The Direction of Causality between Insider Ownership and Market Valuation[1]

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Abstract

The causal relationship between insider ownership and market valuation is tested on a database of the largest EU and US companies. Using a Granger causality test insider ownership (measured by the fraction of closely held shares) is found to have a negative effect on market valuation (measured as the simple Tobin's Q ratio). And market valuation is found to have a negative effect on insider ownership. Consistent with an overall non-linear relationship as hypothesised by Morck et al. (1988) and Stultz (1988), the negative effect from insider ownership to performance is found to be significant only for companies with high initial levels of insider ownership, but insignificant for companies with low initial concentration levels. Furthermore, the effect on market valuation turns out to depend on system affiliation: it is only significant in continental Europe where average insider ownership is much higher than in the Anglo-American world (UK and US).

JEL classifications: G32, L20

Keywords: Insider ownership, Market valuation, Granger causality, system effects, and panel data analysis.

1. INTRODUCTION

An enormous number of papers have addressed the relationship between ownership structure and market valuation. Generally these studies have examined the impact of ownership structure on market valuation in simple regression models. But recently a second generation of research (Loderer and Martin, 1997; Cho, 1998; Himmelberg, Hubbard and Palia, 1999) has built on a point raised by Harold Demsetz (1983): that ownership is an endogenous variable and that this must be taken into account in empirical estimation. The second-generation papers have used more sophisticated simultaneous equation models and concluded that the impact of ownership on performance is insignificant. This confirms the intuition voiced by Demsetz (1983): there should be no impact in equilibrium since this would imply that owners/investors would profit by reshuffling their portfolios. In particular, one might expect a significant reverse feedback from market valuation to ownership structure as owners react to good or bad performance by buying or selling shares.

While previous studies have attempted to infer causality from cross-sectional data sets, causality is more readily understood as a process in time (cause preceding effect). This paper contributes to the ongoing research in this field by applying Granger causality tests (Granger 1969) to examine the causal relationship between insider ownership and market valuation. We analyse time series data on ownership (the fraction of shares that are "closely held") and market valuation (the simple Tobin's Q ratio) over a 10-year period (1988-1998) for 876 of the largest EU and US companies. We find evidence of fairly strong negative effects going both ways: a negative effect of insider ownership on market valuation, and a negative effect of market valuation on insider ownership. However, these results are moderated both by the

initial level of insider ownership and by the system effects (common law contra civil law system).

2. THEORY AND LITERATURE REVIEW

Suppose there is a privately optimal fraction of insider ownership, which involves a trade-off between risk and incentive efficiency (Jensen and Meckling, 1976; Fama and Jensen, 1983; Demsetz, 1983; Shleifer and Vishny, 1997). Ceteris paribus, larger owners will have a stronger incentive to monitor managers and more power to enforce their interests and this should increase the inclination of managers to maximise shareholder value. But generally the owner's portfolio risk will also increase the larger the ownership share. Furthermore, insider ownership above a certain level may lead to entrenchment of managers and majority shareholders who can expropriate the wealth of minority shareholders (Fama and Jensen, 1983; Morck et al., 1988; Shleifer and Vishny, 1997). Presumably, this optimal ownership share will differ from company to company because companies differ in terms of specific risk and the complexity of their activities (Demsetz and Lehn, 1985).

Essentially, this means that the relationship between ownership structure and market value will vary across companies and industries as a function of company size, firm-specific uncertainty, risk and other factors that need to be verified empirically. If owners have already adopted an optimal (shareholder value maximising) ownership structure, little can be learned from empirical studies that correlate ownership structure with market valuation. But if inertia,

agency problems or other factors lead to an imperfect adjustment to shareholder value maximization, there is greater scope to learn from empirical studies.

The consequences of insider ownership for the economic performance of companies have been studied empirically since Berle and Means (1932). While earlier studies tended to find a positive association between owner control and accounting profitability (Cubin and Leech, 1983; Short, 1994), Demsetz and Lehn (1985) found no significant effect of ownership concentration on equity returns when controlling for determinants of ownership structure, and subsequent studies on international data have confirmed their findings (Bergstrøm and Rydkvist, 1990; Gerson and Barr, 1996; Pedersen and Thomsen 1999). Nevertheless several studies - mainly on market data - have continued to find significant, although sometimes conditional and non-linear effects (Lloyd, Hand and Modani, 1987; Zeckhouser and Pound, 1990; Oswald and Jahera, 1991; Li and Simerly, 1998; Morck et al., 1988; McConnell and Servaes, 1990; Thomsen and Pedersen, 2000). More recently, a second generation of research (Loderer and Martin, 1997; Cho, 1998; Himmelberg, Hubbard and Palia, 1999) has disputed the relevance of these findings and reported insignificant performance effects in simultaneous estimations of causes and effects of insider ownership.

Loderer and Martin (1997) examine both Tobin's Q-values and abnormal stock returns to 867 acquisitions made by companies listed in the US from 1978-1988. They find a weak concave effect of director ownership on both performance measures when estimated by simple regression. However, the effect becomes insignificant when a simultaneous two-equation model is estimated that includes firm size and earnings volatility as determinants of director ownership. Abnormal acquisition returns are found to have a significant positive effect on

director ownership whereas Q-values are found to have a significant negative effect. The authors interpret these results as evidence that managers have inside knowledge and increase their shareholdings prior to good acquisitions whereas high share prices and Q-values induce them to sell out.

Cho (1998) examines investment as an intermediate variable between director ownership and performance measured by Q-values. On a sample of 326 Fortune 500 firms in 1991, he finds that Q-values have a *positive* impact on director ownership and that director ownership has a significant non-monotonous effect on investment, which again has a positive impact on Q-values. When taking this into account in a three-equation model simultaneously determining director ownership, Q-values and investment, the non-monotonous effect of ownership structure on Q-values becomes insignificant.

Himmelberg, Hubbard and Palia (1999) use a panel of 300 Compustat firms over the period 1982-1992 to control for fixed firm effects as an indicator of unobserved firm heterogeneity which influences both ownership structure and Q-values. They find a significant impact of director ownership on Q-values even after controlling for some observable determinants of ownership structure, but the impact becomes insignificant when the fixed firm effects are taken into account.

In summary, empirical research has tended to find a positive direct effect of insider ownership or similar measures such as director ownership, ownership concentration, or owner-control dummies. But the effect appears to be insignificant when attempts are made to control for the determinants of ownership structure (when ownership is treated as an

endogenous variable). Therefore, the effect of ownership structure on market values is still unresolved.

3. METHODOLOGY AND HYPOTHESES

While previous studies have relied mainly on cross-section data, this paper applies a time series analysis to test whether changes in insider ownership are followed by changes in market valuation and vice versa. We apply a Granger (1969) test to explore the causal relationship between insider ownership (OS) and market valuation (Q). One standard requirement for causality is that changes in the cause variable should precede changes in the effect variable, and Granger causality analysis essentially tests for this. To apply a Granger causality test for causality we consider the information sets I_t, t=1,…, 10 with $I_t = \{(Q_\delta, OS_\delta)\}_{\delta<t}$, Q_t and OS_t denoting respectively the performance and the ownership at time t. Restricting attention to linear prediction with squared error loss we consider the models

$$(1) \quad Q_t = a_1 + b_1 \mathbf{OS_{t-1}} + b_2 \mathbf{Q_{t-1}} + \mu_{1t}$$

$$(2) \quad OS_t = a_2 + b_3 \mathbf{OS_{t-1}} + b_4 \mathbf{Q_{t-1}} + \mu_{2t}$$

The α´s and β´s are parameters of the models, and μ_{1t} and μ_{2t} are uncorrelated error processes. In these models if $\beta_1 \neq 0$, $\beta_4 = 0$ we infer unidirectional OS to Q. In this case including OS as a predictor for Q will decrease the prediction error (or increase explained variance). Similarly, if $\beta_1 = 0$, $\beta_4 \neq 0$ we infer unidirectional causality from Q to OS, while if $\beta_1 \neq 0$, $\beta_4 \neq 0$ we infer bi-directional causality between Q and OS. To implement the tests we assume normality of errors, homogeneity of variance, condition on the first observation (Q_1, OS_1) and use OLS. β_4 is significant and β_1 is not.

One of the advantages of this approach is that a number of structural factors that influence both present and lagged values of Q and OS are controlled for by including the lagged value as an explanatory variable. However, it is clear that both changes in ownership and market valuation may be accompanied by changes in other variables. Major changes in ownership structure may be accompanied by major changes in corporate strategy and other variables that are difficult to measure: for example when new block-holders convince the board to spin off loss-making business units. The market may respond positively, but it is not necessarily clear whether it responds to a change of strategy or to the ownership change. To filter out effects that are not attributable to Q and OS respectively, we have reported results that also include firm and time effects (i.e. the panel data analysis allows for random firm and time effects).

Theoretically, it might be argued that higher insider ownership implies better incentives to monitor and greater incentive alignment, and, therefore, higher expected profits and share prices. Since the risk of an unbalanced portfolio will mainly be borne by the insider-owner rather than the company, this prediction is not inconsistent with market equilibrium if the insider-owner gets private benefits of control. But higher insider ownership may also imply greater managerial entrenchment, in which case private benefits of control might make a loss of market value acceptable to the insider-owner. And near a value-maximising optimum the marginal effect of changes in insider ownership could theoretically be zero. Although the predicted effects of changes in insider ownership are therefore uncertain, we formulate the following hypothesis for empirical testing.

Hypothesis 1. Insider ownership positively Granger-causes market valuation (the incentive alignment hypothesis).

As previously mentioned, several previous studies have found non-linear relationships between managerial ownership and market valuation (e.g. Morck et al., 1988; McConnell and Servaes, 1990; Thomsen and Pedersen, 2000). We recognise that the effects of changing insider ownership could depend on the initial level of concentration. At low levels of concentration, increasing ownership may imply increased monitoring, better incentive alignment, and a higher share price, whereas negative effects of increased entrenchment may be more important at high levels of insider ownership. We choose to explore these ideas by proposing the following hypothesis.

Hypothesis 2. For high levels of insider ownership the effect is reversed: insider ownership negatively Granger-causes market valuation (non-linear effects hypothesis).

Furthermore, the relationship between insider ownership and market valuation may also be contingent on system effects. In a series of influential papers La Porta et al. (1999a, 1999b) have argued that national legal systems differ with regard to investor protection, and that this has implications for insider ownership and market valuation. Others have emphasised the importance of complementary institutions (Roe 1991, 1994; Pedersen and Thomsen, 1997).

The legal systems approach advocated by Shleifer and Vishny (1997) seems to imply that insider ownership curbs agency problems in civil law countries that provide less investor protection through the legal system. But the high levels of insider ownership come at a price: large owners expropriate wealth from minority investors, because of managerial entrenchment, privileged access to inside information and because their large shareholdings make them more risk adverse than diversified minority investors. In civil law countries, the net effect of changes in ownership are therefore unclear; increasing insider ownership may imply reduced agency problems and higher market valuation, but also greater risk of expropriation of minority investors which should tend to lower market values. In contrast, if minority investors are better protected in common law countries, the positive effects of increasing insider ownership might be more pronounced - at least for equivalent initial levels. This leads to Hypothesis 3.

Hypothesis 3. Increases in insider ownership will more likely Granger-cause market valuation in economic systems that protect minority investors better (system effects hypothesis).

There are also conflicting opinions regarding the reverse effect of a market value on insider ownership. Depending on the supply curve for individual stocks (Zeckhouser and Pound, 1990), individuals may be more tempted to sell parts of their shares in a particular firm when share prices are high relative to expectations. For example, managers and other controlling shareholders may trade on-the-job consumption for monetary compensation. The immediate

gains of selling out are larger and the expected future gains may be lower for a higher share price. Furthermore, companies seem more likely to issue stock to the market and thereby reduce the level of insider ownership when the market for their shares is good (i.e. when share prices are high). Finally, when caused by inefficient management a decreasing share price should in theory invite raiders and controlling shareholders to increase their holdings to repair the problem. These factors point to a negative effect of market valuation on the level of insider ownership. It is also conceivable, however, that outside shareholders choose to reward the insiders for good past performance (ex post settling up) and that high market valuation will therefore tend to lead to higher levels of insider ownership (Kole 1996). Furthermore, higher market value makes it possible to finance a given level of investment with a smaller amount of stock to outsider owners (La Porta et al. 1999b). If the insiders want to keep as large an ownership stake as possible to align incentives (La Porta et al. 1999b) or to avoid issuing too much new equity (Myers and Majluf 1984), this implies a positive effect of market valuation on insider ownership. Since the effect of market valuation on insider ownership is disputed, we suggest the following hypothesis for empirical testing.

Hypothesis 4. Market valuation positively Granger-causes insider ownership (insider preference hypothesis).

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4. DATA AND MEASUREMENT

A description of the variables used is found in Table 1. The database is drawn from the Worldscope electronic database (Worldscope, annually) and consists of all EU and US companies which had net sales and net assets exceeding US$ 2 billion in 1998 and for which a year time series was available over the 1990-1998 period. The data set contains 876 companies with nine years of observation giving a total of 7884 firm-year observations.

Market valuation is measured by dividing the sum of the market value of equity and the book value of the total debt by the book value of assets. The Tobin's Q measure of equity at replacement costs was not available, so we use an approximation denoted (the "simple Q") by Loderer and Martin (1997). However, Chung and Pruitt (1994) found that the correlation between the "simple Q" measure and a measure of Q that attempts to use market values throughout is as high as 0.97. To correct for a right-skewed distribution of the market valuation variable, we use log values.

Insider ownership is measured by the percentage of "closely held"shares to total shares outstanding (CHS). Closely held shares *"represent the shares held by insiders"* (Worldscope 1997) including officers, directors and their families, shares held in trust, shares held by another corporation (except in a fiduciary duty by banks), shares held by pension/benefit plans, or by individuals who hold more than 5%. This measure is somewhat broader than the director ownership variables used in many previous studies since it involves the holdings of other large investors apart from management. The main benefit of the measure is that it is available as a time series in the Worldscope database so we can use up to nine consecutive

years of observation for a large sample of US and European companies (n=876). Its main disadvantage is that it must involve some subjective judgement that we are generally unable to verify. However, in earlier studies we found quite a high correlation between closely held shares and another concentration measure (share of the largest owner) (Thomsen and Pedersen 2000). Since this measure is bounded between zero and 100 we use a logit transformation (see Table 1) to make the measure fit a normal distribution.

In order to test for non-linear effect we split the data in two sub-samples: high and low initial insider ownership. The median of the level of insider ownership in 1990 (the first year of our data window) is 9.8 per cent (mean 6.6 per cent). We therefore split the sample in two groups: low insider ownership < 10 per cent and high insider ownership => 10 per cent. Furthermore, to test for differences in legal system (and the level of investor protection) we follow La Porta et al (1998) and distinguish between companies based in common law countries (US and UK) and civil law countries (continental Europe).

5. RESULTS

Table 2 provides a correlation matrix and some descriptive statistics.

As might be expected, both Q-values and insider ownership (OS) are highly correlated with their lagged values with correlation coefficients well into the nineties. Insider ownership is negatively correlated with both present and lagged values of Q. Q-values are also negatively correlated with both present and lagged values of insider ownership.

As a direct Granger test we first estimated the simple model, with common slopes and intercepts for all firms:

3. $Q_{it} = \alpha_1 + \beta_1 OS_{it} + \beta_2 Q_{i(t-1)} + \mu_{1,it}$

4. $OS_{it} = \alpha_2 + \beta_3 OS_{i(t-1)} + \beta_4 Q_{i(t-1)} + \mu_{2,it}$

the error terms $\mu_{j,it}$ being independent with variances σ_j^2 (j =1,2; t =1990, 1991…1998; i =1,2...876 firms).

Since Q is measured at the end of the year, we assume that changes in insider ownership from t-1 to t are reflected in Q-values at time t. In contrast, Q is expected only to have an effect on insider ownership in the next period. The number of lags included reflects statistical significance: all variables lagging more than one period were found to be highly insignificant so we only report models with one lag.

The model is estimated as an OLS regression model applying the SAS procedure GLM (SAS 1999). The results of the direct Granger tests are reported in Table 3, model I.

// Insert Table 3 about here //

The results indicate that the models are highly significant with very high F-values. In the estimation, insider ownership is found to Granger-cause market value since lagged values of insider ownership have a significant effect on Q-values. However, the effect is significantly negative and not positive as hypothesised. In other words, hypothesis 1 is rejected. Secondly, market value is found to Granger-cause insider ownership since lagged Q-values have a

significant, negative effect on OS, which contradicts hypothesis 4. In other words, both hypotheses 1 and 4 are rejected.

Secondly, we enlarged the model by allowing for random time and firm effects, i.e. we estimated the models:

5. $Q_{it} = \boldsymbol{a}_1 + \boldsymbol{b}_1 OS_{it} + \boldsymbol{b}_2 Q_{i(t-1)} + \lambda_i + \nu_t + \mu'_{1,it}$

6. $OS_{it} = \boldsymbol{a}_2 + \boldsymbol{b}_3 OS_{i(t-1)} + \boldsymbol{b}_4 Q_{i(t-1)} + \phi_i + \gamma_t + \mu'_{2,it}$

where the random firm effects in each equation, λ_i and ϕ_i, are independent with variances respectively $\sigma^2_{Q,\,Firms}$ and $\sigma^2_{OS,\,Firms}$ and means zero. Similarly, the random time effects within each equation, ν_t and γ_t, are independent with variances $\sigma^2_{Q,\,Time}$ and $\sigma^2_{OS,\,Time}$ and means zero. The errors, $\mu'_{1,it}$ and $\mu'_{2,it}$, are still independent with variances σ^2_j and means zero. Furthermore, the random firm effects, random time effects, and the errors are assumed to be independent.

The enlargement of the model, in equations 5 and 6, thus lies in the error structure. In this model the random firm effects (that one can think of as random intercepts) correct for correlation between observations for a given firm (over the observed nine years) while the random time effects correct for correlation between observations at the same point in time. The random effects reflect the influence of unobserved variables characteristic for the individual firms (e.g. changes in strategy like mergers or sell offs) and the points in time (e.g. fluctuations of the market).

The SAS Procedure TSCSREG (Time Series Cross Section Regression) with a variance component model that uses the Fuller-Battese method in the estimation (SAS 1999) is applied

in order to estimate the model. The results of the estimation of the enlarged model with random time and firm effects are shown in Table 3, model II. A Hausman test is conducted in order to test whether adding the random effects improves the models, and for both models the Hausman test turns out to be highly significant. This indicates that the model with random firm and time effects gives a better fit of the data than a model without random effects. The split of the variance components shows that the significance of including the random effects is mainly due to the firm effects that are substantially larger than the time effects.

Again, (as in Table 3, model I) lagged values of Q are found to exert a negative and significant influence on insider ownership, and insider ownership is found to have a negative and significant influence on Q-values. And again, Hypothesis 1 is rejected, whereas Hypothesis 4 cannot be rejected.

Non-linear effects

Previous cross-sectional studies have indicated that the effects of insider ownership on market value might be non-linear: for example positive for small levels of insider ownership because of increasing incentive alignment, but negative for high values of insider ownership because of increasing managerial entrenchment. In order to test this hypothesis we split the sample in two according to the initial level of insider ownership (low insider ownership < 10 per cent and high insider ownership => 10 per cent). Table 4 shows the results of the estimation shown for both sub-samples. Model I shows the direct Granger test (equations 3 and 4) with common slopes and intercepts for all firms. Table 4, model II shows the expanded model with random firm and time effects. As can be seen the qualitative results are very similar for the two models. So, although the Hausman test in model II indicates that the

model with random firm and time effects fits the data, adding the random effects does not change the results qualitatively.

// Insert Table 4 about here //

In the two models in Table 4 we find no significant effects of Q-values on ownership for low initial insider ownership, whereas the effect is significantly negative for high values of initial insider ownership. In other words, Hypothesis 2 cannot be rejected: the negative effects of insider ownership appear to apply only when the initial level is above average.

System differences

Another possible hypothesis is that the relationship between ownership and market valuation might depend on system effects. For example, Hypothesis 3 proposes that increasing insider ownership will have a more positive effect on market values in common law countries where the risk of expropriation of minority investors by insiders is checked by the greater legal protection. An indirect effect of Hypothesis 2 might work in the same direction. Since the average level of insider ownership is much lower in the US/UK, companies in these systems are less likely to experience negative managerial entrenchment effects when insider ownership increases.

In order to test Hypothesis 3, the Granger tests are first run separately for the common law countries (US/UK) and civil law countries (continental European nations) (shown in Table 5, model I and II). The estimates are with random time and firm effects (equations 5 and 6). In continental Europe, lagged values of Q are found to have no significant impact on insider

ownership, whereas insider ownership has a negative effect on valuation. In the US/UK neither the link from insider ownership to valuation nor the link from valuation to insider ownership are significant. In other words, Hypothesis 3 cannot be rejected since the effect of insider ownership on valuation is less negative or more positive in common law countries that are believed to offer better legal protection to minority investors.

In order to establish whether this effect is attributable to high initial levels of ownership concentration, we break down both the civil law and common law samples by initial levels of ownership concentration (below or above the threshold of 10 per cent insider ownership). Table 5, model III shows the estimations for the sample with high initial insider ownership for both civil law and common law firms. We find that the negative effect of insider ownership effect in continental Europe is significant for high initial levels, while it is insignificant for low levels of initial insider ownership (not shown in the Table). In other words, there is some evidence that the system effect is attributable to (or at least co-varies with) a high level of insider ownership. Further analysis (Table 5, model III) shows that the insider ownership effect is insignificant in the US/UK - also for initial high levels. In other words, the negative effect of insider ownership on market valuation appears to be attributable to an interaction effect - the combined effect of high insider ownership in a continental European system.

Some further, circumstantial support for Hypothesis 3 may be found by observing the time trends in insider ownership in continental Europe compared to the US/UK. If insider ownership were negatively correlated with market valuation in continental Europe, there

would seem to be an incentive to reduce insider ownership over time. This is what Figure 1 shows.

// Insert Figure 1 about here //

After an increase at the end of the 1980s, insider ownership in Europe has declined steadily from 57 per cent in 1991 to 51 per cent in 1998. Over the same period, insider ownership in the US/UK increased steadily from 7 to 13 per cent - where the effect of insider ownership was found to be slightly positive (although insignificant). In other words, there is some evidence that the level of insider ownership actually adapts to market signals.

6. CONCLUSION

This paper has contributed to the ongoing discussion on the causal link between ownership structure and market valuation.

The results may be summarised as follows: for high levels of insider ownership, further increases are found to have a negative effect on market valuation. For low levels, the effect is insignificant. Likewise, the effect is insignificant in common law countries (US/UK), where the legal protection of minority investors is said to be higher than in civil law countries (continental Europe). In contrast, the effect is negative and highly significant for high initial levels of insider ownership and for companies based in continental Europe where the risk of insider expropriation of minority investors is presumably higher. Finally, we find evidence of

a negative and significant feedback effect from market valuation to insider ownership, perhaps because insiders are more likely to sell out when they can get a higher price for their shares.

Compared to previous studies of managerial ownership, the present study has relied on a broader concept of ”insider ownership”. This means that some of the positive effects of managerial ownership on market valuation may be attenuated or suppressed by more complicated effects of ownership concentration. Furthermore, this study has emphasised marginal change effects whereas level effects have presumably been neutralised by controlling for lagged values and adding random effects. For example, there may very well be positive effects of a high level of insider ownership while developments in the financial markets, monitoring technology, and other control factors have made it possible to increase shareholder value by marginally lowering that level. An assessment of the overall relationship between insider ownership and market value must involve both level and change effects.

Taking the Demsetz (1983) critique into consideration, the observed negative effect of insider ownership may not be an equilibrium phenomenon, but rather a consequence of the restructuring of corporate governance and finance taking place in the largest European companies. Furthermore, hidden owner identity effects may be at work; many incumbent owners of the largest European companies - such as families, governments, banks or company groups - appear to have more complex objective functions than maximising shareholder value (Thomsen and Pedersen, 2000). When these groups reduce their holdings relative to outsider portfolio investors, the markets may (correctly) infer greater emphasis on

shareholder value. On the other hand, incumbent insiders may not want to adjust their holdings to maximise shareholder value if they also value the private utility associated with ownership.

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Table 1. List of Empirical Variables.

Code	Description	Definition
Q	Transformation of the sum of the market value of equity, and the book value of the total debt divided by the book value of assets	Log ((Market price-year end * Common shares outstanding) + book value of total debt) / book value of total assets).
LAGQ		Lagged value of Q (one lag)
ANGLO	System. Headquarters based in an Anglo-American common law system or in a continental-European civil law system	Dummy=1 for common law countries (US, UK). =0 for continental European civil law countries. (La Porta et. al 1999a)
OS	Transformation of the fraction of closely held shares (chs). Closely held shares are shares held by insiders including officers, directors (and their families), trust, pension/benefit plans, and shares held by another corporation or individuals that hold more than 5%.	LOG (chs / (100-chs))
LAGOS		Lagged value of OS (one lag)

Source: The Worldscope Database (annually).

Table 2. Correlation matrix

	1	2	3	4
1) Insider ownership	1.00			
2) One lag of insider ownership	0.92***	1.00		
3) Q- value	-0.11***	-0.11***	1.00	
4) One lag of Q-value	-0.12***	-0.10***	0.96***	1.00
Mean	-2.93	-2.97	-0.23	-0.25
Standard Deviation	2.98	2.97	0.83	0.82

Table 3. Granger Causality tests

	Model I		Model II	
Dependent variable	OS	Q	OS	Q
Intercept	-0.237***	-0.003	-1.017***	-0.069***
$Q_{(t-1)}$	-0.072***	0.956***	-0.119***	0.703***
$OS_{(t-1)}$	0.913***		0.625***	
$OS_{(t)}$		-0.006***		-0.004**
N (observations)	6768	6768		
F-value	18080***	34719***		
N (firm-years)			6766	6766
Hausman test			522***	530***
Variance Components:				
- firms			1.996	0.104
- time series			0.030	0.005
- Error			1.085	0.040

***, ** and * = significant at 1, 5 and 10 per cent, respectively

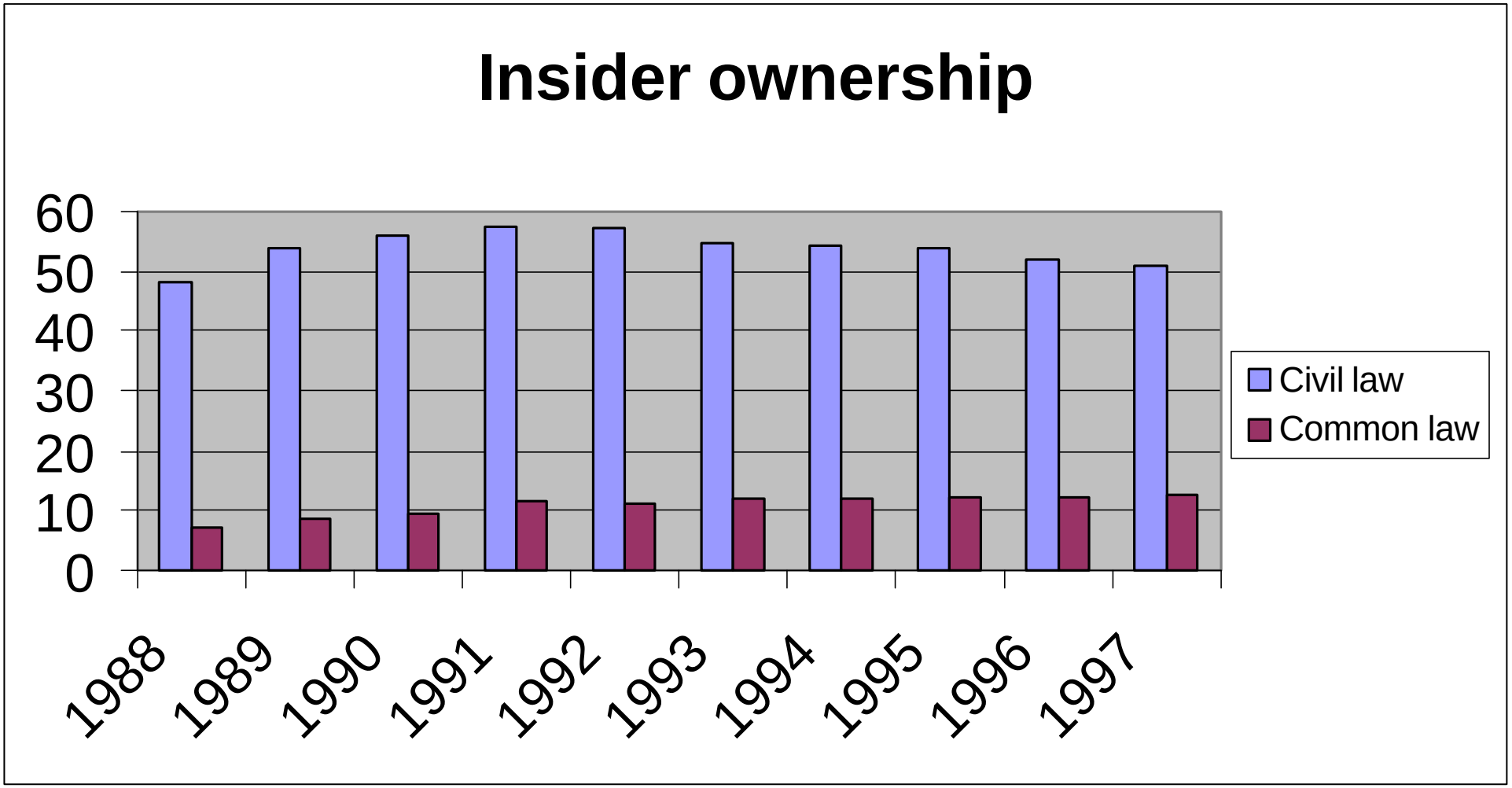
Table 4. Granger Causality by initial level of insider ownership

	Model I				Model II			
Initial level of insider ownership	Low		High		Low		High	
Dependent variable	OS	Q	OS	Q	OS	Q	OS	Q
Intercept	-0.769***	0.028***	-0.173***	-0.006	-1.736***	-0.002 ns	-0.433 ***	-0.0877***
$Q_{(t-1)}$	-0.101	0.960***	-0.105***	0.960***	-0.0002	0.756***	-0.208***	0.700***
$OS_{(t-1)}$	0.842***		0.839***		0.656***		0.572***	
$OS_{(t)}$		-0.001		-0.009***		0.0008		-0.007**
N (observations)	3312	3312	2964	2964				
F-value	3195***	17782***	4592***	18024***				
N (firm-years)					3310	3310	2962	2962
Hausman test					202***	197***	271***	282***
Variance Components:								
- firms					0.639	0.068	0.898	0.114
- time series					0.032	0.006	0.035	0.004
- Error					1.239	0.031	0.884	0.044

Table 5. Granger Causality Tests by System

	Model I		Model II		Model III High levels of initial insider ownership			
System	Continental Europe		US/UK		Continental Europe		US/UK	
Dependent variable	OS	Q	OS	Q	OS	Q	OS	Q
Intercept	-0.086	-0.177***	-1.42***	0.011	-0.008	-0.192***	- 0.829***	0.032
$Q_{(t-1)}$	-0.069	0.702***	0.026	0.700***	-0.057	0.679***	-0.069	0.718***
$OS_{(t-1)}$	0.621***		0.618 ***		0.594***		0.548***	
$OS_{(t)}$		-0.013***		0.003		- 0.018***		0.001
N (firm-years)	1968	1968	4652	4652	1597	1597	1767	1767
Hausman test	143***	166***	361***	351***	135***	149***	127***	126***
Variance Components:								
- firms	0.877	0.094	1.383	0.092	0.761	0.106	0.594	0.083
- time series	0.008	0.007	0.008	0.006	0.010	0.006	0.066	0.005
- Error	0.586	0.041	1.270	0.038	0.434	0.041	1.278	0.043

Figure 1


Insider ownership
60
50
40
30
20
10
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Civil law
Common law