UNIVERSIDADE CATÓLICA PORTUGUESA

# Common Ownership's impact on the Cost of Equity Capital

## An empirical analysis of the DAX-30

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Católica Porto Business School

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# Common Ownership's impact on the Cost of Equity Capital

## An empirical analysis of the DAX-30

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# Resumo

*Common ownership* tem apresentado um crescimento extraordinário nos últimos anos.

A presença de *common ownership* nas estruturas empresariais pode ter efeitos negativos e positivos no custo de capital próprio das empresas. Por um lado, o aumento da colaboração entre empresas detidas pelos mesmos investidores causa um aumento de covariância entre *cash-flows*, resultando num acréscimo do custo de capital próprio. Por outro lado, a redução de competição entre empresas detidas pelos mesmos investidores permite que estas empresas se foquem na expansão para novos mercados, internalizem externalidades negativas e aumentem a divulgação voluntária, resultando numa redução do custo de capital próprio.

Na presente tese, eu investigo de forma empírica o impacto de *common ownership* no custo de capital próprio nas empresas do índice DAX-30. Para tal, regrido o custo de capital próprio de Ohlson & Juettner-Nauroth (2005) descontado da taxa sem risco, em três medidas de *common ownership*. Os resultados de estimação estão em linha com os resultados previamente obtidos na literatura para empresas dos E.U.A., mas também sugerem que o impacto de *common ownership* no custo de capital próprio está criticamente dependente da medida de *common ownership* utilizada.

Palavras-chave: *Common Ownership,* Custo de Capital Próprio, DAX-30

5352 palavras

# Abstract

Common ownership has been rising at an extraordinary rate over the past years.

Common ownership structures can have negative and positive effects in the cost of equity capital of firms. On one hand, the increase of collaboration between commonly owned firms will increase their cashflows covariance, resulting in a higher cost of equity capital. On the other hand, commonly owned firms' anticompetitive behaviors will allow them to expand into new markets, internalize negative externalities and increase voluntary disclosure, resulting in a reduction of the cost of equity capital.

In this thesis, I empirically investigate the impact of common ownership on the cost of equity capital of firms in the DAX-30 index. To do so, I regress Ohlson & Juettner-Nauroth (2005)'s cost of equity (discounted of the risk free rate) on three different proxies of common ownership. The estimation results are in line with previous results in the literature for U.S. firms, but also suggest that the impact of common ownership on the cost of equity capital depends critically on the proxy of common ownership used.

Keywords: Common Ownership, Cost of Equity Capital, DAX-30

5352 words

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# Glossary

United States – U.S.

Ordinary least squares – OLS

North American Industry Classification System – NAICS

# Introduction

The mainstream economic literature has assumed that firms aim to maximize own profit. This uncontested assumption has been present for a very long time and served as a clear management objective for firm's corporate governance (Zakhem & Palmer, 2017). From the standpoint of the classical ownership structure, investors would buy a given firm's shares with the expectancy of realizing capital gains on it, and so the firm's management (with fiduciary obligations) is left to satisfy their shareholders' interests. In order to maximize profits, firms would engage in competition against industry rivals in attempts to secure the highest market share, sale margins, etc.

However, the growing demand for diversified low-cost investments became an important vehicle for the widespread of common ownership in the last years (Fichtner et al., 2017), defined as the "incidence or frequency of shareholder overlap between firms" (Schmalz, 2018).

Figure 1 illustrates the growth that index funds have experienced in these past years. From the year 2000 to 2015, the assets managed by those funds, which does not include any of the active funds or these companies' positions in bonds or commodities, has increased 700%.

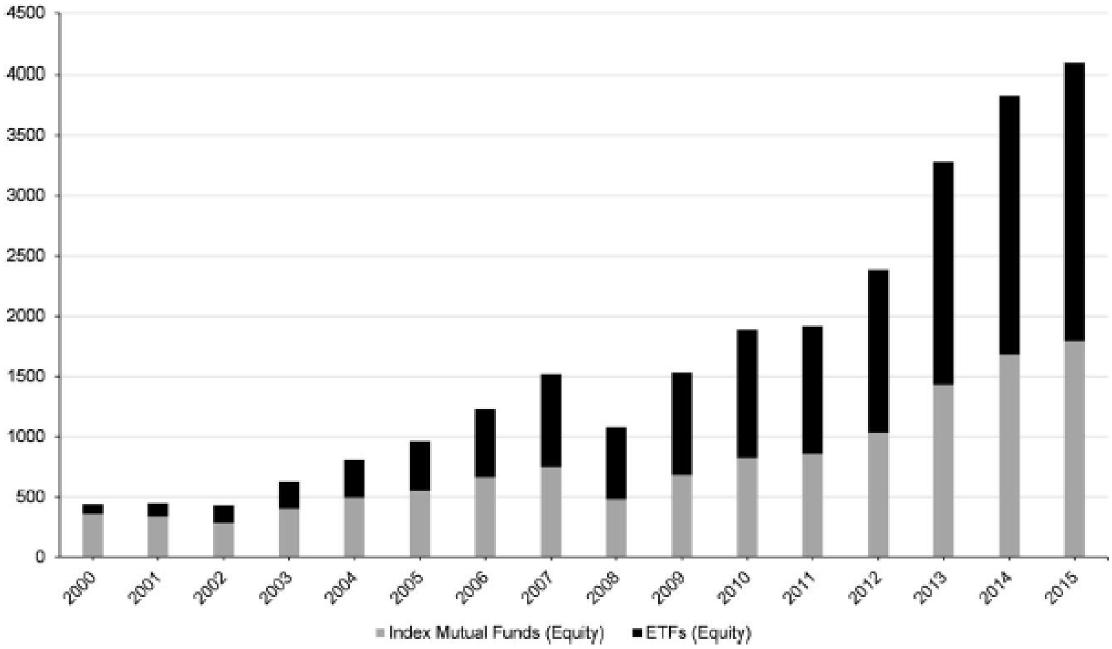


**Figure 1 - Assets under management by equity passive index funds (billion dollars)**

**Source: Fichtner et al., 2017, p. 303**

Fichtner et al. (2017) performed an in-depth analysis of the passive index fund industry, giving special emphasis on what they name as the "Big Three", the three companies that dominate this market – BlackRock, Vanguard, and State Street.

In 2015, the Big Three combined were the largest shareholder of 1,662 United States (U.S.) publicly listed companies, which represented a share of 42.6% of all the 3,900 listed firms. In regards to the S&P 500 stock index (in 2015), their combined ownership made them the biggest shareholder of 438 firms, which corresponds to 88% of the largest 500 U.S. market capitalized firms (Fichtner et al., 2017).

Although the asset management firms are not the actual owners of the stocks, through proxy votes they are the ones who exercise control over the companies, which emphasizes the relevancy of analyzing the role of intermediated asset management in the creation of highly concentrated and coordinated corporate control.

Fichtner et al. (2017) revealed that the internal voting inconsistency of same family funds in the Big Three is 18 per 100,000 proposals for BlackRock, 6 per 100,000 for Vanguard, and 195 per 100,000 for State Street, which confirms the idea that funds exercise voting at the family-fund level contributing to a higher level of common ownership concentration than expected.

Although most of the literature and empirical studies revolving around common ownership are related to the U.S. market due to its high availability of information regarding public owned company's ownership structures, Schmalz (2018) reported that BlackRock alone is the largest shareholder of a third of the companies on the FTSE 100 and DAX-30, which confirms this trend at a global scale.

Common ownership poses very important questions regarding firms' corporate governance, strategic collaboration and outcomes. This thesis focuses on a particular one: the firm's cost of equity capital.

Ni & Yin (2021) examine this exact question for U.S. firms. They present theoretical opposing arguments in what concerns common ownership's impact on the cost of equity capital. On one hand, collaboration between commonly owned firms will increase their cashflows covariance, resulting in a higher cost of equity capital. On the other hand, in the face of relaxed competitive pressures, commonly owned firms will focus on expanding into new markets, internalizing negative externalities, and increasing voluntary disclosure, all factors that will lead to a reduction of the cost of equity capital. As a consequence, they propose to quantify the net impact of common ownership on the cost of equity capital.

I examine the same question. My contribution is two-folded. First, I examine the German market, more specifically the DAX-30 index (currently DAX-40), expanding on the scarce common ownership's literature to the European market. Secondly, I consider alternative common ownership measures that reflect the weight of commonly owned industry peers in each firm, as suggested by Antón et al. (2016) and Huse et al. (2022).

I use data extracted from various databases, namely: Refinitiv Eikon, (I/B/E/S), Worldscope and Datastream to construct a sample of 270 firm-year observations of companies listed in the DAX-30 for the time frame of 2010 to 2020.

I then regressed Ohlson & Juettner-Nauroth (2005)'s cost of equity capital (discounted of the risk free rate) on three different proxies of common ownership. One of these proxies is also used by Ni & Yin (2021), while two are alternative proxies found in the literature. Using Ni & Yin (2021)'s proxy, the estimation results suggest a significant and negative relation between common ownership and the cost of equity capital, in line with the results obtained from Ni & Yin (2021). The other alternative common ownership proxies suggest that common ownership does not affect the cost of equity capital. This suggests that the impact of common ownership on the cost of equity capital depends critically on the proxy of common ownership used.

This thesis is organized in the following parts: Chapter 1 reviews the literature on the impact of common ownership in the cost of equity capital and presents a brief introduction to the measurement of cost of equity capital and common ownership. Chapter 2 presents the theoretical and empirical frameworks. Chapter 3 describes the empirical application and Chapter 4 concludes.

# Chapter 1 – Literature Review

## 1.1 Common Ownership's impact on the Cost of Equity Capital

Recent literature has provided evidence on negative and positive effects of common ownership on the cost of equity capital. On one hand, common ownership's anticompetitive effect has been documented by several authors (Azar et al., 2018; He & Huang, 2017; Ni & Yin, 2021). A possible channel for a positive effect of common ownership in the cost of equity capital is through the reduction of competitive behaviors and improvement of collaboration, which will increase the covariance of the commonly owned firm's cashflows, resulting in under-diversification and a higher cost of equity capital (Ni & Yin, 2021).

On the other hand, the "opposing" channels that yield a negative impact of common ownership in the cost of equity capital, state that strategic collaboration between competing firms will allow them to focus on expanding into new markets and internalize negative externalities previously imposed on commonly owned firms, resulting in a reduction of the variance and covariance of cashflows, as well as an increase on the expected future cashflows. There is also a second channel that argues that common owners will facilitate information sharing between commonly owned industry peers causing an increase in voluntary disclosure, which will, in turn, reduce uncertainty on the expected future cashflows and decrease these firms cost of equity capital.

The question that remains to be answered is – what is the net effect of common ownership on the cost of equity capital? Ni & Yin (2021) take on this research proposal and perform various in-depth analyses to investigate this effect. They begin their empirical research by estimating the impact of common ownership on the cost of equity capital through ordinary least squares (OLS), where the explained variable is the average of five different measures of the implied cost of equity capital minus the risk free rate, and the main explanatory variable is a common ownership measure (they consider several other alternative measures). All the coefficient estimates on the common ownership proxies revealed a negative and significant relation with the cost of equity capital. The authors also performed several other robustness analyses and all of them corroborated this negative relation.

AlHares et al. (2020) study the impact of institutional ownership on the cost of equity capital. They regress the average of Ohlson & Juettner-Nauroth's (2005) cost of equity capital valuation model and it's simplified version, on the share of institutional owners. AlHares et al. (2020) estimation results revealed a positive and statistically significant relation between institutional ownership and the cost of equity capital.

As mentioned before, institutional ownership constitutes the main vehicle for the significant presence of common ownership in today's companies' ownership structures. Therefore, given the intrinsic connection between common and institutional ownership it is important to consider that the results found by AlHares et al. (2020) might indicate a positive relation between common ownership on the cost of equity capital, thus implicating opposite results from the ones obtained by Ni & Yin (2021).

## 1.2 Measuring Cost of Equity Capital

The cost of equity capital can be interpreted from two different perspectives. For investors, it represents the required rate of return demanded of the companies where they own stock, in order to face the risks involved in investing in those firms. From the point of view of a corporate's governance, the cost of equity capital will represent their budgeting threshold, in other words, it is the rate at which they evaluate if a given investment meets the capital return requirements (Botosan & Plumlee, 2005).

The asset pricing literature has two main frameworks for the valuation of firms' cost of equity capital: the Dividend Capitalization Model (DCM) and the Capital Asset Pricing Model (CAPM) (Botosan & Plumlee, 2005; Lambert et al., 2007). According to Botosan & Plumlee (2005), the DCM formulates that the cost of equity capital of a given firm can be obtained through diving all the expected future cashflows discounted by a risk-free rate, by the current share price. Whereas the CAPM equates that the cost of equity capital will depend on the risk-free rate, the market expected return and a firm's coefficient beta, which represents the covariance of a given firm's stock returns with the general market's returns.

There are several different models for computing the cost of equity capital under the CAPM framework, being that the majority of these models rely on various range of proxies of accounting information and analysts forecasts, such as the ones used by Claus & Thomas (2001), Easton (2003), Gebhardt et al. (2001) and Ohlson & Juettner-Nauroth (2005).

## 1.3 Measuring Common Ownership

Ni & Yin (2021) use some of the classical measures of common ownership, such as an indicator variable that assumes the value one if the firm has a common owner in a firm of the same industry, and zero otherwise, the total share of a given firm's common owners that own a stake in at least one industry competitor, the total number of common owners that are present in at least one industry competitor and the number of industry competitors' firms that share a common ownership link for a given year.

The measures mentioned above fail to incorporate the share of ownership that investors hold in industry peers, which means, they only consider the ownership structure of the respective firm, neglecting the possible weights between investors' interests on the specific firm versus its industry peers.

Antón et al. (2016) and Huse et al. (2022) argue that, in the face of conflicting shareholders' interests, the objective function of a firm should maximize a control-weighted sum of the returns of each shareholder's portfolios. Thus, proposing a common ownership measure that reflects shareholders' interests on commonly owned industry peers for each given firm.

# Chapter 2 – Theoretical and Empirical Frameworks

As mentioned before the literature exhibits theoretical arguments both in favor and against a positive relation between common ownership and the cost of equity capital. Therefore, in order to investigate the net effect of common ownership on the cost of equity capital, following the hypothesis development of Ni & Yin (2021), I propose to examine the following hypotheses:

- H0: Holding other conditions constant, there is no significant relation between common ownership and the cost of equity capital;
- H1: Holding other conditions constant, there is a significant relation between common ownership and the cost of equity capital.

In order to examine these hypotheses, I propose the following two OLS regression models:

$$r_{i,t} - rf_t = \theta_0 + \theta_1 co_{i,t} + \boldsymbol{\alpha x}_{i,t} + \varepsilon_{i,t} \,,$$

$$\log r_{i,t} - rf_t = \theta_0 + \theta_1 co_{i,t} + \boldsymbol{\alpha x}_{i,t} + \varepsilon_{i,t} \,,$$

where the explained variable consists of the risk premium $r_{i,t} - rf_t$ and $\log r_{i,t} - rf_t$ for firm *i* in year *t*, with $r_{i,t}$ denoting a measure of the cost of equity capital of firm *i* in year *t* and $rf_t$ representing the risk free rate for year *t* (the values were multiplied by one hundred to facilitate interpretation results). The main explanatory variable is given by $co_{i,t}$, which represents a common ownership measure associated to firm *i* in year *t*. The set of controls $\boldsymbol{x}_{i,t}$ include firm size (SIZE), book-to-market ratio (BM), book leverage (LEV), analyst forecast dispersion (DISP), return momentum (RET) and equity beta (BETA1Y). Finally, $\varepsilon_{i,t}$ denotes the error term associated to firm *i* in year *t*.

The regression model also includes year and industry fixed effects to account for unexplained differences between different years and industries, respectively.

The next sections will provide more detail on the calculation of the cost of equity capital and the proxies used for common ownership. Further descriptions of the set of controls are included in Appendix 4.

## 2.1 Cost of Equity Capital Measures

I measure the cost of equity capital using the approach of Ohlson & Juettner-Nauroth (2005). They provide a valuation formula for the cost of equity based on share price and analysts forecast previsions on earnings and dividends. According to the authors, the cost of equity of a firm is given by:

$$r_{i,t} = A_{i,t} + \sqrt{A_{i,t}^2 + \frac{EPS_{i,t+1}}{P_{i,t}} (g2_{i,t} - gl_{i,t})}$$

where $A_{i,t} = 0.5 \left(gl_{i,t} + \frac{DPS_{i,t+1}}{P_{i,t}}\right)$

$EPS_{i,t+1}$ denotes the mean of analysts' forecasted earnings per share of firm *i* for year *t+1*, $DPS_{i,t+1}$ denotes the mean of analysts' forecasted earnings per share of firm *i* for year *t+1* and $P_{i,t}$ represents the share price of firm *i* in year *t*. $g2_{i,t}$ represents the earnings per share short-term growth computed by $\frac{EPS_{t+2} - EPS_{t+1}}{EPS_{t+1}}$, where $EPS_{t+2}$ denotes the mean of analysts' forecasted earnings per share of firm *i* for year *t*+2. Finally, $gl_{i,t}$ represents the earnings per share long-term growth, assumed to be 3% for all firms.

## 2.2 Common Ownership Measures

As stated above, the main explanatory variable is a proxy of common ownership. Three different proxies were considered for this purpose, namely: Kappa (K); Top5 (TOP5); Total Common Ownership (TCO).

Kappa (K) was estimated following Antón et al. (2016) and Huse et al. (2022), this variable will represent the weight that a given firm places on its industry competitors' profits:

$$k_{i,j} = \frac{\sum_o \gamma_{i,o}\beta_{j,o}}{\sum_o \gamma_{i,o}\beta_{j,o}}$$

where $\gamma_{i,o}$ and $\beta_{i,o}$ denote, respectively, the control and ownership shares of investor *o* in firm *i* (where $\gamma = \beta$). $k_{i,j}$ will represent the weight that all of firm's *i* investors combined will give to its industry peer *j*.

The final value of Kappa (K) used in this model is the average k-value obtained for all of the same-industry peers included in the sample, given by the following:

$$\bar{k_\iota} = \frac{1}{n-1}\sum_{j \neq i} k_{i,j}$$

Kappa (K), the mean of all $k_{i,j}$, portrays the weight that the investors of a given firm, on average, place on a competitor firm.

Top5 (TOP5) replicates Kappa (K) for the top-5 shareholders of each firm in our sample, its interpretation is exactly as Kappa (K), for the exception that we are not considering the complete structures of ownership, but rather, only considering the ownership stakes of the top-5 owners of each firm.

Lastly, applying one of the common ownership proxies estimated by Ni & Yin (2021), Total Common Ownership (TCO) was estimated by summing all the percentages of ownership owned by common owners.

# Chapter 3 – Empirical Application

## 3.1 Sample

The selected sample for the study was based on the composition of the DAX-30 index, which is the biggest index in Germany and one of the Europe's largest indexes. The chosen timeframe was 2010 to 2020 (totaling 11 years). Ownership data was extracted from Refinitiv Eikon. Analyst forecast information was sourced from Institutional Brokers' Estimate System (I/B/E/S). Accounting data came from Worldscope and share prices from Datastream.

The risk-free rate was obtained through the mean of the daily 10-year German Government Bond yield for each given year of the sample, this data was also extracted from Refinitiv Eikon. For the industry coding the North American Industry Classification System (NAICS) was adopted, the main model makes use of the NAICS at the 4-digit level.

Considering all the constituents of DAX-30 throughout 2010 to 2020, the initial sample consisted of 330 firm-year observations. The firm-year observations where the component of the cost of equity formula $g_2$ (earnings per share forecasted short-term growth) was negative were dropped, resulting in a total of 49 firm-year observations eliminated from our original sample. After accounting for these dropped observations, 10 more observations were dropped due to the fact that $g_2$ was smaller than the risk-free rate for that given year, making the whole component of the square root of Ohlson & Juettner-Nauroth (2005)'s cost of equity formula negative, which restricts the estimation of the square root. One observation was dropped due to missing accounting information on the control variables. The final sample considering all the mentioned considerations consisted of 270 firm-year observations.

## 3.2 Data Descriptions

Table 1 presents summary statistics for the main variables. The average firm in the sample has a cost of equity capital of 10.84%. The chosen proxies for common ownership display a relevant presence of common ownership in our sample, especially when considering its size, revealing that the average firm has 14.44% of its shares held by common owners and weights its industry-peers' firm value at 17.52%, being that this weight is only 13.12% if we only consider the top-5 shareholders of each firm.

| | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| COC_OJN | 10.8400 | 9.4910 | 6.7240 | 3.0230 | 89.7700 |
| K4D | 0.1752 | 0.0000 | 0.2941 | 0.0000 | 1.0660 |
| TOP54D | 0.1312 | 0.0000 | 0.2485 | 0.0000 | 1.0320 |
| TCO4D | 0.1444 | 0.0000 | 0.1730 | 0.0000 | 0.6802 |
| SIZE | 24.7500 | 24.4300 | 1.3520 | 22.2700 | 28.4000 |
| BM | 0.6396 | 0.4562 | 0.5593 | 0.1111 | 4.3430 |
| LEV | 0.1810 | 0.1834 | 0.1101 | 0.0001 | 0.4947 |
| DISP | 0.1153 | 0.0657 | 0.1863 | 0.0042 | 2.3420 |
| RET | 0.1109 | 0.0662 | 0.5038 | -0.6133 | 7.1660 |
| BETA1Y | 0.9543 | 0.9490 | 0.3078 | 0.0857 | 2.4760 |

The statistics presented are computed across 270 observations.

**Table 1 - Summary Statistics of the main variables**

## 3.3 Preliminary Analysis

In order to examine (in a preliminary analysis) the net impact of common ownership on the cost of equity capital, I now plot the cost of equity capital with the three proxies of common ownership.

The XY graphics that display the relations of Kappa and TOP5 with the cost of equity capital (Figures 2 and 3) reveal a statistical insignificance of the relation between common ownership and the cost of equity capital.

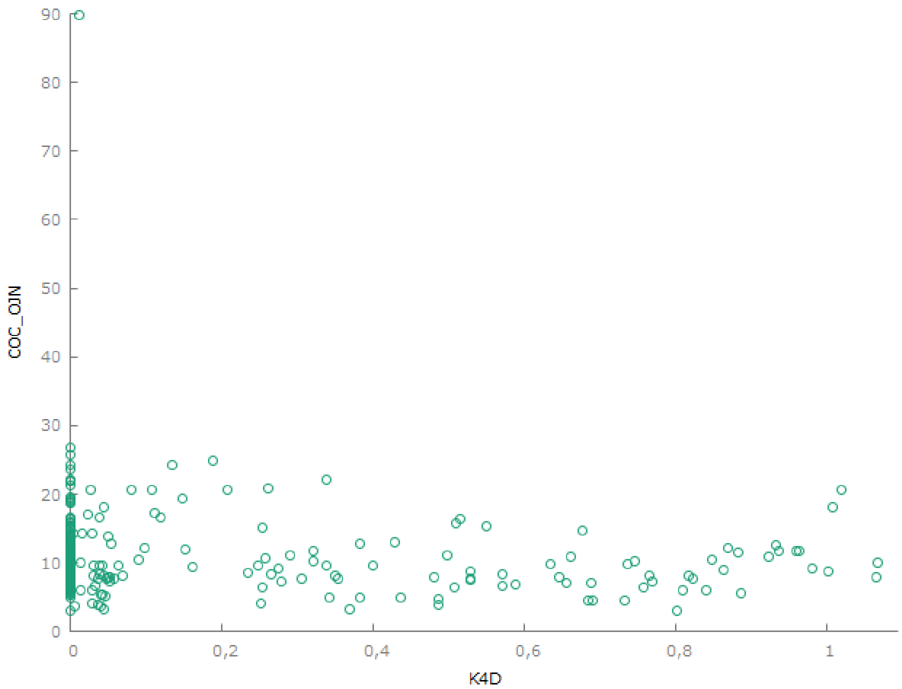


**Figure 2 - Kappa's (K) impact on the Cost of Equity Capital**

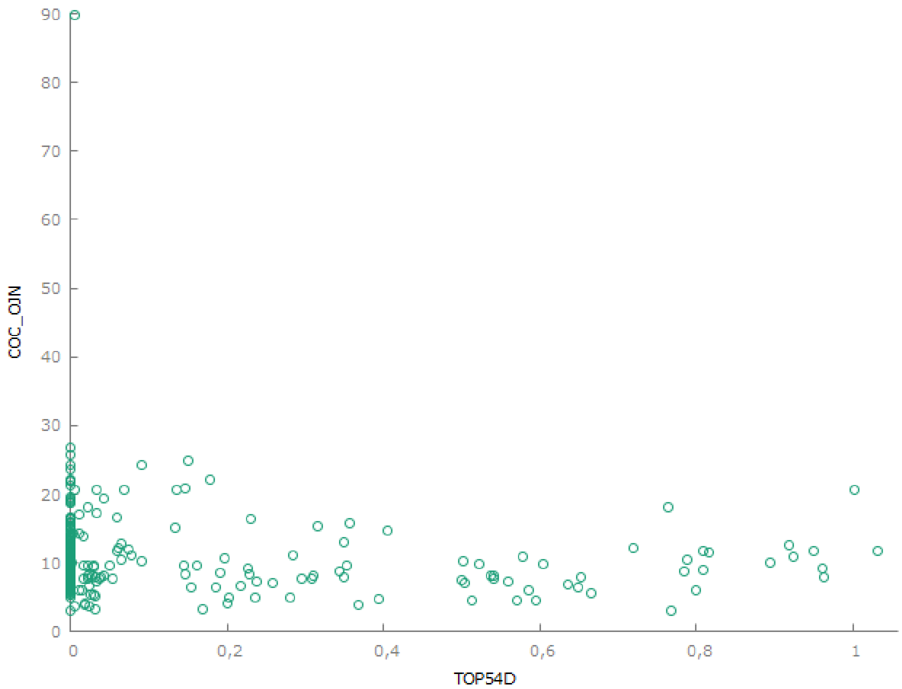


**Figure 3 - TOP5's impact on the Cost of Equity Capital**

In contrast with the above figures, Figure 4 displays a statistically significant and negative effect of common ownership on the cost of equity capital. According to the graphic, as the percentage of common owners in a given firm increases, the cost of equity capital will reduce, leaving the company better off with a higher degree of common ownership since it would have access to capital at a lower expense rate.

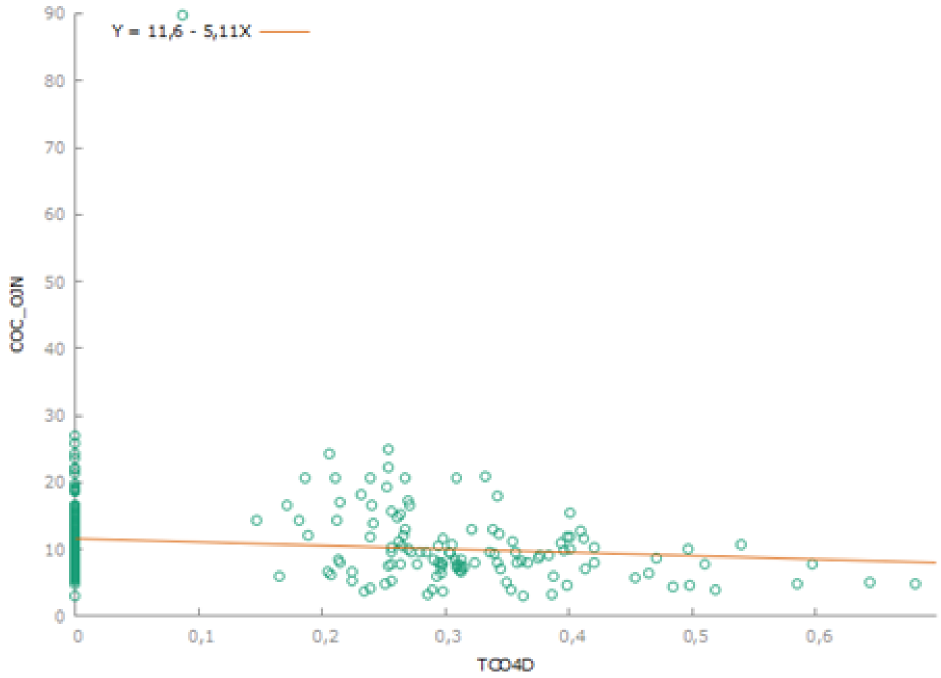


**Figure 4 - Total Common Owners' (TCO) impact on the Cost of Equity Capital**

## 3.4 Impact of Common Ownership in the Cost of Equity Capital

The main estimation results can be observed in Table 2, equations 1, 2 and 3 present the estimation results for the regression of the cost of equity capital on the three common ownership proxies, while equations 4, 5 and 6 present the same results for the logarithmic transformation of the cost of equity capital.

The coefficient estimate obtained for equation 3 reveals that a one-standard-deviation increase in the percentage of common owners (TCO) of a given firm, results in a 16.96% (=-10.6248*0.1730/10.8400) decrease in the cost of equity capital. The average company in the sample has a total shareholder's equity of 21,192 million euros, which implies that a firm with a one-standard increase in its share of common owners will be able to save 3.59 (=21.192*0.1696) million euros when obtaining equity financing. From equation 6, the results obtained estimate a reduction of 14.91% (=1-$e^{-0.9334*0.1730}$) in the cost of equity capital for a one-standard-deviation increase in the share of common owners.

The estimation results of Ni & Yin (2021) for all the four proxies of common ownership utilized by the authors, reveal a significant negative relation of common ownership with the cost of equity capital. These results are aligned with the coefficients obtained by our model for TCO, but when we observe the results obtained for different measures of common ownership than the ones used by Ni & Yin (2021), more specifically Kappa and TOP5, we obtain different results.

The estimated coefficients for Kappa and TOP5 (equations 1, 2, 4 and 5) reveal a statistically insignificance of common ownership on the cost of equity capital. These results suggest that when applying a common ownership measure that takes into account the shareholders' interests on commonly owned industry peers for each given firm, the results yield that common ownership doesn't affect the cost of equity capital.

The OLS regression was also performed for different levels of industry, the model and the three common ownership variables were constructed for the NAICS at 1, 2, 3 and 4 digits. As presented in Appendices 1 to 3, the estimation results for Kappa and TOP5 remain statistically insignificant, while for the three and two-digits NAICS, with the exception of the log transformation on the 2-digit NAICS, the TCO variable continues to present a relevant negative relationship with the cost of equity capital. The definition of industry through the one-digit NAICS becomes too broader to obtain any statistically relevant estimation results in what concerns common ownership variables. Therefore, we can conclude that the main estimation results do not depend on the level of industry chosen.

All the coefficient estimation results obtained in the control variables Book-to-Market ratio (BM) and Analyst forecast dispersion (DISP) reveal a positive and significant relation between the respective variables and the cost of equity capital, in line with the results obtained by Ni & Yin (2021). Stock Return (RET) yields a significant and negative relation with cost of equity capital, being that its logarithmic transformation of the cost of equity capital indicates a lack of relationship. The estimated coefficients for Firm Size (SIZE), Firm Leverage (LEV) and Stock Return Beta (BETA1Y) yield statistically insignificant results.

| | | **COC_OJN** | | | **LOG_COC_OJN** | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| K4D | 1.1754 | | | 0.1464 | | |
| | (2.9431) | | | (0.2342) | | |
| TOP54D | | 1.9616 | | | 0.2063 | |
| | | (3.0117) | | | (0.2301) | |
| TCO4D | | | -10.6248*** | | | -0.9334*** |
| | | | (3.2866) | | | (0.2195) |
| SIZE | -0.2001 | -0.2187 | -0.0092 | 0.0761 | 0.0763 | 0.0969** |
| | (0.9700) | (0.9562) | (0.8911) | (0.0508) | (0.0510) | (0.0435) |
| BM | 6.9015*** | 6.9265*** | 6.1934*** | 0.3463*** | 0.3475*** | 0.2815*** |
| | (1.2758) | (1.2722) | (0.9766) | (0.0468) | (0.0456) | (0.0455) |
| LEV | 11.9439 | 11.9553 | 8.7606 | 0.2615 | 0.2506 | -0.0411 |
| | (13.4396) | (13.1900) | (12.6583) | (0.6450) | (0.6186) | (0.6036) |
| DISP | 12.7471*** | 12.7164*** | 12.7310*** | 0.5756*** | 0.5719*** | 0.5733*** |
| | (0.7604) | (0.7510) | (0.7682) | (0.1235) | (0.1222) | (0.1131) |
| RET | -0.7666** | -0.7665** | -0.6629** | -0.0384 | -0.0384 | -0.0294 |
| | (0.3417) | (0.3359) | (0.3312) | (0.0599) | (0.0591) | (0.0565) |
| BETA1Y | 1.9157 | 1.9594 | 1.5057 | 0.1358 | 0.1400 | 0.0990 |
| | (1.8087) | (1.8204) | (1.7918) | (0.1202) | (0.1211) | 0.1316 |
| INDUSTRY FE | Y | Y | Y | Y | Y | Y |
| YEAR FE | Y | Y | Y | Y | Y | Y |
| R-squared | 0.5543 | 0.5548 | 0.5614 | 0.5702 | 0.5711 | 0.5817 |

*The statistics presented are computed across 270 observations. Robust standard-errors are clustered at the industry level. Standard-errors in parenthesis. *** denote p-values<0.01, ** denote p-values<0.05, and * denote p-values<0.10.

**Table 2 - OLS Estimation Results**

# Chapter 4 – Conclusion

The purpose of this thesis is to investigate the relation of common ownership on the cost of equity capital for the firms on the Germany's stock exchange DAX-30 index.

The results obtained suggested that when measuring common ownership using the total share of common owners (TCO), common ownership has a significant negative impact on the cost of equity capital, in line with the results presented by Ni & Yin (2021). When using proxies of common ownership different from the ones Ni & Yin (2021)'s propose, the results suggest an insignificant effect of common ownership on the cost of equity capital. It is of upmost importance to consider that our model introduces two common ownership proxies (Kappa and TOP5) that grasp a new dimension of common ownership that isn't considering in Ni & Yin (2021) common ownership's measures.

In the selection process of the sample, the imposed time restrain was a very limiting factor, which constrained the number of same-industry firms in our final sample, ultimately restricting the presence of common ownership in our sample.

As stated in the sections above, the positive and negative effects of common ownership on the cost of equity capital have been well documented in the extant common ownership literature. The bilateral and theoretical effects of common ownership on the cost of equity highlight the importance of an empirical approach to determine the net effect of the relation between these two variables. To my knowledge, the present work is the first empirical study to examine common ownership's impact on the cost of equity capital in the German stock exchange and introducing common ownership measures that reflect the weight of commonly owned industry peers in each firm, as developed by Antón et al. (2016) and Huse et al. (2022). Therefore, contributing to the extant and scarce literature on the important subject.

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# Appendix

## Appendix 1 – OLS estimation results at the NAICS 3-digit level

| | COC_OJN | | | LOG_COC_OJN | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| K3D | -0.5858 | | | 0.0733 | | |
| | (2.3803) | | | (0.1639) | | |
| TOP53D | | 0.1601 | | | 0.1498 | |
| | | (3.5186) | | | (0.2264) | |
| TCO3D | | | -7.8506* | | | -0.5302*** |
| | | | (4.2474) | | | (0.1679) |
| SIZE | -0.6869 | -0.7340 | -0.6225 | 0.0169 | 0.0128 | 0.0327 |
| | (0.5825) | (0.5530) | (0.6386) | (0.0262) | (0.0260) | (0.0241) |
| BM | 6.7186*** | 6.7383*** | 6.4137*** | 0.3281*** | 0.3285*** | 0.3031*** |
| | (1.0633) | (1.0750) | (1.0059) | (0.0453) | (0.0443) | (0.0462) |
| LEV | 9.7419 | 9.6764 | 12.0943 | 0.2280 | 0.2177 | 0.4039 |
| | (8.4177) | (8.4652) | (9.3997) | (0.3551) | (0.3518) | (0.5372) |
| DISP | 12.4909*** | 12.5377*** | 12.3131*** | 0.5577*** | 0.5608*** | 0.5345*** |
| | (0.7071) | (0.7169) | (0.7467) | (0.1205) | (0.1199) | (0.1125) |
| RET | -0.9778*** | -0.9683*** | -0.9474*** | -0.0585 | -0.0566 | -0.0590 |
| | (0.3519) | (0.3605) | (0.3583) | (0.0601) | (0.0602) | (0.0572) |
| BETA1Y | 2.4061 | 2.3574 | 2.3922 | 0.1787 | 0.1716 | 0.1903 |
| | (1.7525) | (1.8084) | (1.5843) | (0.1182) | (0.1197) | 0.1196 |
| INDUSTRY FE | Y | Y | Y | Y | Y | Y |
| YEAR FE | Y | Y | Y | Y | Y | Y |
| R-squared | 0.5479 | 0.5477 | 0.5578 | 0.5590 | 0.5599 | 0.5687 |

*The statistics presented are computed across 270 observations. Robust standard-errors are clustered at the industry level. Standard-errors in parenthesis. *** denote p-values<0.01, ** denote p-values<0.05, and * denote p-values<0.10.

# Appendix 2 – OLS estimation results at the NAICS 2-digit level

| | COC_OJN | | | LOG_COC_OJN | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| K2D | -0.4951 | | | -0.0479 | | |
| | (1.0255) | | | (0.0504) | | |
| TOP52D | | 0.0674 | | | -0.0124 | |
| | | (1.0962) | | | (0.0687) | |
| TCO2D | | | -3.7704** | | | -0.2267 |
| | | | (1.7043) | | | (0.1858) |
| SIZE | -0.4836* | -0.5304* | -0.6506** | -0.0046 | -0.0079 | -0.0162 |
| | (0.2858) | (0.3143) | (0.3221) | (0.0130) | (0.0108) | (0.0149) |
| BM | 4.7326*** | 4.8114*** | 4.5246*** | 0.2662*** | 0.2718*** | 0.2563*** |
| | (0.2083) | (0.2102) | (0.3964) | (0.0453) | (0.0427) | (0.0452) |
| LEV | 7.0834 | 7.0858 | 8.5565 | 0.4485 | 0.4490 | 0.5372 |
| | (5.1764) | (5.2545) | (5.4602) | (0.2957) | (0.2952) | (0.3535) |
| DISP | 11.4614*** | 11.5794*** | 11.3650*** | 0.4927*** | 0.5006*** | 0.4907*** |
| | (0.5497) | (0.5312) | (0.5339) | (0.0764) | (0.0747) | (0.0833) |
| RET | -1.2343** | -1.2086** | -1.2630** | -0.0837 | -0.0820 | -0.0846 |
| | (0.5095) | (0.5268) | (0.5097) | (0.0728) | (0.0743) | (0.0735) |
| BETA1Y | 1.8464*** | 1.8019*** | 1.9206*** | 0.2110** | 0.2080** | 0.2140** |
| | (0.6172) | (0.6268) | (0.6822) | (0.0881) | (0.0914) | 0.0975 |
| INDUSTRY FE | Y | Y | Y | Y | Y | Y |
| YEAR FE | Y | Y | Y | Y | Y | Y |
| R-squared | 0.5327 | 0.5326 | 0.5360 | 0.5366 | 0.5363 | 0.5390 |

*The statistics presented are computed across 270 observations. Robust standard-errors are clustered at the industry level. Standard-errors in parenthesis. *** denote p-values<0.01, ** denote p-values<0.05, and * denote p-values<0.10.

# Appendix 3 – OLS estimation results at the NAICS 1-digit level

| | COC_OJN | | | LOG_COC_OJN | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| K1D | 0.4862 | | | 0.0300 | | |
| | (0.3601) | | | (0.0477) | | |
| TOP51D | | 1.6835 | | | 0.1070 | |
| | | (1.1527) | | | (0.0903) | |
| TCO1D | | | -0.2878 | | | -0.0910 |
| | | | (2.1012) | | | (0.1036) |
| SIZE | -0.3972*** | -0.4588*** | -0.3670*** | -0.0100 | -0.0140 | -0.0097 |
| | (0.1059) | (0.1483) | (0.0622) | (0.0185) | (0.0167) | (0.0219) |
| BM | 4.4397*** | 4.5190*** | 4.3901*** | 0.2411*** | 0.2462*** | 0.2375*** |
| | (0.3513) | (0.3742) | (0.3372) | (0.0560) | (0.0543) | (0.0563) |
| LEV | 2.1409 | 2.4215 | 2.0350 | 0.2290** | 0.2471** | 0.2278*** |
| | (2.0322) | (2.4031) | (1.6728) | (0.0998) | (0.1204) | (0.0624) |
| DISP | 12.3422*** | 12.5501*** | 12.2398*** | 0.5712*** | 0.5846*** | 0.5634*** |
| | (1.1963) | (1.1272) | (1.1868) | (0.1495) | (0.1457) | (0.1450) |
| RET | -1.4955*** | -1.4522*** | -1.5089*** | -0.1075 | -0.1047 | -0.1072 |
| | (0.4962) | (0.5031) | (0.4639) | (0.0666) | (0.0666) | (0.0656) |
| BETA1Y | 3.5432*** | 3.4343*** | 3.5688*** | 0.3631*** | 0.3561*** | 0.3650*** |
| | (0.9676) | (0.9474) | (0.9671) | (0.0750) | (0.0776) | 0.0778 |
| INDUSTRY FE | Y | Y | Y | Y | Y | Y |
| YEAR FE | Y | Y | Y | Y | Y | Y |
| R-squared | 0.5063 | 0.5074 | 0.5061 | 0.4906 | 0.4916 | 0.4910 |

*The statistics presented are computed across 270 observations. Robust standard-errors are clustered at the industry level. Standard-errors in parenthesis. *** denote p-values<0.01, ** denote p-values<0.05, and * denote p-values<0.10.

## Appendix 4 – Control Variable Definitions

SIZE – Firm size, computed as the natural logarithm of Total Assets.

BM – Book-to-market ratio, the ratio of Total Shareholder's Equity divided by the total Market Capitalization.

LEV – Firm leverage, computed as Total Long-term Debt divided by the firm's Total Assets.

DISP – Analyst Forecast Dispersion, the standard deviation of the analysts' Earnings per Share estimate for next period divided by its mean value.

RET – Stock Return, the one-year stock price growth, computed with year-end values.

BETA1Y – Stock Return Beta, computed by regressing the daily firm's stock price on DAX-30 stock index price.