



Online-Appendix zu

„The Impact of Management, Family and Employee Ownership Concentration on Firm Performance“

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Appendix

A Alternative Models

A.1 Management Ownership – Filtered Sample

Variable	Model 11	Model 12	Model 11.b	Model 12.b
Significant Ownership (≥ 1% & < 6%)	0.007 (0.013)	0.001 (0.023)	0.004 (0.014)	0.004 (0.024)
Strategic Ownership (≥ 6% & < 20%)	0.064*** (0.022)	0.059 (0.039)	0.063*** (0.024)	0.069 (0.042)
Determining Ownership (≥ 20% & < 50%)	0.041* (0.022)	0.040 (0.040)	0.043* (0.023)	0.053 (0.042)
Controlling Ownership (≥ 50%)	0.021 (0.026)	0.030 (0.053)	0.024 (0.028)	0.040 (0.055)
Number of Employees (log)	-0.020*** (0.003)	-0.022*** (0.006)	-0.018*** (0.004)	-0.018*** (0.006)
Leverage (log)	-0.295*** (-0.044)	-0.373*** (0.075)	-0.337*** (0.051)	-0.396*** (0.083)
R&D Intensity		0.032*** (0.008)		0.034*** (0.008)
Constant	1.116*** (0.026)	1.017*** (0.047)	1.253*** (0.035)	0.988*** (0.051)
Year FE	Yes	Yes	Yes	Yes
Country × Industry FE	Yes	Yes	Yes	Yes
<i>N</i>	17,523	7,316	14,793	6,403
<i>F</i> -statistic	18.844***	14.666***	16.538***	13.637***
Adjusted R^2	0.354	0.404	0.347	0.402

Dependent Variable: Log of Tobin's Q. Standard Errors are clustered on firm level. 'Model 11' and 'Model 12' are included as a reference.

***p < 0.01, **p < 0.05, *p < 0.1

Table A1: Regression Results of Tobin's Q on Management Owner Concentration (Filtered Sample)

A.2 Family Ownership – Filtered Sample

Variable	Model 15	Model 16	Model 15.b	Model 16.b
Significant Ownership (≥ 1% & < 6%)	0.005 (0.012)	0.015 (0.020)	0.005 (0.016)	0.024 (0.025)
Strategic Ownership (≥ 6% & < 20%)	0.030** (0.015)	0.035 (0.024)	0.029 (0.019)	0.055* (0.032)
Determining Ownership (≥ 20% & < 50%)	-0.005 (0.019)	-0.018 (0.030)	0.003 (0.023)	0.005 (0.039)
Controlling Ownership (≥ 50%)	0.023 (0.034)	0.022 (0.068)	0.022 (0.039)	0.029 (0.078)
Number of Employees (log)	-0.021*** (0.003)	-0.022*** (0.006)	-0.023*** (0.005)	-0.021*** (0.009)
Leverage (log)	-0.300*** (0.043)	-0.375*** (0.077)	-0.346*** (0.062)	-0.446*** (0.112)
R&D Intensity		0.031*** (0.008)		0.038*** (0.009)
Constant	1.123*** (0.028)	1.022*** (0.047)	1.230*** (0.043)	1.283*** (0.080)
Year FE	Yes	Yes	Yes	Yes
Country × Industry FE	Yes	Yes	Yes	Yes
<i>N</i>	17,528	7,314	9,328	3,826
<i>F</i> -statistic	18.710***	14.630***	13.152***	10.140***
Adjusted <i>R</i> ²	0.353	0.404	0.353	0.396

Dependent Variable: Log of Tobin's Q. Standard Errors are clustered on firm level. 'Model 15' and 'Model 16' are included as a reference.

***p < 0.01, **p < 0.05, *p < 0.1

Table A2: Regression Results of Tobin's Q on Family Owner Concentration (Filtered Sample)

A.3 Employee Ownership – Filtered Sample

Variable	Model 17.b	Model 18.b	Model 19.b	Model 20.b
Employee Concentration (log)	0.088*** (0.015)	0.099*** (0.022)		
Significant Ownership (≥ 1% & < 6%)			0.066*** (0.013)	0.072*** (0.018)
Strategic Ownership (≥ 6% & < 20%)			0.066* (0.041)	0.108 (0.087)
Determining Ownership (≥ 20% & < 50%)			-0.008 (0.038)	-0.018 (0.055)
Controlling Ownership (≥ 50%)			-0.025 (0.060)	-0.036 (0.091)
Number of Employees (log)	-0.021*** (0.005)	-0.024*** (0.007)	-0.022*** (0.005)	-0.023*** (0.008)
Leverage (log)	-0.308 (0.098)	-0.421* (0.145)	-0.291 (0.094)	-0.385 (0.141)
R&D Intensity		0.027*** (0.0002)		0.031*** (0.0002)
Constant	1.093*** (0.035)	0.964*** (0.059)	1.125*** (0.035)	0.970*** (0.058)
Year FE	Yes	Yes	Yes	Yes
Country × Industry FE	Yes	Yes	Yes	Yes
<i>N</i>	11,561	5,499	12,136	5,724
<i>F</i> -statistic	16.986***	15.167***	17.206***	15.252***
Adjusted <i>R</i> ²	0.361	0.426	0.358	0.424

Dependent Variable: Log of Tobin's Q. Standard Errors are clustered on firm level.

***p < 0.01, **p < 0.05, *p < 0.1

Table A3: Regression Results of Tobin's Q on Employee Owner Concentration
(Filtered Sample)

B Examination of Regression Assumptions

According to ROBERTS/WHITED¹⁰⁵, ordinary least squares regression requires four key assumptions to hold in order to produce consistent parameters. These assumptions are:

1. a random sample of observations on the dependent and independent variables,
2. a mean zero error term,
3. no linear relationships among the explanatory variables,
4. an error term that is uncorrelated with each explanatory variable.

The following subsections will test each assumption for the models stated in equation 1 and equation 2. As both of these models only differ in the scale of measure for owner concentration, the following conclusions hold for both of these models, if not stated differently. Assumptions 1 to 3 are fulfilled. As the fourth condition is not empirically testable, arguments are provided to address endogeneity.

B.1 Assumption 1: Random Sample of Observations on the Dependent and Independent Variables

As described in section 3.1, the sample has been drawn mainly from the EFES database, which provides an exhaustive sample of significant companies in Europe. It contains all listed companies with a stock market capitalisation of more than 200 million euros from 31 European countries. It is an almost complete sample representing large corporations as 99% of capitalisation and 95% of employees is included. Some filtering has been applied to the dataset to exclude non-sensible observations (e.g. firms having zero employees). No systemising filtering has been applied that would cause the data set to become a non-random sample of observations.

Hence, one can assume that the error term is independent of the sample selection mechanism conditional on the covariates.¹⁰⁶ Assumption 1 is fulfilled.

¹⁰⁵ See Roberts/Whited (2012) p. 8.

¹⁰⁶ See Roberts/Whited (2012).

B.2 Assumption 2: Mean Zero Error Term

To test the assumption of mean zero error term, the variance of the residuals has been graphically analysed. Figure B1 depicts the residuals plotted against the fitted values for 'Model 12'. The variance of the residuals is non-constant, which indicates heteroscedasticity.¹⁰⁷ This pattern can be observed among all models used in this study. The assumption is satisfied when an intercept among the regressors is included.¹⁰⁸ As an intercept α is included in all models, assumption 2 is fulfilled.

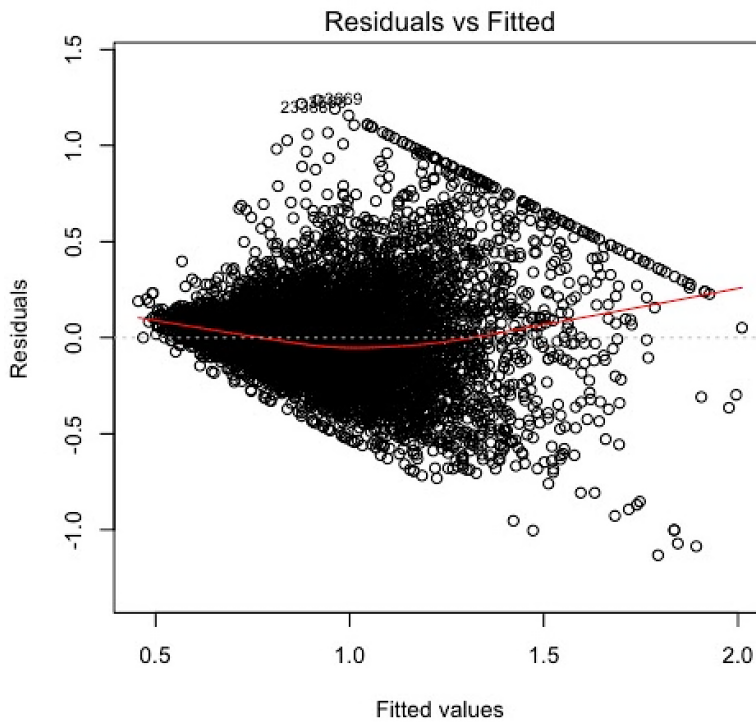


Figure B1: Residuals plotted against Fitted Values

B.3 Assumption 3: No Linear Relationships Among the Explanatory Variables

To test for multicollinearity in the models, the variance inflation factor has been computed. A value of less than 10 does not require further investigation.¹⁰⁹ For the variables used in this study, the variance inflation factor never exceeds 1.2 and the mean for all variables is 1.14, indicating that multicollinearity is not an issue in the models used. Hence, the third assumption is fulfilled.

¹⁰⁷ See Chen et al. (2003).

¹⁰⁸ See Roberts/Whited (2012), p. 9.

¹⁰⁹ See Chen et al. (2003).

B.4 Assumption 4: Uncorrelated Error Term

Assumption 4 is not empirically testable as the error term is unobservable.¹¹⁰ Therefore, the three causes of endogeneity are just commented. These are omitted variables, simultaneity, and measurement error.¹¹¹

The study may suffer from omitted variable bias as there are at least three potential factors that influence firm performance while at the same time being correlated with ownership concentration. Such omitted variables are decisions that lead to a certain ownership structure, the implementation of an ownership structure and self-reinforcing effects of a certain owner identity (see section 5.5.3 for detailed explanation). To account for such issues, industry-country fixed effects have been used and the ownership structure has divided up into separate owner identities.

This study may also suffer from simultaneity bias as the direction of causality cannot be clearly defined.¹¹² Possibly, the ownership structure is an endogenous outcome of the compensation contracting process, which happens when owners request higher shares of a company when the firm performance is expected to increase.

As a last source of endogeneity, it is possible that this study suffers from measurement error as it can be argued that there is a discrepancy between the true effect of an owner and ‘Owner Concentration’ as a proxy.¹¹³ Even though this proxy is a common standard in economic practice, the implications that may result from the measurement error should be considered.

To control for fixed effects caused by correlation of explanatory variables and unobservable, time-invariant variables of the error term, year and country-industry dummy variables have been introduced. To account for potential problems of autocorrelation non-independence, error-terms are clustered on firm-level.

¹¹⁰ See Roberts/Whited (2012), p. 9.

¹¹¹ See Roberts/Whited (2012), pp. 10-13.

¹¹² See Roberts/Whited (2012), pp. 11-12.

¹¹³ See Roberts/Whited (2012), pp. 13-17.

C Examination of the Normality of Residuals

According to FIELD/MILES/FIELD¹¹⁴, residuals have to be random, normally distributed variables with zero mean. Otherwise, generalisability is violated and conclusions beyond the sample cannot be drawn.

Figure C1 shows a normal quantile-quantile plot to assess whether the residuals for ‘Model 4’ are normally distributed. The graphical representation is similar across all models using Tobin’s Q as a dependent variable. Hence, this plot is representative of all models using Tobin’s Q. It can be seen that the residuals do not follow a perfect normal distribution but are light-tailed.

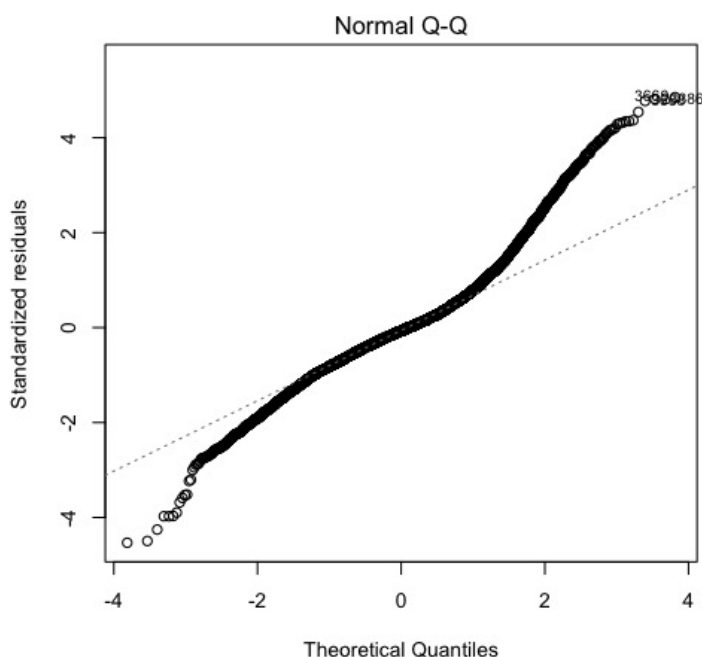


Figure C1: Normal Quantile-Quantile Plot for the Continuous Regression of Tobin’s Q

Figure C2 depicts the normal quantile-quantile plot for ‘Model 8’. It is representative of all models using ROA as a performance measure. A heavy-tailed distribution can be observed that is far from normally distributed.

Comparing both figures, ROA is less suitable to come up with results that can be generalized and is therefore excluded from further analysis. Nonetheless, generalizability may also be poor for models that use Tobin’s Q as a performance measure. The model can still be used to draw conclusions on the sample.¹¹⁵ As the sample concludes all significant European firms, the results are still of practical

¹¹⁴ See Field/Miles/Field (2012), pp. 271f.

¹¹⁵ See Field/Miles/Field (2012), p. 298.

value. However, one should be cautious when applying the results to firms significantly different from the companies used in the sample.

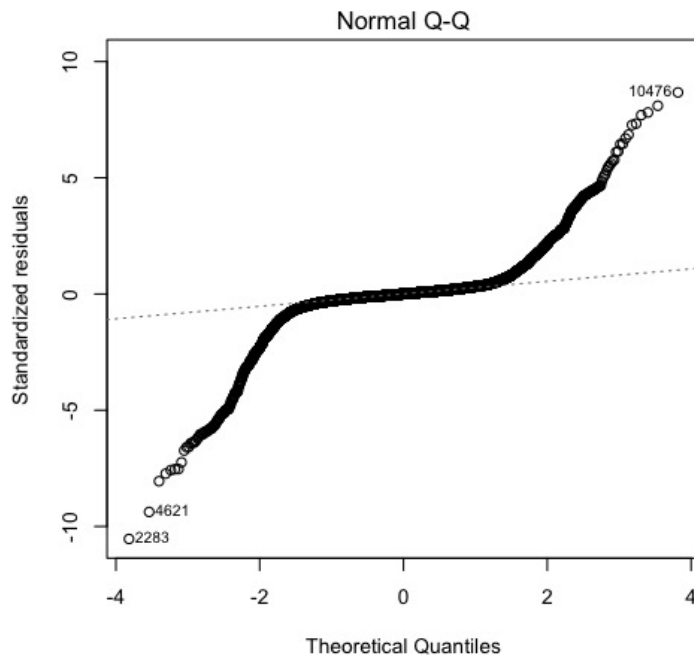


Figure C2: Normal Quantile-Quantile Plot for the Continuous Regression of ROA