

**Internet Appendix:**  
**Who Falls Prey to the Wolf of Wall Street?**  
**Investor Participation in Market Manipulation**  
**November 2024**

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**Appendix A: Hand-Collected Pump-and-Dump Schemes**

*A.1 Search Process*

This section describes our procedure to identify pump-and-dump schemes beyond those provided by BaFin. The goal is to identify additional pump-and-dump schemes that have targeted German investors, but were not investigated by BaFin. Towards this end, 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 information sources: (1) consumer protection webpages; (2) financial news websites and their message boards; (3) other webpages and blogs. The first source (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 pump-and-dump schemes. In total, we identified 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 stock spam message.

The second information source comprises websites containing financial information about stocks 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 included cases in our hand-collected subsample if we could identify the approximate 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 browsed the thread, in which we found the original stock promotion (via our Google search) and investigated the prior three nodes of the message board to identify any further cases. In this process, we also researched further potential tout cases that were mentioned in message boards or by the media during the discussion of other pump-and-dump campaigns.

Third, 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. We also browsed

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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 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 us with a classification based on their tout investigation.

these websites to identify further tout cases. However, few webpages of this type yielded more than the one case that came up in the original Google search that brought us to this site.

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 investors. To further round out our sample construction, we searched for U.S. stock promotions and touts on U.S. websites, finding the most comprehensive list on *OTC Today*. Although most of these U.S. pump-and-dump schemes did not target German investors, some of these touts were indeed “recycled” for German investors. To identify these schemes, we identified a pool of candidate schemes with German participation and then used the same sources and applied the same search criteria as described for the German touts (i.e., tout messages or complaints by investors or on German websites or message boards for these touts).<sup>2</sup> Through this process, we were able to identify 17 additional cases.

In total, our process yields a hand-collected sample of 320 unique stock spam messages, in which 311 distinct stocks were promoted to a German audience between December 2002 and January 2015. We use the date on which the e-mail was allegedly sent or the phone call placed 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

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<sup>2</sup> Specifically, we created a candidate pool of ‘salient’ U.S. touts that were potentially recycled or promoted in Germany by identifying the numbers of investors who traded the respective stock in our German brokerage sample. About 70% of the cases from our candidate pool of US touts stem from *OTC Today*. The remaining cases are assembled from nine different sources with Pink Sheet’s Caveat Emptor label (16%) and Spamnation (6%) being the most relevant ones. We require that at least 10 sample investors traded the promoted stock in a 60-day window around the alleged U.S. promotion date for the tout to enter the candidate pool. For these more salient U.S. touts, we then applied the same search criteria as for the German stock promotions. This two-step procedure eliminates ‘false positives’ (i.e., U.S. stocks that were not promoted in Germany) and keeps the hand-collection process manageable. That is, we examined 34 candidate cases instead of several thousand U.S. stock promotions, most of which would not be relevant. However, this process uses participation by at least a few German investors as a criterion to identify candidates. We obtain very similar results if we drop the resulting 17 cases that satisfy our sample criteria. We also re-run our analyses using only touts from the BaFin sample and find consistent results throughout.

webpage or message board. We classify all stocks mentioned in a promotional message as touted stocks and do not require that the touted stocks are penny stocks or traded on specific venues.

To better illustrate our search process, we provide four examples of tout cases that we identified using this strategy. These examples illustrate German (A2 and A4) and U.S. stocks (A3 and A5) with German (A2, A3 and A4) and English tout messages (A5), respectively. Furthermore, we compare the BaFin sample with the hand-collected sample in terms of investor participation and performance in Appendix B.

## 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><br/><i>Rosbergweg 2</i><br/><i>87459 Pfronten</i><br/><i>WKN 519280</i></p> <p><i>Tageskurs: 20 Cent</i><br/><i>7-Tage-Ziel: 70 Cent</i><br/><i>Monatsziel: 1,20 Euro</i><br/><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><br/><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-l9z-wkn-a0jdw0/">http://www.tradingideas.de/2007/03/31/humet-pbc-l9z-wkn-a0jdw0/</a></li> </ul>   |
| ISIN:                  | US4454081070  |
| Type:                  | E-mail  |
| Tout Message:          | <p><i>KAUF-TIPP DER WOCHE<br/>DIENSTAG 3 APRIL!<br/>DIE RALLYE IST GESTARTET!</i></p> <p><i>Firma: HUMET-PBC NA (L9Z.F)<br/>4-Tag Prognose: 0.50-0.90<br/>Letzter Preis: 0.06 (+62%)<br/>Kürzel : L9Z</i></p> <p><i>WKN: A0MMPH<br/>ISIN: US4454081070<br/>Börsen: Frankfurt</i></p> <p><i>KAUFEN! L9Z ESGESCHAFT FIN UNTER PARI!<br/>800%+ GEWINNE WERDEN AN 4 TAGEN!</i></p> <hr/> <p><i>ANLEGER UHR ***L9Z.F***<br/>DIE RALLYE IST GESTARTET!<br/>UHR AN DIENSTAG MONTAG 2 APRIL!</i></p> <p><i>Firma: HUMET-PBC NA (L9Z.F)<br/>5-Tag Prognose: 0.25-0.90<br/>Letzter Preis: 0.04<br/>Kürzel : L9Z</i></p> <p><i>WKN: A0MMPH<br/>ISIN: US4454081070<br/>Börsen: Frankfurt<br/>KAUFEN KAUFEN KAUFEN!<br/>L9Z ESGESCHAFT FIN UNTER PARI!<br/>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><br/><i>Kurs: 5,9 Cent</i><br/><i>7-Tage-Ziel: 22 Cent</i><br/><i>8-Wochen-Ziel: 2,10 Euro</i><br/><i>WKN: 622950</i><br/><i>ISIN: DE0006229503</i><br/><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><br/><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-drehendurch-APWL-Advanced-Powerline-Technologies&amp;highlight=pennystocks/">https://www.antispam-ev.de/forum/showthread.php?13581-Stock-Spammer-drehendurch-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><br/> <i>Rating: VERY Bullish</i><br/> <i>Current Price: \$0.062</i><br/> <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: Additional Descriptive Information about the Sample**

### *B.1 Pump-and-Dump Schemes*

This section provides more detailed information on the pump and dump campaigns in our sample. Panel A of Figure B1 shows that promoters disseminate tout campaigns via a variety of different communications. E-mail and newsletter, which provide stock recommendations to subscribers, are among the two most common means of distribution. They are used by 37% and 32% of all campaigns, respectively. About 31% of campaigns rely on the telephone as their communication channel. The relatively high percentage of phone campaigns is notable considering the higher costs and lower reach of such campaigns. About a fifth of all campaigns, or 18%, 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. For the subset of touts for which we possess the tout messages (254 of 470 touts), we evaluate the sophistication of these messages (based on specificity and content) using a 4-point scale (as shown in Figure B1). The majority of these messages are of relatively low quality.

We are able to find data on the industry, location of the tout venue, and the company's official headquarters for 468 out of 470 touts. As shown in Panel C of Figure B1, touted stocks are traded on venues in 9 different countries, with venues from Germany and the U.S. dominating the sample (70% and 21%, respectively). The official or alleged location of tout firms' headquarters is more diverse, comprising 12 countries. Although Germany (30%) and the United States (25%) are again the most frequent locations (Figure B1, Panel C).

We also find that touted firms are purported to be operating in a diverse set of industries (Figure B1, Panel D). Tout stocks are most commonly in Financial Services (26%), 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.

For 397 out of 470 pump-and-dump schemes, we are able to obtain full market data from Datastream over the 60-day period preceding the tout campaign. We report information on this data in Panel A of Table B1. Touted stocks have an average (median) stock price of €3.06 (€0.69) and an average (median) market capitalization of €67 million (€11.10 million). Thus, tout stocks are typically penny stocks or small cap firms. Additionally, more than half of the stocks exhibit positive returns immediately prior to the start of the tout campaign. This phenomenon likely occurs because perpetrators frequently engage in wash trades among themselves before the tout, creating an illusion of market liquidity and signaling positive price momentum.

In Panel B, we extend our analysis to the aftermath of the tout campaigns, examining the same 397 stocks 60 days after the beginning of the tout. The average (median) stock price halves to €1.55 (€0.4). Concurrently, the average market capitalization suffers a sharp reduction, dropping to €47.36 million (median €7.62 million) from pre-tout levels. This decline translates into average (median) market cap losses of €22.36 million (€3.48 million). Aggregating these figures, the 397 pump-and-dump schemes are associated with a cumulative market capitalization loss of approximately €8.88 billion. Although this quantification underscores the potential financial repercussions of such schemes, it is subject to several caveats. For example, stock prices in the pre-period might be substantially inflated due to wash trades and concentrated trading among perpetrators, suggesting that the pre-tout valuations may not accurately reflect the stocks' true market values. Moreover, a significant portion of the shares outstanding are often held by the perpetrators themselves and, as such, the apparent losses in market capitalization partly reflect value tied to fictitious transactions rather than genuine market losses. If so, this calculated aggregated loss likely overestimates the genuine financial impact on investors. Our calculations in

Section 4.3 based on actual trading volume does not suffer from the same issue to the same extent.<sup>3</sup>

### *B.2 Comparison between BaFin-Provided and Hand-Collected Schemes*

In this section, we undertake a descriptive comparison between the combined (or full) sample and the subsample comprising only schemes that BaFin identified and provided to us. First, we analyze participation statistics across both sample sets. In Panel A of Table B2, we duplicate the data presented in Panel A of Table 1 to facilitate a direct comparison with the subset derived from the 263 schemes identified by BaFin. Although the schemes flagged by BaFin have a slightly lower average number of investors per traded tout than the overall sample (73.7 versus 77.72), the overall distribution across both samples is quite comparable. Applying a t-test to gauge the disparity in investor participation, we find that the difference is not statistically significant at conventional thresholds (also consistent with Column 2 of Table 1).

Second, we turn our focus to the key performance indicators of investors in both groups of touts. In this regard, Panel B of Table B3 replicates the data from Panel A of Table 2, enabling a comparison with the BaFin-only statistics. Here too, the descriptive statistics of the BaFin-only sample are largely aligned. Average returns are somewhat more positive in the BaFin sample, but investors tend to invest more money in these touts. Thus, in total, investors have higher average losses in BaFin-sample touts relative to the combined sample (-€859 versus -€770). A similar pattern emerges for trades aggregated at the tout level in Panel C of Table B3.

Taken together, the analysis suggests that the BaFin-provided and the hand-collected schemes are quite similar in terms of participation and investor performance. This comparison validates the decision to combine both samples in the main analysis.

### *B.3 Investor Sample*

This section provides additional descriptive statistics on investors in our sample. We obtain

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<sup>3</sup> Another difference is that our estimates in Section 4.3 focuses on losses suffered by German investors. On the other hand, market cap losses in touted stocks accrue to investors globally.

individual investor 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. In Figure B2, we compare these 113,000 sample investors to investors from other studies (Barber and Odean 2001; Dorn and Huberman 2005; Calvet et al. 2007). We find that our sample is largely comparable to others in terms of personal, portfolio and trading characteristics. This comparison also confirms that our sample contains typical online brokerage clients.

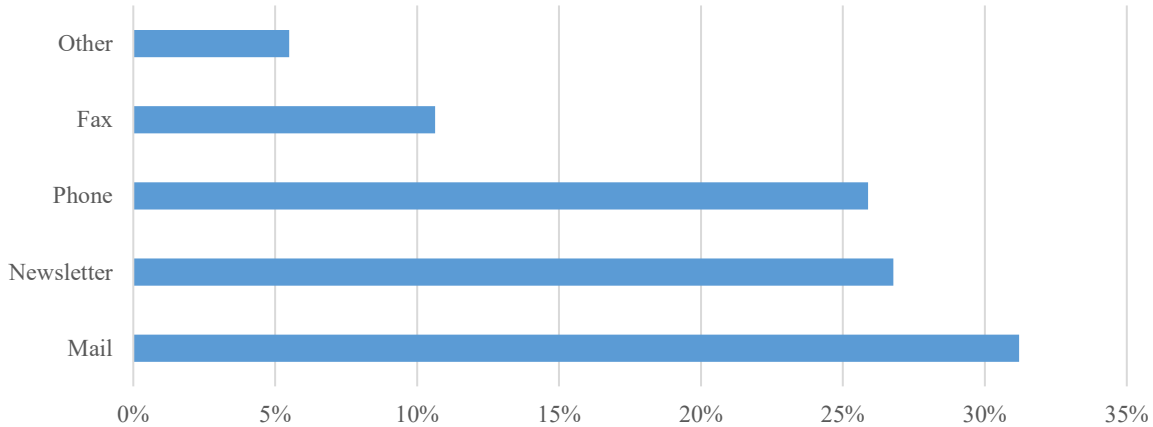
For our analyses, we focus on tout investors and (matched) active control investors. Since these investors traded at least one stock during the 60-day pump period, they are naturally more active relative to all customers from our online bank. Panel A of Table B3 indicates that the 'typical tout investor' is a 46-year-old male living in the suburbs that is married and has a high self-assessed risk tolerance for his investments. The average tout investor has approximately €68,600 in their account, most of which is invested in equities. In fact, a large fraction of their entire portfolio (28%) is comprised of penny stocks (defined as having a price below €5), which often have lottery-like return characteristics (Kumar 2009). Interestingly, we find that control investors exhibit somewhat similar personal characteristics (i.e., age, gender, married), but that their portfolios are significantly different. Specifically, non-tout investors trade less frequently than tout investors and hold a smaller (larger) fraction of their portfolio in penny (blue-chip) stocks. This descriptive evidence suggests that portfolios and trading behavior reveal more than personal characteristics.

In Panel B of Table B3, we directly compare single tout investors with Multi-Tout Investors. Generally, Multi-Tout Investors appear to be an even more extreme version of a single tout investor. Specifically, the penny share of their portfolio is higher (37.28% versus 22.99%) and they trade more frequently (81.49 versus 47.81 purchases over the last year). Nevertheless, although their returns are more volatile, they seem to have superior returns on average.

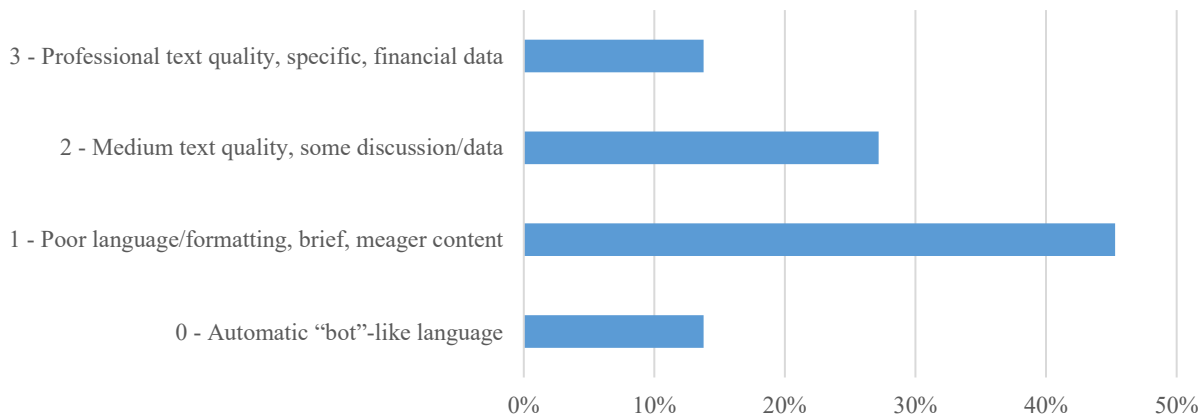
**Figure B1: Descriptive Statistics for the Pump-and-Dump Schemes**

This figure provides descriptive statistics for the 470 touts in our sample. Panel A describes the distribution channel or tout medium. The total sum is larger than 100% (120%) since a single tout can have more than one distribution channel. Panel B shows the sophistication of the tout message for a subset of the touts. 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.

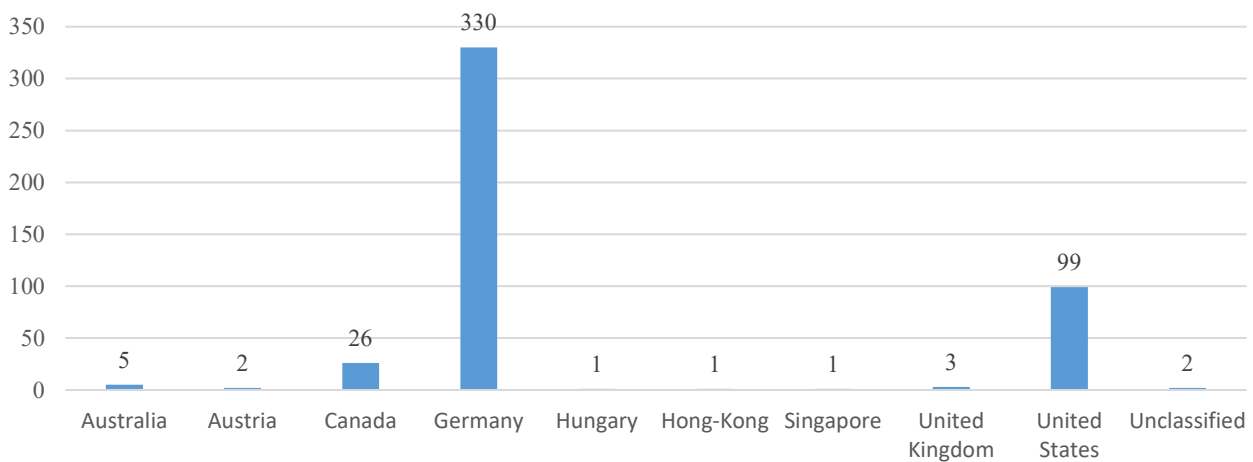
*Panel A: Distribution Channel of Touts*



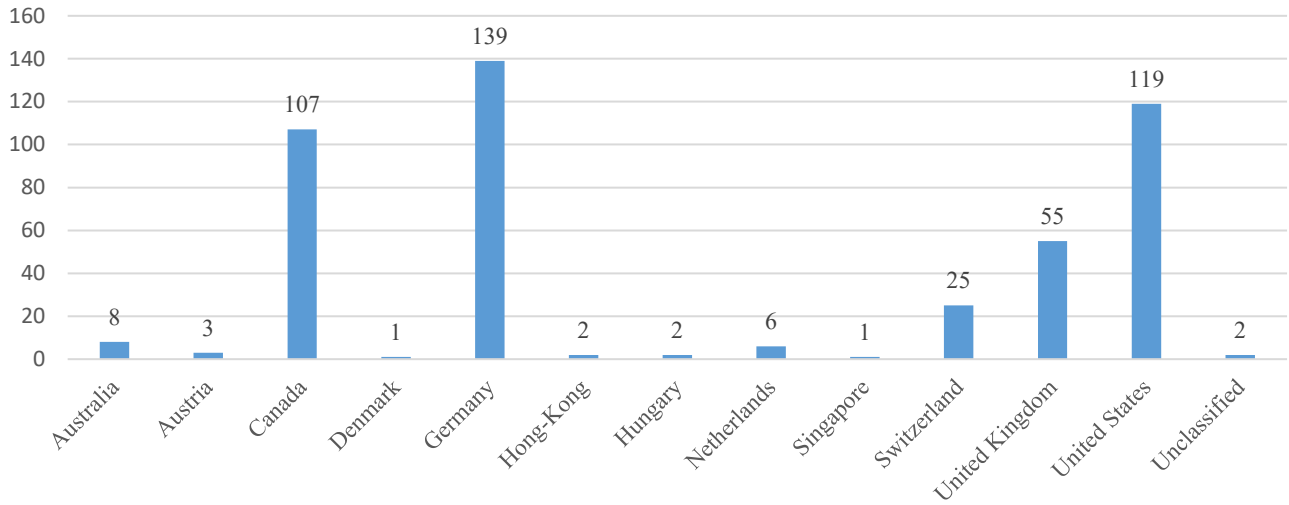
*Panel B: Sophistication of Tout Message*



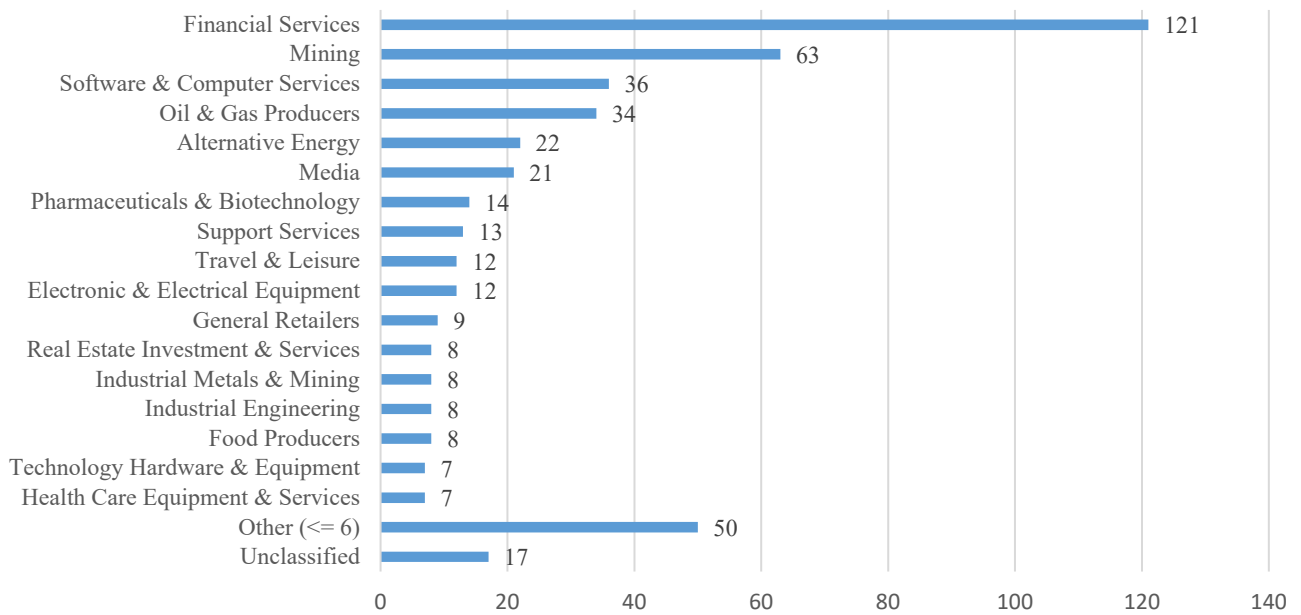
*Panel C: Country of Tout Trading Venue*



Panel D: Alleged Tout Headquarter Locations

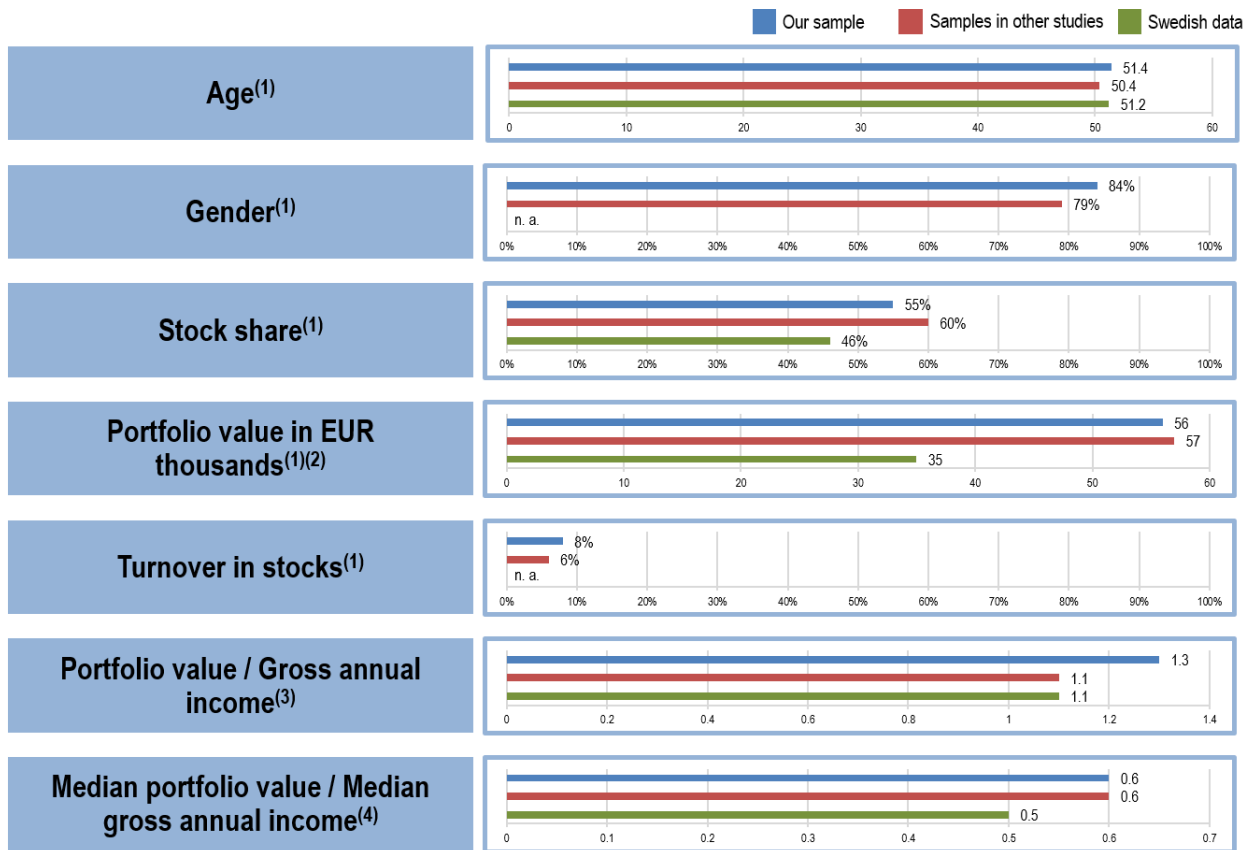


Panel E: Alleged Tout Industries



## Figure B2: Descriptive Comparisons of Investor Sample with Other Studies

This figure compares our random sample of 113,000 investors from a large German online bank to investors from other studies. The indicated comparison sources are Barber and Odean (2001), Dorn and Huberman (2005) and Calvet et al. (2007).



Sources: <sup>(1)</sup> Barber and Odean (*QJE*, 2001); <sup>(2)</sup> \$47,000 (portfolio value) / 60% (stock share) \* 0.72 (exchange rate); <sup>(3)</sup> German Federal Bureau of Statistics 2008; <sup>(4)</sup> Dorn and Huberman (*RoF*, 2005); <sup>(5)</sup> Calvet, Campbell and Sodini (*JPE*, 2007)

**Table B1: Descriptive Statistics on Tout Stocks**

This table provides descriptive statistics on tout stocks. Panel A shows the average share price, market value (in millions) and pre-tout returns in the 60 days period before the beginning of the tout. Panel B shows the share price, market value and market value loss (in millions) 60 days after the beginning of the tout. Data is reported on the 397 touts for which we have full Datastream coverage before the beginning of the tout.

Panel A: Before Pump-Phase

|                 | <i>N</i> | <i>Mean</i> | <i>SD</i> | <i>P10</i> | <i>P25</i> | <i>P50</i> | <i>P75</i> | <i>P90</i> |
|-----------------|----------|-------------|-----------|------------|------------|------------|------------|------------|
| Share Price     | 397      | 3.06        | 20.23     | 0.05       | 0.23       | 0.69       | 1.80       | 3.33       |
| Market Value    | 397      | 67.00       | 316.4     | 0.54       | 2.53       | 11.10      | 38.10      | 92.96      |
| Pre-Tout Return | 397      | 0.15        | 0.81      | -0.47      | -0.12      | 0.03       | 0.33       | 0.83       |

Panel B: End of Pump-Phase

|                   | <i>N</i> | <i>Mean</i> | <i>SD</i> | <i>P10</i> | <i>P25</i> | <i>P50</i> | <i>P75</i> | <i>P90</i> |
|-------------------|----------|-------------|-----------|------------|------------|------------|------------|------------|
| Share Price       | 397      | 1.55        | 5.10      | 0.03       | 0.1        | 0.4        | 1.1        | 2.99       |
| Market Value      | 397      | 47.36       | 240.16    | 0.35       | 1.65       | 7.62       | 26.96      | 68.82      |
| Market Value Loss | 397      | -22.36      | 202       | -34.6      | -11.86     | -1.64      | 0.1        | 6          |

**Table B2: Comparison between BaFin and Hand-Collected Schemes***Panel A: Trades in Pump-and-Dump Schemes*

|  | <i>N</i> | <i>Mean</i> | <i>SD</i> | <i>P10</i> | <i>P25</i> | <i>P50</i> | <i>P75</i> | <i>P90</i> |
|--|----------|-------------|-----------|------------|------------|------------|------------|------------|
| <i>Full Sample</i>                     |          |             |           |            |            |            |            |            |
| # purchases per tout during pump phase | 385      | 77.72       | 199       | 2          | 5          | 18         | 61         | 158        |
| <i>BaFin Sample</i>                    |          |             |           |            |            |            |            |            |
| # purchases per tout during pump phase | 217      | 73.37       | 218       | 1          | 4          | 14         | 44         | 141        |

*Panel B: Investor Performance at the Trade Level*

|                                  | <i>N</i> | <i>Mean</i><br>( <i>per Trade</i> ) | <i>SD</i> | <i>P10</i> | <i>P25</i> | <i>P50</i> | <i>P75</i> | <i>P90</i> |
|----------------------------------|----------|-------------------------------------|-----------|------------|------------|------------|------------|------------|
| <i>Full Sample</i>               |          |                                     |           |            |            |            |            |            |
| Volume of investments (# shares) | 29,922   | 6,138                               | 38,017    | 200        | 500        | 1,400      | 4,000      | 10,000     |
| Size of Investment (Euros)       | 29,922   | 4,026                               | 16,234    | 443        | 944        | 1,915      | 4,000      | 8,250      |
| Percent Return (raw)             | 29,922   | -0.25                               | 0.50      | -0.84      | -0.61      | -0.22      | 0.02       | 0.20       |
| Percent Return (market adjusted) | 29,922   | -0.28                               | 0.52      | -0.90      | -0.63      | -0.24      | 0.02       | 0.18       |
| Gross gain/loss (Euros)          | 29,922   | -770                                | 5,572     | -2,425     | -985       | -266       | 44         | 462        |
| <i>BaFin Sample</i>              |          |                                     |           |            |            |            |            |            |
| Volume of investments (# shares) | 15,921   | 5,590                               | 40,065    | 190        | 500        | 1,000      | 3,500      | 10,000     |
| Size of Investment (Euros)       | 15,921   | 4,747                               | 21,487    | 468        | 984        | 2,034      | 4,556      | 9,740      |
| Percent Return (raw)             | 15,921   | -0.22                               | 0.57      | -0.88      | -0.63      | -0.19      | 0.05       | 0.26       |
| Percent Return (market adjusted) | 15,921   | -0.25                               | 0.58      | -0.92      | -0.67      | -0.20      | 0.04       | 0.24       |
| Gross gain/loss (Euros)          | 15,921   | -859                                | 7,413     | -2,851     | -1,084     | -245       | 96         | 658        |

*Panel C: Investor Performance at the Tout Level*

|                                       | <i>N</i> | <i>Mean</i><br>( <i>per Tout</i> ) | <i>SD</i> | <i>P10</i> | <i>P25</i> | <i>P50</i> | <i>P75</i> | <i>P90</i> |
|---------------------------------------|----------|------------------------------------|-----------|------------|------------|------------|------------|------------|
| <i>Full Sample</i>                    |          |                                    |           |            |            |            |            |            |
| Volume of investments (# shares)      | 18,680   | 9,832                              | 99,995    | 250        | 700        | 2,000      | 5,000      | 15,000     |
| Size of Investment in Tout (Euros)    | 18,680   | 6,449                              | 26,740    | 476        | 1,002      | 2,200      | 5,130      | 11,966     |
| Percent Return (raw, value-weight)    | 18,680   | -0.28                              | 0.48      | -0.85      | -0.64      | -0.27      | -0.01      | 0.15       |
| Percent Return (market, value-weight) | 18,680   | -0.32                              | 0.50      | -0.91      | -0.67      | -0.29      | -0.02      | 0.13       |
| Gross gain/loss (Euros)               | 18,680   | -1,234                             | 7,440     | -3,462     | -1,376     | -399       | -10        | 437        |
| <i>BaFin Sample</i>                   |          |                                    |           |            |            |            |            |            |
| Volume of investments (# shares)      | 9,304    | 9,566                              | 104,288   | 200        | 550        | 1,600      | 5,000      | 14,000     |
| Size of Investment in Tout (Euros)    | 9,304    | 8,123                              | 34,763    | 500        | 1,070      | 2,500      | 6,197      | 15,100     |
| Percent Return (raw, value-weight)    | 9,304    | -0.26                              | 0.57      | -0.89      | -0.68      | -0.25      | 0.02       | 0.22       |
| Percent Return (market, value-weight) | 9,304    | -0.30                              | 0.58      | -0.94      | -0.71      | -0.27      | 0.01       | 0.19       |
| Gross gain/loss (Euros)               | 9,304    | -1,470                             | 10,147    | -4,269     | -1,610     | -405       | 36         | 665        |

**Table B3: Descriptive Comparisons of Tout and Non-Tout Investors**

This table reports characteristics of tout investors at the point of investing in their first tout ( $n = 8,584$ ). In Panel A, we compare tout investors relative to active non-tout (or control) investors. The latter are randomly drawn from the sample of all investors in the month of a tout, have never invested in a tout before, and are required to have purchased a non-touted stock during the pump period ( $n = 52,171$ ). In Panel B, we compare tout investors that will only invest into a single tout ( $N = 5,049$ ) with *Multi-Tout Investor* who will invest in at least four touts ( $N = 1,324$ ) during the sample period. See notes of Table 3 for the variable definitions; some variables are only available for a subset of the investors. For categorical variables, p-values are based on chi-squared tests (t-tests otherwise).

*Panel A: Characteristics of Tout and Active Non-Tout Investor*

|   | <i>Tout Investor</i> | <i>Active Non-Tout Investor</i> | <i>p-value</i> |
|---|----------------------|---------------------------------|----------------|
| <i>Personal Characteristics</i>         |                      |                                 |                |
| Male                                    | 89.38%               | 85.95%                          | < 0.01         |
| Married                                 | 60.42%               | 58.87%                          | < 0.01         |
| Age <sub>t</sub>                        | 45.93                | 44.55                           | < 0.01         |
| Self-assigned Risk Class                | 3.98                 | 3.51                            | < 0.01         |
| Log(Account Wealth <sub>t-1</sub> )     | 68,592               | 84,238                          | < 0.01         |
| <i>Portfolio Characteristics</i>        |                      |                                 |                |
| Penny Share <sub>t-1</sub>              | 27.52%               | 9.41%                           | < 0.01         |
| Blue Chip Share <sub>t-1</sub>          | 16.49%               | 30.62%                          | < 0.01         |
| # Stocks <sub>t-1</sub>                 | 3.23                 | 2.39                            | < 0.01         |
| <i>Behavioral Characteristics</i>       |                      |                                 |                |
| # Purchases <sub>[t-12,t-1]</sub>       | 55.42                | 21.16                           | < 0.01         |
| Return Deciles <sub>[t-12,t-1]</sub>    | 5.87                 | 5.87                            | 0.94           |
| SD_Return Deciles <sub>[t-12,t-1]</sub> | 6.76                 | 5.29                            | < 0.01         |
| HHI Stock Portfolio <sub>t-1</sub>      | 0.28                 | 0.30                            | < 0.01         |
| <i>District Characteristics</i>         |                      |                                 |                |
| City                                    | 50.00%               | 56.81%                          | < 0.01         |
| East Germany                            | 15.55%               | 13.10%                          | < 0.01         |
| % Graduate Education <sub>2011</sub>    | 15.71%               | 16.72%                          | < 0.01         |
| % Unemployment <sub>2011</sub>          | 4.18%                | 4.18%                           | 0.82           |
| <i>Job Characteristics</i>              |                      |                                 |                |
| White-collar Job                        | 34.46%               | 41.19%                          | < 0.01         |
| Blue-collar Job                         | 4.69%                | 2.90%                           | < 0.01         |
| Other and Dependent                     | 2.74%                | 4.14%                           | < 0.01         |
| Retiree                                 | 17.11%               | 14.73%                          | < 0.01         |
| Civil Servant                           | 4.88%                | 5.24%                           | 0.162          |
| Managerial Position                     | 3.94%                | 4.86%                           | < 0.01         |
| Self-employed                           | 18.64%               | 16.11%                          | < 0.01         |
| Not disclosed (NA)                      | 13.54%               | 10.82%                          | < 0.01         |

**Table B3 (Continued)***Panel B: Characteristics of Single and Multi-Tout Investors*

|   | <i>Single Tout Investor</i> | <i>Multi-Tout Investor</i> | <i>p-value</i> |
|---|-----------------------------|----------------------------|----------------|
| <i>Personal Characteristics</i>         |                             |                            |                |
| Male                                    | 89.62%                      | 89.55%                     | 0.94           |
| Married                                 | 58.91%                      | 66.59%                     | < 0.01         |
| Age <sub>t</sub>                        | 45.28                       | 48.16                      | < 0.01         |
| Self-assigned Risk Class                | 3.89                        | 4.25                       | < 0.01         |
| Log(Account Wealth <sub>t-1</sub> )     | 72,368                      | 64,123                     | 0.04           |
| <i>Portfolio Characteristics</i>        |                             |                            |                |
| Penny Share <sub>t-1</sub>              | 22.99%                      | 37.28%                     | < 0.01         |
| Blue Chip Share <sub>t-1</sub>          | 18.92%                      | 11.40%                     | < 0.01         |
| # Stocks <sub>t-1</sub>                 | 3.06                        | 4.19                       | < 0.01         |
| <i>Behavioral Characteristics</i>       |                             |                            |                |
| # Purchases <sub>[t-12,t-1]</sub>       | 47.81                       | 81.94                      | < 0.01         |
| Return Deciles <sub>[t-12,t-1]</sub>    | 5.84                        | 6.21                       | < 0.01         |
| SD_Return Deciles <sub>[t-12,t-1]</sub> | 6.56                        | 7.16                       | < 0.01         |
| HHI Stock Portfolio <sub>t-1</sub>      | 0.28                        | 0.25                       | < 0.01         |
| <i>District Characteristics</i>         |                             |                            |                |
| City                                    | 51.36%                      | 46.73%                     | < 0.01         |
| East Germany                            | 14.78%                      | 16.87%                     | 0.06           |
| % Graduate Education <sub>2011</sub>    | 15.83                       | 15.30                      | < 0.01         |
| % Unemployment <sub>2011</sub>          | 4.17                        | 4.16                       | 0.90           |
| <i>Job Characteristics</i>              |                             |                            |                |
| White-collar Job                        | 36.98%                      | 28.32%                     | < 0.01         |
| Blue-collar Job                         | 4.44%                       | 4.83%                      | 0.54           |
| Other and Dependent                     | 2.73%                       | 2.19%                      | 0.27           |
| Retiree                                 | 14.52%                      | 25.76%                     | < 0.01         |
| Civil Servant                           | 5.31%                       | 4.53%                      | 0.26           |
| Managerial Position                     | 4.30%                       | 3.55%                      | 0.22           |
| Self-employed                           | 18.36%                      | 18.13%                     | 0.85           |
| Not disclosed (NA)                      | 13.37%                      | 12.69%                     | 0.52           |

## Appendix C: Matching Tout and Control Stocks based on Price Path

To ascertain that the investor response in our sample is due to the tout itself, we match touted stocks to a control group of stocks with a similar price path using coarsened-exact matching (CEM). We aim to obtain a set of control stocks that exhibit a similar price path as the touted stocks prior to and even in the early phases of the campaigns. The idea is to differentiate with stocks that have tout-like price momentum from stocks that are actually being touted.

Our matching procedure comprises three steps. First, we identify the country of origin for each touted stock by relying on the first two digits of its ISIN. We then collect the *Datastream* universe of all non-touted stocks with the same first two digits of the ISIN and that are active at the same time as the touted stock in the 100-days before the touted stock's event date.<sup>4</sup> Second, we retain only those control stocks that have a similar initial *price level* by matching on five different price strata (0, 0.1]; (0.1, 1]; (1, 5]; (5, 10] and (10; 25] € at the stock's initial date in the pre-period.<sup>5</sup> We match on initial prices to ensure that both tout and control stocks have similar price levels (e.g., lottery stock features). Matching on returns only would potentially yield a very different set of control firms (e.g., matching a penny stock trading for a few cents to a control stock with a more conventional share price of €20). Essentially, the first two steps ensure that we match each touted stock in calendar time to a similar type of stock in the same country. By matching on country and time, we hold the market environment constant.

In the final step, we further restrict the set of eligible control stocks based on their returns to ensure that the control stocks have price run-ups that match those of the touted stocks in the

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<sup>4</sup> Specifically, we determine whether a stock is active at four different dates before the beginning of the pump-and-period (at  $t = -100$ ,  $t = -75$ ,  $t = -50$ ,  $t = -25$ ) by checking whether price data for the stock is available in *Datastream* at the particular date. We require that price data for control stocks becomes available around the same time as for the touted stock. For example, if a touted stock only becomes active between the  $[-75, -50]$  time period, we require that the control stocks only becomes active during the same time frame.

<sup>5</sup> We exclude stocks with an initial price level above €25. Only three tout stocks fall into this  $(25, \infty)$ -category and including these stocks with extreme price levels would have an extreme influence on the average price levels (and hence price paths based on raw prices would be hardly interpretable).

beginning of the tout campaigns. Specifically, we employ three different approaches: In the first approach (I), we match on return quartiles over the two 25 days period preceding the beginning of the tout (i.e., on return quartiles over the [-50,-25] and [-25,0] periods). This matching approach is the least demanding approach and corresponds to Figure 4 in the paper. The second approach (II) additionally requires that touted and matched control stocks are within the same return quartile for the 25-day period after beginning of the campaign (i.e., stocks are also matched on return quartiles over the [0, 25] time period). In the third approach (III), we follow approach (II) and then add the criterion that both touted and control stocks have similar trading volume over the [-100, 0] pre-period, coarsened by quartiles. This approach ensures that both type of shares have similar liquidity before the beginning of the tout campaign. Depending on the exact matching procedure, we are able to match 317 (I), 264 (II) or 193 (III) out of 470 tout cases.<sup>6</sup> Table C1 provides statistics on returns for touted and matched control stocks. In general, all matching approaches lead to similar return patterns for touted and control stocks immediately before and around the event date [-50, 25]. Approaches (II) and (III), shown in Panels B and C, exhibit even more similar return patterns directly around the tout date (i.e., during the [-25, +25]-day time period). Figure C1 (or Panel A of Figure 4), Figure C2 and Figure C3 show the respective price paths for each of the matching procedures. For logged prices, we use  $\log(1 + \text{Price})$  as a significant number of stocks has prices below €1, leading to a heavily skewed distribution otherwise.

After matching, we analyze the investor response around the tout and pseudo-tout dates within our brokerage sample.<sup>7</sup> We use four different proxies to measure the investor response, comparing treated and control stocks in event time. All measures are based on the same 113,000 investor

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<sup>6</sup> While our sample contains 470 touts, we have the relevant non-missing *Datastream* data around the tout campaign for 383 cases only (i.e., we can match up to 317 out of 373 cases, or 85%). Our inability to match some tout stocks in approach (II) and (III) reflects the more stringent matching requirements. We view the investor response test as a way to ascertain that investors indeed respond to the tout campaign and hence prefer to have tightly matched stocks, rather than a larger sample.

<sup>7</sup> Since we often have multiple matches per touted stock, we ensure that all control stocks have in aggregate the same weight as the respective tout stock (consistent with CEM weights).

sample of our large German online bank (see Section 3.2 for details): (i) the total number of distinct touted or control stocks traded per day, (ii) the average number of (new) investors per stock and per day, (iii) the average number of purchases per stock and per day and (iv) the average Euro investment per stock and per day. The respective investor response proxy is plotted in Panel B of Figure C1 (I), Figure C2 (II) and Figure C3 (III), for each of the three matching approaches.

We find a sharp increase in trading activity in our brokerage sample around the start of the pump-and-dump campaign for touted stocks but not for matched control stocks, despite the fact that the latter exhibit a similar price path before or even in the early phase of the tout campaign. This evidence suggests that investors respond to the campaigns rather than invest coincidentally because they see the price momentum.

**Table C1: Returns for Touted and Matched Control Stocks**

This table shows average stock returns of touted stocks and a set of matched control stocks over different periods in event time (for a detailed description of our matching procedure see above). We use CEM weights to calculate average returns for matched stocks. The last column contains t-statistics comparing the average returns of touted and (weighted) control stocks over the respective sub-periods. In Panel A, we match on initial price levels (five price strata) and on return quartiles over the [-50, -25] and [-25, 0] time periods before the event date. In Panel B, we additionally match on return quartiles over the [0, 25] time period after the event date. In Panel C, we add the average Euro trading volume (four EUR trading volume quartiles) over the entire pre-event period [-100, 0] as another matching variable. \*, \*\*, and \*\*\* indicate significance (two-sided) at the 10%, 5%, and 1% levels, respectively

*Panel A: Matching on initial price levels and pre-event returns*

|                     | <i>Touted Stock Returns</i> | <i>Matched Stock Returns</i> | <i>t-statistic</i> |
|---------------------|-----------------------------|------------------------------|--------------------|
| $t \in [-100, -75]$ | -0.014                      | -0.025                       | 0.359              |
| $t \in [-75, -50]$  | 0.033 *                     | -0.023                       | 1.861              |
| $t \in [-50, -25]$  | 0.038                       | 0.022                        | 0.460              |
| $t \in [-25, 0]$    | 0.122                       | 0.095                        | 0.870              |
| $t \in [0, 25]$     | -0.002                      | -0.042                       | 1.121              |
| $t \in [25, 50]$    | -0.122 ***                  | -0.018                       | -3.762             |
| Number of stocks    | 317                         | 23,334                       |                    |

*Panel B: Matching on initial price levels, pre-event returns and post-event returns*

|                     | <i>Touted Stock Returns</i> | <i>Matched Stock Returns</i> | <i>t-statistic</i> |
|---------------------|-----------------------------|------------------------------|--------------------|
| $t \in [-100, -75]$ | -0.029                      | -0.029                       | -0.005             |
| $t \in [-75, -50]$  | 0.011                       | -0.017                       | 0.802              |
| $t \in [-50, -25]$  | 0.031                       | 0.023                        | 0.202              |
| $t \in [-25, 0]$    | 0.106                       | 0.079                        | 0.739              |
| $t \in [0, 25]$     | -0.027                      | -0.045                       | 0.411              |
| $t \in [25, 50]$    | -0.125 ***                  | -0.014                       | -3.739             |
| Number of stocks    | 264                         | 9,142                        |                    |

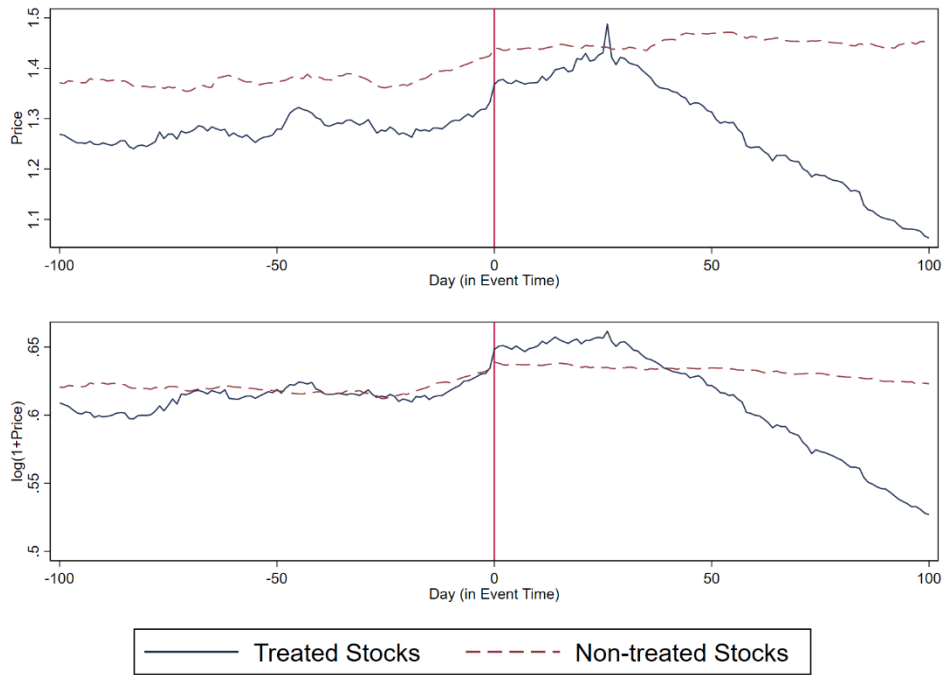
*Panel C: Matching on initial price levels, pre-event returns, post-event returns and pre-event trading volume*

|                     | <i>Touted Stock Returns</i> | <i>Matched Stock Returns</i> | <i>t-statistic</i> |
|---------------------|-----------------------------|------------------------------|--------------------|
| $t \in [-100, -75]$ | -0.052                      | -0.022                       | -0.792             |
| $t \in [-75, -50]$  | 0.004                       | 0.010                        | -0.138             |
| $t \in [-50, -25]$  | 0.031                       | 0.001                        | 0.596              |
| $t \in [-25, 0]$    | 0.080                       | 0.045                        | 0.814              |
| $t \in [0, 25]$     | -0.022                      | -0.022                       | 0.019              |
| $t \in [25, 50]$    | -0.124 ***                  | -0.027                       | -2.698             |
| Number of stocks    | 193                         | 4,810                        |                    |

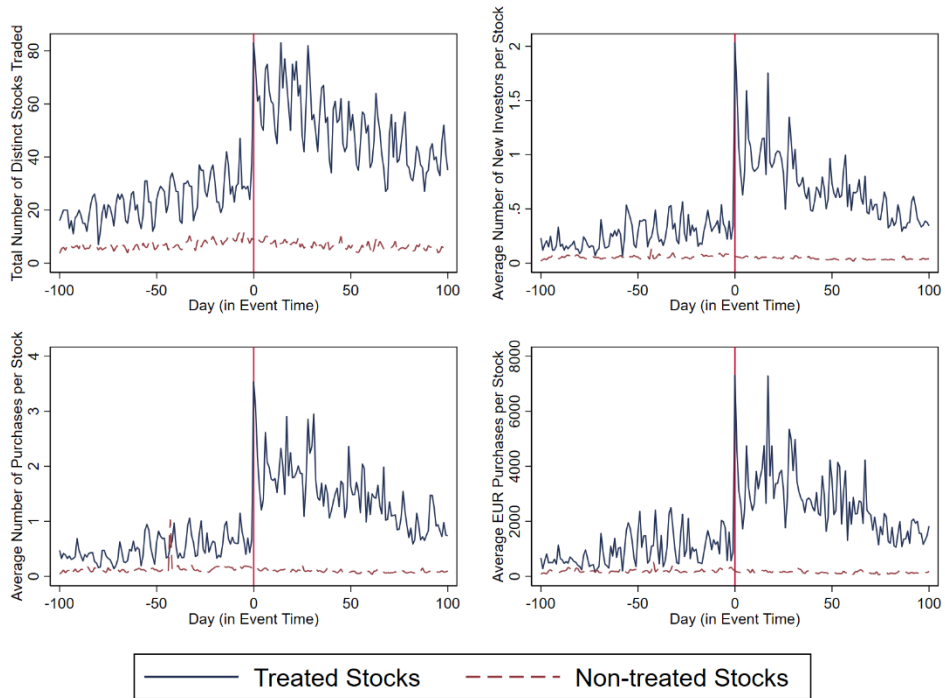
### Figure C1: Main CEM Matching Procedure (Approach I)

This matching procedure corresponds to the matching procedure in Figure 4. See notes to Figure 4 for details.

Panel A: Price Path of Touted and Matched Stocks



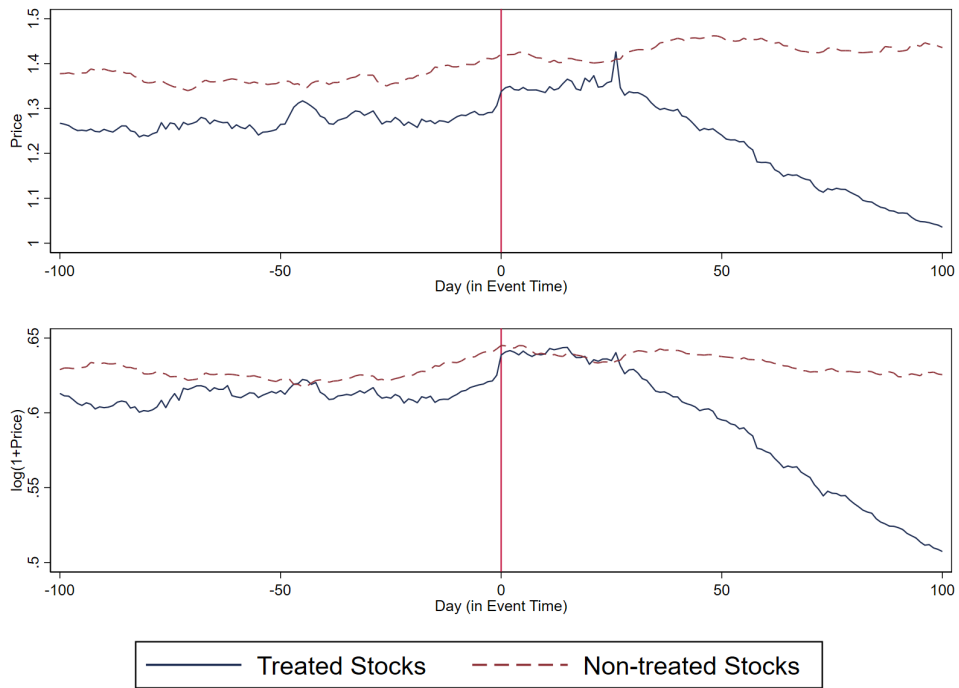
Panel B: Response by Investors in Brokerage Sample



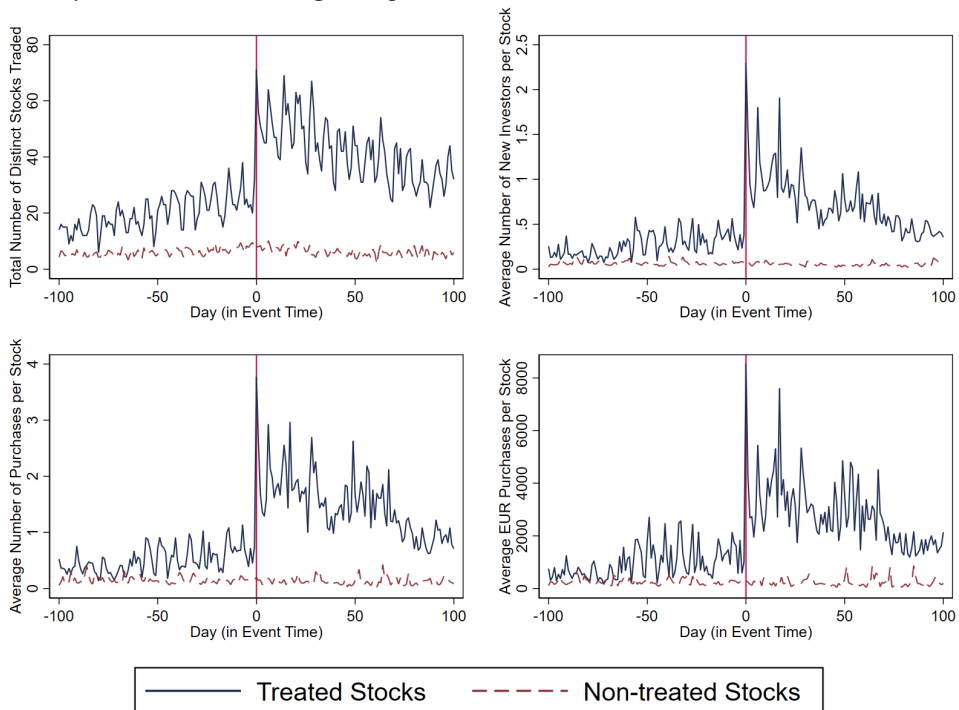
### Figure C2: Alternative CEM Matching Procedure (Approach II)

See notes to Figure 4 for details.

Panel A: Price Path of Touted and Matched Stocks



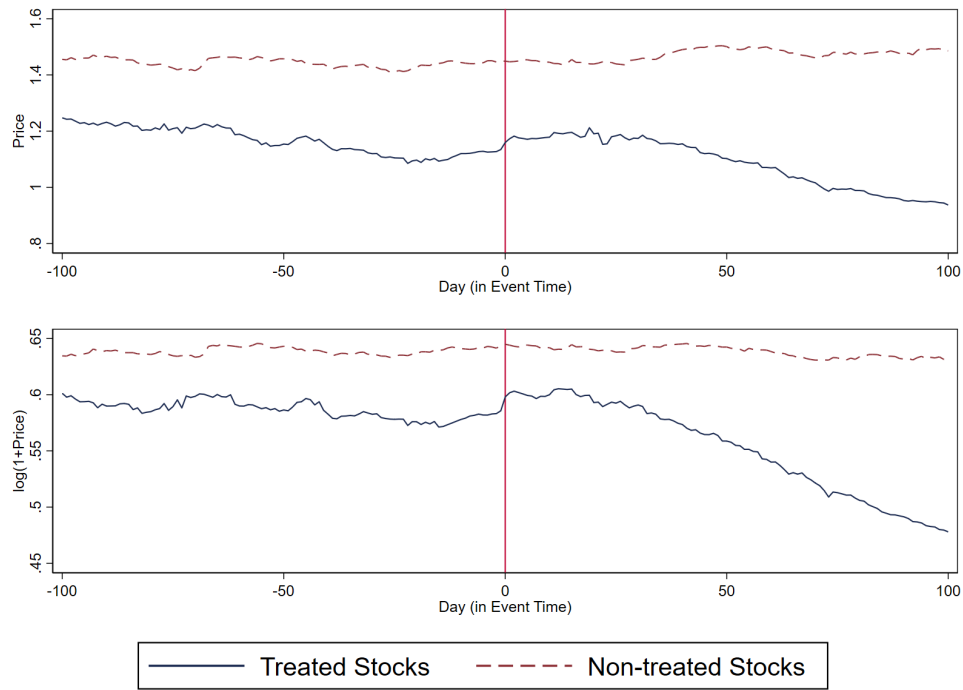
Panel B: Response by Investors in Brokerage Sample



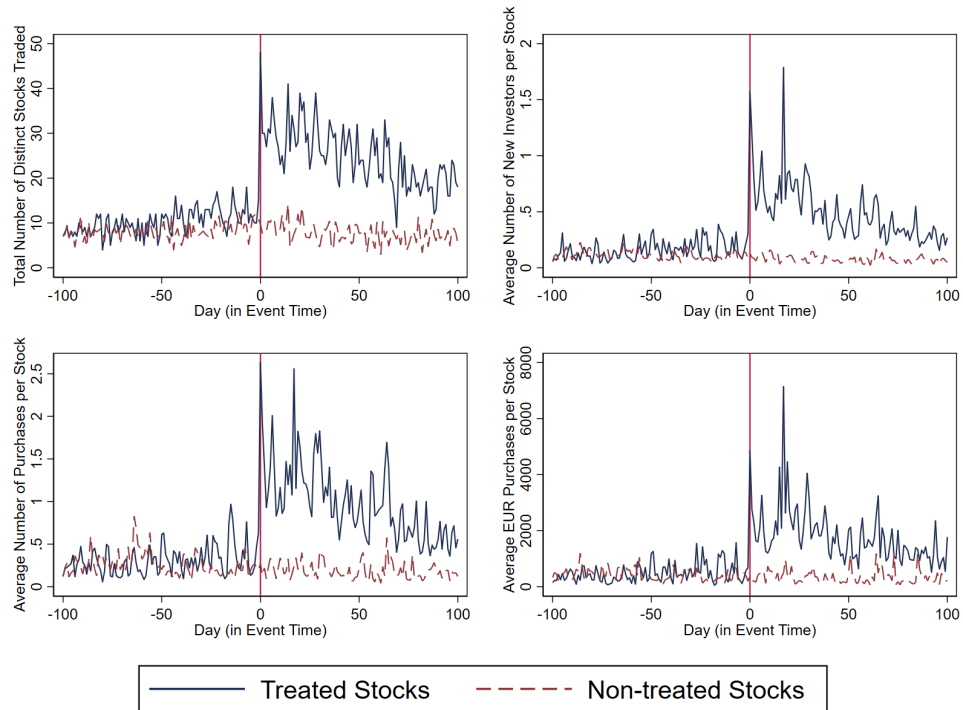
### Figure C3: Alternative CEM Matching Procedure (Approach III)

See notes to Figure 4 for details.

Panel A: Price Path of Touted and Matched Stocks



Panel B: Response by Investors in Brokerage Sample



## Appendix D: Sensitivity Analysis for the Pump-Period Assumption

Throughout the paper, we treat investors within the first 60 days of the tout promotion as pump-and-dump investors. This 60-day assumption is supported by the elevated trading pattern in the aftermath of the promotion (e.g., see Figure 3). We also show that the vast majority of purchases within 60 days from the start of the tout campaigns are indeed investor responses to the schemes and in that sense constitute participation. Nevertheless, we gauge the sensitivity of our results with respect to the 60-day window. Towards this end, we provide the main descriptive statistics for four alternative pump-period assumptions in Table D1.

Column (2) of Table D1 corresponds to our main sample and replicates the key results from Table 1 and Table 2. Using this assumption, we have 385 traded touts with 77.72 purchases per tout (see also Table 1). These 29,922 tout trades lead to 18,680 distinct tout observations from 8,584 investors, who lose on average -€1,234 or -28% per tout investment (see also Table 2). Unsurprisingly, for a shorter 30-day window, the absolute numbers are somewhat smaller. However, the overall participation (e.g., 350 traded touts with 50.74 purchases per tout) and, in particular, average losses per tout (-26%) are still sizeable and quite comparable to the statistics we obtain using the 60-day window. For longer windows, average losses (-29%) remain consistent with overall participation further increasing (e.g., 399 traded touts with 95.40 purchases per tout for the 90-day window). Thus, the specific choice of a 60-day window does not appear to have a major influence on our results.

**Table D1: Participation and Performance for Various Pump-Period Assumptions**

This table shows the sensitivity of our key descriptive results with respect to alternative pump period assumptions. Column 2 (60 Days) corresponds to our main assumption in and replicates the main results from Table 1 and Table 2. *Percent Return (raw, value-weight)* and *Gross gain/loss (Euros)* are based on the Investor Performance at the Tout Level. Column (1) shows the statistics for a shorter window and Column (3) to (5) for longer windows.

|                                    | 30 Days | 60 Days | 90 Days | 120 Days | 150 Days |
|------------------------------------|---------|---------|---------|----------|----------|
| <i>Table 1</i>                     |         |         |         |          |          |
| Traded Touts                       | 350     | 385     | 399     | 405      | 405      |
| Number of Purchases                | 50.74   | 77.72   | 95.40   | 111.04   | 125.14   |
| <i>Table 2</i>                     |         |         |         |          |          |
| # Tout Trades                      | 17,758  | 29,922  | 38,063  | 44,970   | 50,680   |
| # Tout Observations                | 13,089  | 18,680  | 22,100  | 25,079   | 27,179   |
| # Tout Investors                   | 6,736   | 8,584   | 9,695   | 10,398   | 10,852   |
| Percent Return (raw, value-weight) | -0.26   | -0.28   | -0.29   | -0.29    | -0.29    |
| Gross gain/loss (Euros)            | -987    | -1,234  | -1,316  | -1,250   | -1,303   |