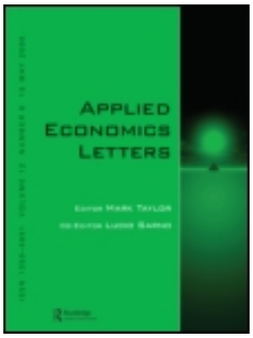

Applied Economics Letters

ISSN: 1350-4851 (Print) 1466-4291 (Online) Journal homepage: https://www.tandfonline.com/loi/rael20

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To cite this article: Julio Pindado & Chabela De La Torre (2004) Why is ownership endogenous?, Applied Economics Letters, 11:14, 901-904, DOI: 10.1080/1350485042000267003

To link to this article: https://doi.org/10.1080/1350485042000267003

Published online: 22 Aug 2006.

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Applied Economics Letters, 2004, **11**, 901–904

Why is ownership endogenous?

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A recently published paper by Gugler and Weigand (2003) addresses the problem of the endogeneity of ownership, but an unresolved question remains. Where does this endogeneity come from? It is shown that the main source of endogeneity is the simultaneity between ownership and value.

I. INTRODUCTION

The value–ownership relationship has been a matter of debate since the agency problem, deriving from the separation of ownership from control, was formulated. Consistent with Jensen and Meckling (1976), extensive empirical research exists pointing out the influence of insider ownership on firm value. Most of the empirical evidence on this relationship relies on the assumption of exogeneity.

However, the endogeneity of ownership structure has given rise to increasing controversy in the literature since Demsetz (1983) and Demsetz and Lehn (1985) illustrated that ownership is endogenously determined to reach a trade-off between several costs advantages and disadvantages in the firm. This argument may seriously affect the value–ownership relationship as shown in Cho (1998) or Demsetz and Villalonga (2001), whose results reveal no significant influence of ownership on value when controlling for the simultaneity between both variables.

In addition to simultaneity, ownership may be endogenous as a result of the individual heterogeneity affecting both firm value and its ownership structure. Using the panel data methodology, Himmelberg *et al.* (1999) examine whether certain characteristics of the firm influencing value make insider ownership endogenous in the value model. Their results show that both value and insider ownership in US firms are explained by common characteristics, some of which are unobservable, and that the omission of these characteristics in the value model may lead to biased conclusions regarding the influence of insider ownership on value because of the relation between the former and the omitted variables. Following the same reasoning, Palia (2001) confirms the endogeneity of ownership to value.

In a recently published paper, Gugler and Weigand (2003) ask whether ownership is really endogenous and, consistent with Himmelberg *et al.* (1999), they provide panel data evidence on the endogeneity of insider ownership in US and German firms. That ownership is endogenous to value seems to be a fact nowadays, but the source of such endogeneity is an unresolved question. Our analysis is an attempt to answer this question, and focuses on testing whether endogeneity is a consequence of the individual heterogeneity that affects both firm value and its ownership structure, or a result of the simultaneity that exists between the two variables.

To reach our goal, the correlations between ownership variables and the two components of the value regression error – the individual effect and the random disturbance – are computed. The results show that ownership structure is endogenous because of its simultaneity with value, while we do not find evidence on individual heterogeneity being the cause of the endogeneity of ownership structure.

The paper is organized as follows. Section II describes our empirical approach and presents the models and the data set. Section III discusses our main results. Section IV concludes.

II. METHODOLOGY AND DATA

To solve the question about the origin of the endogeneity of ownership structure, we have computed the correlation

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Applied Economics Letters ISSN 1350–4851 print/ISSN 1466–4291 online © 2004 Taylor & Francis Ltd
http://www.tandf.co.uk/journals
DOI: 10.1080/1350485042000267003

coefficients between ownership variables and the regression error once the following fixed effect model was estimated:

$$y_{it} = x_{it}b + Z_{it}c + \boldsymbol{u}_i + \boldsymbol{e}_{it} \quad (1)$$

where y_{it} is the market value of the firm shares, x_{it} denotes ownership structure, Z_{it} is a vector of control variables, $\boldsymbol{u}_i$ denotes the individual effect, and $\boldsymbol{e}_{it}$ is the random disturbance.

As pointed out in Gugler and Weigand (2003), insider ownership is not the only variable that captures a firm's ownership structure. The level of ownership concentration is also a relevant feature, even more so if we take into account the high concentration levels characterizing Spanish firms. Therefore, we add to our analysis a measure of ownership concentration in addition to the insider ownership one. Furthermore, we also consider the square and cube of insider ownership as well as the square of ownership concentration so as to control for the potential non-linearities in the value–ownership relationship. In a recent survey, Denis and McConnell (2003) show that there is no consensus about the linearity of the relationship between ownership structure. We have therefore estimated various versions of the proposed Model (1), in which the ownership structure variable x is as follows:

$$x_{it} = (IO_{it}) \quad (1.1)$$

$$x_{it} = \left(IO_{it}, IO_{it}^2, IO_{it}^3\right) \quad (1.2)$$

$$x_{it} = (OC_{it}) \quad (1.3)$$

$$x_{it} = \left(OC_{it}, OC_{it}^2\right) \quad (1.4)$$

$$x_{it} = (IO_{it}, OC_{it}) \quad (1.5)$$

$$x_{it} = \left(IO_{it}, IO_{it}^2, IO_{it}^3, OC_{it}, OC_{it}^2\right) \quad (1.6)$$

where IO_{it}, IO_{it}^2 and IO_{it}^3 denote insider ownership, its square and its cube, and OC_{it} and OC_{it}^2 denote ownership concentration and its square.

The vector Z includes some of the variables that may influence both value and ownership structure and may thus be potential sources of endogeneity. Specifically, we have considered intangible assets, market share, size and debt ratio as control variables in our value model. Himmelberg *et al.* (1999) argue that the existence of both intangible assets and competitive advantages in the product markets increases corporate value, and leads to higher levels of insider ownership so as to align incentives and to control for managerial discretion. Therefore, the omission of measures of intangible assets and market power makes ownership an endogenous variable in the value model, since a correlation between the error term and the ownership variable will exist. Also if measures of size and leverage are omitted from the value model, ownership will be endogenous because of the influence – negative in this case – of both size and leverage on ownership. In fact, firm size is negatively related to ownership concentration because, as Demsetz and Lehn (1985) pointed out, the larger the firm is, and the larger its capital resources are, generally the more difficult it is to own a given fraction of the firm. Moreover, the negative effect of debt on ownership concentration is the result of the higher risk associated to a given stake in a more leveraged firm, and of the natural risk aversion of owners (Demsetz and Lehn, 1985; Stulz, 1988).

The use of panel data methodology allows us to control for heterogeneity through the individual effect, in which the common determinants of ownership and value will be included. If, as Himmelberg *et al.* (1999) suggest, the endogeneity of ownership is due to the resulting misspecification of the value model, hence a certain correlation between ownership variables and the individual effect will exist (i.e. $E(x_{it} \cdot u_i) \neq 0$). Moreover, this correlation will be affected by the inclusion or omission of the aforementioned common determinants in the value model. In other words, if the omission of one of the proposed control variables in our value model leads to a higher correlation between ownership variables and the individual effect, it must be thus considered as a source of endogeneity. The alternative source of endogeneity, the simultaneity between ownership and value, must be tested by means of the correlation between ownership variables and the random disturbance. In fact, if the endogeneity problem stems from the lack of consideration of the potential inverse causality rather than from individual heterogeneity, ownership variables will be thus correlated with the random disturbance (i.e. $E(x_{it} \cdot e_{it}) \neq 0$), once the individual effect has been controlled for.

Our test consists, therefore, in analysing whether this problem is caused by the individual heterogeneity that affects both firm value and its ownership structure, or by the simultaneity that exists between the two variables. With this aim we first computed the correlation coefficients between ownership variables and the individual effect, u_i, so as to validate individual heterogeneity as the cause of endogeneity of ownership structure. Furthermore, we omitted one by one the control variables in Z when estimating Models from (1.1) to (1.6), and afterwards compared the resulting correlations with the corresponding ones obtained from the estimation of the value models containing them all. Secondly, the correlation coefficients between ownership variables and the random disturbance, e_{it}, are computed so as to verify if the cause of the endogeneity of firms' ownership structure is its simultaneity with value.

To test for the origin of the endogeneity of ownership, we constructed an unbalanced panel data of 135 non-financial quoted Spanish firms for the period between 1990 and 1999. Table 1 provides the structure of the panel by number of annual observations per company.

Table 1. *Structure of the sample*

Number of annual observations per Company	Number of companies	Number of observations
10	76	760
9	22	198
8	24	192
7	5	35
6	8	48
Total	135	1233

Table 2. *Summary statistic*

	Mean	Standard deviation	Minimum	Maximum
Value	0.62448	0.86339	0.00371	12.725
Insider Ownership	0.17664	0.23821	0.0000	1.0000
Ownership Concentration	0.64311	0.24155	0.00011	1.0000
Size	10.582	1.60051	6.3724	15.933
Debt	0.20056	0.21741	0.0000	0.98392
Intangible Assets	0.00617	0.17693	−0.01725	0.23016
Market Share	0.08196	0.14062	0.0000	0.92367

Our principal source of information is the database from the CNMV (Spanish Security Exchange Commission). Balance sheet and ownership data were collected in the form of 'Interim Financial Reports for all quoted companies' and 'Significant shares for all quoted companies', respectively. Data on the market value of the company shares were extracted from the Daily Bulletin of the MSE (Madrid Stock Exchange). Summary statistics (mean, standard deviation, minimum and maximum) of the variables used in the analysis are given in Table 2.

III. RESULTS

Since our discussion is not focused on the value–ownership relationship, which has already been widely discussed in the literature, but on the source of the endogeneity of ownership structure in the value model, we will not comment here on the estimation results[1] but will turn our attention directly to the correlation analysis.

The figures at the top of each row in Table 3 show the correlation coefficients between ownership variables and the individual effect after estimating Models (1.1) to (1.6) using the within-groups estimator. On the one hand, the results obtained reveal that insider ownership is significantly correlated with u_i in all cases, which suggests that a problem of endogeneity exists as a result of unobservable heterogeneity. However, this observed correlation shows no increase after the omission of the control variables, except for the intangible assets variable, although the increment is very small. Therefore, these results cast doubt as to whether the proposed characteristics of the firm, which are sources of unobservable heterogeneity, are actually sources of endogeneity of the insider ownership variable. On the other hand, the results for ownership concentration are rather different. As shown in the table, ownership concentration does not seem to suffer from endogeneity as a consequence of unobservable heterogeneity, since its correlation with u_i is not significantly different from zero in most cases. There is an exception, however. The omission of a measure of size in the value model makes the correlation between ownership concentration and the individual effect significant. Consistent with Demsetz and Lehn (1985), our evidence points to firm size as a source of endogeneity of ownership concentration.

To deal with the second concern, the simultaneity between ownership and value, the correlation coefficients between ownership variables and the random disturbance e_{it} are computed. Since the within-groups estimator is based on the assumption that $E(x_{it} \cdot e_{it}) = 0$ for all t and s, another type of estimation is needed. The figures at the bottom of each row in Table 3 show the correlation coefficients between ownership variables and e_{it} after using instrumental variables for insider ownership and ownership concentration in the estimation of our value models. The results for Model (1.1) show that there is a significant correlation between insider ownership and the random disturbance, even when controlling for unobservable heterogeneity. The observed correlation decreases when controlling for non-linearities in the value–ownership relation – see results for Model (1.2) – and is not significantly different from zero when insider ownership and ownership concentration are jointly considered in the regression – see results for Models (1.5) and (1.6).[2] Overall, insider ownership is clearly endogenous, and not only as a consequence of firm heterogeneity but mainly as a result of its simultaneity with value.

Concerning ownership concentration, the results in Table 3 reveal a high and significant correlation between this variable and the random disturbance, while its correlation with the individual effect was not significant. This evidence suggests that ownership concentration is endogenous in the value model, and that this endogeneity is not caused by unobserved heterogeneity but by its simultaneity with value. Moreover, this correlation is again

[1] The estimation results will be provided by the authors upon request.

[2] We find, however, no conclusive explanation for this lack of significance. In addition to the simultaneity between insider ownership and value, the fact that ownership concentration significantly contributes to the explanation of insider ownership levels, as shown in Chen and Steiner (1999), may explain this result.

Table 3. *Correlation coefficients*

Model	Ownership variable	With all control variables	Without *intangible assets*	Without *debt*	Without *size*	Without *market share*
(1.1)	*Insider*	−0.1744***	−0.1747***	−0.1651***	−0.1227***	−0.1713***
	ownership	−0.2137***	−0.2224***	−0.2494***	−0.3730***	−0.2618***
(1.2)	*Insider*	−0.1654***	−0.1565***	−0.1508***	−0.0951***	−0.1532***
	ownership	−0.1098***	−0.0843**	−0.1146***	−0.0662*	−0.0936**
(1.3)	*Ownership*	−0.0133	−0.0104	−0.0265	−0.0623**	0.0125
	concentration	−0.6272***	−0.5433***	−0.3865***	−0.9184***	−0.5069***
(1.4)	*Ownership*	−0.0142	−0.0111	−0.0266	0.0647**	−0.0133
	concentration	−0.6163***	−0.6246***	−0.5522***	−0.7414***	−0.4993***
(1.5)	*Insider*	−0.1721***	−0.1723***	−0.1633***	−0.1186***	−0.1689***
	ownership	−0.0157	−0.0231	−0.0618	0.0212	0.0018
	Ownership	−0.0140	−0.0110	−0.0272	0.0618**	−0.0133
	concentration	0.5884***	0.5896***	0.5633***	0.8864***	0.6736***
(1.6)	*Insider*	−0.1478***	−0.1478***	−0.1426***	−0.0789***	−0.1440***
	ownership	0.0045	−0.0034	−0.0237	0.2219***	0.1079**
	Ownership	−0.0371	−0.0343	−0.0451	−0.0447	−0.0362
	concentration	0.4093***	0.4692***	0.4079***	0.5727***	0.4432***

Notes:
(i) Figures at the top of each row denote correlation coefficients between the ownership variable and the individual effect, u_i. Figures at the bottom of each row denote correlation coefficients between the ownership variable and the random disturbance.
(ii) ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

much higher after omitting the size variable from the regression, which confirms that firm size is an essential source of endogeneity of ownership concentration.

IV. CONCLUSIONS

This paper examines the causes of the endogeneity of ownership structure through an analysis of the correlation coefficients between ownership variables and the error term in the value regression. Using both insider ownership and ownership concentration so as to capture firms' ownership structure, our analysis shows that the main source of the endogeneity problem is the simultaneity between ownership and value, rather than individual heterogeneity. Therefore, the best way to control for endogeneity is by using instrumental variables in the estimation, or specifying a simultaneous equation model.

ACKNOWLEDGEMENTS

We thank the research agency of the Spanish Government, DGI (Project BEC2001-1851) and the Junta de Castilla y Leon (Project SA 033/02) for financial support.

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