do not account for any time-specific effects at the stock level. For example, one could argue that the return chasing behavior of individual investors can drive our results (Bergstresser, Chalmers, and Tufano, 2009).

[14] To assess whether a fixed effect (FE) model is the appropriate specification, we first perform the Breusch and Pagan (1980) Lagrange multiplier test, finding that the random state effects are significant and that their variance differs from zero. Similarly, the F-test also implies that FE estimation performs better than pooled OLS. To determine which of these panel estimation techniques (RE or FE) to employ in the analysis, we finally perform a Hausman and Taylor (1981) specification test: The estimated p-value of the Hausman and Taylor (1981) test is zero, implying that we reject the null hypothesis of consistent and unbiased estimates under an RE estimation. In other words, the Hausman and Taylor (1981) specification test indicates that FE estimation is the appropriate technique, as it provides consistent and unbiased estimates. Therefore, we always employ the fixed effects technique in analyzing the relationship between bank and customer portfolios.

More specifically, retail investors may have a tendency to invest in stocks that exhibit positive returns in the previous quarter, whereas banks may avoid such an investment bias and rather cater to the increased demand of their customers for those stocks. To address this issue, we construct a dummy variable, Dummy gain$_{it-1}$, that is equal to one for stock i if it exhibited a positive average return in the previous quarter $t-1$ (Bodnaruk, Massa, and Simonov, 2009). Similarly, one might also suspect that greater uncertainty associated with a stock's valuation in a given time period may lead to portfolio reallocations between banks and their customers, perhaps because retail investors and financial institutions have different attitudes towards realized risk. Therefore, we control for the volatility of the daily returns, $Vola_{it-1}$, of each stock i in the previous quarter.[15] We proxy for stock volatility with the standard deviation of daily returns in the previous quarter. Moreover, retail customers might have a tendency to avoid illiquid stocks, whereas banks might be less concerned about the liquidity of their positions. Therefore, retail investors could reduce their holdings of stocks whose transaction volumes are low. In terms of market timing, retail customers might also sell off stocks that they view as overvalued, which should be captured by the market-to-book ratio. To ensure that our findings are not driven by these effects, we include as further controls the previous quarter's market-to-book ratio ($MtBV_{it-1}$) and the trading volume ($Turnover_{it-1}$) for each stock i in the model.

The results, reported in column (ii) of Table 4, provide no evidence for performance chasing behavior of retail customers. On the contrary, when a stock had a positive average return in the previous quarter, private investors tend to sell this stock in the following period and reduce the share of this stock in their portfolios. This finding is in line with the results of Calvet, Campbell, and Sodini (2009), who also find that the probability of an exit decision from the stock market increases when stocks held by individuals exhibit large absolute positive returns.[16] Past realized volatility also has a significant effect on the stock investment decisions of retail investors. However, the estimated coefficient on this variable has the opposite sign of what one might expect: retail investors appear to increase their holdings in stocks that display high volatility in the previous quarter. This result is somewhat puzzling but consistent with findings in the existing literature (Shefrin and Statman, 2000; Statsman, 2002). As regards market-to-book value, we find no significant effect on retail customers' investment decisions. Finally, our results indicate, somewhat surprisingly, that retail investors tend to sell stocks when their market liquidity, as measured by trading volume, is high. Overall, most important for our analysis is that including these time varying stock controls does not change our main finding: Holdings of a stock by a bank's retail customers increase as the bank reduces its holdings of the respective stock, even after controlling for stock characteristics.

Furthermore, one could also presume that the decision of individuals to invest in a particular stock can be partly driven by the portfolio decisions of their peers. Investors might herd simply because they suspect others have superior information (Banerjee, 1992) or they might try to ride a bubble.[17] What might appear to be herding behavior might

[15] Note that we cannot use a dummy for contemporaneous positive abnormal returns or the contemporaneous return volatility of a stock i in quarter t because they might be endogenous.

[16] Calvet, Campbell, and Sodini (2009) attribute the strong positive effect of winning stock performance on the exit decision to the disposition effect, i.e., the tendency to sell winning stocks too early and losing stocks too late (Shefrin and Statman, 1985; Odean, 1998).

[17] As noted by De Long et al. (1990), the sentiment-driven demand of individual investors can be correlated if they follow similar signals from the market, such as the forecasts of Wall Street gurus or

also result from investors responding jointly to investment recommendations of the same professionals or their like (Scharfstein and Stein, 1990; Graham, 1999). In any case, large-scale demand of retail customers for a particular stock must be met by some other market participant. Some banks, with this particular stock in their portfolio, might find it attractive - particularly, after a price increase - to sell it to their customers. Thus, according to this argument, our results would not indicate that banks push stocks to their retail customers. Rather, our results would be driven by the retail investors' demand for particular - maybe overvalued - stocks.

To ensure the robustness of our results to this possibility, we construct a variable for the aggregate investment decisions of other individual investors in a specific stock at a given time. More precisely, we first aggregate the changes in the normalized stock holdings of all retail investors in a particular stock in a given quarter and then exclude the changes in the same stock made by the retail customers of the bank in question from this aggregate, i.e.,:

$$\Delta Share_{ijt}^{others} = \sum_{k \neq j}^{J} \Delta Share_{ikt}^{B} \tag{2}$$

As column (iii) in Table 4 shows, such herding behavior seems to play a significant role. Retail customers tend to increase (decrease) their portfolio positions in stocks in which customers of other banks simultaneously increase (decrease) their holdings. Nevertheless, accounting for the possible herding behavior of individuals leaves our results unaffected, supporting the view that our results are not driven by the herding behavior of individuals.

Next, one might also suspect that, rather than reflecting banks pushing stocks to their customers, our results may be due to the opposite flow of stocks. Specifically, the negative relationship between banks' and their customers' stock positions may exist because banks may serve as market makers for their retail clients: Banks sell to their retail customers those stocks that their customers demand and buy from their customers those stocks that their customers sell. If such a relationship exists, it is natural to assume that the dependency between bank and customer portfolios would also be negative when banks increase their holdings of a given stock.

However, as already shown in the univariate analysis, an increase in a bank's holdings in a given stock is associated with an increase in the bank's customers' holdings of this stock. This suggests that banks do not appear to take the counter positions that their customers wish to liquidate, i.e., banks do not serve as market makers for the sell trades of their customers. To further assess this finding, we construct a dummy variable, Buy_{ijt}^{B}, that is equal to 1 when a bank buys a stock and 0 otherwise. We then substitute this variable for the indicator variable for the sell trade of a bank and estimate the interaction model, as in Equation 1:

$$\Delta Share_{ijt}^{C} = \beta_1 \cdot \Delta Share_{ijt}^{B} + \beta_2 \cdot Buy_{ijt}^{B} + \beta_3 \cdot \Delta Share_{ijt}^{B} \times Buy_{ijt}^{B} + \beta_4 \cdot \text{Controls}_{it-1} + \gamma_j + \alpha_t + \epsilon_{ijt} \tag{3}$$

past price and volume patterns.

$$Buy^B_{ijt} = \begin{cases} 1 & \text{if } \Delta Share^B_{ijt} > 0 \\ 0 & \text{if otherwise} \end{cases}$$

Column (iv) in Table 4 reports the estimation results, which confirm the findings of the univariate analysis. The estimated coefficient on the interaction term (i.e., $\Delta Share^B_{ijt} \times Buy^B_{ijt}$) is positive and highly significant. Thus, it is unlikely that our results are driven by banks acting as market makers for their retail customers. If this were the case, banks would take only the opposite sides of their customers' trades when their customers wished to buy stocks. Our findings suggest, on the contrary, that the direction of stock flows is from bank to customer portfolios, underscoring our hypothesis that banks push those stocks that they sell from their own trading books to their retail customers.

Finally, one could argue that our results are blurred by customers being less likely to increase their holdings in certain stocks if they already hold a substantial number of those shares. Conversely, customers of banks tend to overweight particular stocks due to local bias or industry bias. Banks might at times simply accommodate the demand for these specific stocks by selling them to their customers from their proprietary trading portfolios. To control for this effect, following Haushalter and Lowry (2011), we include in our model the normalized holdings of stock i of bank j's customers in the previous quarter $t-1$ as a control variable. Column (v) in Table 4 reports the estimation results. As the results indicate, retail customers indeed have a tendency to increase their holdings of stocks in which they already hold a position. However, incorporating this additional effect into our analysis does not change our main finding.

Overall, controlling for other possible explanations of why larger sell trades of banks in a stock are related to large increases in the portfolio holdings of the respective stock by banks' customers does not change our key finding. Thus, we are relatively confident in interpreting our results as evidence that banks tend to push stocks that they sell from their proprietary trading portfolio to their retail customers. In the following section, we dig deeper into this effect and analyze possible drivers of this behavior. Identifying what induces and what permits banks to push stocks into the portfolio of their customers might further affirm our reading of the results.

3.3 Drivers of the Stock Shifts between Bank and Retail Customer Portfolios

An essential question that immediately arises concerns how banks can push stocks into the portfolios of their retail customers. In the absence of perfect 'Chinese Walls', banks' portfolio management units are a natural suspect for such a channel.[18] If banks manage portfolios on behalf of their retail customers, the customers might not be fully aware of the stocks that are added to (or removed from) their portfolios. Thus, a portfolio manager can easily – intentionally or unintentionally – push those stocks to their customers that the proprietary trading desk intends to sell. Whether portfolio managers do so, fully aware of possible conflicts of interest, or whether they are only following, for instance, a 'hot stock tip' of their colleagues is beyond the scope of this paper. However, using our

[18]Note that we use the term portfolio management for the sake of brevity in referring to discretionary portfolio management services offered by banks to their individual clients.

dataset, we can assess to what extent the portfolio management divisions of banks may play a role in this process.

We define a dummy variable with a value of 1 for banks that have an active portfolio management unit and 0 otherwise.[19] To analyze whether those banks with portfolio management divisions tend to push stocks into their customers' portfolios, we interact the active portfolio management unit dummy with our key variables of interest, i.e., $\Delta Share^{B}_{ijt} \times Sell_{ijt} \times PM_{ij}$. Column (i) of Table 5 presents the estimation results. As shown in the Table, the negative relationship between bank and customer portfolios is more pronounced for banks that run portfolio management units than for those that do not. Clearly, retail customers tend to more heavily purchase those stocks that their banks sell out of their proprietary trading portfolios.

To check the robustness of this result, we next split the sample into two: one containing banks with active portfolio management units and one comprising all banks that do not have portfolio management units. We then run the baseline regression, including all control variables, for these two subsamples separately. Columns (ii) and (iii) of Table 5 report the results for the subsamples. The regression results confirm the findings for the interaction model: it is the banks with portfolio management divisions, selling from their proprietary portfolios, that push stocks to their retail customers. For banks that do not actively manage the portfolios of their retail customers, we find a weaker and only marginally significant relationship between the stock investment decisions of banks and their customers. Overall, it appears that the portfolio management units play an important role in the reallocation of stocks from banks' proprietary portfolios to customers' portfolios.

As most of the banks in our sample are relatively large and thus have portfolio management divisions, one might suspect that the differences in the sample sizes may drive the differential effects we observe in the regressions for the subsamples. To address this concern, we randomly draw equal numbers of observations from the subsample of banks with active portfolio management units to match the number of observations from the subsample of banks without portfolio management units. The estimates for this randomly drawn sample are shown in column (iv) of Table 5. They indicate that our findings are not driven by differences in sample sizes.

Overall, it appears that the combination of portfolio management and proprietary trading provides banks with an opportunity to easily push stocks from their proprietary trading portfolios to their retail customers' portfolios. The next question that arises is: what compels banks to take advantage of this opportunity and sell stocks to customers rather than in the financial markets? A priori, we propose two possible explanations: (a) banks wish to avoid market impact; (b) banks do not want to disclose private information they have about companies.

To assess the extent to which concern about market impact is a crucial driver, we first calculate the average Amihud ratio for each stock in each quarter in the final sample. This illiquidity measure is generally seen as a good approximation of the price impact of security trades.[20] It is defined as the ratio of the quarterly average of daily price changes

[19] These data are hand-collected, based on reports of banks on their websites or in their annual reports.

[20] For a comprehensive comparison of different market liquidity measures, see, for example, Goyenko et al. (2009), who also note that the Amihud ratio is a good indicator of the price impact of trades.

of a stock to the transaction volume on a given day (Amihud, 2002):

$$Amihud_{it} = \frac{1}{D_{it}} \sum_{d=1}^{D_{it}} \frac{|P_{idt} - P_{idt-1}|}{Vol_{idt}} \tag{4}$$

where D_{it} is the number of trading days in quarter t for stock i, and P_{idt} and Vol_{idt} are stock i's price and trading volume on day d in quarter t, respectively.

Stocks with high Amihud ratios are generally regarded as illiquid. Therefore, we define stocks with an Amihud ratio above the median value in a given quarter as illiquid. Accordingly, we generate a dummy variable (i.e., $Illiquid1_{it}$) that is equal to one if the Amihud ratio of stock i is above the median Amihud ratio for all stocks in quarter t and 0 otherwise. To avoid extremely illiquid stocks, we eliminate penny stocks, that is, stocks with prices of less than one euro, from the sample.[21] If banks push stocks from their proprietary trading portfolios to customers to avoid market impact, the negative effects of banks' sell trades should be stronger among illiquid stocks. To capture this effect, we include in our baseline regression a three-way interaction term ($\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times Illiquid1_{it}$) between the dummy variable characterizing illiquid stocks, the indicator variable for the sell trades of the banks, and the change in the banks' normalized stock holdings. Column (i) of Table 6 presents our findings. As shown in the table, banks appear to more heavily push relatively more illiquid stocks to their retail customers. The three-way interaction term has a significant negative coefficient, suggesting that reduction of a stock in a bank's portfolio leads to a particularly strong increase of that stock in the bank's customers' portfolios, if that stock is less liquid, based on the Amihud ratio.

However, we note that these results could be driven by stock observations that are close to the median Amihud ratio. To check for robustness, we next group stocks into three quantiles: the most liquid third (Q1), the intermediate third (Q2), and the most illiquid third (Q3). We assign a dummy variable to illiquid stocks ($Illiquid2_{it}$) that fall into the highest quantile, i.e., the most illiquid stocks (Q3). We then estimate our panel regressions, using the three-way interaction term ($\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times Illiquid2_{it}$), for a subsample that contains only the most illiquid and most liquid stocks (Q1+Q3). As reported in column (ii) of Table 6, we find that the difference in the effects between liquid and illiquid stock is even more pronounced under this specification. A given reduction in a bank's holdings of a stock is associated with a significantly larger increase in the holdings of that stock by the bank's customers if the stock is in the highly illiquid quantile (Q3) rather than in the highly liquid quantile (Q1). Thus, banks appear to push particularly illiquid stocks from their proprietary trading portfolios into the portfolios of their customers. Finally, we also split the sample into liquid stocks (Q1) and illiquid stocks (Q3) and estimate the baseline panel regression with the full set of control variables for these subsamples separately. The findings, reported in columns (iii) and (iv) of Table 6, confirm our previous results. For the sample of illiquid stocks, we find that a reduction in a bank's holdings of a particular stock leads to a larger increase in customers' portfolios than in the sample of more liquid stocks. Thus, our results suggest that banks push stocks to their retail customer portfolios to avoid market impact.

Our sample period covers 12 quarters before the subprime crisis culminated in the

[21] Note that exclusion of penny stocks reduces the sample size by approximately 10,000 to 122,703 observations.

failure of Lehman Brothers in 2008Q3 and 4 quarters after the Lehman collapse. We can thus use the Lehman failure as a natural experiment to further assess whether it is indeed market impact costs that banks try to avoid when pushing stocks that they liquidate to their retail customers. During the financial crisis, especially after the Lehman collapse, financial markets dried up, and market liquidity evaporated on a large scale. Thus, if banks really aim to avoid market impact, they should have an especially strong incentive to liquidate their stock positions by selling them off to their retail customers in the post-Lehman period.

To address this issue, we define a dummy variable that takes a value of one for the time period following the Lehman failure. Similarly to the above, we interact this dummy variable with our key variable of interest. The three-way interaction term ($\Delta Share^B_{ijt} \times Sell^B_{ijt} \times Lehman_t$) allows us to assess whether banks more heavily push stocks to their retail customers in the post-Lehman period when financial markets are particularly illiquid. Our estimates, reported in column (v) of Table 6, indicate that a decline in a bank's stock position is associated with a strong increase in the holdings of this stock by the bank's customers even before the Lehman failure. However, this relationship is significantly more pronounced in the period following the Lehman collapse. If we split our sample into pre-Lehman and post-Lehman periods and estimate the baseline regressions separately for these subsamples, we obtain similar results (see columns (vi) and (vii) of Table 6). The negative relationship between bank and customer portfolios appears to be significantly stronger in the period following the Lehman collapse. This suggests that in periods of especially illiquid markets, banks more heavily push stocks that they sell from their portfolio to their retail customers, providing further support for the market impact hypothesis.

Apart from avoiding market impact, concealing private information about a stock provides another rationale for why banks may avoid selling stocks in the financial markets and instead sell them directly to their retail customers. However, whether a bank possesses any private information about a company is by definition hard to measure. Therefore, we use two different proxies for whether a bank is more likely to possess private information about a given company.

As a first proxy, we use the block holdings of a bank in a company. We argue that if a bank is a major owner of a company and holds a sizable share of its issued stock, it is more likely that the bank possess/receives more detailed information about that firm compared to other market participants, either through a close relationship to the firm or more intense monitoring of it. As the percentages of company shares held by banks in our sample are relatively small, we first use a threshold of a 0.5% share of the free-float market capitalization held by a bank to define a high ownership level. More specifically, we construct a dummy variable ($Blockholder1_{ijt-1}$) with a value of 1 if bank j holds more that 0.5 percent of the free float market capitalization of stock i in quarter $t-1$. This dummy variable is then interacted with our key variable of interest. The estimated coefficient of the three-way interaction term ($\Delta Share^B_{ijt} \times Sell^B_{ijt} \times Blockholder1_{ijt-1}$) allows us to assess whether a bank is more inclined to push stocks of which it holds a larger position to its retail customers when selling off part of its holdings. As reported in column (i) of Table 7, banks seem to have a stronger tendency to liquidate a stock position by selling parts directly to their retail customers if they hold a larger stake in the respective firm.

One could argue, however, that concealing private information by circumventing the market is only likely if the bank is not obliged by regulation to publish changes in its voting rights that result from its trades. In Germany, investors are required to report changes in their voting rights if they hold more than 3% of a firm's equity. Thus, to check the robustness of our results, we next exclude stock observations if the percentage of company shares held by a bank exceeds 3% of the free float market capitalization. The coefficient estimates are reported in column (ii) of Table 7, where we observe that our results are unchanged. As a further robustness check, we define an additional dummy variable for high ownership levels of banks in companies (i.e., $Blockholder2_{ijt-1}$). This variable takes a value 1 if bank j's holdings of stock i in quarter $t-1$ exceed the 90th percentile of the percentage of the company shares held by all banks in the final sample. Again, we find, for those stocks of which banks hold a relatively large share, a stronger effect of a bank's stock sales on the stock holdings of its customers (see column (iii) in Table 7).

Admittedly, the blockholdings of banks in firms represent a vague measure of the possible informational advantage of banks about such firms. Alternatively, one can argue that this measure actually proxies for a bank's incentives to avoid market impact. In particular, if a bank holds a sizable amount of stock even after liquidating some of it, it might be worried that the price impact of the sale causes accounting losses due to marking-to-market of the remaining shares. Thus, we cannot be sure that our blockholding measure captures banks' incentives to avoid revealing private information rather than to avoid price impact. Therefore, we next focus on a second indicator, one that we believe may serve as better proxy for possible informational advantages of banks.

German banks tend to maintain strong business relationships with German firms. For instance, domestic firms are more likely to use German banks than non-German banks as underwriters of IPOs and SPOs. Furthermore, German banks more often serve as key lenders to local firms. Thus, it appears more likely that German banks have an informational advantage over other market participants when trading German stocks but not international stocks. Therefore, we first define an indicator variable for stocks of firms located in Germany and then construct a three-way interaction term with our key variable (i.e., $\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times \text{German stock}_{it}$). The estimation results are reported in column (iv) of Table 7. As seen in the table, we do not find a significantly different relationship between a bank's stock sales and its retail customers' holdings of the respective stocks of German firms. Thus, based on this test, we cannot confirm the hypotheses that banks sell off stocks to their customers in order to conceal private information about companies.[22]

In sum, the evidence presented in this section strongly supports the view that banks push stocks from their proprietary trading portfolios to their retail customer portfolios to avoid market impact. The alternative hypothesis, that banks do so to conceal possible informational advantages, appears to not be supported by the data.

[22]In unreported analysis, we also identify whether a particular bank was involved in an IPO or SPO of a particular company during the sample period. We then examine whether banks more heavily push stocks to their customers for whom they acted as the underwriter or market maker. As we could identify only a very small number of IPOs and SPOs during the sample period, we cannot identify a particular effect for those stocks.

4 Stock Performance

The previous section provides evidence that banks appear to push stocks that they sell from their proprietary portfolios to their private customers. Whether this has any negative implications for their retail customers remains an open question. Banks might simply acquire stocks that cater to the preferences of their customers in order to sell these stocks to their clients later. In fact, banks might even buy larger positions in stocks that banks expect to outperform the market simply to pass some of those to their customers. Therefore, the observation that banks move stocks from their proprietary trading portfolio into the portfolios of their customers can actually be an indication that banks share their market knowledge with their customers. Thus, to assess whether there is a conflict of interest between proprietary trading and retail banking divisions, we next study the performances of those stocks that are pushed from the proprietary trading portfolios of banks to their retail customers.

First, we naively compare the quarterly average returns of stocks sold by banks to their retail customers (i.e., *Case Group*) with the average returns of stocks in different control groups that we construct based on the stocks in the bank and retail customer portfolios. The first control group (i.e., *Control Group I*) includes all the stocks that retail customers hold in their portfolios, except those that they receive from their respective banks. This control group allows us to assess how strong stocks in customers' portfolios perform compared to the stocks that were presumably pushed by banks into their clients' portfolios. The second control group (i.e., *Control Group II*) consists of stocks of which retail customers increase their holdings but excluding stocks that their respective banks simultaneously sell from their proprietary portfolios. The average return on this control group captures the stock picking ability of customers when they invest in stocks that their respective banks do not sell. The additional control groups capture the performance of banks' stock investments, to determine whether stocks that banks push to their customers perform differently from the other stock positions banks hold, buy or sell. Accordingly, the third control group (i.e., *Control Group III*) includes all stocks held by banks other than those that the banks partially sell to their customers. The *Control Group IV* covers only those securities in which banks increase their positions, to measure the stock picking abilities of banks. Finally, *Control Group V* comprises stocks that banks sell but not to their respective customers, i.e., stocks in which banks reduce their positions but in which their retail customers do not increase their holdings.

We first simply calculate the average gross returns $\overline{GR}^G$ for the case group (i.e., $\overline{GR}^0$) and different control groups $G = \{1, ...5\}$. We derive for each stock i the average return r_{it+1} for the following quarter $t+1$, based on our market data. We then assign the stocks to the different groups G, based on the observations for the quarter t and average the different stock returns in a given control group for the following quarter $t+1$:

$$\overline{GR}^G = \frac{1}{T-1}\sum_{t+1}^{T}\frac{1}{N}\sum_{i}^{N} r_{it+1} \quad \forall \quad i \in G|t \tag{5}$$

As a slightly more sophisticated measure, we also compare the average abnormal return $\overline{AR}^G$ for the different control groups, using a four-factor model. We estimate quarterly abnormal returns α_{it} for each stock based on daily market data, using the four-factor

model that includes Fama and French (1993) factors and the Carhart (1997) momentum factor:

$$r_{itd} - r_{ftd} = \alpha_{it} + \beta_1 \cdot RMRF_{td} + \beta_2 \cdot SMB_{td} + \beta_3 \cdot HML_{td} + \beta_4 \cdot MOM_{td} + u_{itd} \quad (6)$$

where $r_{itd} - r_{ftd}$ is the daily return of stock i in excess of the risk-free rate in quarter t, α_{it} is the risk-adjusted abnormal stock return in quarter t, $RMRF_{td}$ denotes the excess return on the market portfolio and SMB_{td}, HML_{td} and MOM_{td} correspond to returns on size, value premium and momentum portfolios, respectively.[23] Based on the individual abnormal returns of stocks in the following quarter, i.e., α_{it+1}, the average abnormal returns $\overline{AR}^G$ for the case group and the different control groups are then calculated in a manner equivalent to (5).

Table 8 presents the mean and median values of the gross returns and the abnormal returns calculated with the four-factor market model, respectively. We use the t-test and Wilcoxon test (Wilcoxon, 1945) to test whether the mean and median returns on stocks in the case and control groups are significantly different from each other. For both return measures, the t-test and Wilcoxon test indicate that the mean and median returns on stocks in the case group are significantly below returns on stocks in most of the control groups. For instance, we find strong evidence that the average and median stocks that banks hold in their portfolios (i.e., *Control Group III*) and the average and median stocks in which banks have increased their holdings in a given quarter (i.e., *Control Group IV*) perform significantly better than the mean and median stocks that banks push into their retail customers' portfolios. Of course, one could argue that this simply reflects the better stock selection and market timing abilities of institutional investors compared to individual investors (Bollen, 2001). From that perspective, these performance differences do not indicate that banks' behavior is detrimental to retail investors. It only shows that retail investors do not fully benefit from the stock selection and market timing abilities of their respective banks. However, we also observe that the stocks in which retail investors increase their holdings have significantly higher mean and median gross returns than stocks that retail clients presumably receive from their banks' proprietary portfolios. This also holds for the comparison of mean abnormal returns in the four-factor model. The median stock in retail investors' portfolios outperforms the median stock in the case group, whereas we do not find any significant difference between the mean stock returns in customers' portfolios.

Only in the case of stocks that banks sell off but not directly to their customers do we find a mean abnormal return that is worse than that of stocks that are pushed into the customers' portfolios. This might indicate that price impact is indeed an issue that banks can avoid by selling to their customers.

In sum, the results of this naive test suggest that banks not only push underperforming stocks onto their customers. The stocks that customers evidently receive from their banks

[23] The size portfolio return (SMB) is proxied by the difference in daily returns on the small cap SDAX index and the large cap DAX 30 index. The book-to-market portfolio return (HML) is proxied by the return difference between the MSCI Germany Value Index and the MSCI Germany Growth Index. Finally, the momentum portfolio return (MOM) is the difference in daily returns between a group of stocks with recent above-average returns and another group of stocks with recent below average returns from the CDAX index.

perform more poorly than both stocks already in their portfolios and stocks in which they increase their holdings but not by acquiring them from their banks. Thus, the effect of banks pushing stocks from their proprietary trading portfolios to their retail customers indeed appears to be detrimental for the banks' retail customers. The stocks that are moved by banks to their customers underperform systematically.

However, this naive comparison of the mean and median performance of stocks across different banks has some shortcomings. In particular, it does not tell us whether the mean and median stocks moved by the *average* bank to its customers' portfolios underperform the mean and median stocks held by the customers of the *average* bank. Pooling stocks across banks and aggregate customer portfolios of different banks does not account for bank heterogeneity. Using the average performance of stocks across banks implies that banks with large proprietary trading portfolios and banks with large customer portfolios have a stronger effect on the performance of the mean and median performance of stocks held by retail investors. However, banks with large proprietary trading portfolios do not necessarily have a large aggregate customer portfolio. At the same time, stocks that fall in a particular group for several banks count only once when simply taking the mean and median returns of the different groups across banks.

Therefore, as a more sophisticated approach, we next construct 6 different stock portfolios (1 case and 5 control groups) in each period for each bank, based on the definitions provided above. Note that those quarters in which there is no stock in the portfolios are excluded from the analysis. We then calculate the equal-weighted returns for each of these stock portfolios and contrast their performances using the t-test and Wilcoxon test, respectively:

$$EWR_{jt}^{G} = \frac{1}{N}\sum_{i}^{N} r_{ijt+1} \quad \forall \quad i \in G|t \tag{7}$$

To take into account that stocks can have different weights in different stock portfolios, we also calculate the value-weighted portfolio returns, i.e., VWR_{jt}^{G}, for each bank in each period:

$$VWR_{jt}^{G} = \sum_{i}^{N} w_{ijt}^{G} \cdot r_{ijt+1} \quad \forall \quad i \in G|t \tag{8}$$

where w_{ijt}^{G} is the weight of stock i in the stock portfolio G of bank j in quarter t. Furthermore, we not only calculate the equal-weighted and value-weighted portfolio returns, using raw stock returns (i.e., r_{ijt+1}), we also use the abnormal stock returns (i.e., α_{it+1}), estimated using (6) to calculate EWR_{jt}^{G} and VWR_{jt}^{G}, respectively.

Table 9 presents the comparisons of these different stock portfolios.[24] Again, we use the t-test and the Wilcoxon test to assess whether there are differences in the performances of stocks in the case and control groups at the bank level. The results provide an even clearer picture than that of the naive approach: When comparing the returns of the stock portfolios at the bank level, the value-weighted and equal-weighted portfolio returns of stocks moved from banks' proprietary trading portfolios to their customers' portfolios

[24]Note that we constantly have only 791 observations because not every bank among the 102 banks in the sample move one or more stocks to customer portfolios in each period.

(i.e., *Case Group*) underperform the portfolio returns of all control groups. This is true not only for comparisons of stocks in the case group with stocks in bank portfolios. It is also true for stocks held by retail investors.

In general, our results provide strong evidence that it is detrimental to retail customers to receive stocks sold from their banks' proprietary trading portfolios. It is not just that banks push stocks that are worse-performing than other stocks they have in their portfolios but that such stocks also underperform stocks already held by retail customers or acquired from other sources. Thus, the conflict of interest that arises between banks' proprietary trading and retail banking divisions, when banks use their customers as exit channel for stock positions, is clearly detrimental to retail investors.[25]

5 Is Proprietary Trading *really* Detrimental to Retail Investors?

The analysis thus far provides evidence that banks push underperforming stocks that they sell from their proprietary portfolios to their retail customers. Thus, there appears to be a conflict of interest between the proprietary trading activities of banks and their retail banking units, a conflict of interest that negatively affects the stock performance of retail investors.

However, this finding does not necessarily imply that the net effect of being a customer at a bank with a proprietary trading division is detrimental to retail investors. For example, banks might share information with retail customers about stocks that could potentially outperform the market. In particular, banks may take long positions in future 'winners' while also advising their customers to invest in those stocks, or they may directly place such stocks in customers' portfolios through their portfolio management divisions. Ultimately, gains retail investors realize as a result of their banks' market knowledge may compensate for the losses they experience when their banks push underperforming stocks on them.

Thus, to answer the question of whether banks' proprietary trading activities are indeed detrimental to their retail customers or whether retail investors benefit from the market knowledge that their banks acquire through proprietary trading, we compare the stock portfolio performance of retail investors whose banks have proprietary trading units with those of retail investors whose banks do not have such units.

When comparing the stock performances of bank customers, we no longer restrict our attention to the subsample of banks with the largest proprietary trading portfolios. Instead, we now consider all banks for which we have information on the stock investments of their retail customers. A total of 1,846 banks report the stock holdings of their retail customers to the Bundesbank. Of these 1,846 banks, 37 percent (677 banks) have no stock investments, while the remaining 63 percent (1,169 banks) hold stock positions in

[25] In a further analysis, we split the sample into the pre-Lehman and post-Lehman periods, comparing the performance of stocks that banks push from their proprietary trading portfolios to their customers with the performance of the different control groups, using both our naive and more sophisticated performance measures. For brevity, we do not report these results; however, they are available upon request. In sum, they show that the performance differences cited above are significant both before and after the Lehman failure. The difference is also slightly elevated after the Lehman failure, suggesting that banks' incentives to sell underperforming stocks to their customers is more pronounced during crises.

their proprietary portfolios. Finally, it is important to note that we now consider all stock holdings, in retail customers' portfolios, that have a value of at least 100 Euro.

Following the same procedure as in Daniel et al. (1997), we first calculate for each bank's customer portfolio the monthly raw returns, which would be realized by holding the same portfolio share of stocks, as reported by the end of the previous quarter, in each month of the following quarter. Again, we compute both value-weighted and equal-weighted monthly portfolio returns.[26] This gives us 48 equal-weighted and 48 value-weighted raw return observations for each bank's customer portfolio over the period from October 2005 to September 2009. Using the value-weighted and equal-weighted monthly returns, we then calculate the monthly four-factor alphas for each of these customer portfolios, analogously to (6). Finally, we sort the banks into two groups in terms of whether they have a proprietary trading desk or not and compare the stock portfolio performances of their retail customers using the t-test and the Wilcoxon test. As additional performance measures, we use the time-series averages of both value-weighted and equal-weighted raw returns of the customers' stock portfolios.

Table 10 presents the differences in the monthly raw and abnormal returns for the aggregated customer portfolios of the banks in the sample, grouped in terms of whether they have proprietary trading divisions. Both the t-test and the Wilcoxon test indicate that the mean and median performances of the two groups differ significantly, regardless of whether four-factor alpha or average raw returns are used. In particular, the mean and median portfolio performances of customers of banks with proprietary trading desks are significantly below those of customers of banks without proprietary trading divisions, a result that holds both for equal-weighted and value-weighted portfolios.[27]

In sum, these results suggest that even if banks share market knowledge or 'hot stock tips' with retail customers, the negative effects of pushing underperforming stocks from their proprietary trading portfolios onto their customers appear to offset potential benefits. This leads us to conclude that the proprietary trading of banks is detrimental to their retail customers.

These findings are somewhat surprising, as most large banks in Germany actively trade stocks on their own account. These banks are predominantly located in big cities (e.g., in financial centers), while the majority of smaller banks cater to customers in more rural areas. As education and other demographic factors suggest that individual investors from larger agglomeration areas are likely to be more financially sophisticated, one would expect that customers of smaller banks, which presumably lack proprietary trading units, would be more prone to serious investment mistakes and therefore realize poorer portfolio performance. However, this bias appears to be offset by other factors – possibly including the conflict of interest between proprietary trading and retail banking.

[26] For instance, when the share of a stock in the aggregated customer portfolio is 0.1 in 2008Q1, we assume that customers of the bank hold the same share in the three months following this quarter.

[27] In unreported analysis, we also compute the differences in performance between aggregated customer portfolios, using data with quarterly rather than monthly frequency. The results remain the same, namely, the stock portfolios of customers at banks with proprietary trading underperform those of customers at banks without proprietary trading.

6 Conclusion

In this paper, we study the possible conflict of interests between banks and their retail customers that might arise due to having proprietary trading and retail banking under one roof. In particular, we directly analyze the stock investments of banks and those of their retail customers on a security-by-security basis and first address the question of whether banks push stocks sold from their proprietary portfolios to their retail customers. Although we cannot directly observe the stock flows between bank portfolios and the portfolios of their retail customers, our results suggest that banks seem to partially push stocks from their portfolios to their retail customers. Banks seem to do so particularly for relatively more illiquid stocks, for example, in the period after the failure of Lehman Brothers, and for those stocks for which they are blockholders. Overall, these results suggest that banks aim to avoid the possible market impact costs of their asset sales. Moreover, those stocks that banks push to their retail investors tend to be on average the underperformers. The losses the customers face due to this conflict of interests seem to be so severe that they even outweigh the potential positive spillovers that customers could realize from banks' market knowledge acquired through proprietary trading. Put differently, we show that the stock portfolio performance of customers at banks with proprietary trading is significantly lower than that of customers at banks without a proprietary trading desk.

We believe that the findings of this paper are highly relevant and insightful not only from an academic standpoint but also from both political and regulatory perspectives. In many developed countries, there is an ongoing regulatory and political discussion on how to restore confidence in the financial industry. For instance, the Dodd-Frank Act recently enacted in the U.S. and similar policy initiatives in Europe are some of the most recent examples that aim to create a sound foundation on which to improve investor protection and achieve other similar goals. Our findings underpin policymakers' concerns over conflicts of interests in retail finance and add a new dimension to this discussion. The possible incentive problems in the retail finance industry (e.g., misselling of financial products) are typically limited to the interactions between bank agents and individual investors. Therefore, new regulations are, to a large extent, designed to prevent such agency problems that arise between retail customers and bank agents. For instance, the Financial Services Authority (FSA) in the U.K. bans financial advisors from receiving sales or trail commissions from investment firms.[28] Nevertheless, our results imply that policymakers should also consider other possible (incentive) problems in designing new regulations to improve investor protection, for instance, those that may arise due to information spillovers between different divisions within financial institutions, as shown in this paper. Accordingly, the Volcker Rule that is a part of the new financial reform act prohibits commercial banks from engaging in proprietary trading. Although the underlying objective of the Volcker Rule is to prevent banks from shifting their exposure arising from (speculative) proprietary investments to federally insured deposits, our results indicate another possible role of this rule, namely, preventing the possible conflict of interests that may arise due to combining proprietary trading and retail banking.

In summary, we provide a first step in understanding the possible conflict of interests that arises from having proprietary trading and retail banking under one roof. The

[28] Through these new rules, the FSA aims to ensure that recommendations and information provided by professionals to individuals are based on unbiased market analysis.

Table 1: Portfolio Composition: Banks in the Final Sample vs. All Banks in Germany

	All Banks			*Banks in the Final sample*		
	No of Obs	Mean	Std. dev.	No of Obs	Mean	Std. dev.
Short-term bond share	27,761	0.0203	0.059	1,466	0.028	0.062
Long-term bond share	27,761	0.788	0.236	1,466	0.718	0.203
Listed-equities share	27,761	0.01	0.055	1,466	0.056	0.139
Non-listed equities share	27,761	0.0134	0.085	1,466	0.003	0.010
Other-equities share	27,761	0.0007	0.008	1,466	0.011	0.022
Mutual fund share	27,761	0.168	0.222	1,466	0.194	0.181

Note: This table presents the portfolio compositions of banks in the final sample and those of all financial institutions in Germany. The data come from *Deutsche Bundesbank*, and cover the period from December 2005 to September 2009.

presented findings suggest that further research in this area is worthwhile. In particular, a more detailed understanding of how banks can actually manage to push stocks in the presence of 'Chinese Walls' into their retail customers' portfolios would be very important. However, to identify the different 'channels', more detailed data would be required. As a further step, it would be useful to broaden the analysis and include bank-affiliated investment funds and their portfolios to investigate the interactions between banks, their investment firms and retail customers in a trilateral context.

Table 2: Descriptive Statistics for the Final Sample

	No of Obs	Mean	25th percentile	Median	75th percentile	Std. dev.
$Holdings^B$	140,447	2,872,964	3,872.81	91,694.2	568,446.5	2.44e+07
$Holdings^C$	140,447	2,108,083	0	5,219.1	254,661.7	1.77e+07
$\Delta Share^B$	140,447	.9238798	-.0151638	.0021521	.3156103	7.90852
$\Delta Share^C$	140,447	1.14887	-1.77e-07	0	.0123357	6.52425
Dummy Gain	140,447	.4655706	0	0	1	.498815
Return volatility	138,825	.0289369	.0156584	.0236913	.0362144	.0198464
$FFMC$	140,447	1.16e+10	2.23e+08	1.87e+09	9.72e+09	2.55e+10
Trading volume/1000	136,463	8.879133	.029519	.6799453	4.157398	304.1247
MtBV	136,110	2.858408	1.048769	1.761846	2.902462	157.9985

Note: This table presents descriptive statistics for both dependent variables and control variables employed in the analysis. Dummy Gain is a dummy variable that equals to one if a stock displayed positive average returns in the previous quarter, and 0 otherwise. Return volatility is the standard deviation of daily returns of a stock in a given quarter. $FFMC$ is the free float market cap that is the number of shares in issue times the percentage of shares freely available to investors. Trading volume is the number of shares traded for a stock on a particular day. $MtBV$ represents the market value of the common equity divided by the balance sheet value of the common equity in the company. $Holdings^B$ ($Holdings^C$) represents the Euro value of holdings of a bank (its retail customers) in a particular stock at the end of a given quarter. $\Delta Share^B$ ($\Delta Share^C$) denote the changes in the normalized stock holdings (i.e., $Holdings^B/FFMC$) of a bank (its retail customers) in a given stock. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 3: Stock Flows: Univariate Analysis

	(i)	(ii)	(iii)
	Full Sample	*Sell Trades*	*Buy Trades*
	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$
$\Delta Share^B_{ijt}$	0.1282	-0.1399	0.1648
	(0.000)	(0.000)	(0.000)
No of Obs	140,447	56,248	84,010

Note: This table presents the Pearson correlation coefficients between the changes in the normalized stock holdings (i.e., $Holdings^B/FFMC$) of a bank and those of its retail customers in a given quarter. Column (i) reports the unconditional correlation between $\Delta Share^C_{ijt}$ and $\Delta Share^B_{ijt}$. Column (ii) is restricted to the sell trades of the banks (i.e., $\Delta Share^B_{ijt}$¡0), whereas Column (iii) considers only the buy trades of the banks $\Delta Share^B_{ijt} > 0$. The corresponding p-values of the pairwise correlations are reported in the parentheses. The data come from *Deutsche Bundesbank*, and cover the period from December 2005 to September 2009.

Table 4: Stock Flows: Baseline Regressions

	(i)	(ii)	(iii)	(iv)	(v)
	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$
$\Delta Share^B_{ijt}$	0.1315***	0.1374***	0.1271***	-0.0918***	0.1328***
	(9.60)	(9.88)	(9.19)	(-4.50)	(9.67)
$Sell^B_{ijt}$	-0.8840***	-0.8888***	-0.8100***	-	-0.8616***
	(-16.17)	(-16.21)	(-12.49)	-	(-16.51)
$\Delta Share^B_{ijt} \times Sell^B_{ijt}$	-0.2183***	-0.2294***	-0.1969***	-	-0.2052***
	(-7.97)	(-8.42)	(-8.18)	-	(-7.90)
Dummy Gain$_{it-1}$	-	-0.1534*	-0.0386	-0.1537*	-0.1297*
	-	(-1.88)	(-0.65)	(-1.89)	(-1.67)
Return volatility$_{it-1}$	-	20.7051***	19.9880***	20.7009***	19.8540***
	-	(4.65)	(4.23)	(4.65)	(4.92)
$MtBV_{it-1}$	-	0.0001	0.0001	0.0001	0.0001
	-	(1.12)	(1.14)	(1.12)	(1.13)
Trading volume$_{it-1}$	-	-0.0001**	-0.0001**	-0.0001***	-0.0001**
	-	(-2.95)	(-3.27)	(-2.95)	(-2.94)
$\Delta Share^{others}_{it}$	-	-	0.0439***	-	-
	-	-	(12.74)	-	-
Buy^B_{ijt}	-	-	-	0.8858***	-
	-	-	-	(16.51)	-
$\Delta Share^B_{ijt} \times Buy^B_{ijt}$	-	-	-	0.2292***	-
	-	-	-	(8.40)	-
$Share^C_{ijt-1}$	-	-	-	-	109.1938***
	-	-	-	-	(17.77)
Constant	1.3111***	0.7828***	0.3958*	-0.1021	0.7908***
	(8.78)	(3.73)	(1.83)	(-0.51)	(3.98)
Bank Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Quarter Dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
SEs	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*
R^2	0.064	0.068	0.092	0.068	0.104
No of Obs.	140,447	132,059	132,059	132,059	132,059

Note: This table reports the coefficient estimates of the fixed effects regressions. The dependent variable, i.e., $\Delta Share^C_{ijt}$, is the changes in the normalized stock holdings (i.e., $Holdings^B/FFMC$) of the retail customers of bank j in stock i in time t. $\Delta Share^B_{ijt}$ represents the changes in the normalized stock holdings of bank j in stock i in time t. $Sell^B_{ijt}$ is a dummy variable that equals to 1 if bank j sells the stock i from its proprietary portfolio. Buy^B_{ijt} is an indicator variable that equals to 1 if bank j buys the stock i in time t. Dummy Gain$_{it-1}$ is a dummy variable that equals to one if stock i displayed positive average returns in the previous quarter, and 0 otherwise. Return volatility$_{it-1}$ is the standard deviation of daily returns of stock i in time $t-1$. Trading volume$_{it-1}$ is the quarterly average number of shares traded for stock i as measured in the previous quarter. $MtBV_{it-1}$ represents the quarterly average of the market value of the common equity divided by the balance sheet value of the common equity in the company as measured in time $t-1$. $Share^C_{ijt-1}$ represents the percentage of the shares of company i held by the retail customers of bank j in time $t-1$. We estimate the pooled panel regressions with bank and time fixed effects using the ordinary least squares method. The t-statistics reported in the parentheses beneath the estimates use serial and cross-sectional correlation adjusted Driscoll and Kraay (1998) standard errors. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 5: Stock Flows: Role of Portfolio Management

	(i)	(ii)	(iii)	(iv)
	Full Sample	*Portfolio Man.*	*No Portfolio Man.*	*Portfolio Man. (Ran. Sample)*
	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$
$\Delta Share^B_{ijt}$	0.1497***	0.1450***	0.0208*	0.1643***
	(10.53)	(9.67)	(1.84)	(7.28)
$Sell^B_{ijt}$	-0.9312***	-1.0107***	-0.1460***	-0.9029***
	(-12.31)	(-15.32)	(-3.86)	(-8.65)
PM_{jt}	0.9458***	-	-	-
	(8.73)	-	-	-
$\Delta Share^B_{ijt} \times Sell^B_{ijt}$	-0.1780***	-0.2460***	-0.0222*	-0.2761***
	(-12.79)	(-8.03)	(-1.86)	(-7.76)
$\Delta Share^B_{ijt} \times Sell^B_{ijt} \times PM_{jt}$	-0.0852***	-	-	-
	(-4.29)	-	-	-
Dummy Gain$_{it-1}$	-0.1455	-0.1686*	-0.0623*	-0.2351*
	(-1.55)	(-1.69)	(-1.86)	(-1.74)
Return volatility$_{it-1}$	10.4631***	23.1667***	5.6377	23.6878***
	(3.29)	(6.34)	(1.01)	(4.66)
$MtBV_{it-1}$	0.0001	0.0003	-0.000004	0.0024
	(1.10)	(1.45)	(-0.90)	(1.29)
Trading volume$_{it-1}$	-0.0001***	-0.0001***	-0.0006**	-0.0003
	(-2.89)	(-3.00)	(-2.50)	(-1.33)
Constant	0.6875***	0.8363***	-0.0185	0.9168***
	(7.91)	(4.47)	(-0.08)	(3.81)
Bank Dummies	*No*	*Yes*	*Yes*	*Yes*
Quarter Dummies	*Yes*	*Yes*	*Yes*	*Yes*
SEs	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*
R^2	0.039	0.064	0.211	0.071
No of Obs.	132,059	113,289	18,770	18,770

Note: This table reports the coefficient estimates of the fixed effects regressions. The dependent variable, i.e., $\Delta Share^C_{ijt}$, is the changes in the normalized stock holdings (i.e., $Holdings^B/FFMC$) of the retail customers of bank j in stock i in time t. $\Delta Share^B_{ijt}$ represents the changes in the normalized stock holdings of bank j in stock i in time t. $Sell^B_{ijt}$ is a dummy variable that equals to 1 if bank j sells the stock i from its proprietary portfolio. PM_{jt} is an indicator variable that equals to 1 if bank j has an active portfolio management division, and 0 otherwise. Dummy Gain$_{it-1}$ is a dummy variable that equals to one if stock i displayed positive average returns in the previous quarter, and 0 otherwise. Return volatility$_{it-1}$ is the standard deviation of daily returns of stock i in time $t-1$. Trading volume$_{it-1}$ is the quarterly average number of shares traded for stock i as measured in the previous quarter. $MtBV_{it-1}$ represents the quarterly average of the market value of the common equity divided by the balance sheet value of the common equity in the company as measured in time $t-1$. Column (i) uses data for the full sample, whereas Column (ii) (Column (iii)) consider only banks with (without) portfolio management units. In Column (iv), we draw a random sample banks with portfolio management to match the number of observations for the banks without portfolio management division. We estimate the pooled panel regressions with bank and time fixed effects using the ordinary least squares method. The t-statistics reported in the parentheses beneath the estimates use serial and cross-sectional correlation adjusted Driscoll and Kraay (1998) standard errors. The data come from the *annual reports or web sites of the banks*, *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 6: Stock Flows: Testing the Market Impact Hypothesis

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$	$\Delta Share^C_{ijt}$
	Full sample	*Q1+Q3*	*Highly Liquid (Q1)*	*Highly Illiquid (Q3)*	*Full sample*	*Pre-Lehman*	*Post-Lehman*
$\Delta Share^B_{ijt}$	0.1236***	0.1323***	0.0128***	0.1392***	0.1372***	0.1377***	0.1293***
	(9.31)	(8.29)	(3.19)	(7.85)	(9.86)	(7.86)	(8.53)
$Sell^B_{ijt}$	-0.8669***	-1.1296***	-0.1905***	-2.2954***	-0.8895***	-0.9026***	-0.8695***
	(-14.02)	(-18.89)	(-11.44)	(-24.17)	(-16.27)	(-10.30)	(-12.92)
$\Delta Share^B_{ijt} \times Sell^B_{ijt}$	-0.1353***	-0.1103***	-0.0113***	-0.2174***	-0.2067***	-0.2070***	-0.2688***
	(-8.71)	(-5.89)	(-2.67)	(-6.87)	(-9.60)	(-8.30)	(-6.36)
$Illiquid1_{it}$	2.3879***	-	-	-	-	-	-
	(13.68)	-	-	-	-	-	-
$\Delta Share^B_{ijt} \times Sell^B_{ijt} \times Illiquid1_{it}$	-0.0796***	-	-	-	-	-	-
	(-2.96)	-	-	-	-	-	-
$Illiquid2_{it}$	-	3.7955***	-	-	-	-	-
	-	(17.90)	-	-	-	-	-
$\Delta Share^B_{ijt} \times Sell^B_{ijt} \times Illiquid2_{it}$	-	-0.0961***	-	-	-	-	-
	-	(-3.54)	-	-	-	-	-
$Lehman_t$					-0.9022***	-	-
					(-6.08)	-	-
$\Delta Share^B_{ijt} \times Sell^B_{ijt} \times Lehman_t$					-0.0709**	-	-
					(-2.05)	-	-
Dummy Gain$_{it-1}$	-0.1342**	-0.0569	-0.0202	-0.1605	-0.1531*	-0.0198	-0.3826***
	(-2.18)	(-0.70)	(-1.24)	(-0.90)	(-1.88)	(-0.23)	(-8.84)
Return volatility$_{it-1}$	14.2219***	12.3907**	2.9247**	36.1248***	20.6342***	29.7369***	10.2891***
	(3.48)	(3.21)	(2.33)	(5.88)	(4.60)	(11.43)	(3.35)
$MtBV_{it-1}$	0.0001	0.0006	-0.0001	0.0010	0.0001	0.0009	0.0000
	(1.11)	(0.79)	(-1.57)	(1.25)	(1.12)	(1.51)	(0.39)
Trading volume$_{it-1}$	0.0011	0.0018**	0.0001	-0.9355**	-0.0001***	-0.0002*	-0.0001***
	(1.48)	(2.00)	(0.95)	(-2.35)	(-2.95)	(-1.92)	(-3.22)
Constant	-0.4735**	-0.7684**	0.0615**	2.4395***	0.8027***	0.4102**	0.8968***
	(-1.96)	(-2.38)	(2.47)	(4.62)	(3.71)	(2.18)	(5.14)
Bank dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Quarter dummies	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
SEs	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*
R^2	0.096	0.129	0.031	0.161	0.068	0.075	0.065
No of Obs	122,703	81,708	41,337	40,371	132,059	83,233	48,826

Note: This table reports the coefficient estimates of the fixed effects regressions. The dependent variable, i.e., $\Delta Share^C_{ijt}$, is the changes in the normalized stock holdings (i.e., $Holdings^B/FFMC$) of the retail customers of bank j in stock i in time t. $\Delta Share^B_{ijt}$ represents the changes in the normalized stock holdings of bank j in stock i in time t. $Sell^B_{ijt}$ is a dummy variable that equals to 1 if bank j sells the stock i from its proprietary portfolio. $Illiquid1_{it}$ is a dummy variable that is equal 1 if the Amihud ratio of stock i falls above the median Amihud ratio of all stocks the sample in quarter t, and 0 otherwise. $Illiquid2_{it}$ is an indicator variable that equals to 1 if stock i is in the highest quantile of all stocks according to their Amihud ratio. $Lehman_t$ is a dummy variable that takes the value 1 for the time period following the Lehman Brother failure in 2008Q3. Dummy Gain$_{it-1}$ is a dummy variable that equals to one if stock i displayed positive average returns in the previous quarter, and 0 otherwise. Return volatility$_{it-1}$ is the standard deviation of daily returns of stock i in time $t-1$. Trading volume$_{it-1}$ is the quarterly average number of shares traded for stock i as measured in the previous quarter. $MtBV_{it-1}$ represents the quarterly average of the market value of the common equity divided by the balance sheet value of the common equity in the company as measured in time $t-1$. We estimate the pooled panel regressions with bank and time fixed effects using the ordinary least squares method. The t-statistics reported in the parentheses beneath the estimates use serial and cross-sectional correlation adjusted Driscoll and Kraay (1998) standard errors. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 7: Stock Flows: Testing the Information Hypothesis

	(i)	(ii)	(iii)	(iv)
	$\Delta Share^{C}_{ijt}$	$\Delta Share^{C}_{ijt}$	$\Delta Share^{C}_{ijt}$	$\Delta Share^{C}_{ijt}$
	Full	$Share^{B}_{ijt-1}$ ¡3%	*Full*	*Full*
$\Delta Share^{B}_{ijt}$	0.1346***	0.1386***	0.1358***	0.0972***
	(9.64)	(9.69)	(9.51)	(7.94)
$Sell^{B}_{ijt}$	-0.8659***	-0.8569***	-0.8557***	-0.7523***
	(-15.79)	(-15.61)	(-16.93)	-
$\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt}$	-0.1943***	-0.1988***	-0.1260***	-0.0969***
	(-6.59)	(-6.66)	(-3.23)	(-6.72)
$Blockholder1_{ijt-1}$	0.7419***	0.9673***	-	-
	(2.66)	(2.94)	-	-
$\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times Blockholder1_{ijt-1}$	-0.0512***	-0.0582***	-	-
	(-4.16)	(-4.04)	-	-
$Blockholder2_{ijt-1}$	-	-	0.2202	-
	-	-	(0.82)	-
$\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times Blockholder2_{ijt-1}$	-	-	-0.0941***	-
	-	-	(-2.94)	-
German $stock_{it}$	-	-	-	4.9859***
	-	-	-	(20.13)
$\Delta Share^{B}_{ijt} \times Sell^{B}_{ijt} \times$ German $stock_{ijt}$	-	-	-	-0.0307
	-	-	-	(-0.93)
Dummy $Gain_{it-1}$	-0.1482*	-0.1454*	-0.1491*	-0.0869*
	(-1.83)	(-1.79)	(-1.85)	(-1.82)
Return $volatility_{it-1}$	20.7030***	20.6131***	20.5912***	17.8702***
	(4.71)	(4.66)	(4.62)	(5.99)
$MtBV_{it-1}$	0.0001	0.0001	0.0001	0.0001
	(1.13)	(1.13)	(1.13)	(1.17)
Trading $volume_{it-1}$	-0.0001***	-0.0001***	-0.0001***	0.0000
	(-2.96)	(-2.95)	(-2.91)	(0.07)
Constant	0.7699***	0.7437***	0.7676***	-0.2978
	(3.65)	(3.44)	(3.72)	(-1.51)
Bank dummies	*Yes*	*Yes*	*Yes*	*Yes*
Quarter dummies	*Yes*	*Yes*	*Yes*	*Yes*
SEs	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*	*Driscoll-Kraay*
R^2	0.068	0.068	0.068	0.146
No of Obs	132059	131426	132059	132059

Note: This table reports the coefficient estimates of the fixed effects regressions. The dependent variable, i.e., $\Delta Share^{C}_{ijt}$, is the changes in the normalized stock holdings (i.e., $Holdings^{B}/FFMC$) of the retail customers of bank j in stock i in time t. $\Delta Share^{B}_{ijt}$ represents the changes in the normalized stock holdings of bank j in stock i in time t. $Sell^{B}_{ijt}$ is a dummy variable that equals to 1 if bank j sells the stock i from its proprietary portfolio. $Blockholder1_{ijt}$ is a dummy variable that is equal to 1 if bank j holds in quarter t more than 0.5 percent of the free-float market cap of stock i, and 0 otherwise. $Blockholder2_{ijt}$ is an indicator variable that equals to 1 if bank j's holdings of stock i in quarter t fall above the 90th. percentile of the percentage of the company shares held by all banks in the final sample. German $stock_{it}$ is a dummy variable that takes the value 1 if company i is located in Germany. Dummy $Gain_{it-1}$ is a dummy variable that equals to one if stock i displayed positive average returns in the previous quarter, and 0 otherwise. Return $volatility_{it-1}$ is the standard deviation of daily returns of stock i in time $t-1$. Trading $volume_{it-1}$ is the quarterly average number of shares traded for stock i as measured in the previous quarter. $MtBV_{it-1}$ represents the quarterly average of the market value of the common equity divided by the balance sheet value of the common equity in the company as measured in time $t-1$. We estimate the pooled panel regressions with bank and time fixed effects using the ordinary least squares method. The t-statistics reported in the parentheses beneath the estimates use serial and cross-sectional correlation adjusted Driscoll and Kraay (1998) standard errors. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 8: Stock Performance: Naive Approach

	No of Stocks	Mean	*t-test*	Median	*Wilcoxon test*
Raw Returns					
Case Group vs.	12,240	-0.042		-0.022	
Control Group I	2,227,512	-0.042	0.0347	-0.014	-1.749*
Control Group II	952,633	-0.033	-4.2952***	-0.011	-5.713***
Control Group III	117,094	-0.029	-6.3835***	-0.008	- 6.616***
Control Group IV	75,676	-0.020	-10.4698***	-0.006	-10.136***
Control Group V	41,123	-0.045	-1.0844	-0.017	0.297
Four-Factor Alpha					
Case Group vs.	12,240	-0.057		-0.028	
Control Group I	2,227,512	-0.059	0.6956	-0.021	-2.434**
Control Group II	952,633	-0.055	-0.9766	-0.022	-3.148***
Control Group III	117,094	-0.048	-3.6890***	-0.019	-4.794***
Control Group IV	75,676	-0.041	-6.9853***	-0.017	-7.534***
Control Group V	41,123	-0.062	1.9435**	-0.027	0.599

Note: This table presents the mean and median differences in the quarterly returns of different stock portfolios. *Case Group* comprises the stocks that are sold by banks to their retail customers. *Control Group I* includes all stocks that retail customers hold in their portfolios except for those that retail customers receive from their respective banks. *Control Group II* includes stocks in which retail customers increase their holdings in the respective quarter other than those stocks, which their respective banks simultaneously sell from their proprietary portfolios. *Control Group III* includes all stocks held by banks other than those that the bank partially sell to its customers. *Control Group IV* covers only those stocks, in which banks increase their holdings. *Control Group V* comprises the stocks that banks sell, which, however, do not end up int their retail customer portfolios. In Panel A, we consider the quarterly average raw returns of stocks, whereas we contrast the four-factor alphas of stocks in Panel B. The four-factor model includes Fama and French (1993) and the Carhart (1997) momentum factor. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 9: Stock Performance: Bank-Level Portfolios

	No of Obs	Mean *(value-weighted)*	t-test	Mean *(equal-weighted)*	t-test	Median *(value-weighted)*	Wilcoxon test	Median *(equal-weighted)*	Wilcoxon test
Raw Returns									
Control Group I vs.	791	-0.0169	2.7343***	0.0000	2.4303***	0.0000	2.089**	0.0000	3.094***
Case Group	791	-0.0274		-0.0083		-0.0190		-0.0015	
Control Group II vs.	791	-0.0194	2.0432**	-0.0001	2.4109***	0.0000	1.219	0.0000	3.056***
Case Group	791	-0.0274		-0.0083		-0.0190		-0.0015	
Control Group III vs.	791	-0.0224	2.2275**	-0.0020	2.2812**	-0.0154	2.835***	-0.0001	3.349***
Case Group	791	-0.0305		-0.0083		-0.0185		-0.0021	
Control Group IV vs.	791	-0.0194	2.7959***	-0.0041	1.4419*	-0.0059	2.929***	-0.0001	1.979**
Case Group	791	-0.0305		-0.0083		-0.0185		-0.0021	
Control Group V vs.	791	-0.0212	2.4583***	-0.0013	2.4673***	0.0000	3.282***	0.0000	4.174***
Case Group	791	-0.0305		-0.0083		-0.0185		-0.0021	
Four-Factor Alpha									
Control Group I vs.	791	-0.02337	3.3260***	-0.00002532	4.1400***	0	2.786***	0	5.609***
Case Group	791	-0.035856		-0.01584		-0.021816		-0.001938	
Control Group II vs.	791	-0.023076	3.3515***	-0.0000708	4.9992***	0	2.589***	0	5.576***
Case Group	791	-0.035856		-0.01584		-0.021816		-0.001938	
Control Group III vs.	791	-0.032016	1.8836**	-0.00432	3.8379***	-0.005838	2.666***	-0.0000648	5.270***
Case Group	791	-0.039894		-0.01584		-0.023868		-0.002226	
Control Group IV vs.	791	-0.029226	2.5153***	-0.006648	2.9691***	-0.006318	3.118***	-0.0000834	3.976***
Case Group	791	-0.039894		-0.01584		-0.023868		-0.002226	
Control Group V vs.	791	-0.030426	2.2283***	-0.004914	3.5075***	0	2.684***	0	4.457***
Case Group	791	-0.039894		-0.01584		-0.023868		-0.002226	

Note: This table presents the mean and median differences in the quarterly returns of different stock portfolios that are constructed at the bank level. *Case Group* comprises the stocks that are sold by banks to their retail customers. *Control Group I* includes all stocks that retail customers hold in their portfolios except for those that retail customers receive from their respective banks. *Control Group II* includes stocks in which retail customers increase their holdings in the respective quarter other than those stocks, which their respective banks simultaneously sell from their proprietary portfolios. *Control Group III* includes all stocks held by banks other than those that the bank partially sell to its customers. *Control Group IV* covers only those stocks, in which banks increase their holdings. *Control Group V* comprises the stocks that banks sell, which, however, do not end up int their retail customer portfolios. We calculate the equal-weighted or value-weighted quarterly portfolio returns for each of these stock portfolios at the bank level. In Panel A, we focus on the quarterly average raw returns of bank-level stock portfolios, whereas we contrast the quarterly four-factor alphas of each stock portfolio in Panel B. The four-factor model includes Fama and French (1993) and the Carhart (1997) momentum factor. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

Table 10: Is Proprietary Trading really Detrimental to Retail Investors?

		Banks without prop trading	Banks with prop trading	t-test / Wilcoxon test
Raw returns (Equal-weighted)	*Mean*	-0.015	-0.019	4.9307***
	Median	-0.013	-0.018	5.348***
Raw returns (Value-weighted)	*Mean*	-0.005	-0.008	3.7099***
	Median	-0.002	-0.005	3.964***
4-Factor Alpha (Equal-weighted)	*Mean*	-0.014	-0.019	5.5638***
	Median	-0.013	-0.018	5.829***
4-Factor Alpha (Value-weighted)	*Mean*	-0.004	-0.008	4.5271***
	Median	-0.003	-0.006	4.648***
No of Obs		677	1,169	

Note: This table presents the mean and median differences of the stock portfolios of retail customers at banks with proprietary trading divisions and those of the customers at banks without proprietary trading units. Following Daniel et al. (1997), we first calculate for each bank's customer portfolio the monthly raw returns, which would be realized by holding the same portfolio share of stocks as reported by the end of the previous quarter in each month of the following quarter. We then compute both value-weighted and equal-weighted monthly portfolio returns, which gives us 48 equal-weighted and 48 value-weighted raw return observations for each bank's customer portfolio. Using the value-weighted and equal-weighted monthly returns, we then calculate the monthly four-factor alphas for each of these customer portfolios. The four-factor model includes Fama and French (1993) and the Carhart (1997) momentum factor. We also use the time-series averages of both value-weighted and equal-weighted raw returns of the customers' stock portfolios. The data come from *Deutsche Bundesbank* and *Thomson Reuters Datastream*, and cover the period from December 2005 to September 2009.

References

Acharya, V. V. and T. Johnson (2007). Insider trading in credit derivatives. *Journal of Financial Economics 84*(1), 110–141.

Agrawal, A. and M. A. Chen (2008). Do analyst conflicts matter? evidence from stock recommendations. *Journal of Law and Economics 51*, 503–537.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets 5*(1), 31–56.

Banerjee, A. V. (1992). A simple model of herd behavior. *The Quarterly Journal of Economics 107*(3), 797–817.

Ber, H., Y. Yafeh, and O. Yosha (2001). Conflict of interest in universal banking: Bank lending, stock underwriting, and fund management. *Journal of Monetary Economics 47*(1), 189 – 218.

Bergstresser, D., J. M. R. Chalmers, and P. Tufano (2009). Assessing the costs and benefits of brokers in the mutual fund industry. *Review of Financial Studies 22*(10), 4129–4156.

Bodnaruk, A., M. Massa, and A. Simonov (2009). Investment banks as insiders and the market for corporate control. *Review of Financial Studies 22*, 4989–5026.

Bollen, N. P. B. (2001). On the timing ability of mutual fund managers. *Journal of Finance 56*(3), 1075–1094.

Bolton, P., X. Freixas, and J. Shapiro (2007). Conflicts of interest, information provision, and competition in the financial services industry. *Journal of Financial Economics 85*.

Brambor, T., W. R. Clark, and M. Golder (2005). Understading interaction models: Improving empirical analyses. *Political Analysis 13*, 1–20.

Breusch, T. S. and A. R. Pagan (1980, January). The lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies 47*(1), 239–53.

Brunnermeier, M. K. and S. Nagel (2008). Do wealth fluctuations generate time-varying risk aversion? micro-evidence on individuals' asset allocation. *American Economic Review 98*(3), 713–736.

Calvet, L. E., J. Y. Campbell, and P. Sodini (2009). Fight or flight? portfolio rebalancing by individual investors. *Quarterly Journal of Economics 124*(1), 301–348.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance 52*, 57–82.

Chater, N., S. Huck, and R. Inderst (2010). Consumer decision-making in retail investment services. Report to the european commission.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers (1997). Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Finance 52*(3), 1035–58.

De Long, J. B., A. Shleifer, L. H. Summers, and R. J. Waldmann (1990). Noise trader risk in financial markets. *Journal of Political Economy 98*, 703–738.

Driscoll, J. C. and A. C. Kraay (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics 80*, 549–560.

Fama, E. F. and K. R. French (1993). Common risk factors in the returns on stock and bonds. *Journal of Financial Economics 33*, 3–56.

Goyenko, R. Y., C. W. Holden, and C. A. Trzcinka (2009). Do liquidity measures measure liquidity? *Journal of Financial Economics 92*(2), 153–181.

Graham, J. R. (1999). Herding among investment newsletters: Theory and evidence. *Journal of Finance 54*(1), 237–268.

Hackethal, A., M. Haliassos, and T. Jappelli (2012). Financial advisors: A case of babysitters? *Journal of Banking & Finance 36*, 509–524.

Haushalter, D. and M. Lowry (2011). When do banks listen to their analysts? evidence from mergers and acquisitions. *Review of Financial Studies 24*(2), 321–357.

Hausman, J. A. and W. E. Taylor (1981). Panel data and unobservable individual effects. *Econometrica 49*(6), 1377–98.

Hung, A. A., N. Clancy, J. Dominitz, E. Talley, C. Berrebi, and F. Suvankulov (2008). Investor and industry perspectives on investment advisers and broker-dealers. Technical report, RAND Center for Corporate Ethics and Governance.

Inderst, R. and M. Ottaviani (2009). Misselling through agents. *American Economic Review*.

Ivashina, V. and Z. Sun (2011). Institutional stock trading on loan market information. *Journal of Financial Economics 100*, 284–303.

Kadan, O., L. Madureira, R. Wang, and T. Zach (2009). Conflicts of interest and stock recommendations: The effects of the global settlement and related regulations. *Review of Financial Studies 22*, 4189–4217.

Karabulut, Y. (2012). Financial advice: An improvement for worse? working paper, Goethe University Frankfurt.

Kroszner, R. S. and R. G. Rajan (1997). Organization structure and credibility: Evidence from commercial bank securities activities before the glass-steagall act. *Journal of Monetary Economics 39*(3), 475 – 516.

Ljungvist, A., F. Marston, L. T. Starks, K. D. Wei, and H. Yan (2007). Conflicts of interest in sell-side research and the moderating role of institutional investors. *Journal of Financial Economics 85*, 420–456.

Lusardi, A. and O. S. Mitchell (2007). Baby boomer retirement security: The roles of planning, financialliteracy, and housing wealth. *Journal of Monetary Economics 54*, 205–224.

Malmendier, U. M. and D. Shanthikumar (2007). Are investors naive about incentives? *Journal of Financial Economics 85*(2), 457–489.

Massa, M. and Z. Rehman (2008). Information flows within financial conglomerates: Evidence from the banks-mutual funds relation. *Journal of Financial Economics 89*, 288–306.

Mehran, H. and R. M. Stulz (2007). The economics of conflicts of interest in financial institutions. *Journal of Financial Economics 85*(2), 267 – 296.

Michaely, R. and K. L. Womack (1999). Conflict of interest and the credibility of underwriter analyst recommendations. *Review of Financial Studies 12*, 653–686.

Odean, T. (1998). Are investors reluctant to realize their losses? *Journal of Finance 53*(5), 1775–1798.

Puri, M. (1996). Commercial banks in investment banking conflict of interest or certification role? *Journal of Financial Economics 40*(3), 373 – 401.

Puri, M. (1999). Commercial banks as underwriters: implications for the going public process. *Journal of Financial Economics 54*(2), 133 – 163.

Scharfstein, D. S. and J. C. Stein (1990). Herd behavior and investment. *American Economic Review 80*(3), 465–79.

Shefrin, H. and M. Statman (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *Journal of Finance 40*(3), 777–90.

Shefrin, H. and M. Statman (2000). Behavioral portfolio theory. *Journal of Financial and Quantitative Analysis 35*(02), 127–151.

Statsman, M. (2002). Lottery players/stock traders. *Financial Analysts Journal 58*(5), 14–21.

van Rooij, M., A. Lusardi, and R. Alessie (2011). Financial literacy and stock market participation. *Journal of Financial Economics 101*, 449–472.

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin 1*(6), 80–83.