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# LEVELS OF EMPLOYEE SHARE OWNERSHIP AND THE PERFORMANCE OF LISTED COMPANIES IN EUROPE

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**ABSTRACT**

We investigate the effects of employee share ownership (ESO) on three alternative measures of firm performance in a panel of 1115 companies from the five largest European economies. The results show that firms with ESO enjoy significantly higher levels of capital market performance and of accounting performance than firms without ESO however, the marginal effects of ESO are declining with increasing ESO levels. ESO does not have a clear effect on productivity. These findings hold for all countries except Spain. Variations in ESO levels within firms over time exert little performance effects.

# LEVELS OF EMPLOYEE SHARE OWNERSHIP AND THE PERFORMANCE OF LISTED COMPANIES IN EUROPE

Giving employees an ownership stake in their companies is widely believed to be beneficial not only for the employees themselves, but also for the firms concerned (Gates 1998; Rosen et al. 2005). According to economic theory, these beneficial effects are rooted in the interest alignment between employees and other shareholders, and the resulting reduction in principal-agent problems (French 1987). However, economists also caution that employee share ownership (ESO) may have undesirable consequences on the firm level such as the costs associated with adopting and administering employee share ownership plans (Jones & Kato 1995).

Empirical research has largely, but not unequivocally, attested to the idea that ESO is good for firm performance (Freeman 2007; Freeman et al. 2010). In an analysis of French firms, Guedri & Hollandts (2008) find an inverted U-shaped effect of employee ownership on accounting performance, but no significant effect on capital market performance. Their study raises three issues that we seek to address in our paper. First, we investigate whether the potential effects of ESO hold for different dimensions of firm performance, namely capital market performance, accounting performance, and productivity. Distinguishing between alternative performance measures is important as these measures represent the performance expectations of different stakeholder groups (Richard et al. 2009). Second, we provide a more finely-grained analysis of the ESO–performance relationship, by using a spline regression approach that makes less restrictive assumptions regarding the nature of the relationship than does the quadratic regression methodology employed by Guedri & Hollandts (2008). Third, we use a large-scale sample of companies from the five largest European economies, in order to assess whether the presumed performance effects of ESO are contingent on institutional and socio-economic conditions in the countries concerned. We argue that differences in these

conditions across countries not only affect the level of ESO, but that they also moderate the strength and shape of the ESO–firm performance relationship.

## REVIEW

Employee share ownership refers to situations in which a broad cross-section of employees holds a portion of the ownership rights in the firm employing them. This characteristic distinguishes ESO from other ownership forms, which involve only a limited fraction of the work force, such as partnerships. Employee participation in ownership is often viewed as normatively preferable to exclusive control of companies by outside shareholders for such reasons as equality or autonomy (Dow 2003). Nevertheless, absolute ESO levels in many market-based economies are low (Boatright 2004). However, the importance of ESO has increased in recent decades for a variety of reasons, e.g. the increased importance of (investments in) human capital in knowledge-intensive firms (e.g., Robinson & Zhang 2005).

The economics literature has analyzed the effects of employee share ownership primarily in terms of a device for alleviating principal-agent problems between workers and shareholders (Holmstrom & Milgrom 1991). Principal-agent theory suggests that the interests of shareholders (principals) and employees (agents) may differ (e.g., Conte & Svejnar 1988; Sappington 1991). Under conditions of information asymmetry and imperfect monitoring, agents may maximize their own utility at the expense of principals (Jensen & Meckling 1976).

Economic theory thus suggests that ESO may benefit firm performance by internalizing conflicts of interest between workers and owners (French 1987). Employees who hold a stake in the ownership rights are entitled to sharing in the returns of the firm for which they work. This right should increase employee motivation to exert effort, to cooperate with management, and to stay with the firm. These arguments resonate with behavioral perspectives, suggesting that employee participation in ownership elicits feelings of attachment to and responsibility

for the firm concerned (Pierce et al. 2001; Rousseau & Shperling 2003). Employee stability can facilitate investment in human capital and skill accumulation, thus improving firm performance (Hansmann 1996). A cooperative culture can foster trust and reduce bargaining costs associated with collective choice (Ben-Ner 1988). A more participatory firm is expected to experience superior conflict resolution and fewer strikes and work stoppages (Estrin et al. 1987). Front-line workers are experts regarding the processes at their own workplace and, if committed to the success of their firm, are more likely to make suggestions for improvements to increase productivity (Nalbantian 1987). Ownership participation increases their interest in the business and fosters engagement in productivity-enhancing activities such as quality control circles (Jones & Kato 1995).

At the same time, economists caution that ESO may induce inefficiencies that limit its positive effects on firm performance or even reduce it, for four reasons. First, in the presence of a large number of shareholders, an increase in the share of an employee's total compensation that is accounted for by his/her participation in ownership may soften his/her incentives to increase individual performance, as s/he bears the full cost of effort as well as the cost of the risk associated with the variability in returns, while receiving only a small portion of the gains accruing from it. As this effect holds true for every employee shareholder, it may limit aggregate value creation (Boatright 2004). Informal and formal monitoring may reduce this problem (Fama & Jensen 1983) and employee identification with the firm will increase information sharing and peer monitoring (Putterman 1993), yet these mechanisms are imperfect especially in large and anonymous organizations.

Second, higher ESO levels may also weaken the incentives for outside monitoring and control as economic surplus for non-employee shareholders decreases (Jensen & Meckling 1979). Furthermore, higher levels of ESO may facilitate managerial entrenchment (Pugh et al. 1999), although empirical research does not universally support this argument (Lu et al. 2007). Managers may use ESO to protect their position and defend against threats of hostile

takeovers (Aubert et al. 2011; Rauh 2006). The entrenchment argument may have lost importance since the 1980s, a period characterized by high levels of hostile takeover activities by 'corporate raiders', yet some argue that in recent years ESO may serve similar purposes in helping management defend against unwelcome advances by private equity investors (Keeling 2007).

Third, employees are in a weak position to bear the costs associated with greater ownership of their firm (Hansmann 1996). Employees have comparatively tight wealth constraints and face borrowing restrictions (Pagano et al. 1998). Even if they do not have to provide the financial means for the initial investment, they nevertheless bear the costs of sub-optimal portfolio diversification (Brown et al. 2006; Schlicht & von Weizsäcker 1977). However, recent work by Blasi et al. (2010) has shown that for most employees, prudent asset allocation strategies may include ownership stakes in their firm of approximately 10 to 15 per cent of an individual's portfolio at only modest loss in utility due to risk.

Fourth, higher levels of employee ownership may carry costs of collective decision-making. Especially in large enterprises with many employees, there is often heterogeneity of interests among employees, which leads to frictions in decision-making processes (Dow & Putterman 2000; Kennan & Wilson 1993). These arguments carry little weight at low levels of employee share ownership, as employee participation in governance is likely to be relatively limited in such situations, but they become more relevant as ESO levels increase.

The above considerations suggest that the marginal effects of ESO on firm performance should decline with increasing ESO levels. Moreover, the shape of the ESO–performance relationship may also depend on which performance dimension is used. For example, outside investors might welcome low levels of ESO due to its signaling effects, yet be more critical of higher ESO levels, which would translate into an inverted U-shaped relationship between ESO and capital market performance. In contrast, the motivational effects of ESO (which

would be better captured by productivity or accounting-based measure of performance) might only kick in at a particular (unknown) threshold level.

Extant empirical research suggests that investigations of the ESO–firm performance relationship are sensitive to model specification and the use of alternative performance measures. There appears to be a weakly positive association between employee share ownership and *firm productivity* (Bradley et al. 1990; Jones & Kato 1995; Kalmi et al. 2005; Sengupta et al. 2007). Conte & Svejnar (1988) find a positive effect for low ESO levels when using regressions with instrumental variables, but no ESO effect on productivity when using OLS regression.

The effects of ESO on other measures of firm performance are not entirely conclusive. Many studies find positive ESO effects on *profits* (Kalmi et al. 2005; Long 1980; Rosen & Quarrey 1987), *growth* (Blasi et al.1996; Rosen & Quarrey 1987), *market returns* (Richardson & Nejad 1986), *cost of equity* (Barney 1990) and *survival* (Park et al. 2004). However, others find no effect on *accounting performance* (Chaplinsky et al. 1998; Davidson & Worrell 1994). Blasi et al. (1996) find no strong association between a continuous ESO measure and various *profitability* measures, but the companies with more than 5% ESO had significantly higher growth in *return on assets*, *return on equity* and *profit margin* than did other companies in their sample. Richardson & Nejad (1986) analyze longitudinal *changes in stock prices* of companies with and without ESO in the multiples stores sector in Britain. They conclude that the average return for the portfolio of companies with ESO was significantly higher than for the portfolio of companies without. In contrast, Faleye et al. (2005) find that firms with ESO have significantly lower *Tobin's Q*, *sales growth*, and *total factor productivity* than firms without ESO. In an early study using data from the 1960s (i.e, before the creation of defined ESO plans), Livingston & Henry (1980) found that companies with employee stock purchase plans had lower mean *profitability ratios* than those without such plans.

In their study on 230 French firms, Guedri & Hollandts (2008) have modeled the possibility of an inverted U-shaped relationship between ESO and firm performance. They find support for this hypothesis when using an *accounting measure of performance* (return on invested capital), but neither linear nor curvilinear effects when using a *market-based performance measure* (market-to-book ratio). The authors leave this puzzling result largely unexplained. They rely on the inclusion of a quadratic ESO term in order to model the proposed curvilinear relationship, a method that attaches disproportionately large weight to firms with high ESO. Quadratic regression is restrictive in that it assumes the existence of an unambiguous inflection point as well as a symmetric shape of the ESO–performance function that is imposed on the data.

We thus seek to provide an advance over the extant literature in several ways. First, we provide a more differentiated analysis of the effects of ESO on three dimensions of firm performance, namely capital market performance, accounting performance, and productivity. Capital market performance is "a dynamic indicator of the market's reaction to firm actions and expectation of those actions on future performance" (Sirmon & Hitt 2009; 1381). Accounting performance measures are widely employed by managers, analysts and researchers as they reflect a return more directly under the control of management and the workforce. Capital market and accounting performance tend to be highly correlated, and we expect them to exhibit a more stable relationship with ESO than more intermediate performance measures. Specifically, firm-level productivity measures (such as *sales per employee*) have two limitations in this regard. They are susceptible to high inter-temporal variability, e.g. due to fluctuations in sales. Also, a decrease in a firm's workforce (and thus of the proportion of share capital held by employee shareholders) is likely to result in an *increase* in the productivity, as the denominator of the *sale per employee* ratio decreases in size. This effect may counteract and thus distort any positive performance effects that ESO may otherwise have.

Second, in order to model non-linearities in the ESO–firm performance relationships in a more succinct manner, we use spline regression. This technique allows estimating the relationship between the independent variable of interest and the dependent variable as a piecewise linear function (Greene 2008). It thus traces the shape of the underlying relationship between ESO levels and firm performance more closely than alternative techniques that make more restrictive assumptions about the shape of that relationship.

**The role of the country environment**

The institutional economics literature suggests that both the *level* of employee ownership and the *effects* of ESO on performance may differ across countries (Estrin et al. 1987). According to this perspective, country-specific formal and informal institutions define the rights and responsibilities of different groups of economic actors, and provide positive or negative incentives for ownership (Hansmann 1996). Among others, countries differ in terms of

- the protection given to different groups of owners, specifically minority shareholders;
- the fiscal and other incentives for different forms of employee financial participation;
- the level of political support for employee ownership, and the perceived importance of ESO as expressed in the public debate.

The differences between countries in these respects help explain cross-country variations in ESO adoption rates and ESO levels. As the PEPPER reports (Commission of the European Communities 1997; Lowitzsch 2006; Lowitzsch et al. 2009; Uvalić 1991) show, these variations in the use of ESO and other forms of financial participation among the EU member countries are significant. We argue that country-specific institutional factors also *moderate the strength and the shape of the ESO–firm performance relationship*, for two reasons. First, in countries whose institutional conditions favor ESO, the effects of its use on firm performance should be stronger than in those countries that impose costs or other hurdles on the use of ESO. For example, both France and the UK have strong traditions in fostering ESO

(Lowitzsch & Hashi 2012; Würz 2003). These countries raise reduced respectively no social security contributions on the returns from ESO plans. Furthermore, they impose alternative taxes (such as capital gains tax in the UK) at favorable rates in lieu of personal income taxes. These fiscal measures reduce the costs of using ESO to both employees and firms, thus increasing the demand for and the returns to ESO. Furthermore, in countries where support for ESO is high, its use may have secondary firm performance effects, as outside investors may respond to the presence of ESO more positively and increase their demand for shares (which raises capital market performance). In contrast, in countries with poor support for ESO, both employees and outside investors will respond more reluctantly to the use of ESO, so that its effects on firm performance will be weaker. For example, in Spain, tax incentives for broad-based ESO plans were introduced only in 2003, and have not yet led to a significant increase in the adoption of such plans beyond large multinationals, suggesting that their economic attractiveness is limited.

Second, the effects of ESO on firm performance are likely to depend on the availability of other forms of employee participation in countries. Where well-developed systems for employee representation and participation exist, the marginal effects of ESO on employee motivation, commitment and retention should be lower than in countries where ESO represents a relatively more important instrument for achieving employee participation. For example, Germany's codetermination system emphasizes forms of employee participation other than ESO (Kabst et al. 2006), thus the (incremental) importance of ESO for achieving these objectives should be lower than in countries without such a system. Along the same lines, the marginal performance effects of ESO should be weaker in countries whose social security and pension systems provide a higher level of financial welfare independent of employees' acquisition of ownership rights in their companies.

We thus expect not only the level of ESO, but also its effects on firm performance, to differ between countries. We provide a differentiated analysis of the ESO–firm performance relationship across the five largest economies in the European Union.

## DATA AND METHODS

### Data

We use information on publicly traded companies in Germany, Spain, France, Italy and the UK from the European Foundation of Employee Share Ownership (EFES). The EFES data set includes all listed companies whose market capitalization was 200 million Euro or more in any one year between 2006 and 2008, regardless of whether these companies had any employee ownership or not. It thus covers 24% of all European listed companies, but 97% of the entire stock market capitalization in Europe.

EFES provides data on the level (stock) of ESO on the basis of information produced by companies in their audited financial reports. Companies are required to report in the balance sheets their shareholders' equity (Weygandt et al. 2015), yet there is no legal requirement that they distinguish between contributed or paid-in capital and retained earnings, or to provide information on which shareholder groups hold equity (Stice et al. 2009). However, they are obliged to provide detail on the *availability* of employee share plans and their target population. According to EFES, 60% of the companies in their database disclose the number of employee shareholders, and 13.4% of them specify the level of ESO in their accounts.

EFES thus estimates the level of ESO on the basis of information on share-based transactions. IFRS2, issued in 2005 by the International Accounting Standards Board (IASB), requires all companies listed in Europe to detail such transactions in their financial statements, "including transactions with employees or other parties to be settled in cash, other assets, or equity instruments of the entity. Specific requirements are included for equity-settled and

cash-settled share-based payment transactions, as well as those where the entity or supplier has a choice of cash or equity instruments" (http://www.iasplus.com/en/standards/ifrs/ifrs2; see Deloitte 2007). Although the rules set out in IFRS2 have attracted criticism (see Osborne 2007; Smith & Luesby 2009; Stibbe 2005), their application has resulted in greater comparability between companies from different countries regarding their reporting of ESO information. EFES then uses those companies for which it has information on both ESO levels and flows in order to obtain estimates of the level of ESO where only flow information is available. In arriving at these estimates, it uses the full historical information about each employee share plan (especially the length of the lock-up period), as well as retention models (i.e., the length of time the shares are kept after the end of the lock-up period or after options are exercised).

EFES provides data on the amount of share capital held by all employees and on the split between share capital held by executives (provided by about 80% of all listed firms according to EFES) and non-executive employees. This information includes capital held directly by employees and indirectly on their behalf by collective bodies such as foundations, funds and trusts. With respect to the latter, EFES seeks to focus on trusts that are truly vehicles of collective ownership, whereas those trusts that are merely vehicles for treasury shares are excluded. Stock options, performance shares and deferred shares are not included in the data, yet shares kept following the exercise of such options, the vesting of deferred shares and the like are included. It needs to be pointed out that shares acquired by companies on behalf of their employees, for example those held by foundations and funds, are highly indirect in that they provide virtually no participation in control rights to the employees concerned. Therefore, not all of the ESO reported in this paper may confer participation in the full sets of rights generally associated with ownership.

The original sample of listed companies for the five countries included 1,228 companies. Information on sales, total assets, return on assets, debt and industry affiliation was obtained

from the Thomson One Banker database. The data we used were for the years 2006 through 2008. 105 observations were dropped from the original sample as no complete data could be obtained. We also omitted eight firms with a one-digit SIC code of 0 (agriculture, forestry & fishing), due to the small number of observations in this industry. Therefore, the final sample includes 1,115 companies. ANOVA tests for the variables market capitalization and non-executive ESO as a percentage of total market capitalization suggest that there are no significant differences between the original and the final sample.

## Variables

***Firm performance.*** We used *Tobin's Q* as a measure of capital market performance. It is calculated by dividing the market value of the firm by the replacement value of its assets, approximated by the total assets of a firm (Lewellen & Badrinath 1997). We used *RoA* as an accounting-based measure of the firm's profit generation relative to its asset base The finance literature, due to its concern with market valuation, tends to give preference to *Tobin's Q*, while economists are primarily interested in matters of profitability and price-cost ratios, thus preferring *RoA* (Stevens, 1990). Both measures are commonly used to analyze performance effects of employee ownership (e.g., Bell & Kruse 1995; Faleye et al. 2006; Kim & Ouimet 2008; Park & Song 1995). They tend to be highly correlated.

Given that the distributions of these two variables depart from normality, logarithmic transformations were used. In order to avoid observations from dropping out of the analysis as a result of zero values, we applied a box-cox transformation. A few cases where the *RoA* values were negative were omitted from the analysis as the logarithm of negative values is undefined. Dropping these observations did not affect our findings.

As a measure of productivity we used *sales per employee*. This measure is used less commonly in studies on the performance effects of ESO (for exceptions see Kramer 2010;

Quarrey & Rosen 1993), possibly due to its limitations discussed above. In order to be able to estimate a Cobb-Douglas type production function, we used logarithmic transformations.

***Employee share ownership (ESO).*** Our main independent variable is defined as the percentage of company stock owned by non-executive employees relative to the total number of shares in this company. This ESO operationalization is commonly used in the literature (Blasi et al. 1996; Guedri & Hollandts 2008; Park et al. 2004). As an alternative specification, we also created a dummy variable taking the value of one if a company had any ESO in a given year, and zero otherwise.

***Firm size.*** As firm size may have a significant effect on firm performance (e.g., for economies of scale and market power reasons, we included the logarithm of the number of employees as a measure of firm size as a control factor (Blasi et al. 1996; Kimberly 1976).

***Capital per employee***. To control for differences in capital stocks in the regressions on productivity effects we included a variable for capital intensity (Blasi et al. 1996; Conte & Svejnar 1988), namely the logarithm of the ratio of total assets to the number of employees.

***Leverage.*** High levels of debt can reduce financial ratios based on net income (Gamble 1998). Leverage is measured by calculating the logarithm of the ratio of total debt to total assets per firm.

Furthermore, we included dummy variables for country and industry.

## Analytical approach

As our main tool for testing the proposed effects, we chose a random effects model implemented as a feasible generalized least squares (FGLS) regression (Baltagi 2008); for conceptual as well as for analytical reasons. First, we are primarily interested in the performance differences between firms that can be attributed to organizational features such as ESO. This between-firm variance can be best analyzed using a random-effects model (Hsiao 2003). Second, inspection of our data revealed that for all variables there is more

variation across individual firms (between-variation) than over time (within-variation). For example, 87% of the companies in our sample which did not have ESO in any one year did not change this situation over the whole time period. Conversely, 95% of the companies which did have ESO at one point in time had ESO over the whole period of analysis. Third, the model includes two time-invariant variables, country and industry. Fixed-effects models cannot estimate the effects of these variables because variables that do not change over time drop out of the model. A Breusch-Pagan/Cook-Weisberg test for heteroskedasticity yielded positive results; therefore a FGLS regression which controls for heteroskedasticity was necessary for consistency and robustness reasons (Cameron & Trivedi 2009). A test for multicollinearity showed that the variance inflation factors for all main effects were well below the acceptable level of 10 (Bowerman and O'Connell 1990; Myers 1990).
For the regressions on productivity effects we used a Cobb Douglas–type production function, controlling for differences in labor and capital stocks in addition to the other control variables.

We supplemented our analysis with fixed-effects estimations that investigate the effects of the (limited) variation in ESO levels within firms over time, omitting the time-invariant *country* and *industry* dummies. We ran these regressions with alternative independent variables, namely with ESO levels (and the squared term thereof), and with dummy variables denoting the introduction of ESO in firms that did not offer it in 2006. However, these fixed-effects regressions provided only minimal explanatory power (with $R^2$ values between 0.03 and 0.06), probably as a result of the small changes in ESO over time. Therefore, we refrain from presenting the results here.

## RESULTS

A breakdown of firms in the sample by industry, country and size is available from the authors. Employee share ownership was most common in the UK, where more than 90% of

sample firms had some form of ESO. In contrast, in Spain only one in four large, listed firms offered ESO. The differences in ESO usage among countries are statistically significant, with one exception: With about 55%, Germany and Italy had similar ESO usage rates. On average, reported ESO levels within firms were fairly small. At industry level, the differences in ESO usage were less pronounced than they were between countries.

As is the case in prior studies (e.g., Guedri & Hollandts 2008), the distribution of ESO size categories across the firms in our sample is right-skewed. The average ESO level in the overall sample did not change much over time: On average, ESO accounted for 1.1% to 1.2% of total market capitalization in the years 2006 to 2008, with a median of 0.33% in 2006 and 0.43% in 2008. The maximum ESO share in 2008 was 49%. However, 23.4% of firms did not have employee ownership at all, 67.8% of them reported ESO levels under 3%, and 8.7% of firms reported ESO levels of more than 3%. Only a few firms reported ESO of more than 10%.

Despite the small employee ownership levels, the number of firms offering ESO increased over the time period from 791 firms in 2006 to 854 firms in 2008, an increase of about 8%. Furthermore, of those 791 firms that already had some ESO in 2006, more firms increased than decreased their ESO levels during the period analyzed. As a result, the median ESO level in those firms with ESO increased slightly, from 0.33% to 0.43%.

Table 1 shows the descriptive statistics for the variables in this study, distinguishing between firms with and without ESO. Firms with ESO tended to be larger than firms without; they also had a higher market capitalization, but were less capital-intensive. These differences were statistically significant. The performance measures log *Tobin's Q* and log *RoA* were, on average, higher for firms with ESO, and these differences were statistically significant. Median *sales per employee* levels were significantly lower in firms with ESO than in those without.

Table 2 presents the correlations between the central variables in this study. ESO is positively correlated with *Tobin's Q* and negatively correlated with *sales per employee*. Furthermore, it is positively correlated with firm size, but negatively with capital intensity (measured as *capital per employee*). The results show that firms with higher ESO levels are characterized by a higher number of employees and by lower capital intensity than firms with lower levels of or no ESO. These results are consistent with the preponderance of ESO in service industries, which tend to be less capital-intensive than firms in manufacturing. *Tobin's Q* and *RoA* are positively correlated with one another, and negatively related to *sales per employee*.

Results of the random effects regressions are presented in Table 3. For each dependent variable (*Tobin's Q*, *RoA* and *sales per employee*) we estimated three models. All models have good model fit, as demonstrated by high Wald $chi^2$ values. The first model includes all control variables, namely *firm size*, *leverage*, *industry* and *country* (and *capital intensity* for the regression using *sales per employee* as dependent variable), plus ESO as a dummy variable. In all models the coefficients for this variable are positive and statistically significant. Therefore, ESO has a positive effect on *Tobin's Q*, *RoA* and *sales per employee*, after controlling for a range of other factors.

In models 1.2, 2.2 and 3.2 we included ESO as a continuous variable. The coefficients are positive and significant throughout. However, entering ESO as a continuous variable into the models does not necessarily improve model fit (as indicated by the Wald $chi^2$ statistics) compared to including it as a dummy variable.

In order to ascertain the shape of the ESO–performance relationship, we performed spline regressions (models 1.3, 2.3 and 3.3). We divided the sample firms into quintiles by ESO level and estimated the performance function for each linear segment representing one firm quintile. We experimented with different segmentations for the splines. However, our

results did not vary much between the different models. Graphs of the results are presented in Figures 1a–1c.

The results for *Tobin's Q* and for *RoA* are fairly similar. The coefficients for each of the first four splines representing ESO between 0 and 1.84% are positive and significant for both *Tobin's Q* and *RoA*. The coefficients for the last spline representing ESO of more than 1.84% are negative. However, the decline in *Tobin's Q* respectively in *RoA* is fairly minor in magnitude relative to the increase in these performance measures for the first four quintiles of ESO levels. We tested pairs for differences in spline coefficients. The coefficients are all statistically different from each other.

In contrast, when using *sales per employee* as a measure of firm productivity, no clear pattern of ESO effects emerges. Initially there appear to be negative effects of ESO, before they turn positive for firms with ESO levels of more than 0.21%. However, for firms in the third and fourth quintile of the ESO distribution, the effects of ESO are negative, before they turn positive again for firms with ESO greater than 1.84%. Overall, the *sales per employee* measure does not appear to have a stable, interpretable relationship with ESO. In our further analysis, we thus focus on *Tobin's Q* and *RoA*, as ESO has consistent, clearly patterned effects on these two measures of firm performance.

We also performed an analysis that is more directly comparable to the one by Guedri & Hollandts (2008), using the conventional (quadratic) curvilinearity test (the results are available from the authors). The coefficients for the ESO variable and its squared term have opposite signs and are significant for all our performance measures. A graphical analysis of these regression results shows that *Tobin's Q* increases in the level of employee share ownership up to a value of 1.44%, and decreases thereafter. For *RoA* the maximum performance value is at an ESO level of 1.53%. However, a comparison between the results of the conventional curvilinearity test and those of the more differentiated spline regressions above shows that the former approach tends to *underestimate* performance-optimal ESO

levels and, more importantly, to *overestimate* the decrease in firm performance for ESO levels above that optimal point. When using quadratic ESO terms, a few firms with relatively high levels of ESO carry disproportionately greater weight in the regressions, and thus the performance decreases above the 'optimal' ESO level appear to more than outweigh the performance increases at ESO levels below that point. The results of spline regressions show that this impression is misleading: Any performance decreases above a particular level of employee share ownership do not "eat up" the performance gains achieved at lower levels.

We were also interested in whether the relationships between reported ESO levels and the two central measures of firm performance uncovered in our analyses varied between the five countries included in our data set. To this end, we ran our spline regressions for five different subsamples, each including all firms from a particular country. The numerical results are available from the authors. Overall, we find that the general profile of the relationship between levels of ESO and firm performance in the five countries except Spain follows the one described above and sketched in Figures 1a and 1b. Specifically, we observe that in none of the countries, the relationship between ESO and performance is of a monotonic shape, regardless of the performance measure used.

However, in terms of the exact shape of the ESO–performance relationship, there are noteworthy differences between countries. First, in several countries, low levels of ESO are associated with adverse performance effects, as indicated by negative and statistically significant coefficients on the first ESO spline. This is the case for Germany when *Tobin's Q* is used as dependent variable, and for Spain when *RoA* is used. For Italy, the positive effects of ESO kick in strongly at low ESO levels already. At the same time, in Italy the decline and eventual "flattening out" of the effects of ESO on performance set in at a somewhat lower ESO level than is the case in the other countries. Second, the country with the ESO–performance profile that is least in line with the one found for the other countries is Spain. There, the "slump" in the ESO–performance relationship occurs at medium ESO levels,

whereas for higher levels of ESO, the effects are positive again. Also, the total effect of ESO on performance is small in Spanish firms.

## DISCUSSION

Our analysis of the effects of ESO on firm performance in listed companies in the five largest Western European economies has produced three major insights. First, ESO enhances firm performance in that, holding other factors constant, firms that report ESO enjoy a performance advantage over firms reporting no ESO. This finding holds for *both* capital market measures of firms' value generation potential (as reflected in Tobin's *Q*), and for measures of firms' underlying value generation capacity relative to its asset base (as reflected in *RoA*). Our analysis thus provides a counterpoint to the one by Guedri & Hollandts (2008), who had found, for no apparent reason, different results of the effects of ESO on capital market performance as compared to accounting performance.

However, we do not find a consistent relationship between ESO and *sales per employee*, our measure of firm productivity. We believe that the *sales per employee* measure is susceptible to problems (e.g. it may be "artificially" increased by reductions in employment levels) which may result in a distorted picture of the ESO–firm performance relationship.

Second, the marginal effects of ESO on firm performance are declining with increasing ESO levels. There are some indications that the marginal effects may even become negative at some point however, the performance decreases at ESO levels above that point are relatively small, regardless of whether *Tobin's Q* or *RoA* is used as performance measure. Overall, the performance effects of ESO appear to simply "peter out" at levels anywhere between 1.5% and 2.0%. Firms with ESO above these levels do not enjoy an additional performance advantage over others with lower ESO levels.

Third, the performance effects of ESO hold true across the five European economies we investigated, except Spain, although both the strengths of these effects, and the shape of the ESO-performance relationship, differ from country to country. Spain is the country in which we find the weakest performance effects of ESO. However, it is also the country with the lowest number of observations in our sample, reflecting the smaller size of its economy. With respect to the other four countries the shape of the ESO–performance relationship exhibits a greater degree of similarity, although the performance effects of ESO appear to kick in at different levels. In Germany, the initial introduction of ESO appears to be associated with negative performance effects; and in the UK, there are no statistically significant effects for low levels of ESO. These findings seem consistent with the argument made by authors such as Conte et al. (1996), Jones & Kato (1995) and Kumbhakar & Dunbar (1993) that the introduction of employee ownership may be associated with set-up and administrative costs, and that any positive effects of employee ownership might take time to develop any impact.

Our results are in line with the economics perspective developed above, according to which employee participation in ownership helps align the interests of employees and shareholders (Holmstrom & Milgrom 1991). At the same time, in line with our expectations, the marginal returns to ESO appear to be declining with increasing levels of ESO. We believe this to be the case as with increasing ESO levels, its beneficial effects – e.g., the signaling effect associated with its initial introduction – are exhausted, while its disadvantages (e.g., the weakening of incentives for outside monitoring) may begin to set in. However, our analysis casts doubt on the finding by Guedri & Hollandts (2008) of a "fully-fledged" inverted U-shaped relationship between ESO and performance. We believe their finding to be an over-interpretation, driven by the inclusion of a quadratic ESO term in their regressions. Our findings are more consistent with an "Enough-of-a-Good Thing" argument than with the "Too-Much-of-a-Good Thing" effect in management recently described by Pierce & Aguinis

(2013). Following their recommendations, our application of a range restriction technique helps to provide a far more nuanced image of the relationship under investigation.

Our cautiously positive findings on the firm performance effects of ESO shed new light on why extant empirical research, while largely positive about ESO, has produced somewhat inconsistent results. For example, we notice that several papers reporting statistically insignificant ESO effects use productivity measures of performance (e.g., Bloom 1985; Dunbar & Kumbhakar 1992), which we, too, find to be less strongly related to ESO than the other two measures of firm performance we use.

The dual findings regarding Spanish listed firms of low ESO levels and weak performance effects in the few companies that have ESO should be interpreted against the background of Spain's institutional framework. Spain has traditionally favored another form of workers' financial participation, namely through "Workers' Companies" (sociedades laborales) in which employees hold the majority of the shares. However, these are largely micro-enterprises (with an average of fewer than ten employees) (Lowitzsch et al. 2009). Spain's support for ESO in larger companies was introduced relatively recently, and it is still weaker as compared to the situation in the other four countries. We believe that our results are indicative of our argument that unfavorable conditions lead not only to lower ESO levels, but also to a weakening of the ESO–performance relationship.

In contrast, we find the highest levels of ESO in France and the UK. Both of these countries have strong traditions in fostering ESO. Lowitzsch and Hashi (2012; 58) rate the UK as the most supportive of employee ownership among all EU member states. The UK began introducing tax incentives for ESO plans in 1978, and these plans are regularly reviewed by the government. As a result, the UK has seen a steady increase in such plans, in particular so-called Revenue-Approved Plans (Würz 2003; 130). Consequently, the ESO–firm performance relationship appears to be particularly strong for British firms. With respect to France, Lowitzsch and Hashi (2012) argue that the French institutional tradition favors profit

sharing (with respect to which they rate France as the most favorable country in Europe). However, as most profit sharing in France is share-based, this support for profit sharing also indirectly favors ESO.

According to our findings, Italy and Germany have medium levels of employee share ownership, as compared to the UK and France on the one hand, and Spain on the other. In particular with respect to Germany, Lowitzsch and Hashi (2012) argue that although tax incentives for ESO are in place, they are overly restrictive, thus preventing a more widespread use of ESO. In particular, German codetermination law (§87 Section 1 No. 10 *Betriebsverfassungsgesetz*) stipulates that the use of ESO plans for all but executive employees requires prior agreement by the Works Council. KPMG describes the use of ESO plans in Germany as "complex though doable", thus requiring significant time commitments and efforts (Steininger 2011). The hurdles to the initial introduction of ESO plans may also help explain why the initial performance effects of ESO in Germany turn out to be negative. In Italy, there are fiscal advantages (e.g., in terms of reduced corporate and income taxes and social security contributions) to employee share acquisitions however, there is a whole range of restrictive rules that effectively limit their benefits (see the report by Clifford Chance 2010; 113-124).

Overall, our results support our argument that country-specific institutional conditions (e.g., regulatory and fiscal regimes, cultural attitudes and so on) matter for *both* the adoption *and* the effects of ESO (Pendleton et al. 2001; Poutsma 2001; Poutsma & de Nijs 2003;). We thus caution against transferring the results found in a particular country to geographies characterized by different institutional settings.

Our study has several limitations that should be addressed in future research. First, our sample only includes large and medium-sized listed companies, whose share of employee ownership is typically small. We believe the dynamics of ESO are quite different in stock-market listed companies with large employee ownership stakes, and in smaller firms. Future

research should explore the performance effects of ESO in such firms. Second, we use estimates of absolute ESO levels provided by EFES on the basis of companies' payment transactions with their employees reported in the audited financial statements. While the information basis on which EFES draws is strong, there is the possibility that these estimates may misrepresent the true level of ESO, i.e., ESO flows recorded in IFRS2 statements do not necessarily turn into ESO stocks. Also, we only have information on overall ESO levels per firm, but not on the *distribution* of ownership rights among employees. Whether only a small group of employees holds large stakes in the firm or all employees hold relatively small stakes may influence the effect of share ownership on employee attitudes and behaviors, corporate governance, and ultimately, firm performance. Future research should focus on the governance implications of ESO, using multiple data sources.

Third, and related to the point above, we do not have much information on the way ESO was implemented, nor do we know if it was introduced along with other human resource management (HRM) policies. Given the importance of complementarities among HRM practices (Ichniowski et al. 1997; Laursen & Foss 2003), research should take into account the consequences of ESO and other HRM policies used in conjunction.

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**Table 1: Descriptive Statistics**

| | Firms with ESO | | | Firms without ESO | | |
|---|---|---|---|---|---|---|
| **Variables** | **Median** | **Min** | **Max** | **Median** | **Min** | **Max** |
| **Tobin's Q** | .620 | 0 | 31.6 | .510 | .01 | 55.18 |
| **RoA** | 6.160 | -148.84 | 104.66 | 5.395 | -63.62 | 104.48 |
| **Sales/employee** | .204 | 0 | 12.838 | .254 | 0 | 8.258 |
| **Employees** | 4,278 | 7 | 561,876 | 1,974 | 0 | 136,931 |
| **Capital/employee** | .257 | .006 | 97.987 | .355 | .012 | 138.612 |
| **Leverage** | .229 | 0 | 3.100 | .261 | 0 | .949 |
| **Market capitalization** | 738 | 2 | 125,762 | 342 | 7 | 37,619 |

*N*=3,345 for all variables except for *RoA* (*N*=3,327).

**Table 2: Correlations**

| | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
|---|---|---|---|---|---|---|---|
| **1. Log(Tobin's *Q*)** | 1.0000 | | | | | | |
| **2. Log(*RoA*)** | .5551*** | 1.0000 | | | | | |
| **3. Log(*sales per employee*)** | -.1644*** | -.1097*** | 1.0000 | | | | |
| **4. Log(*firm size*)** | -.2329*** | -.1209*** | -.3189*** | 1.0000 | | | |
| **5. Log(*leverage*)** | -.3507*** | -.1326*** | .0622*** | .1235*** | 1.0000 | | |
| **6. Log(*ESO share*)** | .0401* | .0182 | -.0969*** | .1970*** | -.0710*** | 1.0000 | |
| **7. Log(*capital per employee*)** | -.2638*** | -.3109*** | .7148*** | -.3604*** | .1815*** | -.1015*** | 1.0000 |

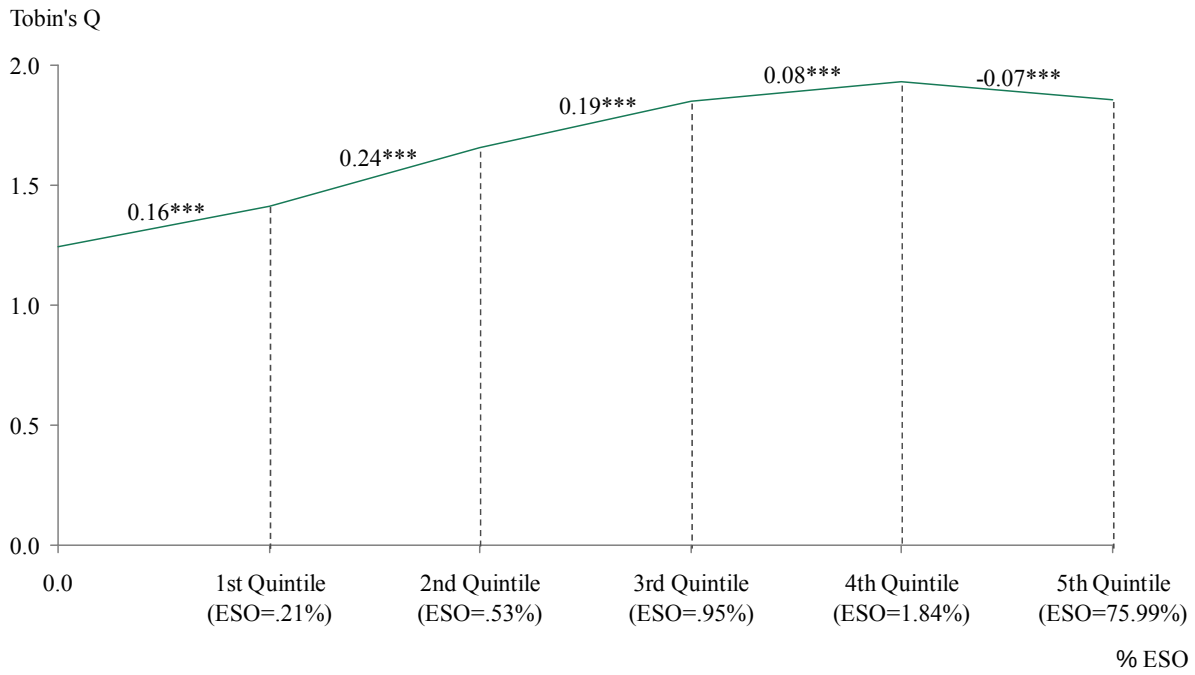
Significance levels: *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$. $N$= 3,345 for all variables except *RoA* ($N$=3,327)

## Table 3: Results of Random Effects Regressions

| | **Model 1 dependent variable: *Tobin's Q*** | | | **Model 2 dependent variable: *RoA*** | | | **Model 3 dependent variable: *sales per employee*** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **1.1** | **1.2** | **1.3** | **2.1** | **2.2** | **2.3** | **3.1** | **3.2** | **3.3** |
| Constant | 1.2074*** | 1.2289*** | 1.2425*** | 2.9025*** | 2.9117*** | 2.9274*** | .2370*** | .2407*** | .2444*** |
| | (.0118) | (.0135) | (.0123) | (.0309) | (.0303) | (.0306) | (.0036) | (.0039) | (.0041) |
| Log (Firm size) | -.0587*** | -.0600*** | -.0638*** | -.0868*** | -.0864*** | -.0915*** | -.0091*** | -.0090*** | -.0095*** |
| | (.0007) | (.0008) | (.0007) | (.0026) | (.0024) | (.0026) | (.0003) | (.0003) | (.0003) |
| Log (Leverage) | -.8017*** | -.7869*** | -.7974*** | -.3970*** | -.3794*** | -.3911*** | -.1557*** | -.1514*** | -.1458*** |
| | (.0117) | (.0131) | (.0126) | (.0322) | (.0313) | (.0301) | (.0035) | (.0039) | (.0043) |
| Log (Capital per employee) | | | | | | | .3322*** | .3323*** | .3303*** |
| | | | | | | | (.0028) | (.0028) | (.0029) |
| Spain[a] | .0182*** | .0066 | .0272*** | .0269 | .0158 | .0466** | -.0342*** | -.0392*** | -.0398*** |
| | (.0052) | (.0060) | (.0052) | (.0164) | (.0157) | (.0159) | (.0022) | (.0025) | (.0024) |
| France[a] | -.0610*** | -.0715*** | -.0844*** | -.1230*** | -.1238*** | -.1323*** | -.0270*** | -.0294*** | -.0296*** |
| | (.0045) | (.0052) | (.0051) | (.0124) | (.0127) | (.0133) | (.0016) | (.0017) | (.0015) |
| Italy[a] | -.1606*** | -.1564*** | -.1531*** | -.2890*** | -.2778*** | -.2723*** | -.0018 | -.0025 | -.0012 |
| | (.0045) | (.0045) | (.0043) | (.0168) | (.0178) | (.0165) | (.0018) | (.0023) | (.0020) |
| UK[a] | .0639*** | .0734*** | .0477*** | .1470*** | .1597*** | .1324*** | -.0879*** | -.0845*** | -.0880*** |
| | (.0054) | (.0056) | (.0060) | (.0121) | (.0116) | (.0116) | (.0015) | (.0015) | (.0013) |
| ESO (yes/no)[b] | .0570*** | | | .0654*** | | | .0224*** | | |
| | (.0037) | | | (.0123) | | | (.0014) | | |
| Log (ESO share) | | .0515*** | | | .0393*** | | | .0171*** | |
| | | (.0037) | | | (.0057) | | | (.0009) | |
| 1st spline | | | .1692*** | | | .2204* | | | -.0712*** |
| | | | (.0333) | | | (.0978) | | | (.0113) |
| 2nd spline | | | .2436*** | | | .3146*** | | | .1897*** |
| | | | (.0378) | | | (.0838) | | | (.0096) |
| 3rd spline | | | .1917*** | | | .0663 | | | -.0529*** |
| | | | (.0467) | | | (.0720) | | | (.0075) |
| 4th spline | | | .0826** | | | .0954* | | | -.0229*** |
| | | | (.0273) | | | (.0435) | | | (.0048) |
| 5th spline | | | -.0763*** | | | -.0834*** | | | .0239*** |
| | | | (.0059) | | | (.0114) | | | (.0019) |
| **Wald chi$^2$** | 31,170*** | 26,749*** | 32,512*** | 8,481*** | 11,287*** | 8,709*** | 41,112*** | 36,063*** | 39,255*** |

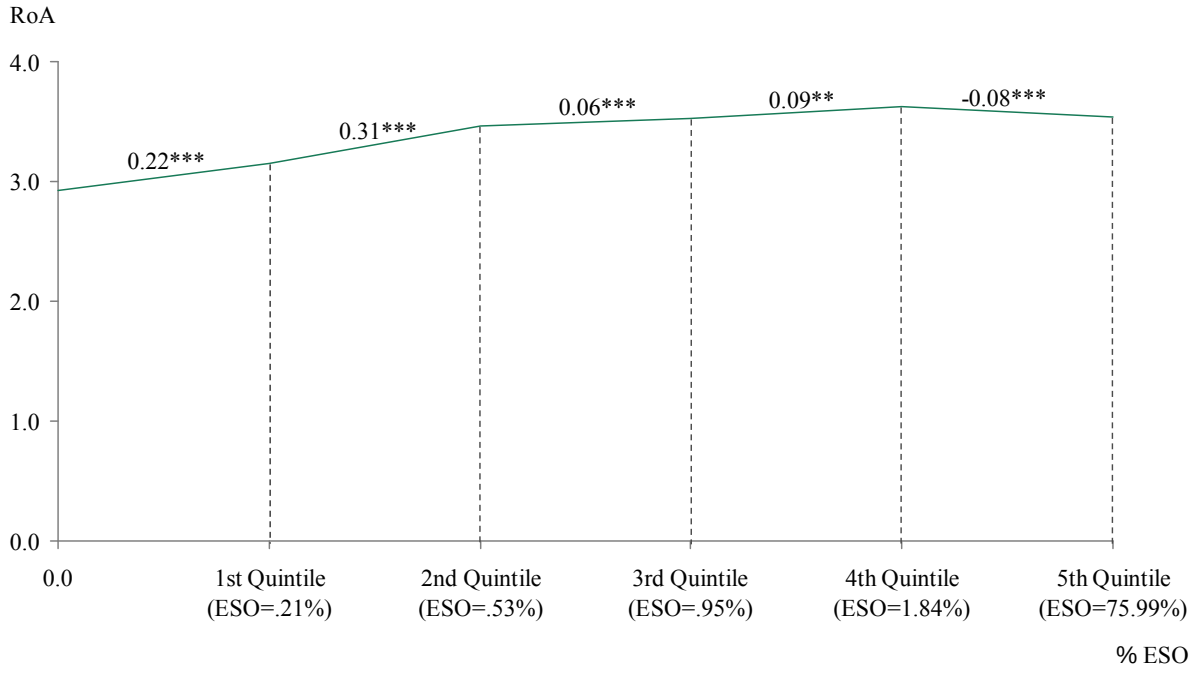
*N*=3,345 for Model 1; *N*=2,673 for Model 2; *N*=3,345 for Model 3. Standard errors in parentheses. All regressions control for industry. Significance levels: **p*<.05, ***p*<.01, ****p*<.001.
[a]Naturally coded, reference category: Germany. [b]Dummy variable.

**Figure 1a: Spline Regression on Tobin's *Q***



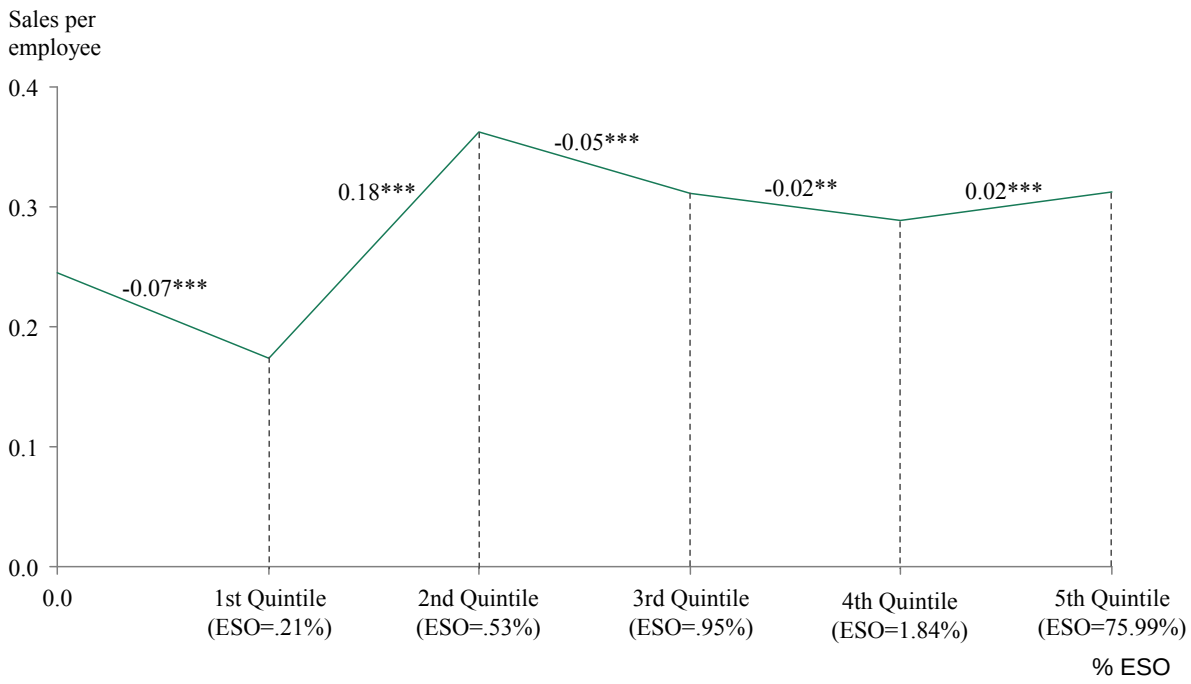

Note: Numbers above the line denote coefficients. Significance levels: ***$p$<.001.

**Figure 1b: Spline Regression on *RoA***




Note: Numbers above the line denote coefficients. Significance levels: **$p$<.01, ***$p$<.001.

**Figure 1c: Spline Regression on *sales per employee***




Note: Numbers above the line denote coefficients. Significance levels: ***p*<.01, ****p*<.001.