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Empirical Study of Dynamic Chinese Corporate Governance Based on Chinese-listed Firms with A Panel VAR Approach

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Abstract

Purpose – In this article, a dynamic model like a VAR is an appropriate choice for estimating the possible interrelationship between ownership structure and firm performance as a dynamic process.
Research design, data, and methodology – Data of this work are collected from Chinese stock exchange including 350 Chinese-listed firms during the period of 1999-2012. We hypothesize that this interrelationship dynamically exists between ownership structure and firm performance. To examine the correlation, a panel Vector Auto-regression (PVAR) approach generated by GMM method is utilized to test the possible dynamic relation embedded in corporate governance. Another two dynamic analysis solutions such as orthogonalized impulse-response function and variance decomposition are also used simultaneously.
Results – Findings of this study indicate the evidence that dynamically endogenous relationship exists between ownership structure and firm performance. Further, there is a dynamical correlation between investment and performance. Impulse response and variance decomposition illustrate that impact of a shock to variables themselves is the main source for their variability.
Conclusions – The conclusion in this study is that there is a bidirectional and inter-temporal effect between proportion of ownership and corporate performance for a long run in accordance with impulse response function. Overall, our results suggest that corporate governance in China is more market oriented.

Keywords: Ownership Structure, Firm Performance, Endogeneity, Dynamics, Panel VAR.

JEL Classifications: L25, L50, M21.

1. Introduction

The most important and pervasive issue confronting studies in empirical corporate finance is endogeneity. Recently, a considerable amount of empirical researches (Wintoki et al., 2012; Nguyen et al., 2014) have verified that dynamic endogenous relationship exists in the corporate governance. In terms of dynamic endogeneity, Hu and Izumida (2008) argue that ownership concentration has a significant effect on contemporary and subsequent corporate performance. Fahlenbrach and Stulz (2009) find that the relationship between change of performance (Tobin'Q) and past and contemporaneous change in ownership structure depend on controlling for past stock returns. Cheung and Wei (2006) also indicate that insider ownership and corporate performance can be explained by their respective lagged values. Wintoki et al. (2012) summarize that there are three main sources of endogenous problem in empirical experiments, including unobservable heterogeneity, simultaneity and current values of governance variables are a function of past firm performance. The third endogeneity is called dynamic endogeneity. In their study, there is no relation

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between current board structure and current firm performance when taking dynamic endogeneity into account. Davidson and Rowe (2004) also develop a theory of inter-temporal endogeneity of board composition and financial performance. Using causality tests in panel regressions with three years of data for 130 closed-end mutual funds, they find only minimal evidence of inter-temporal endogeneity. Prior relevant empirical researches show that dynamic endogeneity exists in the corporate governance and neglecting this endogenous problem can have serious consequences for inference.

Regarding the methodology of exploring the dynamically endogenous problem, Davidson and Rowe (2004) use fixed effect model and random effect model to exploit the endogeneity. Wintoki et al. (2012) and Nguyen et al. (2014) utilize the dynamic panel generalized method of moments (GMM) to investigate the relation between board structure and firm performance. Different from the aforementioned method, this study provides a pioneering approach by applying panel vector auto-regression method (PVAR) to examine the possible endogenous correlation between ownership and performance initially.

The idea that ownership and performance may be dynamically and endogenously related is not new. However, we turn to another new solution (panel VAR method) to explore this dynamic endogeneity. This method treats all variables as endogenous variables by allowing the endogenous interaction between these variables in a system and uses orthogonalized impulse-response function and variance decomposition, which shows the responses of one variable of interest (i.e., ownership) to an orthogonal shock in another variable of interest (i.e., performance). By orthogonalizing the response we are able to identify the effect of one shock at a time, while holding other shocks constant (Love, 2006). Panel VAR approach is a method of system, which is similar to a prior simultaneous equation system. Panel VAR mainly explore the dynamic relationship between different variables in a system. This paper attempts to look for some new findings through using panel VAR approach.

Sims (1980) provides a new macro-econometric framework: vector auto-regressions (VARs). A univariate auto-regression is a single-equation, single-variable linear model in which the current value of a variable is explained by its own lagged values. A VAR is an n-equation, n-variable linear model in which each variable is in turn explained by its own lagged values, plus current and past values of the remaining n-1 variables. This simple framework provides a systematic way to capture rich dynamics in multiple time series and the statistical toolkit that came with VARs was easy to use and interpret. As Sims (1980) and others argued in a series of influential early papers, VARs held out the promise of providing a coherent and credible approach to data description, forecasting, structural inference, and policy analysis. In this study, a dynamic model like a VAR is an appropriate choice for estimating the inter-relationship between ownership structure and firm performance as a dynamic process.

Observing previous studies of ownership-performance, no vector auto-regressions model is to consider the dynamic interactive impacts between ownership and performance. Dynamic panel generalized method of moment (GMM) is also a main method to alleviate potentially dynamic endogeneity compared with traditional methods such as ordinary least squares, fixed effect model and simultaneous equation models. In addition, a considerable amount of prior studies have ignored dynamic analysis solutions, such as generalized method of moment, impulse responses and variance decompositions, and have had gaps in their econometric procedure of applying the VAR model, such as ignoring VAR diagnostics. All of these factors may have caused biased results. The paucity of literature drove this further study, but with a different approach to correct current shortcomings. In an attempt to decompose cause and effect, panel vector auto-regressions generated by GMM are estimated that describe the relation between ownership structure and firm performance in pursuit of new findings.

The current study mainly provides several possible contributions to a growing number of literatures of corporate finance. Specifically, this paper is in line with previously cited studies on the endogenous interaction between ownership and firm performance in corporate conditions.

Firstly, the study provides the econometric application to avoid misspecification and to minimize the resulting bias. Most of past literatures normally use dynamic panel data model to deal with the possible correlation between ownership-performance and use the lag one term of dependent variable. This study tests and estimates the causal relationship by applying the three-variable VAR model based on the panel data (ownership structure, investment and firm performance). We use vector auto-regressions on panel data and enable us to investigate the endogenous relationship between ownership, investment and firm performance in corporate finance, which allowing for a firm-specific unobserved heterogeneity considering the levels of variables (i.e., fixed effects model). Unlike traditional methodology, traditional simultaneous equation should assume endogenous variables and exogenous variables separately according the economic theory. Inappropriate exogenous variable assumed will lead to serious estimating bias. Panel VAR approach does not rely on these strong assumptions that are necessary in models that utilize the economic theory or Euler equations.

Secondly, using the orthogonalized impulse-response functions, we are able to separate the response of one variable to shocks coming from other variables. In this way, we can find which influence factors should be entered in the ownership equation in models and decide which factors mostly affect ownership. Traditional methods (fixed effect model or simultaneous equation) are not able to complete

this work.

Thirdly, this study utilizes the technique of selection for lag order criteria, namely, AIC (Akaike's Information Criterion), BIC (Schwarz criterion), HQIC (the Hannan & Quinn criterion), and obtains a comprehensive lag order length and complete dynamic estimation, which is affluent in the estimating technique of panel vector auto-regression methodology. Compared with the traditional method, they usually estimate the lag order in accordance with prior literature reviews.

This paper supplements the scant literature on relationships between ownership structure and firm performance and empirical evidence about the source of endogeneity by using a new approach: panel VAR. This paper also adds to present the new evidence of corporate governance in ownership structure and firm performance in China from 1999-2012. In recent years, many scholarly papers use Chinese samples as research goals (Jiang & Kim, 2016). However, it is not clear whether the findings from western scholars (Wintoki et al., 2012; Nguyen et al., 2014) can be generalized in the context of China where capital market for development is generally not effective.

As a robust measure, the purpose of this section is to use data on a large sample of Chinese listed companies examined over the period from 1999 to 2012. We re-investigated the inter-relationship between ownership and performance in order to address the above research question. The main objective is to re-examine whether the dynamics of firm performance can be used as indication of the change of ownership structure or not; whether or not intertemporal effect exists between ownership and performance. To deal with these problems, investment variable is involved in the panel VAR system. For doing this, we document significant differences in the response of investment to firm performance because McConnel and Muscarella (1985), Cho (1998) have shown that investment positively affects corporate value. A considerable amount of researches have provided the evidence that there is an indirect path heading for investment due to ownership structure (Devereux & Schiantarelli, 1990; Ramirez, 1995). However, there also are proofs of a direct and non-monotonic relationship between investment and ownership structure (Cho, 1998; Iturriaga & Sanz, 2001). This paper initially attempts to explore the possible triangle relationship between ownership structure, investment and performance under the dynamic framework, but we examine the dynamic relation by applying a panel VAR model in order to obtain some new findings.

The work of Zhou (2011) is an empirical study focusing on the corporate governance-firm performance relationship in China. Our study differs from his work in the way we deal with the endogeneity problem in a panel VAR approach.

At last, this paper also analyzes and maps economic policy onto estimated results, and then provides insightful policy implications for governments.

The rest of the paper is as follows: section 2 presents the empirical method and specification including data description, unit root test and lag length selection; Section 3 provides the final results. Summary, limitations and suggestions for further work are presented in section 4.

2. Empirical Methodology

2.1. Sample Data and Key Variables

The sample utilized in this study comprises data for 350 public companies listed on the Chinese Stock Exchange quoted on the Shanghai and Shenzhen. Annual dataset was collected for these companies in respect of the period 1999 to 2012 inclusive. The total effective number of firm-year observations is 4,900. Data predominantly was obtained from three sources: The first database is the Chinese Center for Economic Research (CCER). The second database is the China Stock Market and Accounting Research (CSMAR) database. The third database is RESSET database. They are the most important databases on the Chinese capital market. (Kato & Long, 2005; Firth et al., 2006, 2007)

The sample employed in the study is subject to the following criteria: (1) remove unavailable information, indeterminable ownership structure and incomplete financial data; (2) eliminate companies treated by ST, *ST and PT; (3) exclude firms of issuing both B and H shares; (4) excluded financial companies; (5) the firm must have been quoted on the Chinese Stock Exchange at least one year before year of analysis. To alleviate the impact of extreme outliers, we winsorize all firm-level variables at the 1^{st} and 99^{th} percentile levels. Winsorization is commonly used in corporate governance literature, such as studies by Erkens et al. (2012) and Liu et al. (2012). Without these outliers, results are qualitatively not different from those reported above. We can therefore rule out that our results are driven by outlier values.

In our investigation, the key endogenous variables of interest are measure of performance of firms, ownership structure and investment. We construct a panel-data vector auto-regression method with three variable, including ownership, investment and performance. All variables are treated as endogenous variables in our study, the interrelationship between these variables can be tested efficiently.

Ownership concentration is mainly measured by the fraction of share-owned by the first largest shareholder (CR). Investment variable is calculated by net capital expenditure divided by the total assets (CAPITAL). Performance variable is proxies for two alternative variables: return on assets (ROA) and Tobin'Q (Q). ROA variable is utilized for robustness checking. <Table 1> reports the summary statistics for the firm-level variables.

<Table 1> Statistics Description

Q	2.08	1.31	0.59	1.69	14.98
ROA	0.04	0.07	-0.97	0.03	2.68
CR	0.40	0.17	0.04	0.38	0.89
CAPITAL	0.07	0.09	-0.91	0.04	1.48

2.2. Unit Root Test

Unit root test is a necessarily initial step for estimation using panel VAR model. In this study we implement two panel unit root tests (LLC and ADF tests) proposed by Levin et al. (2002), Maddala and Wu (1999), respectively. The null hypothesis of the above unit root tests is that there exist unit root in the series, i.e., the variables are non-stationary. Rejecting the null hypothesis means the series is stationary. This series is non-stationary if we cannot reject the null hypothesis. Unit root test is reported in <Table 2>.

2.3. Model Specification

We use a panel-data vector auto-regression methodology in our study. This technique contains the traditional VAR approach, which treats all the variables in the system as endogenous, with the panel-data approach, which allows for unobserved individual heterogeneity.

<Table 2> Unit root Test

statistics	Levin-Lin-Chu		ADF Fisher	
	Trend	No trend	trend	No trend
Variable	Adjusted t*Statistics	Adjusted t*Statistics	Chi-squared Statistics	Chi-squared Statistics
ROA	-21.88***	-18.74***	15.31***	23.29***
Tobin'Q	-30.41***	-44.17***	14.76***	47.46****
CR	-61.73***	-25.31***	4.89***	1.96**
CAPITAL	-28.75***	-31.71***	25.26***	32.88***

Notes : *** indicates significance at 1% level, ** at 5%, and *** at 10% level, respectively.

To implement the model, the empirical method, which is closely based on the approach taken in Love and Zicchino (2006), is to estimate a P-order n-variable VAR model in a panel setting as follows:

$$y_{it} = \alpha_0 + \alpha_1 y_{i,t-j} + f_i + d_t + \varepsilon_{it}$$

Where y_{it} is one vector of endogenous variable. The vector has three variables containing CAPITAL, Q and CR. α_1 is a vector of parameters to be estimated, f_i represents firm -fixed effects. d_t denotes time effects, ε_{it} is the error term assumed to be IID with a zero mean. The lowercase subscripts i and t represent firm i at time t respectively, with the period t(1999-2012). The VAR includes j lags, which is selected using the Information Criterion.

In applying the VAR procedure to panel data, we need to impose the restriction that the underlying structure is the same for each cross sectional unit. Since this constraint is likely to be violated in practice, one way to overcome the restriction on parameters is to allow for "individual heterogeneity" in the levels of the variables by introducing fixed effects, denoted by i in the model (Love & Zicchino, 2006). Since the fixed effects are correlated with the regressors due to lags of the dependent variables, the mean-differencing procedure commonly used to eliminate fixed effects would create biased coefficients. To avoid this problem we use forward mean-differencing, also referred to as the 'Helmert procedure" (Arellano & Bover, 1995). This procedure removes only the forward mean, i.e. the mean of all the future observations available for each firm-year. This transformation preserves the orthogonality between transformed variables and lagged regressors, so we can use lagged regressors as instruments and estimate the coefficients by system GMM method. This is a standard procedure for estimating dynamic models with panel data.

2.4. Lag Length Selection

This step is to check the lag order selection. This model will be over-parameterized if the number of lags is too large. Too-long lags result in a rapid loss of degrees of freedom and over-parameterization, while too-short lags might introduce biased results caused by omitting important variables and failing to capture the system's dynamics.

In our study, AIC criterion, SC criterion and HOIC criterion are simultaneously selected as the criterion of the lag order selection. The appropriate lag length for panel VAR model is one is presented in <Table 3>.

<Table 3> Selection Order Criterion

lag	AIC	BIC	HQIC
1	-2.51049	-.911184	-1.94498
2	-2.6978*	-.962418*	-2.08146*
3	-2.62208	-.726403	-1.94554
4	-2.50365	-.416063	-1.75461
5	-2.33226	-.010323	-1.49413

Note: (*) indicates lag order selected by the criterion
AIC: Akaike information criterion
SC: Schwarze information criterion
HQIC: Hannan-Quinn information criterion

3. Empirical Results

This section mainly analyzes the primary results through a

three-variable panel VAR model by applying GMM methodology. There are two lag orders chosen by the AIC criterion, HQIC criterion and the BIC criterion. <Table 4> provides the primary result. Impulse response is reported in <Figure 1>. Variance Decomposition is presented in <Table 5>.

3.1. Result of Panel VAR

According to the <Table 4>, result using the GMM method indicates that there is a dynamically inter-temporal relationship between ownership and performance. In the row 5, it is interesting to note that there is a significantly negative relation between current Q and lagged one CR. However, in row 11, the coefficient of lagged two CR is positive and statistically significant. Impulse responses also illustrates that the response of Q to CR shock is negative from the beginning to the second period, and then shows a positive shock after the second period. In the row 3 and row 9, it is also found that the coefficient of lag Q variable with 1-2 periods is statistically significant and positive, which implies that lagged firm performance is significant feedback effect to ownership concentration. This also confirms the results of Cho (1998), Chui and Mak (2002), park and Jang (2010) for samples of USA.

<Table 4> Result of PVAR Model

		Response of		
Row	Response to	CAPITAL(t)	Q(t)	CR(t)
1	CAPITAL(t-1)	0.426***	1.057***	-0.007
2		(18.24)	(-4.02)	(-0.46)
3	Q(t-1)	0.006***	0.339***	0.002*
4		(4.42)	(13.02)	(1.91)
5	CR(t-1)	0.027	-2.393***	0.778***
6		(1.17)	(-6.23)	(35.10)
7	CAPITAL(t-2)	0.005	0.008	-0.021
8		(0.26)	(0.03)	(-1.52)
9	Q(t-2)	-0.002*	0.062***	0.003***
10		(-1.78)	(3.47)	(4.03)
11	CR(t-2)	0.015	1.965***	0.030**
12		(0.91)	(5.93)	(1.99)

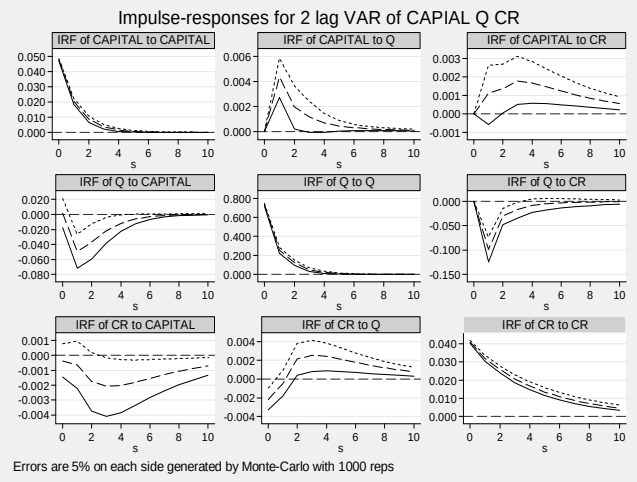
Note: Heteroskedasticity adjusted t-statistics are in parentheses.
*** indicates significance at 1% level, ** at 5% and *** at 10% level, respectively. L.CR is the first order difference of CR..

As for the investment variable, panel VAR model (row 1) reveals that the lagged first-period investment has a significantly positive impact on Tobin's Q, which is consistent with the view from western countries in which investment positively affects corporate performance (Cui & Mak, 2002; Davies et al., 2005; Cho, 1998; Demsetz & Villalonga, 2011). Row 3 shows that the lag-one year performance is positive in the investment, which shows that adverse effect exists from performance to investment and this confirms the result of Cho(1998), Hu and Izumida(2008) suggest that firm performance affects investment. However, the interesting thing from row 9 is that the coefficient of performance variable with lag two period is negative significantly.

It is also found that this panel VAR analysis not only supports the possibility of detecting the presence of dynamism in dynamic modeling but to also control and investigating important endogeneity issues. From the table above, CAPITAL (t) column can for instance be seen as an investment function, Q (t) as firm performance function, CR (t) as ownership structure. The presence of these estimated functions presents the evidence of establishing the direction of causation and the presence of reinforcing effects. Thus from the table it can easily be seen that firm performance is able to explain ownership structure and vice versa as well, in other words there are bi-causal (reverse) relationships with reinforcing effects.

3.2. Result of Impulse Response

This section provides the impulse response functions from the panel VAR. This section presents graphs of the impulse-response functions (IRF) and the 5% error bands generated by Monte Carlo simulation. Figure 1 illustrates impulse responses function for models with three variables (CAPITAL, Q and CR) estimated for a sample of Chinese listed firms, and consists nine parts of IRF separately.



<Figure 1> Impulse-responses for 2 lag VAR of CAPITAL Q CR

The orthogonalized impulse response (OIR) is sensitive to the ordering of the variables. One of the approach is to use OIR with the ordering of the variables will be as follows (Enders, 2003). The first place in the list of ordering will be reserved for the variable that is not caused by any other variables; the ordering of the remaining variables will follow in order of increasing correlation among them; the last place

in the list of ordering will be reserved for the target variable. In the model with three variables, we assume that CR affects all other variables with a lag and is simultaneously affected by all other variables. Thus, CR is the most endogenous variable in the system, thus capturing all available information.

The impulse functions in IRF-2 show that the response of capital to Q shock and as expected, a positive relationship is derived from Q.

In the IRF-4, we also observe that the response of Q to capital shock is negative in the impulse responses, which show that investment has a significantly negatively effect on firm performance in a short and long run. Love (2006) explores that performance (Tobin'Q) measured the investment opportunities, the invest shock implied that the available opportunities existed.

It is also found that a negative impact of a shock to CR on Q in the IRF-6 and this impact arrive at the maximize value after one year and then the effect of a shock starts to decline but still is negative, and this effect continues for more than two years, and disappears eventually.

At the same time, we can confirm the evidence from the IRF-8 that CR variable responds positively and significantly to Tobin's Q for a long run, more than ten years. These results are in line with some previous empirical studies that firm performance (Tobin's Q) has a feedback effect of the ownership structure (Davidson & Rowe, 2004; Cheung & Wei, 2006; Hu & Lzumida, 2008; Zhou, 2011). We also can find that there is a long interactive impact between CR and Q, and the persistent period is ten years or more.

3.3. Result of Variance Decomposition

<Table 5> Variance Decomposition

	PERIOD	CAPITAL	Q	CR
CAPITAL	1	1.000	0.000	0.000
CAPITAL	2	0.993	0.007	0.000
CAPITAL	3	0.991	0.008	0.001
CAPITAL	4	0.989	0.009	0.002
CAPITAL	5	0.988	0.009	0.003
Q	1	0.000	1.000	0.000
Q	2	0.004	0.980	0.016
Q	3	0.006	0.977	0.017
Q	4	0.007	0.976	0.017
Q	5	0.007	0.976	0.017
CR	1	0.000	0.003	0.997
CR	2	0.000	0.002	0.998
CR	3	0.001	0.003	0.996
CR	4	0.002	0.004	0.994
CR	5	0.003	0.005	0.992

The variance decomposition of each endogenous variable is reported in <Table 5>. The first part reports the variance decomposition of CAPITAL. The second part presents the variance decomposition of Q and the last part shows the variance decomposition of CR. Each part contains five columns. The first column lists the variable name. The second column lists the time periods. The remaining columns report the variance proportion of the shock to each variable in each time period.

The variance decompositions for the three variables presented in <Table 5> are consistent with these mentioned results above. According to <Table 5>, the fluctuations of CAPITAL are explained mainly by CAPITAL shocks in a long run. CAPTIAL shock accounts for 100% in the first year. Its proportion in the variance of CAPITAL decreases over time and however, it still exceeds 99% every year. As for Q, the fluctuation of Q is dominantly explained by itself and CAPTIAL. CR shock just plays a little role in explaining the effect of its shock to Q. CR is also only explained by itself in a long run. No significant effect of Q or investment shock to CR exists. In summary, shocks to CR, investment and Q are important sources of variability for themselves.

3.4. Robustness Test

In this section, we conducted several additional tests to investigate the sensitivity of our results, which are not reported here in the interest of brevity. We introduce the ROA into the panel VAR model to test the stability of data. The evidence indicates that the result maintain the expected signs. We also introduce the CR10 variable (the percentage of share held by tenth largest shareholders). According to the results of panel VAR model, the results of impulse response and variance decomposition are coherent.

4. Conclusions

4.1. Summary

This paper uses a panel VAR approach to analyze the inter-temporal relationship between ownership structure and firm performance in Chinese listed companies over a period of 1999-2012. Our results provide evidence that there is a positive bidirectional correlation between ownership structure and firm performance. More specifically, impact of a positive shock to performance on ownership structure is statistically significant and vice-versa. This result supports the view of Zhou (2011) in the two-way interaction effect between the proportion of largest shareholding and corporate performance. Contrary to the prior literature on the US, UK and other western countries, this result indicates that even after controlling for endogeneity, corporate governance structures do matter in China, the feedback effect of ownership structure on firm performance is still valid and robust, and not spurious because of endogeneity.

These further results indicate the possibility of bidirectional

relationship between investment variable and firm performance. In our study, investment variable is an intermediate variable between ownership and performance. According to the impulse response, there is a significantly negative bidirectional relationship between investment and firm performance, which means that the investment responds significantly and positively to the firm performance shock, while firm performance responds significantly and negatively to the investment shock. This evidence also implies that the efficiency of investment in Chinese listed firms is lower. In the future, we can make a deeper research in this question.

4.2. Limitations

Several limitations in this paper still exists. Firstly, the use of panel VAR model has its own shortage. The VAR models pioneered by Sims (1980) have been for at least three decades to measure the response of economic variables to shocks and the degree to which each shock accounts for the variability of the variable through a specified time horizon. The earlier panel VAR method in empirical research in the micro finance used is from Love (2006), who provides the program in his owned paper. Most prior researches applied by panel VAR approach are utilized in the macro-economics.

Choosing the correct lag-length is critical for panel VAR since excessively short lags may fail to capture the system's dynamics, leading to omitted variables, bias the remaining coefficients, and likely produce serially correlated errors. Meanwhile, too long a lag leads to loss of degrees of freedom and to over-parametarization.

There is no uniform standard mechanism for making these choices and the possibility that the results obtained from a panel VAR analysis could be sensitive to the selection of lag length and the number of variables included in the system are considered. Different lag order criterion has its own characteristics, compromising result of lag order when using several criterions simultaneously might lead to inaccuracy. It is recommended that adequate steps are taken to test the model for the appropriate lag-length and the number of variables it can handle.

In effect, the conclusions of this study should be treated only as suggestive, because it draws its inference from a panel VAR model that is relatively new for economic analysis and includes a number of theoretical issues that have not been sufficiently and satisfactorily resolved in the literature. Nevertheless, such a new approach after adequate refinement could become a highly powerful analytical tool and an important addition to the existing menu of instruments used in comparative economic research.

4.3. Further Research

Panel VAR analysis not only allows us to control and investigate essential endogeneity issue but to also detect the presence of dynamism in ownership modeling. This study complements earlier work in finance and growth literature by Davidson and Rowe (2004) and others, this dynamic mechanism will lead to a lead-lag relationship. In the future, more studies and topics in the micro field of corporate finance should be considered by using this method. This study opens up new avenues for further research from a dynamic viewpoint by applying a panel VAR approach, our study also contributes to expand literature by showing that in developing countries with underdeveloped financial markets.

References

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control, AC-19*(6), 716-723.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error component models. *Journal of Economics*, *68*(1), 29-51.

Beetsma, R., & Giuliadori, M. (2011). The effects of government purchase shocks: review and estimates for the EU, *Economic Journal*, *121*(550), F4-F32.

Berdiev, A. N., & Saunoris, J. W. (2016). Financial development and the shadow economy: A panel VAR analysis. *Economic Modelling*, *57*(C), 197-207.

Boubtane, E., Coulibaly, D., & Rault, C. (2010). Immigration, growth and unemployment: Panel VAR evidence from OECD countries. *Labour Press*, *27*(4), 399-420.

Caivano, M. (2006). *The transmission of shocks between the U.S. and the Euro area*. Bank of Italy.

Canova, F., & Perez Forero, F. (2012). Estimating overidentified, non-recursive, time varying coefficients, structural VARs, UPF manuscript.

Canova, F., & Ciccarelli, M. (2013). Panel vector autoregressive models: A survey. Working Paper Series, No.1507.

Cheung, W. K. A., & Wei, K. C. J. (2006). Insider ownership and corporate performance: Evidence from the adjustment cost approach. *Journal of Corporate Finance, 12*(5), 271–350.

Cho, M. (1998). Ownership structure, investment and the corporate value: An empirical analysis. *Journal of Financial Economics, 47*(1), 103-121.

Choi, I. (2001). Unit Root Tests for Panel Data. *Journal of International Money and Finance*, *20*(2), 249-272.

Ciccarelli, M., Ortega, E., & Valderrama, M. T. (2012). Heterogeneity and cross-country spillovers in macroeconomic-financial linkages. ECB working paper.

Cui, H., & Mak, Y. T. (2002). The relationship between managerial ownership and firm performance in high R&D firms. *Journal of Corporate Finance*, *8*(4), 313-336.

Davidson, W. N., & Rowe, W. (2004). Ownership concentration and corporate performance: A causal analysis with Japanese panel data. *Corporate Governance*, *70*(1), 1-16.

Davies, D., Hillier, D., & McColgan, P. M. (2005). Ownership structure, managerial behaviour and corporate value. *Journal of Corporate Finance*, *11*(4), 645–660.

Delios, A., Xu, D., & Beamish, P. W. (2008). Within-country product diversification and foreign subsidiary performance. *Journal of International Business Studies*, *39*(4), 706-724.

Demsetz, H., & Villalonga, B. (2001). Ownership structure and corporate performance. *Journal of Corporate Finance*, *7*(3), 209-233.

Devereux, M., & Schiantarelli1, F. (1990). Investment, financial factors, and cash flow: Evidence from U.K. panel data, in R. G. Hubbard (ed.), *Asymmetric Information*, *Corporate Finance and Investment* (pp.279–306), Chicago: The University of Chicago Press.

Earle, J. S., Kucsera, C., & Telegdy, A. (2005). Ownership concentration and corporate performance on the Budapest Stock Exchange: Do too many cooks spoil the goulash. *Corporate Governance*, *13*(2), 254-264.

Enders, W. (2003). *Applied Econometric Time Series*. Hoboken, NJ: Wiley.

Erkens, D. H., Hung, M. Y., & Matos, P. P. (2012). Corporate governance in the 2007–2008 financial crisis: evidence from financial institutions worldwide. *Journal of Corporate Finance*, *18*(2), 389–411.

Fahlenbrach, R., & Stulz, R. M. (2009). Managerial ownership dynamics and firm value. *Journal of Financial Economics*, *92*(3), 342-361.

Fuxiu, J., & Kim, A. K. (2015). Corporate governance in China: A modern perspective. *Journal of Corporate Finance*, *32*, 190-216.

Hannan, E. J. (1980). The Estimation of the Order of an ARMA Process. *Annals of Statistics*, *8*(5), 1071-1081.

Hannan, E. J., & Quinn, B. G. (1979). The determination of the order of an autoregression. *Journal of the Royal Statistical Society*, *B41*, 190-195.

Himmelberg, C. P., Hubbard, R. G., & Palia, D. (1999). Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics, 53*(3), 353-384.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, *115*(1), 53-74.

Iturriaga, F. J. L., & Sanz, J. A. R. (2001). Ownership structure, corporate value and firm investment: A simultaneous equations analysis of Spanish companies. *Journal of Management and Governance*, *5*(2), 179-204.

Jensen, M., & Meckling, W. (1976). Theory of the firm: managerial behaviours, agency cost and ownership structure. *Journal of Financial Economics, 3*(4), 305-360.

Levine, A. Lin, C. F., & Chu, C. S. (2002). Unit root tests in panel data: Asymptotic and finite sample properties. *Journal of Economics, 57*, 265-301.

Liu, N. Y., Bredin, D., Wang, L. M., & Yi, Z. H. (2014). Domestic and foreign institutional investor behavior in China. *European Journal of Finance*, *20*(7-9), 728-751.

Love, I. (2003). Financial development and financing constraints: International evidence from the structural investment model. *Review of Financial Studies, 16*(3), 765-791.

Love, L., & Zicchino, L. (2006). Financial development and dynamic investment behavior: Evidence from panel VAR. *The Quarterly Review of Economic and Finance*, *46*(2), 190-210.

Madala, G., & S, Wu. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics, 61*(S1), 631-652.

Mc Connell, J., & Muscarella, C. (1985). Corporate investment expenditure decisions and the market value of the firm. *Journal of Financial Economics*, *14(*3), 399-422.

Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica*, *49*(6), 1417–1426.

Nguyen, T., Locke, S., & Reddy, K. (2014). A dynamic estimation of governance structures and financial performance for Singaporean companies. *Economic Modelling*, *40*(C), 1-11.

Park, K., & Jang. S. S. (2010). Insider ownership and firm performance: An examination of restaurant firms. *International Journal of Hospitality Management*, *29*(3), 448-458.

Ramirez, C. D. (1995). Did J. P. Morgan's Men add liquidity? Corporate Investment, Cash Flow, and Financial Structure at the Turn of the Twentieth Century. *Journal of Finance*, *50*(2), 661–678.

Ramey, V., & Shapiro, M. (1998). Costly investment reallocation and the effects of government spending. *Carnegie-Rochester Conference Series on Public Policy*, *48*(1), 145-194.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, *6*(2), 461-464.

Schwert, G. W. (1989). Tests for Unit Roots: A Monte Carlo Investigation. *Journal of Business and Economic Statistics*, *7*(2), 147-160.

Sim, C. (1980). Macroeconomics and Reality. *Econometrica*, *48*(1), 1-48.

Thomsen, S., Pedersen, T., & Kvist, H. K. (2006). Blockholder ownership: Effects on firm value in market and control based governance systems, *Journal of Corporate Finance*, *12*(2), 246–269.

Wintoki, B., James, S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, *105*(3), 581–606.

Yabei, H., & Shigemi, I. (2008). The relationship between ownership and performance: A review of theory and evidence. *International Business Research, 1(*4), 72-81.

Zhou, Y. (2011). Empirical research of ownership structure and corporate performance based on the perspective of dynamic endogeneity. *Energy Procedia*, *5*(1), 1878-1884.