

# **Who Falls Prey to the Wolf of Wall Street? Investor Participation in Market Manipulation\***

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## **Abstract**

Manipulative communications touting stocks are common in capital markets around the world. Although the price distortions created by so-called “pump-and-dump” schemes are well known, little is known about the investors in these frauds. By examining 421 “pump-and-dump” schemes between 2002 and 2015 and a proprietary set of trading records for over 110,000 individual investors from a major German bank, we provide evidence on the participation rate, magnitude of the investments, losses, and the characteristics of the individuals who invest in such schemes. Our evidence suggests that participation is quite common and involves sizable losses, with nearly 6% of active investors participating in at least one “pump-and-dump” and an average loss of nearly 30%. Moreover, we identify several distinct types of investors, some of which should not be viewed as simply falling prey to these frauds. We also show that portfolio composition and past trading behavior can better explain participation in touted stocks than demographics. Our analysis offers insights into the challenges associated with designing effective investor protection against market manipulation.

*JEL classification:* D14, G11, G18, K42, M48

*Key Words:* Market manipulation; Pump-and-dump schemes, Securities regulation; Fraud; Investor protection; Lottery stocks; Household finance

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## 1. Introduction

Well-functioning equity markets are predicated on investors' access to reliable and accurate information. There are many information sources that investors can utilize in their decisions including disclosures issued by firms, news conveyed by third-parties (e.g. analysts, brokers, promoters), and information contained in prices themselves. Manipulation of any of these sources of information can create distortions that undermine market functioning, efficient capital allocation, and individuals' willingness to invest in the stock market in the future (e.g., Aggarwal and Wu 2006; Kyle and Viswanathan 2008; Giannetti and Wang 2016).

Given these distortions and potential externalities, securities regulators generally mandate truthfulness in disclosures and take action against those who seek to deceive. Regulators also prohibit deceptive trading practices and market manipulation, largely with the intention to protect investors. For example, the U.S. Securities and Exchange Commission (SEC) describes its mission as one "to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation" (SEC 2016). These objectives can compete with each other and making the appropriate tradeoffs between them requires, among other things, understanding the trading behavior of individual investors.<sup>1</sup>

While there is a significant body of work examining the role of disclosure and securities regulation in fostering capital formation and market quality (e.g., Leuz and Wysocki 2016 for a survey), there is much less research on even the most basic questions related to market manipulation and investor protection. What is the participation rate in market manipulation? How damaging is market manipulation to investors' portfolios? And to what extent do investors

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<sup>1</sup> For instance, lowering the regulatory burden for firms can foster access to and use of public capital markets, but doing so can also expose investors more frequently to duplicity in market transactions and lower market quality (e.g., Brüggemann et al. 2017).

“fall prey” to manipulative schemes and need protection?

In this paper, we seek to make progress towards answering these questions by analyzing investor participation in “pump-and-dump” schemes. In such schemes, a promoter acquires a position in a stock and then artificially raises the price by disseminating false or misleading information about the firm (Kyle and Viswanathan 2008; Putnins 2012). To facilitate a rapid run up in stock price during the pump phase, promoters often target thinly traded “penny” stocks for which limited liquidity leads to fast price increases when demand rises. Once the stock reaches a certain heightened price level, promoters sell their shares causing a rapid decline in share price and significant losses for other investors.

Pump-and-dump schemes harm investors who purchase shares on the false premise that some innovation or impending development justifies a rising valuation. Harm can spread further as those investors come to distrust information about other stocks and, more generally, loose trust in stock markets (Antweiler and Frank 2004; Guiso et al. 2008; Giannetti and Wang 2016; Soltes 2016). To mitigate these adverse effects, regulators expend considerable resources seeking to curtail market manipulation. Yet, an effective regulatory response requires understanding who invests in such schemes and why, as well as a sense for how investors fare in them.

To shed light on these questions, we examine a large set of pump-and-dump schemes from 2002-2015 provided to us by the German supervisory authority, BaFin, supplemented with additional hand-collected cases. We combine these schemes with trading records for over 110,000 individual investors from a major German online bank.<sup>2</sup> These confidential trading records not only allow us to assess the returns or losses of individual investors that participate in

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<sup>2</sup> The sample of individual investors is randomly drawn from the total customer base. We compare basic characteristics of our sample to other studies with individual investor data (e.g., Barber and Odean 2001; Dorn and Huberman 2005; Calvet et al. 2007) and find that our sample is quite comparable in terms investor age, gender, portfolio value, etc.

pump-and-dump schemes, but also allow us to learn about the characteristics of participating investors, their trading behavior and their portfolios.

Our evidence shows that investing in pump-and-dump schemes is fairly common. We find 6,569 individuals making over 20,000 purchases during the first 60 days of the 421 pump-and-dump schemes in our sample. Thus, nearly 6% of the investors in our sample invest in at least one pump-and-dump scheme. Moreover, in any given year, there is a 2% chance that a sample investor would take a position in at least one tout campaign. Analyzing which pump-and-dump schemes garner larger responses, we find that schemes for stocks that have their headquarters in Germany have the most investors, likely reflecting a broader tendency of individuals to invest in firms closer to home (French and Poterba 1991). We also find that pump-and-dumps using e-mail tend to have larger responses than those employing telephone or fax, which likely reflects the wide reach and low cost of e-mail distribution.

Investors put on average €6,972 into a tout, which is sizeable relative to their average portfolio value (11.4%). By comparison, the average investment outside pump-and-dump schemes for these investors is €6,142. Compared to a random sample of active investors who do not invest in pump-and-dump schemes, tout investors hold a greater number of stocks, have a higher share of penny stocks in their portfolio, a lower share of blue chip stocks, and smaller investments in each stock they purchase, compared to the average investment for non-tout (or control) investors of €9,725 per firm.

As would be expected, investors on average lose money in tout investments (€1,305 for the average tout). The average return to a pump-and-dump scheme is -28%. Although the losses are fairly large, the returns to tout investments are much less negative than what the price path of many schemes would suggest. For comparison, the average (median) 120-day holding period

return for a pump-and-dump beginning on the date a stock is first touted is -50% (-70%). Thus, many investors curb their losses by selling their tout investments more quickly. Assuming investors at other online banks behave similarly, the average tout generates aggregate losses of at least €1.2 to 2 million for German retail investors with online accounts.

Given the returns to tout investments, it is perhaps surprising that we find a considerable number of individuals investing in more than one tout. In fact, roughly 11% of tout investors place money in four or more touts during the sample period. These multi-tout investors perform less poorly in their initial tout investments, but they still lose 24% on average across all their touts. They place larger-than-average investments and have a large fraction of penny stocks in their portfolios. The frequency with which some investors invest in touts as well as the composition of their portfolios suggests that not all tout investors are gullible or fall prey to pump-and-dump schemes. Instead, some investors appear to seek out stocks with lottery-like payoffs and potentially even pump-and-dump schemes.

To assess the characteristics of tout traders and better understand the vulnerability of different investors to tout schemes, we group investors based on their past trading behavior in non-tout stocks. By relying on their prior *non-tout* trading, we assess whether the tout investment was consistent with their prior investment approach. We find that more than 30% of the tout investors have been day-trading in penny stocks or are frequent traders with short investment horizons. These investors appear to be willing to take substantial risks and trade aggressively also in other stocks. We find that these investor types are more likely to invest in touts, place larger bets and have better returns. Their participation in touts looks quite differently from more conservative investors.

We also investigate the broader ramifications of pump-and-dump experiences for investor behavior by studying how past tout investments are related to subsequent portfolio choices. We find that investors' subsequent investment behavior is associated with prior tout performance. Specifically, investors with relatively poor returns in their past tout are less inclined to invest in another tout. Those with more positive returns invest more quickly into the next tout and stay in for a longer period (which tends to hurt performance and perhaps indicates overconfidence). Moreover, we find that investors with more negative return experiences in a past tout tend to trade fewer stocks and are more likely to stop trading in stocks all together in the subsequent 120 days. The latter effect is more pronounced for infrequent traders who are likely the more vulnerable or inexperienced. Finally, we find some evidence that participation in a pump-and-dump campaign could have a lasting effect on the behavior of some investors. For instance, we find that, even three years after the tout, investors who lost money in a pump-and-dump campaign still make fewer equity trades than before the tout.

Overall, our analysis contributes to a more nuanced understanding of market manipulation and investor protection. First and foremost, our findings highlight the heterogeneity among investors participating in deceptive market manipulation like pump-and-dump schemes. There appear to be several types of individuals, including investors who trade infrequently and appear to be more vulnerable. But there is also a substantial fraction of investors (about 30%) who trade frequently and often day-trade in penny stocks. These investors are more likely to gamble with tout stocks, rather than being fooled by the schemes. Importantly, we find that demographics provide only limited insights into who participates in pump-and-dump schemes. Instead, portfolio characteristics and past trading behavior play a much larger role. We also show that there is substantial heterogeneity in outcomes and that this heterogeneity is connected to trading

motives and investor types. Last but not least, we find that the level of participation and the magnitude of the individual and implied aggregate losses are considerable.

Observing individual investor behavior is challenging and prior research with access to such data has typically focused on characterizing potential investment biases (e.g. Odean 1999; Barber and Odean 2000, 2013; Schmittmann et al. 2014; Fecht et al. 2017). We build on this work by exploring individual investor participation in specific investments, i.e., pump-and-dump schemes, which are particularly relevant from an investor protection perspective. A unique aspect of our analysis is that we examine how the investor response differs across a variety of distribution channels for promotional communications, including e-mail, newsletter, and phone. These channels have not been analyzed in prior studies.

We also contribute to the literature on fraud and investor protection. A considerable body of work has examined the impact of financial fraud on firms (Karpoff and Lott 1993; Karpoff et al. 2008b), managers (Karpoff et al. 2008a), and investors (Guiso et al. 2008; Giannetti and Wang 2016; Miles and Pyne 2017). However, there is much less work on the impact of market manipulation. We find that participating in pump-and-dump schemes is fairly common. At the same time, our findings highlight that the notion that investors simply fall prey to deceptive schemes is not appropriate in all cases. Some tout investors appear to gamble in penny stocks and pump-and-dump schemes. This evidence contrasts with the popular image of vulnerable investors being successfully duped by aggressive promoters. As such our analysis suggests a nuanced approach to investor protection, one that recognizes the documented heterogeneity. To the extent that some individuals knowingly invest in pump-and-dump schemes, regulators could

question the need of protecting these investors.<sup>3</sup> Our analysis also suggests that educational and protection efforts that target investors based on personal characteristics alone are unlikely to be particularly effective in reaching the relevant audiences.

## **2. Stock Touts and Investor Behavior**

### *2.1. Stock Touting and Pump-and-Dump Schemes*

Since the creation of the earliest joint-stock companies, individuals have been deceptively promoting specific stocks. In the early 1700's, the South Sea Company devised a scheme to exploit investors as the British government sought to restructure its debt by proposing to convert its obligations into South Sea stock (Sperling 1962). The South Sea Company created the appearance of a highly desirable stock by publicly distributing it to influential people who spread rumors of overnight fortunes (Voth 2016). Investors rushed to purchase stock and within three months it soared from 330 to 1,050 pounds. The bubble burst three months later as the price fell by more than 80% leaving investors with worthless stock and creating a national economic crisis.

Despite the growth in regulation over time to combat deceptive enterprises and fraud, market manipulation continues (Allen and Gale 1992; Jiang et al. 2005; Khwaja and Mian 2005). Putnins (2012) characterizes manipulative schemes as market-power based (e.g., “corners,” “squeezes”), contract-based (e.g., “marking the close,” “capping”), or information-based (e.g., “pump-and-dump”). We focus on information-based pump-and-dump schemes. Such schemes distort trading in and market prices of the underlying stocks and hence are a form of illegal market manipulation according to the definition of Kyle and Viswanathan (2008).<sup>4</sup>

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<sup>3</sup> Regulators may still want to mitigate investments in tout campaigns (even by those who understand and are willing to bear the risks of such schemes) to curtail the incentives for promoters to manipulate stocks. But even then, it would be important to understand that the motive for some investors appears to be a form of gambling.

<sup>4</sup> We also provide the relevant legal definition for this form of market manipulation when we describe our sample in Section 3.1.



In the typical pump-and-dump scheme, a promoter begins by purchasing stock in a thinly traded firm. Promoters tend to focus on stocks that trade at low share prices, commonly referred to as penny stocks. Most of these securities trade on over-the-counter or alternative markets (e.g., the German Open Market, the U.K. AIM, or the U.S. OTC Markets, formerly known as the Pink Sheets), which are less rigidly regulated than major exchanges (Aggarwal and Wu 2006; Brüggemann et al. 2017). The relatively light regulation and low liquidity of these markets facilitate more effective “pumping.” Moreover, even when a severe mispricing is identified, low liquidity makes arbitrage difficult. Together, these factors make these markets well-suited for promoters to engineer deceptive schemes (Griffin and Block 2001; White 2016; Renault 2017).

To increase interest in the stock, promoters often concoct a story about some impending news or innovation that would lead to a dramatic increase in the firm’s value. The promoters then circulate this information through e-mail, newsletters, or other promotional communications to potential investors. As an example, in one tout from September 2007, a promoter e-mailed:

*We are glad to inform you of a CANCER CURE invented by ANDOVER MEDICAL INC (ADOV) that will take the world by storm. This new medicine, is above all other and boosts a 80% success rate during clinical trials*

*Over the next few days you will hear about this in the PAPERS and on TV.  
So buy shares now, while price is low, before the news hits.*

*ANDOVER MEDICAL INC (ADOV) \$.45*

During the period of promotion and touting, the price of the stock typically rises as investors increasingly purchase shares in anticipation of the good news being realized. Once the campaign ends (or perhaps even during the campaign), the promoters sell their holdings leading to a precipitous decline in the stock. This pattern of promotion and rapid price increase followed by a steep decline in price fits the name to describe such schemes.

As with other attention-grabbing news about firms (Lee 1992; Barber and Odean 2008), investors have been shown to react to information touted by promoters. Several prior papers examine promotional communications and find that stock touts generate significant trading volume and distortions in market pricing. Frieder and Zittrain (2008), for example, show that trading volume rises dramatically during periods of heavy touting. They find that stocks with a 4% likelihood of being the most actively traded during non-touted days have a 70% likelihood of being the most actively traded during touting periods. Relatedly, Böhme and Holz (2006) find significantly positive abnormal returns on the day of the tout for over 100 stock spams. Nelson et al. 2013 find that stock spams that are bundled with ostensibly more credible information also tend to have greater market impact.<sup>5</sup>

Although the deceptive practices utilized by promoters to create pump-and-dump schemes are not themselves new or innovative, the cost of engineering such schemes has declined dramatically by recent technological advances. Promotional campaigns once required telemarketers or physical mailings to reach potential investors, but now promoters can rely on inexpensive e-mail lists. To put these costs in comparison, Böhme and Holz (2006) estimate the cost per recipient for direct mailing and telemarketing (i.e., via phone) at \$1.39 and \$0.66 per recipient respectively. By comparison, sending e-mails to potential investors with addresses harvested from bulk e-mail lists costs only \$0.0005 per recipient.

With these reduced costs, it is not surprising that the amount of stock related e-mail spam has risen dramatically in the 2000s (Böhme and Holz 2006; Frieder and Zittrain 2008). One estimate from the security firm Sophos suggests that stock spam as a percentage of all

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<sup>5</sup> Renault (2017) examines the potential for social media (Twitter in particular) to foster market manipulation and create pump-and-dump schemes. He finds that abnormally large message activity is associated with price movements consistent with pump-and-dump schemes in those firms and suggests that these price changes are rooted in manipulative promotion rather than over-optimism by investors.

unsolicited e-mail rose as high as 25% in 2007 (Sophos 2007). Even if e-mail is significantly less effective than telemarketing on a per unit basis, the vastly larger reach makes e-mail campaigns a popular and potentially successful way of promoting stocks.

To provide an example of a pump-and-dump campaign, Figure 1 displays the price path for BAR.bra Mining Group AG from December 5, 2007 to December 31, 2008. BAR.bra Mining Group was authorized for trading on the less strictly regulated Open Market of the Frankfurt Stock Exchange on December 5, 2007 with an initial price of €0.46. Officially, the company was a mining company extracting precious metals and rare earths with operations in Mongolia and Ghana. The company stated that it has licenses for several territories in both countries and had been doing explorations for several years. Beginning on January 10, 2008, promoters advertised the company in several newsletters, mentioning the surge of the stock price since its launch in Frankfurt's Open Market as well as highlighting the firm's tremendous growth potential. Specifically, the promoters claimed that BAR.bra Mining Group was heavily undervalued since the company's mining territories were very promising and the company was expected to generate enormous profits once these resources were extracted. Indeed, the stock continued to rise by 26% over the next five days until the price reached its climax (€0.87) on January 15, 2008. As the dump phase began, the stock lost 67 percent of its value (€0.29) in less than a week. Roughly three months later, the stock was essentially worthless (€0.04). According to German newspaper reports, the premises of the stock promoters were searched by police in 2012 in connection with the BAR.bra Mining Group tout as well as eight other promotional campaigns (Reimann and Reimer 2012).

## 2.2. *Investors and their Investments in Touted Stocks*

Although the price path of touted stocks suggests that pump-and-dump campaigns can be effective, little is known about the investors who trade upon receiving a promotional communication. From a regulatory perspective, understanding who responds, why they respond and whether there are different motivations or investor types is central to regulators' efforts to protect investors and reduce the impact of manipulative schemes. Media articles discussing the risks of pump-and-dump schemes offer anecdotal evidence suggesting that those who fall prey to these schemes are vulnerable investors who believe the touted information is truthful and are taken aback when it is revealed to be otherwise (e.g., Sterbenz 2014; Antilla 2016). Put differently, these investors are deceived by the schemes and unaware of their risks.

Why investors succumb to schemes that contain unsubstantiated or even outlandish claims has gained considerable attention in the behavioral ethics literature. Chugh and Bazerman (2007) argue that people have bounded awareness, which limits individuals' ability to appropriately incorporate accessible and relevant information into their decision-making processes. In one experiment exploring this limitation, Zhang et al. (2015) show a graph to participants depicting the multi-year returns for five hypothetical funds, including the S&P 500, a tobacco fund, and a technology fund. They also included an additional fund named the "Fortitude Fund" that exhibited a significantly better risk-return profile than the other funds with remarkably stable year-over-year growth at a moderately high rate. Zhang et al. (2015) asked participants to place themselves in the position of an investment advisor and choose the fund that had a long-term perspective and a moderate tolerance for risk. Nearly 70% of participants chose the Fortitude Fund. Yet, unbeknownst to the participants, Fortitude was actually a Madoff feeder fund (whose returns plummeted immediately after the graph ended when Madoff's fraud was disclosed). The

returns for Fortitude were “too good to be true,” but the majority of participants were not able to identify this suspicion without being prompted. Thus, bounded awareness provides one explanation why investors do not identify deceptive schemes when making trading decisions.<sup>6</sup>

However, it is not clear that all investors fall prey to pump-and-dump schemes. Some investors may invest in high-risk or penny stocks because they view them as lotteries and a form of gambling (Kumar 2009). These investors are looking for legitimate stocks that potentially generate large returns, albeit with high risks. Such investors may accidentally invest in a pump-and-dump scheme when seeking high-risk, high-return payoffs. It is also conceivable that some investors participate in pump-and-dump schemes in order to profit from the schemes. These individuals are not duped by the promotional communication, but rather consciously decide to invest despite knowing the nature and risk of the investment. For example, a 2014 *Bloomberg* article describes a 27-year-old telecom broker named Matthew Fromm who often traded stocks in his spare time in the evening (Faux and Lawrence 2014). He often invested in touted penny stocks noting that “the trick with trading penny stocks is being ahead of the curve.” Fromm labeled these “Lotto Picks,” indicating that he hoped to reap a large gain, but also understood that his initial investment might be worthless in the end. Thus, some investors are attracted to touted penny stocks, because of the skewed payoffs and/or utility gain from investing in risky equities (Kumar 2009; Eraker and Ready 2015). Given the more deliberate involvement, it is also much less clear that these investors can or should be protected by securities regulators.

Prior research on market manipulation provides only limited evidence of the size of tout investments and the losses incurred by investors. Frieder and Zittrain (2008) assume investors

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<sup>6</sup> For a broader overview of the behavioral ethics research regarding why individuals overlook deceptive conduct, see Bazerman and Tenbrunsel (2011) and Gino (2013). Frankel (2012) describes the victims of financial fraud by examining those that fall prey to Ponzi like investments.

purchase stocks when they are most heavily touted and hold them for two days. Based on these assumptions, they estimate that investors lose on average 5.4% in a tout investment before transaction costs. However, if investors entered earlier or held longer, their profits could be substantially different. Moreover, we do not know if investors place small bets or invest a significant fraction of their stock portfolios.

To obtain evidence on tout investments and their performance, we combine detailed trading and portfolio data for a large sample of German investors with a dataset of pump-and-dump schemes that were “offered” to German investors or “pushed” in Germany. As market manipulation is a global phenomenon, investors encounter pump-and-dump schemes in securities markets around the world.<sup>7</sup> In fact, the same schemes are often pushed in several countries at the same time. As such, our analysis speaks to the global market for touts, beyond Germany.

### **3. Data and Research Design**

#### *3.1. Pump-and-Dump Sample*

Our investigation of pump-and-dump schemes extends from January 2002 to January 2015. We collect data on stocks that were subject to touting from two sources. The first source is a proprietary sample provided to us by the German Financial Supervisory Authority (BaFin). This agency is charged with supervising German securities markets and enforcing German securities laws. Restricting market manipulation is considered one of its main functions.<sup>8</sup> BaFin actively monitors German securities markets and also receives tips and complaints about manipulative schemes from investors and banks. It investigates these claims and determines whether the

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<sup>7</sup> Market manipulation is a phenomenon in both developed securities markets (e.g., the US and the UK) and emerging markets (e.g., Khwaja and Mian 2005).

<sup>8</sup> See Market Manipulation, BaFin, May 8, 2017 (available at: [https://www.bafin.de/EN/Aufsicht/BoersenMaerkte/Marktmanipulation/marktmanipulation\\_node\\_en.html](https://www.bafin.de/EN/Aufsicht/BoersenMaerkte/Marktmanipulation/marktmanipulation_node_en.html)).

schemes constitute illegal market manipulation.<sup>9</sup> The characteristics of an illegal pump-and-dump campaign are summarized and described in Article 4 of MaKonV (“*other acts of deception*”). Under German law, it is prohibited (i) to tout a stock based on false or misleading information or (ii) to provide deceptive stock recommendations that conceal the promoter’s financial interests.<sup>10</sup> Cases that BaFin determines to be illegal market manipulation are handed over to the German prosecution.

From January 2002 to January 2015, BaFin identified 259 allegedly illegal tout campaigns which it handed over to law enforcement.<sup>11</sup> This sample comprehensively includes all pump-and-dump schemes provided by BaFin to German prosecutors during this time period. BaFin generally does not consider the likelihood of apprehending the promoters or the likelihood of obtaining a conviction in determining whether or not to refer these cases to the prosecution. Thus, almost all cases that BaFin investigates and it views as illegal are referred to the prosecution and hence form part of our sample. Given BaFin’s jurisdiction, we are confident that the touts within this sample targeted German investors and took place in German markets. This feature is important for our analysis, given that we have a sample of retail investors with accounts in Germany and given how we identify individual investor participation.

To mitigate potential sample selection concerns about this sample (e.g., due to the way BaFin identifies potentially illicit stock promotions), we create a second dataset of touts through

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<sup>9</sup> Illicit market manipulation is prohibited in Germany according to Article 20a of the Securities Trading Act (*Wertpapierhandelsgesetz*). The definition of illegal market manipulation was revised in 2005 via an administrative order by the German Ministry of Finance (*Marktmanipulations-Konkretisierungsverordnung, MaKonV*). The law changed again in 2016 (i.e., after our sample period) due to changes in EU law.

<sup>10</sup> Stock ownership or other financial interest in a firm constitutes a conflict of interest that must be disclosed when recommending a stock. Insufficient conflict-of-interest disclosures can make a stock promotion illegal. Pump-and-dump campaigns are also illegal for other reasons (“*wrong and misleading signals due to an artificial price level*”, Article 3 of MaKonV). For example, pump-and-dump campaigns often rely on fake trading to create an illusion of market activity and liquidity in advance of the scheme.

<sup>11</sup> BaFin viewed the schemes as illicit market manipulation, but the touts would be accurately described as ‘alleged market manipulation’ since depending on the nature and result of the prosecution there may not have been civil or criminal sanctions for the perpetrators of the schemes.

hand-collecting cases from German websites and internet forums. To find these additional cases, we conducted several different searches. First, we examined stock trading websites that feature promotional communications and that allow users to post touts and spams. Second, we examined those trading websites for complaints by individuals about receiving unsolicited e-mail, fax, or telephone calls touting a stock (see Internet Appendix for details on the search process and examples). To ascertain that the incident described was a stock tout, we require that the individual provided either a copy or detailed description of the promoted tout text. Based on this strategy, we identify 280 distinct campaigns that occurred between January 2002 and January 2015. If the same stock is touted multiple times, we treat the subsequent tout as a new campaign if there are more than six months between promotional communications.

When we combine the two sources, we obtain 421 distinct pump-and-dump campaigns. There are 118 cases that appear in both samples. While the overlap in the cases from the two sources may appear low, we emphasize that the BaFin sample is focused on manipulations in German markets. For the hand-collected cases, it is harder to ascertain that the tout campaigns actually targeted German investors or that they took place on German trading venues. Moreover, all the BaFin cases were deemed illegal market manipulation by the supervisor after an investigation. Our hand collection does not apply this criterion. As such, the hand-collected sample is less restrictive and could include promotions that were not necessarily illegal. In the end, both subsamples have their advantages and, for this reason, we combine them for our analyses. However, we confirm that all our analyses yield similar results and inferences when using BaFin cases only.<sup>12</sup>

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<sup>12</sup> We also analyze systematic differences between the two subsamples (Table 1) and find that the primary difference is the “uptake” by our sample investors, consistent with the above discussion on the sample construction.



A key data item for our analysis is the beginning of the tout campaign (i.e., pump phase). For the BaFin cases, we rely on the date provided by BaFin, which marks the beginning of the illegal promotion activity according to their investigation. For the hand-collected cases, we define the beginning of the tout campaign as the date of the promotional e-mail, fax, or telephone communication, unless this date is not available in the actual message. In this case, we record the date of the post about the tout as the start of the tout campaign. When we find multiple posts or messages for the same tout campaign, we record the date of the first promotional communication. For each pump-and-dump campaign, we collect additional descriptive information about the touted firm, the type and country of its trading venue, the location of its headquarters, and industry via historical snapshots of Datastream.

Figure 2 describes our tout sample with 421 distinct pump-and-dump campaigns. In Panel A, we show the number of touts per year in our BaFin sample, hand-collected sample, and those contained in both samples. From 2006-2014, there are 46 touts on average per year. In the earlier period, 2002-2005, we have far fewer touts in our sample, which could be explained by the supervisory ramp-up. BaFin was not charged with the supervision of market manipulation until 2002. Its special organizational unit for the surveillance and enforcement of market manipulation came into existence a year later and its legal authority with respect to market manipulation was further expanded in 2004 and 2005. The time-series pattern of pump-and-dump schemes also coincides with the bull-bear market cycles. Moreover, within the hand-collected sample, the lower incidence rate likely reflects that it is harder for us to find stock touts on websites when they are more distant in time. In addition, the spike in the number of hand-collected touts in 2007 stands out. The large number could be related to the following stock spam patterns. The internet security firm Sophos notes that increased SEC enforcement with respect to 'hyped' Pink Sheets

stocks (in particular, “Operation Spamalot” in March 2007) led to a significant rise in stock spam campaigns outside the US (Sophos 2008). Simultaneously, new spam technology (‘image spam’ or ‘PDF spam’) allowed perpetrators to bypass most anti-spam filters during this year. Consistent with this explanation, we observe that almost 95% of all tout cases in 2007 involve e-mail or newsletter campaigns.

In general, however, promoters disseminate tout campaigns via a variety of different communications. E-mail and phone are the two most common means of distribution and are used by 30% and 29% of all campaigns in our sample, respectively. The relatively high percentage of phone campaigns is notable considering the higher costs and lower reach of such campaigns. About 25% of campaigns employ newsletters, which provide stock recommendations to subscribers. Over a fifth of all campaigns, or 21%, use multiple distribution forms with two channels being common. The two most common combinations are e-mail & phone and e-mail & newsletter. Only a very small number of campaigns (<2%) employ more than two channels.

We are able to find data on the industry, location of the tout venue, and the company’s official headquarters for 416 out of 421 touts. Our touted stocks are traded on venues from 9 different countries, with Germany and the United States dominating the sample with 73% and 19%, respectively. The location of tout firms’ headquarters is more diverse, comprising 12 countries. Although Germany and the United States are again the most frequent locations, there is considerably more heterogeneity in the official headquarter location, with Germany, the United States, and the UK representing 31%, 22%, and 13%, respectively (Figure 2, Panel D).

We also find that touted firms are purported to be operating in a diverse set of industries (Panel E). Tout stocks are most commonly in Financial Services (27%), but mining, software,

and oil & gas companies are also common. However, these designated industries may be deceptive in that some touted firms are shell companies and/or lack substantive operations.

### 3.2. *Investor Sample*

We obtain individual investor trading and portfolio data from a large German online bank that operates in all 16 states of the country. Out of the bank's more than half-million clients, we obtain a random sample of 113,000 investors. For each investor, we have their complete trading activities from 2002 to 2015. This includes information on the transaction volumes, prices, and dates as well as information on order types (i.e., orders with and without limits). We also receive information on age, gender, residence (i.e., zip-code), marital status, education level, employment type, and for how long they had an account with the bank. We also have self-reported categorical information on income levels, total wealth, and investment risk tolerance.<sup>13</sup>

During our sample period, the investors in our sample made 29 million trades with an aggregate transaction value of €178 billion. 54% of all trades are purchases and the average portfolio value at the end of 2013 is €5,854. Slightly more than half (55%) of the average investor's portfolio is invested in equities. The mean and median number of transactions (equity and non-equity trades) per year is 36 and 16, respectively, indicating that most investors manage their portfolios quite actively. The majority of our sample is male (83%) with an average age of 52. Prior research suggests that individuals with investment portfolios are more highly educated and financially savvy than the population (Van Rooij et al. 2011; Cole et al. 2014). Following this expectation, we find that 7% of the sample investors hold doctoral degree as compared with 1.5% of the German population (German Federal Bureau of Statistics 2015).

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<sup>13</sup> Some investors do not provide personal characteristics (e.g. employment type) to the bank. Thus, we do not have these characteristics for all investors in our sample.

We conduct several comparisons to gauge how our sample compares to the population of German investors to make sure that investment portfolios in our sample are fairly representative (and not, for instance, online “play money” accounts). Towards this end, we first compare the average portfolio value in our sample to the value reported in German national statistics. The Deutsche Bundesbank reports that the average portfolio value for German equity investors in 2013 is €48,000, which is only slightly lower than our sample average of €55,854. We also compare the portfolio holdings to annual household income. As investors in our dataset provide income in ranges (e.g., €100,000 - €150,000), we use the midpoint of each range to construct a measure for the average investor’s income. We find that the ratio of the average portfolio value to average annual income is 1.3 in our sample, which is comparable to the ratio of 1.1 computed for German investors more broadly (German Federal Bureau of Statistics 2008a, 2008b; Deutsche Bundesbank 2013). Together, this evidence suggests that our bank sample is comparable to the population of German investors holding accounts at other financial institutions. We also compare several key descriptive statistics for our sample to those reported in other household finance studies using U.S online brokerage data (e.g., Odean 1998; Barber and Odean 2001) and Scandinavian data (e.g., Calvet et al. 2007). Again, we find that the statistics for our sample are quite comparable (see Internet Appendix for details).

### 3.3. *Investor Participation in Pump-and-Dump Schemes*

We do not observe whether our sample investors obtain the communication used to tout the stock (e.g., the spam e-mail). Thus, we have to infer tout participation from their trading behavior. We assume that investors who purchase the touted stock within 60 days of the beginning of the pump phase as participating in the pump-and-dump scheme. (We discuss this assumption in more detail in Section 4.1.)

In Table 1, we describe the characteristics of touts with a positive investor response. Out of the 421 distinct touts in our sample, 79% (334 touts) are traded by at least one investor in our bank sample during the 60-day period from the start of the tout.<sup>14</sup> Of the touts with a positive investor response, the average tout has approximately 60 purchase trades by our sample investors. However, we find that the distribution is positively skewed; the median tout has 13 purchases. Our sample investors make a total of 20,066 purchases in touted stocks during the assumed 60-day pump period. As some investors would make multiple trades in the same touted stock during the pump campaign, we have a total of 12,296 tout-investor observations. Thus, the average tout investor makes approximately 1.6 purchases if they participate.

Panel B of Table 1 indicates that the average tout attracts 37 different investors from our sample bank. However, there is considerable variation and skew with the median tout having 9 investors and the standard deviation being 90 investors. In total, we have 6,569 unique investors who participate in at least one tout in our sample. Thus, 5.8% of all sample investors trade in at least one tout during our sample period. We find that more than 50% of the investors participate only once but the average tout investor purchases nearly 1.9 distinct tout stocks, implying that at least some investors participate in multiple distinct touts.

In Panel C of Table 1, we explore the characteristics of different tout campaigns. In Column (1), we use a linear probability model and find that tout firms that are headquartered in Germany are 12.1% more likely to have a positive investor response. We also find that e-mail touts are more likely to garner a response by sample investors than telephone-based campaigns, likely reflecting the greater reach by low cost e-mail campaigns. Touts that utilize e-mail (telephone) are 16.0% more likely (15.8% less likely) to be traded by an investor from our sample bank. We

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<sup>14</sup> As expected given the sample construction (Section 3.1), the participation in the BaFin subsample is higher (84% of these touts have at least one sample investor participating) than in the hand-collected subsample (72%).

do not find any differences in trading propensity between trading venue locations, potentially reflecting the ease with which investors can trade on different venues globally.

We also examine which attributes are associated with more “effective” campaigns that draw in more investors. In Column (2), we find that firms headquartered in Germany attract more investors, likely reflecting a form of home bias (French and Poterba 1991). Specifically, touts headquartered in Germany have on average 61% more investors. E-mail and newsletter campaigns reach greater number of investors and we find that more investors join the campaign when such media are utilized. Phone campaigns are costlier and likely reach fewer potential investors, resulting in fewer individuals who actually invest in the tout. Specifically, telephone campaigns are associated with a 65% decrease in the number of investors. We also find that touts investigated by BaFin are 30% more likely to be traded within our sample and that such touts attract more investors. This finding reflects our sample construction, i.e., the fact that for the BaFin sample we know that the scheme targeted German investors. In Column (3), we find that schemes involving larger firms (as measured by their pre-pump market capitalization) attract more investors. In Column (4), we explore the associations for the tout message and hence focus on the subset of touts for which we can observe the original tout message. We code a discrete variable ranging from 0 to 3 with higher values indicating a more sophisticated tout message (i.e., professional text quality, specific financial data). As one would expect, we find that more sophisticated tout messages are associated with a larger number of participating investors.

Overall, the participation rate in touts is fairly high, with nearly 6% of all investors in our brokerage sample investing in at least one. Thus, our analysis shows that pump-and-dump campaigns engage a considerable number of investors.

### 3.4. Performance in Pump-and-Dump Schemes

In this section, we examine the portfolio and wealth consequences of investors' decisions to participate in pump-and-dump schemes. In Table 2, we provide descriptive statistics on the returns of investing in pump-and-dump campaigns. In Panel A, we describe the performance of individual tout trades. Within our sample, 84.5% of the tout trades are closed out by investors during our sample period, i.e., roundtrip investments. For those trades that are not closed by the investor, we close the trade 120 days after the purchase for the purpose of computing roundtrip returns.<sup>15</sup>

For the 20,066 tout purchases that occurred during the 60-day pump period, we find a mean raw return of -24%. We also compute the average market return over the period during which investors hold the touted stocks using the CDAX index and find that the average market return is 2% during the tout trade window. Thus, the market-adjusted tout return is -26%. On average, each tout trade reduces investor wealth by €800.<sup>16</sup> Despite the significantly negative return for the average tout trade, we find that for a considerable fraction of the tout trades (30%) the return is actually positive. The average and median return for these trades are 29.82% and 12.98%, respectively. Thus, it is conceivable that some investors are attracted to touts because of “lottery-like” payoffs.

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<sup>15</sup> Trades that are not closed out over our sample period (‘inventory investment’) tend to have larger negative returns than roundtrip investments. Based on our 120-days assumption, we calculate an average -53% return for inventory investments, whereas the average roundtrip investment has a -18% return. However, this large difference between both type of investments is not unexpected since retail investors tend to hold losing investments for a longer period (Shefrin and Statman 1985; Odean 1998). Additionally, selling crashed stocks is often not feasible (liquidity) or sensible (given fees). As a result, using an artificial 120-day cut-off is likely to understate the magnitude of the losses associated with these inventory investments. For example, roundtrip investments that are sold after this cut-off date have a negative -63% return with only a quarter of those investments achieving better returns than -53% (the average inventory investment return based on our assumptions).

<sup>16</sup> White (2016) examine returns for trading in U.S. OTC stocks and finds a considerably smaller magnitude of loss per trade of \$96 (median loss). For promoted stocks, he reports a mean holding return of -13%, which is better than the average holding return for our roundtrip investments (-18%).

In Panel B of Table 2, we show the performance of tout investments by aggregating all trades by the same investor within a tout. We find the market-adjusted, value-weighted performance is -31%, indicating that relatively larger tout trades are being made by investors that tend to perform worse. The average loss per tout investment is €1,305. Aggregating these losses for all sample investors (approximately 37 investors per tout) yields a total loss of €48,000 per tout in our sample, which is small but our investor sample represents roughly 4% of all online brokerage accounts in Germany. Thus, if investors behave similarly at other online banks, the average tout generates aggregate losses of at least €1.2 million for German retail investors with online accounts.<sup>17</sup> This estimate does not account for the trading activity of non-online brokerage accounts, which may be less responsive, but have a 90% market share in Germany. Thus, the losses to individual investors due to pump-and-dump schemes seem fairly substantial.

In Panels C and D of Table 2, we examine the returns for the tout and non-tout part of the portfolios of investors who invest in at least one tout campaign. The performance of the tout part of the portfolios is aggregated by investor and described in Panel C of Table 2. The average tout investment by our sample investors is €13,051, but the standard deviation is €56,567 reflecting considerable variation in the invested amount across investors. The average value-weighted return for the tout portion of an investor's portfolio is -31% with the median value being similar in magnitude. Remarkably, the average return for the tout portion of the bottom quartile of tout investors is -64%.

For comparison, the hypothetical 120-day buy-and-hold return for the median tout is -70.4%. Thus, tout investors are doing considerably “better” than holding returns based on the

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<sup>17</sup> We corroborate this calculation using trading volume. We relate the aggregate trading volume of tous that are exclusively traded on German exchanges (for which we can observe the consolidated trading volume via Datastream) to the purchase trading volume over the 60-day pump period in our sample. Using this approach, we estimate that aggregate losses per tout are at least €1.5 to 2 million.



price path following the pump phase would suggest. Essentially, many investors limit losses by selling earlier. That said, the average (median) holding period is 61 (11) days and hence considerably longer than the 2 days assumed in Frieder and Zitrain (2008). 73.6% of the trades are closed out within 120 days from the start of the tout. To the extent that investors hold onto tout investments longer, their losses tend to grow substantially.

Panel D of Table 2 shows the attributes of the non-tout part of the tout investors' portfolios and hence give us a sense for their overall investment behavior and portfolio performance. 5,140 of our 6,569 unique tout investors purchase other non-tout stocks during the 60-day pump period in which they purchase a touted stock. For these stock investments, the median and average value weighted return is -4% and -5%, respectively. This return is below the market return but considerably greater than the return in tout investments. The former observation is consistent with prior research showing the tendency for individual investors to underperform market indices (e.g., Barber and Odean 2000). The latter observation already indicates that tout investments are indeed different and considerably worse than other investments made by tout investors.

#### **4. Analysis of Touts Campaigns**

In this section, we investigate which individuals invest into touts and their investment behavior subsequent to these investments. We begin by providing support that investors respond to tout campaigns when making investments during the 60-day period after the start of the pump-and-dump campaign. Next, we explore which investor characteristics relate to tout participation, cross-sectional differences in investor returns, the existence of investor types, and how the tout experience relates to subsequent tout and non-tout investments.

#### 4.1. *Exposure to Touts*

In treating investor purchases during the 60 days after the start of the tout campaign as “participation” in the tout, we assume that investors are responding to promotional communications. However, we do not observe whether investors actually saw or received the tout communications. Thus, we have to infer tout participation from investment behavior. To assess the validity of this assumption, we provide two pieces of evidence that suggest that investors are responding to tout communications rather than trading in touted stocks by chance.

First, we find that only 11% (732) of the investors who invest during the 60 days pump period purchased the same tout stock in the 180 days preceding the beginning of the tout campaign. This relatively small number of prior investments in touted stocks already suggests that these stocks are not typical investments in their equity portfolio for our sample investors and that they are responding to the tout campaigns.

Second, we examine whether we would see a similar trading response by our sample investors for other stocks that were not touted, yet exhibited a similar price path. This test addresses for instance the concern that investors respond to momentum, rather than tout promotions. Toward this end, we match the prices of touted stocks at five dates before the pump-and-dump campaign to the prices of non-touted stocks from the same country using coarsened-exact matching techniques (see Internet Appendix for details on the matching procedure). In essence, this technique matches stocks based on the price path until the beginning of the tout. We rather match on prices (instead of returns) to ensure that control stocks have similar price levels (and hence the lottery-like characteristics of low-priced stocks). Panel A of Figure 3 shows the price path of the touted and the matched non-touted stocks. Visually, the run-up in prices is relatively similar across both types of stocks until the beginning of the pump-and-dump

campaign. We also confirm with t-tests that the returns of the two groups are not significantly different before the tout date. Next, we examine investor responses to tout and control stocks. In Panel B (average number of purchase-trades per stock) and Panel C (mean value of purchases), we plot the purchases of tout and matched non-tout stocks by our sample investors to compare the response in event time. The figures illustrate that investors react right around the time of the tout campaign and that the response is much stronger for touted stocks than for matched stocks. These results suggest that investors respond to the touts and mitigate concerns that investors purchase these stocks for some other reasons (e.g., momentum trading). That said, our measurement of tout participation is indirect and so our results should be interpreted with this caveat in mind.

#### 4.2. *Characteristics of Tout Investors*

Given the significantly negative returns to the average tout investment as shown in Section 3, we seek to better understand who and why investors participate in tout campaigns. Panel A of Table 3 indicates that the median tout investor is a 47-year-old male living in the suburbs, is married, and has a high self-assessed risk tolerance for his investments. The average tout investor has approximately €60,000 invested in securities, most of which is in equities. In fact, a large fraction of his (or her) entire portfolio (31%) is comprised of penny shares (defined as having a price below €5), which often have lottery-like return characteristics (Kumar 2009).

To provide a basis of comparison, we create a matched control sample of investors. For each tout month, we draw a random sample of 2,000 investors that did not invest in any tout before this date. We then retain only those investors who purchase at least one non-tout stock during the 60-day pump period. This restriction ensures that our control investors are not inactive and also invest in equities during the same time period. We find that control investors are relatively

similar with respect to their personal characteristics and demographics (i.e., age, gender, married), but that there are significant differences in their portfolio characteristics. Specifically, non-tout investors trade less frequently than tout investors and hold a smaller (larger) fraction of their portfolio in penny (blue-chip) stocks.

In Panel B of Table 3, we investigate more closely the characteristics associated with being a tout investor. In line with the univariate evidence, we find that investors who are male, older, have higher investment risk tolerance, and live outside cities are more likely to be tout investors (Column 1).<sup>18</sup> Additionally, investors with a greater wealth (based on the value of their entire portfolio) are less likely to invest into touts. In Column (2) we add portfolio-level characteristics. Investors who hold riskier portfolios are more inclined to invest into touts. Specifically, those with a higher share of penny stocks, a lower proportion of blue chip shares, and a greater number of individual stocks are more likely to become tout investors. Personal characteristics alone can explain the propensity to become a tout investor only to a limited extent ( $R^2=2.7\%$ ). However, adding portfolio-level characteristics significantly enhances the explanatory power of the model ( $R^2=19.4\%$ ). This finding suggests that tout investors can be better identified based on their portfolio composition and investment behavior than based on their personal characteristics.<sup>19</sup> In Column (3), we add an investor's profession to the model. Profession is self-reported by the investors when they open their brokerage account with the bank and captures broad employment categorizations (the omitted category is "dependents and others," which includes

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<sup>18</sup> An investor's risk tolerance is an investor's self-reported assessment of their desire for risk and range from 1 to 5. Clients of our sample German bank are only allowed to purchase securities equal or below their self-reported risk class. For example, to be able to trade in blue chips stocks, clients need to select at least risk-class 3 and to trade in penny stocks a risk-class of 5 is required.

<sup>19</sup> This conclusion is subject to one caveat. For about 340 of our 6,549 tout investors (~ 5%), we do not have all the main personal characteristics (gender, age, etc.). Additionally, another 722 tout investors (~ 11%) choose not to disclose their profession to the bank. This lack of data could lead us to underestimate the extent to which personal characteristics are useful in identifying tout investors.

students, apprentices and unemployed people). Again, the explanatory power increases only modestly after the professional indicators are added to the model ( $R^2=20.4\%$ ). Relative to the omitted category (3% of all tout investors and 4% of all control investors), we find that blue-collar workers, retirees, and self-employed are more likely to be tout investors. This result suggests that education could play a role in tout participation. However, our model cannot separate whether certain investors are more responsive to pump-and-dump schemes or promoters target people with certain personal characteristics.

Remarkably, over one-third of the tout investors included in the analyses of Table 3 have more than one tout investment over the sample period. This large fraction of “repeat investors” is noteworthy given the large negative return for the average tout investment. One possible explanation could be that multi-tout and single investors fare quite differently, suggesting that they are different investor types. For example, multi-tout investors could possess superior trading skill or participate in touts for different reasons. Therefore, Table 4 provides descriptive statistics conditional on the number of tout investments over our sample period. Overall, multi-tout investors seem to be a more ‘extreme’ version of single-tout investors, rather than a different type. For example, the share of penny (blue chip) stocks increases (decreases) in the number of tout investments. Investors with only one tout investment have a 27% penny stock share, whereas this percentage reaches almost 50% for investors with seven or more touts. We find little support for the notion that multi-tout investors in general are superior traders or more successful in their tout investments. Although the mean return is higher than the mean return of single-tout investors, it is still quite negative (i.e., -23% for investors with seven or more touts). Moreover, multi-tout investors incur large cumulative losses. While a single-tout investor loses

about \$1,350 of his investment, an investor with five tout investments loses more than \$7,000 across all touts.

In Table 5, we specifically analyze characteristics that are associated with the “success” or better performance of tout investments.<sup>20</sup> In Column (1), we relate investors’ average tout returns to their personal and portfolio-level characteristics. Although most characteristics do not exhibit significant associations with returns, tout investors that hold a larger fraction of penny stocks in their portfolio as well as fewer stocks tend to have more positive tout returns. In Column (2), we compare multi-tout investors with other tout investors, indicating those investing in four or more touts. On average, these multi-tout investors have a 6.5 percentage points higher return. In Column (3), we add investor- and tout-fixed effects and focus on two new variables related to the relative timing of the purchase and the relative position of the tout. First, we find that investors who invest relatively early into the tout (compared to other investors that invest into the same tout) have more positive returns. This result highlights the pyramid-like nature of pump-and-dump campaigns. The magnitude of the coefficient suggests that even investors who purchase after the beginning of the tout (and hence are not likely the perpetrators or affiliated with the promoters) can profit from a pump-and-dump scheme by investing early and quickly flipping the tout to other potential victims.<sup>21</sup> Second, we find a negative coefficient<sup>21</sup> for the variable indicating the number of touts that an investor has participated in up to the point of the most recent tout. This result suggests that repeated participation does not increase performance and, hence, our evidence does not support the interpretation that the superior average return performance of multi-tout investors (Column 2) is due to investor learning.

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<sup>20</sup> We also explore whether certain tout-stock characteristics (e.g., location of headquarter) are related to investor-level returns. However, this analysis yields largely inconclusive results.

<sup>21</sup> Our descriptive statistics in Table 2, Panel B, suggest that fewer than 25% of the investors are able to do so. We also check and do not find return or trading evidence suggesting that some of our sample investors are perpetrators or affiliated with the promoters.

### 4.3. *Subsequent Pump-and-Dump Investments*

In this section, we explore how past tout participation influences subsequent tout investments. In Table 6, we investigate investors' willingness to invest in a subsequent campaign conditional on prior tout performance, controlling for various portfolio characteristics. In Column (1), we examine whether investors that have a more positive experience in their first tout are more likely to invest into a second tout. We find that the return decile is significantly associated with future tout investments. The coefficient implies that a one-decile increase in the first tout's return makes it 8.1% (2.5 percentage points) more likely that the investor participates in a second pump-and-dump campaign. In Column (2), we focus on the first four touts of all investors and include the return decile of the investor's most recent as well as the return decile of the prior tout (thereby, dropping the first tout observation of each investor). While both return variables have positive coefficients, only the return of the most recent tout is significantly associated with the likelihood of the subsequent tout investment. We also find that other right-hand side variables have plausible and expected associations. For example, irrespective of returns, investors with riskier portfolios (as indicated by a higher penny stock share, lower blue-chip share, or a larger number of individual stocks) are more likely to invest in a subsequent tout.

In Column (3), we explore how past performance relates to the time until the next tout investment. We find that, for investors who do invest in another campaign, those with a higher return in the most recent tout invest more quickly into the next one. A one-decile increase in the most recent tout return reduces the time between two tout investments by approximately 11.6%. That is, more successful investors appear to be more eager to quickly invest into another tout, while less successful ones seem to hesitate even when they eventually invest into another tout. Consistent with these adjustments, we find in Column (4) that investors with higher returns in

their prior tout stay longer in the next tout, perhaps suggesting overconfidence rather than skill as staying in tout campaigns for longer periods typically hurts performance.

In sum, investors' prior experiences with pump-and-dump schemes appear to influence their future tout investments. Investors who have negative experiences, i.e., relatively poor returns, tend to reduce subsequent participation and, if they invest again, increase wait times and shorten holding periods. In contrast, investors who are initially successful are more likely to continue participating and seem to accumulate larger losses than initially unsuccessful investors.

#### 4.4. *Types of Tout Investors*

As discussed in Section 2.2, investors may participate in pump-and-dump campaigns for different reasons, consistent with the idea of different types of tout investors. While some investors likely are duped by the promoters and their campaigns, other investors may be aware of the nature of the pump-and-dump scheme and decide to participate with the goal of quickly flipping the stock for a profit. However, it is challenging to infer the *ex-ante* motive of tout investors based on their investment behavior in touted stocks. To address this challenge, we classify individuals based on their past trading behavior in *non-touted* stocks.

In Table 7, Panel A, we create and describe four investor categories: New Traders, Conservative Traders, Penny Stock Day Traders, and Short-term Traders (plus a fifth residual category captures all traders who do not fall into any of four categories). We create the first investor type, New Traders who recently began trading because it is difficult to characterize past non-tout investment behavior for people who only recently opened an account at the bank. The second investor group, Conservative Traders, comprises people who have not purchased a penny stock or did not trade at all within the six months before the tout date. This investor category



contains the least active equity investors who also have little experience with penny stocks. Given their limited trading experience, investors in this group are potentially more vulnerable. The next two investor groups contain frequent traders that regularly trade in penny stocks and typically have short holding periods. Investors in the third group, Penny Stock Day Traders, often buy and (quickly) sell risky, low-priced stocks.

Panel A of Table 7 provides descriptive statistics for the sample composition by investor types, separately for tout and active control investors. While only 2.2% of control investors are Penny Stock Day Traders, more than 10% of all tout investors are of this type. Conservative Traders, on the other hand, are underrepresented in the tout investor sample (26.9% versus 57.9% in the control sample). Penny Stock Day Traders and Short-term Traders are more likely to understand the risks of investing in penny stocks so their participation is less likely to be due to deception. These investors comprise 34% of the tout sample suggesting that a substantial portion of tout investors would be less aptly described as being deceived when making tout investments. There are relatively few New Traders and their frequencies are very similar for the tout and control investors, suggesting that it is not very common for individuals to open an account simply to make a tout investment. In our sample, most tout participants already had and used their account for some time and thus have some degree of familiarity with stock investments.<sup>22</sup>

The described classification of investor types can lead to some overlap of the categories. However, the overlap between the groups is relatively modest; on average, each investor would be only assigned to 1.07 investor types, if they were not assigned sequentially. In the Internet

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<sup>22</sup> Whether this result reflects a deliberate strategy by promoters (i.e., they have lists of people with investment accounts) or selection (i.e., people without accounts tend not to be responsive to tout communications) is not something we can investigate with our data.

Appendix, we examine the distribution of investor types in our sample if we did not exclusively assign investors to one investor type (via iterative assignment). The New Trader category has the largest overlap with other investor groups. In contrast, Conservative Traders and the two groups of frequent traders are relatively distinct. Given the limited overlap, we use mutually exclusive investor type definitions via an iterative assignment of investors in Table 7 (e.g., if an investor is assigned to investor group I, we will not assign him or her to any other group).

Next, we re-estimate our models in Tables 3, 5 and 6 adding indicators for the different investor types. In Panel B of Table 7, Model 1, we investigate the association between investor types and tout participation. In line with the frequencies in Panel A, we find that Conservative Traders have a significantly lower likelihood of participating in pump-and-dump campaigns, whereas Penny Stock Day Traders and Short-term Traders participate with higher frequency compared to the residual traders. We note that the adjusted  $R^2$  of the regression increases considerably (from about 19.4% to 24.5%) once we add the investor type dummies. This increase in explanatory power is significant (F-Test of joint significance has a p-value<0.01) and suggests that our investor type classification captures meaningful differences in the propensity of tout participation, despite the fact that the classification is based on past investment behavior in *non-touted* stocks.

Column (2) shows the results for the return regression. Both frequent trader categories have significantly larger returns as compared with the residual category. The average difference is 19.0% for Penny Stock Day Traders and 8.6% for Short-term Traders. Although these return differences are large, the average tout investment return is still negative for both groups. Nevertheless, the findings are in line with the notion that Penny Stock Day Traders and Short-term Traders are unlikely to be deceived by the pump-and-dump schemes or unaware of their

nature. In Column (3), we assess whether certain investor types are more or less likely to invest into another tout. Even after controlling for performance in the most recent tout, frequent traders (and particularly Penny Stock Day Traders) have a significantly higher likelihood of investing into another tout. This group of investors might even be actively seeking out touts. In contrast, Conservative Traders seem to shy away from another tout investment after facing an adverse outcome in a prior tout.

Finally, in Column (4), we run a linear probability model to test whether certain investor types differ in how much they invest in a tout ('tout stake'). It is conceivable that some invest only small amounts to 'dip their toe into the water.' In contrast, more seasoned traders may make more substantive investments once they decide to invest. To shed light on such strategies, we code the dependent variable as '1' if an investor invests less than 2.31% of her portfolio value into the tout (i.e., the cutoff is equal to the lowest quintile). The finding is in line with our expectation. Relative to the residual category, Conservative Traders (frequent traders) are more (less) likely to invest small amounts in touted stocks.

Overall, the analysis in Table 7 supports the notion that there are several distinct investor types who invest in pump-and-dump schemes. Specifically, we find a substantial number of investors who appear to trade in penny stocks and non-tout stocks with high frequency. Tout participation by these investors is less likely due to deception, but instead is more likely a reflection of gambling or speculation. This interpretation is also supported by the differential performance of the investor types in the touts.

#### 4.5. *Market Participation after Investing in Pump-and-Dump Campaigns*

Our earlier analyses show associations between the past and future tout investments. In this section, we seek to build on this analysis by exploring whether tout participation potentially influences investors' subsequent investment behavior and market participation more broadly.

In Panel A of Table 8, we partition each tout-investor observation into quintiles based on the return of the tout. Observations in the lowest (highest) quintile have a mean return of -88% (37%). We then compute the change in trading frequency in the 120 days after the pump period relative to the 120 days before the pump period (scaled by the total number of trades). Changes in total number of trades (*Diff # TotalTrades*) as well as changes in number of penny stock trades (*Diff # PennyTrades*) display a monotonic pattern across quintiles. Investors who are relatively more successful in past touts appear to adjust their risk of their other investments less. For example, investors in the lowest quintile reduce the number of penny stock trades by 33%, but investor in the highest quintile reduce the number of penny stock trades by 6% only. Changes in blue chip trades (*Diff # BlueChipTrades*) exhibit a reversed U-shaped pattern. Investors in the lowest quintile seem to reduce the number of blue-chip investments. It is possible that they decide to leave the equity market entirely. In contrast, investors in the highest quintile potentially substitute blue-chip trades with riskier stocks.

In Panel B of Table 8, we explore how past returns in touts relate to investors' future market participation in the near-term using a linear probability model. In Column 1 of Table 8, we find that investors who experience more negative returns are more likely to stop trading in stocks in the subsequent 120 days after the pump-period. A one-decile decrease in tout returns is associated with a 1.8 percentage point increase in the probability that the investor stops trading stocks entirely. In untabulated tests, we also analyze how these associations vary by investor

type. Specifically, the effects should be more pronounced for vulnerable investors and hence we expect to see stronger associations for the category of Conservative Traders. It is conceivable that these investors shy away from investing in the stock market entirely after a bad experience. In line with this conjecture, we find that Conservative Traders are significantly more sensitive to the return of their tout investment.

In Column (2), we replace the binary left-hand side variable with a continuous variable, capturing trading frequency (i.e., the difference between the number of trades in the 120 days after the pump period and the number of trades in the 120 days before the pump period scaled by the total number of trades). Again, investors with worse returns reduce their future trading more strongly. Column (3) and Column (4) focus on changes in penny stock trades and changes in blue-chip share trades, respectively. A comparison of the two columns reveals that penny stock trades are more sensitive to the investor's return of the tout.

In Panel C of Table 8, we explore whether the changes in post-tout investment behavior persist in the long-term. Specifically, we analyze how investors change their long-term portfolio composition and investment behavior conditional on their tout performance. In Column (1), we regress the change in trading frequency (number of trades in the second and third year after the tout minus the number of trades in year three and year two before the tout, scaled by the total number of trades) on an investor's tout return. We find that lower tout returns are associated with a significant decrease in the trading frequency even several years out. In Column (2) to (4), we focus on investors with a negative tout experience (or return) and examine whether long-term portfolio changes are consistent with their short-term responses or adjustments documented in Panel B. In Column (2), *Diff# TotalTrades* has a positive association with the corresponding long-run variable, indicating that investors who trade less frequently immediately after the tout,

still do so two to three years later. In the next two columns, we analyze the association of the initial response with the long-run portfolio composition. Consistent with the initial response, investors that increase the number of penny trades still hold more penny stocks three years after the tout relative to their respective penny stock share six months before the tout (Column 3). Finally, investors that purchase fewer blue chip stocks immediately after the tout, have a smaller fraction of blue-chip stocks three years after the tout date (Column 4). While these associations are not necessarily causal and have to be interpreted carefully, they suggest that tout investments not only influence the investment behavior shortly after the tout, but also in the long-term.

Overall, the evidence suggests that pump-and-dump campaigns have the potential to create more lasting effects on investor behavior. Harmed investors appear to reduce their equity market participation. In contrast, investors who fared better in such schemes continue to seek risky and lottery-like investments. As such, our evidence raises the possibility that pump-and-dump schemes have broader distortionary effects in markets beyond the immediate losses to investors.

## **5. Conclusion**

Although pump-and-dump schemes have long been the subject of significant regulatory attention, we have relatively little evidence on investor participation in such schemes. Using a unique proprietary set of trading records for a large set of individual investors along with a database of German pump-and-dump schemes, our paper sheds light on individual investor participation in and outcomes of market manipulation. Our evidence suggests that participation in pump-and-dump schemes is quite common and results in sizable losses. More than 5% of the sample investors participate in at least one “pump-and-dump,” losing on average nearly 30%.

There is considerable heterogeneity in participation and investment outcomes, with a considerable fraction of investors participating in multiple touts. We find that portfolio

composition and past trading behavior are better able to explain participation in touted stocks than investor demographics. Moreover, we identify several distinct types of investors, some of which should not be viewed as simply falling prey to these frauds. A sizeable fraction (35%) of the investors trades frequently, with very short holding periods and often in penny stocks. For these investors, speculation or gambling are more likely to be the motive.

Our analysis offers several insights that could help with designing effective investor protection against pump-and-dump schemes. It seems that effective investor protection should take the documented heterogeneity in investor types into account. For those investors who appear to be duped into these schemes, recent work in behavior ethics offers ideas on how to potentially dissuade individuals from investing in pump-and-dump schemes. For instance, Zhang et al. (2015) show that by simply prompting individuals to think about which fund looked more suspicious, individuals were significantly less likely to invest in an attractive, but fraudulent Ponzi scheme. Brokerages could similarly offer prompts to investors to reconsider investing in pump-and-dump like stocks. Other techniques known to help investors from becoming victims include asking investors to assess the reasonableness of the claims and the evidence prompting them to invest (i.e., the tout communication) or nudging individuals to take more time when making a decision.

Such techniques, however, are less likely to be effective for those investors who speculate or gamble and might even deliberately seek these schemes. They are much less likely to be fooled and might even view the pump phase as an opportunity to make a gain. Such investors are less likely to be dissuaded from investing with additional educational efforts, which makes it more challenging to curtail their desire to invest in pump-and-dump schemes. Doing so could still be

worthwhile to the extent that their investments create externalities by providing greater benefits for promoters. We leave this issue for future research.



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**Table 1: Participation in Pump-and-Dump Schemes**

This table investigates the participation of investors in pump-and-dump schemes. Panel A shows that 334 touts out of 421 sample touts were traded. Our tout sample consists of two subsamples (BaFin and hand-collection). The table also provides statistics on the number of purchases made by all sample investors during the 60-day pump window for both roundtrip and inventory tout trades. Panel B provides summary statistics at the tout-level (number of investors per tout) and the investor-level (number of touts per investor). Panel C reports correlations between tout characteristics and investor participation in the tout using a linear probability model. The dependent variable in Column (1) is coded as '1' if at least one investor in our sample participates in a certain tout and '0' otherwise. The independent variables are firm characteristics of the touted stock, the medium used for the tout and whether the tout is in the BaFin subsample. Market variables (returns and market value) are calculated over a 60-day period before the tout. In Column (2) to (4), we use the logarithm of the number of investors (plus 1) as the dependent variable. In Column (4), we include a manually-coded variable ranging from 0 to 3 depending on the sophistication of the tout message. Higher values of this variable indicate a higher degree of sophistication (e.g., a more professional text). All t-statistics are based on robust standard errors. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively.

**Panel A: Trades in Pump-and-Dump Schemes**

	N	Mean	SD	Q1	Median	Q3	Total Trades
# purchases per tout during pump phase	334	60	179	4	13	46	20,066

**Panel B: Number of Investors in Pump-and-Dump Schemes**

	N	Mean	SD	Q1	Median	Q3	Total Tout-Trades
# investors per tout during pump phase	334	36.81	90.09	3.00	9.00	33.00	12,296
# touts per investor during pump phase	6,569	1.87	1.82	1.00	1.00	2.00	12,296

**Panel C: Investor Response to Pump-and-Dump Schemes**

	(1) Tout Response	(2) Log(Number Investors)	(3) Log(Number Investors)	(4) Log(Number Investors)
Tout HQ in Germany	0.121*** (2.61)	0.476*** (2.94)	0.480** (2.57)	0.727*** (2.71)
Tout on German Exchange	-0.089 (-1.30)	-0.311 (-1.32)	-0.208 (-0.75)	-0.300 (-0.81)
Tout on US Exchange	-0.092 (-1.16)	-0.072 (-0.23)	-0.090 (-0.27)	0.085 (0.22)
Utilized E-Mail	0.160*** (2.84)	0.749*** (3.08)	0.514** (2.15)	0.522 (1.64)
Utilized Telephone	-0.158*** (-3.21)	-1.051*** (-5.27)	-1.211*** (-5.58)	-1.016*** (-3.07)
Utilized Newsletter	0.069 (1.59)	0.916*** (4.88)	0.700*** (3.44)	0.665** (2.33)
Utilized Fax	0.018 (0.31)	0.258 (1.36)	0.015 (0.07)	0.280 (0.80)
BaFin sample	0.292*** (5.04)	1.040*** (5.40)	0.940*** (4.67)	0.921*** (2.93)
Log(Market value)			0.115** (2.37)	
Returns			0.036 (0.36)	
Degree of Sophistication				0.366*** (2.98)
Constant	0.632*** (8.08)	1.246*** (4.63)	1.191*** (3.80)	0.997** (2.53)
Adj. R2	0.112	0.288	0.265	0.193
No. Obs	421	421	354	224

**Table 2: Investor Performance in Pump-and-Dump Schemes**

This table provides descriptive statistics on the size and performance of tout (Panel A to C) and non-tout investments (Panel D). Panel A shows descriptive statistics on all tout trades during the 60-day pump period. Volume of investment refers to number of shares. Size of investment (measured in euro) is the number of shares multiplied by the market price at the time of purchase. Tout trades that are not closed out during our sample period are imputed to be closed out 120 days after the purchase date (these returns are calculated based on Datastream data). Market-adjusted returns are raw returns adjusted by the German CDAX index. Gross gain/loss is the investor's loss before fees. Panel B describes the returns for investors aggregating across all their trades in a particular tout. If indicated, variables are value-weighted by the size of the investment of each trade within a tout. Panel C depicts the performance statistics of investor's tout trades aggregated by all tout investments made by the investor. Returns are value-weighted across tous. Panel D provides statistics on investments in non-touted stocks that were made during the same 60-day pump period as the tout investment. These statistics refer to the 5,140 (out of 6,569) investors that made at least one non-tout investment during the 60-day pump period. We also provide the number different stocks purchased (distinct ISINs) during the 60-day pump period. Average investment size refers to the total investment amount divided by the distinct number of stocks purchased. All remaining rows are defined as in Panel C.

**Panel A: Investor Performance at Trade Level**

All Trades	N	Mean (per trade)	SD	Q1	Median	Q3
Volume of investment (# shares)	20,066	6,519	42,964	500	1,250	4,000
Size of Investment (Euros)	20,066	4,272	19,248	916	1,910	4,050
Percent Return (raw)	20,066	-0.24	0.54	-0.63	-0.21	0.03
Percent Return (mkt adjusted)	20,066	-0.26	0.56	-0.65	-0.23	0.03
Gross gain/loss (Euros)	20,066	-800	6,640	-993	-245	60

**Panel B: Investor Performance at Tout Level**

All Tous	N	Mean (per tout)	SD	Q1	Median	Q3
Volume of investment (# shares)	12,296	10,638	110,635	600	1,900	5,000
Size of Investment in Tout (Euros)	12,296	6,972	30,595	995	2,189	5,298
Average Percent Return (raw value weight)	12,296	-0.28	0.53	-0.66	-0.27	0.00
Average Percent Return (mkt adjust, value weight)	12,296	-0.31	0.54	-0.68	-0.29	-0.01
Gross gain/loss (Euros)	12,296	-1,305	8,895	-1,419	-377	0

**Panel C: Performance of Tout Portion of Investor Portfolio**

All Investors	N	Mean (per investor)	SD	Q1	Median	Q3
Number Different Tous Purchases	6,569	1.87	1.82	1.00	1.00	2.00
Number Tout Trades	6,569	4.18	11.63	1.00	2.00	4.00
Total Investment (euro)	6,569	13,051	56,567	1,160	3,114	8,935
Average Return (raw value weight)	6,569	-0.31	0.50	-0.64	-0.31	-0.04
Average Return (mkt adjust, value weight)	6,569	-0.33	0.51	-0.67	-0.33	-0.05

**Panel D: Performance of Non-Tout Portion of Investor Portfolio**

All Investors	N	Mean	SD	Q1	Median	Q3
Number different stocks purchased	5,140	11.74	36.76	2.00	5.00	11.00
Number Non-Tout Trades	5,140	30.09	258.28	3.00	7.00	19.00
Total Investment (euro)	5,140	117,606	1,538,663	4,336	14,444	45,535
Average Investment (euro/different stocks)	5,140	6,142	19,189	1,360	2,742	5,453
Average Percent Return (raw value weight)	5,140	-0.05	0.34	-0.17	-0.04	0.04
Average Percent Return (mkt adjust, value weight)	5,140	-0.09	0.33	-0.19	-0.06	0.01

**Table 3: Characteristics of Tout and Non-Tout Investors**

This table investigates the characteristics of investors who participate in pump-and-dump schemes. Panel A depicts the average characteristics of a tout investor at the point of investing in his or her first tout (n= 6,569). Non-tout investors are randomly drawn from the sample of all investors that did not invest into a tout before. Non-tout investors are then matched in the same month as the tout investor and are required to have purchased a non-touted stock during the pump period (n = 21,384). For categorical variables, p-values are based on chi-squared tests (t-tests otherwise). Panel B is a linear probability model using investor-level observations. The dependent variable is equal to ‘1’ if the investor is a tout investor and ‘0’ otherwise. The explanatory variables refer to investor and portfolio characteristics (measured one month before the tout investment) and the investor’s profession. Male is an indicator equal to ‘1’ if the investor’s gender is male. Married is an indicator equal to ‘1’ if the investor is married. Age is the investor’s age at the tout date. City is an indicator equal to ‘1’ if the investor’s 4-level zip code contains more than 40,000 citizens. The risk class is a measure for investment risk tolerance and has a value between 1 and 5. It is assigned by the investor; 5 indicates the highest inclination toward taking financial risk. Portfolio wealth is the euro value of the investor’s portfolio and we use the logarithm of the variable (plus 1). Penny stock share is defined as the percentage of the portfolio which is invested in penny stocks (defined as share price below €5). Blue chip share is the percentage of the portfolio that is invested into stocks from the S&P500 and the Euro STOXX 600 indices. All professions are self-reported by investors. The omitted professional category is “dependents and others”. All t-statistics, included in parentheses, are based on standard errors double-clustered at the investor and month level. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively

**Panel A: Descriptive Statistics for Tout and Non-Tout Investors**

	<b>Tout Investor</b>	<b>Non-Tout Investor</b>	<b>p-value</b>
Portfolio Wealth (Euro)	60,988	77,922	0.00
Total Stock Value (Euro)	41,605	51,096	0.00
Penny Stock Share	30.9%	13.2%	0.00
Blue Chip Share	14.4%	31.9%	0.00
Size of Trade (Euros)	3,837	6,634	0.00
Number of Purchases (over prior year)	62	29	0.00
Age	47	46	0.01
Male?	89%	87%	0.00
Married?	61%	60%	0.46
Retired?	18%	16%	0.00
Self-assigned Risk Class (out of 5)	4.0	3.7	0.00
City Resident?	36%	41%	0.00
Maximum N	6,569	21,384	

**Panel B: Personal and Portfolio Characteristics of Tout Investors**

	(1)	(2)	(3)
	Tout Investor	Tout Investor	Tout Investor
Male	0.031*** (2.73)	0.020** (2.02)	0.018* (1.77)
Married	-0.006 (-0.71)	0.001 (0.21)	0.007 (1.02)
Age (at tout date)	0.003*** (3.28)	0.003*** (4.38)	0.001 (1.44)
City	-0.043*** (-4.42)	-0.031*** (-4.37)	-0.029*** (-4.33)
Self-assigned Risk Class	0.031*** (8.23)	0.012*** (4.33)	0.024*** (6.99)
Log(Portfolio Wealth(t-1))	-0.026*** (-8.54)	-0.020*** (-6.29)	-0.019*** (-6.37)
Penny Share (t-1)		0.396*** (14.46)	0.384*** (14.82)
Blue Chip Share (t-1)		-0.348*** (-9.55)	-0.335*** (-9.86)
Log(# Stocks (t-1))		0.058*** (10.29)	0.057*** (10.16)
White-collar Job			-0.003 (-0.20)
Blue-collar Job			0.065*** (2.62)
Retiree			0.098*** (3.99)
Civil Servant			-0.013 (-0.60)
Managerial Position			-0.007 (-0.34)
Self-employed			0.055*** (2.86)
Not disclosed (NA)			0.161*** (5.17)
Constant	0.304*** (4.29)	0.202*** (3.79)	0.193*** (4.13)
Adj. R2	0.027	0.194	0.204
No. Investors	24,742	24,742	24,742
No. Obs	38,313	38,313	38,313

**Table 4: Multi-Tout Investors and their Performance**

This table provides descriptive statistics on unique tout investors sorted by the number of their tout investments over the sample period. Returns are value-weighted across touts (i.e., within investor) and equally-weighted across investors. Euro Return are the cumulative gains/losses over all tout investments. Investment is the average investment amount per tout (equally-weighted across touts and investors) and is calculated as the number of shares multiplied by the market price at the time of purchase. See notes of Table 3 for the other variable definitions.

# Touts invested	N	% Returns		Euro Return (EUR)		Investment (EUR)		Penny Share		Blue Chip Share	
		mean	p50	mean	p50	mean	p50	mean	p50	mean	p50
1	4,162	-0.33	-0.36	-1,355	-427	5,248	1,837	0.27	0.12	0.16	0.02
2	1,156	-0.28	-0.29	-2,343	-942	5,859	2,565	0.37	0.28	0.12	0.02
3	517	-0.24	-0.24	-5,164	-1,474	7,685	2,639	0.43	0.38	0.11	0.01
4	285	-0.24	-0.22	-4,813	-2,079	8,512	3,433	0.40	0.32	0.10	0.03
5	174	-0.26	-0.24	-7,559	-3,949	7,133	4,158	0.47	0.43	0.07	0.02
6	103	-0.26	-0.24	-7,446	-4,172	8,499	4,326	0.48	0.45	0.10	0.05
7 or more touts	172	-0.23	-0.18	-9,140	-4,717	10,148	4,119	0.49	0.48	0.09	0.03
Total	6,569	-0.31	-0.31	-2,442	-640	5,918	2,142	0.32	0.20	0.14	0.02



**Table 5: Regression Analysis of Tout Investor Returns**

This table reports results from a regression analysis of tout investor returns. In Column (1), we use investor and portfolio level variables as defined in Table 3. The dependent variable is the average percentage return of an investor in a specific tout. In Column (2), we add MultiToutInvestor, which is an investor-level indicator variable coded as '1' if an investor participates in at least four different touts during our sample period. Investor- and tout-fixed effects are included in Column (3). Days after tout is defined as the number of days between the investor's first trading date in the focal tout and the beginning of the tout campaign. We take the natural logarithm of this variable (plus 1). Number of Tout is a discrete variable that captures how many touts an investor has invested in until (and including) the focal tout. To determine this variable, touts are sorted within each investor based on the final closing date of each tout (we assume a maximum closing date of 120 days for 'inventory investments' or long 'round-trip investments'). In line with Table 4, the maximum value of this variable is set to 7. All t-statistics, included in parentheses, are based on standard errors double-clustered at the investor and month level. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	Mean Return (%)	Mean Return (%)	Mean Return (%)
MultiToutInvestor		0.065*** (3.43)	
Log(# Days After Tout)			-0.056*** (-4.35)
Number of Tout			-0.031*** (-4.45)
Male	-0.022 (-1.10)	-0.025 (-1.24)	
Married	-0.011 (-0.97)	-0.011 (-1.01)	
Age (at tout date)	-0.001 (-1.57)	-0.001** (-2.26)	
City	0.011 (0.81)	0.012 (0.95)	
Self-assigned Risk Class	-0.001 (-0.11)	-0.002 (-0.38)	
Log(Portfolio Wealth(t-1))	0.001 (0.17)	0.002 (0.43)	0.000 (0.11)
Penny Share (t-1)	0.117*** (4.17)	0.103*** (3.92)	0.006 (0.23)
Blue Chip Share (t-1)	0.016 (0.31)	0.027 (0.55)	-0.014 (-0.27)
Log(# Stocks (t-1))	-0.038*** (-4.00)	-0.043*** (-4.51)	0.003 (0.18)
Constant	-0.179*** (-4.21)	-0.174*** (-4.24)	
Fixed Effects	No	No	Investor & Tout
Adj. R2	0.012	0.015	0.394
No. Investors	6,094	6,094	2,354
No. Obs	11,466	11,466	7,942

**Table 6: Subsequent Pump-and-Dump Investments**

This table examines the investment behavior of tout investors in subsequent pump-and-dump schemes and its associations with the return of prior tous, portfolio and tout characteristics. To alleviate right censoring, we restrict the analysis to tous before 2013. The dependent variable in Column (1) and (2) is an indicator variable that takes the value of '1' if an investor invests into at least one subsequent tout later during our sample period (for the sorting procedure of the tous see notes of Table 5). In Column (1), we restrict the sample to the first tout of each investor. Decile Return (most recent tout) is a decile-ranked return of the tout with a higher rank indicating higher returns. All remaining variables are defined as in Table 3. In Column (2), we add a lagged decile-ranked return variable (i.e., decile-ranked return of the previous tout) and restrict the sample to the first four tout observations of each investor. In Column (3) to (4), we additionally restrict the sample to tout-investor observations that resulted into at least one subsequent tout investment of the investor during the sample period. In Column (3), the dependent variable is the natural logarithm of the number of days between the closing of the most recent tout and the investment into the subsequent tout (plus 1). The dependent variable in Column (4) is an indicator variable that is coded as '1' if the next tout investment has a longer duration than the most recent tout investment. Linear (probability) models are used in all tests. All t-statistics, included in parentheses, are based on standard errors double-clustered at the investor and month level. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
	Another Tout Investment	Another Tout Investment	Log(# Days Next Tout)	Increase Duration
Decile Return (Recent Tout)	0.025*** (9.56)	0.034*** (7.20)	-0.116*** (-3.77)	0.037*** (4.32)
Decile Return (Previous Tout)		0.005 (1.17)	-0.026* (-1.71)	0.005 (1.19)
Log(Portfolio Wealth(t-1))	-0.000 (-0.09)	-0.010* (-1.68)	0.025 (1.36)	0.007 (0.93)
Penny Share (t-1)	0.144*** (4.40)	0.053** (2.00)	-0.143 (-1.46)	-0.066* (-1.88)
Blue Chip Share (t-1)	-0.171*** (-6.00)	-0.140*** (-3.08)	-0.539** (-2.34)	-0.070 (-0.88)
Log(# Stocks (t-1))	0.048*** (7.49)	0.065*** (5.45)	0.119* (1.91)	-0.019 (-1.18)
Utilized Newsletter	0.067* (1.67)	0.010 (0.25)	0.523* (1.91)	-0.045 (-1.16)
Constant	0.023 (0.50)	0.178*** (3.09)	5.411*** (17.71)	0.226*** (2.93)
Sample	After 1st Tout	After 2-4 Tous	After 2-4 Tous	After 2-4 Tous
Adj. R2	0.065	0.053	0.118	0.047
No. Investors	6,303	1,992	881	881
No. Obs	6,303	3,250	1,498	1,498

**Table 7: Investor Types Trading in Touted Stocks**

This table classifies investors into five different investor types based on their trading behavior in *non-touted stocks* during the 180 days before each tout. Panel A provides the definitions and descriptions of these five different investor types. Panel A also shows the percentage of tout investors that fall into each investor type category at the point of investing in his or her first tout relative to the corresponding percentage for active control investors (see Table 3 for details on control investors). We iteratively assign investors into each investor type category in Panel A, resulting in mutually exclusive investor types. In Column (1), (2) and (3) of Panel B, we supplement prior analyses of Table 3, Table 5 and Table 6, respectively, by adding dummies for each investor type to the regressions. The dependent variable in Column (4) is an indicator variable that is coded as ‘1’ if the tout investment is less than 2.31% of the investor’s overall portfolio value (lowest quintile). In all columns, the omitted investor type category is “residual trader”. In line with Panel A, we use mutually exclusive investor type definitions. All t-statistics, included in parentheses, are based on standard errors double-clustered at the same level as in the underlying analyses (and by investor and month in Column 4). \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively.

**Panel A: Different Investor Types**

			<b>Tout-Investors</b> (N = 6,569)	<b>Control-Investors</b> (N = 21,384)	<b>p-value</b>
<b>I.</b>	<b>New Trader</b>	First-time use of brokerage account in the 180 days before the tout	6.6%	6.3%	0.47
<b>II.</b>	<b>Conservative Trader</b>	No trade or no penny trade in the 180 days before the tout	26.9%	57.9%	0.00
<b>III.</b>	<b>Penny Stock Day Trader</b>	At least one day-trade in a penny stock in the 180 days before the tout	10.9%	2.2%	0.00
<b>IV.</b>	<b>Short-term Trader</b>	Flipped at least one stock within a week in the 180 days before the tout	24.3%	10.6%	0.00
<b>V.</b>	<b>Residual Trader</b>	Not a member of the other four investor-type groups	31.3%	23.0%	0.00
			100.0%	100.0%	

**Panel B: Explanatory Power of Investor Types**

	(1)	(2)	(3)	(4)
	Tout Investor	Mean Return (%)	Another Tout Investment	Small Investment
New Trader	0.035 (1.58)	0.019 (0.53)	0.067** (2.29)	-0.059*** (-4.17)
Conservative Trader	-0.102*** (-6.18)	-0.032 (-1.43)	-0.092*** (-4.90)	0.022** (1.98)
Penny Stock Day Trader	0.300*** (13.34)	0.190*** (5.75)	0.134*** (5.33)	-0.036** (-2.45)
Other Short-term Trader	0.123*** (6.10)	0.086*** (3.46)	0.055*** (3.28)	-0.061*** (-6.16)
Decile Return (Recent Tout)			0.022*** (7.90)	
Constant	0.243*** (4.74)	-0.236*** (-4.27)	0.108*** (3.08)	-0.230*** (-6.28)
<i>Controls</i>				
Personal characteristics	Yes	Yes	No	Yes
Portfolio characteristics	Yes	Yes	Yes	Yes
Adj. R2	0.245	0.029	0.083	0.209
No. Investors	24,742	6,094	6,303	6,094
No. Obs	38,313	11,466	6,303	11,466

**Table 8: Subsequent Portfolio Investments after Tout Participation**

This table analyzes subsequent portfolio investments after tout participation. We restrict our sample to investors that purchased at least one stock during the 120 days before the pump period (as in Table 6, we focus on the first four touts of each investor). In Panel A, we partition the sample based on return quintiles. The dependent variable *Diff # TotalTrades* is the number of stock purchases in the 120 days after the pump period minus the number of stock purchases in the 120 days before the pump period (scaled by the total number of purchases). The dependent variable (*Diff # PennyTrades*) [*Diff # BlueChipTrades*] is the number of penny stock [blue chip] purchases in the 120 days after the pump period minus the number of penny stock [blue chip] purchases in the 120 days before the pump period (scaled by the total number of penny stock [blue chip] purchases). Panel B shows the trading behavior of tout investors in the immediate aftermath of a tout investment conditional on the success of the most recent tout (decile-ranked returns). All independent variables are defined as in Table 5, except that the portfolio composition is measured six months before the tout for some variables (due to the definitions of the dependent variables in Column 2 to 4). The dependent variable in Column (1) is an indicator variable coded as ‘1’ if an investor does not purchase any stock in the 120 days after the pump period of a tout. The remaining dependent variables are defined as in Panel A. Panel C focuses on longer-term changes in subsequent portfolio investments conditional on the investor’s tout return. The dependent variable in Column (1) is defined as the number of stock purchases in year 2 and year 3 after the tout minus the number of purchases in year 2 and 3 before the tout (scaled by the total number of purchases). We use the decile-ranked return in the most recent tout as the variable of interest. In Column (2) to (4), we focus on longer-term changes for investors that had a negative tout return. We use the dependent variables of Panel A as our main test variables. The dependent variable in Column (3) [(4)] is *DiffPennyShare* [*DiffBlueChipShare*], which is the difference between the penny share [blue chip share] three years after the tout and the penny share [blue chip share] six months before the tout. The remaining variables are defined as in Panel B. All t-statistics, included in parentheses, are based on standard errors double-clustered at the investor and month level. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively.

**Panel A: Investor Response by Return Quintile**

Return Quintile	count	(Mean Return)	Diff # TotalTrades		Diff # PennyTrades		Diff # BlueChipTrades	
			mean	p50	mean	p50	mean	p50
1	1,559	-88%	-0.37	-0.33	-0.33	-0.33	-0.10	0.00
2	1,638	-59%	-0.26	-0.25	-0.25	-0.20	-0.05	0.00
3	1,694	-28%	-0.19	-0.16	-0.17	-0.14	-0.02	0.00
4	1,734	-5%	-0.16	-0.12	-0.17	-0.11	-0.04	0.00
5	1,709	37%	-0.11	-0.05	-0.06	0.00	-0.07	0.00
Average	8,334	-27%	-0.22	-0.19	-0.19	-0.14	-0.06	0.00

**Panel B: Stock Trading Subsequent to Tout**

	(1)	(2)	(3)	(4)
	No Trades	Diff # TotalTrades	Diff # PennyTrades	Diff # BlueChipTrades
Return Deciles	-0.018*** (-11.03)	0.032*** (9.57)	0.032*** (6.20)	0.003 (0.71)
Log(Portfolio Wealth(t-6))	0.006** (2.54)	-0.002 (-0.80)	0.000 (0.03)	0.003 (0.72)
Penny Share (t-6)	-0.016 (-1.20)	-0.019 (-0.80)	-0.051** (-1.98)	0.044** (2.24)
Blue Chip Share (t-6)	0.069*** (3.20)	0.001 (0.03)	0.077* (1.95)	-0.122*** (-3.60)
Log(# Stocks)(t-6)	-0.064*** (-11.80)	0.047*** (6.34)	0.023** (2.13)	0.016 (1.62)
Utilized Newsletter	-0.025 (-1.52)	0.025 (0.60)	0.027 (0.48)	-0.003 (-0.12)
Constant	0.331*** (13.67)	-0.477*** (-14.07)	-0.427*** (-9.56)	-0.122*** (-3.70)
Adj. R2	0.048	0.040	0.027	0.004
No. Investors	5,460	5,460	5,460	5,460
No. Obs	8,324	8,324	8,324	8,324

**Panel C: Long-Term Portfolio Changes for Investors with Negative Returns**

	(1)	(2)	(3)	(4)
	DiffNumberPurchases	DiffNumberPurchases	DiffPennyShare	DiffBlueChipShare
Return Deciles	0.012*** (3.09)			
Diff # TotalTrades		0.174*** (6.61)	0.000 (0.02)	0.010 (1.16)
Diff # PennyTrades		0.026 (1.09)	0.018* (1.68)	0.002 (0.24)
Diff # BlueChipTrades		-0.015 (-1.05)	-0.026** (-2.05)	0.010* (1.94)
Log(Portfolio Wealth(t-6))	-0.021*** (-2.90)	-0.018** (-2.17)	-0.012*** (-7.02)	-0.005*** (-4.27)
Penny Share (t-6)	-0.183*** (-6.80)	-0.172*** (-5.70)	-0.667*** (-30.41)	-0.067*** (-7.32)
Blue Chip Share (t-6)	0.104*** (3.33)	0.105*** (2.80)	-0.170*** (-8.73)	-0.636*** (-22.50)
Log(# Stocks)(t-6)	-0.009 (-0.91)	-0.019 (-1.62)	0.031*** (5.17)	0.023*** (6.89)
Utilized Newsletter	-0.044 (-0.92)	-0.063 (-1.22)	-0.025 (-1.46)	-0.002 (-0.19)
Constant	0.209*** (2.40)	0.317*** (3.60)	0.289*** (14.80)	0.137*** (12.94)
Adj. R2	0.031	0.050	0.299	0.237
No. Investors	5,344	4,488	4,575	4,575
No. Obs	8,180	6,047	6,144	6,144

### Figure 1: Example for a Pump-and-Dump Campaign – BAR.bra Mining Group AG

This figure shows the price path of “BAR.bra Mining Group AG” (ISIN: CH0032823640). The red line corresponds to January 10, 2008 which is the first date for which we find a newsletter. At December 5, 2007, the stock was authorized for trading on the *Open Market* of the Frankfurt stock exchange, a less strictly regulated market segment. The price increased from €0.46 at its inception to €0.69 (January 10, 2008) and reached its maximum at January 15, 2008 (€0.87). Within less than three months, the stock lost most of its value (€0.04 at April 15, 2008) and is basically worthless ever since.

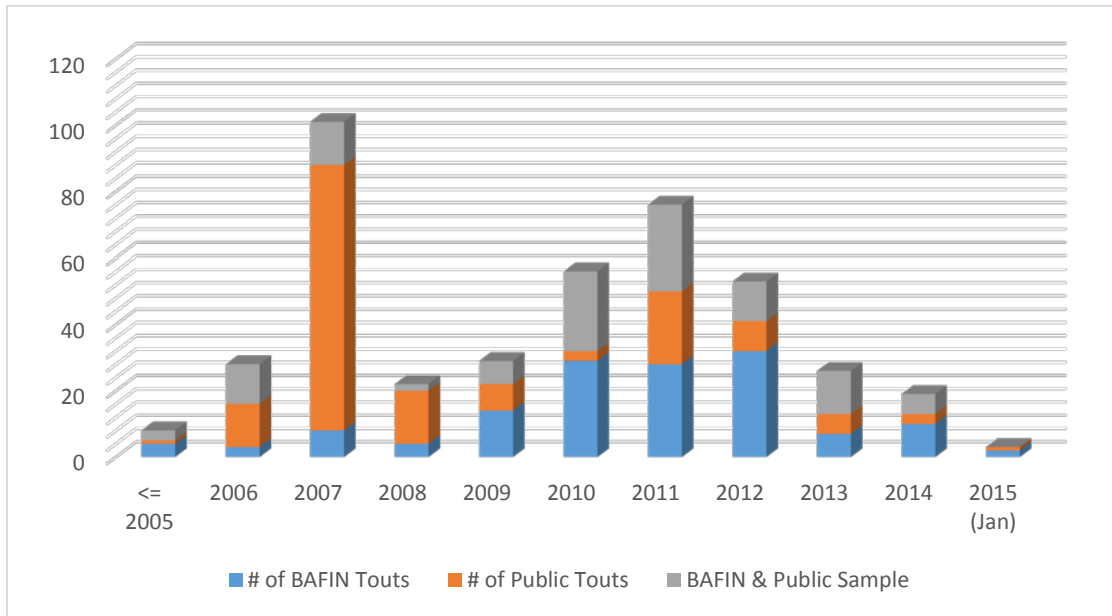




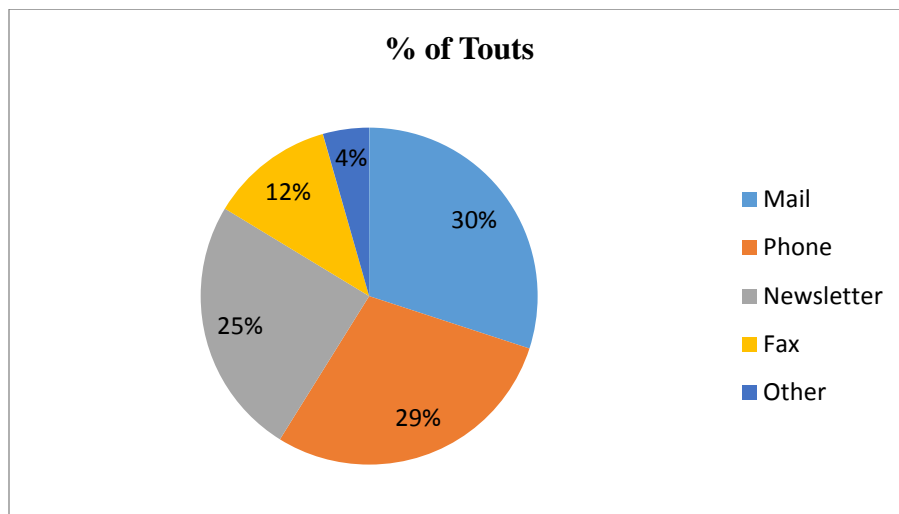
## Figure 2: Descriptive Statistics on the Pump-and-Dump Schemes

This figure provides descriptive statistics on the 421 touts in our sample. Panel A shows the frequency of touts as well as the source of the data by year. The sample period begins in 2002 and ends in January 2015. Panel B describes the distribution channel or tout medium. Panel C and Panel D show the country of the touted firm by its primary trading venue and the location of its headquarters, respectively, as described by Datastream. Panel E shows the industry of each tout at the time of the pump-and-dump as collected from Datastream.

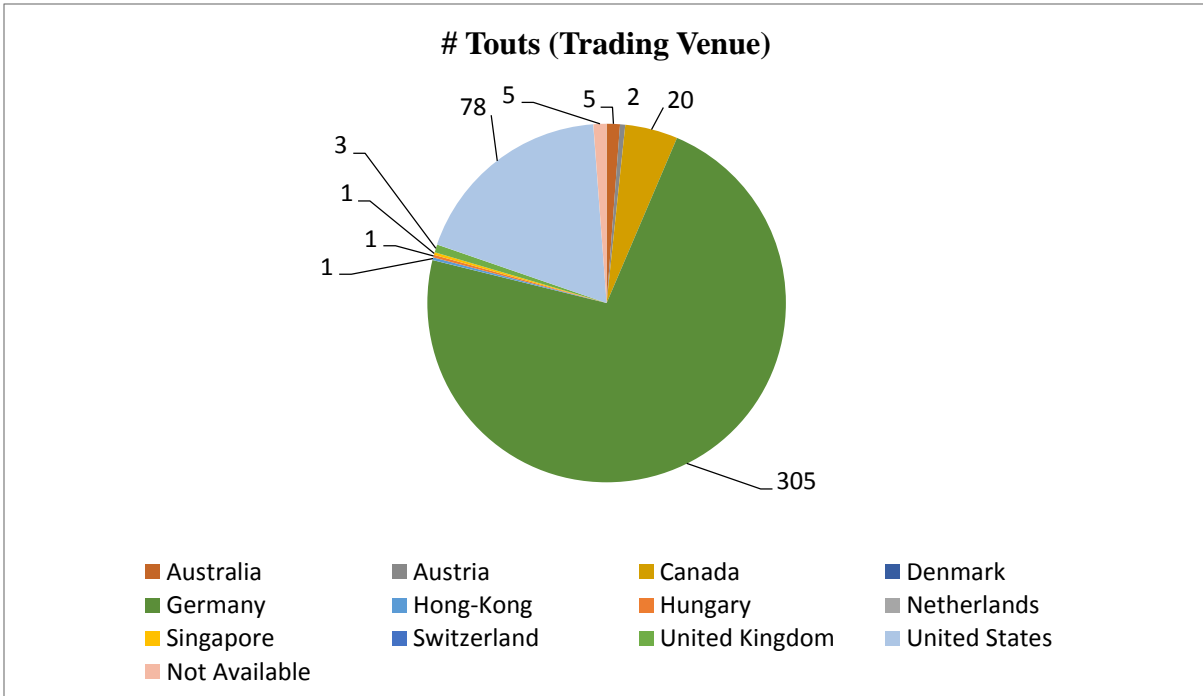
**Panel A: Frequency of Touts**



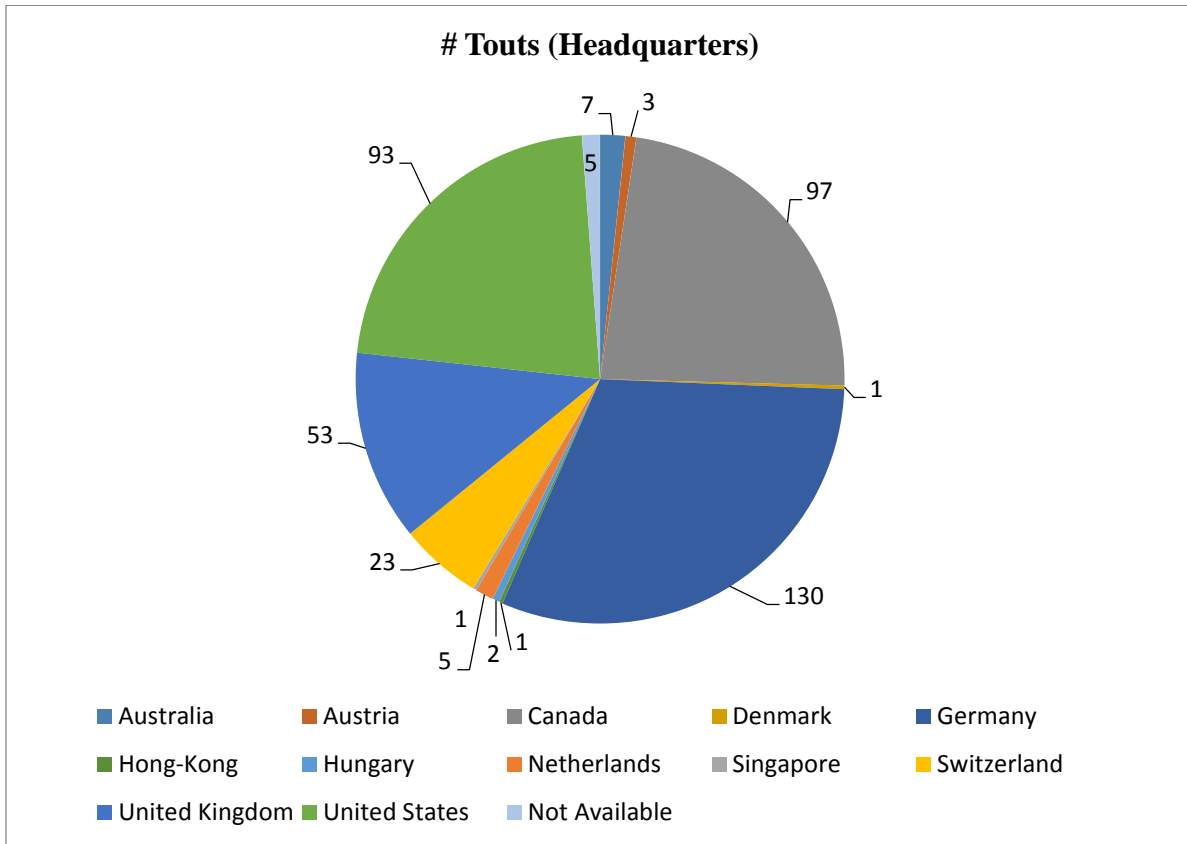
**Panel B: Distribution Channel of Touts**



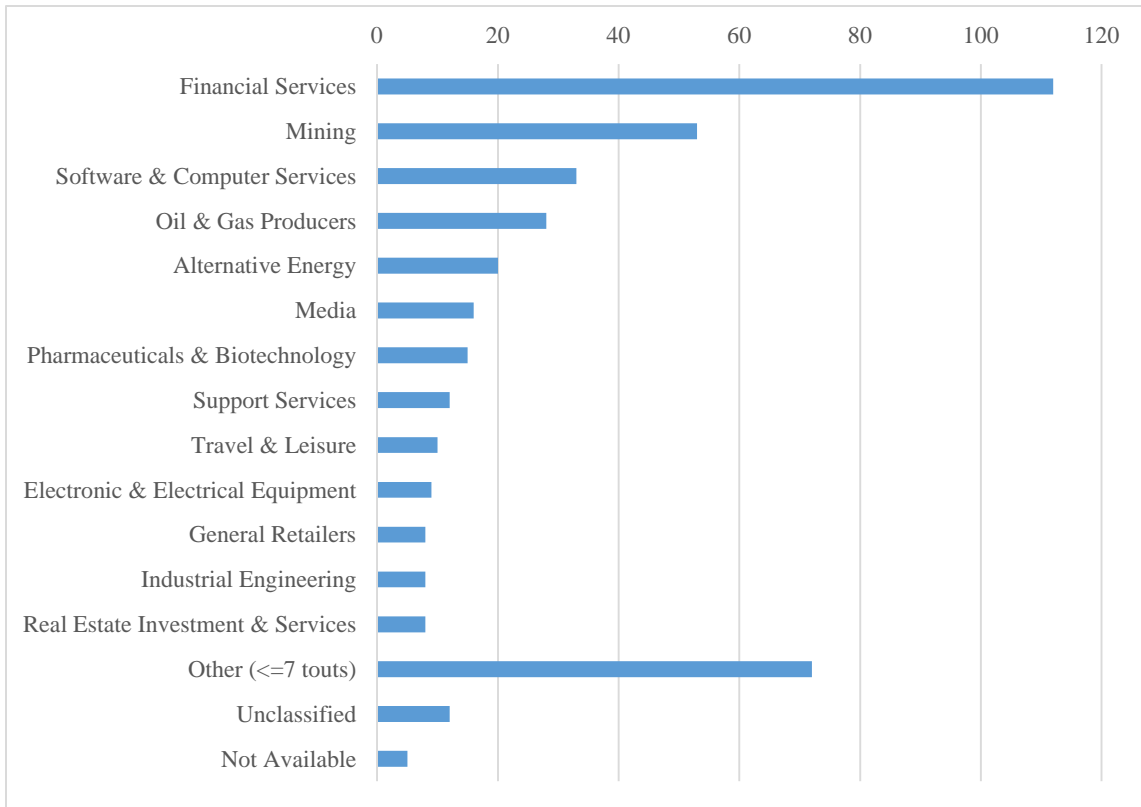
**Panel C: Country of Tout Trading Venue**



**Panel D: Tout Headquarter Locations**



**Panel E: Tout Industries**



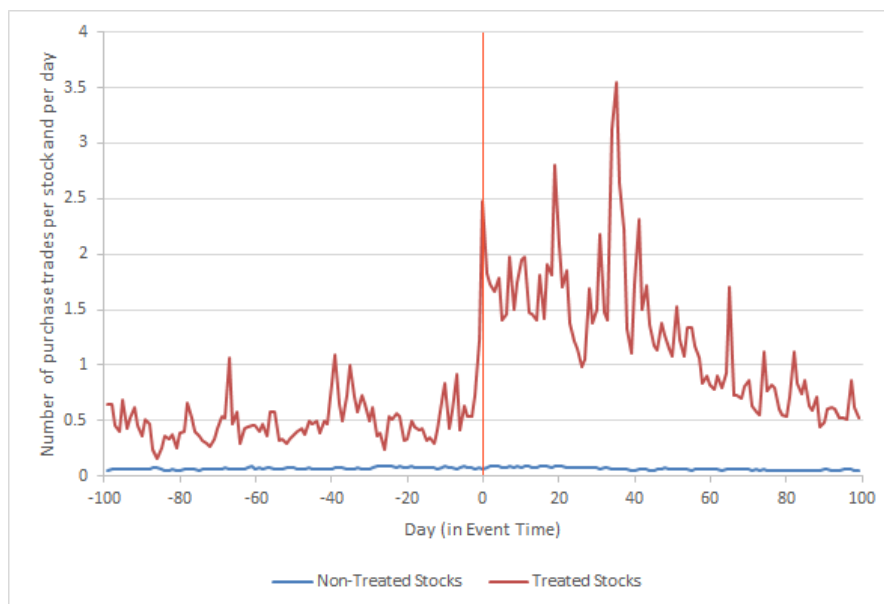
### Figure 3: Coarsened-Exact Matching of Touted Stocks with Non-Touted Stocks

This figure shows the price path and investor response for coarsened-exact matched touted stocks and non-touted control stocks. Stocks are matched based on (unadjusted) prices at five dates before the beginning of the tout using five different price strata. Panel A shows the price path of touted and non-touted stocks. Returns for both types of stocks are not significantly different before the tout date. See Internet Appendix. Panel B shows the within-sample average of the number of purchases per stock and per day. Panel C provides the within-sample average of the average value of the purchases per stock and per day.

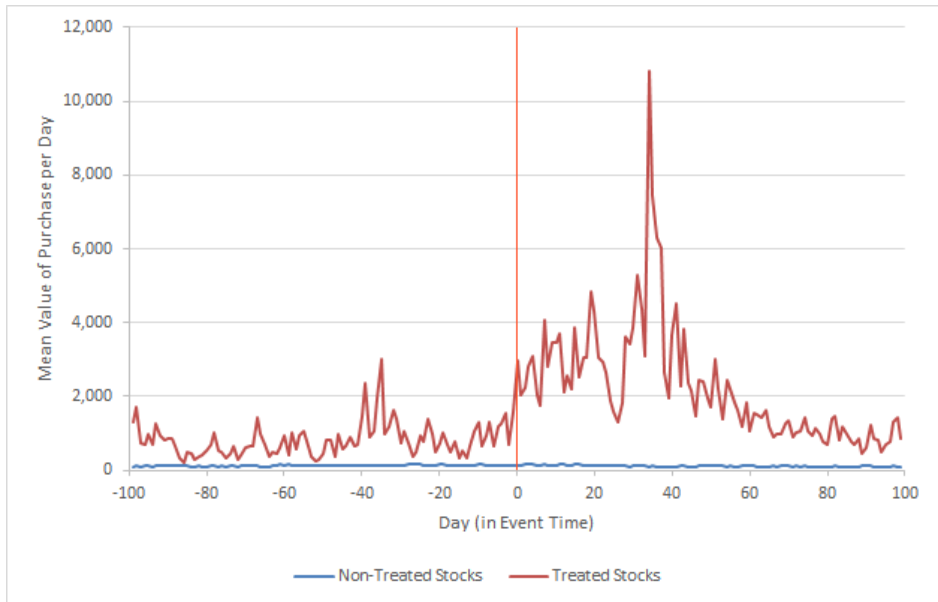
**Panel A: Price Path of Touted and Matched Stocks**



**Panel B: Average Number of Purchases for Touted and Matched Stocks**



**Panel C: Average Value of Purchases for Touted and Matched Stocks**



**Internet Appendix:**  
**Who Falls Prey to the Wolf of Wall Street?**  
**Investor Participation in Market Manipulation**

**October 2017**

**Appendix A: Hand-Collected Tout Cases**

*A.1 Data Collection Process*

This section describes our procedure to identify pump-and-dump campaigns beyond the subsample provided by BaFin. To identify a pool of suitable stock promotions, we conducted a Google-search using a variety of different German search terms that could identify tout promotions (such as “*Aktien-Spam*” [stock spam], “*Betrug E-Mail*” [fraud e-mail], “*ungefragte Aktienempfehlungen*” [unsolicited stock recommendation], “*Abzocke Aktien*” [stock scam], “*Insider-Tipp Aktie*” [stock insider tip]). We then manually went through the first 100 search results of each search term and identified three potentially valuable sources of information: (1) consumer protection webpages; (2) financial news websites and their message boards; (3) other webpages and blogs. The first source of information (1) comprises websites on which individuals complain about stock spamming incidents via unsolicited e-mail, fax, or telephone calls and which seem to be linked with consumer protection initiatives. Once we identified such a website, we went through their archives to identify relevant cases, i.e., pump-and-dump schemes. Overall, we were able to identify a total of 13 such consumer protection webpages. In one case (“*Verbraucherzentrale Nordrhein-Westfalen*”; consumer protection agency of the state North Rhine-Westphalia), we also contacted the administrators of the webpage and directly obtained their archive of all stock spam complaints. We included cases in the hand-collected subsample only if we also found the original tout message or a detailed description of the spam message.

The second source of information comprises websites containing financial information about firms and message boards for discussions between retail investors. We found 9 such webpages on which users discussed or complained about potentially illegal stock promotions. We only included cases in our hand-collected subsample if we could identify the content of the tout and were able to determine whether the tout was e-mailed or faxed to the receivers.<sup>1</sup> For all message boards, we also browsed the thread in which we found the original stock spam (via our Google search) and investigated the prior three nodes of the message board to identify any further cases.

Finally, we included tout cases that we found on various other websites and blogs via our Google search. This third source comprises 46 websites. Most of these websites explain the risk of trading based on dubious stock spam and provide examples as illustrations. Beyond the original tout case that we found via our Google search, we also browsed these websites to identify further tout cases. However, there were few webpages of this type that yielded more than one case.

The hand-collected data sample underlying this study comprises 280 unique stock spam messages, in which 270 distinct target stocks were promoted for a German audience from December 2002 to January 2015. We use the date on which the e-mail was allegedly sent to determine the beginning of the pump-and-dump campaign. If this date is not available, we use the date on which the stock spam complaint or the promotional message was posted on the respective webpage or message board. We classify all stocks which were mentioned in a

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<sup>1</sup> While we make a distinction between newsletters and e-mail spam in our analyses, it is rather difficult to neatly differentiate between these two types of tout campaigns in our hand collection, in particular when we have to rely on indirect information to determine the medium of the tout. For example, spam e-mails are often designed as legitimate investment newsletters and it is hard to determine whether the newsletter was originally sent to subscribers only. Additionally, newsletters are sometimes reposted on message boards or subsequently sent as spam e-mails to reach a bigger audience beyond the original subscribers of the newsletter. These issues do not arise in the BaFin sample as they provide a classification.

promotional message as touted stocks and do not require that the touted stocks are penny stocks or on traded on specific venues.

Since we were using German search terms for our Google search, the resulting source websites mostly had their domain in Germany. However, the tout messages themselves were sometimes in English. We include these English stock spams if the tout message was discussed on German-domain websites as the campaign presumably also targeted German-speaking investors.

To illustrate our methodology, we provide four examples for tout cases that we identified using this strategy. These examples illustrate German (A2 and A4) and US stocks (A3 and A5) with a German (A2, A3 and A4) or English tout message (A5), respectively.



## A.2 Example Amatech AG

Company:	Amatech AG
Date of first message:	March 2, 2007
Further occurrences:	March 4, 2007; March 5, 2007; March 18, 2007
Sources:	<ul style="list-style-type: none"><li>• <a href="http://de.admin.net-abuse.mail.narkive.com/I4UVTlbg/joe-job-gegen-uceprotect">http://de.admin.net-abuse.mail.narkive.com/I4UVTlbg/joe-job-gegen-uceprotect</a></li><li>• <a href="http://www.tradingideas.de/2007/03/18/amatech-txade-wkn-519280/">http://www.tradingideas.de/2007/03/18/amatech-txade-wkn-519280/</a></li><li>• <a href="http://www.achtung-aktie.de/index.htm?grundwissen.htm">http://www.achtung-aktie.de/index.htm?grundwissen.htm</a></li></ul>
ISIN:	DE0005192801 (not in original tout message)
Type:	E-mail
Tout Message:	<p><i>Die sensationelle 1000% Chance - jetzt einsteigen und richtig Geld verdienen</i></p> <p><i>Sehr geehrte Damen und Herren,</i></p> <p><i>hiermit machen wir Sie auf die aktuelle Kursrakete AMATECH AG aufmerksam und empfehlen unbedingt eine Aufnahme in Ihr Depot: Der DAX sinkt, Amatech steigt</i></p> <p><i>AMATECH Aktiengesellschaft</i> <i>Rosbergweg 2</i> <i>87459 Pfronten</i> <i>WKN 519280</i></p> <p><i>Tageskurs: 20 Cent</i> <i>7-Tage-Ziel: 70 Cent</i> <i>Monatsziel: 1,20 Euro</i> <i>Bewertung: Strong Buy</i></p> <p><i>Laut unserer Chartanalyse hat die Aktie enormes Potential. Jetzt einsteigen und keine Zeit verlieren.</i></p> <p><i>Hochachtungsvoll</i> <i>[NAME]</i></p>

### A.3 Example HUMET-PBC NA

Company:	HUMET-PBC NA
Date of first message:	March 31, 2007
Further occurrences:	April 1, 2007 to April 5,2007; April 6, 2007; April 8, 2007; April 10, 2007
Sources:	<ul style="list-style-type: none"><li>• <a href="http://www.cbr1000rr.de/fireblade_forum/index.php?page=Thread&amp;threadID=43595">http://www.cbr1000rr.de/fireblade_forum/index.php?page=Thread&amp;threadID=43595</a></li><li>• <a href="http://www.antispam-ev.de/forum/archive/index.php/t-14878.html">http://www.antispam-ev.de/forum/archive/index.php/t-14878.html</a></li><li>• <a href="http://www.tradingideas.de/2007/03/31/humet-pbc-19z-wkn-a0jdw0/">http://www.tradingideas.de/2007/03/31/humet-pbc-19z-wkn-a0jdw0/</a></li></ul>
ISIN:	US4454081070
Type:	E-mail
Tout Message:	<p><i>KAUF-TIPP DER WOCHE DIENSTAG 3 APRIL! DIE RALLYE IST GESTARTET!</i></p> <p><i>Firma: HUMET-PBC NA (L9Z.F) 4-Tag Prognose: 0.50-0.90 Letzter Preis: 0.06 (+62%) Kürzel : L9Z</i></p> <p><i>WKN: A0MMPH ISIN: US4454081070 Börsen: Frankfurt</i></p> <p><i>KAUFEN! L9Z ESGESCHAFT FIN UNTER PARI! 800%+ GEWINNE WERDEN AN 4 TAGEN!</i></p> <hr/> <p><i>ANLEGER UHR ***L9Z.F*** DIE RALLYE IST GESTARTET! UHR AN DIENSTAG MONTAG 2 APRIL!</i></p> <p><i>Firma: HUMET-PBC NA (L9Z.F) 5-Tag Prognose: 0.25-0.90 Letzter Preis: 0.04 Kürzel : L9Z</i></p> <p><i>WKN: A0MMPH ISIN: US4454081070 Börsen: Frankfurt KAUFEN KAUFEN KAUFEN! L9Z ESGESCHAFT FIN UNTER PARI! 600% Gewinne werden an 5 Tagen!! ÜBERRASCHEN!</i></p>

#### A.4 Example Kabel New Media AG

Company:	Kabel New Media AG
Date of first message:	March 14, 2007
Further occurrences:	March 16, 2007 and March 21, 2007
Sources:	<ul style="list-style-type: none"><li>• <a href="http://www.dc-campus.net/showthread.php?t=2402">http://www.dc-campus.net/showthread.php?t=2402</a></li><li>• <a href="http://www.virenguard.de/blog/der-aktien-spam-geht-weiter/">http://www.virenguard.de/blog/der-aktien-spam-geht-weiter/</a></li><li>• <a href="http://www.tradingideas.de/2007/03/21/kabel-new-media-knw-wkn-622950/">http://www.tradingideas.de/2007/03/21/kabel-new-media-knw-wkn-622950/</a></li></ul>
ISIN:	DE0006229503
Type:	E-mail
Tout Message:	<p><i>Die aktuelle Kursrakete: Kabel New Media AG</i></p> <p><i>Sensationeller Kursanstieg erwartet!</i></p> <p><i>Sehr geehrte Damen und Herren,</i></p> <p><i>folgende Aktien sollten Sie sich in Ihre Depot legen:</i></p> <p><i>Kabel New Media AG</i> <i>Kurs: 5,9 Cent</i> <i>7-Tage-Ziel: 22 Cent</i> <i>8-Wochen-Ziel: 2,10 Euro</i> <i>WKN: 622950</i> <i>ISIN: DE0006229503</i> <i>Bewertung: Kaufen</i></p> <p><i>Das geballte Wissen unseres Chartexperten-Teams ist Ihr Nutzen!</i></p> <p><i>Herzlichst, Ihr</i></p> <p><i>[NAME]</i> <i>Redakteur</i></p>

### A.5 Example EQUIPMENT & SYS ENGR

Company:	EQUIPMENT & SYS ENGR
Date of first message:	December 1, 2006
Further occurrences:	none
Sources:	<ul style="list-style-type: none"> <li>• <a href="https://www.antispam-ev.de/forum/showthread.php?13581-Stock-Spammer-drehen-durch-APWL-Advanced-Powerline-Technologies&amp;highlight=pennystocks/">https://www.antispam-ev.de/forum/showthread.php?13581-Stock-Spammer-drehen-durch-APWL-Advanced-Powerline-Technologies&amp;highlight=pennystocks/</a></li> </ul>
ISIN:	US29445M1036 (not in original tout message)
Type:	E-mail
Tout Message:	<p><i>Alert! Watch this one Rise!</i></p> <p><i>Equipment &amp; Systems Engineering, Inc. (EQSE)</i></p> <p><i>Sector: Environmental Engineering</i>  <i>Rating: VERY Bullish</i>  <i>Current Price: \$0.062</i>  <i>Projected: \$0.20</i></p> <p><i>This is THE pick for the fourth quarter. Environmental stocks are getting incredible exposure and taking off as governments and companies realize they need to start investing NOW. EQSE is involved in high tech solutions for both the problems we face today and those of the future.</i></p> <p><i>Search your favorite financial information site and become a believer. This is HOT!</i></p> <p><i>An earth-shattering release is expected out of the company any day. With all of EQSE's governmental contacts we are expecting a major contract announcement. This issue is VERY tightly held and the release is going to push it up rapidly. Don't delay. It's not going to stop till we see 20 cents!</i></p>

## **Appendix B: Matching Tout Stocks to Control Stocks based on Price Path**

To support that the investor response in our sample is due to the tout itself, we match our touted stocks to a control group of stocks with a similar price path using coarsened exact matching (CEM). Specifically, we aim to obtain a set of lottery-like control firms that exhibit a similar price path until the beginning of the tout, but which were not subject to a pump-and-dump campaign. Our matching procedure is as follows. First, we identify the country of origin for each touted stock by relying on the first two digits of its ISIN. We then retain the universe of all non-touted stocks with the same first two digits of the ISIN and that are active in the -180 to 180-day window around the touted stock's event date. Second, we match touted and control stocks based on *prices* at five different dates before the event date, i.e., at  $t = -180$ ,  $t = -45$ ,  $t = -18$ ,  $t = -1$  and  $t = 0$  relative to the event date, using five different price strata at each of the matching dates  $[0, 0.1]$ ;  $[0.1, 1]$ ;  $[1, 5]$ ;  $[5, 10]$  and  $[10, \infty]$  €. That is, we match each touted stock in calendar time to a stock in the same country (with a similar price at the five different dates) with the aim of holding the market environment constant. Furthermore, we rather match on prices (instead of returns) at different pre-event event dates to ensure that both tout and control stocks have not only similar returns but also similar price levels. Matching on returns only would potentially yield a very different set of control firms, e.g., match a penny stock trading for a few cents to a control stock with a more conventional share price of €20. Third, after the matching procedure, we collect all ISINs and the corresponding pseudo-event dates of the matched control firms and analyze the investor response within our brokerage sample.

Overall, we are able to match 257 out of 421 tout cases.<sup>2</sup> Table B1 provides statistics on returns for touted and matched control stocks. Over the [-100,0] pre-event period, touted and matched control stock returns do not exhibit significant differences in daily returns. After the beginning of the pump period, touted stocks eventually have significantly lower returns, which is expected given the nature of the pump-and-dump scheme. This price pattern corresponds to Panel A of Figure 3 in the main text.

**Table B1: Returns for Touted and Matched Control Stocks**

This table shows average daily stock returns of touted stocks and a set of matched control stocks (for a description of our matching procedure see above) over the [-100, 100] period in event time. The last column contains p-values from t-tests comparing the daily average returns over the respective subperiods (two-sided tests). We match “on the way up” (i.e., we match prices before the event date) and, hence, these two types of stocks should show no significant differences in returns over the [-100, -50] and [-50, 0] subperiods.

Period in Event Time	Touted Stock Returns	Matched Stock Returns	p-value
$t \in [-100, -50]$	0.30%	0.46%	0.504
$t \in [-50, 0]$	0.29%	0.08%	0.181
$t \in [0, 50]$	-0.33%	0.06%	0.072
$t \in [50, 100]$	-0.40%	-0.02%	0.001

<sup>2</sup> While our sample contains 421 touts, we have the relevant Datastream data for 383 cases only (i.e., we can match 257 out of 383 cases, or 67%). Our inability to match some tout stocks reflects our stringent matching requirements, looking for tout stocks in the same country and calendar time period with a similar price path and return. We view the investor response test more as a “proof of concept” and hence prefer to have reasonably tightly matched stocks, rather than a larger sample.

## Appendix C: Additional Tests and Tables

**Table C1: Potential Overlap Between Different Investor Types**

This table provides details on the overlap between all investor types if we did not assign tout investors iteratively to each category (related to Panel A of Table 7). Without iterative assignment, investor type III is a perfect subgroup of investor type IV and, hence, we group investor types III and IV into one category (“Frequent Trader”) to provide meaningful comparisons.

	N	Exclusively belonging to the respective investor type		Number of investors within each category who (also) belong to the following investor type:			
		N	%	I.	II.	III. + IV.	V.
				New Trader	Conservative Trader	Frequent Trader	Residual Trader
<b>I. New Trader</b>	430	112	26%	430			
<b>II. Conservative Trader</b>	1,973	1,636	83%	203	1,973		
<b>III. + IV. Frequent Trader</b>	2,572	2,311	90%	127	146	2,572	
<b>III. Penny Stock Day Trader</b>	[750]	[716]	[95%]	[34]	[0]	[750]	
<b>IV. Short-term Trader</b>	[2,572]	[2,311]	[90%]	[127]	[146]	[2,572]	
<b>V. Residual Trader</b>	2,058	2,058	100%	0	0	0	1,420
Number of types per investor	1.07						