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Exploring Financial Behavior:
A multi-study thesis on adaptive markets, decision-making, comparison-based emotions, and Green Finance

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von

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List of Abbreviations

AMH Adaptive Market Hypothesis

BeMaS Benign and Malicious Envy Scale

BFI-10 Big Five Inventory

BRI Belt and Road Initiative

CBI Climate Bonds Initiative

CBRC China Banking Regulatory Commission

CI confidence interval

CSES Core Self-Evaluation Scale

ECB European Central Bank

EIB European Investment Bank

EMH Efficient Market Hypothesis

GFC Green Finance Committee

GIP Green Investment Principles for the Belt and Road

ISIC International Standard Industrial Classification

KMO Kaiser-Meyer-Olkin Measure of Sampling Adequacy

MCap market capitalization

NDRC National Commission of Development and Reform

NGFS Network for Greening the Financial System

OLS ordinary least squares

PBoC People‘s Bank of China

STEM science, technology, engineering and mathematics

TEJ Taiwan Economic Journal Equity database

TWSE Taiwan Stock Exchange

UNEP UN Environment Program

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Abstract

This thesis contains four parts that are all connected by their contributions to the Efficient Market Hypothesis and decision-making literature. Chapter two investigates how national stock market indices reacted to the news of national lockdown restrictions in the period from January to May 2020. The results show that lockdown restrictions led to different reactions in a sample of OECD and BRICS countries: there was a general negative effect resulting from the increase in lockdown restrictions, but the study finds strong evidence for underreaction during the lockdown announcement, followed by some overreaction that is corrected subsequently. This under-/overreaction pattern, however, is observed mostly during the first half of our time series, pointing to learning effects. Relaxation of the lockdown restrictions, on the other hand, had a positive effect on markets only during the second half of our sample, while for the first half of the sample, the effect was negative.

The third chapter investigates the gender differences in stock selection preferences on the Taiwan Stock Exchange. By utilizing trading data from the Taiwan Stock Exchange over a span of six years, it becomes possible to analyze trading behavior while minimizing the self-selection bias that is typically present in brokerage data. To study gender differences, this study uses firm-level data. The percentage of male traders in a company is the dependent variable, while the company's industry and fundamental/technical aspects serve as independent variables. The results show that the percentage of women trading a company rises with a company's age, market capitalization, a company's systematic risk, and return. Men trade more frequently and show a preference for dividend-paying stocks and for industries with which they are more familiar.

The fourth chapter investigated the relationship between regret and malicious and benign envy. The relationship is analyzed in two different studies. In experiment 1, subjects had to fill out psychological scales that measured regret, the two types of envy, core self-evaluation and the big 5 personality traits. In experiment 2, felt regret is measured in a hypothetical scenario, and the subject's felt regret was regressed on the other variables mentioned above. The two experiments revealed that there is a positive direct relationship between regret and benign envy. The relationship between regret and malicious envy, on the other hand, is mostly an artifact of core self-evaluation and personality influencing both malicious envy and regret. The relationship can be explained by the common action tendency of self-improvement for regret and benign envy.

Chapter five discusses the differences in green finance regulation and implementation between the EU and China. China introduced the Green Silk Road, while the EU adopted the Green Deal and started working with its own green taxonomy. The first difference comes from the definition of green finance, particularly with

regard to coal-fired power plants. Especially the responsibility of nation-states' emissions abroad. China is promoting fossil fuel projects abroad through its Belt and Road Initiative, but the EU's Green Deal does not permit such actions. Furthermore, there are policies in both the EU and China that create contradictory incentives for economic actors. On the one hand, the EU and China are improving the framework conditions for green financing while, on the other hand, still allowing the promotion of conventional fuels. The role of central banks is also different between the EU and China. China's central bank is actively working towards aligning the financial sector with green finance. A possible new role of the EU central bank or the priority financing of green sectors through political decision-making is still being debated.

1 Introduction

The neoclassical view of financial markets is that markets are efficient, and any mispricing should quickly be eliminated. The Efficient Market Hypothesis (EMH) acknowledges the possibility of arbitrage opportunities existing in its various forms of efficiency (weak, semi-strong, and strong form efficient). However, these opportunities should be random in nature, resulting in returns following a random walk. As a result, no group of investors should be able to consistently beat the market (Fama, 1970). However, the neoclassical view of an efficient market has come under scrutiny as evidence against the different forms of efficiency emerged over the last decades. Return predictability of different financial markets (Barkoulas et al., 2000; Cajueiro & Tabak, 2006; Kasman et al., 2009), or strategies such as momentum are examples of such violations (Jegadeesh & Titman, 2001). Furthermore, not every market participant is rational and tries to maximize their expected utility function. Many market participants make decisions based on emotional factors such as regret, envy, fear, and greed, which impact their decision-making process. For instance, Lo et al. (2005) discovered that day traders who experience emotions more intensively tend to perform worse. Additionally, evidence has emerged that the market is not good at pricing long-term risks that seem intangible at present but could materialize in the future, such as the risks associated with climate change. This thesis contributes to the literature in four ways. First, it studies the EMH in the context of COVID-19. Secondly, it investigates the gender difference in stock picking on the Taiwan Stock Exchange. Thirdly, this thesis studies the relationship between regret and envy, which impact decision-making. Finally, this thesis discusses the role of China and the EU in establishing taxonomies for green finance and the involvement of central banks.

The second chapter contributes to the EMH literature by investigating the effects of government restrictions on the global financial market during the COVID-19 pandemic. Because the pandemic did not affect each country simultaneously, some countries and, as such, their financial markets had a chance to "look into the future" and learn from other countries. We find an under/-overreaction pattern in national stock markets. Just like Edmans et al. (2007), we find that markets are driven by events of national importance, and similar to Kaplanski & Levy (2010b),

we find evidence of a market driven by fear. Furthermore, our results show regional learning effects and a gradual move towards efficiency. Consistent with Adaptive Market Hypothesis (AMH), our results show that markets are adaptive, but arbitrage opportunities can last for a relatively long time (Lim & Brooks, 2011).

The EMH postulates that investors are expected utility function maximizers. As such, investors on the stock market should only be concerned with their risk-return trade-off. However, as Statman (2017) noted, people are not just expected utility maximizers but also incorporate their emotional and expressive wants and needs into their decision-making process. As a result, we see that people are subject to behavioral biases and behave irrationally. For example, overconfidence can lead people to trade too much despite the negative consequences. The third chapter of this thesis contributes to the literature on investors' decision-making process by investigating gender differences on the Taiwan Stock Exchange. We analyze the fundamental and technical aspects of a company or stock to assess its appeal to both male and female investors. In our study, we use a unique data set containing the complete trading record of every trader on the Taiwan Stock Exchange (TWSE). This is the same data set that has previously been used by H.-L. Chen et al. (2015) and Cao et al. (2023). Because we have access to the trading data of every trader on the TWSE, our data is free of the selection bias that might arise with brokerage data. Furthermore, the stock market participation of men and women is close to being equal. As a result, the potential self-selection bias of a particular group of women who invest in stocks is reduced. Similar to Niessen-Ruenzi & Ruenzi (2019), we find a preference for women in companies with low idiosyncratic risk but higher systematic risk, and the reverse for men. Furthermore, we find a gender difference in preferences for a company's size, dividends, and industry. Just like Barber & Odean (2001), we find evidence that men trade more often compared to women, which, combined with our other findings, indicates more active trading by men.

Research has indicated that emotions, contrary to the suggestions of the EMH, have an impact on financial decision-making. For example, Hoelzl & Loewenstein (2005) showed that experiencing regret or envy can result in individuals holding onto their investments for a longer period of time. Previous studies predominantly

concentrated on the harmful form of envy, but it is now acknowledged in the literature that there exist two types of envy: benign and malicious envy (Crusius & Lange, 2014). As such, chapter four contributes to the literature by investigating the relationship between regret and envy, taking the difference between benign and malicious envy into account. This study has discovered a connection between benign envy and regret, whereas the link between malicious envy and regret is mediated by core self-evaluation. The findings help to further understand the connection between regret, and envy, and might contribute to a better understanding of the associated emotion of FOMO (fear of missing out)(Milyavskaya et al., 2018), which has been shown to influence herding and loss aversion (Baur & Dimpfl, 2018; Gupta & Shrivastava, 2022).

In the future, climate change will have a significant impact on our lives and might result in substantial financial costs. Due to this, governments and institutions worldwide have made it a priority to mitigate the risk of climate change, with green finance being a crucial aspect of their agenda. Because government subsidies won't be enough, it is clear that the transition to a sustainable future requires funds from private investors.[1] A big risk associated with climate change is the so-called "transition risk", which can either occur gradually, with manageable costs, or abruptly, with high costs as non-sustainable industries experience sudden repricing (Gros et al., 2016). Additionally, there could be a big increase in the cost of insurance. As such, it is important that financial markets incorporate this climate risk. However, there is a discussion on whether or not the market is integrating this risk (Statman, 2000; Renneboog et al., 2007; Trinks et al., 2018; Bernardini et al., 2021). A study by Alessi et al. (2021) shows that transparency, together with sustainability, seems to explain asset returns, indicating the importance of detailed reporting. In the fifth chapter, we explore how China and the EU are developing their own taxonomies to establish guidelines for reporting sustainability. We also examine how they are working together to coordinate their sustainable efforts. This adds to the existing literature on green finance. We find that both China and the EU have worked extensively on the definition of what is

[1]For more information read: Communication from the commission to the European Parliament, the European council, the council, the European economic and social committee and the committee of the regions, The European Green Deal, COM/2019/640 final, 11.12.2019.

a green investment and their reporting requirements. However, China has established a catalogue of green projects to guide companies and investors, while the EU has not yet released an equivalent list yet. Furthermore, both are divided on the exact definition of which projects are considered to be green, which complicates their collaboration. Secondly, this chapter will examine the involvement of Chinese and European banks and central banks in promoting green finance. Here, we find that China uses its central bank to guide investments into green projects, while the EU is still discussing the exact role of its central bank in this matter.

Finally, I want to acknowledge the contributions of my co-authors to this dissertation. Prof. Xenia Matschke was greatly involved in finding the right model for the second chapter, wrote the introduction, and took the lead in getting our paper published. Prof. Dr. Marc Oliver Rieger contributed by writing the conclusion and giving insightful comments. As a result, I contributed by doing the analysis and writing the rest of the paper as well as the online Appendix, which includes more details. For easier readability, I combined the online appendix with the main study for this dissertation. Regarding chapters three and four, Professor Rieger contributed with his insightful comments and supervision. Dr. Hung-Ling Chen contributed to chapter three by providing the necessary data for the analysis. Chapter five was completed with the equal contribution of Dr. Lea Shih, who additionally, took the initiative to ensure the paper was published. In this dissertation, the citation format for the final chapter has been changed from footnote to Harvard citation to maintain consistency. Furthermore, while the original paper was published in German it has been translated to English for this dissertation. Additionally table 19 has been updated from the Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the establishment of a framework to facilitate sustainable investment 2018/0178 (COD) to REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation(EU) 2019/2088. More details about the contributions of co-authors can be found in the footnote at the beginning of each chapter.

2 Stock market reaction to COVID-19 lockdown: A global analysis [2]

2.1 Introduction

When the first COVID-19 cases were reported to the World Health Organisation (WHO) on December 31, 2019, the New York Stock Exchange did not really react. Only around February 20, when the disease started to spread in the North of Italy, did the Dow Jones change trend. On March 3, the index dropped by more than 2000 points within a day, followed by another precipitous drop on March 12 and finally, the highest point drop ever on record on March 16, 2020. On March 9, Italy imposed a national lockdown, followed by other EU countries. While most countries imposed restrictions on business and social activities in the course of 2020, the restrictions varied by country, date and duration, as evidenced by the Oxford COVID-19 Government Response Tracker (OxCGRT) index.[3]

In this paper, we investigate the effects of COVID-19 government responses on the financial markets, contributing threefold to the literature. First, we test the market impact of government interventions in an international setting. Secondly, we test how well markets are connected and identify regional learning effects. Thirdly, we show that the financial markets did not behave efficiently in the first half of our sample period, but these inefficiencies decreased in the second half of our sample period. This is in line with Dima et al. (2021) who show that the VIX index in 2020 was no more or less efficient than during other time periods.

In our study, we combine a multi-country market panel analysis with an event study design in the vein of Kaplanski & Levy (2010a) to investigate the effects of lockdown stringency on abnormal market returns, using a comprehensive OECD and BRICS country panel dataset for the period from January 22 to May 20, 2020. This design allows us to control for the timing of government interventions on a

[2] This chapter was written in co-authorship with Prof. Xenia Matschke and Prof. Marc Oliver Rieger. This chapter was published in: Scherf, M., Matschke, X., & Rieger, M. O. (2022). Stock market reactions to COVID-19 lockdown: A global analysis. Finance research letters, 45, 102245. doi: 10.1016/j.frl.2021.102245. Copyright Elsevier (Scherf et al., 2022).

[3] See Hale, Angrist, Cameron-Blake, et al. (2020) (database) and Hale, Angrist, Kira, et al. (2020) (description).

daily basis and to group certain days. Our sample start date is January 22, 2020 (first major Corona restriction: lockdown in Wuhan), the end date is May 20, 2020 (last day for which the OxCGRT index was available throughout the summer). We explain abnormal national stock market returns (residuals of an auxiliary regression of national returns on their lags and leads and the world market returns) by the timing of changes in restrictions to contain the pandemic. We investigate how well the financial markets in different countries, ranging from emerging to highly industrialized economies, were able to absorb information in the course of the crisis. Similarly to Edmans et al. (2007), we also find a link between events of more or less national importance (sports event outcomes vs. national Corona policies) and national stock markets. As Becchetti & Ciciretti (2011), we conclude that knowledge of past events may lead to a reconsideration of available information.
We find that national Corona-related measures lead to a typical under/-overreaction pattern in the national stock market returns. A tightening of national lockdown restrictions coincides with negative stock market returns, but these effects are delayed (initial underreaction). The subsequent negative reaction is an overreaction which is in turn partly reversed, at least during the first half of our time series. This confirms the result of Rahman et al. (2021) that the Australian stock market underreacted to the announcement of a national emergency and the introduction of stimulus packages. Moreover, since we include leads and lags of the OxCGRT index change instead of cumulative abnormal returns into our model, we are able to also identify a subsequent overreaction. Even after having purged the world market return effect from the data, we find a separate influence of the first major restrictive measures within a country and greater region. Moreover, the easing of lockdown restrictions has a comparable positive mirror impact on stock market returns as does tightening, considering the entire sample period. Interesting differences emerge, however, when we split the sample into an earlier and a later period. In the early period, the markets did not appreciate the easing of restrictions.
Considering the effects of Corona lockdown, our study is related to Askitas et al. (2020), a multi-country panel event study on the effect of different types of lockdown restrictions on the COVID-19 infection numbers and mobility patterns.
As regards COVID-19 financial market repercussions, Ru et al. (2020a) and Ru et al. (2020b) show that countries affected by the SARS epidemic of 2003 were

quicker and more decisive in their policy responses, resulting in quicker stock market reactions. Alfaro et al. (2020) show that especially unexpected changes in the numbers of COVID-19 cases influence the U.S. stock market. Ramelli & Wagner (2020) consider the performance of individual stocks at the beginning of 2020. At first, the stock prices of firms with China ties suffered the most, but later the stocks of firms with high debt and low liquidity were most affected. Beirne et al. (2020) find that financial markets in emerging economies in Asia and Europe were more severely hit by the pandemic than those of advanced economies, as abrupt and sizable capital outflows were triggered. Baker et al. (2020) compare the current pandemic to other pandemics and conclude that the much stronger government response to COVID-19 drives the observed strong market volatility in the U.S.
In section 2.2, we describe the data used in our study and present the empirical model. In section 2.3, we document the main results. Section 2.4 concludes.

2.2 Data and methodology

To investigate how stock markets are affected by government interventions to control the spread of COVID-19, we use data from three different sources.
Infection data are obtained from the Humanitarian Data Exchange, which is compiled and updated daily by the Johns Hopkins University (JHU) in Baltimore.
The Reuters database contains the individual stock market data for each country as well as the MSCI World Index. We use the value weighted country all share index, a standard measure of stock market performance (Nyberg, 2010), if available; otherwise, we employ the index including the highest number of companies. Moreover, if available, we use the total return index because it includes dividends and other rights offerings and is therefore considered a more accurate performance measure (Nyberg, 2010). Since local currencies are affected by an individual country's expected inflation, which is reflected in the individual asset discount rate (Damodaran, 2012), we employ individual stock market indices in Euros.
To measure the effect of government interventions, we use the OxCGRT stringency index.
We limit our sample to countries of the Organisation for Economic Cooperation and Development (OECD) and the BRICS states (Brazil, Russia, India, China,

and South Africa) because these industrialized or big emerging economies have a large impact on the global economy (Garcia-Herrero, 2012). In total, this study analyses daily data from 42 different countries from January 22 to May 20, 2020. We follow an event-study approach and test whether the national COVID-19 case numbers and COVID-19 related government interventions affect a country's stock market. All regressions use heteroskedasticity and serial correlation robust estimators (Arellano et al., 1987).

We estimate our model in two stages. In the first stage, we control for confounding effects (correlations of stock indices, Monday effect, non-weekend holidays etc. (Edmans et al., 2007; Cho et al., 2007; Kaplanski & Levy, 2010b). The estimation equation is:

$$R_{i,t} = \gamma_0 + \sum_{j=-1}^{1} \gamma_{1j} R^m_{t+j} + \gamma_2 M_t + \gamma_3 H_{i,t} + \sum_{j=1}^{4} \gamma_{4j} R_{i,t-j} + \epsilon_{i,t}; \tag{1}$$

where $R_{i,t}$ is the daily rate of return of country i at time t. Following Edmans et al. (2007), we control for the correlation of local stock indices across countries by including a world market portfolio R^m_t in the regression, namely the daily rate of return of the MSCI World index. Furthermore, we include the lead R^m_{t+1} and the lag R^m_{t-1} of the world market portfolio to control for time-varying correlations at the world level. To control for the Monday effect found in stock markets (Cho et al., 2007), we include a dummy variable M_t. A similar effect often exists for the day after a non-weekend holiday (Edmans et al., 2007; Kaplanski & Levy, 2010b). Therefore, we also include a dummy variable $H_{i,t}$ to control for this effect, which takes the value 1 for days following a non-weekend holiday. Finally, we control for serial correlation in national stock market returns by including the j^{th} previous day rate of return of country i in our model. The adjusted R^2 for this regression is 36%.

From the above first stage of our model, we recover the estimated regression residuals $\hat{\epsilon}_{i,t}$ of the regression model. In the second stage of our model, we use these residuals as endogenous variable and now focus on the COVID-19 related deter-

minants of the stock returns. The estimation equation is:

$$\begin{aligned}\hat{\epsilon}_{i,t} = \beta_0 + \beta_1 C_{i,t} + \beta_2 C_t^w + \beta_3 F_{i,t} + \beta_4 G_{r,t} \\ + \left(\beta_5 \Delta S_{i,t-2} + \beta_6 \Delta S_{i,t-1} + \beta_7 \Delta S_{i,t} + \beta_8 \Delta c_{1,2} S_{i,t} + \beta_9 \Delta c_{3-7} S_{i,t}\right) \chi_+(\Delta S_{i,t}) \\ + \left(\beta_{10} \Delta S_{i,t-2} + \beta_{11} \Delta S_{i,t-1} + \beta_{12} \Delta S_{i,t} + \beta_{13} \Delta c_{1,2} S_{i,t} + \beta_{14} \Delta c_{3-7} S_{i,t}\right) \chi_-(\Delta S_{i,t});\end{aligned} \tag{2}$$

where

$$\chi_+(x) := \begin{cases} 1, \text{ if } x \geq 0, \\ 0, \text{ otherwise;} \end{cases} \qquad \chi_-(x) := \begin{cases} 1, \text{ if } x < 0, \\ 0, \text{ otherwise.} \end{cases}$$

First, we control for the individual country's COVID-19 cases, since negative consequences of the pandemic on stock market returns are likely to occur (Döhrn, 2020) because expected future cash flows decline, which should be reflected in asset prices. For this reason, we calculate the daily percentage change in total COVID-19 cases $C_{i,t}$ of country i. Because today's economies are connected globally, we additionally control for the percentage change in the worldwide number of cases C_t^w.

Next, we include a dummy variable $F_{i,t}$ for the first severe measures that are introduced in a country to stop the spread of the virus. The idea is that the first (partial) lockdown in a country signals the impact the virus will have on the country - not only for the health of the population, but also in economic terms (Reuters, 2020). This should lead to an adjustment of asset prices. To determine when a government introduced its first severe measures, we look at the containment and closure policy data provided by the OxCGRT. We consider measures such as required school closing, workplace closing, cancellation of public events and stay-at-home orders as well as restrictions on gatherings of ten or less people as severe measures. If one of these measures is introduced for the first time on day t, the dummy variable $F_{i,t}$ of country i is set to one, otherwise, it is set to zero.

Similar to the dummy variable that controls for the first severe measure in a country, we also employ a dummy variable $G_{r,t}$ that controls for the first severe measures in the greater region r in which i is located. If these changes happen on a weekend, we move the dummy variable one for $F_{i,t}$ and $G_{r,t}$ to a Monday. To calculate $G_{r,t}$, we again look at the containment and closure policy data provided

by the OxCGRT and consider the same measures as before. We split the data into the following regions r: Africa, North America, South America, South-East Asia, Europe and Western Pacific, using the definition for the different regions provided by the World Health Organisation (WHO). For North and South America, we employ the definition by Our World in Data.

To determine the effect of government interventions, we calculate the difference of the stringency index at time $t-1$ and time t to obtain the daily changes in government interventions $\Delta S_{i,t}$. Next, we create separate variables for positive and negative changes in a country's stringency index, where $(\Delta S_{i,t})\chi_+$ represents restrictions and $(\Delta S_{i,t})\chi_-$ represents relaxations of government interventions. In the case of tightening of restrictions, we multiply $\Delta S_{i,t}$ with the dummy variable χ_+ and in the case of relaxations of government interventions, we multiply $\Delta S_{i,t}$ with χ_-. Because the information about a change in policies is released prior to the day of the event, we lag the variable $\Delta S_{i,t}$ by one and two days and include the variables $\Delta S_{i,t-2}$ and $\Delta S_{i,t-1}$ in our regression. For the day after the event day $t+1$ as well as the other six days following the event day (hence for dates $t+j$ with $j = \{1, ..., 7\}$), we decided to merge $\Delta S_{i,t+1}$ till $\Delta S_{i,t+7}$ into two separate variables. The first variable $\Delta c_{1,2} S_{i,t}$ cumulates $\Delta S_{i,t+1}$ and $\Delta S_{i,t+2}$ into one variable. The second variable $\Delta c_{3-7} S_{i,t}$ cumulates $\Delta S_{i,t+3}$ till $\Delta S_{i,t+7}$. Those cumulated stringency indices $\Delta c_{1,2} S_{i,t}$ and $\Delta c_{3-7} S_{i,t}$ are calculated by summing up the delta stringency indices $\Delta S_{i,t+j}$ from $j = 1$ till $j = 2$ and from $j = 3$ till $j = 7$, respectively.

As a final step, we split the whole sample into two different sub-samples on which we also conduct our analysis. The first sub-sample period starts January 22 and ends March 27, 2020, and the second starts March 28, 2020 and ends May 20, 2020. We chose the sample split at that date because by March 27, all countries within our sample had introduced their first severe measures. In the end, we are left with the following (sub-)samples: OECD&BRICS, OECD&BRICS-firsthalf, and OECD&BRICS-secondhalf.

Coefficients from the abnormal return construction

Table 2 shows the regression results for the first stage of our model, where we calculated the residuals $\hat{\epsilon}_{it}$, which we use as the dependent variable in the second stage. R_{t-2} and R_{t-3} have been dropped to improve the model's adjusted R^2, which is 36%. The Breusch-Godfrey test was used to test for serial correlation, because it allows for the inclusion of lagged variables, which could potentially cause problems in more general tests for autoregressive processes (Godfrey, 1978). The corresponding p-value is 0.52 which means our model is not subject to serial correlation. The variables for the international stock market (MSCI World) are highly significant and confirm that international markets are integrated with one another. Similar to other studies, we find a highly significant negative return on Mondays (Cho et al., 2007; Kuria & Riro, 2013; Ülkü & Rogers, 2018) and positive returns after a non-weekend holiday (Tsiakas, 2008, 2010).

Table 2

Model for the calculation of abnormal stock market returns

variable	coefficient	p-value
Intercept	0.00	0.36
MSCI World t-1 (R^m_{t-1})	0.28	0.00**
MSCI World t0 (R^m_t)	0.57	0.00**
MSCI World t+1 (R^m_{t+1})	-0.08	0.00**
Monday M_t	-6E-03	0.00**
Holiday $H_{i,t}$	4E-03	0.00**
$R_{i,t-1}$	0.07	0.32
$R_{i,t-4}$	0.07	0.52
adjusted R^2		0.36
Breusch Godfrey	LM test 0.4	0.52
N		3440

This table reports the regression results of the first-stage The estimation equation is:

$$R_{i,t} = \gamma_0 + \sum_{j=-1}^{1} \gamma_{1j} R^m_{t+j} + \gamma_2 M_t + \gamma_3 H_{i,t} + \sum_{j=1}^{4} \gamma_{4j} R_{i,t-j} + \epsilon_{i,t};$$

where $R_{i,t}$ is the daily rate of return of country i at time t. A further explanation is provided in the text.

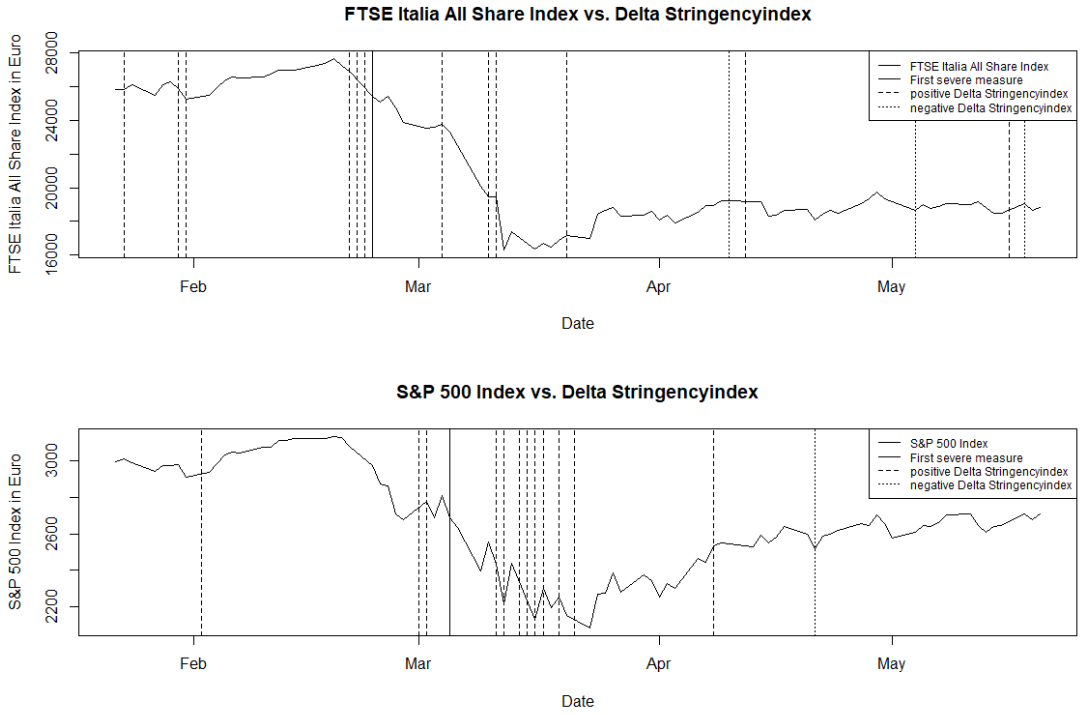
2.3 Results

2.3.1 Descriptive statistics

Figure 1 shows the Italian and the U.S. index in Euros for January 22 till May 20. In addition to the indices, the figure shows the changes in a country's measures against the COVID-19 virus ($\Delta S_{i,t}$) as a vertical line. In the case of Italy and the U.S., we can clearly see that drops in the corresponding index happen around the time of further restrictive government interventions. The early changes in the stringency index ($\Delta S_{i,t}$) that we see for Italy and the U.S. around the end of January and the beginning of February show only a small impact on the countries' markets. The reason may be that those restrictions are travel restrictions set by the two countries. The U.S. on the other hand did not ban travel from some regions and only put quarantine requirements in place at the beginning of February. For details, we refer to the OxCGRT database. For both countries, the corresponding stringency index stays at a value below 20 at that time. If we look at the time around the first severe measures for Italy, we see the first big drop in the stock market.

Figure 1

Italian and U.S. Indices vs Delta Stringency Indices



This figure shows two graphs. The first graph shows the Italian stock index in Euro terms and the second graph shows the U.S. index in Euro terms. Furthermore, both graphs feature the dates of the corresponding country's changes in government interventions against COVID-19 as a dashed or dotted vertical line. Additionally, the first severe measures of the corresponding countries are indicated as a solid vertical line.

Around the time of Italy's first severe measures, a drop in the U.S. index occurred. For the U.S., we see a big drop around the time of its first severe measure. If we look at the relaxations of restrictions, we see a positive reaction for the U.S. market and a mixed reaction for the Italian market.

Table 3 shows the descriptive statistics of abnormal returns for OECD and BRICS countries as well as for the three considered sample periods. We used both a parametric and a non-parametric test to test for differences in means. The corresponding tests are the Welch t-test and the Mann-Whitney U-test. On average, we see that the abnormal return is -0.0058%.[4] The difference between the first and second half of our study is significant for both OECD and BRICS countries. Here, the first half on average shows negative abnormal returns while the second half shows positive returns.

[4]We did not find any difference between OECD and BRICS countries, neither in the first nor in the second half of the sample (results available upon request).

Table 3

Distribution of abnormal returns for OECD and BRICS countries

	Full Sample Period			First Half			Second Half		
	Full Sample	OECD	BRICS	Full Sample	OECD	BRICS	Full Sample	OECD	BRICS
Mean	-5.8E-04	-4.4E-04	-1.4E-03	-2.4E-03	-2.2E-03	-3.3E-03	2.1E-03	2.3E-03	2.5E-03
Median	1.0E-04	1.4E-04	-7.2E-04	-1.0E-03	-9.2E-04	-2.1E-03	2.1E-03	2.2E-03	2.3E-03
Sd	2.1E-02	2.0E-02	2.8E-02	2.3E-02	2.2E-02	3.1E-02	1.7E-02	1.6E-02	2.0E-02
Min	-0.12	-0.11	-0.12	-0.12	-0.11	-0.12	-5.9E-02	-5.1E-02	-5.9E-02
Max	0.12	0.11	0.12	0.12	0.12	0.12	6.9E-02	6.9E-02	6.9E-02
N	2666	2300	366	1591	1374	217	1075	926	149
	OECD- BRICS	diff.	p-value	First - Second Half (OECD)	diff.	p-value	First - Second Half (BRICS)	diff.	p-value
Welch's t-test		9.8E-05	0.52		-4.6E-03	0.00**		-5.8E-03	0.03**
Mann-Whitney-U-test		9.8E-05	0.65		-4.6E-03	0.00**		-5.8E-03	0.03**

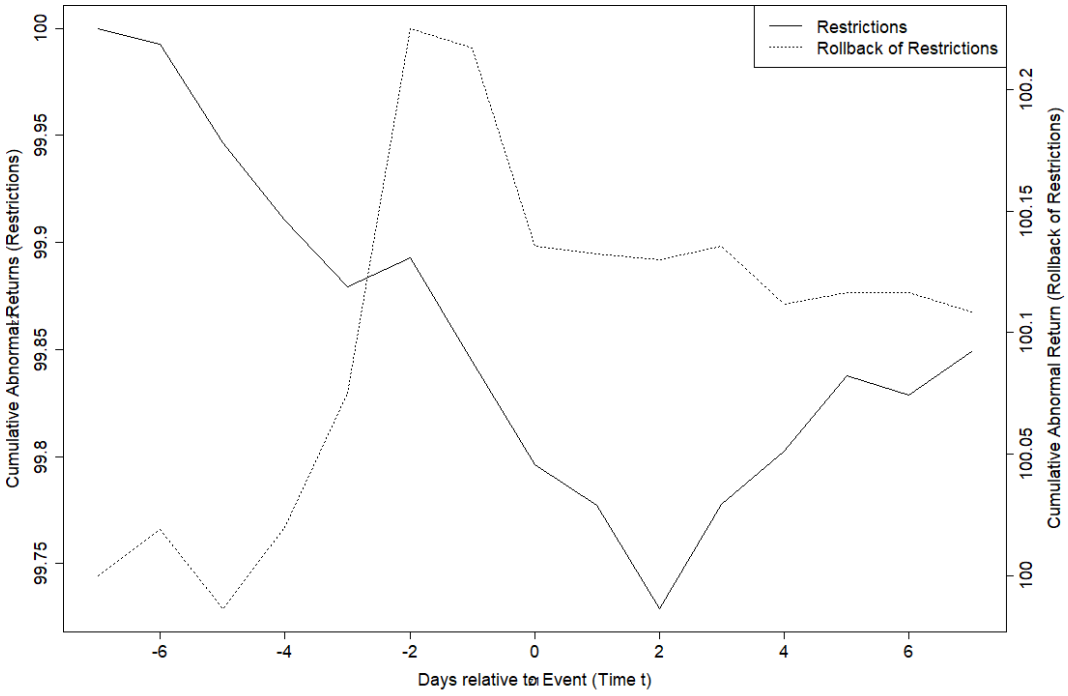
This table reports the abnormal returns for OECD and BRICS countries. Additionally, the table distinguishes between the full sample period (January 22 - May 20), the first half (January 22 - March 27), and the second half (March 28 - May 20); and reports on the T-test and U-test p-value for the differences between the first and second half.$^{*}p \leq 0.1$,$^{**}p \leq 0.05$

2.3.2 Main results

The main results are summarised in figure 2. We see an initial price drift, corresponding to an underreaction on the stringency measures that leads to an overreaction, which can be seen from the partial recovery starting a few days after the stringency event. The patterns for restrictions and their rollbacks are mostly symmetric.

Figure 2

OECD and BRICS Cumulative Abnormal Return Index Base 100



This figure shows the cumulative abnormal returns around the event day (t=0) with either restrictions or the rollback of restrictions for the period from January 22 to May 20, 2020. For better illustration, the returns have been rebased to create an index around the event day, which starts at t-7 with a value of 100. The next index points are calculated as follows:
Index value$_t$ = Index value$_{t-1} \cdot (1 + \beta(\Delta S_{it}))$ for $t = \{-6...7\}$.

Table 4 shows the second-stage regression results for the full sample of OECD and BRICS countries. In the overall sample, neither local nor global new COVID-19 cases have a significant effect on local stock markets. However, if the first

country implements the first strict preventive measures against COVID-19 within a given region, the national stock markets in that region react negatively. The results are highly significant. Similarly, the first measures implemented by an individual country negatively affect the respective stock market. This confirms that the stock market expects negative economic consequences as a result of government restrictions. Comparing the two returns, we see that the first regional restriction has a similar but slightly bigger impact compared to the first national restriction. Once the first strict restrictions have been implemented in a region, it can possibly be expected that other countries will follow suit.

Concerning the sequential impact of further government interventions, the restrictions have a highly significant negative impact one day before, on the day the measures are implemented, and up to two days after the implementation. This is in line with an announcement effect: announced measures are priced in before implementation. In comparison to the effect of the first national preventive measures, these negative returns are smaller. When looking at days 3 to 7 after implementation, we find a significant positive return: the market slightly overreacted, which was then corrected. On the other hand, a restriction relaxation has a significant positive (double negative) impact on the stock market two days before the relaxation.

Table 4

OECD and BRICS countries (January 22 - May 20, 2020)

variable	coefficient	p-value
intercept	2.62E-04	0.61
new cases (country i) $C_{i,t}$	-1.92E-03	0.12
new cases (global) C_t^w	4.45E-03	0.26
first strict measures (country i) $F_{i,t}$	-1.58E-02	0.01**
first strict measures (region) $G_{r,t}$	-1.95E-02	0.00**
positive stringency index t-2 $\Delta S_{i,t-2}\chi_+(\Delta S_{i,t})$	-3.36E-06	0.99
positive stringency index t-1 $\Delta S_{i,t-1}\chi_+(\Delta S_{i,t})$	-6.06E-04	0.00**
positive stringency index t0 $\Delta S_{i,t}\chi_+(\Delta S_{i,t})$	-5.13E-04	0.02**
pos. cum. string. index t1 & t2 $\Delta c_{1,2}S_{i,t}\chi_+(\Delta S_{i,t})$	-3.40E-04	0.03**
pos. cum. string. index t3 - t7 $\Delta c_{3-7}S_{i,t}\chi_+(\Delta S_{i,t})$	2.28E-04	0.01**
negative stringency index t-2 $\Delta S_{i,t-2}\chi_-(\Delta S_{i,t})$	-1.70E-03	0.04**
negative stringency index t-1 $\Delta S_{i,t-1}\chi_-(\Delta S_{i,t})$	-5.12E-04	0.34
negative stringency index t0 $\Delta S_{i,t}\chi_-(\Delta S_{i,t})$	4.60E-04	0.33
neg. cum. string. index t1 & t2 $\Delta c_{1,2}S_{i,t}\chi_-(\Delta S_{i,t})$	6.42E-06	0.92
neg. cum. string. index t3 - t7 $\Delta c_{3-7}S_{i,t}\chi_-(\Delta S_{i,t})$	-5.60E-05	0.37
adjusted R^2		0.06
N		2666

$^*p \leq 0.1, ^{**}p \leq 0.05$.

The corresponding estimation equation is (2).

Table 5 shows the results for periods January 22 - March 27 & March 28 - May 20. The estimation equation is the same as in Table 4.

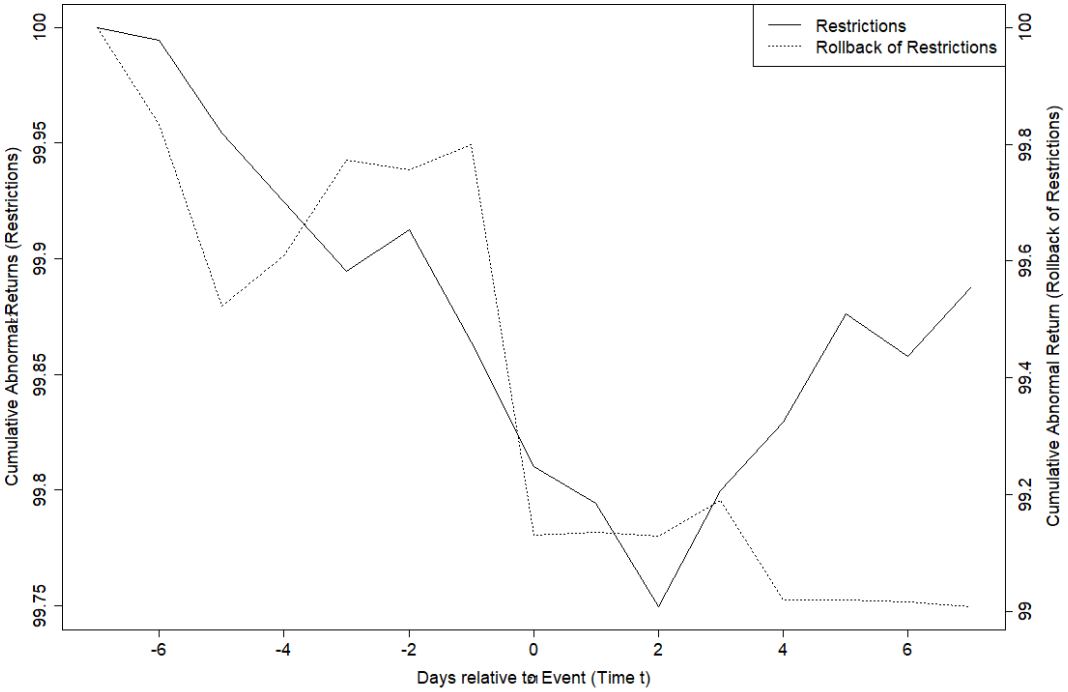
In the first sub-sample, we find – contrary to the overall sample – a highly significant positive return for an increase in the number of global COVID-19 cases, while an increase in local COVID-19 cases does not have a significant impact on local stock markets. The results for regional and national first strict measures are analogous to the results for the whole sample. The first sub-sample also confirms the pattern of the stock market decline after further government restrictions and the subsequent correction. Contrary to the results for the whole sample, we find a significant negative effect on the day of restriction relaxation (negative stringency index). Possibly the market considers early relaxations as premature and, therefore, reacts negatively.

Figure 3 shows the pattern of restrictions and relaxations for the first half of the studied period. We again see the negative impact of restrictions with a correction and the negative impact of relaxation during the studied period up to the end of

March.

Figure 3

OECD and BRICS Cumulative Country Return Index base 100 (first half)



This figure shows the cumulative abnormal returns around the event day (t=0), which are either restrictions or the rollback of restrictions, for the period January 22 till March 27, 2020. For better illustration, the returns have been rebased to create an index around the event day which starts at t-7 with a value of 100. The next index points are calculated as follows:
Index value$_t$ = Index value$_{t-1} \cdot (1 + \beta(\Delta S_{i,t}))$ for $t = \{-6...7\}$.

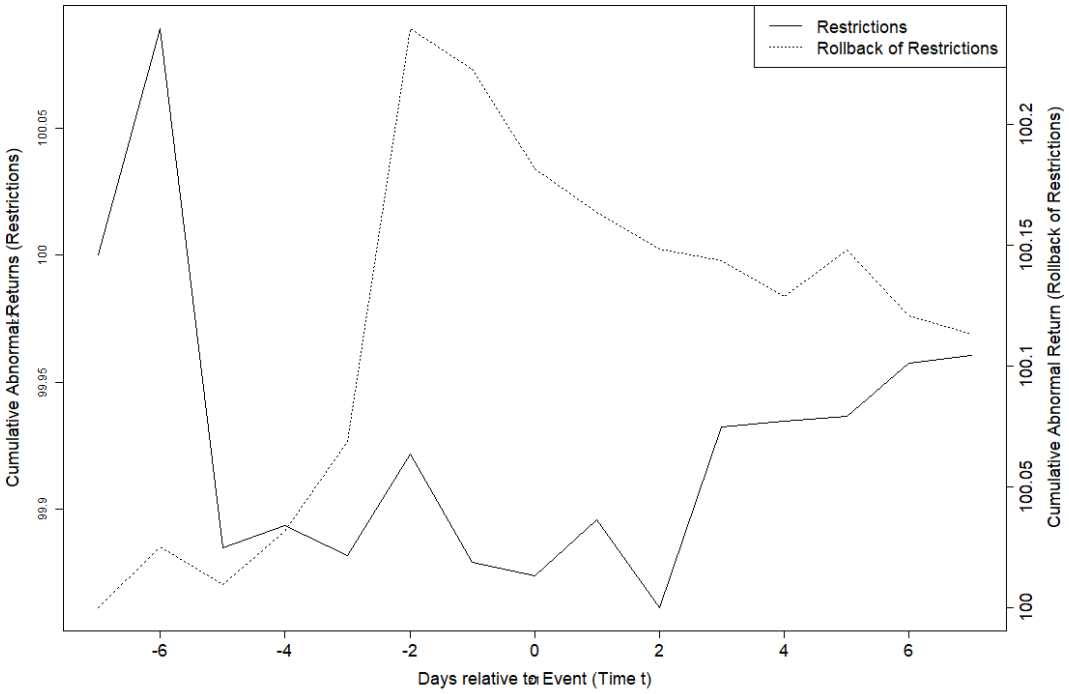
In the second sub-sample, as for the overall sample, we do not find a significant effect of an increase in COVID-19 cases. Considering the restriction implementation, we only find weakly (at the 10% level) significant returns on day $t-1$. Possibly, restrictions have been expected by the market and, thus, have already mostly been priced in. Considering the restriction relaxation, we find a significant positive (double negative) return two days before the implementation.

Figure 4 shows the same pattern of restrictions and relaxations for the second

half of our studied period – starting March 28 till May 20, 2020. For restrictions, we see negative returns, as we have observed before, and positive returns before relaxations, which are corrected afterwards.

Figure 4

OECD and BRICS Cumulative Country Return Index Base 100 (second half)



This figure shows the cumulative abnormal returns around the event day (t=0), which are either restrictions or the rollback of restrictions, for the period March 28 till May 20, 2020. For better illustration the returns have been rebased to create an index around the event day which starts at t-7 with a value of 100. The next index points are calculated as follows:
Index value$_t$ = Index value$_{t-1} \cdot (1 + \beta(\Delta S_{i,t}))$ for $t = \{-6...7\}$.

Table 5

OECD and BRICS countries (January 22 - March 27 & March 28 - May 20, 2020)

	(1)		(2)	
variable	coefficient	p-value	coefficient	p-value
intercept	-2.16E-03	0.00**	1.47E-03	0.20
new cases (country i) $C_{i,t}$	-1.21E-03	0.31	-3.30E-03	0.87
new cases (global) C_t^w	1.25E-02	0.01**	1.41E-02	0.67
first strict measures (country i) $F_{i,t}$	-1.60E-02	0.01**		
first strict measures (region) $G_{r,t}$	-1.76E-02	0.00**		
positive stringency index t-2 $\Delta S_{i,t-2}\chi_+(\Delta S_{i,t})$	8.26E-05	0.76	3.43E-04	0.44
positive stringency index t-1 $\Delta S_{i,t-1}\chi_+(\Delta S_{i,t})$	-5.73E-04	0.00**	-4.58E-04	0.07*
positive stringency index t0 $\Delta S_{i,t}\chi_+(\Delta S_{i,t})$	-5.49E-04	0.02**	1.65E-04	0.68
pos. cum. string. index t1 & t2 $\Delta c_{1,2}S_{i,t}\chi_+(\Delta S_{i,t})$	-3.12E-04	0.07*	-1.98E-05	0.92
pos. cum. string. index t3 - t7 $\Delta c_{3-7}S_{i,t}\chi_+(\Delta S_{i,t})$	2.88E-04	0.00**	1.29E-04	0.31
negative stringency index t-2 $\Delta S_{i,t-2}\chi_-(\Delta S_{i,t})$	-4.00E-04	0.93	-1.68E-03	0.00**
negative stringency index t-1 $\Delta S_{i,t-1}\chi_-(\Delta S_{i,t})$	2.23E-04	0.82	-3.70E-04	0.53
negative stringency index t0 $\Delta S_{i,t}\chi_-(\Delta S_{i,t})$	6.21E-03	0.00**	2.14E-04	0.45
neg. cum. string. index t1 & t2 $\Delta c_{1,2}S_{i,t}\chi_-(\Delta S_{i,t})$	-5.49E-05	0.44	1.84E-04	0.10
neg. cum. string. index t3 - t7 $\Delta c_{3-7}S_{i,t}\chi_-(\Delta S_{i,t})$	4.63E-05	0.38	-7.68E-06	0.95
adjusted R^2		0.08		0.01
N		1591		1075

*$p \leq 0.1$,**$p \leq 0.05$.

This table reports the regression results for OECD and BRICS countries in the subsample periods January 22 - March 27 (1) and March 28 - May 20 (2). The estimation equation is (2).

2.3.3 Robustness checks

To check if our results are robust, we modify the second stage of our model. Instead of using the cumulated stringency index $\Delta cS_{i,t}$ in our analysis, we include the full range of stringency indices $\sum_{j=-7}^{7} \Delta S_{i,t+j}$ in our model. The results are reported in Tables 6, 7, and 8.

The regression results for the full sample (table 6) confirm the results of our first regression. The negative impact for first measure in a region and first measure in a country are almost identical compared to our main results. If we again look at the sequential impact, we see that negative returns again start one day before the implementation of restrictions and extend to two days after the implementation, followed by a correction between day $t3$ and $t5$. Furthermore, we find negative returns seven to four days before the government interventions are imposed, which provides further evidence for an existing announcement effect. Another explanation may be that discussions about lockdowns take place around that time, which is priced in by the market. This time, however, we find no significant effects for the easing of government restrictions.

Table 6

Robustness Check OECD and BRICS Countries (January 22 - May 20, 2020)

variable	coefficient	p-value
intercept	1.15E-03	0.04**
new cases (country i)	-3.30E-04	0.77
new cases (global)	3.70E-03	0.38
first severe measures (country i)	-1.47E-02	0.01**
first severe measures (region)	-1.89E-02	0.00**
positive stringency index t-7	-5.90E-04	0.00**
positive stringency index t-6	-7.50E-05	0.67
positive stringency index t-5	-4.59E-04	0.01**
positive stringency index t-4	-3.61E-04	0.05**
positive stringency index t-3	-3.15E-04	0.15
positive stringency index t-2	1.37E-04	0.60
positive stringency index t-1	-4.82E-04	0.01**
positive stringency index t0	-4.85E-04	0.03**
positive stringency index t+1	-1.90E-04	0.37

positive stringency index t+2	-4.85E-04	0.07*
positive stringency index t+3	4.91E-04	0.03**
positive stringency index t+4	2.46E-04	0.28
positive stringency index t+5	3.54E-04	0.08*
positive stringency index t+6	-9.11E-05	0.68
positive stringency index t+7	2.05E-04	0.20
negative stringency index t-7	-1.86E-04	0.40
negative stringency index t-6	-1.91E-04	0.26
negative stringency index t-5	3.28E-04	0.23
negative stringency index t-4	-3.33E-04	0.31
negative stringency index t-3	-5.56E-04	0.13
negative stringency index t-2	-1.50E-03	0.11
negative stringency index t-1	8.14E-05	0.84
negative stringency index t0	8.12E-04	0.13
negative stringency index t+1	3.31E-05	0.76
negative stringency index t+2	2.54E-05	0.81
negative stringency index t+3	-5.84E-05	0.73
negative stringency index t+4	2.39E-04	0.28
negative stringency index t+5	-4.67E-05	0.61
negative stringency index t+6	1.39E-07	1.00
negative stringency index t+7	7.71E-05	0.56
adjusted R^2		0.09
N		2666

This table reports the regression results for OECD and BRICS countries for the full sample from January 22 - May 20, 2020. For the independent variable, we use the abnormal returns from the first-stage model reported in Table 2.

Table 7 shows the results for the first half of our sample period (January 22 - March 27, 2020). The results confirm the main results for our first sub-sample. The returns are again negative and bigger when the first severe measures are implemented - whether regional or national - compared to the implementation of further restrictions. The pattern of returns for further restrictions is also similar to the whole sample. Negative returns can be seen again seven to five days and one day before further restrictions as well as on the day restrictions are imposed. This time, however, we do not find negative returns for day $t1$ and $t2$. The negative returns are again partially corrected after the implementation, which is a sign of

an overreaction before the implementation. Similarly to our main results, we find a negative return on the day restrictions are eased. (Because of the negative delta stringency indices, results have to be multiplied by -1). However, we additionally find negative returns 7 to 5 days before the relaxation of government interventions. This is further evidence that the market interprets the easing of restrictions as coming too early in the period January to March. Furthermore, we find further evidence for an announcement effect.

Table 7

Robustness Check OECD and BRICS Countries (January 22 - March 27 2020)

variable	coefficients	p-value
intercept	-3.20E-06	1.00
new cases (country i)	-2.02E-04	0.86
new cases (global)	7.18E-03	0.12
first severe measures (country i)	-1.35E-02	0.02**
first severe measures (region)	-1.82E-02	0.00**
positive stringency index t-7	-5.71E-04	0.00**
positive stringency index t-6	-5.52E-05	0.76
positive stringency index t-5	-4.02E-04	0.02**
positive stringency index t-4	-2.97E-04	0.12
positive stringency index t-3	-3.01E-04	0.20
positive stringency index t-2	1.80E-04	0.51
positive stringency index t-1	-4.84E-04	0.01**
positive stringency index t0	-5.41E-04	0.02**
positive stringency index t+1	-1.57E-04	0.49
positive stringency index t+2	-4.49E-04	0.13
positive stringency index t+3	5.02E-04	0.05**
positive stringency index t+4	2.97E-04	0.25
positive stringency index t+5	4.71E-04	0.05**
positive stringency index t+6	-1.85E-04	0.48
positive stringency index t+7	2.97E-04	0.14
negative stringency index t-7	1.37E-03	0.02**
negative stringency index t-6	1.66E-03	0.02**
negative stringency index t-5	3.12E-03	0.04**
negative stringency index t-4	-8.62E-04	0.48
negative stringency index t-3	-1.65E-03	0.50
negative stringency index t-2	1.62E-04	0.97

negative stringency index t-1	-4.32E-04	0.69
negative stringency index t0	6.70E-03	0.00**
negative stringency index t+1	-5.00E-05	0.68
negative stringency index t+2	6.23E-05	0.82
negative stringency index t+3	-6.19E-04	0.59
negative stringency index t+4	1.71E-03	0.29
negative stringency index t+5	3.94E-06	0.91
negative stringency index t+6	2.97E-05	0.71
negative stringency index t+7	9.00E-05	0.20
adjusted R^2		0.11
N		1591

This table reports the regression results for OECD; BRICS countries; January 22 - March 27. $^{*}p \leq 0.1$,$^{**}p \leq 0.05$

In Table 8, the results for the second half of our study can be found (March 28 - May 20, 2020). Our main results for the second sub-sample are again confirmed in our robustness check. While the negative effect of further restrictions seems to have weakened one day before the implementation of restrictions, this effect is still strong on day 5 before the restrictions are implemented. In addition to the positive returns two days before the rollback of restrictions, we find a correction at the day of the relaxation. Overall, the robustness check confirms our findings in Section 3 in the main text.

Table 8

Robustness Check OECD and BRICS Countries (March 28 - May 20, 2020)

variable	coefficient	p-value
intercept	1.25E-03	0.33
new cases (country i)	-4.05E-03	0.84
new cases (global)	1.98E-02	0.56
positive stringency index t-7	2.51E-04	0.81
positive stringency index t-6	9.03E-04	0.21
positive stringency index t-5	-2.05E-03	0.03**
positive stringency index t-4	1.83E-05	0.99
positive stringency index t-3	-1.12E-04	0.74
positive stringency index t-2	4.00E-04	0.35
positive stringency index t-1	-4.28E-04	0.10*
positive stringency index t0	-5.66E-05	0.89

positive stringency index t+1	2.23E-04	0.46
positive stringency index t+2	-3.48E-04	0.26
positive stringency index t+3	7.17E-04	0.05**
positive stringency index t+4	2.03E-05	0.96
positive stringency index t+5	2.25E-05	0.95
positive stringency index t+6	2.10E-04	0.58
positive stringency index t+7	2.51E-05	0.89
negative stringency index t-7	-2.19E-04	0.34
negative stringency index t-6	-2.52E-04	0.11
negative stringency index t-5	1.54E-04	0.54
negative stringency index t-4	-2.19E-04	0.51
negative stringency index t-3	-3.71E-04	0.11
negative stringency index t-2	-1.71E-03	0.00**
negative stringency index t-1	1.69E-04	0.70
negative stringency index t0	4.12E-04	0.04**
negative stringency index t+1	1.81E-04	0.28
negative stringency index t+2	1.51E-04	0.35
negative stringency index t+3	4.78E-05	0.77
negative stringency index t+4	1.48E-04	0.46
negative stringency index t+5	-1.93E-04	0.69
negative stringency index t+6	2.73E-04	0.34
negative stringency index t+7	7.60E-05	0.77
adjusted R^2		0.03
N		1075

This table reports the regression results for OECD; BRICS countries; March 28 - May 20. $^{*}p \leq 0.1$,$^{**}p \leq 0.05$

2.4 Conclusion

The COVID-19 pandemic is an ideal test situation for market efficiency, as the unfolding events were completely novel for financial market participants and largely exogenous. The initial stock market reaction shows a delayed response: only after the number of COVID-19 cases started to increase in Italy, did the international stock markets drop. When governments tried to contain the virus spread by introducing stricter preventive measures, stock markets reacted with further decreases. The reaction, however, showed clear signs of underreaction with a significant post-announcement drift, i.e., the market takes a couple of days to incorporate the new

information. At least in the first half of our time series, we also see clear signs of overreaction: three days after the introduction of the restrictions, the stock markets started to show abnormal positive returns for a few days[5]. In summary, we find the typical pattern of a delayed and then too strong response to a surprising exogenous event. This pattern is inconsistent with the efficient market hypothesis that prices immediately and fully reflect all available information, but is in line with other empirical rejections of the efficient market hypothesis Sewell (2012); Boubaker et al. (2015); Rahman et al. (2021).

Moreover, markets reacted to the first strict national preventive measure, but also to the first strict preventive measure within the same greater region. In fact, a region's first strict measure prompted a stronger response than that of an individual country, probably due to anticipation effects.

When restrictions were relaxed again, stock markets reacted, but in different ways: they reacted negatively to earlier restriction relaxations (mainly between January and the end of March) and positively to later relaxations. This suggests that market participants deemed early relaxations premature and counter-productive, but considered later relaxations as reasonable and beneficial for economic development.

Finally, the number of new COVID-19 cases nationally and worldwide did not significantly affect stock market returns, which is somewhat surprising since these numbers triggered the imposition or relaxation of stringency measures. This feedback effect does not seem incorporated in market prices.

[5]This cannot be explained by positive effects of the preventive measures on the infection rates, as such effects can only be observed after a longer period, certainly not within two days, given that the incubation time of COVID-19 and the time needed to detect new cases add up to about a week on average

3 Gender differences among investors of the Taiwanese stock market [6]

3.1 Introduction

In order to understand the full range of the decision-making progress of investors on the stock market, one has to understand the difference in financial decision-making between men and women. One notable result that has emerged over the last two decades is that male and female retail investors invest differently. According to Bhushan & Medury (2013), women tend to be more risk-averse than men regarding their portfolio composition and, as a result, hold higher amounts of their investment in fixed deposits or bonds but are also less likely to be invested in the stock market.

However, there is little research that looks at the gender difference in trading behavior on the stock market itself. Understanding the gender differences in trading behavior not only gives us important insights into the general trading behavior of investors but also yields important implications for financial education and financial advertisement. So the question remains, how do men and women invest if they participate in the stock market?

Research has found little gender difference in average returns for fund managers (Bliss & Potter, 2002; Niessen & Ruenzi, 2006; Babalos et al., 2015; Aggarwal & Boyson, 2016; Niessen-Ruenzi & Ruenzi, 2019), but the evidence regarding risk-taking is mixed and depends on the risk measure used (Barber & Odean, 2001; Bliss & Potter, 2002; Felton et al., 2003; Niessen & Ruenzi, 2006; J.-H. Chen, 2010; Aggarwal & Boyson, 2016).

Therefore, this study investigates the technical and fundamental characteristics of stocks/companies and their effect on the trading behavior of men and women. To study the gender effect, we use a data set containing the complete trading record of every trader on the Taiwan Stock Exchange (TWSE) from January 1, 2001, to December 31, 2006. The data set has previously been used by H.-L. Chen et al. (2015) and Cao et al. (2023). Different form H.-L. Chen et al. (2015) and Cao

[6] This chapter was written in co-authorship with Prof. Marc Oliver Rieger and Dr. Hung-Ling Chen.

et al. (2023) we use firm-level data instead of individual trading data, which we average over the six years. This allows us to identify the differences in preferences based on the company's characteristics. We regress the percentage of men trading any given company, the percentage of men in the total trading volume, and the percentage of men in the total number of trades per company on a company's size, return, volatility, beta, return skew, dividend yield, a dividend dummy, firm age, its Sharp ratio, and Treynor ratio as well as industry dummies. Including the industry dummies allows us to examine how varying levels of familiarity impact the financial decision-making of both men and women. Most studies have focused on home bias or considered locational proximity to the company (Karolyi, 2002; Chan et al., 2005; Dvořák, 2005; Ivković & Weisbenner, 2005; Bodnaruk, 2009; J. R. Graham et al., 2009), but only a few studies focus on other factors that strengthen familiarity with a company (Ackert et al., 2005; Hong & Kostovetsky, 2012). Because there is a gender difference in vocational interest (McNabb et al., 2002; Ceci & Williams, 2010), one could suspect that this induces a difference in familiarity that then leads to a difference in investment behavior. This idea finds some support in the effectiveness of gender-specific advertisement (Cramphorn, 2011). Therefore, we investigate whether the choice to invest in specific industries depends on gender. As such, our paper contributes to the gender-related risk preference and the familiarity bias literature.

Our first results show that the ratio between men and women trading on the stock market is nearly equal (51.43% men), which is close to the sex ratio of households in Taiwan (Statista, 2023). If we compare our results with stock market participation data from around the world, which show lower participation for women (Van Rooij et al., 2011a; Almenberg & Dreber, 2015; Vohra & Kaur, 2016; Barasinska & Schäfer, 2018), there seems to be a cultural difference. As a result, our data should limit the self-selection bias of women invested in the Taiwanese stock market as the two genders are nearly equal in participation. In other countries, there might be a greater probability of a self-selection bias for women due to the difference in the percentage of women invested in the stock market and the country itself.

Secondly, our results show a gender difference in risk preferences and preferences for fundamental company characteristics. The share of women trading a

given company increases with an increase in systematic risk and higher returns, while the share of men increases with idiosyncratic risk and decreases with higher returns. There is no difference in total risk; as such, women are compensated with higher levels of return. These results were surprising as we expected companies with higher volatility and higher beta to attract a higher share of men. However, our results can be explained by higher overconfidence of men and lower competitiveness by women (Niessen & Ruenzi, 2006; Beckmann & Menkhoff, 2008). We find evidence for higher overconfidence by men in the form of higher numbers of trades and evidence for lower competitiveness by women, by the fact that the top 25% of companies traded by women have, on average, a beta of 0.93, which is close to the market beta. On the other hand, the top 25% of companies traded by men have a beta of 0.57. Furthermore, men prefer younger and smaller companies compared to women. We find these gender differences in preferences for the percentage of men trading a given company, the percentage of men in the total trading volume, and the percentage of men in the total number of trades per company. Regarding familiarity bias, we find that men prefer to invest in industries with whom they are more familiar with – due to vocational selection, such as the computer, electronic components, information services, or non-metallic mineral product industry, while we do not find such a pattern for women.

The rest of the paper is structured as follows. In section two, we summarize the relevant literature concerning gender differences in investment decisions, as well as the gender differences in familiarity. In section three, we describe the methodology of our paper. Section four presents our results, and section five concludes our paper.

3.2 Literature review

Gender differences in investment decisions

Women invest more conservatively and are less confident about their investments than men (Barber & Odean, 2001; Adhikari & O'Leary, 2011). These results hold across different types of investments, such as single stocks, bonds, or mutual funds. Using data from more than 8000 households, Sunden & Surette (1998) showed that women, whether single or married, are less inclined than men to have predominantly stocks in their retirement portfolio. Furthermore, married women have the highest probability of holding primarily bonds. Bhushan & Medury (2013) studied retirement plans offered by employers to their employees and found similar results; women are less likely to invest in stocks and are more likely to invest in fixed deposits. However, no differences in the amount invested in mutual funds were found. Watson & McNaughton (2007), who studied Australian retirement funds with different risk profiles, found that women choose retirement funds with less risk. Even more concerning is that women are at a higher risk of having no retirement account than men (Sunden & Surette, 1998; Herd et al., 2012). The collective implication of all these findings is that higher risk aversion of women can lead to lower returns, in the long run, (Watson & McNaughton, 2007). These studies have in common that the difference in investment style is often attributed to a generally higher financial risk aversion and less risk tolerance of women compared to men (J. F. Graham et al., 2002; Charness & Gneezy, 2007; Faff et al., 2008; Hira & Loibl, 2008).

Given these results, the question is whether this difference in risk tolerance results from gender differences or whether other factors can explain it. While women report lower intentions to take risks and invest less in their pension plans, these differences disappear after controlling for financial literacy (Dwyer et al., 2002; Adhikari & O'Leary, 2011). Interestingly, financial literacy rather than general education seems to lower this gap. Hibbert et al. (2013), who surveyed professors across the United States, found that women are more risk averse in their portfolio allocation than men, but this difference disappears with higher levels of financial education. Other studies further support these findings; they report financial literacy to be positively correlated with both the intention and actual stock market

participation (Van Rooij et al., 2011b; Sivaramakrishnan et al., 2017) and with the savings rate in general (Jappelli & Padula, 2013). This gap of lower average financial literacy in women seems to be a global phenomenon affecting both developing and developed countries (Hasler & Lusardi, 2017). Furthermore, Bucher-Koenen et al. (2017) reported low levels of financial literacy for both young and old women in the United States, the Netherlands, and Germany. Taiwan's women, on the other hand, show higher financial literacy (34%) compared to the women's global average (30%) and are nearly equal in financial literacy to the global average of men (35%) according to Hasler & Lusardi (2017).

Since the lower rate of women participating in the stock market seems to be explained by lower rates of financial literacy, the question remains, do men and women invest differently if they participate in the stock market and have equal financial literacy? Therefore, institutional investors are a natural choice for studying gender differences. Considering average returns, there seems to be no difference in performance between male and female fund managers (Bliss & Potter, 2002; Niessen & Ruenzi, 2006; Babalos et al., 2015; Aggarwal & Boyson, 2016; Niessen-Ruenzi & Ruenzi, 2019). However, according to Niessen & Ruenzi (2006) and Niessen-Ruenzi & Ruenzi (2019), men tend to display a higher likelihood of extreme performance, while women have more consistent returns.

There is mixed evidence regarding portfolio risk: Niessen & Ruenzi (2006) and Niessen-Ruenzi & Ruenzi (2019) find no difference in portfolio volatility. But, women seem to hold lower levels of idiosyncratic risk and are less likely to invest in small caps. On the other hand, Aggarwal & Boyson (2016) find that female hedge fund managers hold portfolios with lower volatility but find no difference for idiosyncratic and systematic risk. Bliss & Potter (2002) report no differences in beta but higher sharp ratios for female fund managers, and J.-H. Chen (2010) report that female fund managers show lower betas.

If we go back to retail investors Barber & Odean (2001) report that men favor stocks with a higher beta, small-cap, and trade more excessively than women. According to Barber & Odean (2001) men trade 45% more than women, ultimately hurting their returns. Felton et al. (2003) find similar results in their year-long investment game with undergraduate business students. They show that men hold riskier investments and trade more often than women, so their portfolios are more

volatile. They attributed this difference to a subgroup of particularly optimistic men. These men are more likely to invest in futures and options than their less optimistic counterparts.
In conclusion, whether women are more risk averse than men depends mainly on the investor type and the risk measures used. Regarding retail investors, women, on average, show higher risk aversion than men, which can partly be explained by financial literacy. For the financially literate, there seems to be no clear consensus on the difference in risk aversion between men and women for the different risk measures (total risk, systematic risk, and idiosyncratic risk) used.

Before we come to our hypothesis, we will need to look at our data set, which consists of trading data from the TWSE. Because we are using the same data set as Cao et al. (2023) we refer to their paper for an exact breakdown of the investor type. In summary, the data consists of 76.87% small individual investors, 10.52% large individual investors, 6.84% foreign and 5.78% institutional investors. Because a large number of traders on the TWSE are retail investors, we hypothesize that female investors prefer companies or stocks with lower risk compared to men. As a result, we expected – due to the risk-return trade-off (Ghysels et al., 2005) – that women pick stocks with slightly lower returns than those picked by men. Furthermore, we hypothesize that risk aversion is of equal sign across the risk measures used. Regarding other company characteristics, Khan et al. (2016) reports that across investor types (retail, professional and institutional), women prefer companies that pay dividends as well as older companies. This is in line with our hypothesis of higher risk aversion of female investors as these types of firms are regarded as more mature and less risky (Khan et al., 2016). We have formulated the following hypotheses:

- *Hypothesis 1a: The share of women invested in a company decreases with an increase in volatility.*
- *Hypothesis 1b: The share of women invested in a company decreases with an increase in beta.*
- *Hypothesis 2: The share of women invested in a company decreases with an increase in average return.*
- *Hypothesis 3: The share of women invested in a company increases with an increase in market capitalization.*
- *Hypothesis 4a: The share of women invested in a company increases if the company pays dividends.*
- *Hypothesis 4b: The share of women invested in a company increases with an increase in dividend yield.*
- *Hypothesis 5: The share of women invested in a company increases with an increase in the firms age.*

Stock investment and familiarity

In the next section, we will dive deeper into the decision-making progress of people to help us understand how investors make decisions. If we consider a rational investor, he or she will analyze and compare every company that trades on the stock market to pick out the best companies and invest their money with them. However, given that the TWSE has more than 900 companies from which investors can choose and the US market has more than 2000 companies to choose from (WFE, 2022), one has to simplify the decision process. So how do investors navigate the decision progress?

A good place to start is to look at the biases and heuristics that investors are subject to or use in their decision-making progress. Recent studies have shown that people disproportionately invest in companies they are familiar with or believe to have better information about than other investors. As a result, we see a positive correlation between holding too much of a certain stock in a portfolio and the level of familiarity with that company (Grinblatt & Keloharju, 2001; Huberman, 2001; Cohen et al., 2008; Seasholes & Zhu, 2010; Hong & Kostovetsky, 2012; Pool et al., 2012).

Initially, research focused on the home bias, which is the bias of investors to invest in companies from their home country disproportionately. For example, using data from the BS/Gallup investor survey, J. R. Graham et al. (2009) found that 62.5% of US Investors did not hold any foreign stocks in their portfolio. While the survey does not test for financial literacy, education significantly and positively influences the percentage of foreign stocks included in the portfolio (J. R. Graham et al., 2009). On the other hand, even mutual funds, which are managed by financially educated managers, show a significant home bias. Chan et al. (2005), who studied mutual funds from 26 different countries, showed that funds in every country exhibit home bias and that factors such as economic development, capital control, and investor protection only play a minor role in explaining the effect. However, whether this home bias is a result of an informational advantage and, thus, abnormal returns for domestic investors is unclear. While Hau (2001); Choe et al. (2005); Dvořák (2005) find abnormal returns Grinblatt & Keloharju (2000); Karolyi (2002); Huang & Shiu (2009); Seasholes & Zhu (2010) do not. On the other

hand, if we consider local bias and compare domestic investors among themselves, studies suggest that investors that hold local stocks rather than companies that are located further away do have an informational advantage, which allows them to gain abnormal returns from these companies (Ivković & Weisbenner, 2005; Ivković et al., 2008; Bodnaruk, 2009; Baik et al., 2010). Furthermore, Bodnaruk (2009) finds that investors that move decrease their positions in local stocks from their original location and increase their position in local stocks from their new residence. They compare the investor's new positions with old local positions and find that the investor gains higher risk-adjusted returns with their new positions, suggesting an informational advantage.

While the home bias effect can partly be explained by a common language and culture (Grinblatt & Keloharju, 2001; Chan et al., 2005), it does not explain a closely related bias: the familiarity bias. The familiarity bias is similar to the home bias and states that investors disproportionately invest in companies based on their familiarity with the company. This familiarity can take on many forms, such as locational proximity, employment in a given company, political values, social networks, or familiarity with the company's name (Huberman, 2001; Ackert et al., 2005; Cohen et al., 2008; Hong & Kostovetsky, 2012; Pool et al., 2012).

Furthermore, consumer behavior shows that if a person phases a purchasing decision with a large set of available alternatives, he or she will choose from a much smaller subset of brands (Laroche & Sadokierski, 1994). This smaller set is called the evoked set and is defined as the set of brands the consumer considers purchasing from. The set consists of brands available to him or her – or these that he or she is aware of (Howard & Sheth, 1969; Laroche & Sadokierski, 1994). Consumers only pick brands from the evoked set instead of comparing all of the alternatives available because of the cost of researching and evaluating the alternatives. These costs can take on different forms, such as time, money or cognitive capacity, etc.; hence, restricting the alternatives to the evoked set is a much-applied strategy (Gronhaug, 1973).

While there are many different strategies for how a person forms an evoked set, personal interest or familiarity with an object or activity can reduce the felt search cost through stronger engagement (Gronhaug, 1973). As such, the person is more involved in the search process, collects more information on a bigger set

of alternatives, and thus makes more qualified decisions.
Additionally, studies show that repeated exposure to an advertisement increases a person's attitude towards a brand (D. S. Cox & Cox, 1988; D. Cox & Cox, 2002; Hansen & Wänke, 2009; Montoya et al., 2017). D. S. Cox & Cox (1988); Laroche et al. (1996) explain that the exposure effect results from the consumer's increased knowledge about a brand's claims and thus increased familiarity.
In conclusion, we see that people purchase products of brands or invest in companies with whom they are familiar. In the case of investments, increased familiarity leads to the investor's portfolio tilting toward familiar companies and less diversification. However, this tilt does not necessarily result in an informational advantage. Increased exposure to a given brand leads to higher familiarity and, as such, higher confidence and purchasing intentions for this brand. Furthermore, people reduce their purchasing decisions to a subset of the available alternatives. The exact mechanism should apply to investments. First, due to the vast array of alternative investment options available, individuals must limit their potential investment choices. Second, with increased exposure to a given company or industry, familiarity with that company or industry increases and, as a result, the investor's confidence and investment intention. Thus, we see that people are subject to familiarity bias. The next section will discuss whether this familiarity bias leads to different investments for men and women.

Gender differences in familiarity

There is much evidence that men and women are familiar with different topics. According to a report by the Department of Gender Equality of the Executive Yuan (2021) in Taiwan, in 2018, 43.1% of degrees in natural sciences, mathematics, and statistics were earned by women, as well as 28% of degrees in information and communication technologies and 18.9% of degrees in engineering, manufacturing, and construction. On the other hand, around 70% of degrees in education, arts, and humanities were earned by women. Furthermore, according to Fu et al. (2021) the number of women earning a bachelor's degree in science, technology, engineering and mathematics (STEM) was 23.6% in 2017. According to labor statistics, only 10.1% of women worked in a STEM profession in 2017 (Fu et al., 2021). Looking

at Taiwan's biggest industries, the electronic parts and components manufacturing industry has a female workforce of 46.7%, followed by computers, electronics, and optical products manufacturing at 42%, and telecommunications at 39%. Computer programming, consultancy, and related activities have 35.8% female workers, while information services have 45% (Department of Gender Equality of the Executive Yuan, 2021).

These differences between men and women seem to be a reflection of attitude towards science and technology, which is formed at a young age and only increases with age. This pattern of lower interest of women in science and technology can be found around the world, including Taiwan (Chang et al., 2009; Ceci & Williams, 2011; Charles et al., 2014). This gap in attitude increases for more affluent "postmaterialist" countries (Charles et al., 2014; Charles, 2017). Charles (2017) attributes these cross-cultural differences to adolescents and young adults in more affluent countries being encouraged to "follow their passion" as self-expression becomes more important in those countries.

Taken together, we see that investors disproportionately invest or tend to invest in companies that they are familiar with, and at least in the case of local bias, there is evidence that this tendency provides them with an informational advantage. Secondly, men and women tend to have different personal interests and values, as seen in the different career aspirations (McNabb et al., 2002; Ceci & Williams, 2010; M.-T. Wang & Degol, 2013). Further evidence of personal interests and value differences can be found in the topics of magazines for men and women (Maknickienė & Rapkevičiūtė, 2022) or gender-specific advertisement (Buijzen & Valkenburg, 2002; Cramphorn, 2011). Since men and women are exposed to different degrees of different topics, either through their jobs or personal interests, we should see a difference in familiarity with these topics, which should be reflected in their portfolios. For example, if men are more likely to read about trends or work in the automobile industry, they should be more familiar with that industry compared to women, and as a result, we expect a higher proportion of men holding stocks in that industry. Based on this, we should see a gender difference in terms of industries that the investors invest in. Our hypothesis is as follows:

- *Hypothesis 6: The share of women invested in a company is unequally dis-*

tributed across the different industries.

3.3 Data and methodology

Data and sample

We use the same data set as H.-L. Chen et al. (2015) and Cao et al. (2023). The data set contains a complete record of the trading activities of every single trader on the TWSE from January 1, 2001, to December 31, 2006. Furthermore, it holds detailed information about the executed orders, such as the transaction date, time, stock code, the transaction price, whether it was a buy or sell order and the number of shares traded. Details about the trader include whether he or she is a domestic or foreign investor, is an institutional or retail investor, as well as the trader's identity[7]. Together, we have information on 1.9 billion trades, which translates to a trading volume of 254.1 trillion NT (New Taiwan) dollars. Furthermore, we use stock-specific information such as the company's founding, market capitalization, and the daily closing price from the Taiwan Economic Journal Equity database (TEJ). We obtain information on dividends and the closing price for the MSCI Taiwan index from the Refinitiv Datastream database. We use this data to calculate the investor's trading volume (price times shares traded) and the daily logarithmic stock returns R_{it}. Overall, we have data on 792 companies. The following section describes the calculations of the dependent and independent variables. Unless otherwise specified, all variables are calculated as averages over the 2001 to 2006 period.

Dependent variables

To study the difference in investment behavior for men and women, we run regression models with three different dependent variables
$Pct_i \in \{Pct_i^v, Pct_i^t, Pct_i^{nt}\}$ which capture different aspects of investment behavior. The first variable is the percentage of volume traded by men Pct_i^v for stock i. The second dependent variable is the percentage of men trading Pct_i^t. This variable is calculated by dividing the number of men trading NT_i^m by the total number of

[7]This allows us to identify the trading history and the gender of the trader

men and women trading NT_i. We only count each investor j once, no matter if he or she trades the same stock multiple times (Equation 3).

$$NT_i = \sum_{j=1}^{J} X_{ij}, \tag{3}$$

where

$$X_{ij} := \begin{cases} 1, & \text{if stock } i \text{ is traded at least once by person } j, \\ 0, & \text{otherwise.} \end{cases}$$

This allows us to study the general interest in a given stock without inflating the general interest by investors who trade in and out of stocks multiple times.

The third variable is the percentage of men in the total number trades for a given stock Pct_i^{nt}. Instead of only counting an investor j once, each individual trade is counted. For example, if an investor buys and sells a given stock, it is counted as two trades. This variable is calculated to capture the overall interest in a given stock.

Independent variables

In order to examine how varied interests between genders impact investment behaviors, we categorize stocks based on their industry using the International Standard Industrial Classification (ISIC) (Department of Economic and Social Affairs, 2008). The industry variable names and the associated ISIC can be found in table 20 in the appendix. The study aims to explore the impact of subjective interests on investment choices. We classified the companies in our data set into 18 different industries using the pre-classification provided by TEJ. From these classifications we construct a dummy variable In_{ik} for each industry $k = \{1, ..., 18\}$. Companies that are part of multiple industries or cannot exactly be classified are identified as "other industries". Out of 792 companies, 47 fall into this category. We define the market capitalization $MCap_i$ as the natural logarithm of market capitalization. A company's average return μ_i is calculated as the average daily rate of return R_{it}. Similarly, volatility σ_i and skew γ_i are also calculated from a company's daily rate of return R_{it}. Volatility σ_i is simply the standard deviation and skew γ_i is the

third standardized moment of returns. Remember, R_{it} is calculated as the daily logarithmic return. We obtain a company's beta β_i by regressing R_{it} on the market returns R_t^m, which we define as the return of the MSCI Taiwan index. We chose a country index to better capture the country-specific stock variations (Fama & French, 2012). All betas are calculated using heteroscedastic and autocorrelation robust estimators (Arellano et al., 1987). A company's age F_i is defined as a company's firm age, which is the difference between its founding year and the year 2003. We chose 2003 as it represents the middle of our studied data. Companies that are founded after 2003 or during 2003 are excluded from our study. This cuts our data down to 683 companies. We do this for two reasons. The first reason is to have enough data points to calculate a company's beta. The second reason is that we want to avoid companies that just started out and might not survive past the three-year mark. According to Khurshed et al. (1999), about ten percent of companies delist in the first three years. To study the effect of dividends D_i on the choice to trade a stock for male vs. female investors, we calculated two different variables, where $D_i \in \{Dummy\_Div_i, Yield\_Div_i\}$. First, we calculate a dummy variable $Dummy\_Div_i$ which takes the value of one if the company pays dividends and zero otherwise. Since Refinitiv Datastream provides dividends per share as a daily value, we consider a company to be paying dividends if it lists dividends on more than 90 percent of trading days. At last, we include dividend yield $Yield\_Div_i$, which is the average daily dividend yield over the studied period. We get the daily dividend yield from the Refinitiv Datastream database[8]. As a relative risk measure $Risk_i \in \{S_i, T_i\}$ we include the Sharp ratio $S_i = \frac{\mu_i}{\sigma_i}$ and the Treynor ratio $T_i = \frac{\mu_i}{\beta_i}$ in our model, which we calculate without a risk-free rate.

Regression model

Before running the regressions, we winsorized our data by excluding the top and bottom 0.5^{th} percentile of companies with the lowest / highest skewness, volatility, Sharp Ratio, and Treynor Ratio as these variables showed the most extreme outliers.[9] After winsorizing our data and excluding companies that contain missing

[8]The Refinitiv Datastream database calculates the daily dividend yield as a percentage of the annual dividend over the daily share price, as such, it does not represent a daily return

[9]For the exact values before and after winsorization check table 21 in the appendix

values, we are left with 628 companies. To avoid problems with multicollinearity, only one element of the previously defined sets is used in the regression analysis at a time. This means we only include one dividend, and risk variable. As such, our full regression model looks as follows:

$$\begin{aligned} Pct_i = \alpha_0 + \sum_{k=1}^{K-1} \alpha_{2k} In_{ik} + \alpha_3 MCap_i + \alpha_4 \mu_i + \alpha_5 \sigma_i \\ + \alpha_6 \gamma_i + \alpha_7 \beta_i + \alpha_8 F_i + \alpha_9 D_i + \alpha_{10} Risk_i + \epsilon_i \end{aligned} \tag{4}$$

We verified that our models are free of multicollinearity, using a cut-off point of five for the Variance Inflation Factor (VIF). Because the test statistics of the Breush-Pegan test are significant at the 5% level, we use the heteroscedastic-robust estimator $HC3$ in our regression models, as it is the most robust estimator (Long & Ervin, 2000). Furthermore, our longest models include more than 25 independent variables, which can increase the type one error. As a result, we use the Benjamin-Hochberg procedure to control for the false discovery rate, which we set to 5%. We chose the Benjamin-Hochberg procedure over the Bonferroni correction as it is more powerful than the latter (Benjamini & Hochberg, 1995). Concerning the industry dummy variables, we use the industry classification of "Other" as our reference point. Furthermore, the variables: average return, volatility, skewness, Sharp ratio, Treynor ratio, dividend yield, and the percentages of men trading ($Pct_i^v, Pct_i^t, Pct_i^{nt}$) are multiplied by 100 to make interpretations easier.

3.4 Results

Descriptive results

The average percentage of men trading any particular company is 51.43% for Pct_i^t, 56.32% for Pct_i^v and 57.94% for Pct_i^{nt}. We performed a two-sided t-test to determine if the percentage of men trading is significantly higher than that of women. Our results show that all percentages are significantly above 50% at the 0.1% level. Consistent with the literature, men participate more often than women in the stock market. However, the difference is not economically large – only 1.43%. The difference in trading volume and the number of trades, on the

other hand, is much larger – 6.32% and 7.94%, respectively.

Table 9

Descriptive statistics winsorized

	mean	median	sd	min	max
Percentage men trading	51.34	51.10	2.81	43.02	66.49
Percentage men trading volume	56.32	55.80	3.37	42.50	73.85
Percentage men trading number	57.94	57.51	3.21	39.70	73.00
Return	0.03	0.05	0.11	-0.57	0.29
Volatility	3.04	2.99	0.69	1.61	5.52
Skewness	10.44	8.87	10.28	-16.86	48.56
Beta	0.76	0.75	0.23	0.11	1.36
Market Cap	8.42	8.24	1.47	4.53	14.02
Sharp ratio	1.23	1.79	3.10	-11.47	8.30
Treynor ratio	0.03	0.07	0.20	-1.47	0.42
Firm age	26.21	25.00	12.61	1.00	68.00
Dividend yield	1.97	1.48	1.97	0.00	9.06

Return, Volatility, Skewness, Sharp ratio,
Treynor ratio,Dividend yield
and the Percentages of men are multiplied by 100,
Market cap = ln(Market cap),
Winsorized data; $N = 628$.

Preliminary correlation analysis shows skewness, beta, market cap, and dividend yield significantly correlate with our three dependent variables. The results for firm age and average returns depend on the model. These results support our hypothesis about men preferring smaller companies. Furthermore, based on these results, we expect men to prefer companies with lower beta, higher skew, higher dividend yield, and older companies and pick companies with lower returns. The positive correction with skew and negative correlation with average returns suggests that men are more likely to pick companies with lower returns than women. The negative correlation with beta and the positive correlation with dividend yield contradict our hypothesis. These results are further supported if we compare the mean difference between the percentages of men trading in any given company for the top 25% and the bottom 25% percentile. We find that the top 25% of companies preferred by men compared to the top 25% companies preferred by

women (bottom 25% preferred by men) have, on average, a daily return that is 0.06% ($p < 0.001$) points lower. If we converted these numbers into yearly numbers (252 trading days), we find that the top 25% companies preferred by men lose on average 5% per year while the top 25% of companies preferred by women gain 10%. In terms of beta, we find that the top 25% of companies traded by men have a beta of 0.57, while the top 25% of companies preferred by women have a beta of 0.93, which is very close to the market beta of one. The difference for beta (0.36) is significant at the 0.01% level. The other differences for the other company characteristics are as follows: volatility 0.11 ($p = 0.24$), skewness 6.33 ($p < 0.001$), market capitalization 2.4 ($p < 0.001$), firm age 1.3 ($p = 0.37$), Sharp-ratio 1.47 ($p < 0.001$), and dividend yield 0.65 ($p < 0.001$).

Results can be found in table 22, 23 and 24 in the appendix.

$(Pct_i^v, Pct_i^t, Pct_i^{nt})$

Regression results

Next, we will look at the regression results regarding the industry-only model. We find that men trade the following industries more often and with higher volume: Mineral Products, Food and Textile. On the other hand, Electronic Components shows a significant negative influence on the volume traded by men (Pct_i^v). The results for the number of trades (Pct_i^{nt}) are similar, except that the dummy variable for the food industry is not significant. If we look at the propensity to trade (general interest model (Pct_i^t)), Information Services significantly increase the percentage of men interested in any particular stock. However, non of the other industries show significant results. The results can be found in table 10, and a visual representation can be found in figure 5. Overall, the industry-only models explain about 20% of the variance for the trading volume, 16% for the number of trades, and 9% for the general interest model.

Table 10

Regression on the percentage of men

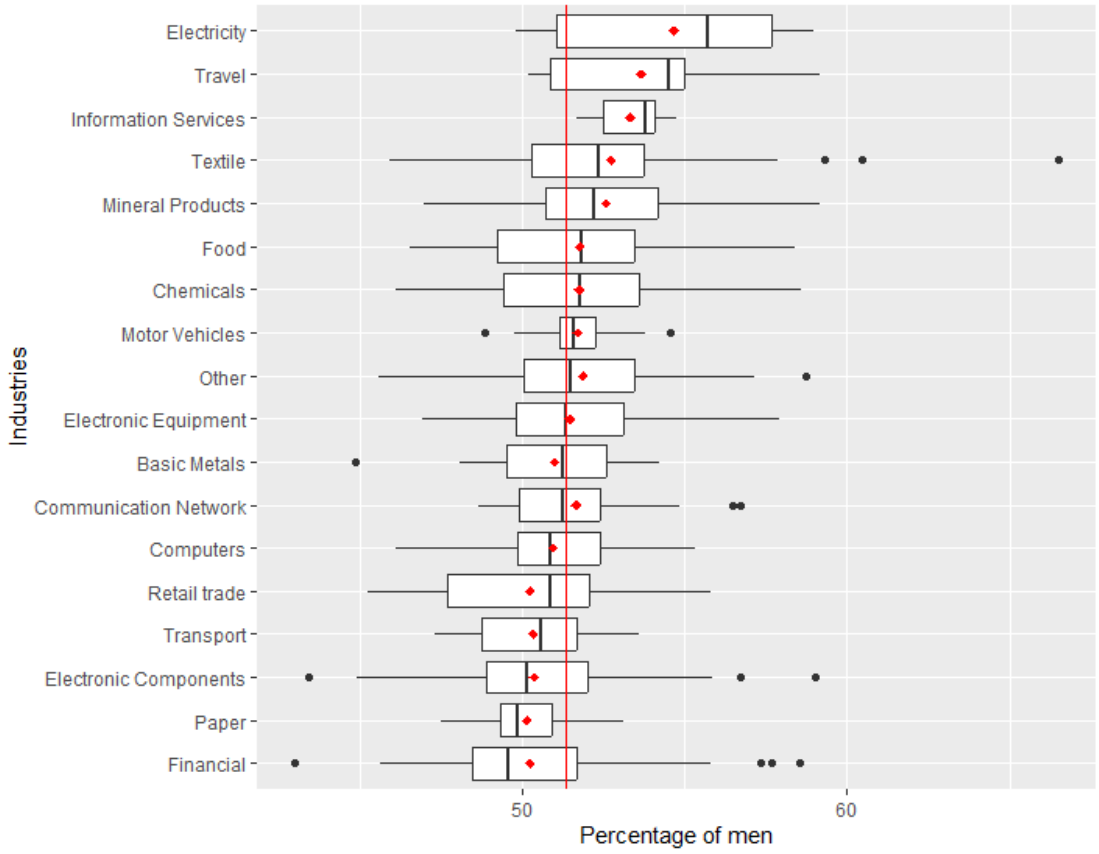
	Model 1	Model 2	Model 3
const	56.27***	51.26***	57.81***
	(122.87)	(129.27)	(123.63)
Motor Vehicles	-0.71	0.44	-0.72
	(-1.17)	(0.72)	(-1.14)
Mineral Products	2.35**	1.33	1.92*
	(3.54)	(2.49)	(2.86)
Chemicals	0.54	0.5	0.78
	(0.84)	(0.84)	(1.32)
Telecommunications	-1.46	0.4	-1.38
	(-2.01)	(0.56)	(-1.85)
Electronic Components	-1.97**	-0.9	-1.68**
	(-3.87)	(-2.0)	(-3.3)
Computers	-0.94	-0.3	-0.8
	(-1.64)	(-0.61)	(-1.43)
Electronic Equipment	0.56	0.64	0.22
	(0.9)	(1.24)	(0.35)
Financial	-0.42	-1.13	0.47
	(-0.63)	(-1.97)	(0.68)
Food	2.31*	0.52	1.98
	(2.75)	(0.71)	(2.37)
Travel	0.99	2.39	-0.15
	(0.85)	(1.73)	(-0.13)
Information Services	0.76	2.07**	-0.23
	(0.88)	(3.43)	(-0.23)
Basic Metals	0.03	-0.26	0.42
	(0.05)	(-0.44)	(0.74)
Electricity	4.09	3.41	3.23
	(1.95)	(1.85)	(1.96)
Paper	-0.32	-1.12	0.13
	(-0.44)	(-1.3)	(0.23)
Transport	-1.44	-0.93	-1.02
	(-2.29)	(-1.44)	(-1.56)
Textile	3.01**	1.47	2.57*
	(3.32)	(2.01)	(2.75)
Retail trade	0.57	-1.02	2.47

	(0.66)	(-1.01)	(2.24)
N	628	628	628
adj. R2	0.2	0.09	0.16

Model 1: Trading Volume, Model 2: Trading,
Model 3: Number of Trades
Significant at: *5%, **1% , ***0.1%.
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.

Figure 5

Percentage of men trading different industries



This figure shows the percentages of men trading in different industries. The boxplots are constructed from the winsorized data, including 628 companies. The red vertical line represents the average percentage of men trading: 51.43%. The red diamonds represent the industry averages.

While the industry-only models show that the volume and number of trades by men in a company significantly vary between industries, the models including the stock's fundamentals, show that these differences can partly be explained by those variables. Regarding the percentage of volume traded by men, we find that the Mineral Products industry seems to increase the volume men trade across the different models ($p < 0.05$). At the same time, Electronic Components significantly decreases the percentage of men trading a company in terms of volume and total number ($p < 0.05$) for all models. The different models explain, on average, about 54.7% of the variance in the volume traded model and about 35.5% of the variance in the number of trade models.

Table 11

Regression on percentage of men: trading volume (dividend dummy model)

	Model 1	Model 2	Model 3	Model 4
const	56.27***	64.93***	66.51***	66.2***
	(122.87)	(32.94)	(88.76)	(92.03)
Motor Vehicles	-0.71	-1.12	-0.49	-0.56
	(-1.17)	(-1.82)	(-0.73)	(-0.86)
Mineral Products	2.35**	1.54*	1.31*	1.15
	(3.54)	(2.97)	(2.58)	(2.32)
Chemicals	0.54	0.55	0.44	0.29
	(0.84)	(1.2)	(0.92)	(0.63)
Telecommunications	-1.46	-0.13	-0.97	-1.08
	(-2.01)	(-0.19)	(-1.14)	(-1.3)
Electronic Components	-1.97**	-0.13	-1.58**	-1.76***
	(-3.87)	(-0.3)	(-3.71)	(-4.25)
Computers	-0.94	0.57	-0.64	-0.8
	(-1.64)	(1.19)	(-1.37)	(-1.73)
Electronic Equipment	0.56	-0.14	-0.6	-0.8
	(0.9)	(-0.31)	(-1.3)	(-1.77)
Financial	-0.42	0.73	0.73	0.38
	(-0.63)	(1.62)	(1.51)	(0.86)
Food	2.31*	0.59	0.86	0.69
	(2.75)	(0.98)	(1.34)	(1.05)
Travel	0.99	0.54	0.75	0.71
	(0.85)	(0.53)	(0.71)	(0.68)
Information Services	0.76	0.39	-1.13	-1.1

	(0.88)	(0.54)	(-1.67)	(-1.68)
Basic Metals	0.03	0.19	-0.08	-0.18
	(0.05)	(0.36)	(-0.14)	(-0.34)
Electricity	4.09	2.23	3.32	3.6
	(1.95)	(1.31)	(1.93)	(1.94)
Paper	-0.32	-0.17	-0.37	-0.46
	(-0.44)	(-0.24)	(-0.44)	(-0.57)
Transport	-1.44	-0.53	-0.61	-0.76
	(-2.29)	(-0.94)	(-0.97)	(-1.26)
Textile	3.01**	1.54	1.42	1.19
	(3.32)	(2.18)	(1.93)	(1.66)
Retail trade	0.57	0.01	0.51	0.38
	(0.66)	(0.01)	(0.6)	(0.44)
Fundamental & technical controls	no	yes	yes	yes
dividend dummy model				
N	628	628	628	628
adj. R2	0.2	0.57	0.5	0.52

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

Results for the number of trades and the volume dividend-yield model can be found in tables: 26, 27, and 29 in the appendix.

Regarding the general interest model (Pct_i^t), we find differences for the following industries: Mineral Products, Telecommunications, Electronic Components, Computers, and Information Services, which all positively increase the general interest of men trading a stock ($p < 0.05$). Furthermore, these differences only show if we look at the models, including variance, beta, and skew, but not the Sharp and Treynor ratio. On the other hand, as discussed earlier, no differences exist in the industry-only model, except for the information service industry. If we include the Sharp- or Treynor-Ratio in our model, the industry differences disappear completely. This means that the differences in interest in a particular stock are more

likely to result from a company's risk-return profile rather than the industry itself. On average, the models explain about 53.5% of the variance in the percentage of men trading any stock. Results for the dividend yield model can be found in the appendix (table 28).

Table 12

Regression on percentage of men: trading (dividend dummy model)

	Model 1	Model 2	Model 3	Model 4
const	51.26***	62.83***	61.82***	61.51***
	(129.27)	(49.06)	(92.68)	(93.6)
Motor Vehicles	0.44	0.08	0.68	0.62
	(0.72)	(0.12)	(0.83)	(0.77)
Mineral Products	1.33	1.3**	0.82	0.7
	(2.49)	(3.15)	(1.91)	(1.64)
Chemicals	0.5	0.78	0.63	0.51
	(0.84)	(2.06)	(1.41)	(1.15)
Telecommunications	0.4	1.72**	0.65	0.54
	(0.56)	(3.07)	(0.84)	(0.7)
Electronic Components	-0.9	1.11**	-0.74	-0.9
	(-2.0)	(3.1)	(-1.9)	(-2.31)
Computers	-0.3	1.24**	-0.28	-0.43
	(-0.61)	(3.35)	(-0.68)	(-1.02)
Electronic Equipment	0.64	0.51	-0.16	-0.35
	(1.24)	(1.5)	(-0.42)	(-0.93)
Financial	-1.13	0.23	0.18	-0.08
	(-1.97)	(0.68)	(0.44)	(-0.21)
Food	0.52	-0.62	-0.18	-0.33
	(0.71)	(-1.49)	(-0.37)	(-0.68)
Travel	2.39	2.34	2.52	2.49
	(1.73)	(2.14)	(2.01)	(2.0)
Information Services	2.07**	2.0***	0.29	0.22
	(3.43)	(4.68)	(0.6)	(0.46)
Basic Metals	-0.26	0.14	-0.33	-0.38
	(-0.44)	(0.29)	(-0.64)	(-0.74)
Electricity	3.41	0.83	2.42	2.63
	(1.85)	(0.62)	(1.63)	(1.66)
Paper	-1.12	-0.04	-0.33	-0.41
	(-1.3)	(-0.05)	(-0.35)	(-0.42)

Transport	-0.93	0.28	0.1	-0.01
	(-1.44)	(0.51)	(0.16)	(-0.02)
Textile	1.47	0.6	0.46	0.27
	(2.01)	(1.2)	(0.81)	(0.51)
Retail trade	-1.02	-1.2	-0.71	-0.83
	(-1.01)	(-1.4)	(-0.78)	(-0.91)
Fundamental & technical controls	no	yes	yes	yes
dividend dummy model				
N	628	628	628	628
adj. R2	0.09	0.6	0.47	0.49

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

We find similar results across all models regarding the variables describing a given stock's technical and fundamental properties. Results can be found in tables 13 and 30 to 34. Starting with market capitalization (MCap), we find a negative coefficient between -0.4 and -1.28 across all models ($p < 0.01$). This means that men prefer smaller companies compared to women. If we look at the average return, we find again significant ($p < 0.01$) negative coefficients with a pretty high causal effect between -4.07 and -6.08, depending on the model. Moreover, the negative effect is, on average, more than one percentage point higher for the volume and number of trades model than the general trading model. While the interpretation that men prefer smaller companies is pretty straightforward, we cannot simply say that men prefer companies with lower returns. We must look at the risk variables to interpret the lower average returns. Our first risk variable is volatility, which is insignificant across all models. The second risk variable beta is significant ($p < 0.01$) across all models. Moreover, its causal effect is also quite big, ranging from -3.13 to -5.76. Both the strong negative causal effect of average returns plus the negative effect of beta suggest that men prefer stocks that are more likely to be uncorrelated with the broader market, and at the same

time, these stocks have lower average returns. This means that men and women take, on average, the same amount of total risk, but men take less systematic risk compared to women, which leaves them with a higher proportion of idiosyncratic risk, for which they are not compensated. A visual representation of the effect of beta on the percentages of men trading can be found in figure 13 in the appendix. The relative risk measures further illustrate this; we find a strong causal effect for the Treynor ratio ($[-5.14,-2.74]$ ($p < 0.01$)). Regarding the sharp ratio, we find weaker effects, which range from -0.27 to -0.11 ($p < 0.05$). This shows that men are less likely to trade the given stocks if we increase the compensation per unit of systematic risk.

Next, let us consider dividends. Among the two variables, dividend yield is highly significant ($p < 0.001$) across all models. The effect size ranges from 0.27 to 0.44. This shows that men favor stocks with higher dividend yields. Regarding the dividend dummy variable, we only find significant results for the percentage of men trading a particular stock. Here, the effect size ranges from 0.99 to 1.41 percentage points, and the coefficients are highly significant ($p < 0.001$). On average, the dividend yield model explains about 49.3% and the dividend dummy model about 46.4% of the variance. In conclusion, a company paying dividends increases the general interest of men but not the share of men in total volume or the share of men in the number of trades for any stock. On the other hand, dividend yield increases the percentage of men trading a company, the share of men in the total trading volume, and the share of men in the total trading numbers.

We conducted a t-test to determine whether dividend-paying stocks are traded more frequently than non-dividend-paying stocks, looking at the total number of traders, trading volume, and number of trades for a particular company. The results were significant ($p < 0.001$) for all three variables. Results can be found in table 25.

Let's take a company's age into account. Our results indicate that firm age has a negative impact ($p < 0.01$) on the percentage of males trading any particular stock. Nevertheless, this effect is small, ranging from -0.03 to -0.02. This supports our hypothesis that men prefer younger companies.

A stock skewness did not prove to be significant across all models. This means that the lower average returns found in the companies that men trade do not result

from men trading companies with higher tail risk but generally lower returns.

Table 13

Regression on percentage of men: trading (dividend dummy model)

	Model 1	Model 2	Model 3
Market Cap	-0.88***	-1.28***	-1.25***
	(-11.01)	(-19.73)	(-19.88)
Return	-4.45***		
	(-3.89)		
Volatility	-0.13		
	(-0.47)		
Skewness	-0.01		
	(-0.66)		
Beta	-5.76***		
	(-9.24)		
Firm age	-0.02**	-0.03**	-0.02**
	(-2.86)	(-3.25)	(-3.07)
Dividend dummy	0.99***	1.41***	1.56***
	(3.91)	(5.83)	(6.53)
Sharp ratio		-0.1	
		(-2.48)	
Treynor ratio			-2.74**
			(-3.38)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.6	0.47	0.49

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

3.5 General discussion and concluding remarks

3.5.1 Discussion

Risk-return preferences

Women are generally regarded as more risk-averse than men when it comes to financial decision-making and stock market participation. However, evidence of gender differences in risk-taking on the stock market shows mixed results and depends on the risk measures used. We employed a unique data set that contains every trade of every trader that participated in the TWSE from January 2001 to December 2006 to study the trading behavior of men and women on the stock market. This allowed us to study gender differences in trading behavior without a self-selection bias that might arise with data that comes from different brokers. We find evidence that the percentage of women trading a company rises with the age and size of the company (Hypothesis 3 and 5). Regarding company size, we additionally find an increase in the share of women in traded volume and number of trades per company. Furthermore, our results show that there is a gender difference in risk-taking. However, our hypotheses that the share of women decreases with an increase in a company's volatility, betas, and as a result, these companies have lower returns were rejected (Hypothesis 1 and 2). Our results are even opposite to what we predicted: an increase in a company's beta increases the share of women invested, the share of women in the total number of trades, and the share of women in the total volume traded per company. On the other hand, we find no such pattern for both men and women in regard to the volatility of a company. Our results are similar to Niessen & Ruenzi (2006); Niessen-Ruenzi & Ruenzi (2019), who also report that women trade companies with higher systematic risk, while men trade companies with higher idiosyncratic risk. Furthermore, we find that the share of women in terms of propensity to trade, trading volume, and number of trades increases with an increase in average returns for a given company. As such, our results are in line with the Capital Asset Pricing Model, which states that because idiosyncratic risk can be eliminated by diversification, investors should only be compensated for systematic risk (Ross, 1978). This is exactly what we find: women, on average, prefer companies with higher systematic risk and, as

such, have higher average returns.

Why do women show a higher preference for stocks with higher betas compared to men? Niessen & Ruenzi (2006) suggest that the higher rate of idiosyncratic risk taken by men is a result of more active trading and overconfidence by men compared to women. Our results seem to support this as we find that men trade on average 8% more per company. Furthermore, the preference for specific industries suggests a more active trading strategy by men. Deaves et al. (2009) show that overconfidence and the better-than-average effect lead to more trading; however, they do not find a gender effect for trading after controlling for these biases. On average, however, studies find that men are more overconfident than women (Bhandari & Deaves, 2006; Yang & Zhu, 2016), which leads to more trading (Barber & Odean, 2001). Furthermore, Schubert (2006) shows that women are more pessimistic towards potential gains and more loss averse than men are. On the other hand, Beckmann & Menkhoff (2008) attribute the higher risk aversion of female fund managers towards their lower competitiveness rather than lower confidence. Taken together, our empirical results of higher systematic risk taken by women and higher idiosyncratic risk-taking by men seem to be a function of men's higher overconfidence and/or women's lower competitiveness, such that men have higher confidence in their stock-picking ability or are more likely to overestimate future returns, while women are more conservative and stick with stocks, which show a higher correlation with the overall market. Hsu et al.'s (2021) findings of higher confirmation bias of men and women's higher regret aversion in Taiwanese traders further underline men's overconfidence and women's tendency to invest in stocks with high correlations with the market.

Dividends

Our hypothesis that women have a stronger preference for dividends than men because it is a type of secure income (Khan et al., 2016) is rejected. Instead, we find the opposite; dividend-paying stocks and higher dividend yield attract a greater percentage of men than women. J. R. Graham & Kumar (2006) shows that preferences for dividend yield in retail traders rise with age and with lower income. Furthermore, they find that this subgroup of traders purchases dividend-paying

stocks around dividend announcements and on the cum-dividend day or earlier. As such, they find that this group actively trades dividend stocks. Our research supports this observation, as the overall trading volume, number of trades, and number of people trading are higher for companies that offer dividends compared to those that do not, plus the share of men trading a company increases if the company pays dividends. Taken together, our results could be driven by a subgroup of men actively trading dividend-paying stocks around their dividend announcement and dividend dates. Because we are looking at company-level data, we cannot test this new hypothesis. Future research should check if there is a gender difference in the trading behavior for dividend-paying stocks.

Familiarity

We have found evidence of a gender difference in stock selection based on familiarity. We find the percentage of men trading in the following industries is significantly higher than the average: the computer, electronic components, telecommunication or non-metallic mineral product industry, and information services, after controlling for a company's fundamental and technical characteristics. As such, the preference for men in these industries is in line with the higher familiarity of men in those industries, which can be seen in the higher percentage of men working in those industries (Department of Gender Equality of the Executive Yuan, 2021). Additionally, we have not observed this trend in industries where women have a higher level of familiarity due to their increased rates of employment. As a result, we find some evidence that men are more prone to the familiarity bias in terms of industries. Further evidence comes from Sandberg et al.'s (1991) and Schuette et al.'s (2012) studies, which found that men are more likely to pick "stereotypical" jobs. On the other hand, these preferences are only significant if we control for the company's characteristics, which means that a company's characteristics and stock risk characteristics are more important.

3.5.2 Conculsion

These results have important implications. When it comes to financially educating men, it's important to highlight the potential negative impact of excessive trading and stock picking based on future speculation, which can harm returns. Furthermore, men should be reminded that diversification by investing in the market is a safer strategy with better returns on average.

In terms of familiarity, we have the following policy implications. For example, the difference in industry preferences for men could be important for funds advertisement. Specialized and niche funds could benefit if they are targeted toward men and their interests. In terms of fund selections, women should be targeted by broader market funds since they do not seem to have a preference for specific industries.

4 Regret and benign envy – Two sides of the same medal [10]

4.1 Introduction

According to Larrick (1993) "[...] if two people face the same decision but make different choices, then learning of the other person's superior outcome could lead to regret and envy" (Larrick, 1993, p.447). While Larrick (1993) was focusing on social comparison when he wrote this citation, it shows that regret and envy are often associated with each other. Moreover, both types of emotion are counterfactual and comparison-based emotions that lead to frustration and pain (Zeelenberg & Pieters, 2007; Crusius & Lange, 2014). Both emotions are fuelled by the natural tendency of people to compare their current situation with what could have been or could be (Carmon & Ariely, 2000; Corcoran et al., 2011). If a person is envious of another person, his emotions focus on the object as well as the person that is being envied (van de Ven, 2016). For the emotion of regret, it can be argued that the envied person is replaced by a person's past self or, in the case of anticipated regret, by a person's future self. Importantly, both emotions signal to the individual that he or she is not in line with his or her personal goals and prompt them to action (Zeelenberg & Pieters, 2007). In the case of investments, Hoelzl & Loewenstein (2005) show that people stick longer with their investments if they are confronted with the emotions of envy or anticipated regret. Furthermore, several studies show a correlation between regret and envy (Zeelenberg & Pieters, 2004, 2007; Coricelli & Rustichini, 2010).

What these studies have in common is that they do not distinguish between benign and malicious envy. This distinction, however, is important since these two types of envy lead to different behavioral actions. In the case of benign envy, the envier tries to improve himself/herself, whereas a person experiencing malicious envy tries to take the other person down (Crusius & Lange, 2014). Therefore, this study investigates the relationship between regret and envy by distinguishing between the two types of envy. Furthermore, since benign and malicious envy are determined by the appraisal of personal control over the situation, this study

[10] This chapter was written in co-authorship with Prof. Marc Oliver Rieger.

includes core self-evaluation as a control variable. By including self-evaluation, this study controls for four different traits: self-efficacy, locus of control, neuroticism, and self-esteem, which together evaluate a person's belief about his or her ability to successfully control the events which are important to them (T. Stumpp et al., 2010). Hence, this study contributes to the current understanding of the relationship between regret and envy.

The main hypothesis of this study is that regret is more closely related to benign envy than it is to malicious envy. The reason is that both benign envy and regret focus on improving one's situation (Zeelenberg & Pieters, 2007; Crusius & Lange, 2014), while the focus of malicious envy is to protect one's self-esteem by taking the envied person down (Crusius & Lange, 2014). This study supports this hypothesis with two different experiments, showing a positive correlation between regret and benign envy, while the correlation with malicious envy disappears after controlling for core self-evaluation and personality. These results are robust to different measures of regret. The results measuring regret as either regret proneness or felt regret, which was measured by the means of a hypothetical scenario, are very similar. Including the big five personality traits did not change the relationship between regret and benign envy, which shows that the results are robust to a person's personality traits.

The rest of this paper is structured as follows. In section two, the relevant literature will be summarised. Next, in section three a description of Experiment 1 and its results will be presented, followed by section four, which will do the same for Experiment 2. Section five will discuss the results and conclude.

4.2 Literature review

The decision justification theory of regret

Regret is defined as a painful counterfactual emotion that people try to manage (Zeelenberg et al., 2002). Following the idea that emotions are felt action tendencies (Frijda et al., 1989), the negative emotion of regret shows people what might have been if they had chosen differently and prompts them to undo their action, if given the chance (Zeelenberg & Pieters, 2007). Regret theory states that people are regret averse and as such employ different strategies to regulate their regret. Zeelenberg & Pieters (2007) list different strategies used by people to lessen their felt regret or avoid the feeling of regret. For example, strategies to regulate regret include but are not limited to, undoing the decision, if possible, or suppressing or denying the feeling of regret. Strategies to avoid regret include trying to increase the information one draws from in order to make the decision process of higher quality or, a much simpler strategy is to delay or avoid the decision altogether. Furthermore, Zeelenberg & Beattie (1997) show that people are willing to choose a riskier option in order to avoid regret. From this, we can conclude that people are regret-averse and try to minimize their felt regret as well as their anticipated regret.

Since people try to avoid regret by delaying or avoiding the decision altogether, one can draw the conclusion that action is more regrettable than inaction. Gilovich & Medvec (1995) were some of the first to study whether action or inaction causes more regret. They report that if asked about their real-life regrets, people regret actions more in the short term but forgone choices more in the long run. However, other studies find no difference between the regret felt from action vs. inaction. For example, Zeelenberg et al. (2002) find an action as well as an inaction effect in short-term decisions and Inman & Zeelenberg (2002) find a short-term inaction effect in the case of voting. The decision justification theory gives a possible explanation for this. It argues that not the choice between action and inaction determines the degree of regret but what choice would have been the justified one in the given situation (Connolly & Zeelenberg, 2002). Inman & Zeelenberg (2002) show that in the case of consumer behavior, when people have to decide between repeated purchases or switching to a new brand, the justification for their decision

influences the level of regret. They show that if there is sufficient evidence for staying with the status quo, switching causes more regret, and if there is more evidence or justification for switching, staying with the status quo causes more regret.

According to the decision justification theory, there are two components to regret (Connolly & Zeelenberg, 2002). The first component is purely the comparative evaluation aspect. Here, the unfavorable comparison of what currently is to what might have been leads to the painful emotion of regret. The second component is self-blame. After a choice, a person starts to evaluate the decision itself, independent of the outcome and classifies his or her choice either as justified or unjustified. This can lead to the effect where a person feels regret despite a good outcome or he or she does not regret the decision despite a bad outcome. Connolly & Zeelenberg (2002) give the following two examples: First, imagine an inebriated person that decides to drive home despite knowing better. The person gets home safely and no other person or thing is harmed, yet the following morning the person regrets his or her choice. The second example is a mother who decides to get her child vaccinated after doing extensive research about the risk and reward trade-off. Her child is one of the unlucky ones who has bad side effects. Even though she feels regret about the bad outcome, she does not feel the extra pain of self-blame for an unjustified decision. See also Sugden (1985); Kraines et al. (2017).

Responsibility, which is an important part of the self-blame component, highlights the importance of oneself as the decision maker and as a result, regret is amplified by responsibility (Frijda et al., 1989; Ordónez & Connolly, 2000; Zeelenberg et al., 1998, 2000). Furthermore, even if a person in a given situation has no decisional agency, this person still feels regret after a bad outcome (Ordónez & Connolly, 2000; Zeelenberg et al., 2000). However, one has to keep in mind that even if one group of the participants in Zeelenberg et al. (1998); Ordónez & Connolly (2000) and Zeelenberg et al. (2000) studies had no decisional agency, they still felt a heightened level of responsibility for their outcome, which is in line with the psychological bias of "illusion of control" (Langer, 1975). As such, one can conclude that felt responsibility is also able to heighten the feeling of regret.

Malicious vs. benign envy

Similar to regret, envy is a comparative counterfactual emotion that a person feels if a social comparison leads to a bad outcome in a domain that is relevant to a person (Lange & Crusius, 2015). In other words, it occurs if the person feels they are of lower social status regarding the object of interest. This can be materialistic like money or a big house or related to other status symbols such as talent or skill. Envy is most pronounced, however, when the envied person is similar to us or works in the same field (van de Ven et al., 2011a, 2012; Lange & Crusius, 2015; van de Ven, 2016; Crusius & Lange, 2017). In any case, envy is a negative emotion that – just like regret – is a felt action tendency to reduce the felt frustration and pain (van de Ven, 2016).

Traditionally, the tendency to reduce felt envy is associated with harming the envied person or taking his superiority away. In recent literature, however, it has been accepted that envy takes on two forms: malicious and benign envy (Smith & Kim, 2007; van de Ven et al., 2011a, 2012; Lange & Crusius, 2015; van de Ven, 2016; Crusius & Lange, 2017).

Malicious envy is driven by the desire to take the envied person down in order to level the playing field. Studies show that malicious envy can lead to social undermining at the workplace (Duffy et al., 2012), Schadenfreude (Smith et al., 1996; Brigham et al., 1997; van Dijk et al., 2006) and people destroying the other person's advantage – if they themselves can not have it – even at their own cost (Zizzo & Oswald, 2001). Furthermore, malicious envy can also lead to crime (Smith & Kim, 2007).

On the other hand, a benign envious person tries to improve him or herself to attain the object of desire and level the playing field (van de Ven et al., 2011a, 2012; Lange & Crusius, 2015; van de Ven, 2016; Crusius & Lange, 2017). van de Ven et al. (2011a) show that benignly envious people plan to study more or work longer on tasks and as a result perform better. Moreover, Lange & Crusius (2015) show that athletes who have a higher propensity for malicious envy than benign envy set lower or no goals for themselves in competitions, while athletes with a higher propensity for benign envy set higher goals.

Further evidence for the separation of malicious and benign envy into two dif-

ferent emotions is that they are caused by different combinations of appraisals (van de Ven et al., 2012). Appraisal theory argues that if different emotions are triggered by different combinations of appraisals, they should be classified as different emotions (Roseman, 1996). In the case of malicious and benign envy the two appraisals that distinguish between the two emotions are felt controllability and deservingness (van de Ven et al., 2012; Lange & Crusius, 2015). Controllability refers to the envious person's ability to change his or her status or achieve the desired outcome. If the envious person feels like he or she is not able to control/change her status, malicious envy is evoked by the envied person (van de Ven et al., 2012). On the other hand, if the envious person feels like he or she is able to control or change her status, this person will feel benign envy. Thus, controllability determines the type of envy felt (van de Ven et al., 2012; Lange et al., 2016).

Moreover, the object of focus is also different for malicious and benign envious people. Maliciously envious people mostly focus on the envied person themself (Hill et al., 2011; Crusius & Lange, 2014). Since they have or feel like they have little to no control over their comparative social status, they focus on the envied person to learn about them and how to take them down. Benignly envious people believe they do have control over their social status and thus focus on the object of desire as well as on the envied person themselves. The goal is to learn from the other in order to improve one's situation and or oneself (Hill et al., 2011; Crusius & Lange, 2014).

van de Ven et al. (2012) show that if a malicious envious person is asked about the deservingness of the superior situation of the envied person they rate the envied person as not deserving. However, if the envious person feels benign envy he or she feels that the other person does deserve his or her superior position. Additionally, if we have a strong positive bond with another person, we are more likely to experience benign than malicious envy (van de Ven et al., 2011a; van de Ven, 2016).

The relationship between regret and envy

Both regret and envy are comparative counterfactual emotions that lead to frustration and pain and therefore the person feeling these emotions tries to reduce

them. Both focus on the what is vs. the what could be/might have been. In the case of regret by projecting ourselves into an alternative present or future where we chose differently, and in the case of envy, by comparing ourselves with a person who has chosen differently (or who got there just by luck). Nevertheless, both emotions elicit an urge to level the playing field. Given these similar characteristics, they should be related to each other. Hoelzl & Loewenstein (2005) show in their study that both regret and envy can lead to the same behavior in investors. Investors in whom either anticipated regret or envy was triggered stuck longer with an investment compared to a control group. Non-experimental, real life evidence comes from Zeelenberg & Pieters (2004) who studied the effect of anticipated regret and envy on real-life lottery participation. They find that both lead to higher participation, even if the effect for envy was stronger. Furthermore, they find that envy leads to higher anticipated regret. In a direct study of the two emotions, Zeelenberg & Pieters (2007) find a significant correlation between propensity for regret and dispositional envy after controlling for different related emotions and other control variables. However, in Zeelenberg & Pieters' (2007) paper the correlation is only weak ($r = 0.11; p < 0.05$). They conclude that regret is more strongly related to a person's tendency to maximize their outcome and envy is more closely related to low levels of self-esteem.

What these studies have in common, however, is that they do not distinguish between the two types of envy and mainly focus on malicious envy. In Hoelzl & Loewenstein (2005) experiments, people took part in a sequential lottery, where the winning chance depended on the previous draw. In the envy scenario, the participants knew that another participant would pick up their lottery after they decided to quit – this caused envy – which made the participant stick longer with their investment. The envy invoked by this experiment should be malicious envy because the subsequent person did not fully contribute to the outcome of the lottery, compared to if they had started anew. Hence, in the eyes of the participants, they did not deserve it. In the case of Zeelenberg & Pieters (2004), envy was evoked by telling the participants to imagine that their neighbors had won a big prize in the lottery. Because the participants in the lottery were neither in control over who won the prize nor was the neighbor especially deserving of the prize, this experiment should evoke malicious envy. Since neither study tests for

the type of envy, however, we do not know. Zeelenberg & Pieters (2007), who directly tested for envy, used the dispositional envy scale from Smith et al. (1999) in their study. This scale uses items such as "It is so frustrating to see some people succeed so easily" or "I sometimes find it hard to feel warmly towards someone who is much better than I am at something" which are all negative and similar to the items used in the malicious envy scale of Lange & Crusius (2015) – "I feel ill will towards people I envy", "Seeing other people's achievements makes me resent them". To further study the link between regret and envy, this study differentiates between benign and malicious envy.

First, let us look at the action tendencies of regret and envy. We see that both regret and benign envy urge a person to improve their situation or anticipated future situation. Zeelenberg & Pieters (2007) list in their regret-reducing strategies that people will try to undo the outcome of a regret inducing choice or try to improve the decision-making process in order to reduce anticipated and subsequent regret. Ordóñez et al. (1999) show that in a job screening experiment, people who are thinking about the regret they might feel screen out more jobs than the control group. This is similar to the self-improvement tendencies we see in benignly envious people, who plan to study longer, set higher goals, and stick longer with a task and as a result have better outcomes (van de Ven et al., 2011b; Lange & Crusius, 2015). These action tendencies imply a relationship between regret and benign envy.

Secondly, decision justification theory argues that self-blame and as a result responsibility or decisional agency play an important part in regret and anticipated regret. Decisional agency is often something that is given and can only be influenced to a certain extent. This is similar to personal control as an appraisal of envy. van de Ven et al. (2012) show that personal control in a given situation influences the type of envy a person feels. Again, if they have a higher level of personal control, they feel benign envy instead of malicious envy. Responsibility, on the other hand, is something that is not always objectively as clear-cut and sometimes people still feel responsible for the outcome of a decision, even if they have no decisional agency (Ordónez & Connolly, 2000; Zeelenberg et al., 2000). Again, if people feel they are responsible for the outcome of a decision they feel more regret (Frijda et al., 1989; Ordónez & Connolly, 2000; Zeelenberg et al., 1998,

2000). This shows that whether a person has actual control over or responsibility for an outcome, or whether they only feel they do, both influence regret and envy. Since the appraisal of controllability is similar to decisional agency in that they are both concerned with a person's ability or belief about their ability to change their current situation, this appraisal again implies a relationship between regret and benign envy.

The second component of decision justification theory, which is the purely comparative evaluation aspect should not be forgotten. Even if a person is not responsible for an outcome or picked the justified choice, this person might still feel regret, albeit to a lesser extent (Connolly & Zeelenberg, 2002; Inman & Zeelenberg, 2002; Zeelenberg & Pieters, 2007). The purely comparative nature of this component and the comparative nature of benign and malicious envy (Smith & Kim, 2007; van de Ven et al., 2011a, 2012; Lange & Crusius, 2015; van de Ven, 2016; Crusius & Lange, 2017) imply a relationship between regret and benign as well as malicious envy. However, the regret-strengthening influence of self-blame argues for a stronger relationship between regret and benign envy than between regret and malicious envy.

4.3 Experiment 1

4.3.1 Data and methodology

The goal of Experiment 1 is to examine the relationship between benign/malicious envy and regret. For this reason, each person's disposition to regret the two types of envy and other personality factors are measured. Finally, regret is regressed on envy including the personality factors as well as demographic variables as a control. The demographic variables include age and gender (female, male, other).

Experiment 1 as well as Experiment 2 were conducted via an online survey, which was advertised through the Trier University email list and the Hochschule Trier email list. The survey was built using Unipark – an online platform for surveys. The study was conducted in German. In this study, 284 people participated, of which ten were eliminated because they gave incomplete answers to the demographic questions. Because only six participants stated their gender to be "other", we excluded them from the analysis. On average, participants took eleven minutes to complete the survey. Participants were on average 25 years old with a standard deviation of 6.34. Of these participants, 116 were male and 231 were students.

Scales

Participants could answer all psychological scales on a five-point Likert-scale with the following answers: [1] Strongly agree (Stimme voll zu); [2] Agree (Stimme eher zu); [3] Neither agree nor disagree (Weder noch); [4] Disagree (Stimme eher nicht zu); [5] Strongly disagree (Stimme überhaupt nicht zu). The psychological scales were reduced by a principal component analysis to construct the factors employed in this study.
To study the relationship between regret and the two types of envy, the Benign and Malicious Envy Scale (BeMaS) by Lange & Crusius (2015) was used to measure each person's disposition to envy. This scale measures benign and malicious envy together in ten items, with five of them scaling on benign envy and five on malicious envy. The scale fully captures the double dissociation between benign and malicious envy, with benign envy correlating with improvement-oriented and malicious envy with harmful behavior (Lange & Crusius, 2015). Furthermore, this scale

has already proved itself effective in a German-speaking population. The scale in the original paper is presented in English, so the scale was translated to German following Lange & Crusius (2015) suggestions of using "beneiden" for benign envy and "Neid" for malicious envy. The English as well as the German translation of the BeMaS can be found in Table 35 in the appendix. The eigenvalues calculated for the first three factors showed that the BeMaS did indeed – following the Kaiser criterion (Kaiser, 1960) – separate into two components. The corresponding eigenvalues were $E = \{3.25, 2.6, 0.82\}$. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) showed a high partial correlation ($KMO = 0.81$) and Bartlett's test of Specificity was significant ($\chi^2 = 967.15$; $df = 45$; $p = 0.00$). The items load on the same factors as in Lange & Crusius (2015). Furthermore, the smallest communality was 0.53, meaning no item had to be excluded from the BeMaS. Cronbach's alpha showed that both the benign and malicious envy scales, if separated, were reliable ($\rho_T = \{0.81, 0.82\}$). Furthermore, if any of the items in both scales were dropped, Cronbach's alpha dropped.

To measure regret, the regret proneness scale by Schwartz et al. (2002) was chosen. This is the same scale Zeelenberg & Pieters (2007) use and allows us to compare the results. The scale consists of five items, which again were translated into German. The English as well as the German translation of the regret proneness scale can be found in Table 36 in the appendix. An analysis of the eigenvalues showed that the regret proneness scale indeed only loaded on one factor ($E = \{2.34, 0.99\}$). The KMO and Bartlett's test showed that the items were partially correlated and could be used to construct the regret proneness scale ($KMO = 0.81, \chi^2 = 274.07$; $df = 10$; $p = 0.00$). Cronbach's alpha was ($\rho_T = 0.71$), which dropped to $\rho_T = [0.65, 0.68]$ if items were dropped from the scale. This means the scale is again reliable.

Because personal control and decisional agency are important factors in determining the type of envy felt (van de Ven et al., 2012; Crusius & Lange, 2017) and the degree of regret felt (Frijda et al., 1989; Ordónez & Connolly, 2000; Zeelenberg et al., 1998, 2000), the core self-evaluation construct was chosen as a measure to capture the personal beliefs of a person about his or her level of personal control over any given situation. The construct is comprised of four traits: self-esteem, self-efficacy, neuroticism, and locus of control (T. Stumpp et al., 2010). Each

trait is related to the others and a person's belief about his or her abilities. Self-esteem is about seeing oneself as successful and worthy. Self-efficacy relates to a person's trust in one's ability to perform in different contexts (T. Stumpp et al., 2010). Neuroticism is concerned with one's tendency to focus on the negative, either about oneself or the world in general. Finally, locus of control regards to a person's belief about his or her ability to control the events in their life (T. Stumpp et al., 2010)[11]. The higher a person's core self-evaluation is, the more a person believes in his or her abilities. To measure a person's self-evaluation, the Core Self-Evaluation Scale (CSES) by T. Stumpp et al. (2010) was used. The CSES is a twelve-item scale that is available in both English and German (T. Stumpp et al., 2010). The English as well as the German translation can be found in Table 37 in the appendix. The principal component analysis showed that the scale could be divided into two components ($E = \{4.91, 1.49, 0.8\}$). If we look at the factor loadings for two components, we see that every positively phrased item loads on one factor and every negatively phrased item on the other factor. As the two factors are similar in their interpretation, the core self-evaluation was constructed as one factor. The factor was constructed by standardizing the sum of the item scores. Cronbach's alpha for one factor was 0.87. If items are dropped from the scale, Cronbach's alpha drops.

Furthermore, both regret and envy are influenced by the big five personality traits (Novliadi et al., 2018; Milić et al., 2022). To control for these additional personality characteristics of the participants, we used the Big Five Inventory (BFI-10) scale. The BFI-10 is a shortened version of the Big Five Inventory scale with 44 items. This scale shows significant levels of reliability and validity and is useful for studies with limited time (Rammstedt & John, 2007). One advantage of this scale is that it has already been used on German participants and as a result is available in German (Rammstedt & John, 2007). Therefore, no additional translation was required. The scale consists of ten items, with two items for each personality trait. The KMO value is 0.53. The Bartlett's test is again significant ($\chi^2 = 413$; $df = 45$; $p = 0.00$). The eigenvalues show that the scale indeed loads

[11]For more information on how these four factors relate to one another and are markers of a higher order concept read: Judge et al. (2002).

on five factors ($E = \{2.00, 1.57, 1.37, 1.23, 1.13, 0.82\}$). The lowest communality value was 0.59, and as a result, no item was dropped. The items load on the same factors as in Rammstedt & John (2007). The English as well as the German version can be found in Table 38 in the appendix.

4.3.2 Results

First, malicious envy and benign envy were regressed on regret proneness. The results showed that malicious and benign envy are both significantly positively correlated with regret (0.24, $p = 0.00$; 0.13, $p = 0.03$). This shows that with an increased disposition to envy, the proneness to regret also increases. However, both correlations were lower compared to Zeelenberg & Pieters' (2007) raw correlation of 0.43.

Secondly, if controlled for self-evaluation (Model 2), the correlation between malicious envy and regret disappeared completely (0.07, $p = 0.2$), and the correlation with benign envy increases (0.2, $p = 0.00$). Self-evaluation showed the highest absolute correlation with -0.47 ($p = 0.00$)– meaning the higher a person's self-evaluation, the lower a person's proneness to regret. Taken together, this suggests that malicious envy is controlled by self-evaluation and that a person's belief about his or her abilities is the driving force in the relationship between malicious envy and regret. For benign envy, there is strong evidence of a relationship even after controlling for self-evaluation. Controlling for demographic or additionally the BFI-10 variables did not change the results. The residual correlation of regret and benign envy in this study ($\rho_T = 0.18, p = 0.001$; $0.15, p = 0.01$) are of the same magnitude as the residual correlation found in Zeelenberg & Pieters (2007) (0.11; $p < 0.05$)[12].

To check if the relation between regret and envy is mediated by personal control, a mediator analysis using the macro by Hayes (2012) was performed. The macro calculates the total, direct, and indirect effects via bootstrapping. As a

[12]To test if the estimated correlations $\hat{\theta}$ are significantly bigger than the original estimate of Zeelenberg & Pieters (2007) at the 5% level, a critical value C was calculated $\mathbb{1}\{\hat{\theta} > C\}$. To calculate this critical value, the z-test for independent samples using Fisher's (1992) transformation was rearranged ($C = 0.23$; , $\rho_{TZeelenberg} = 0.11$; $n_{Zeelenberg} = 472$; $q_\alpha = 1.65$).

result, the calculations are robust to heteroscedasticity (Davidson et al., 1993). The effects are significant at the 5% level if zero is not included in the confidence interval (CI). In this analysis, 10000 samples were calculated. In the case of malicious envy, we found a significant total effect but no significant direct effect (0.24, $p = 0.00$; 0.08, $p = 0.19$). The indirect effect was significant at the 5% level (0.16, $CI = [0.11, 0.23]$). The correlation between malicious envy and self-evaluation was significant and negative (-0.35, $p = 0.00$). The correlation between self-evaluation and regret is -0.46 ($p = 0.00$). This means people with a higher disposition to malicious envy believe less in their personal control and as a result of their lower belief in personal control, they show higher regret. Another interpretation is that people with lower levels of core self-evaluation have a higher disposition to malicious envy and regret. The results show that the effect of malicious envy on regret is mediated (controlled) by self-evaluation.
For benign envy, the total effect was not significant (0.11, $p = 0.07$). However, the direct effect and the indirect effect were both significant (0.18, $p = 0.00$; -0.07, $CI = [-0.13, -0.01]$). The correlation between benign envy and self-evaluation was significant and positive (0.15, $p = 0.00$). Here, people with a higher disposition to benign envy are also higher in their belief in personal control. As a result, we found that the effect of benign envy on regret is partially mediated by self-evaluation. Based on the insignificant total effect and the opposing signs of the direct and indirect effects, we find evidence of a competitive mediation (Zhao et al., 2010). Results can be found in table 14, and a graphical representation can be found in figure 6 and 7.

Table 14

Regression on Regret proneness

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
malicious	0.24***	0.07	0.08	0.13*	0.02	0.03
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
benign	0.13*	0.2***	0.18**	0.15*	0.17**	0.15**
	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
self evaluation		-0.47***	-0.46***		-0.48***	-0.47***
		(0.06)	(0.06)		(0.07)	(0.07)
student			-0.15			-0.15
			(0.18)			(0.17)
male			-0.11			-0.09
			(0.11)			(0.11)
age			0.01			0.01
			(0.01)			(0.01)
big five	no	no	no	yes	yes	yes
N	268	268	268	268	268	268
adj. R^2	0.06	0.26	0.26	0.17	0.29	0.3

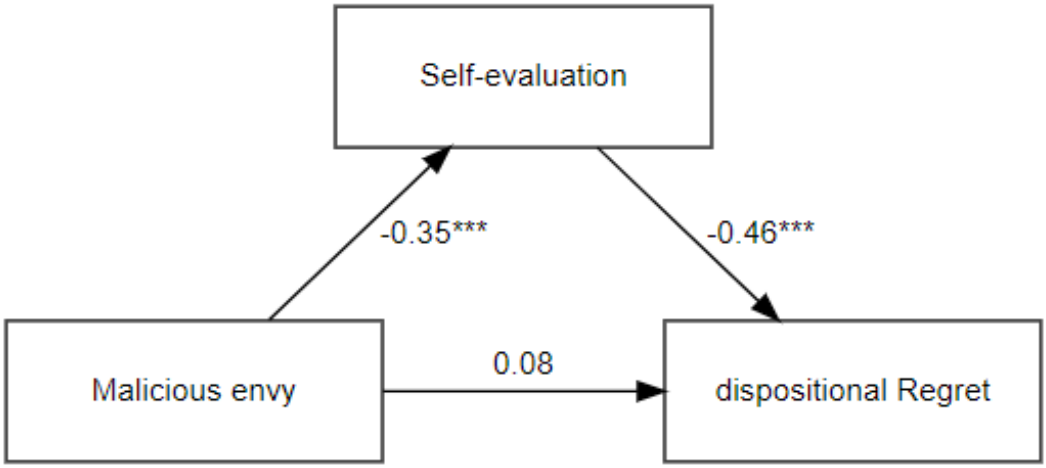
Significant at: *5%, **1% , ***0.1%

Standard errors are shown in parentheses.

The table shows standardized regression coefficients.

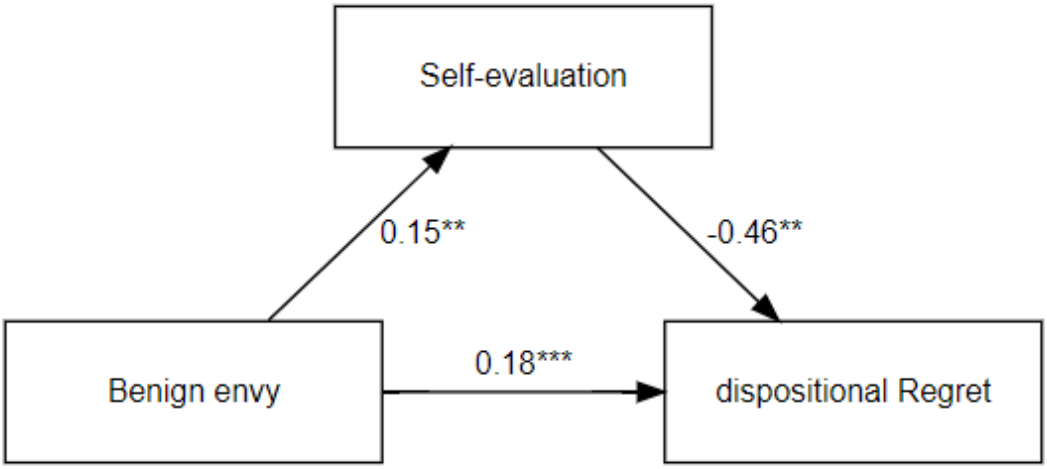
Figure 6

Malicious envy and dispositional regret (mediation)



Reference: Own research
Significant at: *5%, **1% , ***0.1%
Coefficients are calculated by bootstrapping.

Figure 7
Benign envy and dispositional regret (mediation)



Reference: Own research
Significant at: *5%, **1% , ***0.1%
Coefficients are calculated by bootstrapping

4.4 Experiment 2

4.4.1 Data and methodology

In Experiment 1, we found evidence for the relationship between regret and envy. Furthermore, while the relationship between malicious envy and regret was fully controlled by personal control, it partially mediated the relationship between regret and benign envy. Experiment 1 gives evidence that regret is more closely related to benign envy than it is to malicious envy. To further study this relationship and see if this also holds true for state regret, Experiment 2 evoked regret in the participants. For Experiment 2, the same participants took part in the experiment as in Experiment 1. Furthermore, Experiment 2 was conducted in the same survey as Experiment 1.

Scales

To study the relationship between envy and state regret, we again use the BeMaS by Lange & Crusius (2015). Personal control is again measured by the CSES by T. Stumpp et al. (2010). For the additional personality dimensions, BFI-10 (Rammstedt & John, 2007) was used again. Furthermore, the same five-point Likert-scale was used. As demographic variables, age and the dummy variables student and male were again employed. Since the participants of Experiment 1 and Experiment 2 are the same and the experiment for state regret was conducted right after Experiment 1, the measurements described above were only measured once. To measure state regret, we use the experiment from Seiler et al. (2008) with slight modifications. In the original paper of Seiler et al. (2008) the experiment is set up to study the difference between the omission and commission effect of regret. Since this is not part of this study, the experiment is altered to make no distinction between the two. The experiment goes as follows: The participants of the study are asked to imagine the following situation: Five years ago, they bought an apartment for €200,000, and today, they sold the apartment for €300,000. This translates to a compounded return of 8.5% per annum[13]. For most investors, this return is even higher if we consider the leverage effect of down payments (Seiler et al., 2008). Next, following Seiler et al. (2008) hindsight is introduced by telling the participants that they could have sold the apartment for €350,000 two years ago. After reading this scenario, the participants were asked to rate their felt regret on a Likert-scale ranging from one to five. The felt regret was again standardized before use in the ordinary least squares (OLS). The correlation between the regret proneness scale from Schwartz et al. (2002) and state regret from this experiment was 0.33 ($p = 0.00$).

[13] $\text{return}_{p.a.} = \sqrt[5]{\frac{300{,}000}{200{,}000}} - 1$

4.4.2 Results

Just like in Experiment 1, state regret was regressed on envy, self-evaluation, and the same demographic variables. The results of Experiment 2 can be found in Table 15.

The raw correlations show that both benign and malicious envy significantly correlate with state regret. The correlation for malicious envy is 0.2 ($p = 0.00$) and 0.18 ($p = 0.00$) for benign envy, so no difference was detected. If self-evaluation was included, we found a similar pattern as in Experiment 1. The correlation of malicious envy with state regret decreases to 0.13 ($p = 0.03$), and the correlation of benign envy increases to 0.21 ($p = 0.00$). However, the coefficient of malicious envy is still significant ($p = 0.03$). The relationship between malicious envy and state regret, however, disappears if both core self-evaluation and the big five are introduced into the model (0.1, $p = 0.11$). Benign envy stays significant through out all of the different models. As such we again find evidence that the relationship between malicious envy and regret is controlled by personality. If we compare these results with the correlation found in Zeelenberg & Pieters (2007), we find that the correlations between state regret and malicious/benign envy were again not significantly bigger than Zeelenberg & Pieters' (2007) original results[14].

State regret was again significantly and negatively correlated with self-evaluation. The correlation between state regret and self-evaluation is between -0.19 and-0.2.

Just like in Experiment 1, a mediator analysis was conducted to check if the relationship between regret and envy is mediated by personal control. Again, the macro by Hayes (2012) was used with 10000 samples. In the case of malicious envy, the total and the indirect effect are again significant (0.21, $p = 0.00$; 0.07, $CI = [0.02, 0.12]$). This shows that malicious envy is controlled by self-evaluation. However, compared to Experiment 1, the indirect effect is weaker, and the relationship is only partially mediated. As a result, we still find a significant direct effect (0.15, $p = 0.02$). In the case of benign envy, the total (0.18, $p = 0.00$), direct effect (0.21, $p = 0.00$), and indirect effect (-0.03, $CI = [-0.066, -0.003]$)

[14]To test if the estimated correlations $\hat{\theta}$ are significantly bigger than the original estimate of Zeelenberg & Pieters (2007) at the 5% level, a critical value C was calculated $\mathbb{1}\{\hat{\theta} > C\}$. To calculate this critical value , the z-test for independent samples using Fisher's (1992) transformation was rearranged ($C = 0.23$; , $\rho_{TZeelenberg} = 0.11$; $n_{Zeelenberg} = 472$; $q_\alpha = 1.65$).

show the expected pattern.

In summary, Experiment 2 confirms our findings of Experiment 1 that regret and benign envy are positively correlated and that the relationship between malicious (benign) envy and regret is mediated (controlled) by personal control. Results can be found in table 15, and a graphical representation of the mediation analysis can be found in figure 8 and 9

Table 15

Regression on State regret

Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
malicious	0.2***	0.13*	0.15*	0.14*	0.10	0.12
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
benign	0.18**	0.21***	0.21***	0.2**	0.21***	0.21***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
self evaluation		-0.2**	-0.19**		-0.17*	-0.14
		(0.06)	(0.06)		(0.08)	(0.08)
student			-0.35			-0.38
			(0.19)			(0.19)
male			-0.06			0
			(0.12)			(0.13)
age			-0.01			-0.01
			(0.01)			(0.01)
big five	no	no	no	yes	yes	yes
N	268	268	268	268	268	268
adj. R^2	0.07	0.1	0.1	0.09	0.1	0.1

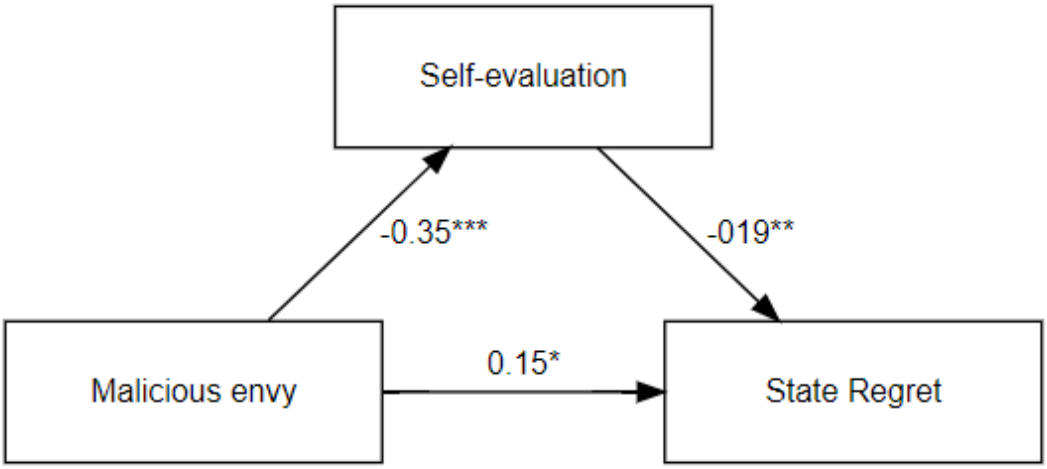
Significant at: *5%, **1% , ***0.1%

Standard errors are shown in parentheses.

The table shows standardized regression coefficients.

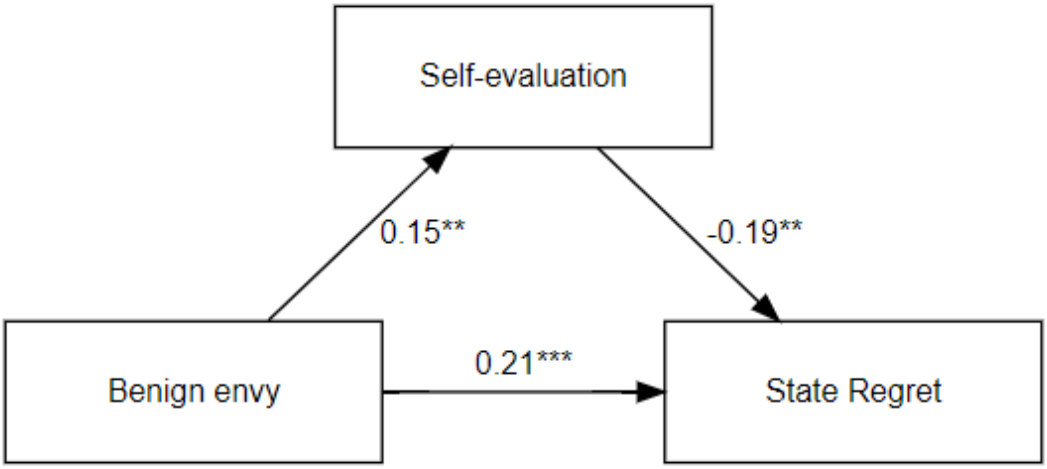
Figure 8

Malicious envy and state regret (mediation)



Reference: Own research
Significant at: *5%, **1% , ***0.1%
Coefficients are calculated by bootstrapping.

Figure 9
Benign envy and state regret (mediation)



Reference: Own research
Significant at: *5%, **1% , ***0.1%
Coefficients are calculated by bootstrapping.

4.5 General Discussion

Regret and envy have long been associated with each other. Both are comparison-based emotions and lead to similar behaviors. However, with recent research differentiating between benign and malicious envy, it has become clear that the relationship between regret and envy requires further disentanglement. This was precisely the aim of this study. We proposed that the common action tendencies of self-improvement for regret and benign envy as well as their common appraisal of personal control imply a relationship between the two. This study confirmed our predictions. We found a positive relationship between regret and benign envy, which was confirmed in two different experiments. The initial relationship between regret and malicious envy, however, disappeared when adjusting for self-evaluation

(personal control) and personality. In line with earlier studies that identify control as an appraisal which distinguishes between the two types of envy (van de Ven et al., 2011a, 2011b, 2012; Crusius & Lange, 2014; Lange & Crusius, 2015; Crusius & Lange, 2017; X. Kang et al., 2019), we found that core self-evaluation was positively correlated with benign envy and negatively correlated with malicious envy. Furthermore, our study gives more evidence to the decision justification theory of regret, which argues that the justification of one's decision influences felt regret (Connolly & Zeelenberg, 2002). We found that people with higher core self-evaluation have a lower proneness to regret as well as lower state regret. According to the decision justification theory, these people should believe their decisions to be more justified and as a result feel less regret. These results are similar to Pieters & Zeelenberg (2005), who show that the time spent thinking about a decision reduces regret independent of the post-decisional outcome. They deduce that this is the result of people believing their decisions are more justified because they feel they are improving the quality of their decision-making process.

Limitations

We acknowledge that the low correlation of 0.33 between the regret proneness scale from Schwartz et al. (2002) and the modified experiment by Seiler et al. (2008) is a limitation of this study. Feeling that one was in control of the situation, had extended effort, and was responsible for the outcome are important appraisals for regret (Frijda et al., 1989; Van Dijk & Zeelenberg, 2002). The low correlation of the experiment with the regret proneness scale and the low correlation with core self-evaluation of -0.2 indicates that for some participants, the experiment might have been measuring disappointment rather than regret (Buchanan et al., 2016). This suggests that telling the participants that they could have sold the house for more money was, for some participants, not enough to elicit regret rather than disappointment. However, it is not clear how many participants confused the two emotions since we explicitly asked them to state their felt regret. To solve this issue in the future, one could follow the experiment of Buchanan et al. (2016) and ask participants to write down and think about a past experience where a decision they made resulted in a bad outcome and afterward measure regret. Nevertheless,

we believe that Experiment 2 still validates our results from Experiment 1 because the correlation of state regret with benign envy and core self-evaluation shows the same pattern we saw in Experiment 1.

4.5.1 Conclusion and future direction

In conclusion, both benign and malicious envy showed a positive correlation with regret. However, if we control for personal control (core self-evaluation) the correlation between malicious envy and regret disappears. This suggests that personality drives the relationship between malicious envy and regret rather than a common push to action. Consequently, the positive relationship between benign envy and regret suggests a common push to action; this common action tendency is self-improvement (Ordóñez et al., 1999; Zeelenberg & Pieters, 2007; van de Ven et al., 2011b; Lange & Crusius, 2015). In the case of malicious envy, decision justification theory explains why low levels of core self-evaluation and, as such, a higher disposition to malicious envy result in higher proneness to regret.

The results of this study have important implications for future studies. The relationship between regret and benign envy suggests that both can simultaneously play a role in the decision-making processes. This can best be seen in the common experience of "Fear of missing out" (FOMO). FOMO is driven by the anticipated regret of missing out on an experience that could improve your life (Milyavskaya et al., 2018). I. Kang et al. (2020) find that FOMO can lead to herding behavior around luxury consumer brands. Furthermore, Good & Hyman (2020) show that envy strengthens the feeling of FOMO, which increases purchase likelihood in consumers. Other effects of the experience of FOMO are more distractability, less focus and increased probability of post-decisional regret (Milyavskaya et al., 2018). However, FOMO does not only have an effect on consumer behavior. Baur & Dimpfl (2018) show that FOMO leads to herding in the cryptocurrency market, especially among uninformed traders. Taken together, the relationship between regret and benign envy might explain risky investments of investors that are driven by the fear of missing out.

5 Green Silk Road in Europe: Meeting Green Deal and Chinese green financing [15]

5.1 Introduction

China's industrial policy had long since arrived in Europe when media attention was stirred by the sale of robot manufacturer Kuka to a Chinese home appliance company and the "Made in China 2025" industrial upgrade plan behind it. Yet few people perceive the actual existence of Chinese industrial policy in Europe. The academic community also tends to treat China's industrial policy (so far) as a purely domestic issue. However, we will show the opposite in this paper. We explain how various actors from China, with the help of the New Silk Road Initiative (also known as the Belt and Road Initiative), want to internationalize China's industrial policy and, in parallel to and together with European actors from the financial sector, transform the global financial market in favor of more sustainable economies.

The extent to which these transnational policy arrangements by China will impact slowing down global climate change, which claims a relatively long time horizon, remains an open question due to the short span of investigation of our paper. The extent to which China's globalization strategy overlaps with European climate policy goals is also an open question. But one thing is clear: green or sustainable finance is no longer a shadowy existence in China or Europe as part of the sustainability transformation. For example, France, Germany, the United Kingdom, and Luxembourg agreed in 2019 to transform their financial center into a Global Sustainable Finance Champion. While this development is new to the European financial market, it stems directly from intensive interactions with Chinese players, who have been less well-known to the public.

In this paper, we aim to illustrate this trend of green finance transformation for Chinese industrial and trade policy and compare it to the Green Deal in Europe. Building on this, we aim to provide an impetus for discussing a modern, sustainable industrial policy in Europe.

[15] This chapter was written in co-authorship with Dr. Lea Shih. Shih & Scherf (2020). Grüne Seidenstraße in Europa: Begegnung zwischen Green Deal und chinesischer grüner Finanzierung. In M. Vassiliadis & K. Borgnäs (Eds.), Nachhaltige Industriepolitik: Strategien für Deutschland und Europa (pp. 286–308). Campus Verlag.

5.2 Internationalization of Chinese industrial policy through the new Belt and Road Initiative

With the help of the Belt and Road Initiative (BRI), the Chinese government is not only helping Chinese companies invest in infrastructure and energy projects worldwide, but it simultaneously internationalizes its industrial policy. Although neither Xi Jinping, China's president and party leader, nor the Chinese government have used the word industrial policy in their statements, the key players in the industrial policy coalition within China, including the National Development and Reform Commission (National Commission of Development and Reform (NDRC)) and the central bank (People's Bank of China (PBoC)), effectively dominate policy making with respect to the BRI. Therefore, this chapter first presents the emergence of the green industry in China and its internationalization with the help of the BRI.

5.2.1 Green Silk Road: from green sector to green finance

Compared to the common understanding of industrial policy in Europe ("picking the winner"), industrial policy in the Chinese context is relatively more comprehensive, referring to both the promotion of new forward-looking industries and the restructuring of the industries that are losing importance. These two components always exist in parallel in Chinese industrial policy.

Against this backdrop, the new "green industry" that has emerged since 2015 can be classified under the first category, which includes renewable energy and new environmental technologies and aims to "build a new engine of growth" (Zentralkomitee der KPC und Staatsrat, 2015). However, the specific industries assigned to the green sector constantly expanded over time (table 16). The current list can be found mainly in the Green Industry Guiding Catalogue published by the NDRC in 2019, which includes six sectors to be promoted: energy efficiency and environmental protection, clean production and energy, natural environment, green infrastructure upgrading, and green service. A distinctive feature of this catalog is that it identifies 211 green products and technologies, which guide the design of government support programs by policy and administrative decision-makers or investments by economic actors. This establishes a policy framework

for all participants. In this respect, it is similar to the classification system for sustainable investment presented by the EU, also known as the taxonomy. However, China's green industries catalog does not exclude support for clean coal production and use,(Development & Commission, 2019) which forms a potential conflict with the EU's Green Deal, which explicitly excludes these industries (see Chapter 5.4 for elaboration).

Table 16

National support programs for the green sector

	Document	Core area
2016	Green Industry Development Plan 2016 – 2020	• Green products, green factories, green industrial zones and green supply chains
2017	Guidance on Promoting green Belt and Road	• Green transportation, green buildings, clean energy, green trade
2019	Green Industry Guiding Catalogue	• Clean production and energy, protection of biological world green infrastructure and green service

source: own research

However, the Green Silk Road (officially called Green Belt-and-Road), which was first introduced in 2017 by the Ministry of Environmental Protection of China as a sub-project of the New Silk Road Initiative, has not attracted much public attention (K. Wang et al., 2018). In its statement (Guidance on Promoting Green Belt and Road), the Ministry of Environmental Protection has prioritized spreading the green idea to the New Silk Road. However, the ministry only required Chinese enterprises operating in other countries to abide by the host countries' environmental protection-related laws and standards. Just like the Ministry of Environmental Protection, the NDRC also demonstrates a rather reluctant will to regulate overseas investment by Chinese companies. For example, in its 2018 directive, environmental protection and climate change mitigation commitments are not among the requirements for investment approval in other countries by the NDRC.

Beyond this rather restrained regulatory intent in the environmental arena, the BRI demonstrates a fundamental paradox in its policy objective from an environ-

mental protection perspective. From the beginning, the BRI has served to reduce China's internal overcapacity in cement, iron and steel, coal-fired power plants, etc. (PBoC, 2016b). These industries relying on conventional energy should seek new markets for their products with the help of the BRI. This is China's second industrial policy goal - the restructuring of established industries - and is supported with massive government loans. The Chinese government has set two contradictory targets by promoting green industry on one side and subsidizing fossil-based products and coal-fired power plant exports. This ambivalence appears frequently in Chinese investments along the new Silk Road.

The Green Silk Road attracted international attention in April 2019 through Xi Jinping's appeal at the second Silk Road Summit in Beijing. This time, however, the initiative is rooted not in the Ministry of Environmental Protection but in the Central Bank of China (PBoC), and "green financing" has become its focus instead of the "green idea."

5.3 Increasing interest of Chinese banks in green finance

China's central bank and state-owned commercial banks became involved with green finance quite early, which was considered an innovation of the financial system. As early as 2012, the China Banking Regulatory Commission (CBRC) issued the first green credit guideline. It was intended to help direct capital flows to green or sustainable industries (Gilbert & Zhou, 2017).

In 2016, the PBoC published comprehensive *Guidelines for Establishing the Green Financial System*, ushering in a series of reforms to help direct capital flows into the green economy (PBoC, 2016a). Accordingly, a wide range of innovative financial products should be developed. These include, for example, green loans, green development funds, green bonds, green stock indices, and green insurances. The PBoC's ambition in terms of green finance also extends to BRI, in which state-owned banks and enterprises should actively participate.

In 2019, 30 global financial institutions signed the so-called Green Investment Principles for the Belt and Road (GIP), which were jointly conceived by the Green Finance Committee of the Chinese Society of Finance and Banking, a research community of PBoC, and the Green Finance Initiative of the City of London

Table 17

Relevant regulations related to green finance

	Document	Core area
2012	Notice of the China Banking Regulatory Commission on Issuing Green Credit Guidelines	• Promoting green industries, low-carbon industries and circular economies • Integration of environmental and social risks in bank management
2015	Green Bond Endorsed Project Catalogue of PBoC	• Defines six investment objects for green bonds
2015	Guidelines of the NDRC for Issuing Bonds	• Definition of green bonds for companies
2016	Guidelines for Establishing the Green Financial System	• Definition of green finance, which supports the improvement of the environment, the mitigation of climate change, and a more efficient use of resources.
2017	Green Bond Guidelines of CSRC	• Definition of green bonds for listed companies
2019	Green Investment Principles for the Belt and Road Initiative (GIP)	• Integrates low-carbon and sustainable development into projects of BRI countries

source: own research

Corporation [16]. Signatory financial institutions include the six largest Chinese state-owned banks, which finance 90 percent of BRI projects. Just like the regulations outlined above, the GIP are not legally binding, but signatory financial institutions and companies are expected to integrate the GIP into their business strategy and apply environmental and social risk management best practices of green finance and green supply chains to their operations. There is no sanction for harmful impact of the investments or further entrepreneurial activities.

Unlike green bank loans, the bond market for green financial products grew exponentially in China. In 2016, the first Chinese green bond was issued. By 2018,

[16]For more information see: Green Investment Principals (2019). Membership. `https://gipbr.net/Membership.aspx?type=12&m=2`

China advanced to become the world's second-largest market with an issuance value of $31 billion, still behind the U.S. ($34 billion) but larger than France ($14 billion) and Germany ($7.6 billion) combined [17]. However, about 59 percent of green bonds in China are issued by state-owned commercial banks and policy banks in the interbank bond market, while only 27 percent are issued by corporations (Climate Bond Initiative, 2019a). Clearly, state-owned banks are playing a driving role in the rapid growth of China's green bond market. The advantage for banks is obvious: issuing green bonds allows existing green loans to be bundled into a new bond with a longer maturity and lower interest rate (China Dialogue, 2018). This eases the bank's balance sheet burden and frees up space for new lending.

However, there is another barrier for Chinese banks to overcome if they want to expand into the international financial market. In 2018, for example, 26 percent of green bonds issued in China still failed to meet internationally recognized standards (Climate Bond Initiative, 2016). Following the introduction of BRI, the pressure on Chinese banks as the largest lender to Chinese companies is increasing (S. Chen, 2017). Therefore, easy access to the international financial market and direct access to foreign currencies are becoming more urgent and necessary for Chinese banks.

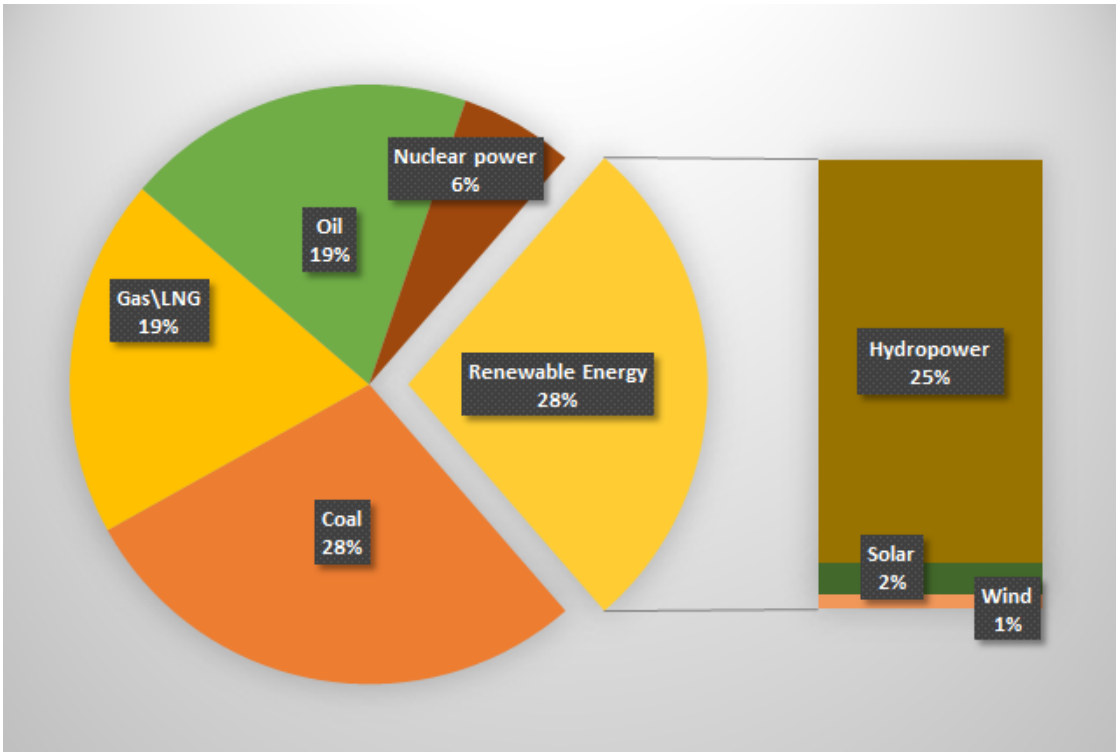
5.3.1 Ambivalent financing of BRI projects by Chinese banks

The BRI's conflicting policy objectives and lack of regulatory will with respect to environmental protection vis-à-vis Chinese banks and large corporations operating outside of China frequently leads to controversial outcomes and thus is met with massive criticism. For example, according to a Boston University study, from 2013 to 2019, the two policy banks, China Development Bank and Export-Import Bank of China, financed mainly fossil fuel projects and only to a limited extent renewable energy projects in BRI countries (Figure 10)(BU Global Development Policy Center, n.d.).

[17] This is exclusively about the green bonds, which met internationally recognized standards (Climate Bonds Standard) (Climate Bond Initiative, 2016)

Figure 10

Financing by policy banks of China according to energy sector 2000-2019



Source: The Global Development Policy Center at Boston University.

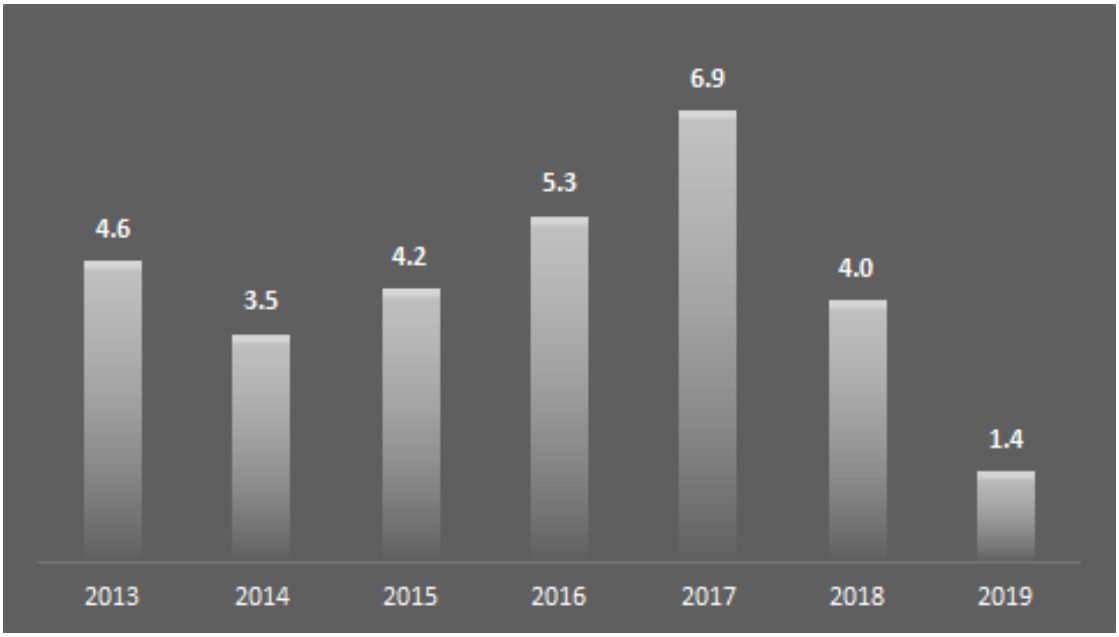
Especially after most international development banks (the World Bank, the European Investment Bank, Japan Bank for International Cooperation, etc.) and OECD countries pulled out of financing coal projects, including coal-fired power plants, in 2013, Chinese development banks remain the only alternative for many developing countries, especially BRI countries, to support such energy projects (PBoC, 2016b). At the same time, Chinese banks increased their financial support for reducing overcapacity within China by explicitly encouraging foreign investment by Chinese energy companies.

For some BRI countries, coal-fired generation remains attractive as a cost-effective means of expanding domestic energy capacity. The Asian Infrastructure Investment Bank (AIIB) estimates that 460 million people in Asia still lack access to electricity, signifying an urgent need for local power that often outpaces concerns about global climate change (Boston University Global Development Policy Cen-

ter, 2020). It is no wonder that after a slight decline in financing for foreign coal projects between 2013 and 2014, China's policy banks again increasingly raised funds for coal projects from 2015 to 2017 (Figure 11).

Figure 11

Financing of overseas coal projects by Chinese policy banks from 2009 to 2019



Source: The Global Development Policy Center at Boston University.

The discrepancy between China's efforts to mobilize the financial system to promote green sectors and fight pollution and climate change nationally, and on the other hand, its laissez-faire attitude toward the activities of Chinese banks and companies in other countries, also brings to light a blind spot in the Paris climate agreement: foreign investment is not subject to the country's obligation to reduce emissions within its own borders (Pike, 2017). This regulatory loophole is being exploited not only by Chinese banks and companies but also by some European banks and companies, albeit in an indirect and discrete manner (see the following subsection).

5.4 Transformation of the European financial system through "Green Deal"

In parallel with the Chinese initiatives, the EU also adopted its own Green Deal policy package in 2019. In doing so, the EU not only demonstrates its intention to implement its promise in the Paris Climate Agreement but also presentes a comprehensive, ambitious economic plan that aims to transform the least sustainable sectors while promoting environmentally friendly, carbon-neutral sectors. In this respect, the Green Deal is comparable to the Chinese initiative. This chapter, therefore, elaborates on the specifics of the European Green Deal in terms of the special role of the financial system, thus providing a basis for the comparison between the Chinese and European strategies for financing the green transformation in the subsequent chapter.

Policy Objective of the Green Deal

As part of the United Nations 2030 Agenda, the EU has set a goal of zero net greenhouse gas emissions by 2050. To achieve this goal, the European Commission published an economic growth plan called the European Green Deal on Dec. 11, 2019, which aims to reduce the EU's greenhouse gas emissions by at least 50 percent by 2030, preferably by 55 percent compared to 1990 levels. In the course of this, sustainable use of resources, restoration of ecosystems, and improvement of human health are to be targeted [18]. To achieve these goals, the Green Deal envisions several policy actions (table 18)[19].

[18] Communication from the European Commission to the Parliament of December 11, 2019, The European Green Deal, COM(2019) 640 of Dec. 11, 2019

[19] ibid.

Table 18
Announced actions of the "Green Deal"

Policy field	Actions	Core area
Climate policy	Extension of the emissions trading system	• Extension to maritime transport • Fewer free certificates for aviation subcontractors.
	Aligns taxation with climate goals	• CO2 pricing • Border adjustment system for imports into the EU (CO2 tax)
	Biodiversity strategy	• Mandatory actions of the member states • Extension of protected areas
Sectoral policy	Action plan for a circular economy	• Minimum environmental protection requirement for products
	Introduction of a taxonomy for sustainable financial products	• Avoidance of "greenwashing" financial products
	Renovation wave	• Subsidies for renovations of public and private buildings
Innovation policy	Increased research funding	• Funding under the "Horizon Europe" program. • 35% funding from "Horizon Europe" for environmental protection
Financial policy	„Just Transition Fund“	• Supporting the areas/sectors that are most affected by the exit

Source: own research

5.4.1 New direction for the European financial system

For all these announced actions, financing is a fundamental and cross-sectoral challenge. The European Commission estimates this will require an annual investment of 260 billion euros. To secure the needed financing, the EU relies on the interaction of public and private financing. To this end, a transparent market for green financial products must be established in order to redirect capital flows in a

targeted manner to the sectors to be promoted.[20]. To achieve this, the EU plans to shift the European financial system toward greater sustainability in the coming years.

Developing a green financial market

One of the focuses for expanding the green financial market is on green bonds. In this regard, as in China, the market for green bonds is steadily growing in Europe (Climate Bond Initiative, 2019a). One problem that exists is the so-called greenwashing: bonds are called green, which are not or only insufficiently so. The main question is what can be called green or sustainable.

Because the EU has not yet adopted a binding green taxonomy, several private taxonomies and labels are currently (as of May 2020) competing in the European financial market in an effort to establish themselves as the standard. Prominent examples include the Green Bond Principles designed by the International Capital Market Association and the Climate Bonds Standard developed by Climate Bonds Initiative (CBI). In particular, CBI's standard for green bonds/loans and other green debt instruments is updated regularly and is the most widely accepted. This certificate requires companies to document the project and its financing accurately, have the project externally audited, and publish an annual update report. To use these tools, a sustainable project must be financed or refinanced. To clarify whether a project qualifies as sustainable, the CBI released a list to qualify suitable projects. In doing so, the list called the Climate Bond Taxonomy parallels the Chinese Green Bond Endorsed Project Catalogue of PBoC (Climate Bond Initiative, 2019b). However, since the CBI is a private initiative and its classification system is not binding on market actors, this does not solve the problem of competition among green labels.

The European Commission, in collaboration with the Technical Expert Group, is therefore working to publish a binding taxonomy that both precisely defines the concept of sustainability and regulates the publication of companies' non-financial information. The taxonomy is scheduled to come into force at the beginning of 2022. It will then apply to all companies and financial market players. These are

[20]ibid.

thus obliged to declare the extent to which their investments or economic activities meet the criteria for environmental sustainability. Non-sustainable activities must be declared as such [21]. Sanctioning of the breach of the taxonomy is made in accordance with national legislation (Art. 12 Taxonomy VO-E) [22]. However, it remains to be clarified to what extent the acts of third-party companies as part of the company's supply chain are attributable to it. Furthermore, it is unclear to what extent nuclear power is considered sustainable (M. Stumpp, 2019). Here, there is a conflict within the EU, as it is considered sustainable in France but not in Germany since the energy transition. This highlights a drawback of the taxonomy, as it does not include a catalog of sustainable projects, as does the Climate Bond Taxonomy of CBI. To help determine which economic activities are considered sustainable, the Technical Expert Group proposes an EU Green Bond Standard based on the Climate Bond Standard and the Climate Bond Taxonomy. However, it is unclear if and when this will come into force [23].

European Investment Bank as a Climate Bank

To support companies that do not have the ability to issue green bonds, the European Investment Bank (EIB) makes low-cost loans. The EIB, which is under the mandate of the EU, is supposed to act as a climate bank and support especially small and medium-sized enterprises. The financing of green projects of the EIB amounts to 279 billion euros and is secured by a guarantee from the InvestEU fund.[24] However, the EIB is not an institution of the EU and is thus not subject to any instructions from the Commission or the Parliament, although it must comply with applicable national law[25]. Thus, accurate accountability for their lending is

[21] European Commission, Questions and Answers: political agreement on an EU-wide Sustainable Investment Classification System (Taxonomy), Brussels 18 December 2019

[22] Proposal of the European Commission for a Regulation of the European Parliament and of the Council on establishing a framework to facilitate sustainable investment of 24 May 2018, COM(2018) 353, May 24, 2018

[23] "EU Green Bond Standard," June 18, 2019: `https://finance.ec.europa.eu/system/files/2019-06/190618-sustainable-finance-teg-report-green-bond-standard_en.pdf`,(visited 09/08/2023)

[24] "Communication from the European Commission to the European Parliament and the Council of 14 January 2020, Sustainable Europe Investment Plan", COM(2020) 21 of 14.01.2020

[25] Art. 26 (ex-Article 28) in conjunction with Art. 20 (ex-Article 22) para. 2 Official Journal of the European Union C 202/251 Protocol (No. 5) on the Statute of the European Investment

difficult. Moreover, while the guarantee lowers the risk of EIB, which should lead to increased lending, it shifts the risk to the EU budget and thus to the EU citizen.

Since it is not an organ of the EU, the EIB can also incur debts in contrast to the latter, namely by issuing bonds, which are then purchased by the European Central Bank (ECB). Thus, the ECB de facto circumvents the regulation under Art. 123 TFEU, according to which it may not finance EU institutions (Sinn, 2020). However, since it already circumvented this regulation during the EU crisis to bail out banks and sovereigns through its quantitative easing (QE) program, a similar program in terms of a green QE program is conceivable (Sinn, 2020). This raises the question of what role the ECB will play in promoting sustainability and transforming the financial sector toward a sustainable financial sector.

New role of the European Central Bank for climate change

The role of central banks in climate change has been debated in academia for some time (Batten et al., n.d.; UNEP Inquiry, 2015), but the ECB was only marginally concerned with the topic until 2019 (Ettel, 2019). It was only after Christine Lagarde took office, who was already committed to climate protection during her time as head of the International Monetary Fund (IMF)(Die Welt, 2015), that the discussion on the role of the European Central Bank received new impetus.

To date, the ECB's role has been solely to preserve the price and financial stability of the eurozone. However, environmental risks to businesses are becoming increasingly important in light of the widespread threat posed by climate change. Consequently, credit risks are also increasing for the entire banking system and the capital market. However, according to a working paper of the UN Environment Program (UNEP), this systemic risk receives insufficient attention in the market. Here, the ECB has various means to correct this and to counteract the systemic risks. For example, by adjusting reserve requirements depending on the green share of banks' investments, the ECB can indirectly encourage banks to carry a higher share of green investments in their portfolios, which reduces the long-term risks of climate change to financial stability (UNEP Inquiry, 2015).

However, not everyone agrees with this new role for the ECB. German Bun-

of 7 June 2016, document 12016E/Pro/05 of. 07.06.2016.

desbank President Jens Weidemann, for example, argues that an increased focus on the environment runs counter to the actual mandates of price and financial stability, which could lead to conflicts between the ECB's objectives and thus make its actions ineffective (Ettel, 2019). Furthermore, Thorsten Polleit, the chief economist at Degussa Goldhandel, argues that this could increase the influence of politics on the ECB, which acts as an independent institution (Ettel, 2019).

Proponents, on the other hand, assume that climate change threatens price stability, especially in the food and energy sectors, through natural disasters and new regulations; thus, environmental protection is implicitly already part of ensuring price stability, which is only made clear by its inclusion in the ECB's mandate (UNEP Inquiry, 2015). The additional political influence is also resolved by the institutional independence of the ECB itself, according to which it does not have to follow political demands. However, an additional mandate may give it too much power, which it is not entitled to under the Maastricht Treaty (Duisenberg, 2003). In this respect, it is necessary to define precisely the limits of action of the ECB in climate and environmental protection instead of discussing whether it should contribute to the protection against climate change or not.

5.4.2 Contradictory Implementation of the Green Deal

Like China, the EU also implements various policies contradicting the Green Deal. This is true both for the EU as a group of states and for the individual member states.

At the EU level, the contradiction can be seen, for example, in the fourth list of projects with common interests. This was published at the end of 2019 under the name Projects of Common Interest. This list includes 32 gas projects, which, according to a study by Artelys (2020), a company specializing in data analysis in the energy sector, among other things, are redundant for the future coverage of the EU's energy demand. These projects are at odds with the plan to reduce natural gas consumption under the Green Deal. According to the analysis, even under the scenario of a supply shock, these projects are unnecessary. They will result in additional costs of 30 billion euros. Furthermore, stricter subsidy regulations have been pushed back; accordingly, they will not apply to existing power plants until

2030 (Greenpeace European Unit, 2018). Thus, EU member states such as Spain, Ireland, Poland, the UK, Belgium, and Germany can continue to subsidize their coal-fired power plants until 2030.

There are significant differences in the way coal phase-out is being pursued in different member states. In Poland, for example, not only is coal continuing to be used for electricity generation, but it is also being defined as a central form of Poland's energy production (Kraushaar, 2018). According to Poland's Prime Minister Mateusz Morawiecki and Poland's Energy Minister Krzysztof Tchórzewski, Poland could reduce its coal share to 50 percent at max by 2050. Other countries, such as the Czech Republic, Greece, and Bulgaria, also use coal largely to generate electricity (Janson, 2019) .

This clearly shows the EU's existing difficulties in consistently implementing the green transformation. On the one hand, it announces that it no longer wants to finance fossil fuels; on the other hand, it continues to finance them through public financial institutions, thus bypassing the balance sheets of national budgets and contributing itself to the risk of future stranded assets. The EU states also disagree on exactly how and when the phase-out of fossil fuels should proceed, leading to internal tensions. Overall, the Green Deal can be summarized as an ambitious plan that is not yet fully developed regarding economic plan, implementation, and taxonomy.

5.5 China and EU: Towards Policy Convergence?

The development of national markets for green financial products in EU countries and China has been accompanied by a flurry of cross-border knowledge and policy transfer. This has resulted in several bilateral and multilateral networks (Figure 12). This chapter takes a closer look at the transnational interaction and the resulting cross-border knowledge and policy transfer, thereby assessing the long-term impact of this international networking in the global financial market.

Table 19

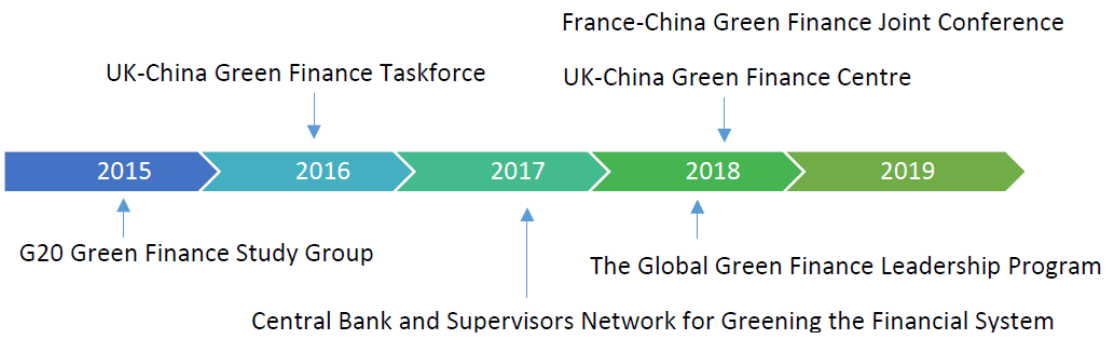
Relevant EU regulations related to green finance

	Document	Core area
2014	DIRECTIVE 2014/95/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information by certain large undertakings and groups	• Mandatory disclosure of nonfinancial disclosures related to environmental, social, and labor concerns (ESG criteria) for large companies and groups
2016	DIRECTIVE (EU) 2016/2341 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 December 2016 on the activities and supervision of institutions for occupational retirement provision (IORPs)	• Mandatory disclosure of nonfinancial information for pension funds
2017	DIRECTIVE (EU) 2017/828 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2017 amending Directive 2007/36/EC as regards the encouragement of long-term shareholder engagement	• Mandatory disclosure of nonfinancial information for institutional investors
2018	EU Green Bond Standard (Usability Guide EU Green Bond Standard)	• Recommendations of a Green Bond standard to the European Commission in the form of a report by the Technical Expert Group • Orientation towards the Climate Bond Standard and the Green Bond Principles
2020	REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation(EU) 2019/2088	• EU Taxonomy • Regulations for financial products

Source: own research

Figure 12

bilateral cooperation and multilateral networking between China and Europe.



Source: Own research.

5.5.1 Transnational knowledge and policy transfer along the Silk Road

From 2011 to 2014, knowledge and information flowed from Europe (including the UK and France) to China and were mainly driven by internationally active research institutes such as the International Institute for Sustainable Development (IISD), and NGOs such as CBI, City of London Green Finance Initiative, etc. (Yao & Zadek, 2016). In 2014, the PBoC established an internal research group to develop policy recommendations for the Party leadership on the new direction of China's financial system. Their work fed into the comprehensive Guidelines for Establishing the Green Financial System adopted in 2016, which the UNEP called "the world's first attempt at an integrated policy package to promote an ambitious shift toward a green economy" (Zu, 2016).

Meanwhile, this research group established a new Green Finance Committee (Green Finance Committee (GFC)) in the China Society for Finance and Banking, which is directly subordinate to PBoC and the largest research community in China's financial sector. As a result, almost all relevant financial institutions, universities, and think tanks join this network, enabling rapid diffusion of financial innovation. In 2015, the GFC designed the first taxonomy for green bonds (Green Bond Endorsed Project Catalogue) to guide green bond issuance and rating, as well as mandatory disclosure of environmental information. The GFC has since

effectively taken the leading role in building the green financial market in China.

In 2015, however, transnational knowledge and policy transfer turned in the opposite direction after China successfully put green finance on the agenda of the G20 summit. As a result, China aims to portray itself on the world stage as an idea generator of financial innovation and an active supporter of the Paris Climate Agreement. A special G20 study group was launched under the leadership of the PBoC and the Bank of England. During the 2015 G20 Summit, it made policy recommendations directly to G20 leaders that addressed the leading role of financial supervisors and central banks in greening the financial system and their available tools, such as prioritizing credit for green investments and disclosing systemic environmental risks. The recommendations cited the Chinese central bank as a model for this (but did not raise the critical issue of central bank independence) (Berensmann & Lindenberg, 2016; Aizawa, 2016). This policy agenda was continued at subsequent G20 summits in Hamburg (2017) and Buenos Aires (2018), respectively, and the fiscal and monetary policy toolkit was further refined.

This agenda-setting made a crucial contribution to the cognitive shift in many G20 countries. Many policymakers and market participants are increasingly convinced that green finance should be at the core of a promising development strategy (Ma & Zadek, 2016), even if it is understood very differently in different countries and even implemented controversially in practice.

In particular, the idea of targeting investment by redirecting capital flows to specific sectors, which is at the core of China's industrial policy and until recently was known only to a small circle of academics outside China, has found increasing support within Europe. The reason is quite pragmatic: public financing for climate and energy change is limited to 15 percent of all required investments. The participation of the financial market or the mobilization of private investors is therefore crucial for the implementation of the Paris Climate Agreement. This also sparks the debate on the new role of the central bank for climate policy within the EU.

Beyond the G20, China also tried to anchor its own green finance policy globally through the UN Environment Programme (UNEP). On the one hand, China is trying to harmonize standards for the emerging global green finance market with the EU; on the other hand, China is very actively supporting developing countries

along the New Silk Road to expand their national green finance market. To this end, several transnational working groups or networks have been established in recent years based on the initiative of China and the EU.

5.5.2 Multi-layered networking as channels of influence

The international harmonization of green finance standards was first driven by the UK and China and predominantly carried out by a joint City of London and GFC research group. Since 2018, there has also been a regular exchange between Chinese and French financial supervisors and institutions, which addresses the harmonization of Chinese green finance project standards with the EU taxonomy. The bilateral exchanges focus mainly on technical issues, while the newly established multilateral Central Bank and Supervisors Network for Greening the Financial System (NGFS) network addresses the fundamental issues concerning the transformation of the entire financial system in favor of low-carbon economic development.

The NGFS was established in 2017. China was among the eight founding members, along with the United Kingdom, France and Germany. Ma Jun, the chairman of the GFC and former chief economist of the PBoC, therefore has a permanent seat on the steering committee of the NGFS. He also heads one of the three research areas[26]. As of March 2020, 59 members and 12 observers were members of the NGFS. The NGFS made its first policy recommendations to national central banks, financial regulators, and legislators in a report published in April 2019, which calls for the integration of sustainability considerations into the management of financial institutions, consistent disclosure of climate and environmental risks, and the development of a taxonomy for economic activities, etc. Going forward, the NGFS seeks to produce a set of tools and methodologies for central banks and regulators to identify, quantify, and mitigate climate risks in the financial system[27].

[26]The research work of the NGFS is divided into three sub-areas: 1) WS 1: Oversight (chaired by the PBoC); 2) WS 2: Macrofinance (chaired by the Bank of England); 3) Mainstreaming Green Finance (chaired by the German Bundesbank). See https://www.ngfs.net/en

[27]See "A call for action - Climate change as a source of financial risk." https://www.banquefrance.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf

As discussed earlier, beyond its cooperation with Europe, China aims to take a leading role in the environmental transformation of the financial system, including its interaction with developing countries and emerging economies along the New Silk Road. Under a special training program, The Global Green Finance Leadership Program (GGFLP), designed by Ma Jun together with the World Bank-supported Sustainable Banking Network (SBN) for political and economic decision-makers from Silk Road countries, seminars are held several times a year in Beijing (2018), Morocco (2019), Kazakhstan (2019), and Singapore (2019) (Ciao & Xiamiao, 2019). According to the self-statement, more than 600 participants from 59 countries have already attended. As a result, new knowledge on financial innovation and policies practiced in China has been shared with these countries. So far, Mongolia, Kazakhstan, and Pakistan have designed Chinese-style green taxonomies for their countries under the leadership of Chinese researchers[28]. Other countries such as Fiji, Nigeria and Malaysia have now successfully issued their own green government bonds.

5.5.3 Green taxonomy: different approaches to the same idea

Despite China's ambition and effort, however, this does not mean that convergence between China's initiatives and the Green Deal or European taxonomy will necessarily result. Indeed, several barriers remain between China and the EU that are difficult to overcome. One of them is the definition of green financing: so far, China and the EU cannot agree on a common definition. The core point of contention is the coal phase-out. In China, coal remains the most important primary energy source: 60 percent of the electricity supply comes from this low-cost source and 14 million jobs depend on this industry. In this respect, China and Poland, the Czech Republic, Bulgaria and other Eastern European countries have more in common with each other than with other EU member states. Furthermore, green financing in China focuses on promoting green industries without monitoring their effects on emission reduction. On the other hand, the EU has listed specific thresholds of car-

[28]Research Center for Green Finance of Tshinghua University "Development Progress Report: International Collaboration and Development of Green Finance in 2018, June 05, 2019: http://www.pbcsf.tsinghua.edu.cn/upload/default/20190605/00151c6da382bb4b9befa1cabed01703.pdf

bon emissions to green economic activities in its taxonomy. These disagreements make benchmarking and evaluation of concrete implementations difficult.

Moreover, the EU taxonomy is not without controversy within the EU. One fundamental criticism is the targeting of financial flows to politically defined sustainable activities with the help of the taxonomy, which could become an industrial policy and neglect the market neutrality of monetary policy (Frühauf & Siedenbiedel, 2019; M. Stumpp, 2019). There is also criticism that not all sustainable activities listed in the taxonomy are necessarily underfunded, so the wrong incentives could be created for the activities that are not underfunded, increasing the risks of an investment bubble (Dupré, 2019). Such shortcomings of policy-led investment are seen repeatedly in Chinese industrial policy: While the subsidized industries are first flooded by the cheap capital and then have to fight against overcapacity, the other industries find it difficult to access the capital market and have to borrow from shadow banks with high interest rates.

5.6 Conclusion

In recent years, there has been much discussion in the scientific community about how to internalize externalities from environmental degradation and climate change in corporate activities as well as in their financing so that investments from polluting sectors and technologies can be reduced and moved in the direction of sustainable and green sectors and technologies. However, it was only after 2016 that a paradigm shift occurred in the political and economic mainstream. Increasingly, policymakers and private investors are convinced that green financing is at the core of a sustainable and green economy, including driving industry transformation. Against this backdrop, China introduced the Green Silk Road as a sub-project of the BRI, while the EU adopted the Green Deal and started work with a green taxonomy in progress.

However, the question of how and with which political and economic instruments to achieve the goal of directing financial flows toward green economic activities is approached in different ways by the EU and China, despite many similarities and even cooperations. These approaches are influenced by different circumstances, such as their respective energy and production structures, and by the

differing role of the central bank in national industrial policy. In this paper, we have examined these differences and identified several shortcomings in terms of regulation and implementation between the EU and China.

The first deficit stems from differences in the definition of green finance, particularly with respect to coal-fired power plants. While Chinese coal companies are allowed to transfer their production overcapacity to other countries with the help of domestic support policies and continue to build coal-fired power plants, the EU completely excludes support for coal-related projects from the Green Deal. This difference in support policies directly complicates the coal phase-out of EU countries. Therefore, the EU requires its member states to raise and harmonize environmental and climate-related standards and their requirements for foreign direct investment in fossil fuels.

On the other hand, a further shortcoming is that the responsibility of nation-states for the joint implementation of the Paris Climate Agreement is still very unclear when it comes to emissions abroad. This is used by China in the Belt and Road Initiative to promote fossil fuel projects abroad. In this context, it would be beneficial for the global implementation of climate goals if nation-states were not only responsible for CO2 reduction within their borders but also had to monitor the cross-border investment activities of domestic companies to ensure that they do not cause environmental and climate-related damage in the target countries. More coordination and joint action at the bilateral level would thus be required to implement the Paris Climate Agreement.

Furthermore, there are policies in both the EU and China that create conflicting incentives for economic actors. On the one hand, the EU and China are improving the framework for green financing while, on the other hand, still allowing the promotion of conventional fuels. The taxonomies aim to strengthen investment support for renewable energy and technologies and standardize criteria. Jointly developing a global green finance market is the right step to coordinate eligibility criteria and reduce confusion around green investments, thereby increasing incentives for companies. But this alone is not enough and cannot replace the elimination of indirect or hidden subsidies into conventional fuels by nation-states. The latter poses a much greater political challenge for environmental global governance. So far, China and the U.S. have established checks and balances on

eliminating subsidies on a voluntary basis. The extent to which this approach can be applied to the EU-China relationship remains to be seen.

The agenda set by the Chinese central bank at the G20 summit was accepted by the EU in a short period of time and not critically scrutinized. Fighting against climate change and for economic transformation in favor of sustainable development are politically desired and legitimate goals, but this does not mean that all means to this end can be automatically legitimized and accepted or that the public should not be involved in the debate. Finally, there has been no empirical research on the effectiveness of Chinese green industrial and monetary policies. This represents a significant knowledge gap that should be urgently filled in order to know whether the "Chinese model" can be relevant to European/Western financial markets as a role model. Such an evaluation of Chinese efforts are central, especially if the EU wants to build a global green financial market together with China and thus has to increasingly confront China's normative and economic influence.

6 Appendix

6.1 Tables (Gender differences among investors of the Taiwanese stock market)

Table 20

Variable names and International Standard Industrial classification

Industry variable names	International Standard Industrial Classification
Motor Vehicles	Manufacture of motor vehicles, trailers and semi-trailers C(29), Wholesale and retail trade and repair of motor vehicles and motorcycles G(45)
Mineral Products	Manufacture of other non-metallic mineral products C(23)
Chemicals	Manufacture of chemicals and chemical products C(20)
Telecommunications	Wholesale of electronic and telecommunications equipment and parts G(4652), Telecommunications J(61)
Electronic Components	Manufacture of computer, electronic and optical products C(2610)
Computers	Manufacture of computer, electronic and optical products C(2620-2660), Wholesale of computers, computer peripheral equipment and software G(4651)
Electronic Equipment	Manufacture of electrical equipment C(27)
Financial	Financial and insurance activities K(64,65)
Food	Manufacture of food products C(10), Wholesale of food, beverages and tobacco G(4630), Food and beverage service activities I(56)
Travel	Travel agency, tour operator, reservation service and related activities N(79)
Information Services	Information service activities J(63)

Basic Metals	Manufacture of basic metals C(24)
Electricity	Electricity, gas, steam and air conditioning supply D(35)
Paper	Manufacture of paper and paper products C(17)
Transport	Manufacture of other transport equipment C(30,33), Transportation and storage H(49-53)
Textile	Manufacture of textiles C(13), Wholesale of textiles, clothing and footwear G(4641)
Retail trade	Retail trade, except of motor vehicles and motorcycles G(47)

The table shows the industry variable names International Standard Industrial Classification (ISIC). and the associated ISIC.
The letter shows the Section, and
the number in parentheses shows the Division/Class.

Table 21

Descriptive statistics

	mean	median	sd	min	max
Percentage men trading	51.43	51.24	2.95	35.00	66.49
Percentage men trading volume	56.47	55.94	3.57	42.50	73.85
Percentage men trading number	58.10	57.63	3.60	35.14	79.08
Return	0.01	0.04	0.17	-2.24	0.28
Volatility	2.92	2.81	1.02	1.32	20.27
Skewness	9.93	9.87	43.66	-915.90	111.76
Beta	0.68	0.67	0.26	-0.42	1.32
Market Cap	8.41	8.25	1.56	4.49	14.02
Sharp ratio	0.95	1.67	3.88	-43.68	12.26
Treynor ratio	-0.04	0.07	1.97	-47.63	13.28
Firm age	26.53	25.00	12.87	1.00	75.00
Dividend yield	1.93	1.39	1.99	0.00	9.06

Return, Volatility, Skewness, Sharp ratio, Treynor ratio,
Dividend yield and the Percentages of men are multiplied by 100,
Market cap = ln(Market cap),
$N = 683$.

Table 22

Descriptive statistics men vs. women

	mean	median	sd	min	max
Top 25% Percent of men trading					
Return	-0.02	0.02	0.15	-0.57	0.22
Volatility	3.14	2.86	0.98	1.61	5.52
Skewness	13.12	12.73	12.43	-16.86	48.56
Beta	0.57	0.55	0.19	0.11	1.04
Market Cap	7.28	7.18	1.06	4.53	10.12
Firm age	26.06	25.00	10.82	6.00	56.00
Sharp ratio	0.06	0.61	3.86	-11.47	8.20
Treynor ratio	-0.05	0.03	0.31	-1.47	0.41
Dividend yield	2.16	1.69	2.19	0.00	9.06
Bottom 25% Percent of men trading					
	mean	median	sd	min	max
Return	0.04	0.05	0.07	-0.27	0.27
Volatility	3.03	3.08	0.53	1.87	4.63
Skewness	6.79	6.00	8.51	-12.30	42.64
Beta	0.93	0.93	0.19	0.33	1.36
Market Cap	9.68	9.46	1.49	6.80	14.02
Firm age	27.36	25.00	15.01	1.00	68.00
Sharp ratio	1.53	1.79	2.30	-6.85	7.95
Treynor ratio	0.05	0.06	0.09	-0.28	0.36
Dividend yield	1.51	1.06	1.64	0.00	8.43

Return, Volatility, Skewness, Sharp ratio,
Treynor ratio,Dividend yield
and the Percentages of men are multiplied by 100,
Market cap = ln(Market cap),
Winsorized data; $N = 628$.

Table 23

Correlation table: part one

	Return	Volatility	Skewness	Beta	Market Cap
Percentage men trading	-0.07	-0.14***	0.30***	-0.54***	-0.62***
Percentage men trading volume	-0.12**	-0.06	0.30***	-0.54***	-0.59***
Percentage men trading number	-0.10*	-0.07	0.19***	-0.40***	-0.35***
Return	1.00	-0.16***	-0.09*	-0.15***	0.13**
Volatility	-0.16***	1.00	-0.40***	0.45***	-0.28***
Skewness	-0.09*	-0.40***	1.00	-0.45***	-0.23***
Beta	-0.15***	0.45***	-0.45***	1.00	0.43***
Market Cap	0.13**	-0.28***	-0.23***	0.43***	1.00
Sharp ratio	0.97***	-0.30***	-0.03	-0.23***	0.16***
Treynor ratio	0.93***	-0.29***	0.02	-0.35***	0.04
Firm age	0.15***	-0.07	0.09*	-0.28***	-0.14**
Dividend yield	0.25***	-0.56***	0.10*	-0.26***	0.16***

Return, Volatility, Skewness, Sharp ratio, Treynor ratio, Dividend yield and the Percentages of men are multiplied by 100
Market cap = ln(Market cap)

Table 24

Correlation table: part two

	Sharp ratio	Treynor ratio	Firm age	Dividend yield
Percentage men trading	-0.04	0.06	-0.01	0.20***
Percentage men trading volume	-0.09*	0.00	0.23***	0.12**
Percentage men trading number	-0.06	0.00	0.22***	0.14***
Return	0.97***	0.93***	0.15***	0.25***
Volatility	-0.30***	-0.29***	-0.07	-0.56***
Skewness	-0.03	0.02	0.09*	0.10*
Beta	-0.23***	-0.35***	-0.28***	-0.26***
Market Cap	0.16***	0.04	-0.14**	0.16***
Sharp ratio	1.00	0.95***	0.18***	0.35***
Treynor ratio	0.95***	1.00	0.18***	0.33***
Firm age	0.18***	0.18***	1.00	0.01
Dividend yield	0.35***	0.33***	0.01	1.00

Return, Volatility, Skewness, Sharp ratio, Treynor ratio,
Dividend yield and the Percentages of men are multiplied by 100
Market cap = ln(Market cap)

Table 25

Dividend vs. Non-Dividend companies total trade numbers

	Total people	Total trade volume	Total numbers of trades
Dividend-paying companies	45039.13	5.536E+10	455113.1
Non-dividend-paying companies	25167.26	1.635E+10	238681.3
Difference	19871.87***	3.9006E+10***	216431.8***

This table shows the mean values for the total number of people trading, the total trade volume, and the total number of trades for a given company
Significant at: *5%, **1% , ***0.1%.
N=628

Table 26

Regression on percentage of men: number of trades (dividend dummy model)

	Model 1	Model 2	Model 3	Model 4
const	57.81***	60.94***	63.76***	63.42***
	(123.63)	(26.51)	(78.19)	(82.33)
Motor Vehicles	-0.72	-1.15	-0.66	-0.73
	(-1.14)	(-1.7)	(-0.92)	(-1.06)
Mineral Products	1.92*	0.99	1.16	0.98
	(2.86)	(1.58)	(1.98)	(1.7)
Chemicals	0.78	0.59	0.62	0.45
	(1.32)	(1.16)	(1.2)	(0.9)
Telecommunications	-1.38	-0.61	-1.16	-1.29
	(-1.85)	(-0.79)	(-1.41)	(-1.6)
Electronic Components	-1.68**	-0.62	-1.55*	-1.75**
	(-3.3)	(-1.12)	(-3.09)	(-3.66)
Computers	-0.8	0.11	-0.71	-0.89
	(-1.43)	(0.2)	(-1.32)	(-1.7)
Electronic Equipment	0.22	-0.56	-0.77	-0.99
	(0.35)	(-0.95)	(-1.33)	(-1.79)
Financial	0.47	1.07	1.08	0.68
	(0.68)	(1.66)	(1.67)	(1.16)
Food	1.98	0.64	0.83	0.65
	(2.37)	(0.93)	(1.18)	(0.94)

Travel	-0.15	-0.52	-0.38	-0.42
	(-0.13)	(-0.51)	(-0.38)	(-0.42)
Information Services	-0.23	-0.45	-1.74	-1.69
	(-0.23)	(-0.49)	(-1.99)	(-1.99)
Basic Metals	0.42	0.34	0.4	0.28
	(0.74)	(0.56)	(0.69)	(0.5)
Electricity	3.23	2.08	2.83	3.16
	(1.96)	(1.47)	(2.03)	(2.05)
Paper	0.13	0.04	-0.06	-0.17
	(0.23)	(0.06)	(-0.1)	(-0.3)
Transport	-1.02	-0.73	-0.58	-0.75
	(-1.56)	(-1.13)	(-0.85)	(-1.16)
Textile	2.57*	1.35	1.37	1.11
	(2.75)	(1.66)	(1.63)	(1.34)
Retail trade	2.47	1.85	2.26	2.11
	(2.24)	(1.9)	(2.09)	(1.95)
Fundamental & technical controls	no	yes	yes	yes
dividend dummy model				
N	628	628	628	628
adj. R2	0.16	0.36	0.32	0.35

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

Table 27

Regression on percentage of men: trading volume (dividend yield model)

	Model 1	Model 2	Model 3	Model 4
const	56.27***	62.94***	66.38***	66.16***
	(122.87)	(29.94)	(93.51)	(96.96)
Motor Vehicles	-0.71	-1.44*	-0.9	-0.93
	(-1.17)	(-2.49)	(-1.46)	(-1.58)
Mineral Products	2.35**	1.35*	1.45*	1.26*
	(3.54)	(2.58)	(2.93)	(2.6)
Chemicals	0.54	0.44	0.36	0.23
	(0.84)	(1.01)	(0.81)	(0.52)
Telecommunications	-1.46	-0.2	-0.86	-0.95
	(-2.01)	(-0.3)	(-1.12)	(-1.28)
Electronic Components	-1.97**	-0.22	-1.34**	-1.5***
	(-3.87)	(-0.5)	(-3.25)	(-3.78)
Computers	-0.94	0.4	-0.61	-0.75
	(-1.64)	(0.83)	(-1.35)	(-1.67)
Electronic Equipment	0.56	-0.26	-0.57	-0.74
	(0.9)	(-0.59)	(-1.31)	(-1.73)
Financial	-0.42	0.79	0.85	0.47
	(-0.63)	(1.79)	(1.81)	(1.09)
Food	2.31*	0.56	0.68	0.53
	(2.75)	(0.94)	(1.11)	(0.82)
Travel	0.99	0.59	0.83	0.8
	(0.85)	(0.55)	(0.82)	(0.78)
Information Services	0.76	0.38	-1.12	-0.97
	(0.88)	(0.49)	(-1.48)	(-1.34)
Basic Metals	0.03	-0.25	-0.31	-0.44
	(0.05)	(-0.44)	(-0.57)	(-0.83)
Electricity	4.09	2.08	2.68	3.01
	(1.95)	(1.23)	(1.63)	(1.68)
Paper	-0.32	-0.48	-0.59	-0.7
	(-0.44)	(-0.58)	(-0.64)	(-0.77)
Transport	-1.44	-0.84	-0.83	-0.98
	(-2.29)	(-1.43)	(-1.37)	(-1.67)
Textile	3.01**	1.62	1.58	1.34
	(3.32)	(2.4)	(2.23)	(1.95)
Retail trade	0.57	0.04	0.53	0.42

	(0.66)	(0.05)	(0.7)	(0.53)
Fundamental & technical controls	no	yes	yes	yes
dividend yield model				
N	628	628	628	628
adj. R2	0.2	0.59	0.54	0.56

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

Table 28

Regression on percentage of men: trading (dividend yield model)

	Model 1	Model 2	Model 3	Model 4
const	51.26***	62.27***	61.83***	61.6***
	(129.27)	(45.45)	(101.14)	(101.99)
Motor Vehicles	0.44	-0.05	0.35	0.31
	(0.72)	(-0.09)	(0.53)	(0.48)
Mineral Products	1.33	1.17**	0.82	0.68
	(2.49)	(2.88)	(2.05)	(1.72)
Chemicals	0.5	0.8	0.64	0.55
	(0.84)	(2.19)	(1.57)	(1.34)
Telecommunications	0.4	1.7**	0.79	0.7
	(0.56)	(3.11)	(1.16)	(1.05)
Electronic Components	-0.9	1.17**	-0.38	-0.51
	(-2.0)	(3.35)	(-1.06)	(-1.41)
Computers	-0.3	1.18**	-0.17	-0.28
	(-0.61)	(3.29)	(-0.43)	(-0.72)
Electronic Equipment	0.64	0.48	-0.1	-0.26
	(1.24)	(1.45)	(-0.3)	(-0.74)
Financial	-1.13	0.2	0.18	-0.08
	(-1.97)	(0.59)	(0.48)	(-0.21)
Food	0.52	-0.73	-0.45	-0.59
	(0.71)	(-1.74)	(-0.97)	(-1.27)
Travel	2.39	2.36	2.58	2.55
	(1.73)	(2.11)	(2.09)	(2.08)
Information Services	2.07**	2.09***	0.54	0.56
	(3.43)	(4.77)	(1.18)	(1.25)
Basic Metals	-0.26	-0.14	-0.63	-0.71
	(-0.44)	(-0.27)	(-1.26)	(-1.4)
Electricity	3.41	0.7	1.83	2.04
	(1.85)	(0.53)	(1.31)	(1.38)
Paper	-1.12	-0.38	-0.75	-0.84
	(-1.3)	(-0.42)	(-0.71)	(-0.8)
Transport	-0.93	0.09	-0.14	-0.26
	(-1.44)	(0.16)	(-0.23)	(-0.41)
Textile	1.47	0.65	0.58	0.41
	(2.01)	(1.31)	(1.07)	(0.79)
Retail trade	-1.02	-1.16	-0.68	-0.79

	(-1.01)	(-1.4)	(-0.8)	(-0.91)
Fundamental & technical controls	no	yes	yes	yes
dividend yield model				
N	628	628	628	628
adj. R2	0.09	0.61	0.51	0.53

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

Table 29

Regression on percentage of men: number of trades (dividend yield model)

	Model 1	Model 2	Model 3	Model 4
const	57.81***	59.23***	63.66***	63.4***
	(123.63)	(23.85)	(81.02)	(85.16)
Motor Vehicles	-0.72	-1.43	-1.0	-1.04
	(-1.14)	(-2.18)	(-1.46)	(-1.59)
Mineral Products	1.92*	0.79	1.28	1.06
	(2.86)	(1.24)	(2.23)	(1.89)
Chemicals	0.78	0.52	0.56	0.4
	(1.32)	(1.03)	(1.12)	(0.84)
Telecommunications	-1.38	-0.67	-1.06	-1.17
	(-1.85)	(-0.91)	(-1.4)	(-1.59)
Electronic Components	-1.68**	-0.67	-1.34*	-1.53**
	(-3.3)	(-1.21)	(-2.74)	(-3.27)
Computers	-0.8	-0.04	-0.68	-0.84
	(-1.43)	(-0.07)	(-1.3)	(-1.64)
Electronic Equipment	0.22	-0.66	-0.74	-0.93
	(0.35)	(-1.13)	(-1.33)	(-1.76)
Financial	0.47	1.11	1.18	0.75
	(0.68)	(1.75)	(1.85)	(1.29)
Food	1.98	0.58	0.68	0.5
	(2.37)	(0.87)	(1.01)	(0.76)
Travel	-0.15	-0.47	-0.31	-0.35
	(-0.13)	(-0.44)	(-0.3)	(-0.34)
Information Services	-0.23	-0.43	-1.73	-1.58
	(-0.23)	(-0.42)	(-1.76)	(-1.66)
Basic Metals	0.42	-0.09	0.2	0.06
	(0.74)	(-0.15)	(0.34)	(0.1)
Electricity	3.23	1.91	2.29	2.67
	(1.96)	(1.36)	(1.7)	(1.78)
Paper	0.13	-0.31	-0.26	-0.38
	(0.23)	(-0.46)	(-0.38)	(-0.58)
Transport	-1.02	-1.03	-0.76	-0.94
	(-1.56)	(-1.5)	(-1.13)	(-1.44)
Textile	2.57*	1.43	1.51	1.23
	(2.75)	(1.84)	(1.84)	(1.54)
Retail trade	2.47	1.89	2.28	2.15

	(2.24)	(1.99)	(2.18)	(2.03)
Fundamental & technical controls	no	yes	yes	yes
dividend yield model				
N	628	628	628	628
adj. R2	0.16	0.38	0.35	0.37

Significant at: *5%, **1% , ***0.1%
T-Values are shown in parentheses.
P-Values are adjusted using Benjamini Hochberg Procedure
to a false discovery rate (FDR) of 5%.
Regression uses HC3 robust estimators.
Model 2 includes $\beta, \mu, \sigma,$ and γ
Model 3: Sharp Ration, Model 3: Treynor Ratio

Table 30

Regression on percentage of men: trading volume (dividend dummy model)

	Model 1	Model 2	Model 3
Market Cap	-0.85***	-1.24***	-1.21***
	(-8.23)	(-16.17)	(-16.94)
Return	-5.96***		
	(-4.34)		
Volatility	0.36		
	(0.87)		
Skewness	0.01		
	(0.91)		
Beta	-4.72***		
	(-6.17)		
Firm age	0.02	0.01	0.01
	(1.75)	(1.14)	(1.23)
Dividend dummy	0.35	0.47	0.6
	(1.17)	(1.6)	(2.12)
Sharp ratio		-0.19***	
		(-4.37)	
Treynor ratio			-4.05***
			(-4.92)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.57	0.5	0.52

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

Table 31

Regression on percentage of men: number of trades (dividend dummy model)

	Model 1	Model 2	Model 3
Market Cap	-0.4**	-0.73***	-0.7***
	(-3.37)	(-8.51)	(-9.05)
Return	-6.08**		
	(-3.79)		
Volatility	0.7		
	(1.39)		
Skewness	0.0		
	(0.1)		
Beta	-3.74**		
	(-3.71)		
Firm age	0.02	0.02	0.02
	(2.15)	(1.61)	(1.69)
Dividend dummy	0.6	0.42	0.56
	(1.75)	(1.27)	(1.78)
Sharp ratio		-0.22***	
		(-4.58)	
Treynor ratio			-4.72***
			(-5.13)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.36	0.32	0.35

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

Table 32

Regression on percentage of men: trading volume (dividend yield model)

	Model 1	Model 2	Model 3
Market Cap	-0.86***	-1.28***	-1.25***
	(-8.82)	(-17.43)	(-18.47)
Return	-5.83***		
	(-4.35)		
Volatility	0.78		
	(1.74)		
Skewness	0.02		
	(1.43)		
Beta	-4.15***		
	(-5.8)		
Firm age	0.02	0.01	0.01
	(1.99)	(1.54)	(1.48)
Dividend yield	0.31***	0.37***	0.37***
	(4.33)	(6.84)	(6.89)
Sharp ratio		-0.24***	
		(-5.73)	
Treynor ratio			-4.58***
			(-5.79)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.59	0.54	0.56

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

Table 33

Regression on percentage of men: trading (dividend yield model)

	Model 1	Model 2	Model 3
Market Cap	-0.88***	-1.26***	-1.23***
	(-10.7)	(-21.39)	(-21.45)
Return	-4.07**		
	(-3.64)		
Volatility	-0.0		
	(-0.01)		
Skewness	-0.0		
	(-0.29)		
Beta	-5.25***		
	(-8.33)		
Firm age	-0.02**	-0.03**	-0.03**
	(-3.03)	(-3.32)	(-3.3)
Dividend yield	0.27***	0.44***	0.44***
	(5.08)	(9.25)	(9.42)
Sharp ratio		-0.12**	
		(-3.14)	
Treynor ratio			-2.81**
			(-3.61)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.61	0.51	0.53

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

Table 34

Regression on percentage of men: number of trades (dividend yield model)

	Model 1	Model 2	Model 3
Market Cap	-0.4**	-0.76***	-0.73***
	(-3.62)	(-8.97)	(-9.68)
Return	-5.85**		
	(-3.74)		
Volatility	1.06		
	(1.95)		
Skewness	0.01		
	(0.52)		
Beta	-3.13**		
	(-3.26)		
Firm age	0.02	0.02	0.02
	(2.27)	(1.88)	(1.86)
Dividend yield	0.33***	0.32***	0.31***
	(3.99)	(5.67)	(5.65)
Sharp ratio		-0.27***	
		(-5.72)	
Treynor ratio			-5.14***
			(-5.76)
Industry controls	yes	yes	yes
N	628	628	628
adj. R2	0.38	0.35	0.37

Significant at: *5%, **1% , ***0.1%

T-Values are shown in parentheses.

P-Values are adjusted using Benjamini Hochberg Procedure to a false discovery rate (FDR) of 5%.

Regression uses HC3 robust estimators.

6.2 Tables (Regret and benign envy – Two sides of the same medal)

Table 35

The Benign and Malicious Envy Scale

	Items English	Factor loadings	
		(1)	(2)
1	When I envy others, I focus on how I can become equally successful in the future.	-0.08	0.73
2	If I notice that another person is better than me, I try to improve myself.	-0.07	0.76
3	Envying others motivates me to accomplish my goals.	0.01	0.73
4	I strive to reach other people's superior achievements.	0.12	0.78
5	If someone has superior qualities, achievements, or possessions, I try to attain them for myself.	0.22	0.78
6	I wish that superior people lose their advantage.	0.75	0.02
7	If other people have something that I want for myself, I wish to take it away from them.	0.74	0.15
8	I feel ill will toward people I envy.	0.73	0
9	Envious feelings cause me to dislike the other person.	0.75	-0.04
10	Seeing other people's achievements makes me resent them.	0.82	0.06
	Items German		
1	Wenn ich andere beneide, dann konzentriere ich mich darauf, wie ich in Zukunft genau so erfolgreich werden kann.		
2	Wenn ich merke, dass eine andere Person besser ist als ich, versuche ich, mich zu verbessern.		
3	Andere zu beneiden, motiviert mich, meine Ziele zu erreichen.		
4	Ich strebe danach, die besseren Leistungen anderer Menschen zu erreichen.		
5	Wenn jemand überlegene Qualitäten, Leistungen oder Besitztümer hat, versuche ich, diese für mich zu erreichen		
6	Ich wünsche mir, dass überlegene Menschen ihren Vorteil verlieren.		
7	Wenn andere Menschen etwas haben, was ich für mich selbst möchte, möchte ich es ihnen wegnehmen.		
8	Ich empfinde Böswilligkeit gegenüber Menschen, auf die ich neidisch bin.		
9	Neidische Gefühle bewirken, dass ich die andere Person nicht mag.		
10	Wenn ich die Erungenschaften anderer Menschen sehe, ärgere ich mich über sie.		

Note: Table contains English scale from table 1 in Lange & Crusius (2015)
plus own German translation and factor loadings

Table 36

Regret proneness Scale

	Items English	Factor loadings
		(1)
1	Whenever I make a choice, I'm curious about what would have happened if I had chosen differently	0.7
2	Whenever I make a choice, I try to get information about how the other alternatives turned out.	0.72
3	If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better.	0.63
4	When I think about how I'm doing in life, I often assess opportunities I have passed up.	0.66
5	Once I make a decision, I don't look back.	-0.69
	Items German	
1	Wann immer ich eine Entscheidung treffe, bin ich neugierig, was passiert wäre, wenn ich anders entschieden hätte.	
2	Wann immer ich eine Entscheidung treffe, versuche ich, Informationen darüber zu erhalten, wie die anderen Alternativen ausgegangen sind.	
3	Wenn ich eine Entscheidung treffe und sie gut ausfällt, fühle ich mich trotzdem wie ein Versager, wenn ich herausfinde, dass eine andere Wahl besser ausgefallen wäre.	
4	Wenn ich darüber nachdenke, wie es mir im Leben ergeht, bewerte ich oft Gelegenheiten, die ich verpasst habe.	
5	Sobald ich eine Entscheidung getroffen habe, blicke ich nicht mehr zurück.	

Note: Table contains English scale from table 1 in Schwartz et al. (2002) plus own German translation and factor loadings

Table 37

Core Self-Evaluation Scale

	English Items	Factor loadings		
		(1)	(2)	single factor
1	I am confident I get the success I deserve in life.	-0.1	0.70	
2	Sometimes I feel depressed.	0.78	0	R
3	When I try, I generally succeed.	0	0.72	
4	Sometimes when I fail I feel worthless.	0.78	-0.19	R
5	I complete tasks successfully.	-0.27	0.60	
6	Sometimes, I do not feel in control of my work.	0.63	-0.22	R
7	Overall, I am satisfied with myself.	-0.47	0.63	
8	I am filled with doubts about my competence.	0.68	-0.31	R
9	I determine what will happen in my life.	0	0.6	
10	I do not feel in control of my success in my career.	0.5	-0.43	R
11	I am capable of coping with most problems.	-0.25	0.72	
12	There are times when things look pretty bleak and hopeless to me.	0.82	-0.13	R
	German Items			
1	Ich bin zuversichtlich, im Leben den Erfolg zubekommen, den ich verdiene.			
2	Manchmal bin ich deprimiert.			
3	Wenn ich mich anstrenge, bin ich im Allgemeinen erfolgreich.			
4	Wenn ich etwas nicht schaffe, fühle ich mich manchmal wertlos.			
5	Ich erledige Aufgaben erfolgreich.			
6	Manchmal habe ich das Gefühl, keine Kontrolle über meine Arbeit zu haben.			
7	Im Großen und Ganzen bin ich mit mir zufrieden.			
8	Ich zweifle an meinen Fähigkeiten.			
9	Ich bestimme, was in meinem Leben geschehen soll.			
10	Ich habe das Gefühl, den Erfolg meiner Karriere nicht unter Kontrolle zu haben.			
11	Ich bin in der Lage, die meisten meiner Probleme zu bewältigen.			
12	Es gibt Zeiten, in denen mir die Dinge ziemlich düster und hoffnungslos erscheinen.			

Note: Table contains the English and German Scale from T. Stumpp et al. (2010).
Table can be found in T. Stumpp et al.'s (2010) Appendix.
Factor loadings are from this study.
Single factor is constructed by standardizing the sum of the item scores.
Item scores marked by an "R" are reversed.

Table 38

Big Five Inventory Scale

	English Items	Factor loadings				
I see myself as someone who...		(1)	(2)	(3)	(4)	(5)
1	... is reserved.	0.89	-0.01	0.14	-0.03	0.04
2	... is generally trusting.	-0.16	0.1	0.11	0.13	0.73
3	... tends to be lazy.	0.25	-0.02	0.06	-0.79	-0.11
4	... is relaxed, handles stress well.	0.11	0.03	-0.86	-0.03	0.01
5	... has few artistic interests.	-0.04	-0.86	0.01	0	0.06
6	... is outgoing, sociable.	-0.87	0	0.03	0.05	0.05
7	... tends to find fault with others.	-0.15	0.06	0.15	0.11	-0.78
8	... does a thorough job.	0.14	0.07	-0.03	0.87	-0.08
9	... gets nervous easily.	0.27	0.06	0.81	-0.13	-0.02
10	... has an active imagination.	-0.05	0.84	0.03	0.08	0.1
	German Items					
Ich...						
1	... bin eher zurückhaltend reserviert.					
2	... schenke anderen leicht Vertrauen, glaube an das Gute im Menschen.					
3	... bin bequem, neige zur Faulheit.					
4	... bin entspannt, lasse mich durch Stress nicht aus der Ruhe bringen.					
5	... habe nur wenig künstlerisches Interesse.					
6	... gehe aus mir heraus, bin gesellig.					
7	... neige dazu, andere zu kritisieren.					
8	... erledige Aufgaben gründlich.					
9	... werde leicht nervös und unsicher.					
10	... habe eine aktive Vorstellungskraft, bin phantasievoll.					

Note: Table contains English and German Scale from Rammstedt & John (2007)
Table can be found in Rammstedt & John's (2007) Appendix.
Factor loadings are from this study.

6.3 Figures (Gender differences among investors of the Taiwanese stock market)

Figure 13

Percentage of men trading vs. beta

This figure shows the percentages of men trading, the percentage of trading volume, and the percentage of the number of trades plotted against the beta of the individual companies. The figures are constructed from the winsorized data, including 628 companies.

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