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Individual investors' trading behavior and gender difference in tolerance of sex crimes: Evidence from a natural experiment☆

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ABSTRACT

We present evidence that males are more tolerant of sex crimes than females. We exploit a natural experiment, in which a firm's executive rapes a nine-year-old girl. Based on individual-level stock transaction data (over 0.2 million individual investors), we show that, after this crime, females are less likely to purchase this firm's stock than males. This result is stronger for females who are likely more averse to sex crimes. We also find that females' intolerance of sex crimes reduces their trading profits, and that the gender difference toward sex crimes is significantly larger than the gender difference toward non-sexually-related scandals.

1. Introduction

Inferring people's social preferences has long been an important and challenging question for economists, psychologists, and sociologists (List, 2006; Levitt and List, 2007). In this paper, we use the stock market as a novel setting and investigate the gender difference in tolerance of sex crimes based on the stock trading behavior of individual investors. Our test exploits a natural experiment, in which the Chairman of the Board of a public firm (Seazen Holdings Co., Ltd., listed in the Shanghai Stock Exchange) is arrested for raping a nine-year-old girl and the firm's stock price plunges by more than 30% following the news. We use investors' trading behavior to infer their attitudes toward this crime, and we expect that, following the sex crime, investors who are less tolerant of such a crime are less likely to hold the firm's stock.

This setting of employing a natural experiment in the stock market is appealing from an empirical standpoint for two reasons. First, as pointed out by Hong and Kacperczyk (2009), investors' stock trading reflects individuals' social preferences, which enables us to infer any gender difference in tolerance of sex crimes. Second, the stock market provides us with a rich set of data on investor trading and profits. This allows us to distinguish more precisely among alternative explanations.

Based on a panel of 426,016 person-period observations and a difference-in-differences approach, we examine the trading behavior of individual investors in response to such a sex crime. We find that both male and female investors increase their holdings of this firm's stock and that the magnitude of the increase for male investors is four times more than that of female investors. Our findings suggest a tension between profits and moral constraints. On the one hand, investors realize that it is good timing to buy the stock at a heavy discount. On the other hand, moral constraints prevent them from doing so. Because women have tighter moral constraints (i.e., less tolerant of sex crimes in our setting), they increase their holdings by a smaller magnitude.

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The assumption behind the difference-in-differences estimation is that, in the absence of the sex crime, male and female investors would have parallel trends both before and after the sex crime. This assumption is inherently untestable, because we do not observe the trading behavior in the absence of the treatment. However, we can obtain peripheral evidence by examining the pre-treatment trends. We show that the pre-treatment trends between the two groups are indeed economically indistinguishable.

To provide further evidence that our treatment effects are indeed tied to attitudes toward sex crimes, we apply a triple difference-in-differences approach to examine heterogeneous treatment effects. We find that the treatment effects are stronger for richer women, for better-educated women, and for women in areas with greater gender equality. Considering that women with higher economic and social status tend to hold feminist beliefs and gender-egalitarian attitudes and thus are particularly intolerant of sex crimes (Morgan, 1996; Ex and Janssens, 1998), these cross-sectional variations in the treatment effects further increase our confidence in the presence of the gender difference in tolerance of sex crimes.

We investigate the profitability implication of the tolerance of sex crimes. Considering that females' intolerance of sex crimes constrains them from trading a stock purely from financial perspectives, we expect that such a moral constraint limits female investors' profits in stock trading relative to male investors. Based on various measures of stock trading profits, we show that, when trading Seazen stock, female investors experience a significantly lower annualized return than their male peers.

We investigate various alternative explanations, including gender difference in trading frequency, risk preference, investment skill, attention to news, contrarian style, etc. We provide evidence that none of these factors can explain our main results. We particularly pay attention to the possibility that females are less tolerant of any improper behavior than males and thus sex crimes are not unique in this aspect. To address this possibility, we implement a placebo test by collecting cases in which a firm is detected to have negative but non-sexually-related news (such as accounting frauds, negative earnings surprises, etc.) and the firm's stock price also plunges by 30% following the news (the same level as Seazen). We find that, relative to females, male investors are indeed more likely to buy these firms' stocks following these non-sexually-related scandals. However, in terms of economic magnitudes, the gender difference toward sex crimes estimated from our main result is more than three times as large as the average magnitude estimated from these non-sexually-related scandals. These results indicate that gender difference in attitudes toward sex crimes is significantly larger than other non-sexually-related scandals.

This paper provides at least four contributions to the existing literature. First, this paper contributes to the literature that examines the market effect of social norms in the setting of the stock market. Hong and Kacperczyk (2009) study public companies involved in alcohol, tobacco, and the gaming business (i.e., "sin" stocks), and show that moral-constrained institutional investors pay a financial cost in abstaining from these stocks. They also show that institutional investors such as pension funds, universities, religious organizations, banks and insurance companies avoid sin stocks more than mutual funds and hedge funds, because the former institutions usually face diverse constituents and can be readily exposed to public scrutiny, while the latter are natural arbitrageurs in the marketplace. We extend their work by focusing on individual investors, and we provide evidence that female individual investors are more moral-constrained than their male peers in the stock market. As summarized in Campbell (2006) and Gomes et al. (2021), one challenge in household finance research is that households face constraints not captured by traditional textbooks, such as borrowing constraints and capacity constraints to process information. Our findings indicate that the moral constraint is another type of constraint faced by households.

Second, our study contributes to the literature on the gender difference in stock trading behavior. Barber and Odean (2001) show that men trade more excessively than women. Dwyer et al. (2002) find that men take more risks than women in their mutual fund investments. Atkinson et al. (2003) compare the investment behavior of male and female fixed-income mutual fund managers and find no significant difference in fund performance or risk between the two groups. These studies usually focus on the cross-sectional difference in stock investment across gender, and thus the omitted variable problem associated with gender is likely to arise. For example, as documented by Dwyer et al. (2002), their observed gender difference in risk taking is significantly attenuated when financial investment knowledge is included as a control variable in the regression. Atkinson et al. (2003) also point out that differences in investment behavior often attributed to gender may be related to some omitted variables in the regression, such as investment knowledge and wealth constraints. In contrast to these cross-sectional comparisons, we exploit a difference-in-differences framework and focus on the gender difference in response to an exogenous shock. In our natural experiment, the sex crime case disrupts the "equilibrium", allowing us to directly observe how investors of different genders subsequently adjust their investment. Thus, our setting could enable us to better identify the gender difference in stock trading behavior.

Our third contribution is related to several theoretical models. In their seminal work, Heinkel et al. (2001) develop a model of ethical investing in which investors exclude companies that do not meet their ethical standards. In equilibrium, such a social preference drives up the price of ethical firms because the risk of unethical firms is shared by a smaller number of investors. Similarly, Fama and French (2007) present a model in which investors invest in financial assets based on not only dollar payoffs but also personal tastes. Our study provides some empirical support for a key assumption of these models: Social preferences are indeed an important determinant of investors' stock trading behavior. Moreover, our study suggests that gender is an *ex-ante* measure to distinguish investors with different levels of moral considerations.

Fourth and last, our study contributes to the psychology literature on the gender difference in tolerance of sexual harassment. This strand of literature is largely motivated by problems faced by the courts in trying to resolve claims of sexual harassment (Gutek and O'Connor, 1995). As summarized by Rotundo et al. (2001), the gender difference in tolerance of sexual harassment mainly exists for "mild" harassment cases (such as unwanted requests for dating, congratulatory hugs, etc.), but largely vanishes for extreme harassment cases (i.e., rape). That is, compared to females, males appear to be more tolerant of mild sexual harassment but equally intolerant of extreme sexual harassment. Almost all existing studies in this strand are conducted by using questionnaires to collect opinions from experiment participants (Russell and Trigg, 2004). Given that rape is clearly a crime, male participants are

obviously inclined to claim to be intolerant. Such a bias could mistakenly lead to a finding of little gender difference in tolerance of rape.[1] Our study provides evidence that, even for sexual harassment as extreme as rape, males are still more tolerant than females. This finding is particularly timely and relevant considering that the ongoing #MeToo campaign has led to unprecedented public attention to the pervasiveness of sexual harassment.

2. Institutional background and hypothesis development

On the evening of Wednesday, July 3, 2019, Chinese billionaire Richard Zhenhua Wang, the founder and Chairman of the Board of Seazen Holdings (one of China's largest property developers listed in the Shanghai Stock Exchange), was arrested by Shanghai police on charges of raping a nine-year-old girl. The rape occurred in a Shanghai five-star hotel on June 29, 2019. The girl is from Jiangsu Province and was brought to Shanghai by her mother's friend. The next day, after the incident, the girl told her mother and the local police was called in to look into the matter. Upon further investigation, Shanghai police discovered that the 57-year-old Wang had sexual intercourse with the girl and caused damage to the child's genitals.[2] The scandal was released by Shanghai police on the evening of July 3 and instantly went viral on the Internet. Panel A of Fig. 1 presents the number of searches on Baidu (the most popular search engine in China) for "Seazen" and "Zhenhua Wang" in Chinese before and after the event date. On the event date, the number of searches for "Seazen" ("Zhenhua Wang") rises dramatically from 2387 (677) on July 2 to 263,189 (110,079) on July 3: an increase of more than 110 times (162 times).[3] As a comparison, the number of searches for the word "weather" in Chinese on July 3 is 128,219. It suggests that people pay even more attention to this sex scandal than weather forecasts on the event date. Overall, these results indicate that this sex scandal is a significant event and raises profound nation-wide attention.[4]

When the stock market opened the next day, the share price of Seazen plunged by 10% each day on July 4 (Thursday), July 5 (Friday), and July 8 (Monday), the maximum daily move allowed on the Shanghai Stock Exchange.[5] As illustrated in Panel B of Fig. 1, the closing price of Seazen was RMB 42.69 on July 3, and it dropped to RMB 31.12 by July 8 (i.e., a decline of more than 27% in three consecutive trading days).[6] In comparison, Seazen's share price was stable in the five-trading-day period before the scandal news, indicating that this scandal had not been anticipated by the stock market.

Following Fama and French (2007), we present a simple theoretical framework involving a utility-maximizing individual investor with social tastes for financial assets as consumption goods. Specifically, suppose an investor optimally invests α percentage of her wealth in stock R and $(1-\alpha)$ percentage of her wealth in the risk-free asset R_f. The investor's utility function augmented with social tastes is as follows:

$$U = U_1\left(\alpha R + (1-\alpha) R_f\right) + \alpha U_2$$

where U_1 denotes the investor's utility from the return of her portfolio and U_2 denotes the investor's utility from holding the stock as a consumption good.[7] All else equal, the optimal α^* maximizing the investor's utility increases with U_2 (i.e., investors are more likely to hold the firm's shares if they derive greater utility from holding the stock as consumption goods). When the firm's executive commits a sex crime, we expect a greater decrease in U_2 for female investors than male investors.[8] This conjecture is consistent with the existing literature in economics and social psychology for the following three reasons.

First, women's role in reproduction and caring for young children gives them direct experience with nurturing activities. To maximize their return on the investment in pregnancy, nursing, and caring for infants, women have greater needs to protect themselves and their infants during the vulnerable period of early childrearing (Valian, 1998). Such evolutionary pressure throughout history makes women value benevolence and foster others' wellbeing, especially when the "others" are children and women (Geary, 1998; Pinker, 2002). Given that the victim in a sex crime is usually a woman (and also a child in our case), women are likely to internalize their (dis)utility more strongly than men.

[1] As pointed out by Levitt and List (2007), human behavior in the lab can be systematically different from that in the real world, especially when the behavior of interest is related to moral and ethical considerations. In a typical lab experiment, subjects enter an environment with keen awareness that their behavior is being monitored, recorded, and subsequently scrutinized. Such scrutiny will exaggerate the importance of moral behavior (i.e., when being scrutinized by others in the lab, one is more likely to behave morally than in the real world). Our setting can better address this challenge because our study is based on a large number of individual investors' real trading behavior in the stock market.

[2] Seazen Holdings is a family firm owned by Wang. After the arrest, Wang's son (who is the firm's CEO) replaced him as the firm's new Chairman of the Board. Seazen Holdings is also a large public firm: On July 2 (the day before the scandal), its market capitalization was 92.8 billion RMB (equivalently 14.5 billion USD).

[3] According to the official explanation of the Baidu index, the search number reported does not match (but is positively correlated with) the exact number of searches. For this reason, it is more meaningful to look at the change of the index over time (Liu et al., 2017).

[4] This case was also widely reported in the international media, such as CNN, BBC, Reuters, and Bloomberg (e.g., https://edition.cnn.com/2019/07/11/business/wang-zhenhua-future-land-arrest/index.html).

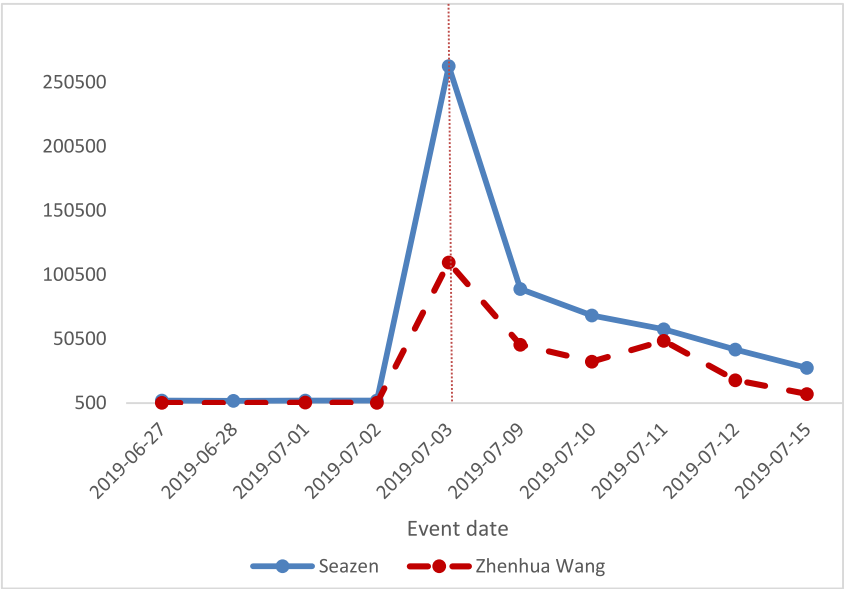
[5] China's stock market has imposed daily price limits of 10% on regular stocks since 1996. That is, within a single trading day, the price of a stock can only increase or decrease by a maximum 10% relative to the closing price on the previous trading day. Once a stock hits the daily price limit, trading with the transaction prices beyond the limits is not allowed (Chen et al., 2019).

[6] Consistent with our finding, Mooibroek and Verschoor (2021) study CEO-related sexual misconducts in U.S. public firms and show that these misconducts negatively affect firms' stock price.

[7] For example, employees likely have tastes for employer stock as a consumption good (Fama and French, 2007). Similarly, investors may get pleasure from holding stocks of strong companies as a consumption good (Daniel and Titman, 1997), and may get disutility from holding "sin" stock (Hong and Kacperczyk, 2009).

[8] In a standard neoclassical profit maximization framework, a rational investor trades stock only for profits and his/her social preference should not affect the trading decision. While both men and women could be subject to various types of deviation from pure rationality, we specifically demonstrate that women are influenced more by their intolerance of sexual crimes than men.

Panel A: The number of Baidu searches for "Seazen" and "Zhenhua Wang"



Panel B: Stock price of Seazen

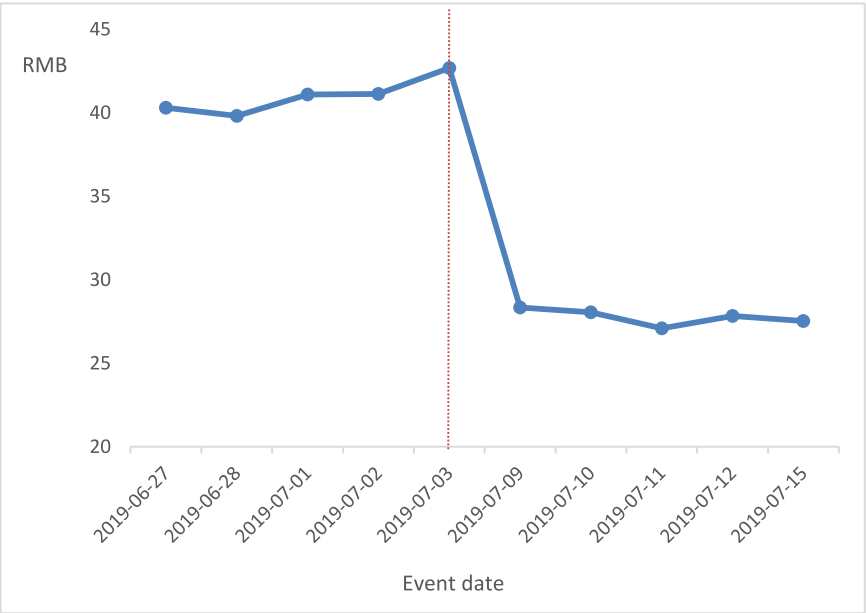


Fig. 1. The Baidu search index and The stock price of Seazen holdings. Panel A presents the number of searches for keywords "Seazen" and "Zhenhua Wang" in Chinese on Baidu. Panel B shows the stock price of Seazen holdings around the event date (July 3, 2019). The sample period is from June 27, 2019 to July 15, 2019.

Second, in most societies, women's smaller body size, lower status, and greater dependence on others' support make them more vulnerable and disadvantaged relative to men. Such experience tends to make women more sensitive to issues of safety and justice, and arouses their empathy for other disadvantaged groups (Eagly et al., 2004; Schwartz and Rubel, 2005).

Third, psychology literature also shows that one usually has stronger cognitive and emotional reactions to the observed experiences of others when one could experience a similar situation (Batson et al., 1996; Loewenstein and Small, 2007). In the context of sex crimes, women (as opposed to men) clearly face a higher likelihood of being the targets, and thus tend to be more

sympathetic to the victims (Lott et al., 1982; Reilly et al., 1992). In other words, women are likely to feel more disturbed than men when seeing another woman being assaulted.

Based on the above discussion, our empirical prediction is: In response to the sex crime, male investors are more likely to hold the firm's stock than female investors.

It is worth noting that, different from Hong and Kacperczyk's (2009) work examining how investors' preferences for sin stocks affect their holdings, this paper examines how investors' attitude toward a sin executive affects their investment decisions. In normal situations, a sin executive is not necessarily the same as a sin stock. However, in our setting, the sin executive is closely related to the firm he works for. As we described above, our focal firm is a family firm, in which the sin executive is the firm's founder, Chairman of the Board, the controlling shareholder, and the father of the firm's CEO at the moment of the sexual harassment in 2019. Even as of April of 2023, the sin executive is still the firm's controlling shareholder, with an ownership of 38.69%, and his son is still the firm's CEO and Chairman of the Board. When the media mentions the sin executive, it will also mention the company together (Fig. 1 Panel A shows that the number of Internet searches of both the company name and the executive name surges at the event date). Therefore, it is almost inevitable for investors to tie the sin executive to his firm. While firms' sin arises from its operation in Hong and Kacperczyk (2009), our study extends their framework by suggesting that firms' sin can also be caused by the sinful personal behavior of their executives.

3. Sample formation and variable construction

Our proprietary data is from the Shanghai Stock Exchange, which records all individuals' trading activities on the stock exchange. Our dataset includes the following two main files: trading and holding. In the trading file, we have account-level trade data that covers security code, encrypted account identifier, trade price, trade volume, trade direction, and the date and time of the trade. The holding file is recorded daily to reflect each account's end-of-day holdings. The holdings variables include encrypted account identifier, date, security code, and holding balance.

Our sample period consists of ten trading days around the scandal: We choose the five trading days before the scandal as the pre-event period and the five trading days after the scandal as the post-event period. Specifically, considering that the scandal was announced on the evening of July 3, 2019 (after the stock market closed), our pre-event period consists of June 27 (Thursday), June 28 (Friday), July 1 (Monday), July 2 (Tuesday), and July 3 (Wednesday), 2019 (henceforth denoted as day −1 to day −5, respectively). Our post-event period consists of July 9 (Tuesday), July 10 (Wednesday), July 11 (Thursday), July 12 (Friday), and July 15 (Monday), 2019 (henceforth denoted as day +1 to day +5, respectively). We do not consider July 4 (Thursday), July 5 (Friday), and July 8 (Monday) as the post-event period because Seazen's stock price reached the down limit (−10%) in these three days and thus investors' trading may not fully reflect their preference (for example, shareholders cannot sell anymore once the stock price reaches the down limit). Our sample includes all individual investors who once held at least one share of Seazen in the ten-day sample period. That is, if an investor always holds zero shares of Seazen during our sample period, she will not be included in the sample. We calculate the average number of shares held by each investor in the pre-event period and in the post-event period. Our final sample consists of a panel of 426,016 person-period observations with 213,008 unique investors (each period corresponds to a span of five trading days).

Table 1 Panel A provides summary statistics. On average, each investor holds 1964 shares of Seazen. Similar to Barber and Odean (2001), we measure turnover as the average of buy volume and sell volume divided by the average portfolio size in the 30 trading days preceding the first day of the sample (i.e., day −5). The average turnover rate is 49.8%, consistent with the view that individual investors are active traders (Barber and Odean, 2013). Portfolio wealth is calculated as the maximum daily amount invested in the stock market by each investor in the 30 trading days before day −5. The average portfolio wealth in our sample is RMB 429 thousand. Investment experience is measured as the number of years since an investor opened her stock trading account. In our sample, investors' average investment experience is 10 years. Portfolio return measures investors' entire portfolio return over the 30 trading days before day −5. These investors generate a positive average portfolio return of 1.707%. Volatility measures the volatility of investors' portfolio returns in the 30 trading days before day −5. The average volatility is 1.4%. About 38.7% of the investors have a Bachelor's degree or above. To minimize the effect of outliers, we winsorize all continuous variables at the 1st and 99th percentiles. Detailed variable definitions are provided in Appendix.

Table 1 Panel B compares the characteristics between male and female investors in the pre-treatment period. Consistent with Barber and Odean (2001), we find that male investors have a higher turnover rate but lower returns than female investors. Moreover, compared to female investors, male investors have a lower value of portfolio wealth (an average of RMB 410 thousand for males vs. RMB 482 thousand for females). In terms of investment experience and portfolio volatility, the two groups are economically comparable. In our sample, male investors are slightly better-educated than female investors: About 40% of male investors have a Bachelor's degree or above, while 34% of female investors do so.

4. Empirical results

4.1. Visual illustration

Fig. 2 shows the holding of Seazen shares by male and female investors during our sample period. We also present the holding of institutional investors for comparison purposes. There are three facts worth highlighting. First, the numbers of shares held by both male and female investors increase after the sex crime, while the shares held by institutional investors decrease. This is consistent

Table 1
Summary statistics.

Panel A: Full sample characteristics					
	Mean	Median	25th Percentile	75th Percentile	Std. Dev
Number of shares	1964	0	80	500	32 678
Male	0.733	1	0	1	0.442
Turnover	0.498	0.194	0.022	0.733	4.164
Portfolio wealth (in thousand RMB)	429	65	17	210	5273
Investment experience	10	9	4	12	7.542
Portfolio return	1.707%	1.619%	−1.318%	6.665%	8.022%
Volatility	0.014	0.014	0.009	0.019	0.008
College	0.387	0	0	1	0.487

Panel B: Comparison of characteristics between male and female investors in the pre-treatment period						
	Male investors		Female investors		Test of differences	
	Mean (1)	Median (2)	Mean (3)	Median (4)	t-test (3)-(1)	Wilcoxon test (4)-(2)
Number of shares	1282	0	2310	0	1028**	0***
Turnover	0.512	0.224	0.307	0.050	−0.205***	−0.174***
Portfolio wealth (in thousand RMB)	410	60	482	82	72***	22***
Investment experience	10	9	11	10	1***	1***
Portfolio return	1.074%	0.934%	3.444%	3.594%	2.370%***	2.660***
Volatility	0.014	0.014	0.015	0.015	0.001***	0.001***
College	0.404	0	0.342	0	−0.061***	0***

This table reports the summary statistics. The sample consists of 426,016 observations over the period June 27, 2019 to July 15, 2019. We obtain data from the Shanghai Stock Exchange. Definitions of all variables are provided in the Appendix. All continuous variables are winsorized at the 1st and 99th percentiles.

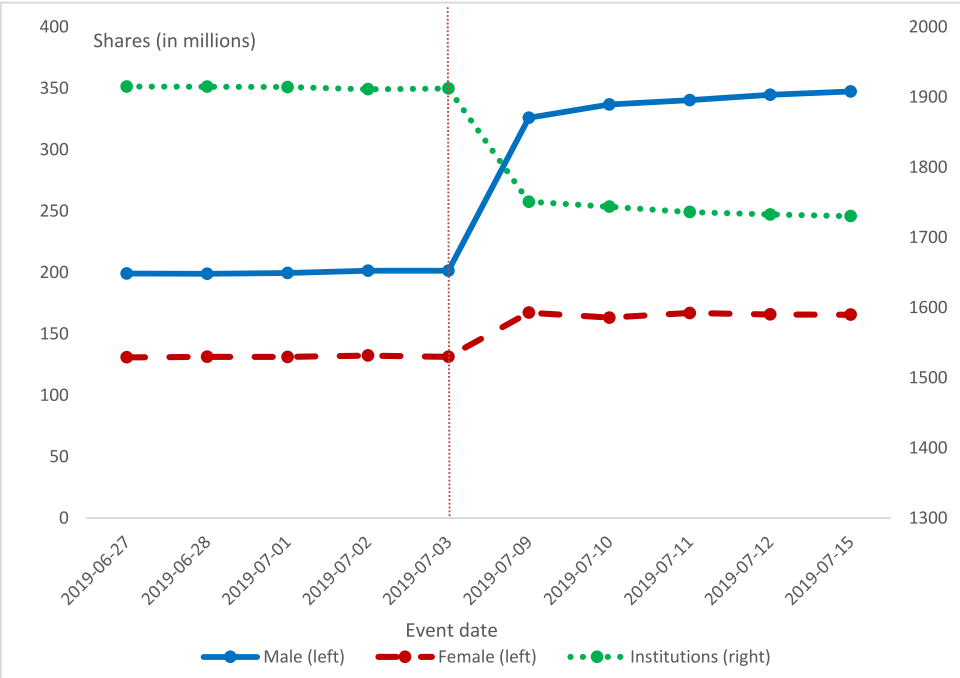
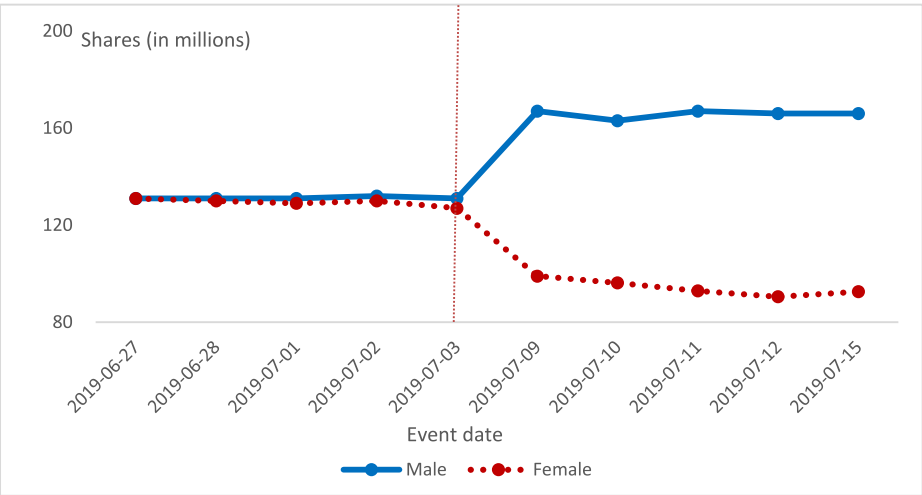


Fig. 2. Number of shares of Seazen holdings held by male, female, and institutional investors. This figure shows the number of Seazen shares held by male, female, and institutional investors around the event date (July 3, 2019). The sample period is from June 27, 2019 to July 15, 2019. July 4 (Thursday), July 5 (Friday), and July 8 (Monday) are excluded from the sample because investors' trading is restricted in these three days as Seazen's stock price reached China's daily lower limit (−10%).

with Hong and Kacperczyk's (2009) view that institutional investors face greater moral constraints than individual investors, as the former is more readily exposed to public scrutiny. This result is also consistent with the view that individual investors on average follow a contrarian style and they tend to buy stocks that have experienced recent price declines (Kaniel et al., 2012; Boehmer et al., 2021). Second, the number of shares held by male investors increases more dramatically than that of female investors. Male investors hold approximately 199 million shares on the first trading day of the pre-treatment period (day −5), and this number increases to approximately 347 million on the fifth trading day of the post-treatment period (day +5): an increase of 74.4% or 148 million

Panel A: Incumbent investors



Panel B: New investors

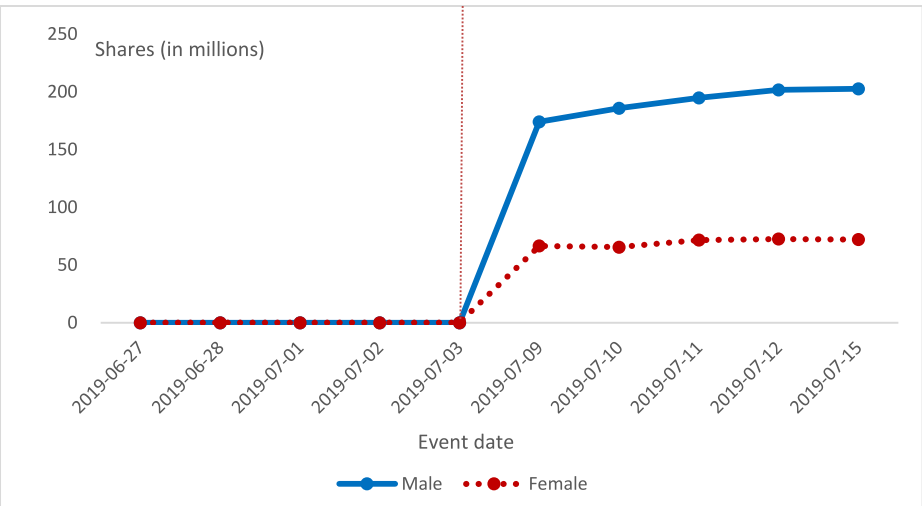


Fig. 3. Number of Seazen shares held by incumbent investors and new investors. Panel A shows the number of Seazen shares held by incumbent male and female investors around the event date (July 3, 2019). Panel B shows the number of Seazen shares held by new male and female investors around the event date. The sample period is from June 27, 2019 to July 15, 2019. In Panel A, an investor is classified as an existing investor if she holds at least one share of Seazen on one of the five trading days in the pre-event period. We match each female investor with replacement to a male one who owns the closest number of shares of Seazen stock on day −1. In Panel B, an investor is classified as a new investor if she does not hold any shares of Seazen on the five trading days in the pre-event period.

shares. In contrast, female investors hold approximately 131 million shares on day −5, and this number increases to approximately 166 million on day +5: an increase of 26.5% or 35 million shares. Thus, male investors are keener on purchasing Seazen stock than female investors, both in relative and absolute terms. Third, the pre-event trend in Seazen stock holding of male investors is parallel to that of female investors, supporting the parallel assumption associated with the difference-in-differences estimation. In summary, Fig. 2 provides a visual illustration that male investors (relative to female investors) are more likely to hold Seazen stock following the sex scandal.

Furthermore, we separately examine the behavior of incumbent investors and new investors. An incumbent investor refers to the one who holds at least one share of Seazen in the pre-treatment period. A new investor refers to the one who holds no Seazen shares in the pre-treatment period and starts to hold Seazen shares only in the post-event period.

Fig. 3 Panel A shows the number of shares of Seazen stock held by the existing male and female investors around the event date. Considering that the number of Seazen shares that an investor could sell depends on the number she owned prior to the sex crime, we match each female investor with replacement to a male one who owns the closest number of Seazen shares on day −1. By doing

so, we ensure that our findings are not driven by the difference in shareholding of Seazen in the pre-event period. As shown in the figure, female investors and their matched male peers own similar shares of Seazen in the pre-event period (about 130 million shares). After the sex crime, male investors buy more Seazen shares, while female investors sell the shares. Specifically, the number of Seazen shares owned by male investors increases from 131 million on day −1 to 167 million on day +5 (an increase of 27%). However, the number of Seazen shares owned by female investors decreases from 129 million on day −1 to 94 million on day +5 (a decrease of 27%).

Fig. 3 Panel B illustrates the number of Seazen shares held by the new male and female investors around the event date. By definition, both the new male and female investors hold zero shares of Seazen in the pre-event period. We find that after the sex crime, new male investors buy more Seazen shares than new female investors. Specifically, the number of Seazen shares owned by new male investors increases from 0 on day −1 to 192 million on day +5. The number of Seazen shares owned by female investors increases from 0 on day −1 to 70 million on day +5.

In summary, following the sex crime, incumbent male investors tend to buy more shares of Seazen, while incumbent female investors tend to sell; new male investors buy more shares of Seazen than new female investors. This result further supports the conjecture about the tradeoff between profits of buying Seazen at a large discount and moral constraints. Incumbent investors already enjoy the utility from higher stock returns. Therefore, the disutility from moral concerns dominates and eventually leads them to reduce shares.

It is worth noting that our results on the trading behavior of incumbent investors could help mitigate the concern that our main results are driven by the gender difference in attention. As shown by Barber and Odean (2008), although attention affects investors' purchase decisions, it hardly affects investors' selling decisions because investors sell only stocks they already own and most investors would pay attention to the stocks they own. Therefore, gender difference in trading behavior among incumbent investors provides further evidence that our results are unlikely driven by the gender difference in attention.

4.2. Baseline regression

To examine the before–after effect of the change in trading behavior for male investors compared to the before–after effect for female investors, we implement a standard difference-in-differences test through the following regression:

$$Ln(Shares) = \alpha_0 + \beta_1 Male \times Post + \beta_2 Post + PersonFE + \varepsilon. \tag{1}$$

The dependent variable is the natural logarithm of one plus the average number of Seazen shares held by an investor in a five-trading-day period (the pre-event period or the post-event period). The indicator variable *Post* takes the value of one for the five-trading-day period after the sex scandal, and zero for the five-trading-day period prior to the sex scandal. We also include the person fixed effect to control for investors' time-invariant characteristics (such as education, profession, financial knowledge, intelligence, experience, or other omitted personal characteristics). Because of person fixed effects, we do not include *Male* in the regression due to the collinearity problem. Throughout the paper, we cluster standard errors by person.

The coefficient of interest in this model is the β_1 coefficient, which captures the differences in the holding of Seazen stock in the male group before and after the event as opposed to the same before–after differences in the female group. It is helpful to consider an example. Suppose we want to estimate the effect of the sex scandal on a person's trading behavior. We can calculate the change in the number of shares held by male investors before and after the event. Then we calculate the same difference in the number of shares held by female investors. Finally, we calculate the difference between these two differences, which represents the incremental effect of the sex scandal on male investors relative to female ones.

Panel A of Table 2 presents the regression results. The coefficient estimates on *Male* × *Post* are positive and statistically significant in all columns. In column (1), we include the full sample in the regression. We find that the coefficient on *Male* × Post is positive and significant at the 1% level, suggesting that male investors hold more shares than do female investors of Seazen after the sex scandal. The coefficient on *Male* × Post is 1.645 and is significant at the 1% level (t-statistics is more than 57).[9] The economic magnitude is sizable: The increase in the number of Seazen shares held by male investors is four times more than ($= e^{1.645} - 1 = 4.18$) that for female investors.

Considering that an investor's social preference is less likely to be revealed through her stock trading behavior if she seldom trades, we further exclude inactive traders. We define inactive investors as the ones who make no trading in our ten-trading-day sample period. As reported in column (2), the results after excluding inactive traders are comparable to those in column (1): The coefficient on *Male* × Post is 1.339 and is significant at the 1% level.

Hong et al. (2008) show that corporate insiders tend to be buyers of last resort for their own stocks, especially after some substantial stock price drop. Thus, our findings could be due to the possibility that Seazen's insiders (who happen to be male) act as buyers of last resort and purchase a large number of the firm's shares after the scandal. To investigate this concern, we exclude both inactive traders and large traders from the full sample, where large traders are defined as those whose number of shares traded for Seazen in the post-event period is in the top 5% of our sample. The results are presented in column (3) and are similar to those in column (1): The coefficient on *Male* × Post is 1.328 and remains statistically significant at the 1% level.

[9] It is worth noting that our t-statistics are comparable to existing studies based on a similar size of sample. For example, Grinblatt et al. (2012) use a sample of 1,252,010 observations to study the relation between propensity to sell and holding-period return and their corresponding t-statistics are around 45 (see their Table 2). Boehmer et al. (2021) use a sample of 4.6 million observations to study the effect of stock return on retail order imbalance and their corresponding t-statistics are around 150 (see their Table 2).

Table 2
Baseline regression.

Panel A: All investors			
	(1) Full sample	(2) Excluding inactive traders	(3) Excluding inactive traders and large traders
Male × Post	1.645*** (57.706)	1.339*** (41.386)	1.328*** (41.250)
Post	2.818*** (109.225)	3.443*** (114.879)	3.344*** (11.871)
Constant	1.482*** (263.314)	0.933*** (159.102)	0.891*** (153.801)
Person FE	Yes	Yes	Yes
Adj_R^2	0.356	0.342	0.341
No. of observations	426,016	384,332	365,680
Panel B: Incumbent investors			
	(1) All incumbent investors	(2) Excluding inactive traders	(3) Excluding inactive traders and large traders
Male × Post	−0.052 (−1.236)	0.207*** (2.963)	0.201*** (2.863)
Post	−1.704*** (−56.471)	−3.557*** (−70.042)	−3.602*** (−68.857)
Constant	6.827*** (643.629)	7.097*** (406.715)	6.800*** (387.766)
Person FE	Yes	Yes	Yes
Adj_R^2	0.414	0.423	0.417
No. of observations	83,688	42,068	38,002
Panel C: New investors			
	(1) All new investors		(2) Excluding large traders
Male × Post	0.245*** (11.379)		0.258*** (12.094)
Post	5.226*** (261.841)		5.067*** (255.027)
Constant	0.183*** (47.660)		0.184*** (48.860)
Person FE	Yes		Yes
Adj_R^2	0.728		0.733
No. of observations	342,328		325,212

This table reports the difference-in-differences tests that examine the effect of the sex crime on individual investors' trading behavior. The dependent variable is *Ln (Shares)*, the natural logarithm of one plus the average number of Seazen shares held by an investor in a five-trading-day period. The indicator variable *Post* takes the value of one for the five-trading-day period after the sex crime (i.e., the post-event period), and zero for the five-trading-day period before the sex crime (i.e., the pre-event period). The indicator variable *Male* takes the value of one if the investor is a male, and zero if the investor is a female. Panel A focuses on all investors. Panel B focuses on incumbent investors, defined as those holding at least one share of Seazen in the pre-event period. Panel C focuses on new investors, defined as those who do not hold any shares of Seazen in the pre-event period. Inactive traders refer to those who have made no trading during our sample period. Large traders refer to those whose number of Seazen shares traded in the post-event period is within the sample's top 5%. All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics based on robust standard errors clustered by person are in parentheses. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

It is worth noting that the coefficients on *Post* are positive and significant at the 1% level in all columns, indicating that both male and female investors increase their holding of Seazen stock after the sex crime (consistent with Fig. 2). This finding indicates a tension between profits and moral constraints. On the one hand, both male and female investors realize the opportunity to buy the Seazen stock at a heavy discount. On the other hand, moral constraints prevent them from doing so. Because women are less tolerant of sex crimes and thus face tighter moral constraints, they increase their holdings by a smaller magnitude than men.

In Panels B and C, we only focus on incumbent investors and new investors, respectively. The regression specification in these two panels is the same as that in Panel A.[10] The coefficients on *Male* × Post are positive and significant at the 1% level in all specifications (except for column (1) of Panel B). These results from regression analysis are consistent with Figs. 2 and 3.

Taken together, these results indicate that males tend to hold more Seazen stock than do female investors after the sex scandal. These findings are consistent with our hypothesis that males are more tolerant of sex crimes than females.

[10] We remove the analysis of excluding inactive traders in Panel C, because new investors, by definition, are not inactive traders.

4.3. Pre-trend test

The validity of difference-in-differences tests depends on the parallel trends assumption: Absent the sex scandal, male investors' holding of Seazen would have evolved in the same way as that of female investors. To be precise, the parallel trends assumption does not require the number of shares held by the male and female groups to be identical in the pre-event period. Instead, this assumption requires a similar trend in stock holding during the pre-event period for both groups. We estimate the following regression:

$$\begin{aligned} Ln(Shares) = {} & \alpha_0 + \alpha_4 Male \times Before4 + \alpha_3 Male \times Before3 + \alpha_2 Male \times Before2 + \alpha_1 Male \times Before1 + \beta_1 Male \times Post1 \\ & + \beta_2 Male \times Post2 + \beta_3 Male \times Post3 + \beta_4 Male \times Post4 + \beta_5 Male \times Post5 + \gamma_4 Before4 + \gamma_3 Before3 \\ & + \gamma_2 Before2 + \gamma_1 Before1 + \delta_1 Post1 + \delta_2 Post2 + \delta_3 Post3 + \delta_4 Post4 + \delta_5 Post5 + PersonFE + \varepsilon. \end{aligned} \tag{2}$$

That is, to compare the pre-treatment trend between male and female investors, we re-estimate the baseline specification in Eq. (1) by replacing the indicator *Post* with nine new indicator variables: *Before4*, *Before3*, *Before2*, *Before1*, *Post1*, *Post2*, *Post3*, *Post4*, and *Post5*. These variables indicate the trading days relative to the sex scandal. For example, *Before4* indicates the fourth trading day before the scandal (i.e., day −4), while *Post5* indicates the fifth trading day after the scandal (i.e., day +5). Other indicator variables are defined similarly. The fifth trading day before the scandal (i.e., day −5) is the baseline day, and thus *Before5* is not included in the regression. The unit of observation in this analysis is at the person-day level and thus we have 2,130,080 person-day observations (=426,016 × 5) in this pre-trend test.

The coefficients on *Male* × *Before4*, *Male* × *Before3*, *Male* × *Before2*, and *Male* × *Before1* are especially important because their magnitudes indicate whether there is any difference in the trend of the stock holding between male and female investors prior to the sex scandal. Column (1) of Table 3 presents the results based on the full sample. The four coefficients α_4 to α_1 are tiny in magnitude: −0.006, 0.014, 0.004, and 0.034, respectively. In contrast, the magnitudes of the coefficients on *Male* × *Post1*, *Male* × *Post2*, *Male* × *Post3*, *Male* × *Post4*, and *Male* × *Post5* are about 100 times as large: 1.134, 1.116, 1.060, 1.111, and 1.017, respectively. These results indicate that the pre-trend in stock holding is economically indistinguishable between the male and female groups and that the gender difference shows up after the event. These results are also consistent with the pattern illustrated in Fig. 2.

It is also worth noting that although the coefficients on *Male* × *Before4* `to` *Male* × *Before1* are economically negligible, they are statistically significant. The reason is that we have a large number of observations (more than 2 million) in the regression and thus even a tiny variation can be statistically significant. Therefore, one should focus on economic significance rather than statistical significance in our study.

In columns (2) and (3), we re-estimate Eq. (2) based on the subsample excluding inactive traders and large traders, respectively (similar to Table 2), and we obtain very similar results: The coefficients on *Male* × *Before4* - *Male* × *Before1* are trivial in magnitude, while the coefficients on *Male* × *Post1* - *Male* × *Post5* are significantly positive and about 100 times as large in magnitude.

In summary, we find that the male group and the female group share a similar trend in the stock holding of Seazen prior to the event, thus supporting the parallel trends assumption for the difference-in-differences test. Moreover, the absence of significant lead effects indicates that the raping event in our sample is unlikely anticipated by individual investors.

4.4. Heterogeneous treatment effect

To provide further evidence that our main results are indeed due to the gender difference in tolerance of sex crimes, in this subsection we examine heterogeneous treatment effects. By doing so, we can further mitigate the concern that some omitted variables are driving our results, as such variables would need to be uncorrelated with all the control variables in the regression and would also need to explain the cross-sectional variation in the treatment effect. Existing literature shows that it is less likely to have an omitted variable correlated with the interaction term than with the linear term (e.g., Claessens and Laeven, 2003; Raddatz, 2006).

If our treatment effect is due to the gender difference in tolerance of sex crimes, we expect the treatment effect to be stronger among females who are more averse to sex crimes. Considering that women with higher social and economic status are more likely to hold feminist beliefs and egalitarian attitudes, and therefore are particularly intolerant of sex crimes (see, e.g., Morgan, 1996; Ex and Janssens, 1998), we explore three possible sources of heterogeneity in the treatment effect.

In column (1) of Table 4, we define the indicator variable *Rich* as taking the value of one if the investor's portfolio wealth is above the sample median, and zero otherwise. We add the three-way interaction *Male* × *Post* × *Rich*, and estimate the following regression:

$$Ln(Shares) = \alpha_0 + \alpha_1 Male \times Post \times Rich + \alpha_2 Male \times Post + \alpha_3 Post \times Rich + \alpha_4 Male \times Rich + \alpha_5 Post + \alpha_6 Rich + PersonFE + \varepsilon. \tag{3}$$

The coefficient on the *Male* × *Post* × *Rich* is positive and significant at the 1% level, indicating that the gender difference is greater between richer women and men. Specifically, the coefficient on *Male* × *Post* is 1.343 and the coefficient on *Male* × *Post* × *Rich* is 0.547; both are significant at the 1% level. The gender difference in holding Seazen's shares between richer women and men is about 41% (=(0.547 + 1.343)/1.343 − 1) larger than that between poorer women and men.

In column (2), we define the *College* indicator as taking the value of one if the investor has a Bachelor's degree or higher, and zero otherwise. We re-estimate Eq. (3) by replacing the *Rich* indicator with the *College* indicator. The coefficient on *Male* × *Post* is 1.578 and the coefficient on *Male* × *Post* × *College* is 0.124; both are statistically significant. The gender difference in holding Seazen's shares between well-educated women and men is about 8% (= (0.124 + 1.578)/1.578 − 1)) larger than that between poorly-educated women and men.

Table 3
Pre-trend test.

	(1) Full sample	(2) Excluding inactive traders	(3) Excluding inactive traders and large traders
Male × Before4	−0.006**	−0.010***	−0.009***
	(−2.146)	(−3.796)	(−2.784)
Male × Before3	0.014***	−0.014***	0.019***
	(3.116)	(−3.093)	(3.294)
Male × Before2	0.004	−0.029***	0.005
	(0.756)	(−5.181)	(0.714)
Male × Before1	0.034***	0.006	0.043***
	(4.764)	(0.730)	(4.903)
Male × Post1	1.134***	0.944***	0.965***
	(54.318)	(39.286)	(39.748)
Male × Post2	1.116***	0.898***	0.910***
	(51.524)	(36.055)	(36.198)
Male × Post3	1.060***	0.825***	0.843***
	(47.735)	(39.294)	(32.676)
Male × Post4	1.111***	0.879***	0.899***
	(49.306)	(33.877)	(34.293)
Male × Post5	1.017***	0.789***	0.810***
	(45.206)	(30.393)	(30.808)
Before4	0.008***	0.016***	0.011***
	(3.132)	(6.354)	(3.554)
Before3	−0.017***	0.034***	−0.023***
	(−4.056)	(7.996)	(−4.363)
Before2	0.009*	0.066***	0.008
	(1.769)	(12.522)	(1.220)
Before1	−0.010	0.043***	−0.020**
	(−1.499)	(5.764)	(−2.403)
Post1	1.589***	1.997***	1.876***
	(87.148)	(92.545)	(85.934)
Post2	1.765***	2.212***	2.092***
	(92.914)	(98.576)	(92.159)
Post3	1.854***	2.321***	2.212***
	(94.908)	(100.614)	(94.856)
Post4	1.859***	2.327***	2.227***
	(93.661)	(99.189)	(93.802)
Post5	1.788***	2.240***	2.171***
	(90.241)	(95.501)	(91.166)
Constant	1.374***	0.830***	0.772***
	(338.415)	(195.636)	(176.923)
Person FE	Yes	Yes	Yes
Adj_R^2	0.479	0.402	0.383
No. of observations	2,130,080	1,921,660	1,828,400

This table reports the results for the pre-trend test. The dependent variable is *Ln (Shares)*, the natural logarithm of one plus the average number of Seazen shares held by an investor on a given trading day. The indicator variables *Before4—Before1* and *Post1—Post5* indicate the trading days relative to the sex scandal. For example, *Before4* indicates the fourth trading day before the scandal (i.e., day −4), while *Post5* indicates the fifth trading day after the scandal (i.e., day +5). Inactive traders refer to those who have made no trading during our sample period. Large traders refer to those whose number of Seazen shares traded in the post-event period is within the sample's top 5%. All continuous variables are winsorized at the 1st and 99th percentiles. Robust t-statistics based on standard errors clustered by person are in parentheses. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

In column (3), we use a province-level newborn male-to-female ratio (hereafter referred to as sex ratio at birth) to measure the gender equality in a given area. While the sex ratio at birth (left to nature) is generally about 100 to 105 boys per 100 girls, China has a significantly higher sex ratio at birth (approximately 115 boys per 100 girls) and a sizeable variation across different provinces (Attané, 2009; Gao et al., 2016). The high sex ratio at birth in China is due to sex-selective abortions and infanticide and reflects a strong gender inequality in social norms (Scharping, 2003; Zhu et al., 2009). Therefore, we expect that women in areas with a low sex ratio at birth (i.e., areas with greater gender equality) are more likely to hold feminist beliefs and are more averse to sex crimes. We define the *Low sex ratio* indicator as taking the value of one if the investor lives in a province with a sex ratio at birth below the sample median, and zero otherwise. We re-estimate Eq. (3) by replacing the *Rich* indicator with the *Low sex ratio* indicator. The coefficient on *Male* × *Post* × *Low sex ratio* is positive and significant at the 5% level, indicating that our treatment effect in areas with greater gender equality is greater than that in areas with poorer gender equality.

Table 4
Heterogeneous treatment effects.

	(1) Wealth	(2) Education	(3) Sex ratio at birth
Male × Post × Rich	0.547*** (9.759)		
Male × Post × College		0.124** (2.168)	
Male × Post × Low sex ratio			0.122** (2.035)
Male × Post	1.343*** (38.947)	1.578*** (37.021)	1.558*** (32.450)
Rich × Post	−0.574*** (−11.401)		
College × Post		−0.210** (−4.046)	
Low sex ratio × Post			−0.266*** (−4.895)
Post	3.133*** (97.728)	2.939*** (76.416)	2.995*** (67.887)
Constant	1.482*** (263.530)	1.482*** (263.356)	1.482*** (263.389)
Person FE	Yes	Yes	Yes
Adj_R^2	0.357	0.356	0.356
No. of observations	426,016	426,016	426,016

This table presents the triple difference-in-differences test to examine heterogeneous treatment effects. The regression specification is the same as column (1) of Table 2 Panel A, except that we add the three-way interaction term *Male* × *Post* × *Rich, Male* × *Post* × *College,* and *Male* × *Post* × *Low sex ratio* in columns (1)–(3), respectively. The dependent variable is *Ln (Shares)*, the natural logarithm of one plus the average number of Seazen shares held by an investor in a five-trading-day period. In column (1), the indicator variable *Rich* takes the value of one if the investor's portfolio wealth is above the sample median, and zero otherwise. In column (2), the indicator variable *College* takes the value of one if the investor has a Bachelor's degree or above, and zero otherwise. In column (3), the indicator variable *Low sex ratio* takes the value of one if the sex ratio at birth of the province is below the sample median, and zero otherwise. Variable definitions are provided in the Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics based on robust standard errors clustered by person are in parentheses. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

In summary, the cross-sectional variations in the treatment effects show that the effect of sex crimes on individual investors' trading behavior is indeed tied to the proxies of individuals' feminist beliefs. Specifically, our main findings are more pronounced for wealthier women, better-educated women, and women living in areas with greater gender equality.

4.5. Matched sample analysis

Barber and Odean (2001) show that male investors tend to trade more frequently than female investors. Thus, it is possible that our main finding is simply due to the gender difference in trading frequency.[11] To investigate this possibility, we form a matched sample by matching each female investor with replacement to a male one who has the closest turnover in the stock portfolio in the 30-trading-day period preceding the event date.[12] We then re-estimate Eq. (1) using this turnover-matched sample. As reported in column (1) of Table 5, the coefficient on *Male* × Post is 1.056 and significant at the 1% level, indicating that male investors increase their stock holding of Seazen by 1.87 ($= e^{1.056} - 1$) times more than their turnover-matched female peers.

Moreover, to address the possibility that our results are driven by the gender differences in wealth (i.e., male investors buy more Seazen shares simply because they are richer), we further match each female investor with replacement to a male investor who has the closest portfolio wealth in the 30-trading-day period preceding the event date. As reported in column (2) of Table 5, the coefficient on *Male* × Post is 1.449 and is significant at the 1% level. This result indicates that our main results are unlikely to be driven by the gender differences in wealth.[13]

Another concern could be that our main results are driven by the gender difference in investment skills. If male investors are more skillful than female ones at identifying investment opportunities, one could also expect to observe a greater holding of Seazen stock by male investors following the sex crime (if investors believe that Seazen becomes undervalued after the stock price plunges). It is worth noting that this concern is unlikely because female investors' portfolio returns are about three times as large as those of male investors (see Table 1 Panel B). Nonetheless, following Coval et al. (2005) and Che et al. (2009), we use investors' portfolio return as the proxy for their investment skill, and we match each female investor with replacement to a male one who has the

[11] *Ex ante*, this alternative explanation could also predict that male investors hold fewer Seazen shares following the sex crime, as male investors could sell shares more frequently than female ones.

[12] The average (median) turnover rate is 0.275 (0.073) for the male group and 0.280 (0.073) for the female group, respectively, indicating that the gender difference in turnover rate is indeed indistinguishable in this matched sample.

[13] Moreover, our Table 1 Panel B indicates that in our sample female investors are actually slightly wealthier than male investors.

Table 5
Matched sample.

	(1) Turnover-matched sample	(2) Wealth-matched sample	(3) Portfolio return-matched sample	(4) Volatility-matched sample	(5) Propensity score-matched sample
Male × Post	1.056***	1.449***	1.218***	1.848***	1.257***
	(30.794)	(42.653)	(35.651)	(62.224)	(37.165)
Post	2.818***	2.818***	2.818***	2.818***	2.818***
	(109.145)	(109.167)	(109.144)	(109.254)	(109.169)
Constant	2.162***	2.004***	2.079***	1.522***	2.060***
	(252.290)	(235.965)	(243.402)	(226.975)	(243.598)
Person FE	Yes	Yes	Yes	Yes	Yes
Adj_R^2	0.234	0.252	0.241	0.357	0.249
No. of observations	227,620	227,620	227,620	227,620	227,620

The regression specification is the same as column (1) of Table 2 Panel A, except that we use matched samples. The dependent variable is *Ln (Shares)*, the natural logarithm of one plus the average number of Seazen shares held by an investor in a five-trading-day period. In column (1), we match each female investor with replacement to a male one who has the closest turnover in their stock portfolio in the 30 trading days preceding the event date. In column (2), we match each female investor with replacement to a male one who has the closest portfolio wealth in the 30 trading days preceding the event date. In column (3), we match each female investor with replacement to a male one who has the closest portfolio return in the 30 trading days preceding the event date. In column (4), we match each female investor with replacement to a male one who has the closest volatility of portfolio returns in the 30 trading days preceding the event date. In column (5), we conduct a propensity-score matching to match each female investor to a male investor. The variables we use in matching are *Turnover*, *Ln(Portfolio wealth)*, *Portfolio return,* and *Volatility*. Variable definitions are provided in the Appendix. All continuous variables are winsorized at the 1st and 99th percentiles. T-statistics based on robust standard errors clustered by person are in parentheses. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

closest portfolio return in the 30 trading days preceding the event date. As reported in column (3) of Table 5, the coefficient on *Male* × Post is 1.218 and significant at the 1% level. This result indicates that our main results are unlikely to be driven by any gender difference in investment skills.

Existing literature shows that males tend to take more risks than females (Eckel and Grossman, 2008; Croson and Gneezy, 2009). Considering that buying a stock associated with sex crimes is a risk-taking behavior, our main results could be driven by the gender difference in risk preferences. We use the volatility of portfolio returns as the proxy for investors' risk preferences and match each female investor with replacement to a male one who has the closest portfolio volatility in the 30-trading-day period preceding the event date. As reported in column (4) of Table 5, the coefficient on *Male* × Post is 1.848 and significant at the 1% level, indicating that male investors are more likely to hold Seazen stock following the sex crime than their risk-preference-matched female peers.

Finally, we also employ a propensity-score matching method as a robustness check. Specifically, we employ a one-to-one nearest neighbor matching without replacement (Heckman et al., 1997). The matching starts with a probit regression where the *Male* indicator variable is the dependent variable. The variables we use to match are *Turnover*, *Ln (Portfolio wealth)*, *Portfolio return,* and *Volatility*. Then, using the predicted probabilities – propensity scores – from the estimated probit regressions, we match each male investor to a female investor that minimizes the absolute value of the difference between propensity scores. We then re-estimate Eq. (1) using this propensity-score-matched sample. Column (5) of Table 5 reports the results. The coefficient on *Male* × Post is 1.257 and significant at the 1% level, indicating that male investors are more likely to hold Seazen stock following the sex crime than their propensity-score-matched female peers.

Taken together, the gender difference in tolerance of sex crimes documented in our main finding is unlikely explained by the gender difference in stock trading frequency, wealth, investment skill or risk preferences.

4.6. Placebo tests: Other negative but non-sexually-related events

Our main results could be driven by the gender differences in other unobservable aspects rather than the tolerance of sex crimes. An example of such differences can be the gender difference in the overall moral standard. Existing literature on economics and social psychology finds that women generally have stronger social preferences and feel more responsible for the well-being of others than men (Beutel and Marini, 1995; Adams and Funk, 2012). Thus, it is possible that females are less tolerant of any improper behavior (regardless of whether or not it is sexually-related) and that there is little special about sex crimes.

A second example could be the gender difference in attention to news. Bimber (1999) and Benesch (2012) find that women usually spend less time consuming news than men. Thus, it is possible that female investors do not pay enough attention to the sex crime news of Seazen and thus do not buy the firm's shares following the crime.

A third example could be that males tend to be contrarian investors, who usually target distressed stocks. In this case, male investors may naturally buy more Seazen stock after its significant price drop caused by the sex crime.

We implement a placebo test to investigate these possibilities. We select pseudo-events based on the following two steps. First, from all stocks listed in the Shanghai Stock Exchange in the period July 1, 2015–July 3, 2020 (i.e., the five-year period prior to our event date), we select the stocks that also reach the down limit (−10%) for three consecutive trading days. Second, we search for the firm-specific news leading to the stock price drop and require that the news is unrelated to any sex scandals.[14] In total, we identify

[14] In fact, for all these negative events that we can clearly identify in the news, none of them is related to a sex scandal.

Table 6
Pseudo-events: Negative but non-sexually-related news.

	Number	Percentage	Average coefficient on *Male* × *Post*
Accounting fraud	2	9.09%	0.738
Earnings lower than expectation	11	50.00%	
M&A failed	8	36.36%	0.472
Unpromising investment plan	1	4.55%	
Total	22	100%	0.496

We select pseudo-events based on the following two steps. First, from all stocks listed in the Shanghai Stock Exchange in the period July 1, 2015–July 3, 2020 (i.e., the five-year period prior to our event date), we select the stocks that also reach the down limit (−10%) for three consecutive trading days. Second, we search for the firm-specific news leading to the stock price drop. In total, we identify 22 such pseudo-events. This table presents the nature of these events and the average value of the treatment effect for each category of these pseudo-events. None of these events is related to sex scandals.

22 pseudo-events. Table 6 presents the nature of these events. Among them, eleven cases are due to announced earnings being significantly lower than expectation; eight cases are due to failed mergers and acquisition plans; two cases are due to the detection of financial frauds; one case is due to the announcement of an unpromising investment plan. Based on these pseudo-events, we re-estimate column (1) of Table 2 Panel A and save the 22 coefficients on *Male* × *Post*. If our main findings are driven by the gender difference in aspects like general moral standard (rather than the tolerance of sex crimes *per se*) or attention to news or contrarian investment style, we would expect to observe similar findings based on these pseudo-events. Table 6 also reports the average values of the coefficients on *Male* × *Post* for these different types of events.

The average value of these coefficients is 0.496, much smaller than the actual coefficient of 1.645 on *Male* × *Post* (see column (1) of Table 2 Panel A). Among these pseudo-events, financial fraud concerns moral issues, while others do not. For this reason, we separately report the coefficients on *Male* × *Post* for financial frauds and other events. The average value of the coefficient for the two fraud cases is 0.738, which is less than half the actual coefficient of 1.645 but is almost 1.5 times as large as that for other pseudo-events (0.472). This finding suggests that the moral issue concerning financial fraud is associated with greater gender difference in stock trading than other negative non-moral-related events. However, the gender difference in attitudes toward sex crimes (which is directly related to gender) is still larger than the gender difference in attitudes toward financial frauds (which is moral-related but not directly related to gender).

In summary, the placebo test provides support that our main finding is driven by the gender difference in tolerance of sex crimes rather than the gender difference in other unobservable aspects (such as tolerance of any improper behavior, attention to news, or contrarian strategy).

5. Additional investigation

5.1. Placebo tests: Possibility of chance

It is possible that our results are purely driven by chance: Male investors happen to buy more Seazen stock after the event date without particular reasons. We implement another placebo test to investigate the possibility. Specifically, we treat the 100 trading days prior to June 27, 2019 (i.e., day −5) as the pseudo-event day. We re-estimate column (1) of Table 2 Panel A based on these 100 pseudo-event dates. Then, we save the 100 coefficients on *Male* × *Post*. That is, we investigate the gender difference in trading Seazen stock during the 100 trading days prior to the sex crime.

Fig. 4 plots the distribution of the coefficients on *Male* × *Post*. The mean of the distribution is 0.014, indicating that the pseudo-events have little impact on the gender difference in trading Seazen stock (i.e., there is little difference among male and female investors for trading Seazen during normal days). Moreover, the actual coefficient on *Male* × *Post* is 1.645 (see column (1) of Table 2 Panel A), which is more than twelve times the standard deviation (0.127) above the mean of the distribution and is more than four times as large as the maximum coefficient estimate (0.334). This result indicates that our results are unlikely driven by chance.

5.2. Returns of trading Seazen after the sex scandal

In the previous sections, we present evidence that female investors are less tolerant of sex crimes than male investors. A related question is: Does such a moral preference reduce female investors' profitability in stock trading? To investigate this question, we focus on investors' transactions on Seazen stock in the post-event period (i.e., day +1 to day +5). Based on the "first in, first out" accounting principle, we compute each investor's gains and losses of her transactions based on the transaction price and the closing price on trading day +10, trading day +100, and trading day +150 after the sex crime, respectively. The following example illustrates our method. Suppose that an investor makes two transactions: purchasing 150 shares at RMB 10 per share on day +1 and selling 50 shares at RMB 11 per share on day +2. Suppose that the closing price on day +10 is RMB 12 per share. Then, the return is 10% (=(11−10)/10) for the sold 50 shares and 20% (=(12—10)/10) for the remaining 100 shares. Finally, the return for this investor trading Seazen (based on the closing price on trading day +10) is 16.67% ($=10\% \times \frac{50\times10}{150\times10} + 20\% \times \frac{100\times10}{150\times10}$). Similarly, we compute the return for this investor trading Seazen based on the closing price on trading day +100 and trading day +150, respectively.

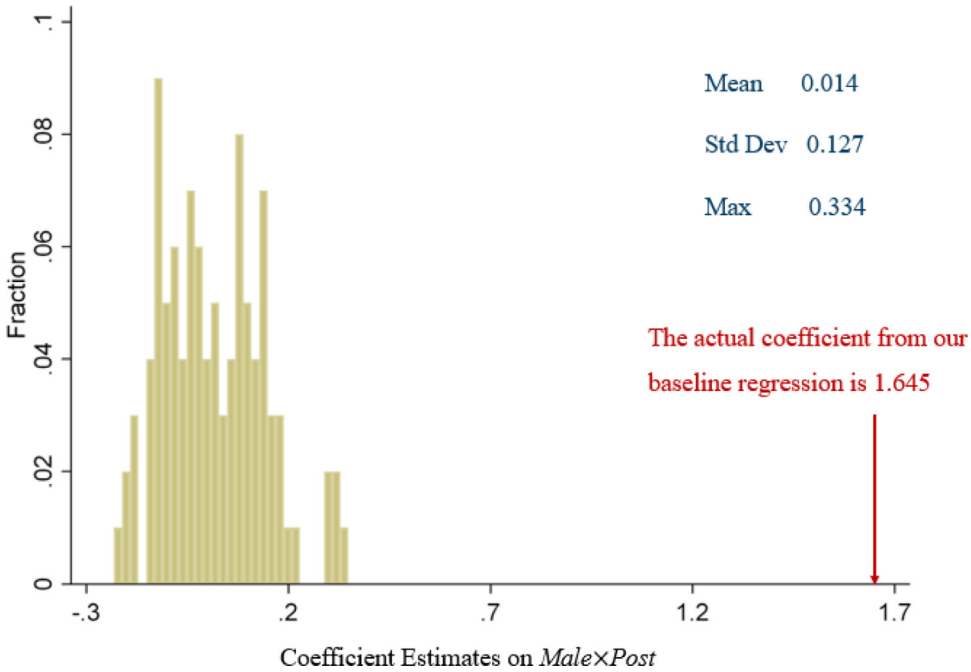


Fig. 4. Placebo tests based on Pseudo-Event Day. This figure shows a histogram of the coefficients on *Male* × *Post* from the placebo tests based on pseudo-event dates. We treat the 100 trading days prior to June 27, 2019 (the first day in our sample period) as the pseudo-event dates, and re-estimate the regression model in Table 2 Panel A column (1) 100 times accordingly. We save the corresponding 100 coefficients on *Male* × *Post*. This figure reports the distribution of these coefficients.

Our second measure of performance is the market-adjusted return, which is computed as subtracting the market return from the return of trading Seazen. The market index is based on the value-weighted index of all stocks listed on the Shanghai and Shenzhen Stock Exchanges.

Furthermore, we follow Barber and Odean (2001) to compute the own-benchmark-adjusted return by subtracting the own-benchmark return from the return of trading Seazen. The own-benchmark is the beginning-period portfolio, excluding Seazen, held by a given individual investor measured on day −1, which represents the return the individual would have earned by holding her beginning-period portfolio. As pointed out by Barber and Odean (2001), the advantage of the own-benchmark-adjusted measure is that it does not adjust returns according to a particular risk model. Considering that no model of risk is universally understood by individual investors, the own-benchmark measure allows each individual to self-select the investment style and risk profile of her benchmark (i.e., her own pre-existing portfolio), thus highlighting the effect of trading Seazen on performance. In other words, the own-benchmark-adjusted return could better capture the effect of moral constraints on stock trading profitability after adjusting each individual's normal trading pattern.

Panel A of Table 7 presents the results. Male investors gain higher returns by trading Seazen than female investors. The differences are both statistically and economically significant. Take the 150-trading-day window as an example: The average raw return of male investors is 8.91%, while the corresponding number for female investors is only 6.98% (i.e., a difference of 1.93% during 150 trading days). Similarly, the gender differences in market-adjusted return and own-benchmark-adjusted return are 3.20% and 1.91%, respectively.

To provide further evidence that males' higher return of trading Seazen is not due to their better investment skill, we examine the return of trading Seazen by institutional investors. Compared to individual investors, institutional investors have better investment skills and are more morally constrained (Hong and Kacperczyk, 2009). If institutional investors also underperform male individual investors, then our results are more likely driven by social norm constraints rather than investment skills.

Similar to Panel A, we calculate institutional investors' raw return, market-adjusted return, and portfolio-adjusted return over the 10-trading-day, 100-trading-day, and 150-trading-day windows. All returns are negative and much lower than the corresponding number for either male or female individual investors. Taking the 100-trading-day window as an example, the average raw return of institutional investors is −6.27%, which is significantly lower than the corresponding number for male (8.49%) or female investors (6.69%). This finding suggests that institutional investors sacrifice monetary profits for their moral preferences. The behavior of institutional investors is closer to that of female individual investors than that of male individual investors; these findings suggest that the gender difference in trading Seazen is likely due to the difference in tolerance of sex crimes rather than the difference in investment skills.

The profit numbers calculated above, however, are not only driven by investors' initial trading decisions, but also contaminated by investors' holding horizon. For example, two investors purchased the same number of stocks during the five days after the

Table 7
Returns of trading Seazen shares following the sex crime.

Panel A: Female investors vs. male investors

	Closing price on trading day +10				Closing price on trading day +100				Closing price on trading day +150			
	Male (a)	Female (b)	Difference (a)–(b)	*t-stat* of the difference	Male (a)	Female (b)	Difference (a)–(b)	*t-stat* of the difference	Male (a)	Female (b)	Difference (a)–(b)	*t-stat* of the difference
Raw return	2.04%	1.71%	0.33%	12.55	8.49%	6.69%	1.80%	23.86	8.91%	6.98%	1.93%	24.34
Market-adjusted return	2.60%	2.40%	0.20%	7.17	7.97%	6.10%	1.87%	25.15	1.76%	−1.44%	3.20%	48.35
Own-benchmark-adjusted return	4.05%	3.55%	0.50%	14.21	10.03%	8.49%	1.54%	15.14	3.57%	1.66%	1.91%	13.29

Panel B: Institutional investors

	Closing price on trading day +10	Closing price on trading day +100	Closing price on trading day +150
Raw return	−1.35%	−6.27%	−6.59%
Market-adjusted return	−0.55%	−6.92%	−16.14%
Portfolio-adjusted return	−0.18%	−6.90%	−16.07%

Panel C: Time-series return regressions

		Alpha (in %)	Mktprem	SMB	HML
100 days	Seazen-Peer	0.453**	−0.384		
		(2.488)	(−1.461)		
	Seazen-Peer	0.459**	−0.481*	0.346	
		(2.524)	(−1.940)	(0.911)	
	Seazen-Peer	0.480**	−0.457*	0.424	0.302
		(2.628)	(−1.831)	(1.044)	(0.611)
150 days	Seazen-Peer	0.283*	0.0481		
		(1.901)	(0.375)		
	Seazen-Peer	0.302**	0.180	−0.595	
		(1.981)	(0.990)	(−1.283)	
	Seazen-Peer	0.264*	0.150	−0.711	−0.498
		(1.807)	(0.949)	(−1.384)	(−1.059)

This table reports the raw return, market-adjusted return, and own-benchmark-adjusted return of trading Seazen shares after the event date for individual investors and institutional investors. We focus on investors' transactions on Seazen stock in the post-event period (i.e., day +1 to day +5). For each investor, we compute her raw returns based on the transaction price and the closing price on trading day +10, trading day +100, and trading day +150 after the sex crime, respectively. The market-adjusted return is computed by subtracting the market index return from the raw return of trading Seazen. The own-benchmark-adjusted return is computed by subtracting the own-benchmark return from the raw return of trading Seazen, where the own-benchmark is the beginning-period portfolio excluding Seazen held by an individual investor measured at the trading day prior to the sex crime (i.e., day −1). Panel A presents the results on male and female individual investors; Panel B presents the results on institutional investors. Panel C reports the results for the time-series regressions of *Seazen-Peer* on a host of well-known factors for both the 100-trading-day and 150-trading-day period after the event. The dependent variable *Seazen-Peer* is the daily return of Seazen, net of the daily return of a comparable stock matched using propensity-score-matching method. The variables we use in matching are ROE and market capitalization at the fiscal year end before the crime. *Mktprem* is the monthly market return after deducting the risk-free rate. *SMB* is the return of a portfolio taking long positions on small stocks and short positions on large stocks. *HML* is the return of a portfolio taking long positions on high book-to-market stocks and short positions on low book-to-market stocks. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

events. If they sell their shares at different point in time, their profits will be different. To mitigate this concern, we follow Hong and Kacperczyk (2009) and conduct time-series regressions to compare the returns of Seazen Holdings with that of a comparable stock in Panel C. The dependent variable *Seazen-Peer* is the daily return of Seazen net of the daily return of a comparable stock matched using the propensity-score-matching method. The variables we use in matching are ROE and market capitalization at the fiscal year end before the crime. *Mktprem* is the monthly return of the market, net of the risk-free rate. *SMB* (the return of a portfolio taking long positions on small stocks and short positions on large stocks) and *HML* (the return of a portfolio taking long positions on high book-to-market stocks and short positions on low book-to-market stocks) are well-known factors downloaded from the CSMAR dataset. We run the time-series regressions using both 100 trading days and 150 trading days after the event.

Similar in spirit to Hong and Kacperczyk (2009), if Seazen is considered as a sin stock after the sex crime, we would expect Seazen to outperform its peer stock. Consistent with this expectation, the estimation of *Alpha* is positive and significant for all the regressions. For instance, the CAPM yields an alpha of 0.453% over the 100-trading-day period, which is statistically significant at the 5% level; the inference is largely the same after controlling for *SMB* and *HML*. As male investors buy more shares of Seazen (with positive alpha) than female investors after the sex scandal, male investors are more likely to have higher returns than female investors. The results in Panel C are consistent with those in Panels A and B.

In summary, we present evidence that female investors' moral constraints (in our setting, the intolerance of sex crimes) make them gain significantly lower returns than male investors. This finding is consistent with Hong and Kacperczyk's (2009) view that there can be significant financial costs associated with norm-constrained investing (i.e., investors pay for their social preferences).

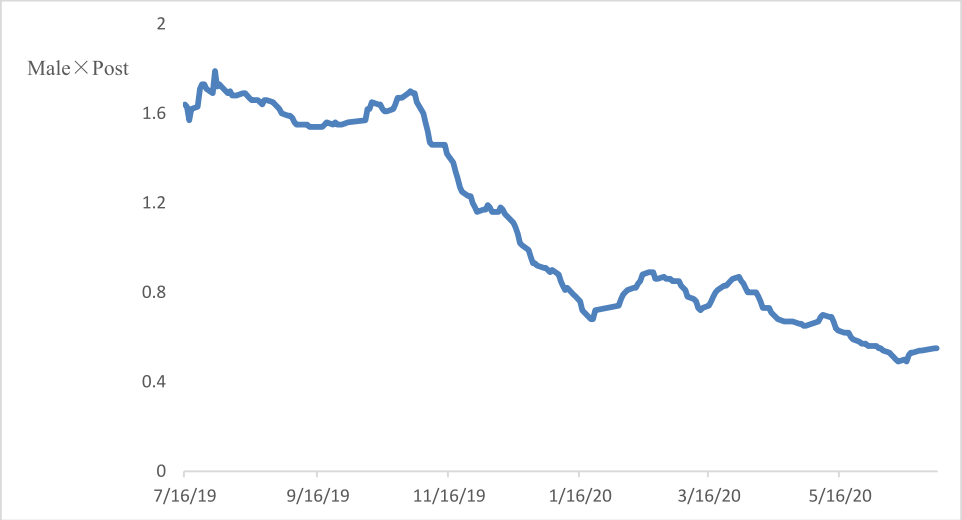


Fig. 5. Rolling window regressions in the long run. We extend our sample period to one year after the event date and compute the holding of Seazen shares over trading day (6, 10), day (7, 11), . . . , day (236, 240), respectively. We then re-estimate the baseline regression in Table 2 Panel A column (1) using the above rolling windows as the post-event period. This figure presents the corresponding coefficients on *Male* × *Post*.

5.3. The long run effect

In this section, we examine the effect of the sex crime on individual investors' trading behavior in the long run. We extend our sample period to one year after the event date and compute the holding of Seazen shares over trading day (6, 10), day (7, 11), day (8, 12), . . . , day (236, 240), respectively. We then re-estimate the baseline regression using the above rolling windows as the post-event period, and plot the coefficients on *Male* × *Post* in Fig. 5. As shown in the figure, the coefficients on *Male* × *Post* gradually decrease from 1.65 (our baseline result) to approximately 0.5 (when the post-event period is day (236, 240)), indicating that even one year after the event, male investors increase their Seazen holdings by 64% more than female investors.

Overall, Fig. 5 presents evidence that our treatment effect is long-lasting, although the effect becomes weaker as time goes by. These results are largely consistent with the psychology literature that people's initial emotional reaction (such as anger and sympathy) toward a negative event is usually larger than the later reaction (Ditton et al., 1999; Verduyn et al., 2009).

5.4. A summary of alternative explanations

As summarized in Table 8, we have considered several alternative explanations of our main results, and we have provided evidence that none of these explanations are likely to be the main driving force. First, our main results are unlikely due to the fact that male investors trade more frequently than female ones because (a) this concern could also predict a greater selling activity (not necessarily buying activity) of male investors, and (b) our turnover-matched sample analysis helps alleviate this concern (see Table 5 column (1)).

Second, our main results are unlikely due to the possibility that male investors have more money available to buy Seazen shares because (a) our wealth-matched sample analysis helps alleviate this concern (see Table 5 column (2)) and (b) female investors actually have greater wealth than male ones in our sample (see Table 1 Panel B).

Third, our main results are unlikely explained by the possibility that male investors are more risk-taking than female ones because (a) our volatility-matched sample analysis helps alleviate this concern (see Table 5 column (4)) and (b) female investors actually have slightly larger portfolio volatility than male ones in our sample, suggesting that our sample male investors are not more risk-taking than females (see Table 1 Panel B).

Fourth, our main results are unlikely due to male investors being more skillful than female ones because (a) while male investors have higher returns on trading Seazen after the sex crime, they on average have lower returns than female investors (see Table 1 Panel B), (b) our implication is unchanged in the portfolio return-matched analysis (see Table 5 column (3)), and (c) institutional investors (which have both higher moral standards and investment skills than individual investors) underperform both groups of individual investors (see Table 7 Panel B).

Fifth, our placebo test in Table 6 indicates that although females are less tolerant than males of any improper behavior, the gender difference toward sex crimes is particularly larger than that toward other types of misbehavior. Thus, our main result is not due to the possibility that females are generally less tolerant of any misbehavior.

Sixth, our main results are unlikely driven by the alternative explanation that males tend to behave as contrarian investors, because such an explanation would predict a similar gender difference in response to other negative events (which cause the same magnitude of stock price drop) in our placebo test in Table 6.

Table 8
Summary of alternative explanations.

Alternative explanations	Address these explanations
(1) Males have higher turnover rate	(a) Turnover-matched sample analysis (Table 5 column (1)) (b) Higher turnover could also predict greater selling activity (not necessarily greater buying activity) of male investors
(2) Males have more wealth to buy Seazen stock	(a) Wealth-matched sample analysis (Table 5 column (2)) (b) Male investors are less wealthy than females (Table 1 Panel B)
(3) Males are more risk-taking	(a) Volatility-matched sample analysis (Table 5 column (4)) (b) Males' portfolio volatility is slightly smaller than females' (Table 1 Panel B)
(4) Males have higher investment skills	(a) Portfolio return-matched sample analysis (Table 5 column (3)) (b) Males have lower portfolio return than females (Table 1 Panel B) (c) Institutional investors also underperform male investors (Table 7 Panel B)
(5) Females are generally less tolerant of any improper behavior	Placebo test in Table 6
(6) Males are contrarian investors	Placebo test in Table 6
(7) Pure chance	Placebo test in Fig. 4
(8) Males are more attentive to news	(a) Turnover-matched sample analysis (Table 5 column (1)) (b) Placebo test (Table 6) (c) Selling behavior of incumbent investors (Fig. 3 Panel A and Table 2 Panel B)

This table summarizes the alternative explanations for our main results and our corresponding tests to address these explanations.

Seventh, our main results are unlikely driven by chance, considering that the placebo test in Fig. 4 (as well as the pre-trend analysis in Table 3) indicates that gender difference in trading Seazen stock is trivial prior to the sex crimes and that such a gender difference shows up only after the sex crime.

Eighth and last, our main results are unlikely driven by females being less attentive to news because (a) considering that turnover can be an imperfect measure of attention (Hou et al., 2009), our turnover-matched analysis helps to alleviate this concern, (b) our placebo test in Table 6 also helps to alleviate this concern because such an attention-based explanation would predict a similar gender difference in response to other negative news, and (c) our analysis of the incumbent investors in Fig. 3 Panel A and Table 2 Panel B further alleviates this concern because attention has little impact on investors' selling decisions on the stocks they already own (Barber and Odean, 2008).

6. Conclusion

In this paper, we infer people's attitude toward sex crimes in the setting of the stock market, and we provide evidence that males are significantly more tolerant of sex crimes than females. Our test is based on a natural experiment, in which a public firm's Chairman of the Board is arrested for raping a nine-year-old girl. We exploit proprietary account-level data from the Shanghai Stock Exchange and infer individuals' tolerance of sex crimes from their stock trading behavior. We find that, following the crime, both male and female investors increase their holdings of this firm's stock and the magnitude of the increase for male investors is significantly larger than that of female investors. We further show that such a finding is stronger for females who are likely more averse to sex crimes. Moreover, we investigate the performance implication of tolerance of sex crimes and show that such a moral constraint limits female investors' trading profitability relative to their male peers. Overall, these results indicate that, when facing the tradeoff between profitable trading opportunities and moral constraints, females judge sex crimes more harshly than males and such moral consideration prevents females from fully exploiting the trading opportunities. We investigate various alternative explanations, including the gender differences in trading frequency, risk preference, investment skill, attention to news, contrarian style, etc., and we provide evidence that none of these factors can explain our main results. We also show that the gender difference in attitudes toward sex crimes is significantly larger than non-sexually-related scandals. Overall, our paper makes an important first step in understanding the impact of individual investors' social preference on their stock trading decisions.

It is worth noting that our study has two limitations. First, our study is based on a single event, and thus we cannot completely avoid the common identification difficulty faced by studies with a single shock (although we find no evidence that our sex crime event coincides with any potential noise that may affect our outcome variables). Second, our sample is based on individual investors in China. Possibly due to the Confucian traditions of patriarchy and subordination of women, Chinese women tend to show less independence to men than American women (Xiao, 1999; Fernández, 2007). That is, the gender difference in social preference is likely smaller in China than in the U.S. Thus, the gender difference in tolerance of sex crimes documented in our study may be even larger in the setting of the U.S. stock market. Readers should be aware of these limitations when deciding how our findings might be generalized.

CRediT authorship contribution statement

Huasheng Gao: Conceptualization, Methodology, Writing – review & editing, Supervision. **Zhengkai Liu:** Formal analysis. **Chloe Chunliu Yang:** Writing – review & editing.

Appendix. Variable definitions

Variable	Definition
College	An indicator variable that takes the value of one if the investor has a Bachelor's degree or above, and zero otherwise.
Investment experience	Number of years since an investor opened her stock trading account.
Ln(Shares)	Natural logarithm of one plus the average number of Seazen shares held by an investor in a five-trading-day period.
Male	An indicator variable that takes the value of one for male investors and zero for female investors.
Post	An indicator variable that takes the value of one for the five-trading-day period after the sex scandal, and zero for the five-trading-day period prior to the sex scandal.
Portfolio return	Investors' portfolio returns over the 30 trading days before the first day of the sample (June 27, 2019).
Portfolio wealth	The maximum daily amount invested in the stock market by each investor in the 30 trading days before the first day of the sample (June 27, 2019).
Turnover	The average of buy volume and sell volume divided by the average portfolio size in the 30 trading days preceding the first day of the sample (June 27, 2019).
Volatility	The volatility of investors' portfolio returns in the 30 trading days before the first day of the sample (June 27, 2019).

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