Internet Appendix:

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

April 2022

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.[1] 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 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,

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[1] 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.

finding the most comprehensive list on *OTC Today*.[2] 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).[3] Through this process, we were able to identify 17 additional cases.

In total, this search 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 webpage or message board. We classify all stocks that were 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.

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[2] 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.

[3] 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. 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.

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:	• http://de.admin.net-abuse.mail.narkive.com/I4UVTlbg/joe-job-gegen-uceprotect • http://www.tradingideas.de/2007/03/18/amatech-txade-wkn-519280/ • http://www.achtung-aktie.de/index.htm?grundwissen.htm
ISIN:	DE0005192801 (not in original tout message)
Type:	E-mail
Tout Message:	*Die sensationelle 1000% Chance - jetzt einsteigen und richtig Geld verdienen* *Sehr geehrte Damen und Herren,* *hiermit machen wir Sie auf die aktuelle Kursrakete AMATECH AG aufmerksam und empfehlen unbedingt eine Aufnahme in Ihr Depot: Der DAX sinkt, Amatech steigt* *AMATECH Aktiengesellschaft* *Rosbergweg 2* *87459 Pfronten* *WKN 519280* *Tageskurs: 20 Cent* *7-Tage-Ziel: 70 Cent* *Monatsziel: 1,20 Euro* *Bewertung: Strong Buy* *Laut unserer Chartanalyse hat die Aktie enormes Potential. Jetzt einsteigen und keine Zeit verlieren.* *Hochachtungsvoll* *[NAME]*

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:	• http://www.cbr1000rr.de/fireblade_forum/index.php?page=Thread&threadID=43595 • http://www.antispam-ev.de/forum/archive/index.php/t-14878.html • http://www.tradingideas.de/2007/03/31/humet-pbc-l9z-wkn-a0jdw0/
ISIN:	US4454081070
Type:	E-mail
Tout Message:	*KAUF-TIPP DER WOCHE* *DIENSTAG 3 APRIL!* *DIE RALLYE IST GESTARTET!* *Firma: HUMET-PBC NA (L9Z.F)* *4-Tag Prognose: 0.50-0.90* *Letzter Preis: 0.06 (+62%)* *Kurzel : L9Z* *WKN: A0MMPH* *ISIN: US4454081070* *Borsen: Frankfurt* *KAUFEN! L9Z ESGESCHAFT FIN UNTER PARI!* *800%+ GEWINNE WERDEN AN 4 TAGEN!* *_____* *ANLEGER UHR ***L9Z.F**** *DIE RALLYE IST GESTARTET!* *UHR AN DIENSTAG MONTAG 2 APRIL!* *Firma: HUMET-PBC NA (L9Z.F)* *5-Tag Prognose: 0.25-0.90* *Letzter Preis: 0.04* *Kürzel : L9Z* *WKN: A0MMPH* *ISIN: US4454081070* *Börsen: Frankfurt* *KAUFEN KAUFEN KAUFEN!* *L9Z ESGESCHAFT FIN UNTER PARI!* *600% Gewinne werden an 5 Tagen!! ÜBERRASCHEN!*

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:	• http://www.dc-campus.net/showthread.php?t=2402 • http://www.virenguard.de/blog/der-aktien-spam-geht-weiter/ • http://www.tradingideas.de/2007/03/21/kabel-new-media-knw-wkn-622950/
ISIN:	DE0006229503
Type:	E-mail
Tout Message:	*Die aktuelle Kursrakete: Kabel New Media AG* *Sensationeller Kursanstieg erwartet!* *Sehr geehrte Damen und Herren,* *folgende Aktien sollten Sie sich in Ihre Depot legen:* *Kabel New Media AG* *Kurs: 5,9 Cent* *7-Tage-Ziel: 22 Cent* *8-Wochen-Ziel: 2,10 Euro* *WKN: 622950* *ISIN: DE0006229503* *Bewertung: Kaufen* *Das geballte Wissen unseres Chartexperten-Teams ist Ihr Nutzen!* *Herzlichst, Ihr* *[NAME]* *Redakteur*

A.5 Example EQUIPMENT & SYS ENGR

Company:	EQUIPMENT & SYS ENGR
Date of first message:	December 1, 2006
Further occurrences:	none
Sources:	• https://www.antispam-ev.de/forum/showthread.php?13581-Stock-Spammer-drehen-durch-APWL-Advanced-Powerline-Technologies&highlight=pennystocks/
ISIN:	US29445M1036 (not in original tout message)
Type:	E-mail
Tout Message:	*Alert! Watch this one Rise!*
	Equipment & Systems Engineering, Inc. (EQSE)
	Sector: Environmental Engineering
	Rating: VERY Bullish
	Current Price: $0.062
	Projected: $0.20
	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.
	Search your favorite financial information site and become a believer. This is HOT!
	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!

Appendix B: 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 in the early phases of the campaigns. 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.[4] 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.[5] 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 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

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[4] 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.

[5] We exclude stocks with an initial price level above €25. Only three tout stocks fall into this (25, ∞)-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).

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.[6] Table B1 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). Panel A of Figure 4, Figure B1 and Figure B2 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.[7] 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 sample of our large German online bank (see Section 3.2 for details): (i) the total number of distinct

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[6] 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.

[7] 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).

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 4 (I), Figure B1 (II) and Figure B2 (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 the tout campaign. This evidence suggests that investors respond to the campaigns rather than invest coincidentally.

Table B1: 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

	Touted Stock Returns	*Matched Stock Returns*	*t-statistic*
t ϵ [-100, -75]	-0.014	-0.025	0.359
t ϵ [-75, -50]	0.033 *	-0.023	1.861
t ϵ [-50, -25]	0.038	0.022	0.460
t ϵ [-25, 0]	0.122	0.095	0.870
t ϵ [0, 25]	-0.002	-0.042	1.121
t ϵ [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

|	*Touted Stock Returns*	*Matched Stock Returns*	*t-statistic*
t ϵ [-100, -75]	-0.029	-0.029	-0.005
t ϵ [-75, -50]	0.011	-0.017	0.802
t ϵ [-50, -25]	0.031	0.023	0.202
t ϵ [-25, 0]	0.106	0.079	0.739
t ϵ [0, 25]	-0.027	-0.045	0.411
t ϵ [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

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

Figure B1: Alternative CEM Matching Procedure (Approach II)

See notes to Figure 4 and Panel B of Table B1 for details.

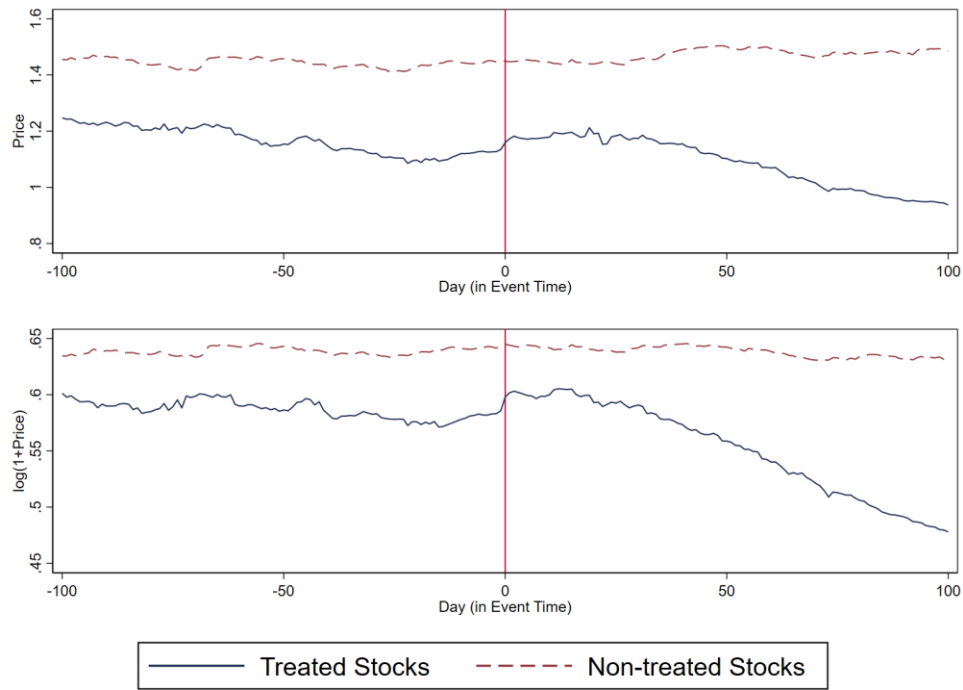*Panel A: Price Path of Touted and Matched Stocks*
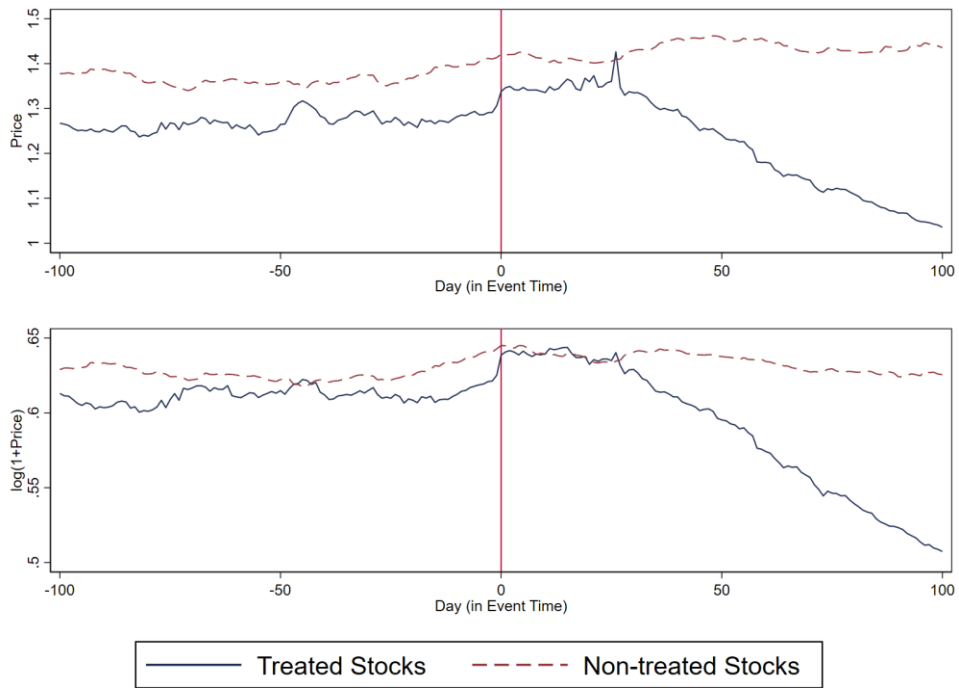
Panel B: Response by Investors in Brokerage Sample
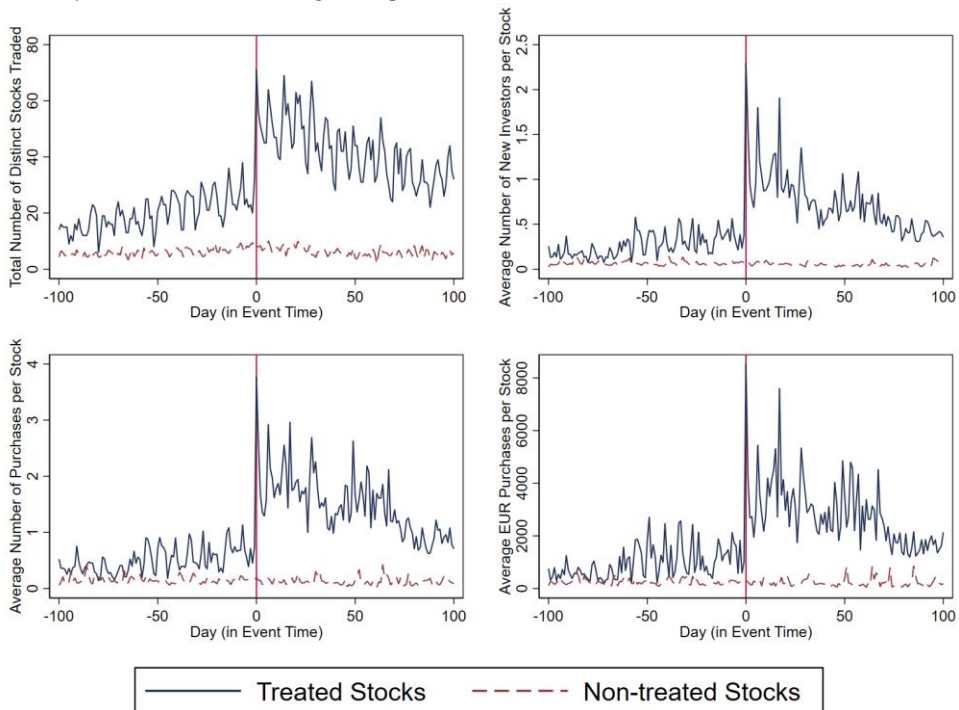
Figure B2: Alternative CEM Matching Procedure (Approach III)

See notes to Figure 4 and Panel C of Table B1 for details.

Panel A: Price Path of Touted and Matched Stocks

Panel B: Response by Investors in Brokerage Sample