How harmful is insider trading for outsiders? Evidence from the eighteenth century

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Abstract

This paper provides evidence on the financial consequences of insider trading for outsiders. We collect a novel data set that contains all equity trades of all corporate insiders and outsiders in an era without restrictions on informed trading. These data features allow us to study the profitability of insider trades and the expected losses outsiders incur due to insider trading. We show that access to private information creates a gap of 3% between the quarterly post-trade returns of insiders and outsiders. Nonetheless, outsiders' expected losses from insider trading are limited because the probability of trading with an insider is low.

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1 Introduction

Information asymmetry is inherent to trading and will always remain a threat to the fairness and integrity of financial markets. But how much do outsiders expect to lose due to insider trading? It is very difficult to answer this question in today's markets for two reasons. First, we face a sample selection problem when quantifying outsiders' expected losses because some insider trades remain unobserved.[1] These unobserved trades may occur more frequently and be more profitable than the insider trades that we observe.[2] Second, we suffer from a joint hypothesis problem. This is best illustrated by imagining that we could observe all insider trades and thus quantify outsiders' expected losses. It would then still be unclear to which extent these losses are affected by insider trading regulation and its enforcement by the SEC. In fact, we would likely underestimate the true harmfulness of insider trading because insiders trade less frequently and realize smaller gains due to effective enforcement of legislation.

In this paper we use hand-collected historical data to address these challenges and quantify outsiders' expected losses due to insider trading. This data offers three main advantages compared to modern data. First, we resolve the sample selection issue because we observe every individual transaction with buyer and seller identities for three companies that comprise more than 40% of the British market. This implies that we can accurately measure how often an insider trades and how much he gains. Second, we resolve the joint hypothesis problem by focusing on an era without legislative restrictions on insider trading. This allows us to measure expected losses that are unaffected by regulatory forces. Third, the granularity of our data enables us to differentiate more sharply between informed and uninformed insider trading. Insiders have a strong incentive to hide their identity when trading

[1] Almost all insider trading data is collected either through voluntarily disclosure by insiders (e.g., 13D filings) or through insiders who get caught by the SEC around M&As and earnings announcements. Augustin, Brenner, and Subrahmanyam (2019) document that the SEC initiated a litigation for only 10% of the takeover deals in their sample with informed option trading activity that is unlikely explained by public information. Blackburne, Kepler, Quinn, and Taylor (2021) report that many SEC investigations are undisclosed.

[2] Prosecuted insider trades tend to be more profitable because this strengthens the regulator's case that these transactions are based on private information (Cohen, Malloy, and Pomorski (2012); Kacperczyk and Pagnotta (2021)). In contrast, reported insider trades tend to be less profitable (Eckbo and Smith (1998)).

on material and non-public information because they want to minimize price impact (Kyle, 1985; Koudijs, 2015). We indeed observe that insiders strategically hide some trades by using friends as intermediaries. By combining this new informativeness measure with ex-post trade profitability, we are better able to classify insider trades as informed or uninformed.

We first examine the value of private information from the perspective of an insider. Our default insider definition classifies board members as insiders for a particular company during the years they serve on its board.[3] We start with an event study that is based on important events that were first discussed in board meetings and later published in newspapers. We find that insiders buy (sell) unusually large amounts of shares before the publication of positive (negative) company news. Furthermore, stock prices increase (decrease) on average by 4.5% over the five days after positive (negative) news is discussed in the board.

We proceed by studying the relation between insider trading activity and future stock prices. We regress future returns on aggregate weekly insider trading volume and document a positive (negative) relation between insider purchases (sales) and stock returns over the next week, month, and quarter. These predictive relations weaken substantially if we focus on the non-board years of directors. We further find no relation between outsider trading volume and future prices. This evidence suggests that board membership provides access to valuable private information that is sometimes leaked to former and future board members.

The information asymmetry between insiders and outsiders should naturally lead to a gap in their trading performance. We test this hypothesis more formally by regressing post-trade returns on insider trading dummies at the transaction level. We find that post-trade returns of insiders are indeed significantly higher than those of outsiders. The outperformance ranges from 1.5% to 3% per transaction over a monthly and quarterly horizon, respectively. This performance difference is robust to controlling for trader fixed effects that absorb unobserved trader characteristics such as financial literacy. These findings indicate that insiders outperform outsiders because they have access to material and non-public information.

[3] A trader can thus be an insider for a company in one year and an outsider for that company in another year. Moreover, in a given year, a trader can be an insider for one firm and an outsider for another firm.

One potential concern is that our default insider definition is too narrow, because some traders that we classify as outsiders may also have access to valuable private information. Such misclassifications may lead to an underestimation of outsiders' expected losses due to insider trading. We address this concern by augmenting the set of insiders with various investor groups: nobility, neighbors of directors, politicians, brokers, and blockholders. We find that the monthly post-trade returns of nobles, neighbors, politicians, and brokers are significantly higher than those of outsiders. However, the trading returns of these potential insiders are smaller than those of directors, particularly over the quarterly horizon.

We then turn to the financial consequences of insider trading for outsiders. We estimate outsiders' expected losses due to insider trading by multiplying the unconditional probability that an outsider trades with an insider by the average loss when doing so. The unconditional probability is computed as the number of outsider transactions with an insider divided by the total number of outsider transactions in our sample. The average loss is defined as the difference in average post-trade return between outsider trades with an insider and trades with another outsider. We can measure these probabilities and expected losses accurately because we observe *all* transactions of *all* insiders and outsiders over a long time span.

We find that expected outsider losses are small, despite the fact that insider trades are highly profitable on average. With our default insider definition, expected losses are below five (ten) basis points per transaction over the one-month (one-quarter) period after the trade. For comparison, the brokerage fee in our sample period is 25 basis points per trade. Expected losses are limited because the probability that an outsider trades with an insider is less than 5%. Expected losses increase to 12 (monthly) and 25 (quarterly) basis points if we expand the insider base with the other groups of potentially informed traders. Under this broad definition, the set of potential insiders is very large (more than 1,000 traders). Because the average size of an insider network in Ahern (2017) rarely exceeds 30 traders, the broad definition seems extremely conservative. We therefore consider the results for this definition an upper bound on the expected losses that outsiders face due to insider trading.

It is reasonable to expect that not all insider trades in our sample are based on private information because insiders may also trade for liquidity and diversification reasons. Because uninformed insider trades are likely less profitable, we also estimate outsiders' expected losses due to informed trades. Determining whether an insider's trade is informed is challenging because we cannot observe an insider's full information set. A common approach in the literature is to classify a trade as informed if the ex-post trade performance exceeds a prespecified threshold (e.g., Marin and Olivier, 2008; Jagolinzer, Larcker, Ormazabal, and Taylor, 2020). However, this method can lead to misspecification because some uninformed insider trades that are profitable ex post due to luck will be misclassified as informed. To address this issue, we create a new informativeness proxy that is based on an insider's intention to conceal his identity when trading on inside information. More specifically, we focus on trades that are anonymized by using a friend as intermediary and label these trades "reverted".[4]

We find that reverted trades of directors earn 2.4% (2.9%) higher returns over the next month (quarter) than non-reverted director trades. This suggests that insiders indeed choose to strategically conceal their identity when trading on material and non-public information. We run additional tests to make sure that intermediating traders revert their position as a result of collaboration with the insider and not because they infer that the insider was trading on private information. In particular, an intermediating trader who discovers informed trading would maximize profits by trading more shares in the second transaction (with an outsider) than in the first (with the insider). Although our default reverted trade definition allows for such profit maximizing strategies, we run additional tests in which we impose that the number of shares traded in the first and second transaction need to be exactly equal. This restriction makes the intermediating position virtually unprofitable and thus very unattractive for a non-collaborative trader. We find that the gains of reverted insider trades become even larger after imposing this constraint, which suggests that insiders indeed collaborate with intermediating friends to hide their informed trades.

[4]These trades are labelled reverted because the intermediating friend reverts his position within five days after trading with the insider.

In our final analysis, we quantify an outsider's expected loss due to *informed* insider trading, where trades are defined as informed if they are reverted and if the ex-post trade return exceeds a prespecified threshold. Using the default insider definition and a threshold of zero, the expected loss for outsiders is less than three basis points per transaction over the next month and less than five basis points over the next quarter. Expected losses become even smaller if we increase the return threshold because the increase in profitability of informed trades at higher thresholds is more than offset by the decrease in likelihood of trading with an informed insider. Expected losses increase to 14 basis points per month and 28 basis points per quarter after expanding the insider set with former and future board members, neighbors, politicians, nobility, brokers, and blockholders. These losses are still relatively small, especially if we take into account that our insider definition is very conservative and the profitability threshold is low. If we tighten the insider definition or increase the return threshold, expected losses decrease substantially.

Despite its advantages, the use of historical data also raises external validity concerns because financial markets have changed dramatically over the past three centuries. The number of outsiders and outsider trading volume has grown exponentially because of improved market access and lower trading costs. In contrast, the number of insiders did not materially change.[5] In addition, the founding of the SEC in 1934 marked the beginning of an era that can be characterized by ever stricter insider trading regulation and stronger enforcement. Due to technological advancements and growing resources, the SEC has been able to detect more illegal insider trading, especially around profitable events such as M&As and earnings announcements.[6] However, these developments do not invalidate our findings because they lead to a *reduction* in expected losses. In other words, our historical estimates serve as an upper bound on expected losses outsiders incur due to insider trading in today's market.

[5]If anything, the size of our historical insider networks and the number of insider trades is mostly larger than those documented by Ahern (2017) and Cziraki and Gider (2021) for modern markets.

[6]Del Guercio, Odders-White, and Ready (2017) present evidence that illegal insider trading in stock markets has decreased due to more aggressive SEC enforcement. Extremely profitable insider trades are less likely to occur because those are more likely to be prosecuted (Cohen, Malloy, and Pomorski (2012); Kacperczyk and Pagnotta (2021)).

This study adds to the literature on insider trading, which can be characterized by two features. First, existing work typically takes the perspective of an insider. Most studies focus on the trading behavior and realized gains of insiders. Koudijs (2015) uses eighteenth-century data to show that insiders strategically time their transactions to minimize price impact. Collin-Dufresne and Fos (2016) extend Kyle (1985)'s model by making noise trading stochastic and predict that insiders trade more when noise trading volume is high. Collin-Dufresne and Fos (2015) find empirical evidence in line with this prediction using data from 13D filings. Ahern (2017) shows how private information flows through a network of insiders and documents that centralized insiders outperform their peers in the periphery.

Second, most insider trading studies use data that are subject to sample selection issues. Insider trading data are typically retrieved from lawsuits initiated by the SEC or self-reported by insiders (e.g., Meulbroek, 1992; Lakonishok and Lee, 2001; Cohen, Malloy, and Pomorski, 2012; Ali and Hirshleifer, 2017; Kacperczyk and Pagnotta, 2019; Ahern, 2020; Jagolinzer, Larcker, Ormazabal, and Taylor, 2020; Kacperczyk and Pagnotta, 2021).

We contribute to this literature by studying insider trading from the perspective of an outsider and by collecting data that are not subject to sample selection issues. In particular, we collect every single transaction for all insiders and outsiders over a multi-year time span. These two contributions enable us to answer two questions that have not been considered before. What is the unconditional probability that an outsider trades with an insider? How large is the outsider's unconditional expected loss from trading with an insider?

The paper proceeds as follows. Section 2 describes the historical setting and the companies in our sample. Section 3 provides an overview of our data sources and discusses our insider definitions. Section 4 presents the empirical results and Section 5 concludes.

2 Historical setting

The early 18th century London stock market consisted of a few stocks, and newspapers typically quoted daily prices for the largest companies (Bank of England, East India Company, South Sea Company, Million Bank, and Royal African Company). In late 1719 and early 1720, two new insurance company stocks were floated: the Royal Exchange Assurance and London Assurance. These public offerings were followed by a widespread enthusiasm for public equity and share trading. Entrepreneurs proposed more than 100 new companies in the spring of 1720 and the market witnessed a flurry of IPOs. Except for the two insurance companies, however, all new initiatives were nipped in the bud by the Bubble Act that was passed on 11 June 1720. While the Act was supposed to terminate all speculative endeavours, the summer of 1720 became a textbook example of a bubble. The episode is commonly referred to as the South Sea Bubble. Since the two insurance companies were the only new companies that survived the turbulent year 1720, the post-bubble market consisted of the same shares as the pre-bubble market plus the two insurance companies. The three companies for which we were able to collect all share transactions, i.e., the Bank of England, East India Company, and Royal African Company, collectively represented more than 40% of the market in terms of pre-bubble capitalization (see Anderson (1801, pp 90-95)).

2.1 Trading

Trading typically took place in coffee houses close to the London Stock Exchange. Traders also met in the transfer offices of the listed companies where transactions were recorded in the company's ledger and transfer books. Similar to today's markets, an investor who wanted to buy or sell stocks contacted a broker who in turn contacted another broker or market maker for price quotes. The broker then executed the transaction at the best possible price for the client and charged a fixed 25 basis points brokerage fee per transaction.[7]

[7]The loan book of the Bank of England documents a few loan defaults where the Bank sells collateralized shares to cover the losses on the loan. For each transaction a brokerage fee of 25 basis points was charged.

2.2 South Sea Bubble

The South Sea Bubble plays a prominent role in our sample. It is characterized by extreme price movements and volatility. Because the South Sea speculation triggered a simultaneous increase in the share price of other British companies, we need to understand the economic mechanism that played a key role in the bubble formation.

The South Sea Company was a private company that was chartered in 1711 and received the Asiento from the British government in 1713. The Asiento comprised the exclusive right to transport slaves to plantations in South America. However, instead of foreign trade, the company focused on sovereign lending. In particular, it facilitated the conversion of illiquid and irredeemable government annuities into liquid and easily transferrable South Sea shares.

In the early 18th century, the British government had a large amount of high-interest rate debt outstanding. A substantial part of the debt was in the form of annuities that were tied to the life expectancy of the annuity holder and therefore hardly tradeable. Due to this illiquidity and the poor financial condition of the state, the annuities were unattractive for debt holders and traded against sharp discounts. The government itself also disliked the annuities because they offered few opportunities to redeem debt or defer interest and principal payments.

The South Sea Company came to the rescue by offering annuity holders the option to convert their illiquid annuities into liquid South Sea shares. The Company paid the government a fixed fee and received in return the interest payments on the annuities and the right to issue a fixed number of new South Sea shares to investors. The government gained because it received the fixed fee, paid a lower interest rate to the Company, and got the opportunity to defer payments. The profitability of the deal for the South Sea Company relied on both legs of the deal: (i) between the Company and the government; and (ii) between the Company and the annuity holders. The profitability of the second leg was sharply increasing with the market price of South Sea shares because higher share prices enabled the Company to convert outstanding annuities more cheaply, i.e., using fewer shares.

As a result, it had more shares left for secondary offerings because the total number of new shares that the Company was allowed to issue was fixed. Moreover, these new offerings could be sold at higher prices. The Company thus had strong incentives to boost its share price.

Over the course of 1720, the South Sea Company issued a second, third, and fourth batch of shares. There was such enthusiasm that the price of each new issue exceeded market prices and new offerings were heavily oversubscribed. However, in the late summer of 1720, the Sword Blade Company that acted as the South Sea Company's financier defaulted on its payments and South Sea share prices started to plummet. As a result of the immediate liquidity problems, the South Sea Company had to be bailed out by its main competitor, the Bank of England.

2.3 Main companies

2.3.1 Bank of England

The Bank of England (BoE) is known today as the central bank of the United Kingdom. However, in the early 18th century it acted as a private bank with strong ties to the government. In January 1720, the Bank pulled the short straw in the bidding war with the South Sea Company for the right to convert government debt into stocks. While the South Sea share price bubbled heavily in 1720, the Bank was considered one of the safer assets in the turbulent bubble market.[8] Figure 1 shows that Bank share prices only doubled in 1720, while some other companies such as the London Assurance witnessed an eightfold increase. Despite its lower volatility, the Bank did contribute to the bubble by allowing shareholders to borrow money cheaply through the collateralization of their Bank shares. Braggion, Frehen, and Jerphanion (2023) show that shareholders who collateralized stocks were more likely to ride the bubble and take speculative positions in new share issues.

[8]For example, stockbroker Peter Crellius wrote on 16 January 1720: "the general opinion is that they [shares] will all continue to rise. Bank shares are not mounting as rapidly as the others, but opinion ranks them the safest of all: most of the speculation is falling on the South Seas." (Wilson (1941, p.124))

[Figure 1 about here.]

As explained in Section 2.2, the Bank also played an important role in the unwinding of the bubble by bailing out the South Sea Company. As the largest private lender in the market, the Bank was probably the only candidate for such a large-scale operation. However, the bailout also jeopardized the Bank as it was forced to call outstanding loans immediately to raise cash for the bailout, including the loans on collateralized Bank shares. The unexpected call induced borrowers to sell their shares in other companies to raise cash for their loan repayments. The credit contraction thus triggered a price-liquidity spiral that spilled over to other companies. In line with the predictions of Brunnermeier and Pedersen (2009), investors were confronted with market-wide drops in stock prices and a severe liquidity drought after the loans had been called on 6 October 1720.

2.3.2 East India Company

The East India Company (EIC) was chartered in 1600 and received a monopoly to trade commodities with the East Indies. Although the company held a monopoly in Britain, it faced fierce competition from the French Compagnie des Indes and the Dutch East Indies Company.[9] The EIC was important for the British government as it was responsible for 30% of Britain's import. This figure also illustrates how tightly the company was connected to the state. Over the course of the bubble year, East India Company stock prices doubled and then dropped by two-thirds when the bubble burst (see Figure 1).

2.3.3 Royal African Company

The Royal African Company (RAC) obtained a royal charter in 1672 and received the British monopoly on trade along the West coast of Africa. In May 1720 the company undertook a major refinancing operation (Shea, 2011). It quadrupled the book value of its equity capital

[9] Appendix A.7 gives an example of the French competition in India. In particular, the French were buying large quantities of goods, thereby driving the British East India Company out of the market.

by issuing new shares, known as "engrafted shares".[10] In July 1720, the company followed the example of the South Sea Company and Bank of England and offered its shareholders the opportunity to borrow cash using RAC shares as collateral. In synchrony with the shares of other firms, the stock price began to tumble in the late summer of 1720 (see Figure 1).

3 Data

We retrieve data from three sources. Our primary source are the Bank and East India ledger books and Royal African transfer files that record daily stock holdings and transactions. We collect the Bank ledger books for the period 1 August 1715 to 29 September 1725, East India ledger books from 25 June 1715 to 25 March 1723, and Royal African engrafted share transfer files from 28 May 1720 to 27 October 1720. Our second data source are the board meeting minutes for each of these companies that discuss the day-to-day business of the company and contain information about a company's board composition and dividend payments. The third data source is a newspaper called Castaing's Course of the Exchange that publishes daily share prices.

3.1 Stock ledgers and transfer files

The Bank and East India ledger books record every individual stock transaction and each shareholder's daily equity holdings in trader-specific accounts. An individual trader may have multiple accounts over the course of time that are all linked to a unique trader-specific ledger index entry showing shareholder characteristics like home address, occupation, and title. We retrieve all buys and sells for every account with accompanying transaction details: date, transaction amount, and buyer and seller identities. Unfortunately, the Royal African ledger books have not survived. However, using the transfer files we are able to reconstruct

[10] The old and engrafted shares were slightly different because holders of the old shares were entitled to a £10 dividend payment in April 1721, whereas holders of engrafted shares were not. Nonetheless, prices of old and engrafted shares were highly correlated (99%) and after the dividend payment newspapers reported only one price.

all transactions and holdings of the engrafted Royal African shares issued in 1720.

The main advantages of the ledger and transfer file data are their completeness and high level of detail. We observe *all* daily holdings and buy and sell transactions for *every* shareholder of a company. Because we want to measure the *unconditional* probability that an outsider trades with an insider and the *unconditional* expected loss of trading with an insider, it is crucial to observe the entire universe of transactions with trader identities. Because every Bank and East India transaction is recorded multiple times (in the ledger accounts of the buyer and seller and in the transfer file), we are able to cross-check each transaction detail to ensure high data quality. We show an example of a ledger book account and transfer file for the Bank of England in Figures A1 and A2 in the Online Appendix.

3.1.1 Shareholder characteristics

We also retrieve shareholder characteristics from the ledger indexes in which background information is recorded in an unsystematic manner. Most likely, company clerks did not systematically document titles, home addresses, and occupations of shareholders because the characteristics served to uniquely identify a shareholder. As a result, we typically observe many details for John Smith (e.g., "woollen draper from Lombard Street in London"), while we know little about Baron Philip van Borselle because there is only one such baron. Table A1 in the Online Appendix gives an overview of the most common trader characteristics in our sample. We find that many traders live close to the stock exchange: in Westminster, St. James', Holborn, or the city of London. Among the foreigners, the Dutch are the largest groups with 810 traders. The table further shows that merchant, draper, and goldsmith are the most popular occupations among shareholders. Temin and Voth (2004) point out that goldsmiths often acted as bankers in the early 18th century. It is therefore not surprising that they are heavily involved in stock trading. Approximately 2% of the traders carry a title, most commonly Baronet, Knight, and Earl, but higher nobility is also active in the London stock market (Dukes, Viscounts, and Marquises).

3.2 Board meeting minutes

Our default insider definition classifies board members of the Bank, East India, and Royal African as insiders for the years that they serve on the board of their respective companies. A trader can thus be an insider for a company in one year and an outsider for that company in another year. Similarly, in a given year, a trader can be an insider for one company and an outsider for another. The board of directors of the companies in our sample consists of a governor, deputy governor, and a number of directors that varies per company. The Bank and East India Company each had 24 directors and the Royal African Company had 23 directors. The Bank scheduled one board meeting per week and the other two boards met twice a week. In case of urgencies, companies planned ad hoc meetings in between the regularly scheduled meetings.[11]

We retrieve director names from the minutes of each company's board meetings. The structure of these minutes is similar across companies.[12] Each report is dated and first lists the names of all board members present at the meeting (see Figure 2). It then proceeds with a reading and approval of last meeting's minutes and a discussion of the most pressing issues at that moment. The Bank board typically discussed loans and repayment conditions, whereas the other two boards discussed colonial developments and the arrival of ships and cargo. Appendix A gives eight examples of material issues that were discussed in board meetings and later covered in newspapers. These examples provide insights into the day-to-day business of each company.

[Figure 2 about here.]

[11] For instance, when the Bank of England faced financial difficulties due to the South Sea Company bail out, meetings took place on Thursday September 29th, Friday September 30th, Tuesday October 11th, and Thursday October 13th.

[12] Board meeting minutes of the Bank (so-called Court of Director meetings) are available on the Bank website: https://www.bankofengland.co.uk/about/people/court-of-directors. For the East India we collect board minutes from the British Library, East India Company Minutes of the Court of directors IOR/B/54-60. Minutes of the Royal African board are obtained from Treasury Papers, Class T70, National Archives, Kew, UK: The Minute Book of the Royal African Company Court of Assistants (T70/90) and Minute Book of the General Court (T70/101).

Twice a year each board decided how much dividend would be paid to shareholders. After that decision was made, the company closed its books and stopped recording stock transactions to determine each shareholder's dividend claim.[13] The meticulous recording of transactions with trader identities was also necessary to determine which shareholders were eligible to elect new board members. Bank and East India investors with at least £500 in nominal holdings were eligible to vote.[14] Companies also imposed lower bounds on shareholdings for election candidates. For instance, to qualify as a candidate, Bank directors were required to hold at least £2,000 nominal in Bank stock. Investors had to own at least £3,000 nominal to be a candidate for the position of deputy governor and £4,000 for the position of governor. For the East India, governor, deputy governor, and director candidates had to hold at least £2,000 nominal in stock of their company. A Royal African governor was required to hold at least £1227.15 nominal and a Royal African director £1200. Elections were held once a year and newspaper advertisements were placed to call shareholders to vote. Figures A3 and A4 in the Online Appendix provide examples of board meeting minutes that discuss the scheduling of board elections and the announcement of voting results.

3.3 Summary statistics

Panel A of Table 1 presents descriptive statistics on investor trades and holdings. Our sample consists of 14,192 shareholders, split into 14,068 outsiders and 124 insiders (directors). The Bank and East India Company had 53 and 52 different board members over the sample period, respectively. The Royal African sample includes 25 directors because the sample period is much shorter and covers only one board. Board members often enter and leave the board multiple times during our sample period. The total number of unique board members (124) is smaller than the sum across companies (130) because some individuals

[13] We find no evidence of insider trading around dividend announcements because dividends are very predictable. For example, prior to 1720, 15 of the 17 dividend payments in our sample were exactly equal to 4%, and after 1720, all dividends were equal to 3%.

[14] See Carlos and Neal (2006) and https://www.british-history.ac.uk/old-new-london/vol2/pp183-194

hold directorships in multiple companies. Some traders even hold board positions in different companies in the same year (e.g., Matthew Decker).

Table 1 further shows that the total number of buy and sell transactions over the sample period is 102,614 for outsiders and 1,705 for insiders. For days with positive trading volume, the average total transaction volume per day is £67,309 for the group of outsiders and £6,509 for the group of insiders. Interestingly, average holdings per trader are much larger for insiders (£13,226) than for outsiders (£2,637), which indicates that insiders tend to hold larger portfolios than outsiders.

Panel B of Table 1 provides information on the monthly and quarterly post-trade returns of insiders and outsiders. The average return of an insider over the one-month period following the trade (1.40%) exceeds the post-trade return of an outsider (-0.02%). The gap in average trade performance of insiders and outsiders widens to 4.27% over the quarterly horizon and is observable in share transactions in each of the three companies in our sample. These descriptive statistics provide preliminary evidence that company directors have better timing ability than outsiders.

[Table 1 about here.]

A key benefit of our data set is the ability to observe each investor's trades in different firms. Figure 3 shows that 2,707 investors hold shares in two companies and 220 traders have positions in all three companies. We can therefore compare a director's performance when investing in the company where he serves on the board to the return he earns on investments in other companies.

[Figure 3 about here.]

3.4 Alternative insider definitions

Our default definition labeled *Board* classifies traders as insiders for a company during the years they serve on its board. However, some non-board members may also have access

to material and non-public information. We address this concern by expanding our insider definition along various ways. Our first alternative, *Board + Pre&Post Board*, also defines directors as insiders in the years prior to joining the board or after leaving the board. This generalization captures potentially valuable information flows from current directors to past and future directors. Second, we expand the set of insiders beyond board members. In particular, we consider as potential insiders: nobility, traders who live in the same area as directors (neighbors), politicians, brokers, and blockholders. Third, we study performance differences *within* the set of board members by singling out the transactions of governors.

In addition to the board members, the upper class may have access to valuable private information. We capture these potential information spillovers by our *Noble* definition that classifies Dukes, Marquises, Earls, Viscounts, and Barons as insiders. This increases the total number of insiders for the Bank, East India Company, and Royal African Company by 117, 56, and 38, respectively. Information spillovers may also occur on the neighborhood level. For instance, Ahern (2017) shows that insiders often live close to each other and are connected through social relationships. Our *Neighbor* definition refers to the group of traders who live in the same neighborhood (ward) as a company's board member and trade in the same direction (buy or sell) on the day after the board member's trade. Adding these traders to the default set expands the group of insiders with 35 for the Bank, 21 for the East India Company, and 10 for the Royal African Company.

We also allow for the possibility that politicians trade on inside information because the companies in our sample have strong ties with the government (see for instance the news events described in Appendix A.2 and A.4). Our *Politician* insider definition includes all members of the British parliament during our sample period. We find that 245, 134, and 65 members of parliament hold shares in the Bank, East India Company, and Royal African Company, respectively. Private information may also be acquired by traders who are very active in the market, such as stock brokers. We account for this possibility by defining brokers as insiders under the *Broker* definition. This leads to an expansion of the insider

base by 121 Bank, 92 East India Company, and 42 Royal African Company investors.

We further consider blockholders as potential insiders. Our *Blockholder* definition classifies the five traders with the largest shareholding in a company in a given month as insiders. This yields a total of 24, 26, and 10 additional insiders over the sample period for the Bank, East India Company, and Royal African Company, respectively. Finally, we account for the possibility that the governor of each board may have access to valuable information that is not available to other board members. We therefore also study performance differences *within* the group of insiders by creating a company- and year-specific *Governor* dummy.

3.5 Prices and dividends

We obtain stock price data from the newspaper Castaing's Course of the Exchange and retrieve dividend payments from the minutes of the board meetings to compute stock returns. We fill in gaps in the stock price series by carrying the last observed price forward, but only for gaps that are less than one month long. Figure 1 plots the evolution through time of share prices, normalized by dividing by the first observation for each company in our sample. The figure highlights the impact of the South Sea Bubble in 1720 when prices quickly doubled before suddenly collapsing a few months later when the bubble burst.

4 Results

4.1 Insider trading: An event study

In this section we give insight into the type of private information that board members had access to. Specifically, we analyze eight examples of non-public events and decisions that were discussed in board meetings of the Bank and East India Company. We select company-specific events that were publicly discussed in newspapers after the board meeting,

which suggests that they were sufficiently important and interesting for a broader audience.[15] Appendix A provides a detailed description of each event. Our analysis aims to answer two questions: Did insiders trade on material and non-public information obtained in board meetings? If so, what is the effect of the private information shared in board meetings on stock prices?

We address the first question by regressing insider and outsider trading activity in Bank and East India shares on a dummy that takes a value of one (minus one) on days on which the board of directors discusses positive (negative) news. Following Meulbroek (1992), we control for the public announcement of the news by including a dummy that is equal to one (minus one) on the day that the positive (negative) news is published in the newspaper.[16] We measure trading activity as the net of daily buy and sell volume divided by the sum of buy and sell volume.[17] We retrieve board discussion days from the company's board minutes and announcement days from the British Library's newspaper archive. We consider one-day and five-day event windows. For the five-day window, the board and news dummies are also nonzero on the four days following the meeting and announcement days.

Table 2 reports the regression results. We find that directors increase (decrease) holdings in their own company stock when positive (negative) news is discussed in board meetings. Specifically, column 1 in panel A shows that net insider purchases as a fraction of total insider trades go up (down) by 82% on days with positive (negative) board news. Over the five-day event window (column 5), the average effect is 90% per day. These results are

[15] These requirements limit the number of events that we can study for two reasons. First, many events are not material enough to be covered in newspapers. Second, many newspapers did not survive. Thus, even if the events were discussed in the public press, we would not be able to observe that three centuries later.

[16] We deviate from the event study approach in Meulbroek (1992) in three ways. First, we test if there is a change in insider trading activity around our set of events (board meetings). This step is not necessary in Meulbroek (1992) because she relies on data from court cases that can only take place if the SEC has detected unusual insider trading activity around an event. Second, we do not control for market returns because the early eighteenth-century London stock market consists of only a handful of stocks and the BoE and EIC collectively represented 40% of total market capitalization. Third, we pool event dummy loadings across companies to increase estimation precision.

[17] We find similar results when measuring trading activity as the net of the number of buy and sell transactions divided by the sum of the number of buy and sell transactions. For each measure of trading activity we run an augmented Dickey-Fuller test and reject the null hypothesis of a unit root at the 1% level.

statistically significant at the 1% level and robust to controlling for news announcements (columns 2 and 6). Columns 3, 4, 7 and 8 of Table 2 show that board discussions have a much smaller and opposite impact on the trading activity of outsiders. On days when the information discussed in the board is positive (negative), we observe a 5 percentage points decrease (increase) in standardized outsider purchases. These results support the conjecture that insiders trade on private information acquired during board meetings. They increase their positions on days when good news is discussed and decrease their positions when bad news is shared. The small and opposite response of outsiders to these events underscores the non-public character of the board discussions.

Next, we study the relation between information shared in board meetings and prices. In particular, we regress daily Bank and East India stock returns on the dummy variables for board meeting days and newspaper reporting days. We again consider one-day and five-day event windows. For the five-day window, the regression coefficients on the dummy variables capture the average effect of the news events on daily stock returns in the event window.

The results reported in panel B of Table 2 show that a company's stock return is more than 2% higher (lower) on days when positive (negative) news is discussed in a board meeting. Over a five-day window, the average effect is approximately 0.90% per day, which means that the cumulative effect over five days equals 4.50%. The one-day effect is statistically significant at a 10% level and the five-day effect at a 1% level. Both effects are robust to controlling for lagged returns and newspaper announcement day dummies. Collectively, the findings in Table 2 suggest that positive (negative) news shared in board meetings leads to insider purchases (sales) and positive (negative) share price shocks.

[Table 2 about here.]

4.2 Do insider trades predict stock returns?

In this section we study the relation between insider trading and future stock returns. In particular, we test if insider purchases (sales) are followed by price increases (decreases). The

unit of observation is the stock-week level and we regress forward-looking weekly, monthly, and quarterly stock returns on aggregate weekly insider and outsider trading volume.

Table 3 documents a positive (negative) relation between insider purchases (sales) and future prices. Insider buys significantly predict stock returns at the one-week horizon, whereas the predictive power of insider sells is statistically significant at the one-month and one-quarter horizon.[18] These findings are in line with existing literature that uses modern data.[19] The effects that we document are economically sizeable, particularly at the quarterly horizon. Specifically, an increase in insider buys by 100 shares predicts a stock price increase of almost 4% over the next quarter. Similarly, an increase in insider sales by 100 shares predicts next quarter's stock return to decrease by 6%.

We also test whether directors' trades have predictive power for the stock return of a company when they do not serve on the board of that company, i.e., when they serve on the board of another firm or serve on the board of the company in another year (past or future). The results in columns 2, 5, and 8 indicate that the predictive power is much weaker when a director does not sit on the board. Finally, in columns 3, 6, and 9 we show that aggregate outsider buy and sell volume does not predict future stock returns. Collectively, these findings suggest that board membership improves a trader's access to valuable, non-public information. Because the predictive power of insider trades is most pronounced at the monthly and quarterly horizons, we focus on these horizons in the rest of the paper.[20]

[Table 3 about here.]

[18] We control for weekly and monthly stock returns to ensure that our results are not driven by short-term momentum or reversal strategies. In an additional robustness test, we have also controlled for one-year momentum and find that our conclusions do not change. We do not include the one-year momentum control in Table 3 as we would lose the Royal African Company because of its short sample period.

[19] Specifically, Meulbroek (1992), Lakonishok and Lee (2001), and Ahern (2017) find that insider buys have stronger predictive power for returns at short horizons than insider sells. Marin and Olivier (2008) show that insiders' sales tend to peak several months prior to a large drop in stock prices.

[20] The use of monthly and quarterly horizons is in line with prior studies on insider trading (e.g., Ali and Hirshleifer (2017), Cohen, Malloy, and Pomorski (2012), and Eckbo and Smith (1998)).

4.3 Do insiders outperform outsiders?

The discrepancy in predictive power between aggregate insider and outsider trading volume suggests that insiders have higher trading returns than outsiders. We test this hypothesis more formally by regressing trader- and company-specific post-trade returns on various insider dummy variables. Trading returns are defined as the stock return over the one-month or one-quarter period after each trade.[21] Returns on sell trades are multiplied by -1 to facilitate comparison with buy trades. The insider dummy variable equals one for an insider's trade with an outsider and zero for all other trades. We also create separate insider dummies for buy and sell trades. An important benefit of this transaction-level analysis is that it allows us to control for trader fixed effects. Doing so rules out the possibility that any return differences between insiders and outsiders are driven by time-invariant trader characteristics such as IQ and financial literacy rather than information asymmetry.

Panel A in Table 4 presents results for the one-month horizon. Column 1 shows that post-trade returns of board members are 1.58% higher than those of outsiders. This return difference is significant at the 1% level. At a quarterly horizon (panel B), the outperformance of insiders is even larger (4.31%). We also find some evidence of information spillovers to former and future board members. Specifically, column 2 shows that in the years prior and post a trader's board membership, the return gap between insider and outsider trades ranges from 0.54% (t-statistic = 1.03) at the monthly horizon to 1.73% (t-statistic = 2.06) at the quarterly horizon. As expected, classifying a director as insider in board and non-board years yields results that are in between those for the board and non-board years (see column 3). The strong outperformance of insiders is robust to the inclusion of trader fixed effects in column 4. In columns 5 and 6, we zoom in on buy or sell transactions. We find that the superior trading performance of insiders is driven by purchases, consistent with results documented by Lakonishok and Lee (2001) and Jeng, Metrick, and Zeckhauser (2003).[22]

[21] In additional analyses, we have measured trading performance in terms of pound profits instead of percentage returns. This yields very similar conclusions.

[22] At first sight, the finding that the outperformance of insiders is strongest among buy trades may seem

[Table 4 about here.]

Thus far, we have defined insiders as the board members of the companies in our sample. However, this definition may be too narrow because some other traders may also have access to private information. We therefore now examine the trading performance of the potential insiders defined in Section 3.4: nobility, neighbors of board members, politicians, brokers, and blockholders. We also separate governors from other board members to study performance differences within the set of board members. In Table 5 we regress trader- and company-specific post-trade returns on dummy variables defined for each of these investor groups.

We find that the monthly post-trade returns of nobles, neighbors, politicians, and brokers are significantly higher than those of outsiders. The outperformance ranges from 0.44% for neighbors to 1.20% for brokers (panel A). Over the quarterly horizon (panel B), the outperformance is approximately 1% for each of these investor groups but only statistically significant for neighbors. In contrast, the outperformance of board members is more than 4% per quarter and significant at the 1% level. The quarterly trading gains of governors are even larger than those of other board members.[23] Overall, the findings in Table 5 suggest that some non-board members may also have access to material and non-public information. However, the trading returns of these potential insiders are smaller than those of board members, particularly over the quarterly horizon.

[Table 5 about here.]

4.4 What is the expected loss for outsiders due to insider trading?

The evidence presented thus far suggests that insiders capitalize on their information advantage. In this section we quantify how much an outsider is expected to lose due to insider

inconsistent with the result in Table 3 that insider sells have stronger predictive power for monthly and quarterly stock returns. Note however that the analysis in Table 3 is on the stock level and predicts stock returns using aggregate insider trading volume, whereas the analysis in Table 4 is on the transaction level and measures the difference in trading performance of insiders and outsiders using insider trading dummies.

[23] The coefficient on the *Governor* dummy in panel B of Table 5 is economically large but statistically insignificant because of the small number of governors in our sample.

trading. We measure the expected loss per transaction by multiplying an outsider's unconditional probability of trading with an insider by the average loss when doing so. The unconditional probability is computed as the number of outsider transactions with an insider divided by the total number of outsider transactions in our sample. The average loss is defined as the difference in average post-trade return between trades with an insider and trades with another outsider. We consider one-month and one-quarter horizons and compute expected losses due to trading with each of the insider groups defined in Section 3.4.

Table 6 presents the results. Column 1 reports the probability that an outsider trades with an insider and columns 2 and 3 show an outsider's expected loss from trading with an insider over a one-month and one-quarter horizon, respectively. We show separate results for outsider sales in columns 4 to 6 and for outsider purchases in columns 7 to 9. We document that the expected loss of trading with an insider is smaller than 5 basis points per transaction over a one-month post-trade period and smaller than 10 basis points over a quarterly horizon. Expected outsider losses are largest when trading with board members, politicians, and brokers, but are small relative to the typical brokerage fee during our sample period (25 basis points). The expected loss is limited because the probability that an outsider trades with an insider is less than 5%. Splitting trades into buys and sells yields interesting insights. Although expected losses remain small, the results indicate that selling to board members, politicians, and blockholders is more harmful for outsiders than buying from these groups. This suggests that the buy trades of these insider groups are more likely to be informed than their sell trades, consistent with our finding for board members in Table 4. In contrast, buying shares from brokers appears more harmful to outsiders than selling to them, which suggests that brokers are more successful in anticipating future stock price declines.

In the bottom row of the table we define all nobles, neighbors, politicians, brokers, blockholders, and current and future/former board members jointly as insiders. Unsurprisingly, this broad insider definition leads to larger expected losses because the probability of trading with an insider increases to 16%. Expected outsider losses range from 12 basis points for the

monthly post-trade period to 25 basis points for the quarterly horizon. Note that under this broad definition, the group of potential insiders is very large, i.e., more than 1,000 traders. Because the average size of an insider network in Ahern (2017) and Cziraki and Gider (2021) seldomly exceeds 30 traders, the broad insider definition seems very conservative. We therefore consider the results for this insider group an upper bound on the expected losses that outsiders face due to insider trading.

[Table 6 about here.]

4.5 Strategically hidden insider trades

It is reasonable to expect that not all insider trades in our sample are based on private information because insiders may also trade for liquidity and diversification reasons. Because uninformed insider trades are likely less profitable, a potential concern with the analysis in the previous section is that we underestimate outsiders' expected losses by including these uninformed trades. Unfortunately, it is notoriously difficult to classify a transaction as informed because we typically cannot observe a trader's full information set.

The literature has addressed this issue by proxying for informativeness using post-trade returns (e.g., Jagolinzer, Larcker, Ormazabal, and Taylor, 2020). This approach classifies insider trades as informed if the ex-post trade performance exceeds a profitability threshold. Although this method seems reasonable, it may misclassify some uninformed insider trades that are profitable ex post due to luck as informed. Similarly, some trades that are motivated by inside information could be unprofitable and therefore incorrectly labeled as uninformed.

The richness and granularity of our data enables us to address this issue in a different way. In particular, we proxy for the informativeness of insider trades using a so-called *reverted trade* measure. Our measure is based on Kyle (1985)'s and Collin-Dufresne and Fos (2016)'s idea that profit-maximizing insiders have a strong incentive to hide their identity when trading on material and non-public information because they want to minimize price impact. However, insiders in our sample cannot conceal their identity when trading *directly*

with outsiders because buyers and sellers observe each other's identity when signing the transfer file. The solution to this anonymity problem lies in trading *indirectly* with outsiders. For example, an insider sells five stocks to a collaborating friend who, in turn, sells five stocks to an outsider. The outsider then effectively trades with the insider without observing his identity because the insider's friend acts as intermediary. We exploit this idea to identify strategically hidden insider trades, which we refer to as reverted trades. We classify a trade as reverted if the counterparty offsets it within five days after the original trade. We expect reverted insider trades to be more profitable than non-reverted trades because an insider has a strong incentive to hide his trade when it is based on private information.

We study the profitability of reverted and non-reverted trades by regressing post-trade returns on dummy variables for insider trades and reverted trades and the interaction between these dummies. Table 7 presents the results for monthly and quarterly post-trade horizons. Columns 1, 2, 5, and 6 correspond to our default definition of reverted trades that allows for the intermediating trader to profit from his position by trading more stocks in the second transaction (with the outsider) than in the first (with the insider). We find that reverted trades of directors earn 2.4% (2.9%) higher returns over the next month (quarter) than non-reverted director trades (columns 1 and 5). The return differences are statistically significant at the 1% level and robust to the inclusion of company fixed effects. These findings are consistent with the idea that insiders conceal their identity when trading on material and non-public information.[24] The economic magnitude of the effects becomes weaker if we expand our insider definition with nobility, neighbors, politicians, brokers, and blockholders (columns 2 and 6). This evidence is consistent with the finding in Table 5 that the trades of these other potential insiders are less profitable than those of board members.

However, the reverted trade results are also consistent with the idea that an insider's counterparty somehow infers informed trading and reacts by trading in the same direction as

[24]The negative loading on the reverted trade (RT) dummy implies that outsider trades that are reverted are less profitable than non-reverted outsider trades. The difference in profitability between reverted and non-reverted insider trades can therefore not be explained by reverted trades being more profitable in general.

the insider, thereby reverting the original transaction. In this case, there is no collaboration between the insider and his counterparty. It is important to note that a non-collaborating counterparty maximizes profits by trading more shares in the second transaction (with the outsider) than in the first (with the insider). We test this alternative interpretation of our results by considering a different definition of reverted trades. Specifically, we impose that the number of shares traded in the first and second transaction must be exactly the same.[25] If counterparties are non-collaborative, our results should become weaker after imposing this restriction. However, columns 3, 4, 7, and 8 in Table 7 show that the gains of reverted insider trades become even larger after imposing the constraint. Overall, these results provide support for the hypothesis that insiders hide their informed trades by using intermediaries.

[Table 7 about here.]

4.6 Expected losses from strategically hidden insider trades

We proceed by studying how much an outsider expects to lose due to strategically hidden informed insider trades. We define a trade as strategically hidden and informed if it is reverted by the counterparty and if the ex-post trade return exceeds a prespecified threshold. By combining the ex-ante reversion requirement and the ex-post profitability criterion, we obtain a more accurate proxy for informed trades than prior literature that identifies informed trades based on trade performance alone. For example, an uninformed insider trade that turns out to be profitable by chance is misclassified as informed based on the profitability threshold. However, given that the transaction is uninformed, the insider has little incentive to conceal the trade. By using the combination of informativeness measures, we observe that the insider did not conceal his trade and correctly label the transaction as uninformed. Similarly, an unprofitable uninformed insider trade that is reverted by chance would be misclassified as informed using solely the reverted trade measure. In contrast, by using both

[25] Recall that in our default definition of reverted trades, we allow the number of shares traded in the second transaction to be larger than or equal to the number of shares traded in the original transaction.

criteria we correctly classify the trade as uninformed because it is unprofitable.[26]

Table 8 reports an outsider's expected loss from trading with an informed insider. We consider monthly and quarterly post-trade horizons and use the reverted trade criterion and various profitability thresholds to identify informed trades. In the top row of each panel we define strategically hidden insider trades with positive returns over the next month or quarter as informed. Along the rows, we gradually increase the profitability threshold by one standard deviation of post-trade returns. By raising the bar we select the most profitable concealed insider transactions for which it is most plausible that they are based on private information. Using the default insider definition (*Board*) and a threshold of zero, the expected loss for outsiders is less than three basis points per transaction over the next month and less than five basis points over the next quarter. Expected losses become even smaller if we increase the return threshold because the increase in profitability of informed trades at higher thresholds is more than offset by the decrease in likelihood of trading with an informed insider. When splitting trades into buys and sells, we observe that selling to an informed insider is slightly more harmful to outsiders than buying from an insider.

In panels C and D of Table 8 we report results for the broad insider definition that adds nobles, neighbors, politicians, brokers, and blockholders as insiders. As expected, expanding the group of insiders leads to larger expected losses because it increases the likelihood of trading with an informed insider. Outsiders expect to lose 14 basis points per month and 28 basis points per quarter due to trading with this expanded group of potential insiders. Similar to panels A and B, expected losses decrease sharply if we raise the profitability bar. For example, if we set the hurdle to two standard deviations above zero, expected losses decrease to 7 and 15 basis points for the monthly and quarterly periods, respectively.

In sum, outsiders' expected losses due to informed insider trading are relatively small,

[26] Although our approach can reduce classification errors substantially, it does not rule out that informed insider trades that are strategically hidden but not profitable ex post are incorrectly labeled as uninformed. Because these unprofitable trades are harmless for outsiders, not including them in the expected loss calculations leads to an overestimation of expected losses. We therefore view the expected losses that we report as an upper bound on the true expected losses that outsiders incur due to informed insider trading.

especially if we take into consideration that the expanded group of insiders contains more than a thousand traders. In addition, a profitability threshold of 0% seems a low hurdle for trades marked as informed to be truly based on private information. We therefore interpret the estimates in the top row of panels C and D as an upper bound on expected losses.

[Table 8 about here.]

5 Conclusion

This paper collects early eighteenth-century transaction data to study insider trading from a novel perspective. We collect trading data for three companies covering more than 40% of the British stock market. We use this data to quantify how much an outsider expects to lose due to insider trading. There are three main advantages of using historical data vis-à-vis modern data. First, because we observe the identity of every trader and the composition of the board of directors for every company, we can classify each trader as either corporate insider or outsider based on board membership. Because we also observe directors' trades in shares of other companies and their trades before and after sitting on a firm's board, we can better identify the value of access to private information. Second, due to the completeness and granularity of our sample, our analysis is not affected by sample selection biases that pose a challenge for existing studies on the profitability and prevalence of insider trading that rely on self-reported insider trades or on data obtained from SEC investigations. Third, because we collect every single equity transaction with buyer and seller identities over a long time span, we can obtain a more accurate estimate of the unconditional probability that an outsider trades with an insider and the average loss she incurs when doing so.

We begin our analysis by selecting important company-specific events that were discussed privately in board meetings and later publicly in newspapers. We find that insiders buy (sell) unusually large amounts of shares before the publication of positive (negative) news. In addition, this good (bad) news leads to large subsequent stock price increases (decreases).

Consistent with these results, we show that aggregate insider trading activity has predictive power for future stock returns. However, directors' predictive ability is much weaker when they step down from the company's board. These findings suggest that board membership improves a trader's access to valuable, non-public information. This information asymmetry leads to a gap in trading performance between insiders and outsiders. Specifically, we document that insiders outperform outsiders by 1.5% to 3% per transaction over a monthly and quarterly horizon, respectively. The outperformance of insiders is robust to the inclusion of trader fixed effects that control for unobserved characteristics such as financial literacy.

Even though insider trades are highly profitable on average, we find that outsiders' expected losses due to insider trading are limited: below five (ten) basis points per transaction over the one-month (one-quarter) period after the trade. Expected losses are small because the probability that an outsider trades with an insider is less than 5%. Expected losses increase to 12 (monthly) and 25 (quarterly) basis points if we expand our insider definition with other potentially informed traders, such as politicians, brokers, and blockholders.

Because not all insider trades are likely based on private information, we also separately estimate outsiders' expected losses due to *informed* insider trading. We define trades as informed if they are strategically hidden by the insider and exceed a profitability threshold. Expected losses due to informed insider trading are less than three (five) basis points per transaction over the next month (quarter). Even after significantly broadening the group of insiders and conditioning the analysis on the most profitable insider trades, expected losses remain limited relative to the brokerage fee of 25 basis points per trade in our sample period.

We argue that the expected losses that we report based on historical data serve as an upper bound on the expected losses outsiders face due to insider trading in modern stock markets. First, the number of outsiders in financial markets has grown exponentially because of improved market access. In contrast, evidence provided by Ahern (2017) suggests that the number of insiders has not changed materially. Second, whereas in our historical sample insider trading was completely unrestricted, in today's markets insiders' opportunities to

trade on private information are limited by increasingly stricter insider trading laws.

Although our evidence shows that expected losses due to insider trading are small, we do not claim that informed insider trading is innocuous and does not need to be regulated. For instance, illegal insider trading can be harmful for companies and investors by reducing market liquidity and by undermining investors' confidence in the fairness of financial markets.

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Figure 1: **Normalized share prices**

This figure shows normalized daily share prices for the Bank of England (BoE), East India Company (EIC), and Royal African Company (RAC). Each company's share price series is normalized by dividing by its first observation. The sample period is 1 August 1715 to 29 September 1725 for the BoE, 25 June 1715 to 25 March 1723 for the EIC, and 28 May 1720 to 27 October 1720 for the RAC.

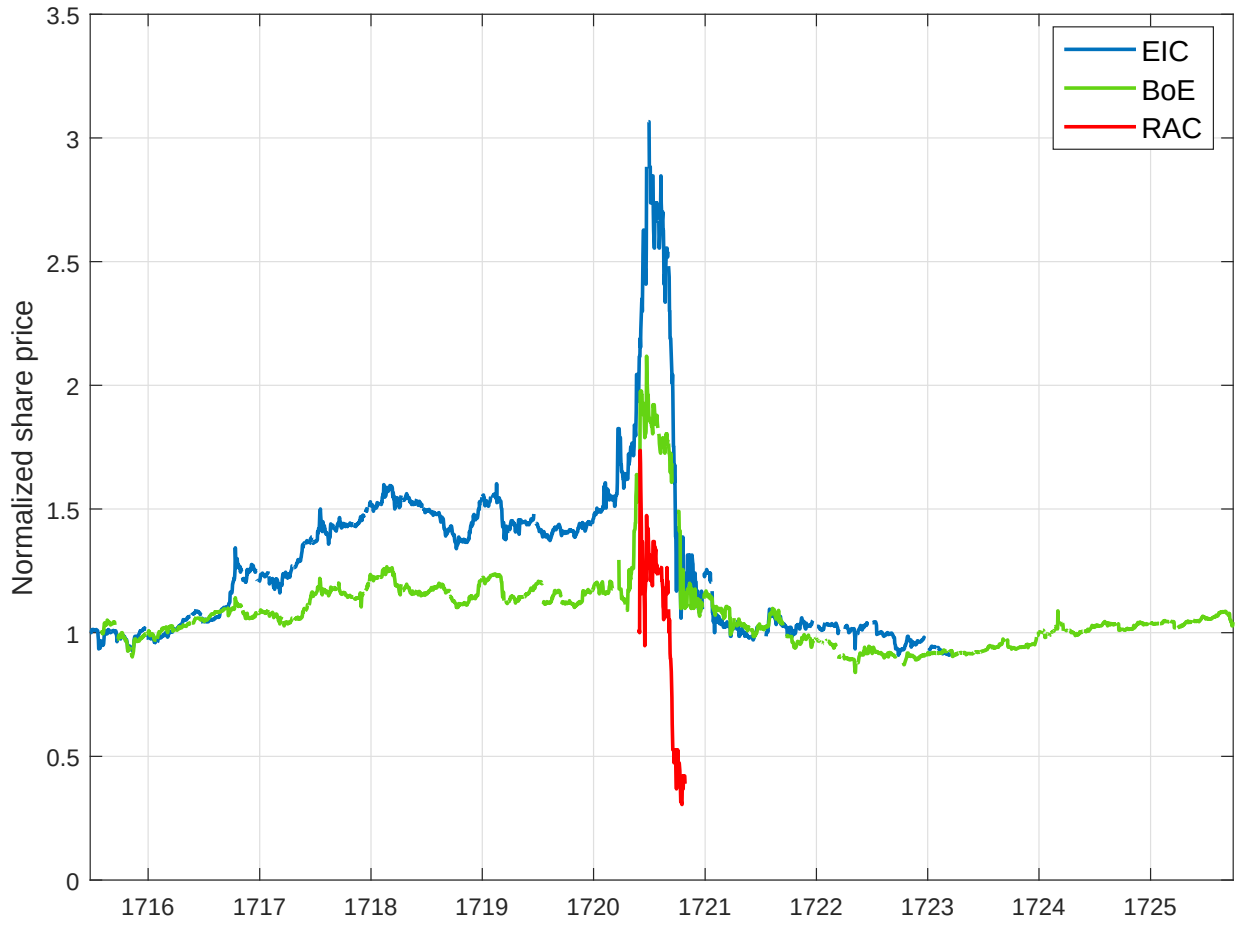


Figure 2: **Board meeting presence Bank of England**

This figure shows an excerpt from the minutes of a Bank of England board meeting on October 8th, 1719. It lists the names of the governor, deputy governor, and directors present at the meeting. This information was retrieved from the BoE website: https://www.bankofengland.co.uk/about/people/court-of-directors

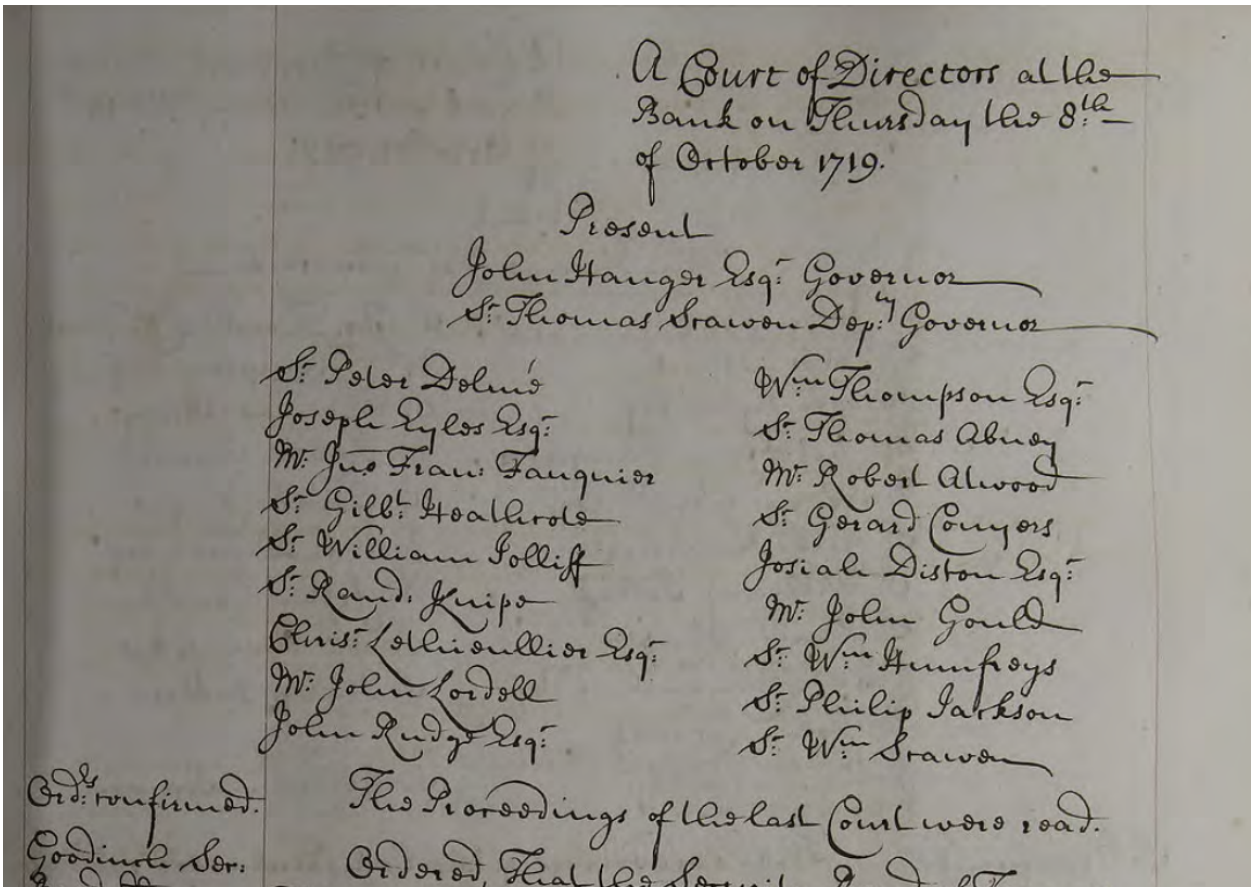


Figure 3: **Number of active traders per company**

This figure shows the number of active traders (i.e., trade at least once) in each of the companies in our sample, with overlapping areas indicating that traders are active in more than one company.

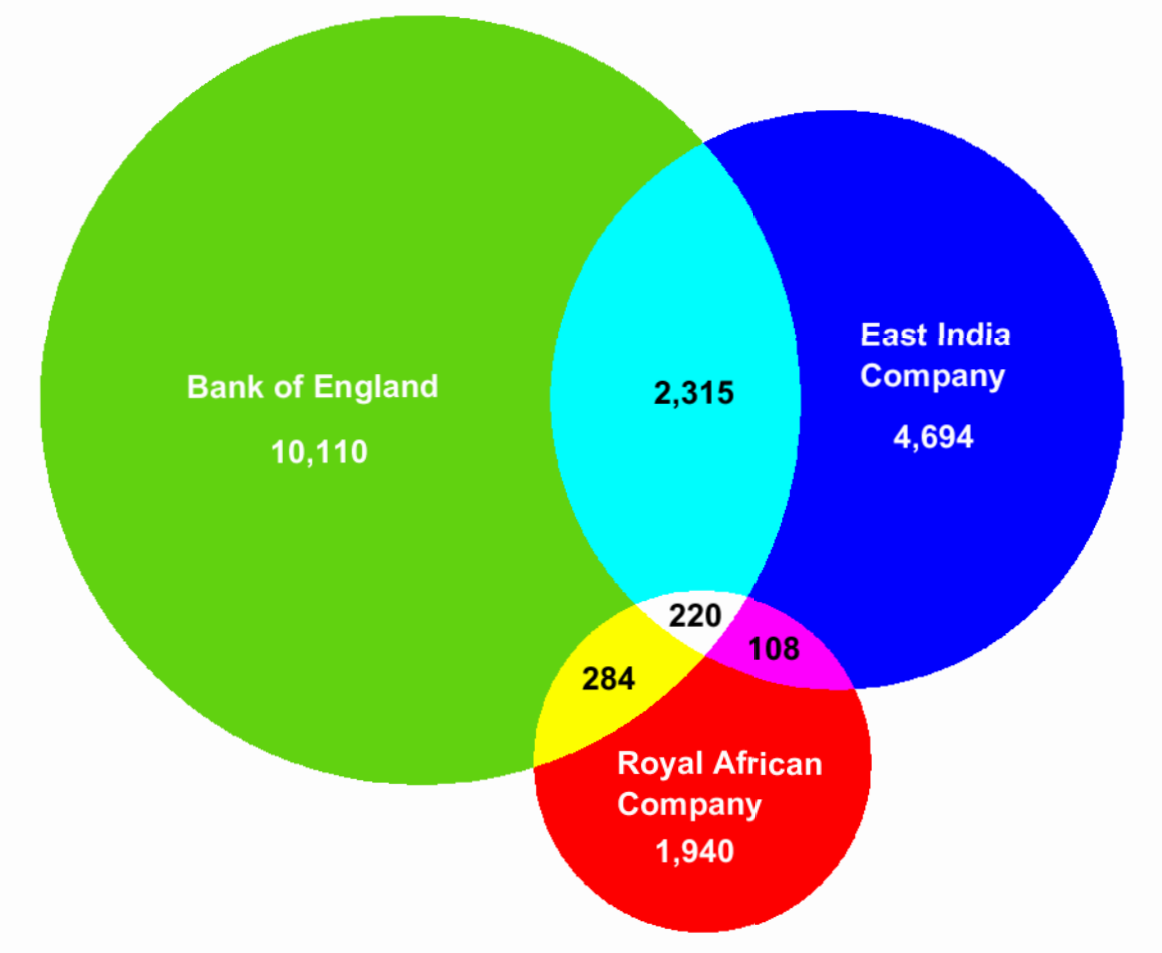


Table 1: **Descriptive statistics on investor trades and performance**

This table reports summary statistics for our sample. We collect every stock transaction for the Bank of England (BoE) for the period 1 August 1715 to 1 October 1725, for the East India Company (EIC) for the period 25 June 1715 to 25 March 1723, and for the Royal African Company (RAC) for the period 28 May 1720 to 27 October 1720. We split the sample into outsiders and insiders. A trader is classified as an insider for a company for the years he serves on its board of directors. Total number of traders is the total number of unique traders per company and across all companies. Total number of transactions reports the total number of buy and sell transactions over the sample period for each company and across all companies. Mean (SD) number of daily transactions is the time-series average (standard deviation) of the total number of buy and sell transactions per trading day for each company and across all companies. Mean (SD) daily volume is the time-series average (standard deviation) of the total buy and sell volume per trading day, expressed in number of shares or in pounds. Descriptive statistics for transactions and volume are computed conditional on having positive daily volume. Mean (SD) holdings per trader is the average (standard deviation) of market value of daily holdings across traders. Mean (SD) monthly (quarterly) return is the average (standard deviation) of one-month (one-quarter) post-trade returns. Post-trade returns are defined as the stock return over the one-month and one-quarter period after the trade. Returns on sell trades are multiplied by -1 to facilitate comparison with buy trades.

	Outsiders				Insiders			
	BoE	EIC	RAC	All	BoE	EIC	RAC	All
	Panel A: Trading activity and investor holdings							
Total # of traders	10,057	4,642	1,915	14,068	53	52	25	124
Total # of transactions	58,495	37,630	6,489	102,614	894	704	107	1,705
Mean # of daily transactions	33	23	130	44	2	2	4	2
SD # of daily transactions	35	25	109	58	2	2	3	2
Mean daily volume (# shares)	293	239	687	402	29	33	30	37
SD daily volume (# shares)	357	297	753	527	44	63	32	62
Mean daily volume (£)	43,021	47,731	77,375	67,309	4,215	7,053	3,279	6,509
SD daily volume (£)	56,501	74,536	97,805	10,417	6,133	18,234	4,183	15,242
Mean holdings/trader (£)	2,188	2,905	1,155	2,637	15,685	10,086	4,061	13,226
SD holdings/trader (£)	4,596	6,647	2,653	6,414	25,526	17,990	6,024	22,683
	Panel B: Post-trade returns							
Mean monthly return (%)	-0.03	-0.02	0.01	-0.02	1.69	1.25	-0.12	1.40
SD monthly return (%)	10.11	11.14	28.69	12.28	10.78	13.34	24.33	13.05
Mean quarterly return (%)	-0.07	-0.06	-0.20	-0.07	4.44	3.32	9.48	4.20
SD quarterly return (%)	16.49	20.56	58.87	21.29	18.40	25.53	57.15	24.70

Table 2: **Board meetings and insider trading**

This table reports results for an event study that examines the effect of information shared in board meetings on daily insider and outsider trading behavior (panel A) and on daily stock returns (panel B). The events are eight company events and decisions that were discussed during board meetings of the BoE and the EIC. Appendix A provides a description of each event. The event date is the day on which the board meeting takes place. We show estimation results for panel regressions of daily insider and outsider trading activity (panel A) and daily stock returns (panel B) on a constant and a dummy variable that takes a value of one (minus one) on days on which the company's board of directors discusses positive (negative) news. In columns two, four, six, and eight, we also include a dummy that takes a value of one (minus one) on the day that the positive (negative) news is published in the newspaper. If a board meeting or news announcement occurs on a non-trading day, the dummy variables take a value of one on the next trading day with a valid share price. We consider one-day and five-day event windows. For the five-day window, the board and news dummies are also nonzero for the four days following the board meeting and newspaper announcement. We measure daily trading activity as the net of buy and sell volume in shares divided by the sum of buy and sell volume. In each regression we control for company fixed effects. In columns three, four, seven, and eight in panel B, we also control for the stock return on the previous day. The t-statistics in parentheses are computed based on Driscoll and Kraay (1998) standard errors with 10 lags that are robust to autocorrelation, cross-sectional dependence, and heteroskedasticity.

Panel A: Net trading activity								
Event window	One day				Five days			
	Insiders		Outsiders		Insiders		Outsiders	
Board meeting	0.82	0.82	-0.05	-0.05	0.90	0.90	-0.06	-0.06
	(3.93)	(3.91)	(-1.68)	(-1.68)	(10.08)	(10.16)	(-1.47)	(-1.48)
News announcement		-0.32		-0.03		0.34		-0.02
		(-0.60)		(-0.90)		(1.31)		(-1.95)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.22	0.15	-0.02	-0.04	0.96	0.98	0.18	0.18
# Obs.	844	844	3,330	3,330	842	842	3,327	3,327

Panel B: Stock returns								
Event window	One day				Five days			
Board meeting	2.17	2.17	2.16	2.16	0.93	0.92	0.87	0.87
	(1.65)	(1.65)	(1.64)	(1.64)	(2.56)	(2.54)	(2.51)	(2.49)
News announcement		-0.46		-0.55		0.32		0.30
		(-0.66)		(-0.73)		(1.45)		(1.34)
R_{jt-1}^{Day}			0.08	0.08			0.08	0.08
			(2.25)	(2.27)			(2.15)	(2.13)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.43	0.44	1.08	1.09	0.40	0.43	0.99	1.02
# Obs.	5,610	5,610	5,608	5,608	5,602	5,602	5,602	5,602

Table 3: **Do insider trades predict stock returns?**

This table reports estimation results for predictive regressions of future stock returns on the aggregate weekly trading volume of insiders and outsiders. We consider one-week, one-month, and one-quarter forecast horizons. In columns 1, 4, and 7, future stock returns of the BoE, EIC, and RAC are regressed on the buy and sell volume of insiders while they serve on the board of the respective company. Results in columns 2, 5, and 8 correspond to regressions of future returns of company j on buy and sell volume of insiders when they do not serve on the board of company j. Insiders who do not serve on the board of company j either serve on the board of another company or serve on the board of company j in another board year. The regressions in columns 3, 6, and 9 include the buy and sell volume of outsiders as predictive variables. Outsiders never serve on the board of any company. All trading volume measures are expressed per 100 shares and winsorized at the 1st and 99th percentiles. In each regression we control for company fixed effects and for the current one-week or one-month stock return. The t-statistics in parentheses are computed based on Driscoll and Kraay (1998) standard errors that are robust to autocorrelation, cross-sectional dependence, and heteroskedasticity. The lag length is set equal to 3 times the length of the forecast horizon in weeks.

Forecast horizon	Week			Month			Quarter		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Insider *Buy* volume on board	1.21			1.60			3.89		
	(1.70)			(0.65)			(0.90)		
Insider *Sell* volume on board	-1.23			-2.75			-6.13		
	(-1.44)			(-1.67)			(-1.91)		
Insider *Buy* volume **not** on board		0.03			0.69			2.99	
		(0.08)			(0.52)			(0.90)	
Insider *Sell* volume **not** on board		1.24			1.50			0.55	
		(1.78)			(0.76)			(0.23)	
Outsider *Buy* volume			0.07			0.01			-0.20
			(0.83)			(0.03)			(-0.47)
Outsider *Sell* volume			0.04			0.12			0.24
			(0.32)			(0.39)			(0.38)
R_{jt}^{Week}	-0.18	-0.18	-0.18						
	(-1.30)	(-1.31)	(-1.32)						
R_{jt}^{Month}				0.14	0.15	0.14	0.15	0.16	0.16
				(1.73)	(1.95)	(1.91)	(1.55)	(1.52)	(1.35)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	7.68	7.06	7.39	15.80	14.91	14.87	22.18	20.28	19.88
# Obs.	838	838	838	823	823	823	802	802	802

Table 4: **Do insider trading returns exceed outsider trading returns?**

This table reports estimation results for panel regressions of trader- and company-specific post-trade returns on insider dummy variables. Trading returns are defined as the stock return over the one-month (panel A) and one-quarter (panel B) period after the trade. Returns on sell trades are multiplied by -1 to facilitate comparison with buy trades. *InsTrade* is a dummy variable equal to one following an insider's trade with an outsider and zero following an outsider's trade or a trade between insiders. *InsBuy* and *InsSell* are dummy variables equal to one following an insider's buy or sell trade with an outsider, respectively, and zero for all other buy and sell trades. In the regressions with the buy (sell) dummy variables, the sample includes only buy (sell) trades to compare the post-trade performance of insider buys (sells) with the post-trade performance of outsider buys (sells). We consider various insider definitions. *Board* classifies a trader as insider for a company during the years he serves on its board. *Pre&Post Board* equals one for the years prior and post a trader's board membership. *Board + Pre&Post Board* classifies board members as insiders for a company over the entire sample period, including the years they do not serve on the board. In each regression we control for the stock return over the one-month period prior to the trade. We further control for company fixed effects in all regressions and for trader fixed effects in column 4. The *t*-statistics in parentheses are based on standard errors clustered by date.

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Monthly horizon			
InsTrade_{Board}	1.58	1.58				
	(2.67)	(2.69)				
$\text{InsTrade}_{Pre\&Post\ Board}$		0.54				
		(1.03)				
$\text{InsTrade}_{Board+Pre\&Post\ Board}$			1.15	1.66		
			(3.03)	(2.64)		
InsBuy_{Board}					2.46	
					(2.69)	
InsSell_{Board}						-0.11
						(-0.23)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Trader FE	No	No	No	Yes	No	No
Adj. R^2	0.02	0.03	0.02	4.51	22.54	22.62
# Obs.	100,896	100,896	100,896	97,118	51,402	49,494
			Panel B: Quarterly horizon			
InsTrade_{Board}	4.31	4.33				
	(3.44)	(3.45)				
$\text{InsTrade}_{Pre\&Post\ Board}$		1.73				
		(2.06)				
$\text{InsTrade}_{Board+Pre\&Post\ Board}$			3.25	3.03		
			(3.98)	(2.56)		
InsBuy_{Board}					5.69	
					(3.22)	
InsSell_{Board}						1.60
						(1.98)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes
Trader FE	No	No	No	Yes	No	No
Adj. R^2	0.07	0.08	0.07	4.85	25.65	26.31
# Obs.	97,868	97,868	97,868	94,249	49,895	47,973

Table 5: **Which insider groups have superior trading returns?**

This table reports estimation results for panel regressions of trader- and company-specific post-trade returns on insider dummy variables. Trading returns are defined as the stock return over the one-month (panel A) and one-quarter (panel B) period after the trade. Returns on sell trades are multiplied by -1 to facilitate comparison with buy trades. *InsTrade* is a dummy variable equal to one following an insider's trade and zero otherwise. We consider various insider definitions. *Board* classifies a trader as insider for a company during the years he serves on its board. *Noble* classifies all traders who belong to the British nobility as insiders. *Neighbor* classifies all traders who live in the same ward and trade in the same direction as a company's board member as insider for that company. *Politician* classifies all traders who are members of the British parliament as insiders. *Broker* classifies stock brokers trading for their own account as insiders. *Blockholder* classifies the five traders with the largest shareholding in a company in a given month as insiders for that company. *Governor* classifies the governor of a company as insider for that company. In each regression we control for company fixed effects and for the stock return over the one-month period prior to the trade. The t-statistics in parentheses are based on standard errors clustered by date.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: Monthly horizon				
InsTrade_{Board}	1.58	1.59	1.59	1.38	1.62	1.51	1.59	1.39
	(2.67)	(2.69)	(2.70)	(2.53)	(2.72)	(2.63)	(2.63)	(2.54)
InsTrade_{Noble}		1.00						0.97
		(1.77)						(1.70)
$\text{InsTrade}_{Neighbor}$			0.44					0.49
			(2.03)					(2.24)
$\text{InsTrade}_{Politician}$				1.18				1.21
				(2.66)				(2.70)
InsTrade_{Broker}					1.20			1.27
					(2.68)			(2.81)
$\text{InsTrade}_{Blockholder}$						0.32		0.36
						(1.03)		(1.15)
$\text{InsTrade}_{Governor}$							-0.39	-0.37
							(-0.27)	(-0.25)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.02	0.03	0.03	0.05	0.06	0.03	0.02	0.10
# Obs.	100,896	100,896	100,896	100,896	100,896	100,896	100,896	100,896
				Panel B: Quarterly horizon				
InsTrade_{Board}	4.31	4.32	4.35	4.11	4.36	4.33	4.20	4.08
	(3.44)	(3.45)	(3.46)	(3.28)	(3.46)	(3.50)	(3.27)	(3.24)
InsTrade_{Noble}		0.91						0.88
		(0.88)						(0.87)
$\text{InsTrade}_{Neighbor}$			0.96					1.03
			(2.28)					(2.46)
$\text{InsTrade}_{Politician}$				1.20				1.26
				(1.63)				(1.71)
InsTrade_{Broker}					1.28			1.35
					(1.61)			(1.68)
$\text{InsTrade}_{Blockholder}$						-0.07		-0.06
						(-0.08)		(-0.07)
$\text{InsTrade}_{Governor}$							3.91	4.07
							(0.84)	(0.86)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.07	0.08	0.08	0.08	0.09	0.07	0.08	0.10
# Obs.	97,868	97,868	97,868	97,868	97,868	97,868	97,868	97,868

Table 6: **Expected outsider loss from trading with insiders**

This table reports estimates of an outsider's expected loss per transaction from trading with an insider instead of with another outsider. We use the insider groups defined in the caption of Table 5 and the insider group *Board+Pre&Post Board*. The insider definition *All* classifies a trader as insider if she belongs to any of these insider groups, i.e., *Board + Pre&Post Board*, *Noble*, *Neighbor*, *Politician*, *Broker*, *Blockholder*, or *Governor*. We consider one-month and one-quarter post-trade horizons. Column 1 reports the unconditional probability that an outsider trades with an insider. This probability is computed as the number of outsider transactions with an insider divided by the total number of outsider transactions in our sample. Columns 2 and 3 report an outsider's expected loss from trading with an insider instead of with another outsider. The expected loss is computed by multiplying the probability of trading with an insider by the difference between the average post-trade return on stocks traded with insiders and the average post-trade return on stocks traded with other outsiders. Column 4 reports the probability that an outsider sells to an insider and columns 5 and 6 report an outsider's expected loss from selling to an insider instead of to another outsider. The expected loss is computed by multiplying the probability of selling to an insider by the difference between the average post-trade return on stocks sold to insiders and the average post-trade return on stocks sold to other outsiders. Column 7 reports the probability that an outsider buys from an insider and columns 8 and 9 report an outsider's expected loss from buying from an insider instead of from another outsider. The expected loss is computed by multiplying the probability of buying from an insider by the difference between the average post-trade return on stocks bought from other outsiders and the average post-trade return on stocks bought from insiders.

	Trade with insider			Sell to insider			Buy from insider		
	π	$E(L^{month})$	$E(L^{quarter})$	π	$E(L^{month})$	$E(L^{quarter})$	π	$E(L^{month})$	$E(L^{quarter})$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Board	1.62%	2.32 bps	7.00 bps	1.72%	4.37 bps	9.89 bps	1.52%	0.13 bps	4.09 bps
Board+Pre&Post Board	2.70%	2.85 bps	8.65 bps	2.69%	6.92 bps	14.24 bps	2.70%	-1.19 bps	3.08 bps
Noble	0.93%	0.76 bps	1.74 bps	0.80%	0.78 bps	-0.03 bps	1.06%	0.95 bps	3.55 bps
Neighbor	3.78%	1.02 bps	4.03 bps	3.72%	0.77 bps	5.84 bps	3.84%	1.36 bps	2.23 bps
Politician	3.14%	3.85 bps	6.33 bps	2.99%	11.53 bps	17.33 bps	3.28%	-3.65 bps	-4.85 bps
Broker	3.44%	3.51 bps	4.99 bps	3.15%	1.53 bps	-1.07 bps	3.74%	5.97 bps	11.23 bps
Blockholder	4.47%	1.80 bps	1.27 bps	4.89%	3.23 bps	7.31 bps	4.04%	-0.35 bps	-4.90 bps
Governor	0.05%	0.05 bps	0.41 bps	0.06%	-0.06 bps	0.11 bps	0.04%	0.15 bps	0.70 bps
All	16.64%	12.33 bps	24.65 bps	16.30%	20.96 bps	37.08 bps	16.97%	4.23 bps	12.12 bps

Table 7: **Returns on reverted insider and outsider trades**

This table reports estimation results for panel regressions of trader- and company-specific post-trade returns on dummy variables for insider trades and reverted trades. Trading returns are defined as the stock return over the one-month (columns 1 to 4) and one-quarter (columns 5 to 8) period after the trade. Returns on sell trades are multiplied by -1 to facilitate comparison with buy trades. *InsTrade* is a dummy variable equal to one following an insider's trade with an outsider and zero following an outsider's trade or a trade between insiders. We consider two insider definitions. *Board* classifies a trader as insider for a company during the years he serves on its board. *All* classifies a trader as insider if she belongs to any of the following insider groups: *Board+Pre&Post Board*, *Noble*, *Neighbor*, *Politician*, *Broker*, *Blockholder*, or *Governor*. *RT* is a dummy variable that is equal to one if the counterparty reverts the trade within five days, i.e., if the seller (buyer) buys (sells) at least (columns labeled ">=") or exactly (columns labeled "=") the same number of shares in the five days following the original transaction. In each regression we control for company fixed effects and for the stock return over the one-month period prior to the trade. The t-statistics in parentheses are based on standard errors clustered by date.

Horizon	Month				Quarter			
Reverting trade size	>=		=		>=		=	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{InsTrade}_{Board} \times \text{RT}$	3.22		3.70		3.50		3.57	
	(3.29)		(2.68)		(1.98)		(1.10)	
$\text{InsTrade}_{All} \times \text{RT}$		1.00		1.12		1.06		1.35
		(3.52)		(2.02)		(1.99)		(1.43)
InsTrade_{Board}	0.79		1.38		3.46		4.13	
	(1.51)		(2.33)		(2.87)		(3.35)	
InsTrade_{All}		0.58		0.78		0.90		1.10
		(2.80)		(3.54)		(2.49)		(3.15)
RT	-0.81	-0.92	-0.63	-0.77	-0.57	-0.68	-0.43	-0.62
	(-4.34)	(-4.48)	(-1.88)	(-2.24)	(-1.38)	(-1.63)	(-0.67)	(-0.94)
Company FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.12	0.15	0.04	0.08	0.09	0.07	0.08	0.05
# Obs.	100,896	100,896	100,896	100,896	97,868	97,868	97,868	97,868

Table 8: **Expected outsider loss from strategically hidden insider trades**

This table reports estimates of an outsider's expected loss per transaction from trading with an informed insider who strategically hides her trade instead of with an uninformed insider, an informed insider who does not hide her trade, or with another outsider. We consider two insider definitions. *Board* classifies a trader as insider for a company during the years he serves on its board. *All* classifies a trader as insider if she belongs to any of the following insider groups: $Board + Pre\&Post\ Board$, $Noble$, $Neighbor$, $Politician$, $Broker$, $Blockholder$, or $Governor$. We consider one-month (panels A and C) and one-quarter (panels B and D) post-trade horizons and classify an insider's trade as informed if the one-month or one-quarter post-trade return exceeds a prespecified threshold value R^{th}. We compute the standard deviation of one-month or one-quarter post-trade returns and specify return thresholds ranging from 0 to 3 standard deviations above 0%. We classify an insider's trade as hidden if the insider's counterparty reverts the trade within five days, i.e., if the seller (buyer) buys (sells) at least the same number of shares in the five days following the original transaction. Column 1 reports the unconditional probability that an outsider trades with an informed insider who hides her trade. This probability is computed as the number of outsider buy and sell transactions with an informed insider who hides her trade divided by the total number of outsider buy and sell transactions in our sample. Column 2 reports an outsider's expected loss from trading with an informed insider who hides her trade. This expected loss is computed by multiplying the probability of trading with an informed insider who hides her trade by the difference between the average post-trade return on stocks traded with informed insiders who hide their trade and the average post-trade return on stocks traded with uninformed insiders, informed insiders who do not hide their trades, or with other outsiders. Similarly, column 3 reports the probability that an outsider sells to an informed insider who hides her trade and column 4 reports an outsider's expected loss from this sale. Column 5 reports the probability that an outsider buys from an informed insider who hides her trade and column 6 reports an outsider's expected loss from this purchase.

R^{th}	Trade with insider		Sell to insider		Buy from insider	
	π	$E(L^{month})$	π	$E(L^{month})$	π	$E(L^{month})$
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Insider definition Board - Monthly horizon						
0.0 SD	0.20%	2.28 bps	0.26%	3.18 bps	0.15%	1.30 bps
1.0 SD	0.06%	1.77 bps	0.09%	2.75 bps	0.02%	0.74 bps
2.0 SD	0.04%	1.39 bps	0.06%	2.23 bps	0.01%	0.51 bps
3.0 SD	0.02%	0.89 bps	0.03%	1.33 bps	0.01%	0.44 bps
Panel B: Insider definition Board - Quarterly horizon						
0.0 SD	0.22%	4.71 bps	0.25%	6.27 bps	0.18%	3.14 bps
1.0 SD	0.08%	3.91 bps	0.10%	5.24 bps	0.06%	2.57 bps
2.0 SD	0.05%	2.93 bps	0.08%	4.71 bps	0.02%	1.14 bps
3.0 SD	0.01%	0.98 bps	0.02%	1.25 bps	0.01%	0.70 bps
Panel C: Insider definition All - Monthly horizon						
0.0 SD	1.68%	13.60 bps	1.81%	14.76 bps	1.55%	12.27 bps
1.0 SD	0.30%	9.16 bps	0.39%	11.33 bps	0.20%	6.88 bps
2.0 SD	0.18%	7.05 bps	0.23%	8.48 bps	0.13%	5.55 bps
3.0 SD	0.09%	4.32 bps	0.11%	4.83 bps	0.08%	3.78 bps
Panel D: Insider definition All - Quarterly horizon						
0.0 SD	1.71%	27.52 bps	1.83%	26.14 bps	1.59%	28.88 bps
1.0 SD	0.44%	20.57 bps	0.37%	17.47 bps	0.51%	23.66 bps
2.0 SD	0.25%	14.63 bps	0.22%	13.04 bps	0.28%	16.22 bps
3.0 SD	0.07%	4.82 bps	0.06%	3.91 bps	0.08%	5.71 bps

Appendix

A Examples of private information

In this section we discuss eight examples of material and non-public information that insiders had access to. These examples involve company-specific events that were discussed in private board meetings and later published in newspapers. We summarize the board discussion of each event and its related newspaper excerpt. We examine insider trading activity and stock price changes around these events in Section 4.1.

A.1 Bank of England opens margin loan facility

The Bank opens a loan facility that allows proprietors to use their shares as collateral for cash loans. Scott (1912) argues that the loan providers were well aware that credit provision would lead to stock price increases: "The effect of these loans [on stock] was to bring about a rapid rise in quotations. The increase in resources available for making purchase added to the demand; while at the same time, it was necessary for the borrowers to deposit with the company stock which had a larger market value than the sums lent on it. Thus, while the demand was increased, the supply was artificially restricted."

Bank of England board minutes, 22 April 1720: "That it be offered to the General Court on Thursday next as the opinion of this court, that it may be for the service of the Bank, to lend money to the proprietors upon this Bank stock."

Stamford Mercury, 28 April 1720: "The same day the directors of the Bank of England made a public declaration, that they would lend money to their proprietors at 5 %, to be employed in trade; upon which their actions are risen 4, or 5%. This they did, because the South Sea Company offered money to their proprietors to trade with at 5% and both companies will endeavour to promote trade in general, for the good of the public."

A.2 Loan for government refinancing

The Bank of England lends the British government a sum of £2,500,000 to buy back outstanding debt, thereby lowering the interest rate on their outstanding debt. This new loan not only secured a stream of income for the Bank but also strengthened ties with the government and is therefore expected to have a positive effect on the Bank's share price.

Bank of England board minutes, 14 May 1717: "That the Bank may advance a sum not exceeding £2,500,000 for the use of the government or such part thereof as may be wanted, for redeeming public funds at an interest of 5% and at such times and in such proportions as shall be found necessary before Lady Day 1718 and redeemable by parliament."

Stamford Mercury, 23 May 1717: "The Bank has agreed to lend the government £2,500,000 at 5% for circulating Exchequer Bills at a lower rate."

A.3 Bank calls collateralized loans to stop bank run

The Bank of England calls 25% of the outstanding loans collateralized by stocks to tackle an ongoing bank run. The immediate call on share loans is a clear signal that the Bank is in financial trouble and is thus expected to affect the Bank's share price in a negative manner.

Bank of England board minutes, 29 September 1720: "That a call be made of 25% of the loans upon Bank stock to be paid out before Wednesday the 12th of October and that public notice be given thereof."

Caledonian Mercury, 6 October 1720: "... upon the whole there are great complaints of scarcity of money. The run still continues upon the Bank, who have called in 25% on the proprietors, and have resolved, that Bank notes with interest at 5% be delivered out in exchange for Bank notes, or money, its given out that the Pr. subscribed 50,000 lib today to the Bank, which its hoped will at least for the present, contribute to answer all demands upon them."

A.4 Government redeems annuities held by the Bank

The British government passing a law on February 13th, 1724 to make funds available to repay 5% annuities issued by the state and held by the Bank. The repayment leads to a reduction in sovereign debt and a capital inflow for the Bank. The new law also reduces the Bank's exposure to government default risk. This news is expected to have a positive effect on Bank stock prices.

Bank of England board minutes, 20 February 1724: "Mr. governor having now received a letter from the right honorable the speaker of the house of commons, the same was opened and read and is as followth, viz.

Gentlemen,

In obedience to the commands of the house of commons I am to acquaint you that the said house did on the thirteenth day of February instant some to the following resolution, viz.

Resolved, that towards lessening the public debts and incumbrances, the principal sum of one million seven hundred and seventy five thousands and twenty seven pounds seventeen shillings and ten pour half penny now owing to the governor and company of the Bank of England in lieu of certain exchequer bills formerly by them delivered up and controlled and which by an Act of Parliament of the third year of his majesties reign...

... was to be attended with an annuity of eighty eight thousand seven hundred fifty one pounds seven shillings and ten pour half penny, being after the rate of five pounds per cent per annum and to be redeemable by parliament upon a year notice, be paid off and redeemed at the feast of the nativity of Saint John the Baptist which shall be in the year of our Lord 1725 according to the proviso or power of redemption contained in the same article for that purpose.

Stamford Mercury, 27 February 1724: "Mr. Speaker acquainted the House, that he had given notice to the Bank of the resolution of the House on the 13th instant.

In a committee went through the bill for redeeming and paying of the annuities at 5 per cent not subscribed into the South Sea Company, and ordered the report be made on Monday next, to which day the house adjourned."

A.5 Arrival of three ships with valuable cargoes

This event is based on the arrival of news through letters carried on board of ships returning from the East Indies. Letters carried by ships were the most important source of news (see also Koudijs (2016)). The announcement of the arrival of three ships, the Marlborough, Rochester, and Prince Frederick, with valuable cargoes is positive news for the East India Company.

East India Company board minutes, 13 June, 1718: "The court being met to open the packets received from the East Indies, the following letters were now read.

Short letter from the deputy governor and council of fort Marlborough dated the 24th of October 1717 received by the Rochester inclosing her invoice.

Letter from the chief and council of Callicut, dated the first of August 1717 received via the fort St George by the Marlborough."

Stamford Mercury, 19 June 1718: "Yesterday, the East India Company received advice from the Downs, of the arrival of three of their ships laden from India, viz. the Marlborough, Rochester, and Prince Frederick; since which, the two last are come up the river and the packers have brought the cargoes of all the three to town, and are valued at £500,000 to the company, the Rochester having been out 4 years, the customs of them to his majesty, is very considerable. They advise that five East India ships more may be expected in a short time with valuable cargoes."

A.6 Proposal to buy large number of South Sea Company stocks

In December 1720, the British government tries to persuade the East India Company to buy South Sea Company stocks and annuities. In particular, the East India Company considers a proposal to convert a total nominal amount of £9,000,000 South Sea stocks into East India stocks. The nominal amount to be purchased by the East India Company vastly exceeds the existing capital base of £3,200,000. The South Sea Company is in dire straits after the burst of the bubble, and the proposal aims to restore public faith in the financial sector. The East India Company board has fierce discussions about the proposal and has to adjourn a decision. It is believed that the large scale share conversion would lead to a reduction in East India Company dividends from 10% to 8%. The proposal is thus regarded as bad news from the perspective of East India Company stockholders.

East India Company board minutes, 22 December 1720: "A proposal had been given in from the ministry, which he now caused to be read in words following viz.

That nine million of the capital stock of the South Sea Company together with an annuity of 5% per annum issuing from the Exchequer and payable weekly be ingrafted into the stock of the East India Company and added to the present capital stock of the said com-

pany amounting to three millions two hundred thousand pounds or whereabouts that every proprietor of the said nine millions so to be engrafted be intituled to a share in the capital of the East India stock at the rate of 120% for every 120 pounds in the nine million so to be engrafted each proprietor to have one hundred pounds stock in the East India Company the remaining 20% part of the nine million making in the whole one million and a half to be reserved for the common benefit and advantage of the East India Company.

That it is generally believed they will by said proposal and some other advantages they are to have thereupon be enabled to divide 8% to all their adventurers whereas hitherto they have often divided less. That the East India Company as is well known do divide 10% per annum."

Caledonian Mercury, 3 January 1721: "Yesterday there was a general court of the East India Company about the proposal to restore public credit: but the objections were so strong and general against acceptance, chiefly on account, that should they comply to the same; it would lessen dividend from 10% to 8% that the court adjourned to Tuesday, in expectation of better terms to be offered to them."

A.7 French buying up large quantities of goods in India

News arrives that French ships with immense sums of money are buying up large amounts of goods in India. This leads to scarcity of goods and is perceived as bad news for the East India Company.

East India Company board minutes, 2 November 1716: "The following letters received by The Queen, were now read."

Stamford Mercury, 8 November 1716: "By the East India ship, the Queen of Peace, now come in, there is advice that 5 French ships of 40 guns are come into India from the South Seas, with immense sums of money on board, that they buy up great quantities of heavy goods, such as pepper, saltpetre, red earth, copper, tin, coffee and tea, but few silks or callicoes, because they are prohibited in France; and that they were endeavouring to buy two large ships at Batavia, but could not be admitted. 'Tis expected that they sail for Europe in a short time, and go for London or Venice, not for France or Spain, where they would be seized; if they arrive, they have sailed around the globe."

A.8 Sinking of ship leads to large losses

The board of the East India Company is notified via a letter that the van Sittart merchant ship sank close to the Isle of May with a large quantity of silver on board. The wrecking of the ship is bad news for East India Company shareholders.

East India Company board minutes, 11 June 1719: "The chairman acquainted the directors that calling them together thus suddenly was occasioned by a letter brought this morning from captain Hyde late commander of the van Sittart dated at the Isle of May the 15th of April 1719 giving an account of the said ship being cast away the 2nd of March last upon the Norwest point of the said island which letter was now read."

Pue's occurrences, 20 June, 1719: "London, June 11 and 13. The Van Cittern an East India merchant ship of 550 tuns worth £100,000 is cast away on the Isle of May, having split on a rock, but there were only 4 or 5 of the crew drowned; she was outward bound and had a great quantity of silver on board."

How harmful is insider trading for outsiders? Evidence from the eighteenth century

Online Appendix

In this Online Appendix we provide additional information about our data set omitted from the paper for the sake of brevity. Section A.1 presents an example of ledger and transfer book entries for transactions in Bank of England shares. Section A.2 gives an overview of the most popular addresses, occupations, and titles of the traders in our data set. Section A.3 gives examples of board meeting minutes of the Bank of England and East India Company that discuss the payment of dividends and the scheduling and results of board elections.

A.1 Example ledger account and transfer file

Figure A1 displays an example of a ledger book entry for the Bank of England: Sir Joseph Eyles' share sales from 29 September 1720 to 29 September 1725. Eyles is a board member for the Bank from 1717 to 1721. He also serves on the board of the East India Company from 1714 to 1717 and in 1721. His ledger book entry shows that he sells for £2,000 nominal to Frances Reynardson on 21 October 1720. The transaction also appears in Reynardson's ledger account as a purchase with the same transaction details. In addition, each transaction is recorded in a transfer file. Figure A2 shows the transfer file for the transaction between Eyles and Reynardson, in which both traders agree to transfer shareholder rights. The transaction was completed when both buyer and seller had signed the transfer file.

A.2 Shareholder characteristics

Table A1 provides an overview of the most popular addresses, occupations, and titles of the traders in our data set. The first three columns focus on location. For instance, 4,669 traders have a home address that contains the term "London", whereas 857 traders report an address that is exactly referred to as "London". Similarly, 1,776 traders describe themselves as some kind of merchant and 1,616 traders report merchant as their only occupation. Finally, we document that Knights and Baronets were relatively common titles among stock traders. In contrast, there were fewer Viscounts and Dukes trading in the early eighteenth century British financial market. In the paper we do not classify Baronets as nobility because Baronet is the only hereditary title that is not regarded as peerage.

A.3 Board meeting minutes and election

Figure A3 shows an excerpt from the minutes of a Bank of England board meeting on 19 February 1718. In this meeting, the company decides to close its transfer books to pay out dividends and to schedule a meeting to discuss how much dividend will be paid to

shareholders. It also orders a list of stock proprietors to determine (i) which stock holders are eligible to vote; and (ii) which stock holders hold a sufficient amount of shares to be eligible as director or (deputy) governor. The board of directors schedules an election of new directors and (deputy) governors on the 14th and 15th of April, 1718, and demands a public announcement of the election. Figure A4 shows the results of an East India Company board election in 1717. It lists the names of the 24 directors that were elected and the number of votes that each of them received. Twelve company officials ratify the election results by signing the allocation of votes.

Figure A1: **Bank of England ledger account Sir Joseph Eyles**

This figure shows an excerpt from the Bank of England ledger books and displays Sir Joseph Eyles' sell transactions between 29 September 1720 and 29 September 1725. The first column shows the transaction date followed by a transaction ID (column 2) and the counterparty's name (column 3). The fourth column reports the transaction number that links the ledger account to the transfer file of the transaction (see Figure A2). Column five displays the nominal transaction amount and the final column shows the page in the ledger book where the counterparty's ledger account is located. This file was extracted from the Bank of England archives: AC27\435\6497

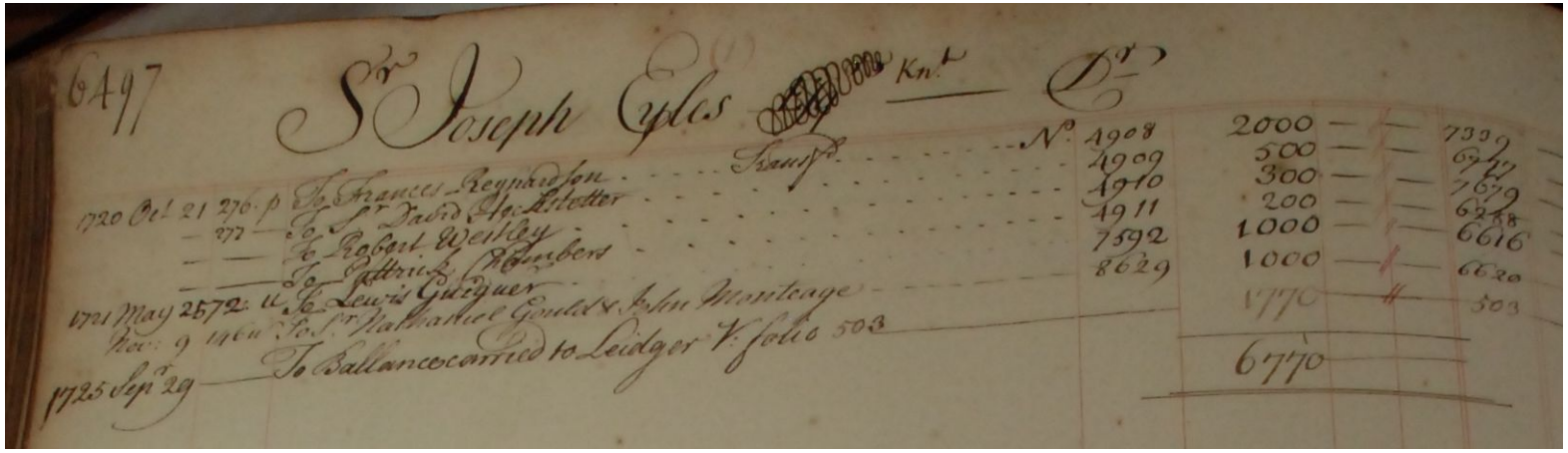


Figure A2: **Bank of England transfer file Sir Joseph Eyles - Frances Reynardson**

This figure shows a copy of the transfer file of a transaction in Bank of England shares between Sir Joseph Eyles (seller) and Frances Reynardson (buyer). Eyles's ledger account is recorded on page 6497 of the ledger book and Reynardson's account on page 7339 of the ledger book. In line with Eyles's ledger account entry in Figure A1, the transaction takes place on 21 October 1720 for a nominal amount of £2,000 with transaction number 4908. This file was extracted from the Bank of England archives: AC28\1542-1558\276

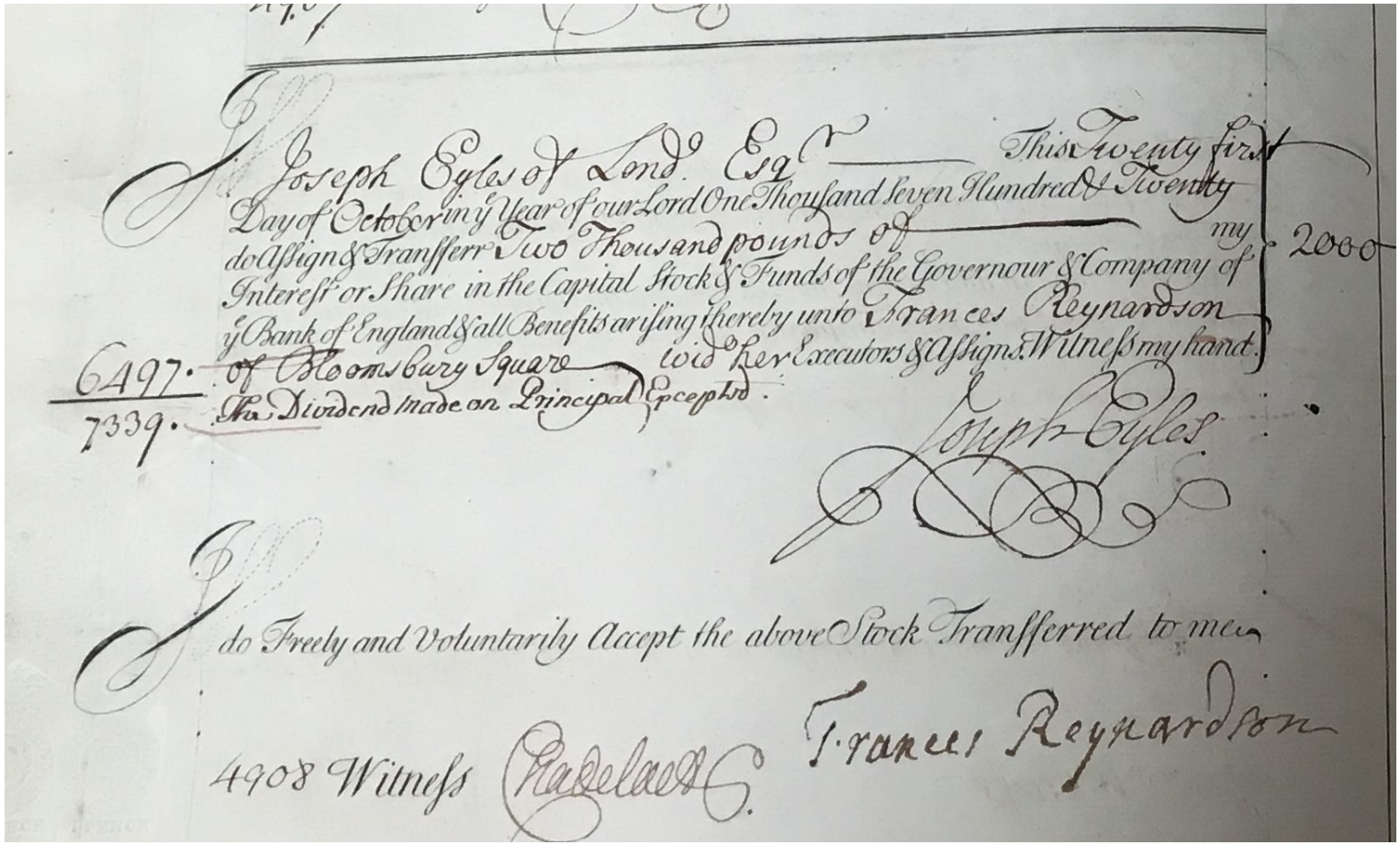


Figure A3: **Board meeting minutes Bank of England**

This figure shows an excerpt from the minutes of a Bank of England board meeting on February 19th, 1718. In this meeting, the board discusses the closure of the company books to pay out dividend and demands a list of proprietors who are eligible to vote for the new board of directors. The board also discusses the scheduling of a governor and deputy governor election on April 14th and a director election on April 15th and the advertisements of these elections. This information was retrieved from the Bank of England website: https://www.bankofengland.co.uk/about/people/court-of-directors

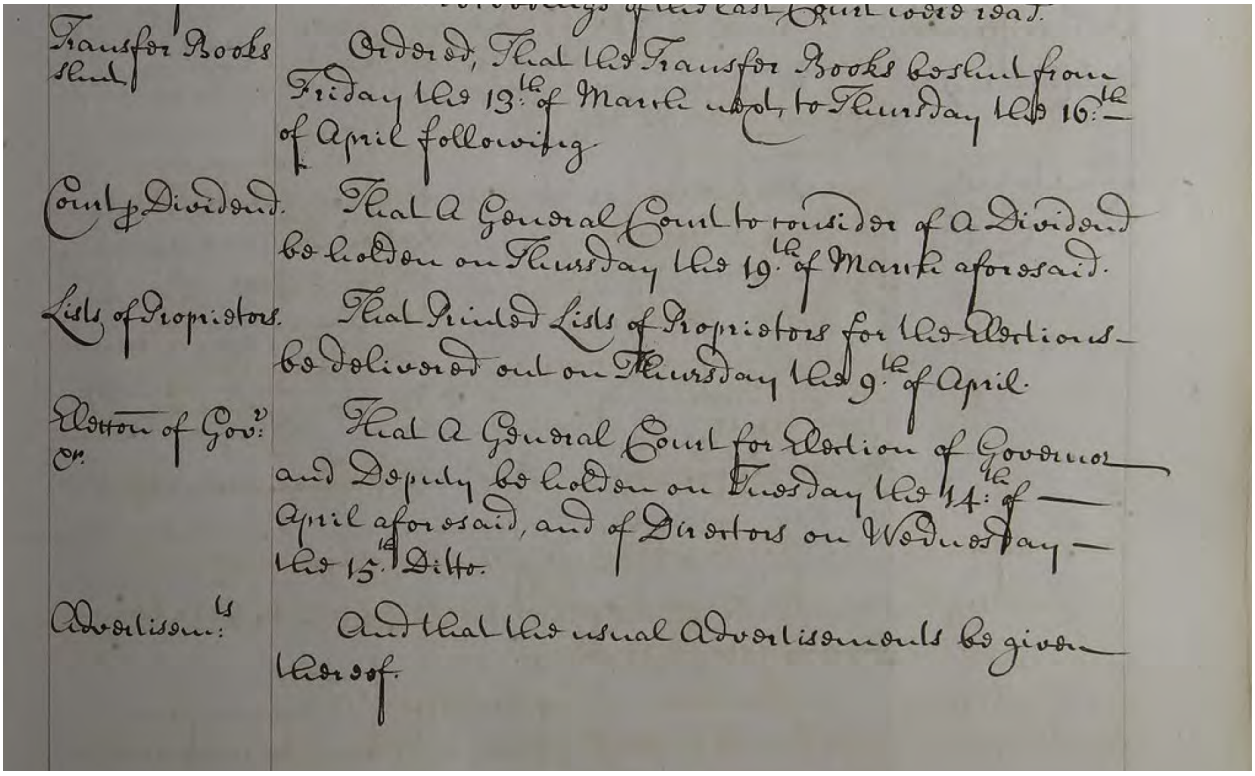
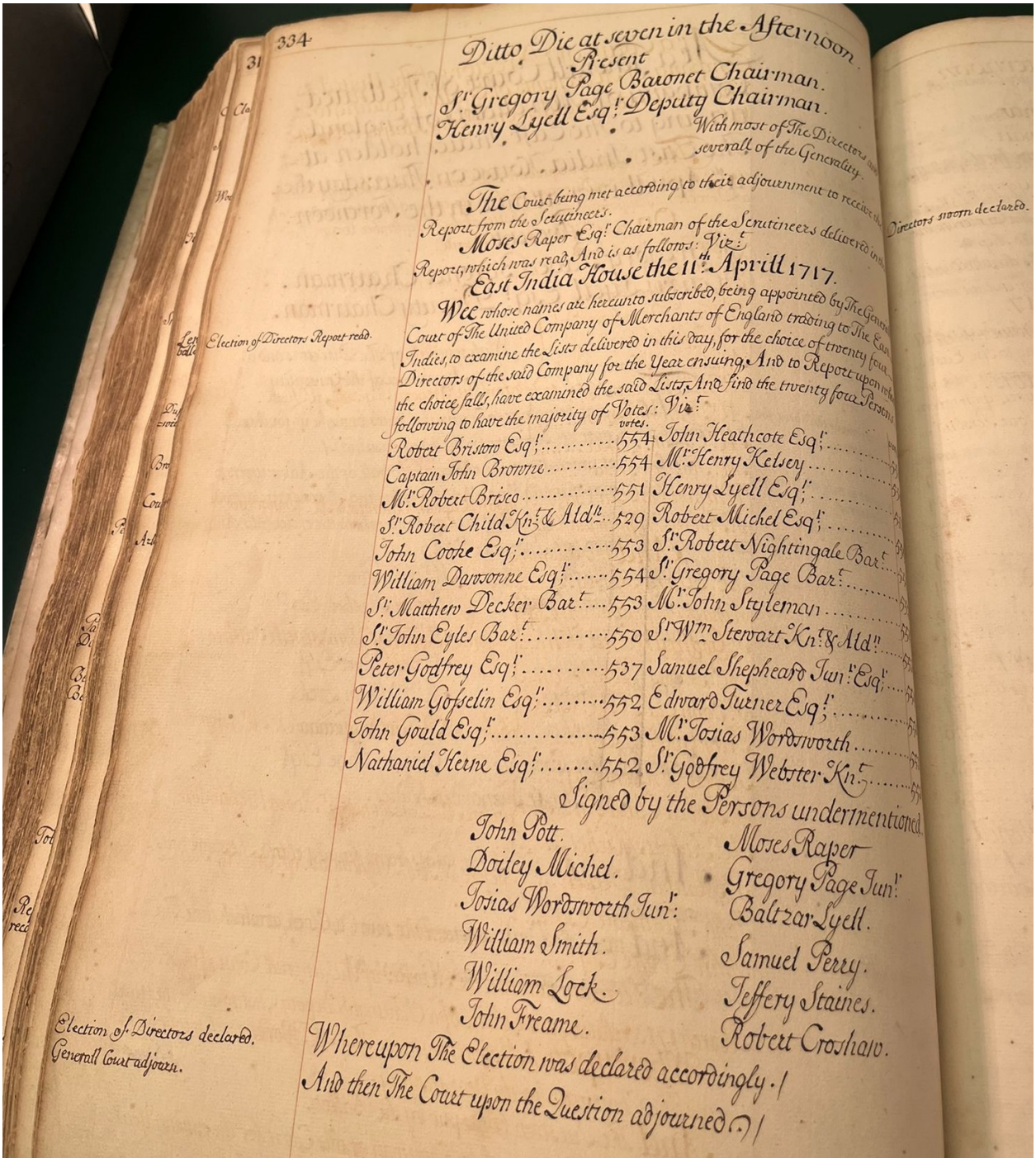


Figure A4: **Board election results East India Company**

This figure shows the outcome of the East India Company board election held on April 11th, 1717. It lists the names of the 24 directors that were elected and the number of votes received by each of them. This information was extracted from the British Library's East India Company Minutes of the Court of directors IOR/B/54-60.



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Ditto Die at seven in the Afternoon.

Present

Sr Gregory Page Baronet Chairman.
Henry Lyell Esqr Deputy Chairman.

With most of The Directors and severall of the Generality.

The Court being met according to their adjournment to receive the Directors sworn declared.

Report from the Scrutineers.

Moses Raper Esqr Chairman of the Scrutineers delivered in the Report, which was read, And is as follows: Viz.t

Election of Directors Report read.

East India House the 11th Aprill 1717.

Wee whose names are hereunto subscribed, being appointed by The General Court of The United Company of Merchants of England trading to The East Indies, to examine the Lists delivered in this day, for the choice of twenty four Directors of the said Company for the Year ensuing, And to Report upon whom the choice falls, have examined the said Lists, And find the twenty four Persons following to have the majority of Votes: Viz.t

	votes.		
Robert Bristow Esqr	554	John Heathcote Esqr	
Captain John Browne	554	Mr Henry Kelsey	
Mr Robert Brisco	551	Henry Lyell Esqr	
Sr Robert Child Knt & Aldn	529	Robert Michel Esqr	
John Cooke Esqr	553	Sr Robert Nightingale Bart	
William Dawsonne Esqr	554	Sr Gregory Page Bart	
Sr Matthew Decker Bart	553	Mr John Styleman	
Sr John Eyles Bart	550	Sr Wm Stewart Knt & Aldn	
Peter Godfrey Esqr	537	Samuel Shepheard Junr Esqr	
William Gofselin Esqr	552	Edward Turner Esqr	
John Gould Esqr	553	Mr Josias Wordsworth	
Nathaniel Heine Esqr	552	Sr Godfrey Webster Knt	

Signed by the Persons undermentioned.

John Pott.
Dorley Michel.
Josias Wordsworth Junr:
William Smith.
William Lock.
John Freame.
Moses Raper
Gregory Page Junr
Baltzar Lyell.
Samuel Perry.
Jeffery Staines.
Robert Crosthaw.

Whereupon The Election was declared accordingly./

And then The Court upon the Question adjourned./

Election of Directors declared.
Generall Court adjourn.

Table A1: **Trader characteristics**

This table reports characteristics for the traders in our sample. Column one shows trader addresses and column two the number of times that the address in column one is part of a trader's home address. Column three shows the number of times a trader's home address exactly matches the address in column one. Column four shows trader occupations and column five the number of times a trader reports the occupation in column as one of his occupations. Column six shows the number of times a trader reports the occupation in column four as his only occupation. Column seven displays titles and column eight the number of times that a trader reports the title in column seven as one of his titles. Column nine lists the number of times a trader's title exactly matches the title in column seven. The three trader characteristics are sorted in descending order on columns two, five, and eight, respectively.

Address	**Contains**	**Exact**	**Occupation**	**Contains**	**Exact**	**Title**	**Contains**	**Exact**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
London	4669	857	Merchant	1776	1616	Baron	204	2
Westminster	1686	50	Draper	249	52	Baronet	155	141
Holland, Netherlands	810	2	Goldsmith	187	171	Knight	130	109
St. James'	582	28	Linen Draper	139	123	Earl	44	1
Holborn	568	22	Mercer	121	99	Dowager	30	1
Amsterdam, Holland, Netherlands	550	550	Clerk	120	110	Viscount	26	1
St. James', Westminster	509	150	Haberdasher	111	94	Duke	14	1
St. Martin-in-the-Fields, Westminster	489	89	Apothecary	107	105	Baronet / Knight	11	11
St. Andrew's, Holborn	425	68	Grocer	101	91	Baroness	9	1
Surrey	359	2	Surgeon	74	57	Baron of the Exchequer	4	1
Kent	319	2	Broker	74	47	Councillor of State	3	3
St. Clement Danes, Westminster	276	26	Mariner	71	71	Knight of the Bath	3	3
Essex	224	1	Taylor	64	22	Chief Baron of the Exchequer	3	2
Inner Temple, London	151	150	Doctor	58	2	Viscount Lonsdale	2	2
St. Margaret's, Westminster	150	60	Distiller	57	56	Baron Brereton of Leighlin	2	2
Switzerland	145	3	Stationer	56	49	Earl of Litchfield	2	2
Southwark	136	38	Brewer	55	54	Earl of Halifax	2	2
Cornhill, London	132	103	Doctor in Physick	53	51	Viscount Fermanagh	2	1
Middle Temple, London	131	129	Salter	52	41	Prince	2	1
Hackney, Middlesex	128	120	Weaver	49	47	Marquess of Winchester	1	1