Mispricing, Misallocation, and Corporate Investment*

Christian Dreyer†

June 4, 2021

This study investigates the effect of stock market overvaluation of non-peer firms on firm investment measured by capital expenditures. To test this effect, Stambaugh et al.'s (2015) misvaluation measure and Text-Based Network Industry Classification (TNIC) codes are used. The results indicate that firm investment is negatively associated with the overvaluation of non-peer firms. Using a path analysis, it is shown that the misvaluation of non-peer firms influences firm investment through financing and non-financing channels. The financing channel mainly works via debt issuance, but the predominant part of this effect is driven by the non-financing channel. Moreover, the empirical results suggest that the effect of non-peer misvalutaion on firm investment is stronger in bubble periods. The findings are consistent with the idea that overvalued firms are more attractive to investors and other stakeholders, which crowds out firm investment of non-peer firms in other industry sectors.

JEL Classification: G14, G31

Keywords: Mispricing, Corporate Investment, Capital Allocation

*For valuable comments and suggestions, I owe special thanks to Irina Beech, Vincent Eulenberg, Alicia Feldhues Martin, Oliver Schulz, Tanja Stjepanovic, and Alexander Viets.

†University of Muenster, Finance Center Muenster, Chair of International Financial Management, Universitaetsstr. 14-16, 48143 Muenster, Germany

1 Introduction

The literature extensively documents that overvalued share prices have a positive impact on the investments of firms and peer firms (see Baker et al., 2003; Gilchrist et al., 2005; Polk and Sapienza, 2009; Dong et al., 2020; Badertscher et al., 2019; Dessaint et al., 2019). The importance of share prices on firm investment decisions is proposed by Tobin's (1969) Q theory. It notes that higher share prices represent greater growth opportunities. Therefore, high valuation firms increase their investments to take advantage of better opportunities. Further studies show that this mechanism also works when share prices differ from fundamentals and are overpriced (e.g., Baker et al., 2003). However, literature is scare on the impact of mispricing on firm investment when non-peer firms in other industry sectors are overvalued. The literature only contains two contradictory predictions. On the one hand, in his theoretical model, Schneemeier (2017) implies that firm investment can be positively stimulated by overvalued non-peer stock prices. Managers consider such share prices as a positive signal for the future prospects of their own companies and extend their investments. On the other hand, Miao and Wang (2014) show theoretically that firms in overvalued industry sectors attract more capital, which crowds out investment of non-peer firms in other industry sectors. A capital allocation based on mispricing can lead to misallocation problems and welfare losses (Miao and Wang, 2014) when capital is attracted to overvalued firms rather than to firms with the highest growth opportunities.

To identify potential misallocation problems, this study analyzes the effect of mispricing of non-peer firms on firm investment. Empirical evidence is provided that firm investment – measured by capital expenditures – is negatively associated with overvalued non-peer firms in other industry sectors.

The literature broadly distinguishes between two kinds of channels how mispricing influences corporate investment – the financing and the non-financing channel. From the financing channel perspective, overvalued equity decreases the firm's cost of equity, which gives companies the opportunity to raise new equity capital to finance their investments (Stein, 1996; Baker et al., 2003; Gilchrist et al., 2005).

Dong et al. (2012, 2020) indicate that due to the limited amount of capital, the supply of capital for debt financing has to decrease whenever the amount of equity issued increases. Firms that are not overvalued are more dependent on debt issuance and therefore their financing capacity is negatively affected by issuing more equity. Consequently, these companies invest less. They are unable to compensate for the difficulties in raising debt capital with lower equity costs and thus have to reduce their investment volume. This argumentation is in line with the model of Miao and Wang (2014), which shows that overvalued sectors attract more capital at the expense of non-overvalued sectors.

Beyond the financing channel, the non-financing channel comprises all other effects that explain the relationship between mispricing and firm investment. In line with Dong et al. (2020), this study supposes that the shared sentiment and the catering effect are the primarily factors in the non-financing channel. Both effects are well established in literature (e.g., Hirshleifer et al., 2006; Polk and Sapienza, 2009).

The idea of the shared sentiment effect is based, among others, on the theoretical work of Dow and Gorton (1997). They show that managers can use share prices as a guide for their investment decisions. Share prices aggregate information from investors who do not interact directly with companies. However, when managers are unable to distinguish between fundamental information and positive investor sentiment in share prices, overvalued share prices can also positively stimulate firms' investment decisions. Furthermore, Subrahmanyam and Titman (2001) theoretically demonstrate that share prices affect the decision of all stakeholders. Positive sentiment in share prices could improve a firm's (bargaining) position in factor and product markets. It is rational for managers to invest in such a situation to support the growth process. Hirshleifer et al. (2006) present this positive feedback effect in their model.

Several empirical papers show that not only the share price of a firm, but also the share prices of other peer firms affect corporate investment decisions via the shared sentiment effect (Ozoguz and Rebello, 2013; Foucault and Fresard, 2014; Dessaint et al., 2019). If various stakeholders of a firm use share prices from peer firms as a source of information, it is plausible to assume that stakeholders also use the share prices of non-peer firms as a reference point for their decisions. When managers of a firm compare the own company with companies with higher share prices affected by mispricing, they may underestimate the growth opportunities of the firm, and thus, invest less. In addition, overvalued companies attract other stakeholders to a greater extent, which has a negative impact on the bargaining position of less overvalued firms in factor and product markets, so that managers are forced to invest less.

Apart from the shared sentiment effect, the second component of the non-financing channel discussed in literature is the effect of stock price pressure, so-called catering. Under the catering hypothesis, managers of overvalued firms should invest more in order to cater to short-term investors' optimism regarding growth opportunities and to maintain overvaluation, including at the cost of long-term value (Stein, 1996; Jensen, 2005; Polk and Sapienza, 2009). The pressure on the stock markets could ease – and managers would no longer need to invest more – when investors see that non-peer companies are also highly valued or even higher valued.

The key challenges in studying the proposed relationship are measuring mispricing and identifying non-peer firms. To estimate the impact of mispricing on corporate investment, it is common in the finance literature to use stock market anomalies as a proxy for mispricing, such as the accrual anomaly (e.g., Polk and Sapienza, 2009; Kusnadi and Wei, 2017). In line with these studies, Stambaugh et al.'s (2015) misvaluation measure is used, which is based on 11 stock market anomalies.[1] These stock market anomalies cannot be explained by (typically risk-based) asset pricing theories (Schwert, 2003). Therefore, the most common explanation for them is mispricing (see e.g., Lakonishok et al., 1994). Each of these anomalies is in itself a mispricing proxy. To aggregate them, a rank between 0 and 100 is assigned to each firm for each anomaly, whereby the highest rank is allocated to the firm whose anomaly variable value is associated with the lowest subsequently abnormal return. The final mispricing proxy averages the rank for each firm, so that the firm with the highest value is the firm with the most overvalued equity.

The advantage of the aggregated measure is that the noise of each anomaly can be reduced by combining 11 different mispricing proxies (Stambaugh et al., 2015). In addition, Stambaugh et al. (2015) measure relative misvaluation in the cross-section, which fits very well with the capital allocation effects discussed in this study. Other mispricing proxies, such as the price-to-value ratio developed by Dong et al. (2006), are less useful since they represent absolute values and are not comparable across different companies in various industries.

Similar to Foucault and Fresard (2014) and Dessaint et al. (2019), non-peer firms are identified as firms which are not part of the individual firm's industry according to the Text-Based Network Industry Classification (TNIC-3) developed by Hoberg and Phillips (2010, 2016). This classification is based on the business description in the firm's annual 10-Ks (from 1996 to 2017) published on SEC's Edgar website. Firms with similar business concepts often face the same demand

[1] The 11 stock market anomalies are financial distress (Campbell et al., 2008), O-score bankruptcy probability (Ohlson, 1980), net stock issues (Ritter, 1991; Loughran and Ritter, 1995; Fama and French, 2008), composite equity issues (Daniel and Titman, 2006), total accruals (Sloan, 1996), net operating assets (Hirshleifer et al., 2004), momentum (Jegadeesh and Titman, 1993), gross profitability (Novy-Marx, 2013), asset growth (Cooper et al., 2008), return on assets (Fama and French, 2006; Chen et al., 2011), and investment-to-assets (Titman et al., 2004; Xing, 2008).

shocks and similar future prospects. To measure the impact of non-peer firms' misvaluation, this study averages the mispricing measure of all non-peer firms on a market-value-weighted basis for each individual firm-year.

The empirical analysis concentrates on a panel of U.S. firms included in the CRSP-Compustat database from 1996 to 2017 and is divided into four parts. First, in the baseline regression, this study estimates how mispricing of the individual firm and of non-peer firms affects firm investment. Second, it is evaluated whether the link between mispricing and business investment is more likely to work through the financing or the non-financing channel. Third, the impact of catering pressure in the non-financing channel is examined. Fourth, the study performs regressions which include Baker and Wurgler's (2006) investor sentiment index to account for the general impact of bubble periods and for the impact of bubble periods on the relationship between mispricing and firm investment.

With regard to the first part, the empirical results show that a firm's overvaluation is positively related to corporate investment, as measured by capital expenditures. The overvaluation of non-peer firms is significantly negatively associated with corporate investment. The effect of non-peer misvaluation is also economically significant. In particular, this study finds that a one standard deviation increase in the average misvaluation measure of non-peer firms is associated with a decrease in corporate investment equivalent to 55.302% of the sample mean.

Second, to distinguish between the financing and the non-financing channel, this study conducts a path analysis of capital expenditure responses to individual and non-peer misvaluation, as employed in Badertscher et al. (2019) and Dong et al. (2020). It is shown that the effect of the financing channel is stronger for the misvaluation proxy of non-peer firms. Furthermore, the study analyzes whether the financing channel works via debt or equity. It is noted that the misvaluation of non-peer firms affects corporate investment via the debt channel, whereas the misvaluation of the individual firm only has a significant impact on equity issuance, but not on debt. Expressed in figures, the debt channel accounts for 10.880% of the total impact of the average misvaluation of non-peer firms on corporate investment, while the equity channel accounts only for 9.375% of the total effect of the individual firm's misvaluation on corporate investment. The preponderance of the total effect of both misvaluation measures – the misvaluation of the individual firm and the average misvaluation of non-peer firms – are driven by the non-financial channel.

To analyze the non-financing channel more deeply, this study performs a third test that control for catering incentives. Similar to Polk and Sapienza (2009) and Dong et al. (2020), both misvaluation measures are interacted with share turnover, which serves as a proxy for firms' catering pressure. The regression results suggest that the estimated impact of both mispricing measures is stronger for firms with more short-term pressure, represented by high share turnover. However, only the interaction term between the individual firm's misvaluation and share turnover is significant. The interaction term between the average misvaluation of non-peer firms and share turnover is insignificant. Therefore, it is reasonable to conclude that catering pressure plays a minor role in the non-financing channel between the misvaluation effect of non-peer firms and corporate investment. Instead, it can be presumed that the non-financing channel is dominated by shared sentiment.

In addition, this study also considers the general effect of bubbles in the fourth empirical test. The previous tests only focus on the (mis)allocation effect caused by the mispricing of non-peer firms. The general impact of bubbles is only indirectly captured by year dummies in the regression analyses. In the fourth test, the year dummies are replaced by Baker and Wurgler's (2006) investor sentiment index. High investor sentiment is strongly associated with bubble periods. The results show that firms invest more in periods with high investor sentiment, which could mitigate the negative effect of non-peer overvaluation. However, it is also shown that the (mis)allocation effect is stronger in bubble periods. Empirical evidence is provided that the impact of the average misvaluation of non-peer firms on firm investment is larger in times with high investor sentiment.

Lastly, this study performs several robustness checks of the baseline results. To address the potential shortcoming that some components of Stambaugh et al.'s (2015) misvaluation measure, such as asset growth, might be associated with corporate investment, an alternative misvaluation measure is used. It is constructed analogously to the mispricing measure of Stambaugh et al. (2015), but is based only on three anomalies that are not associated with firm investment. The three anomalies are total accruals, net operating assets, and gross profitability. It can be shown that the baseline findings are robust to the alternative mispricing proxy. Moreover, different industry classifications are used and, in separate robustness checks, firm fundamentals from non-peer firms and the mispricing of peer firms are taken into account. Across all robustness tests, the results remain similar.

This study contributes to the growing literature on the effects of mispricing on corporate investment (see, among others, Polk and Sapienza, 2009; Dessaint et al., 2019; Badertscher et al., 2019; Dong et al., 2020). In particular, Dessaint et al. (2019) and Badertscher et al. (2019) concentrate on the impact of peer firm misvaluation and find that corporate investment is positively associated with peer firm misvaluation. This study analyzes the effect of non-peer firm misvaluation and finds a negative relationship between the overvaluation of non-peer firms and corporate investment.

In addition, this study extends the work of Dong et al. (2012), which discusses the impact of misvaluation on equity and debt issuance. Dong et al.'s (2012) findings are confirmed in that the mispricing of the individual firm only significantly affects the issuance of equity. Furthermore, it is shown that non-peer firms' misvalaution has only a significant impact on debt issuance, but not on equity issuance. In line with Dong et al. (2020), additional empirical evidence shows that the impact of mispricing on corporate investment is predominantly driven by non-financing rather than financing channels.

Finally, this work is related to the literature on capital allocation. Wurgler (2000) notes that capital allocation is more efficient in countries with developed financial markets, in which investment decisions are based on stock market prices. In contrast, the empirical results of this study show that investment decisions based on stock market prices lead to misallocation when share prices are affected by misvaluation. However, Wurgler (2000) concentrates on cross-country differences and does not consider mispricing. Since mispricing should be lower in more developed financial markets, capital allocation in these countries should also be more efficient based on the findings of this study.

In terms of policy implications, further empirical evidence is provided on how mispricing affects corporate investment. Policymakers have to be aware that bubbles can lead to capital misallocation problems that may reduce welfare (see Miao and Wang, 2014). Based on the empirical evidence that mispricing crowds out debt issuance, policymakers can improve the conditions for credit supply in bubble periods to mitigate the crowding-out effect.

The remainder of this paper is structured as follows: Section 2 describes the data. Section 3 presents the empirical findings on the effect of mispricing on corporate investment. Section 4 contains robustness tests. Section 5 presents the conclusion.

2 Data

The sample in this study comprises U.S. firms covered by the merged CRSP–Compustat database. In line with the literature on corporate finance, this study excludes financial firms (SIC codes 6,000 – 6,999) and utility firms (SIC codes 4,900 – 4,999). This study concentrates on the effect of misvaluation (of non-peer firms) on firm investment (*Capex*) measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at).

Measuring of Misvaluation

The mispricing proxies are based on Stambaugh et al.'s (2015) mispricing measure (*MISP*) obtained by Robert F. Stambaugh's website. The mispricing measure comprises 11 stock market anomalies and is updated monthly. Stock market anomalies cannot be explained by (typically risk-based) theories of asset prices, such as the CAPM or the Fama-French three-factor model (Schwert, 2003). Therefore, the most common explanation for these anomalies is mispricing (e.g., Lakonishok et al., 1994). Stock market anomalies are widely used as a mispricing proxy in literature. For example, Polk and Sapienza (2009) and Kusnadi and Wei (2017) use discretionary accruals to analyze the impact of misvaluation on firm investment in their studies.

Stambaugh et al. (2015) combine 11 anomalies to increase the accuracy of their proxy. Appendix A.1 provides brief descriptions of the 11 anomalies. They include financial distress (Campbell et al., 2008), O-score bankruptcy probability (Ohlson, 1980), net stock issues (Ritter, 1991; Loughran and Ritter, 1995; Fama and French, 2008), composite equity issues (Daniel and Titman, 2006), total accruals (Sloan, 1996), net operating assets (Hirshleifer et al., 2004), momentum (Jegadeesh and Titman, 1993), gross profitability (Novy-Marx, 2013), asset growth (Cooper et al., 2008), return on assets (Fama and French, 2006; Chen et al., 2011), and investment-to-assets (Titman et al., 2004; Xing, 2008). Whereas each anomaly is a mispricing proxy by itself, the aggregation of several anomalies to one measure reduces the noise of each individual anomaly,resulting in a purer mispricing proxy (Stambaugh et al., 2015, p. 1912).

The values of the anomaly variables are calculated monthly, whereby updated accounting variables are not considered in the calculation until four months after the end of the fiscal year. For instance, if the fiscal year ends in December, in December the values from December of the previous year are used to calculate the anomaly values based on annual financial statements data. The aggregation of the anomalies is straight forward. For each anomaly, each firm is assigned to a percentile rank to indicate the order for the given anomaly variable. The highest rank is thereby given to the anomaly variable with the value that is related to the lowest average abnormal return in the following periods, as shown in literature. For example, high accruals are associated with lower abnormal returns in the following periods (Sloan, 1996). Therefore, the company with the highest accruals (relative to total assets) obtains the highest rank. The higher the rank, the higher the degree of overpricing relative to the other companies for the given anomaly variable. The final mispricing measure (*MISP*) is then the arithmetic mean of the company's ranking percentile for each of the 11 anomalies and ranges between 0 and 100. Accordingly, the highest values of the *MISP* indicate the most overpriced and the lowest values the most underpriced companies.

MISP measures mispricing in the cross-section because it compares the anomaly variable values within one period. So, it is possible that stocks identified as 'relatively underpriced' are also overvalued at times when the entire market is overvalued. For the scope of this study, the relative mispricing measure perfectly fits to investigate the (mis)allocation effect of capital related to mispricing. The difference in mispricing over time that is unrelated to the (mis)allocation effect is captured by the use of time fixed effects. The literature also makes use of absolute misvaluation proxies, such as the price-to-value ratio developed by Dong et al. (2006). They are less useful in this study because the absolute values are difficult to compare between different companies in various industries.

Stambaugh et al. (2015) point out that they are relatively successful in eliminating noise in their mispricing proxy *MISP*. They show that the monthly spread between the most undervalued portfolio and the most overvalued portfolio based on their misvaluation measure (*MISP*) is 1.48% over their sample period from 8/1965 to 1/2011. The returns are risk-adjusted to the Fama-French three-factor model. In comparison, the average month's spread between the most undervalued portfolio and the most overvalued portfolio, based on the individual anomalies, is only 0.86%.

The focus of this study is on the effects of non-peer firms' mispricing on firm investment. To identify non-peer firms, this study uses the Text-Based Network Industry Classification (TNIC) developed by Hoberg and Phillips (2010, 2016). The classification starts in 1996 and uses business descriptions of 10-K annual filings to identify peer and non-peer firms by textual analysis. For each U.S. firm pair, a score is defined for product similarity in each fiscal year, whereby the higher the textual similarity in the product description, the higher the score. The scores range from 0 to 1. Firms are identified as peer firms if enough words in their product descriptions match, i.e. the score is high enough. Firms with similar product descriptions are defined as peer firms because they experience the same demand shocks and, consequently, have similar future prospects. Every firm is the center of its own network and has its own peer firms (i.e. firm A can be a peer firm of firm B, but not all peers of firm A are peer firms of firm B). Since peer firms can change from year to year depending on the latest product description, the TNIC provides more research flexibility – and is also more informative – than the standard fixed industry classification codes, such as SIC or NAICS.

In line with Foucault and Fresard (2014) and Dessaint et al. (2019), the TNIC-3 database from the Hoberg-Phillips Advanced Data Options' website is applied. The TNIC-3 database selects critical scores to define peer and non-peer firms in a manner that achieves granularity similar to three-digit SIC codes. In addition to TNIC-3, three-digit SIC and four-digit NAICS codes are used in robustness tests. Similar results are obtained in the Appendix in Table A.I.

The non-peer mispricing measure (*Non-peer MISP*) is computed on a monthly basis by calculating the market-value-weighted average misvaluation score of all non-peer – non-financial and non-utility – firms, which are comprised by the TNIC3 database and Robert F. Stambaugh's website. Since *Non-peer MISP* is based on

MISP values indicating misvaluation in the cross-section, *Non-peer MISP* also displays relative misvaluations and does not follow any time trend. A high (low) value of *Non-peer MISP* indicates that the individual firm's non-peer firms are relatively overvalued (undervalued).

An average firm in the sample of this study has 39 peer and 2,071 non-peer firms. Consequently, on average, 2,071 mispricing scores are used to calculate *Non-peer MISP*, but the different firms do not all have the same impact on *Non-peer MISP* because it is a market-value-weighted average. The influence of large-cap firms is greater compared to mid-cap and small-cap firms.

Control Variables

In contrast to the two misvaluation proxies – *MISP* and *Non-peer MISP* – the calculation of the other firm-level variables is based on the merged CRSP–Compustat database. Similar to Polk and Sapienza (2009), Campello and Graham (2013), and Foucault and Fresard (2014), this study controls for firm's growth opportunities (*Tobin's Q*), annual cash flow (*Cash flow*), and firm size (*Size*) in all regressions. *Tobin's Q* is calculated as [total assets (Compustat item at) + market value of equity (item csho × item prcc_f) − book equity (item ceq) − deferred taxes (item txdb)] scaled by total assets (item at). *Cash flow* is defined by [income before extraordinary items (item ib) + depreciation (item dp)] scaled by beginning-of-year total assets (item at). *Size* is measured by the natural logarithm of the total assets (item at). To reduce the effect of outliers, all accounting variables are winsorized at the top and bottom 1%-level.

Additional Dependent Variables

In further path analyses, *Equity Issuance* and *Debt Issuance* are used as additional dependent variables. *Equity Issuance* is calculated as [Δ book equity (Compustat item ceq) + Δ deferred taxes (item txdb) − Δ retained earnings (item re)] scaled by beginning-of-year total assets (item at). *Debt Issuance* is measured by $\big[\Delta$ total assets (item at) $-\ \Delta$ book equity (item ceq) $-\ \Delta$ deferred taxes (item txdb)$\big]$ scaled by beginning-of-year total assets (item at).

Summary Statistics

The final dataset excludes all firm-year observations with missing values for *MISP*, *Non-peer MISP*, *Capex*, *Tobin's Q*, *Cash flow*, and *Size*. Following Polk and Sapienza (2009), this study focuses on firm-year observations with a December fiscal year-end. This eliminates the problem of incomparability of mispricing scores from different months. As discussed above, year dummies are elementary and important for relative proxies. This study also estimates the baseline regression equation for all firm-year observations with different fiscal year-ends in Table A.II in the Appendix, and obtains similar results.

[Table 1 about here.]

Table 1 presents summary statistics for the main variables of interest. The final sample comprises 25,028 firm-year observations from 1996 to 2017. The arithmetic average value of investment (*Capex*) is 7.025% of beginning-of-year total assets. As expected, the average value of *MISP* is around 50, as the values between 0 and 100 should be equally distributed over the entire sample. The average value of *Non-peer MISP* is 41.430 and below 50. Since *Non-peer MISP* is a market-value-weighted average, it can be assumed that smaller firms tend to be overvalued and larger firms tend to be undervalued.

[Table 2 about here.]

Table 2 provides the correlation matrix of the main variables of interest. The highest absolute value of correlation is between *Cash flow* and *Equity Issuance* with -0.475. It appears that profitable firms are not dependent on external finance. The lowest absolute value of correlation is between *Non-peer MISP* and *Equity Issuance*. This leads to the assumption that the price of other firms' stocks, which is reflected in *Non-peer MISP*, has no impact on firm's equity issuance. *Debt Issuance* has the highest correlation with the main dependent variable *Capex* (0.245), whereas *Size* is nearly uncorrelated with *Capex* (0.025). As expected, *MISP* positively correlates with *Capex* (0.059) and *Non-peer MISP* negatively correlates with *Capex* (−0.057).

MISP and *Non-peer MISP* are negatively correlated (−0.012), which indicates that an overvalued firm has non-peer firms that are relatively undervalued. Consequently, if non-peer firms are relatively undervalued, overvalued firms tend to be part of a sector with peer firms that are also overvalued.

Mispricing proxies are often associated with identification problems. It is sometimes challenging to identify whether they truly capture mispricing or growth opportunities. This problem does not seem to exist in the sample used in this study because the correlation between *MISP* and *Tobin's Q*, the typical measure for growth opportunities, is −0.030, which is relatively low and even negative. This is not surprising, as *MISP* is only a relative score between 0 and 100. Nevertheless, *Tobin's Q* is included to control for growth opportunities in all regression analyses.

3 Results

To estimate the effect of the individual firm's mispricing and non-peer mispricing on firm investment, the following baseline regression model is run:

$$\begin{aligned} Capex_{i,t} = \alpha_j + \alpha_t + \beta_1\ MISP_{i,t-1} + \beta_2\ \textit{Non-peer MISP}_{i,t-1} \\ + \beta_3\ \textit{Tobin's } Q_{i,t-1} + \beta_4\ \textit{Cash flow}_{i,t} + \beta_5\ Size_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{1}$$

where i indexes firms, j indexes industries, and t denotes fiscal years. The dependent variable *Capex* is firm investment. *MISP* and *Non-peer MISP* represent the variables of interest, which measured misvaluation at the beginning-of-year.[2] The set of control variables comprises *Tobin's Q*, *Cash flow*, and *Size*. Similar to Badertscher et al. (2019) and Dong et al. (2020), two-digit SIC industry and year fixed effects are included, indicated by a_j and a_t. Standard errors are clustered by firm and year.

[Table 3 about here.]

Table 3 presents the baseline results. The first regression reports the results for the baseline specification in equation 1 without *Non-peer MISP*. The second regression presents the results without *MISP*. The third regression displays the results for the baseline specification with *MISP* and *Non-peer MISP*.

The results show that the coefficient of *MISP* is positive and highly significant, indicating that the individual firm's relative mispricing is positively associated with its capital expenditures. The effect is also economically significant. A one standard deviation increase in *MISP* by 13.852 is positively related to firm investment, *Capex*, by 0.457 (= 13.852 × 0.033). This is 6.5% (= 0.457 / 7.025) of the average level of *Capex* for the sample.

More important is the firm's investment sensitivity to the average misvaluation of non-peer firms. As expected, this effect is negative and statistically significant at the 1% level. The negative impact of *Non-peer MISP* on *Capex* is also economically meaningful. For example, a one standard deviation increase by 2.588 in *Non-peer MISP* is associated with a decrease in *Capex* of 3.885 (= 2.588 × 1.501), which is 55.302% (= 3.885 / 7.025) of the sample mean. This effect is significantly larger than the effect of mispricing of the individual firm on its investment. This sizeable effect of other firms' mispricing is not untypical in literature. For example, Badertscher et al. (2019) measure that a one standard deviation increase in their mispricing proxy of peer firms is associated with an increase of 57% of the average

[2] The baseline regression analysis is also estimated using annual averages of *MISP* and *Non-peer MISP*. Similar results are obtained in the Appendix in Table A.III.

level of their investment variable in their sample.

The findings for the set of control variables are also highly significant and consistent in relation to other studies (e.g. Foucault and Fresard, 2014). *Tobin's Q* and *Cash flow* are positively related to a firm's investment. *Size* is negatively associated with the capital expenditures of a firm.

Financing versus Non-Financing Channel

Misvaluation can affect corporate investment in several ways. On the one hand, mispricing affects a firm's financing situation via equity and debt issuance. Overvaluation improves the financial position of companies by enabling them to issue overvalued equity (Stein, 1996; Baker et al., 2003; Gilchrist et al., 2005). Miao and Wang (2014) imply in their theoretical model that mispricing in other industry sectors crowds out corporate investment in non-overvalued industries via capital (mis)allocation. On the other hand, managers and other firms' stakeholders use stock market prices as a source of information for their decisions. Therefore, mispricing also affects corporate investment via shared sentiment or catering effect (Hirshleifer et al., 2006; Polk and Sapienza, 2009).

[Figure 1 about here.]

To estimate the share of corporate capital expenditures that is affected by misvaluation via a financing channel, this study follows Badertscher et al. (2019) and Dong et al. (2020) and conducts a path analysis. A path analysis can be used to distinguish between the direct effect of an independent variable on the dependent variable and the indirect effect through mediating variables. This study distinguishes between the direct effect of *MISP* and *Non-peer MISP* on corporate investment and the indirect effect that works via the financing channel, especially via equity and debt issuance, as shown in Figure 1. The following structural equation model is projected to estimate the direct and indirect effects:

$$
\begin{aligned}
Capex_{i,t} = \alpha_j + \alpha_t + \beta_1 \ MISP_{i,t-1} + \beta_2 \ Non\text{-}peer \ MISP_{i,t-1} \\
+ \beta_3 \ EI_{i,t} + \beta_4 \ DI_{i,t} + \mathbf{X}'_{i,t} + \epsilon_{1_{i,t}}
\end{aligned} \tag{2}
$$

$$EI_{i,t} = \gamma_j + \gamma_t + \gamma_1 \ MISP_{i,t-1} + \gamma_2 \ Non\text{-}peer \ MISP_{i,t-1} + \mathbf{X}'_{i,t} + \epsilon_{2_{i,t}} \tag{3}$$

$$DI_{i,t} = \eta_j + \eta_t + \eta_1 \ MISP_{i,t-1} + \eta_2 \ Non\text{-}peer \ MISP_{i,t-1} + \mathbf{X}'_{i,t} + \epsilon_{3_{i,t}}, \tag{4}$$

where i indexes firms, j indexes industries, and t denotes fiscal years. Equation 3 and 4 estimate the impact of *MISP* and *Non-peer MISP* on equity issuance (EI) and debt issuance (DI), respectively. Equation 2 is equivalent to the baseline model in equation 1, except that the effect of equity and debt issuance are included.[3] **X** represents the standard set of control variables that comprises *Tobin's Q*, *Cash flow*, and *Size*. All regressions include two-digit SIC industry and year fixed effects, indicated by a_j and a_t. Standard errors are clustered by firm and year.

[Table 4 about here.]

Before analyzing the direct and indirect effects in the path analysis, this study examines the impact of misvaluation on equity and debt issuance. Panel B of Table 4 presents the corresponding results.

The results suggest that equity misvaluation, *MISP*, is positively and significantly associated with equity issuance, but has no impact on debt issuance. This finding is consistent with Dong et al. (2012, 2020), who also measure no significant or negligible influence of overvalued equity on debt issuance. In comparison to *MISP*, misvaluation of non-peer firms, *Non-peer MISP*, only has a significant impact on

[3]This study is aware of the fact that the anomaly 'net stock issues' is part of Stambaugh et al.'s (2015) misvaluation measure. However, according to the construction of *MISP*, *MISP* includes 'net stock issuance' lagged by two years relative to *EI*. Additionally, equity issuance is negatively correlated (−0.060) with equity issuance two years ahead in the sample of this study. Thus, it is unlikely that the positive effect of *MISP* is driven by the anomaly values of 'net stock issuance'. Moreover, the share of 'net stock issuance' accounts for only 1/11 in *MISP*.

debt issuance, but not on equity issuance. It is negatively associated with debt issuance.

The finding that equity issuance is only affected by firms' misvaluation can be explained by the circumstances that the capital allocation mechanism in the equity market is directly represented by share prices. Higher share prices immediately reduce the cost of equity, which increase the company's incentive to issue new equity. However, the share prices of other companies do not directly influence the own equity issuance costs.

Debt issuance is influenced by two different effects, as noted by Dong et al. (2020). On the one hand, the same factors that may have a positive impact on equity valuation also affect debt issuance. For example, a higher company valuation increases the expected collateralized value of assets, which should reduce the cost of debt (Miao and Wang, 2014). On the other hand, equity finance, based on overvalued equity, crowds out debt issuance (Dong et al., 2020), as the amount of capital in a year is limited. For overvalued firms, these two effects of misvaluation move in different directions and almost offset each other. Other firms are not exposed to the positive influence of overvaluation by non-peer companies. They are only negatively affected by the crowding-out effect, that is, by the flow of capital to overvalued firms via equity issuance. In light of this explanation, the finding is plausible that *MISP* has no impact on debt issuance and *Non-peer MISP* is negatively associated with debt issuance.

To evaluate the impact of the financing channel, the results from Panel A and Panel B of Table 4 are combined. Panel C of Table 4 shows the estimated direct and indirect effects. The direct effects of *MISP* and *Non-peer MISP* are indicated by the coefficients β_1 and β_2 in equation 2. The effect is positive and significant for *MISP* with a coefficient of 0.029. For *Non-peer MISP*, the coefficient is -1.305, which is also statistically significant at the 1% level. The indirect effect via equity issuance can be estimated by $\beta_3 \times \gamma_1$ for *MISP* and by $\beta_3 \times \gamma_2$ for

Non-peer MISP. As mentioned above, the impact of *MISP* on firm investment via the equity channel is positive and significant. The estimated effect is 0.003 (0.038 × 0.085). The estimated effect for *Non-peer MISP* is positive (0.038 × 0.507 = 0.019), but insignificant. The effect of *Non-peer MISP* on *Capex* via the debt channel is captured by $\beta_4 \times \eta_2$. The estimated value $\beta_4 \times \eta_2$ is -0.157 (-2.257 × 0.070). This effect is significant. An significant impact of *MISP* on *Capex* via the debt channel (-0.000 × 0.070) – that is estimated by $\beta_4 \times \eta_1$ – cannot be determined.

The total effect of *MISP* and *Non-peer MISP* is the sum of three components. The total effect of *MISP* on firm investment, *Capex*, is 0.032 (0.029 + 0.003 – 0.000) and the total effect of *Non-peer MISP* is -1.443 (-1.305 + 0.019 – 0.157). For both, *MISP* and *Non-peer MISP*, the fraction of the financing channel is approximately 10%, whereby, the financing channel is stronger for *Non-peer MISP* than for *MISP*. The main difference is that the financing channel for *MISP* operates through equity issuance, with a share of 9.375%, and for *Non-peer MISP* through debt issuance, with a share of 10.880%. However, the preponderance of the total effect arises from the non-financing channel for both variables *MISP* and *Non-peer MISP*. This finding is in line with Dong et al. (2020). They also highlight the importance of the non-financing channel for the effect of equity misvaluation on corporate investment.

Similar to Dong et al. (2020), it is expected that the non-financing effect can presumably be explained by the shared sentiment or catering effect. With respect to the shared sentiment effect, Dessaint et al. (2019) note that firms do not only learn from the share prices of their own company, but also from their peer firms. In case of mispricing, the companies may be misinformed. Thus, it is reasonable to assume that firms also use share prices of other firms as a reference point for their own future prospects. If the share prices of non-peer firms are strongly positively affected by investor sentiment, the reference point increases to higher levels. Compared to these reference points, managers evaluate their own future prospects lower and firms invest less. In addition, the bargaining position of firms on the factor market is negatively affected by overvalued non-peer firms. As shown by Subrahmanyam and Titman (2001) and Hirshleifer et al. (2004), overvalued firms also attract non-financial stakeholders. Companies that are relatively undervalued do not need to invest if stakeholders are attracted by overvalued non-peer firms. In such a situation, firms are unable to exploit their growth opportunities since they cannot find new employees or cannot acquire new suppliers.

Impact of Catering Pressure

Catering pressure is associated with an investor base dominated by short-term investors. Managers of firms with an higher fraction of shareholders with a short investor horizon should have a stronger focus on short-run stock prices to meet their shareholders' expectations (Stein, 1996). As noted by Polk and Sapienza (2009), managers of overvalued firms can temporarily maintain and positively stimulate stock prices by investing more to cater to investors' optimism. The higher investment rate caused by shareholder catering pressure and by the overvaluation of the individual company is well documented in the empirical literature (Polk and Sapienza, 2009; Dong et al., 2020). However, it is questionable whether the catering pressure influences the relationship between non-peer firm misvaluation and corporate investment, too.

In line with Polk and Sapienza (2009) and Dong et al. (2020), share turnover is used as a proxy for shareholders' investor horizon. To evaluate the significance of catering pressure in relation to the mispricing of non-peer firms, interaction terms are established between both mispricing measures, *MISP* and *Non-peer MISP*, and

Share turnover. The following regression model is estimated:

$$\begin{aligned}Capex_{i,t} &= \alpha_j + \alpha_t + \beta_1\ MISP_{i,t-1} + \beta_2\ MISP_{i,t-1} \times Share\ turnover_{i,t} \\ &+ \beta_3\ Non\text{-}peer\ MISP_{i,t-1} + \beta_4\ Non\text{-}peer\ MISP_{i,t-1} \times Share\ turnover_{i,t} \\ &+ \beta_5\ EI_{i,t} + \beta_6\ DI_{i,t} + \beta_7\ Share\ turnover_{i,t-1} + \mathbf{X}'_{i,t} + \epsilon_{i,t},\end{aligned} \tag{5}$$

where i indexes firms, j indexes industries, and t denotes fiscal years. *MISP* and *Non-peer MISP* are the two mispricing proxies used in this study. Similar to Polk and Sapienza (2009) and Dong et al. (2020), *Share turnover* is defined as the natural logarithm of the annual average daily share turnover in percentage. **X** represents the standard set of control variables, which includes *Tobin's Q*, *Cash flow*, and *Size*. Equity (EI) and debt issuance (DI) are included in the regression model to control for the financing channel. The regression also contains two-digit SIC industry fixed and year fixed effects, indicated by a_j. Standard errors are clustered by firm and year.

[Table 5 about here.]

For comparison, regression 1 in Table 5 restates the baseline results for equation 1. Regression 2 in Table 5 presents the results related to equation 5. The estimates indicate that the effect of both mispricing proxies, *MISP* and *Non-peer MISP*, are stronger for firms with higher value of *Share turnover*, which represents a shorter shareholder horizon and greater catering pressure. Expressed in numbers, a one standard deviation increase in *MISP* by 13.852 is positively related to the firm investment, *Capex*, by 0.444 (= 13.852 $\times$ (0.030 + log(1.189) $\times$ 0.012)) in the third quartile (1.189%) of *Share turnover*. This represents 6.3% (= 0.444 / 7.025) of the sample mean of *Capex* and is over 70% higher in comparison to the effect of *MISP* on *Capex* in the first quartile (0.384%) of *Share turnover*. The effect of a one standard deviation increase in the first quartile is only 0.256 (= 13.852 $\times$ (0.030 + log(0.384) $\times$ 0.012)). The difference between the first and the third quartile is not only economically meaningful, but it is also statistically significant. This finding confirms the results of Polk and Sapienza (2009) that catering pressure has an impact on the relationship between the individual firm's misvaluation and its investment activities.

In contrast, short-term pressure has no significant impact on the effect of the average misvaluation of non-peer firms on corporate investment. Based on these results, it is reasonable to reject the hypothesis that the catering effect is mainly responsible for the non-financing channel between *Non-peer MISP* and *Capex*. Instead, it is likely to assume that the non-financing channel is mainly driven by shared sentiment effects.

Misvaluation and Investor Sentiment

Campello and Graham (2013) emphasize the positive impact of the technology bubble in the late 1990s on investment activities of financially constrained manufacturing companies. This study mainly concentrates on the (mis)allocation effect caused by overvaluation. It does not consider potential positive effects of bubble periods which are associated with general lower costs of capital and higher expected growth opportunities (Gilchrist et al., 2005). To distinguish between the potential positive and negative effects of overvalued share prices from firms in other industry sectors on firm investment, Baker and Wurgler's (2006) investor sentiment index is added to the baseline regression in equation 1 and replaces the year-fixed effects. A high investor sentiment index indicates periods in which stocks are more likely to be overvalued. To estimate the effect of the investor sentiment index, the following regression model is estimated:

$$\begin{aligned} Capex_{i,t} = \alpha_j &+ \beta_1 \ MISP_{i,t-1} + \beta_2 \ Non\text{-}peer \ MISP_{i,t-1} \\ &+ \beta_3 \ Sent_t + \mathbf{X}^{'}_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{6}$$

where i indexes firms, j indexes industries, and t denotes fiscal years. *MISP* and *Non-peer MISP* represent the mispricing proxy. *Sent* is the annual average investor sentiment index. The index is updated on a monthly basis. **X** represents the standard set of control variables, which comprises *Tobin's Q*, *Cash flow*, and *Size*. Further, *GDP growth* is now added to the set of control variables to account for changing economic conditions. All regressions contain two-digit SIC industry dummies, indicated by a_j. Standard errors are clustered by firm and year.

[Table 6 about here.]

Regression 1 in Table 6 presents the results for equation 6. The effect of *MISP* and *Non-peer MISP* on firm investment remains highly significant. The impact of *Non-peer MISP* is still positive and the impact of *MISP* is still negative. The coefficient of *Sent* is positive and highly significant. Comparing the effect of investor sentiment between the highest annual value in 2001 during the dotcom bubble and the lowest annual value in 2009 after the financial crisis, an economically significant difference becomes apparent. The impact of *Sent* on *Capex* is 2.245 in 2001 and -0.695 in 2009, which results in a difference of 2.940. Therefore, all else being equal, the estimated investment volume, *Capex*, for each firm is 47.9% (= (2.940 × 1.144) / 7.025) higher (relative to sample mean) in 2001 than in 2009.

In equation 6, two interaction terms are added to the regression model in regression 2 of Table 6. Both mispricing proxies, *MISP* and *Non-peer MISP*, are respectively interacted with the investor sentiment index, *Sent*. The results show that the estimated effect of *Non-peer MISP* is significantly stronger in times with high investor sentiment. For example, a one standard deviation increase by 2.588 in *Non-peer MISP* is associated with a decrease in *Capex* of 1.575 (= 2.588 × (0.153 + 2.245 × 0.203)) in 2001, the year with the highest average annual investor sentiment value. In 2009, the year with the lowest value, a one standard deviation increase by 2.588 in *Non-peer MISP* is only associated with a decrease in *Capex* of 0.031 (= 2.588 × (0.153 - 0695 × 0.203)).

McLean and Zhao (2014) show that firm investment is more sensitive to share prices during times of high investor sentiment, whereby, fundamental accounting figures, such as firm's cash flows, are more important for investment decisions in times of recessions. They argue that equity issuance is less costly when the investor sentiment is high. Applied to the results of this study, this implies that when investor sentiment is low, fewer shares are issued, which reduces the crowding-out effect.

Given that the crowding out effect of *Non-peer MISP* is lower in times of low investor sentiment and stronger in times of high investor sentiment, this study provides empirical evidence that the associated (mis)allocation effect based on stock market misvaluation is stronger in bubble periods.

4 Robustness

Non-peer Control Variables

The baseline regressions in Table 3 consider only the effects of fundamentals at the individual firm-level. However, it is conceivable that firm fundamentals of non-peer firms also affect firm investment and that these fundamentals drive the negative impact of *Non-peer MISP*. Although this is highly unlikely, as *MISP* only correlates very slightly with firm fundamentals (see Table 2), a robustness test is nevertheless conducted with non-peer firm fundamentals.

To estimate the impact of non-peer firms, the market-value-weighted average of the individual fundamentals for each firm is calculated across all non-peer firms. These non-peer firm variables are added to the baseline regression model in equation 1.

In an additional regression model, it is acknowledged that *MISP* only measures relative mispricing for each year and ranges between 0 and 100. Therefore, relative measures of firm fundamentals are constructed to improve the comparability of the effects of fundamentals in relation to *MISP*. To construct relative firm fundamental measures, the percentage rank of each firm fundamental variable must be identified for each fiscal year. For example, the value of *Tobin's Q* for firm i in year t is equal to 100 if the firm has the highest value of *Tobin's Q* in that year. In the same way, the relative values for *Cash flow* and *Size* for each year are formed. These values are also used to calculate a second market-value-weighted average across all non-peer firms, which consists of relative variables. The results are shown in Table 7.

[Table 7 about here.]

Regression 1 of Table 7 presents the findings based on the absolute values of the individual firm and non-peer firm variables. The estimated impact of both mispricing measures, *MISP* and *Non-peer MISP*, remains statistically significant at the 1% level and has the expected sign. Furthermore, the impact of the firm fundamentals *Tobin's Q*, *Cash flow*, and *Size* is still highly significant. The effect of the average values of non-peer firm fundamentals is insignificant for *Tobin's Q* and *Size*. Only the estimated impact of *Non-peer Cash flow* is significant at the 10% level.

In regression 2 of Table 7, the estimated model from regression 1 is replicated using the relative values of *Tobin's Q*, *Cash flow*, and *Size* for both types of variables. The results are quite similar in that the effects of *MISP* and *Non-peer MISP* are still highly significant. With respect to the control variables, the coefficients on *Tobin's Q*, *Cash flow*, and *Size* are statistically significant, but of the coefficients on the non-peer fundamentals, only the effect of *Non-peer Cash flow* is again significantly different from zero. In both regressions, an increase in *Non-peer Cash flow* is associated with a decrease in firm investment, measured by *Capex*. Therefore, it can be concluded that the capital is allocated to firms with the highest cash flow, and when non-peer firms are more profitable, firms face greater difficulty in financing their investments.

Based on the findings in Table 7, it cannot be concluded that capital is allocated to firms with the highest growth opportunities because the effect of *Non-peer Tobin's Q* is insignificant. In contrast to *Tobin's Q*, *Non-peer MISP* has a significant impact on firm investment and it can be assumed that the mispricing of share prices drives capital allocation effects between different industries.

Effect of Peer Misvaluation

Previous empirical studies show that overvalued peer firms have a positive impact on firm investment (Foucault and Fresard, 2014; Badertscher et al., 2019; Dessaint et al., 2019). Since *Non-peer MISP* indicates relative misvaluation, it is negatively correlated to the misvaluation of peer firms. If non-peer firms are relatively overvalued (undervalued), the firms in the same industry have to be relatively undervalued (overvalued). To rule out that the effect of *Non-peer MISP* is driven by the mispricing of peer companies, an additional robustness test is conducted which includes the misvaluation of peer firms.

To measure misvaluation of peer firms, the variable *Peer MISP* is constructed. It is the market-value-weighted average misvaluation score of all peer firms, which are covered by the TNIC-3 database and Robert F. Stambaugh's website. *Peer MISP* is added as an additional independent variable to the baseline regression in equation 1.

[Table 8 about here.]

Table 8 shows the results for the regression analyses with *Peer MISP*. *Peer MISP* is included in regressions 2 and 4. In both specifications the impact of *Peer MISP* is positive, but only in the regression without the other two mispricing proxies, *MISP* and *Non-peer MISP*, the effect is significant. For *MISP* and *Non-peer MISP*, the results are quite similar compared to the baseline findings. In Table A.IV in the Appendix, the regression 4 is conducted with different industry classifications. The results remain similar. Consequently, the effect of *Non-peer MISP* does not seem to be driven by the misvaluation of peer firms.

Alternative Mispricing Proxy

Lastly, this study addresses the potential shortcoming that the mispricing proxies comprise components, such as asset growth, which are related to the dependent variable capital expenditures. Various aspects mitigate this concern. First, while *MISP* is a relative measure, *Capex* enters the regression model as an absolute measure. Second, capital expenditures are not a part of *MISP*. To be precise, asset growth might be correlated with capital expenditure, but the two are not the same. Asset growth is also affected by firm's cash holdings, depreciations, and other valuation issues. Moreover, higher asset growth leads to overvaluation, as noted by Cooper et al. (2008). Higher capital expenditures are positively stimulated by overvaluation. Third, the regression models use beginning-of-year *MISP* and *MISP* does not accurately reflect the current fundamentals of the company. Instead, *MISP* represents accounting variables with a lag from one year and four months up to two years and three months in comparison to capital expenditures. Finally, the focus of this study is to analyze the effect of non-peer firm mispricing on firm investment. As the results in Table 7 indicate, non-peer firm fundamentals are relatively inefficient in explaining differences in corporate investment activities. Therefore, no effect should be expected from *Non-peer MISP* if it only represents accounting figures. An effect is only measured because these anomalies, based on accounting numbers, are proxies for firm misvaluation.

Nevertheless, an alternative mispricing proxy is constructed with stock market anomalies that are not related to the dependent variable *Capex*. The alternative mispricing proxy only consider three anomalies from Stambaugh et al.'s (2015) mispricing measures: accruals, net operating assets, and gross profitability. The construction of the alternative mispricing proxy is similar to Stambaugh et al. (2015), with the exception that Stambaugh et al.'s (2015) misvaluation proxy comprises 11 anomalies, whereas the newly constructed one only comprises three. The new alternative mispricing proxy is the average value of the percentile ranks of each firm for the three anomalies. The highest percentile ranks are related to the lowest abnormal returns in the following periods. Therefore, the highest value represents the most overvalued firms. The new alternative mispricing proxy, *MISP (alt.)*, is also used to calculate the market-value-average mispricing proxy of non-peer firms, *Non-Peer MISP (alt.)*. The two new alternative mispricing proxies are directly used in the baseline regression in equation 1 instead of the proxies based on Stambaugh et al.'s (2015) misvaluation measure.

[Table 9 about here.]

Table 9 shows the results, which remain comparable to the baseline regression results in Table 3. The estimated effects for *MISP (alt.)* and *Non-Peer MISP (alt.)* are still significant and their signs are consistent with the baseline findings. In particular, regression 3 in Table 9 indicates that an increase in *MISP (alt.)* by 13.852 is positively associated with an increase in firm investment, *Capex*, by 0.453 (= 13.852 $\times$ 0.032), which is 6.3% (= 0.457 / 7.025) of the sample mean. The estimated impact of *Non-peer MISP (alt.)* is lower than in the baseline regression in Table 3, but the value is not significant lower and the significance level is higher. The economic effect is also substantial. An increase of 2.588 in *Non-peer MISP (alt.)* is negatively related to firm investment, *Capex*, by 2.883 (2.588 $\times$ 1.114). This is 41.0% (= 2.883 / 7.025) of the average level of *Capex.* The regression analysis with the alternative mispricing proxy is also run with different industry classifications, and similar results are obtained in Table A.V in the Appendix.

Given the presented results, it can be concluded that the results are not driven by stock market anomalies which might be correlated to the used investment measures in this study. Thus, it is very likely that the associated effect of *MISP* and *Non-peer MISP* is attributable to misvaluation effects.

5 Conclusion

In line with the literature on misvaluation, this study provides additional empirical evidence that the individual firm's misvaluation is positively related to corporate investment. However, more crucially, it analyzes the effect of non-peer misvaluation on corporate investment. Using Stambaugh et al.'s (2015) misvaluation measure, this study presents empirical evidence that misvaluation of non-peer firms is negatively associated with firms' capital expenditures. Misvaluation of non-peer firms affects corporate investment via two channels: the financing and the non-financing channel. Overvalued industry sectors attract more capital, which complicates financing conditions in other sectors. In addition, the overvaluation of non-peer firms falsely suggests that non-peer firms in other industries have relatively better growth opportunities, which reduces the incentive of managers to invest.

In a further step, a path analysis is conducted to evaluate the relative importance of the financing and the non-financing channel. The results suggest that the individual firm's misvaluation and the misvaluation of non-peer firms affect corporate investment through both channels. The financing channel is divided into equity and debt issuance. The individual firm's misvaluation affects corporate investment via equity issuance and non-peer misvaluation affects corporate investment via debt issuance. Analyzing the non-financing channel more deeply, this study finds that corporate investment is mainly influenced by non-peer misvaluation via the information role of share prices. In contrast, catering pressure only plays a significant role in the relationship between the individual firm misvaluation and corporate investment.

Moreover, this study discusses the impact of bubble periods on corporate investment. During bubble periods, the general investment volume of firms tends to be higher. At the same time, the analyzed capital (mis)allocation effect is stronger. Considering these results, further research should focus on evaluating which effect is stronger during bubble periods and whether the positive effect of bubbles on corporate investment in less overvalued industries offsets the crowding-out effect of the most overvalued companies.

References

Badertscher, B. A., D. M. Shanthikumar, and S. H. Teoh (2019). Private firm investment and public peer misvaluation. *Accounting Review 94*(6), 31–60.

Baker, M., J. C. Stein, and J. Wurgler (2003). When does the market matter? Stock prices and the investment of equity-dependent firms. *Quarterly Journal of Economics 118*(3), 969–1005.

Baker, M. and J. Wurgler (2006). Investor sentiment and the cross-section of stock returns. *Journal of Finance 61*(4), 1645–1680.

Campbell, J. Y., J. Hilscher, and J. Szilagyi (2008). In search of distress risk. *Journal of Finance 63*(6), 2899–2939.

Campello, M. and J. R. Graham (2013). Do stock prices influence corporate decisions? Evidence from the technology bubble. *Journal of Financial Economics 107*(1), 89–110.

Chen, L., R. Novy-Marx, and L. Zhang (2011). An alternative three-factor model. *Working paper*.

Cooper, M. J., H. Gulen, and M. J. Schill (2008). Asset growth and the cross-section of stock returns. *Journal of Finance 63*(4), 1609–1651.

Daniel, K. and S. Titman (2006). Market reactions to tangible and intangible information. *Journal of Finance 61*(4), 1605–1643.

Dessaint, O., T. Foucault, L. Frésard, and A. Matray (2019). Noisy stock prices and corporate investment. *Review of Financial Studies 32*(7), 2625–2672.

Dong, M., D. Hirshleifer, S. Richardson, and S. H. Teoh (2006). Does investor misvaluation drive the takeover market? *Journal of Finance 61*(2), 725–762.

Dong, M., D. Hirshleifer, and S. H. Teoh (2012). Overvalued equity and financing decisions. *Review of Financial Studies 25*(12), 3645–3683.

Dong, M., D. Hirshleifer, and S. H. Teoh (2020). Misvaluation and corporate inventiveness. *Journal of Financial and Quantitative Analysis*, 1–29.

Dow, J. and G. Gorton (1997). Stock market efficiency and economic efficiency: is there a connection? *Journal of Finance 52*(3), 1087–1129.

Fama, E. F. and K. R. French (2006). Profitability, investment and average returns. *Journal of Financial Economics 82*(3), 491–518.

Fama, E. F. and K. R. French (2008). Dissecting anomalies. *Journal of Finance 63*(4), 1653–1678.

Foucault, T. and L. Fresard (2014). Learning from peers' stock prices and corporate investment. *Journal of Financial Economics 111*(3), 554–577.

Gilchrist, S., C. P. Himmelberg, and G. Huberman (2005). Do stock price bubbles influence corporate investment? *Journal of Monetary Economics 52*(4), 805–827.

Hirshleifer, D., K. Hou, S. H. Teoh, and Y. Zhang (2004). Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics 38*, 297–331.

Hirshleifer, D., A. Subrahmanyam, and S. Titman (2006). Feedback and the success of irrational investors. *Journal of Financial Economics 81*(2), 311–338.

Hoberg, G. and G. Phillips (2010). Product market synergies and competition in mergers and acquisitions: A text-based analysis. *Review of Financial Studies 23*(10), 3773–3811.

Hoberg, G. and G. Phillips (2016). Text-based network industries and endogenous product differentiation. *Journal of Political Economy 124*(5), 1423–1465.

Jegadeesh, N. and S. Titman (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *Journal of Finance 48*(1), 65–91.

Jensen, M. C. (2005). Agency costs of overvalued equity. *Financial Management 34*(1), 5–19.

Kusnadi, Y. and K. J. Wei (2017). The equity-financing channel, the catering channel, and corporate investment: International evidence. *Journal of Corporate Finance 47*, 236–252.

Lakonishok, J., A. Shleifer, and R. W. Vishny (1994). Contrarian investment, extrapolation, and risk. *Journal of Finance 49*(5), 1541–1578.

Loughran, T. and J. R. Ritter (1995). The new issues puzzle. *Journal of Finance 50*(1), 23–51.

McLean, R. D. and M. Zhao (2014). The business cycle, investor sentiment, and costly external finance. *Journal of Finance 69*(3), 1377–1409.

Miao, J. and P. Wang (2014). Sectoral bubbles, misallocation, and endogenous growth. *Journal of Mathematical Economics 53*, 153–163.

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics 108*(1), 1–28.

Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research 18*(1), 109–131.

Ozoguz, A. and M. J. Rebello (2013). Information, competition, and investment sensitivity to peer stock prices. *Working paper*.

Polk, C. and P. Sapienza (2009). The stock market and corporate investment: A test of catering theory. *Review of Financial Studies 22*(1), 187–217.

Ritter, J. R. (1991). The long-run performance of initial public offerings. *Journal of Finance 46*(1), 3–27.

Schneemeier, J. (2017). Shock propagation through cross-learning with costly price acquisition. *Working paper*.

Schwert, G. W. (2003). Anomalies and market efficiency. *Handbook of the Economics of Finance 1*, 939–974.

Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *Accounting Review 71*(3), 289–315.

Stambaugh, R. F., J. Yu, and Y. Yuan (2015). Arbitrage asymmetry and the idiosyncratic volatility puzzle. *Journal of Finance 70*(5), 1903–1948.

Stein, J. C. (1996). Rational capital budgeting in an irrational world. *Journal of Business 69*(4), 429–455.

Subrahmanyam, A. and S. Titman (2001). Feedback from stock prices to cash flows. *Journal of Finance 56*(6), 2389–2413.

Titman, S., K. J. Wei, and F. Xie (2004). Capital investments and stock returns. *Journal of Financial and Quantitative Analysis 39*(4), 677–700.

Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking 1*(1), 15–29.

Wang, H. and J. Yu (2013). Dissecting the profitability premium. *Working paper*.

Wurgler, J. (2000). Financial markets and the allocation of capital. *Journal of Financial Economics 58*(1-2), 187–214.

Xing, Y. (2008). Interpreting the value effect through the q-theory: An empirical investigation. *Review of Financial Studies 21*(4), 1767–1795.

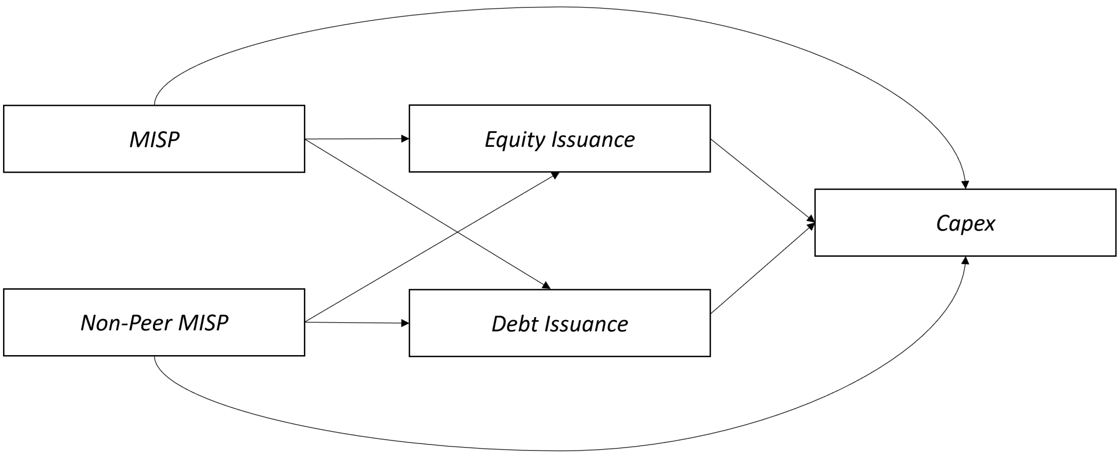

Figure 1. Path Analysis of the Effects of *MISP* and *Non-Peer MISP* on *Capex*

Table 1. Summary Statistics

Statistic	N	Mean	SD	Min	Max
Capex	25,028	7.025	8.790	0.013	56.102
MISP	25,028	50.653	13.852	5.860	98.640
Non-peer MISP	25,028	41.430	2.588	35.568	47.427
Tobin's Q	25,028	2.283	1.812	0.545	11.408
Cash flow	25,028	4.924	20.453	−109.108	40.472
Size	25,028	6.568	1.807	0.432	10.223
Equity Issuance	24,654	8.754	29.490	−15.964	212.897
Debt Issuance	24,654	7.706	23.121	−43.362	144.469

Note: This table contains summary statistics for the sample of public U.S. firms over the period 1996 to 2017. A detailed description of the construction of the sample is given in section 2. The table presents the number of observations, means, standard deviations, min and max values of the main variables used in the analyses. *MISP* and *Non-peer MISP* are retrieved from Robert F. Stambaugh's website. Non-peer MISP is a value-weighted average of non-peer firms based on TNIC-3 industry classification developed by Hoberg and Phillips (2010, 2016). All firm-level fundamentals are obtained from the merged CRSP–Compustat database and encompass *Capex*, *Tobin's Q*, *Cash flow*, and *Size*. *Capex* is measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). *Tobin's Q* is calculated by [total assets (item at) + market value of equity (item csho × item prcc_f) − book equity (item ceq) − deferred taxes (item txdb)] scaled by total assets (item at). *Cash flow* is defined as [income before extraordinary items (item ib) + depreciation (item dp)] scaled by beginning-of-year total assets (item at). *Size* is measured by the natural logarithm of the total assets (item at). *Equity Issuance* is calculated as [Δ book equity (Compustat itme ceq) +Δ deferred taxes (item txdb) − Δ retained earnings (item re)] scaled by beginning-of-year total assets (item at) and *Debt Issuance* is measured by [Δ total assets (itme at) − Δ book equity (item ceq) − Δ deferred taxes (item txdb)] scaled by beginning-of-year total assets (item at). All firm-level fundamentals are winsorized at the 1% and 99% level to reduce the impact of outliers.

Table 2. Correlation Matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Capex	1.000							
(2)	MISP	0.059	1.000						
(3)	Non-peer MISP	-0.057	-0.012	1.000					
(4)	Tobin's Q	0.026	-0.030	-0.005	1.000				
(5)	Cash flow	0.157	-0.412	0.013	-0.247	1.000			
(6)	Size	0.025	-0.128	-0.015	-0.274	0.302	1.000		
(7)	Equity Issuance	0.106	0.197	-0.009	0.433	-0.475	-0.194	1.000	
(8)	Debt Issuance	0.245	0.029	-0.057	0.162	-0.075	0.027	0.267	1.000

Note: This table reports correlations among the primary variables used in this study. See Table 1 for detailed variable definitions.

Table 3. Mispricing and Investment

	Dependent variable: *Capex*		
	(1)	(2)	(3)
MISP	0.037***		0.033***
	(5.083)		(4.502)
Non-peer MISP		−1.759***	−1.501***
		(−3.447)	(−2.892)
Tobin's Q	0.693***	0.663***	0.694***
	(10.188)	(9.794)	(10.195)
Cash flow	0.061***	0.052***	0.061***
	(7.554)	(7.833)	(7.768)
Size	−0.182***	−0.200***	−0.184***
	(−2.834)	(−3.146)	(−2.885)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	25,028	25,028	25,028
Adjusted R^2	0.411	0.410	0.412

Note: This table reports firm-level regression estimates of equation 1. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 4. Path Analysis of the Effects of Mispricing on Investment

Panel A. Capex Regression

	Capex
MISP	0.029***
	(5.760)
Non-peer MISP	−1.305***
	(−4.952)
Tobin's Q	0.315***
	(6.779)
Cash flow	0.088***
	(16.974)
Size	−0.309***
	(−5.882)
Equity Issuance	0.038***
	(12.014)
Debt Issuance	0.070***
	(18.894)
Industry fixed effects	Yes
Year fixed effects	Yes
Observations	24,654
Adjusted R^2	0.462

Panel B. Equity Issuance (EI) and Debt Issuance (DI) Regressions

	EI	*DI*
MISP	0.085***	−0.000
	(5.693)	(−0.002)
Non-peer MISP	0.507	−2.257***
	(0.462)	(−2.461)
Tobin's Q	5.723***	2.326***
	(26.282)	(16.017)
Cash flow	−0.553***	−0.088***
	(−25.657)	(−5.770)
Size	0.490***	1.546***
	(4.217)	(14.318)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	24,654	24,654
Adjusted R^2	0.351	0.070

Panel C. Path analysis results for the effects of Mispricing on Capex

	Coefficient	z-value
(1) Effects of *MISP* on *Capex*		
MISP → Capex	0.029***	(5.760)
MISP → EI → Capex	0.003***	(5.217)
MISP → DI → Capex	−0.000	(−0.002)
Total effect	0.032***	(6.085)
(2) Effects of *Non-peer MISP* on *Capex*		
Non-peer MISP → Capex	−1.305***	(−4.952)
Non-peer MISP → EI → Capex	0.019	(0.463)
Non-peer MISP → DI → Capex	−0.157**	(−2.443)
Total effect	−1.443***	(−5.231)

Note: This table reports firm-level regression estimates of the structural equation system, as outlined in equation 2 to 4. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at) in Panel A. In Panel B, the dependent variables are Equity issuance (EI) and Debt issuance (DI). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. z-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5. Share Turnover, Mispricing, and Investment

	Dependent variable: *Capex*	
	(1)	(2)
MISP	0.033***	0.030***
	(4.502)	(4.931)
MISP × Share turnover		0.012**
		(2.173)
Non-peer MISP	−1.501***	−1.203**
	(−2.892)	(−2.569)
Non-peer MISP × Share turnover		−0.029
		(−1.264)
Tobin's Q	0.694***	0.262***
	(10.195)	(4.836)
Cash flow	0.061***	0.090***
	(7.768)	(13.913)
Size	−0.184***	−0.385***
	(−2.885)	(−6.781)
Equity issuance		3.625***
		(14.066)
Debt issuance		6.969***
		(13.533)
Share turnover		1.024
		(1.023)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	25,028	24,606
Adjusted R^2	0.412	0.466

This table reports firm-level regression estimates of equation 5. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. Share turnover is the natural logarithm of the annual average daily share turnover in percent. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 6. Investor Sentiment, Mispricing, and Investment

	Dependent variable: *Capex*	
	(1)	(2)
MISP	0.044***	0.044***
	(5.744)	(5.834)
MISP × Sent		0.006
		(0.537)
Non-peer MISP	−0.168***	−0.153***
	(−2.919)	(−2.733)
Non-peer MISP × Sent		−0.203**
		(−2.450)
Tobin's Q	0.663***	0.660***
	(8.819)	(8.863)
Cash flow	0.069***	0.068***
	(6.565)	(6.709)
Size	−0.327***	−0.319***
	(−5.132)	(−5.180)
Sent	1.144***	9.873***
	(6.134)	(2.662)
GDP growth	0.437***	0.322**
	(3.635)	(2.380)
Industry fixed effects	Yes	Yes
Year fixed effects	No	No
Observations	20,855	20,855
Adjusted R^2	0.418	0.420

This table reports firm-level regression estimates of equation 6. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are Baker and Wurgler's (2006) investor sentiment index and the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. See Table 1 for further variable definitions. All regressions include industry fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 7. Non-peer Control Variables

	Dependent variable: *Capex*	
	abs. values	rel. values
	(1)	(2)
MISP	0.035***	0.061***
	(4.678)	(9.011)
Non-peer MISP	−2.062***	−2.099***
	(−4.611)	(−4.670)
Tobin's Q	0.724***	0.040***
	(11.288)	(7.342)
Non-peer Tobin's Q	−0.233	0.400
	(−0.067)	(0.765)
Cash flow	0.057***	0.057***
	(7.768)	(11.301)
Non-peer Cash flow	−1.942*	−1.591**
	(−1.900)	(−2.535)
Size	−0.190***	−0.012***
	(−3.166)	(−2.802)
Non-peer Size	−3.059	0.293
	(−0.314)	(0.294)
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	25,028	25,028
Adjusted R^2	0.414	0.431

This table reports firm-level regression estimates of equation 1, with the exception that the average values of non-peer firm fundamentals are added. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. In regression 1, firm fundamentals are measured in relative terms for each year. In regression 2, the absolute values of firm fundamentals are used. See Table 1 and Section 4 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8. Peer Mispricing

	Dependent variable: *Capex*			
	(1)	(2)	(3)	(4)
MISP	0.037***			0.032***
	(5.083)			(4.521)
Peer MISP		0.031***		0.006
		(3.473)		(0.690)
Non-peer MISP			−1.759***	−1.411**
			(−3.447)	(−2.480)
Tobin's Q	0.693***	0.663***	0.663***	0.695***
	(10.188)	(9.813)	(9.794)	(10.233)
Cash flow	0.061***	0.051***	0.052***	0.061***
	(7.554)	(7.286)	(7.833)	(7.801)
Size	−0.182***	−0.189***	−0.200***	−0.182***
	(−2.834)	(−2.928)	(−3.146)	(−2.861)
Industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,028	25,028	25,028	25,028
Adjusted R^2	0.411	0.409	0.410	0.412

Note: This table shows firm-level regressions in which the peer firm mispricing is added to the 1 equation. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are three mispricing proxies. *MISP* is the relative mispricing proxy of the firm, *Peer MISP* is the value-weighted average relative mispricing of peer firms, and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9. Alternative Mispricing Proxy

	Dependent variable: *Capex*		
	(1)	(2)	(3)
MISP (alt.)	0.036***		0.032***
	(6.782)		(6.127)
Non-peer MISP (alt.)		−1.389***	−1.114***
		(−6.310)	(−5.276)
Tobin's Q	0.673***	0.673***	0.697***
	(10.573)	(10.121)	(10.551)
Cash flow	0.063***	0.055***	0.061***
	(9.643)	(8.761)	(9.563)
Size	−0.318***	−0.230***	−0.311***
	(−5.108)	(−3.718)	(−4.998)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	24,143	24,143	24,143
Adjusted R^2	0.418	0.417	0.420

Note: This table replicates the baseline results from Table 3 with alternative misvaluation measures. The calculation of the alternative misvaluation measures follow the calculation procedure of Stambaugh et al. (2015), but only comprises three anomalies: accruals, net operating assets, and gross profitability. *MISP (alt.)* is the alternative relative mispricing proxy of the firm and *Non-peer MISP (alt.)* the value-weighted average relative mispricing of non-peer firms based on the alternative mispricing proxy. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Appendix for "Mispricing, Misallocation, and Corporate Investment"

A.1 Stock Market Anomalies

Variable	Description
Financial distress	Campbell et al. (2008) show that firms with a high default probability tend to have lower instead of higher future returns. Normally, higher returns would be expected to compensate for the higher risk. A dynamic logit model is used to estimate default probabilities. The model includes several equity market variables, such as stock price, book-to-market, stock volatility, size relative to the S&P 500, and cumulative excess return relative to the S&P 500.
O-score bankruptcy probability	Similar to the 'Financial distress' anomaly above, this distress anomaly also predicts that firms with high default probability are related to subsequently lower future returns. The measure is developed by Ohlson (1980) and estimates default probabilities in a static model that employs accounting variables.
Net stock issues	Managers have an incentive to issue new shares when share prices are overvalued in order to benefit from low cost of equity. Ritter (1991) and Loughran and Ritter (1995) show that share issuers perform worse than similar non-issuers in the years following the issue. Additionally, Fama and French (2008) point out that net equity issuance and following returns are negatively related.
Composite equity issues	Daniel and Titman (2006) conclude that equity issuers perform worse than non-issuers. To show this, they create a measure called "composite equity issuance". It is defined as the difference between the growth in the total market value of the company's equity and the return on the stock.
Total accruals	Sloan (1996) finds that companies with high accruals underperform companies with low accruals. He proposes that investors overestimate the stability of the accrual element of earnings when forecasting earnings.

Net operating assets	Hirshleifer et al. (2004) show that net operating assets are strongly negatively related to long-term stock returns. The authors argue that investors with limited attention are prone to concentrate on accounting profitability and disregard information on cash profitability. Net operating assets capture such a distortion. The variable is defined as the sum of all operating assets minus the sum of all operating liabilities, scaled to total assets.
Momentum	Jegadeesh and Titman (1993) discover the momentum effect. It is linked to the pattern that high (low) recent past returns are related to high (low) future returns. The momentum effect is one of the most powerful anomalies.
Gross profitability	Novy-Marx (2013) points out that a firm's profitability is positively related to abnormal benchmark-adjusted returns. He suggests that gross profit is the most reliable accounting measure of true economic profitability. Gross profitability is measured as total revenue minus the cost of goods sold, divided by current total assets.
Asset growth	Cooper et al. (2008) show that firms that increase their total assets generate lower subsequent returns. They point out that asset expansion leads investors to initially overestimate business perspectives. Asset growth is quantified by the growth rate of total assets compared to the previous financial year.
Return on assets	Chen et al. (2011) demonstrate that companies with higher past returns on assets have abnormally higher follow-up returns. This is consistent with the findings of Fama and French (2006), who show that more profitable firms expects higher returns in comparison to less profitable ones. The anomaly occurs mainly within firms with high information uncertainty and high arbitrage costs. Therefore, Wang and Yu (2013) consider incorrect pricing as the guilty factor. The variable is defined as the ratio of quarterly earnings to last quarter's assets.
Investment-to-assets	Titman et al. (2004) and Xing (2008) find that higher past investments are related to lower future abnormal returns. Titman et al. (2004) suggest that unusually high investment is often related to overinvestment

problems due to managers' empire-building behavior. Investors do not realize these problems and initially underreact to these problems. The variable is defined as the annual change in gross property, plant, and equipment, plus the annual change in inventories, scaled by lagged book value of assets.

A.2 Additional Tables

Table A.I: This table shows firm-level regression estimates of equation 1 for different industry classifications.

Table A.II: This table shows firm-level regression estimates of equation 1 for all firms with different fiscal month year ends.

Table A.III: This table shows firm-level regression estimates of equation 1 for the annual average of Stambaugh et al.'s (2015) misvaluation measure (*MISP*).

Table A.IV: This table shows firm-level regression estimates of equation 1 extended by the variable *Peer MISP* for different industry classifications.

Table A.V: This table shows firm-level regression estimates of equation 1 for all firms with a variation of Stambaugh et al.'s (2015) mispricing proxy.

Table A.I. Different Industry Classifications

	Dependent variable: *Capex*		
	TNIC 3	SIC 3	NAICS 4
	(1)	(2)	(3)
MISP	0.033***	0.035***	0.035***
	(4.502)	(5.014)	(5.040)
Non-peer MISP	−1.501***	−1.377***	−1.471***
	(−2.892)	(−3.245)	(−3.093)
Tobin's Q	0.694***	0.715***	0.714***
	(10.195)	(10.359)	(10.343)
Cash flow	0.061***	0.060***	0.060***
	(7.768)	(7.468)	(7.506)
Size	−0.184***	−0.193***	−0.194***
	(−2.885)	(−3.059)	(−3.080)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	25,028	25,028	25,028
Adjusted R^2	0.412	0.412	0.412

Note: This table reports firm-level regression estimates of equation 1. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. In regression 1 the industry classification is based on TNIC 3, in regression 2 on three-digit SIC industries, and in regression 3 on four-digit NAICS industries. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.II. All Fiscal Year Ends

	Dependent variable: *Capex*					
	TNIC 3	SIC 3	NAICS 4	TNIC 3	SIC 3	NAICS 4
	(1)	(2)	(3)	(4)	(5)	(6)
MISP	0.037***	0.038***	0.038***	0.036***	0.036***	0.037***
	(6.192)	(6.201)	(6.208)	(6.022)	(6.113)	(6.139)
Non-peer MISP	−0.148*	−0.165**	−0.143*	−0.374***	−0.400***	−0.366***
	(−1.724)	(−2.159)	(−1.854)	(−3.048)	(−3.131)	(−2.713)
Tobin's Q	0.733***	0.736***	0.735***	0.728***	0.734***	0.733***
	(11.622)	(11.649)	(11.636)	(11.354)	(11.479)	(11.438)
Cash flow	0.064***	0.064***	0.064***	0.065***	0.064***	0.064***
	(9.060)	(9.047)	(9.063)	(9.010)	(8.951)	(8.984)
Size	−0.117**	−0.119**	−0.119**	−0.125**	−0.128**	−0.128**
	(−2.298)	(−2.319)	(−2.324)	(−2.452)	(−2.514)	(−2.524)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	No	No	No
Year-quarter fixed effects	No	No	No	Yes	Yes	Yes
Observations	38,550	38,550	38,550	38,550	38,550	38,550
Adjusted R^2	0.383	0.383	0.383	0.383	0.383	0.383

Note: This table reports firm-level regression estimates of equation 1 for all observations with different fiscal year ends. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. In regressions 1 and 4, the industry classification is based on TNIC 3, in regressions 2 and 5 on three-digit SIC industries, and in regressions 3 and 6 on four-digit NAICS industries. See Table 1 for further variable definitions. All regressions include industry fixed effects. Year fixed effects are included in regression 1 to 3. Year-quarter fixed effects are included in regression 4 to 6. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.III. Annual Average of Misvaluation Measure (*MISP*)

	Dependent variable: *Capex*		
	TNIC 3	SIC 3	NAICS 4
	(1)	(2)	(3)
MISP	0.076***	0.078***	0.078***
	(7.844)	(8.082)	(8.027)
Non-peer MISP	−1.783**	−1.878***	−2.326***
	(−2.372)	(−3.430)	(−3.481)
Tobin's Q	0.700***	0.724***	0.722***
	(10.688)	(10.952)	(11.051)
Cash flow	0.073***	0.071***	0.071***
	(7.698)	(7.441)	(7.489)
Size	−0.185***	−0.200***	−0.203***
	(−3.357)	(−3.686)	(−3.772)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	24,353	24,353	24,353
Adjusted R^2	0.416	0.416	0.417

Note: This table reports firm-level regression estimates of equation 1. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. *MISP* and *Non-peer MISP* is the annual average of each fiscal year. In regression 1 the industry classification is based on TNIC 3, in regression 2 on three-digit SIC industries, and in regression 3 on four-digit NAICS industries. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.IV. *Peer MISP* and Different Industry Classifications

	Dependent variable: *Capex*		
	TNIC 3	SIC 3	NAICS 4
	(1)	(2)	(3)
MISP	0.032***	0.034***	0.032***
	(4.521)	(5.101)	(4.539)
Peer MISP	0.006	0.009	0.025**
	(0.690)	(0.586)	(2.122)
Non-peer MISP	−1.411**	−1.283***	−1.161**
	(−2.480)	(−2.924)	(−2.447)
Tobin's Q	0.695***	0.716***	0.718***
	(10.233)	(10.468)	(10.419)
Cash flow	0.061***	0.060***	0.059***
	(7.801)	(7.516)	(7.486)
Size	−0.182***	−0.194***	−0.198***
	(−2.861)	(−3.066)	(−3.161)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	25,028	25,028	25,028
Adjusted R^2	0.412	0.412	0.412

Note: This table reports firm-level regression estimates of equation 1. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm, *Peer MISP* is the value-weighted average relative mispricing of peer firms, and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. In regression 1 the industry classification is based on TNIC 3, in regression 2 on three-digit SIC industries, and in regression 3 on four-digit NAICS industries. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. *t*-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table A.V. Alternative Misvaluation Measure and Different Industry Classifications

	Dependent variable: *Capex*		
	TNIC 3	SIC 3	NAICS 4
	(1)	(2)	(3)
MISP (alt.)	0.032***	0.033***	0.033***
	(6.127)	(6.542)	(6.338)
Non-peer MISP (alt.)	−1.114***	−1.029***	−1.241***
	(−5.276)	(−4.510)	(−4.574)
Tobin's Q	0.697***	0.708***	0.708***
	(10.551)	(11.065)	(11.236)
Cash flow	0.061***	0.060***	0.060***
	(9.563)	(9.394)	(9.668)
Size	−0.311***	−0.321***	−0.323***
	(−4.998)	(−5.207)	(−5.208)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Observations	24,143	24,143	24,143
Adjusted R^2	0.420	0.420	0.419

Note: This table reports firm-level regression estimates of equation 1. The dependent variable, *Capex*, is firm investment measured by capital expenditures (Compustat item capx) scaled by beginning-of-year total assets (item at). The independent variables of interest are the two mispricing proxies. *MISP* is the relative mispricing proxy of the firm and *Non-peer MISP* the value-weighted average relative mispricing of non-peer firms. *MISP* and *Non-peer MISP* are alternative misvaluation measures that comprise only three stock market anomalies: accruals, net operating assets, and gross profitability. In regression 1 the industry classification is based on TNIC 3, in regression 2 on three-digit SIC industries, and in regression 3 on four-digit NAICS industries. See Table 1 for further variable definitions. All regressions include industry and year fixed effects. Standard errors are clustered on both firm and year. t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.