THE CAUSAL RELATIONSHIP BETWEEN CEO TENURE AND FIRM FINANCIAL PERFORMANCE IN THE SHIPPING INDUSTRY

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Abstract

Shipping companies' CEOs play a critical role in founding credibility and confidence in their firms, thereby contributing to improved firm financial performance, enhancing firm economic stability and growth prospects, and attracting investors. During their term in office CEOs are to maximize profits with short term pressures severely constraining their long term strategies. The relationship between CEO tenure and financial performance has recently been in the center of interest of academic researchers and shipping professionals, with mixed evidence and results.

The purpose of this paper is to establish the relationship between CEO tenure and financial performance in the case of international listed shipping firms and examine whether there is simultaneity between those two variables. The method employed is General Method of Moments (GMM), because it corrects for the bias caused by endogenous explanatory variables. Our findings suggest a positive relationship between CEO tenure and shipping financial performance and confirm their reverse causality.

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1. Introduction

The shipping industry is among the largest industries globally and caters for about 90% of world trade. The CEOs of the shipping firms have a fundamental role in the global economic prosperity. By conveying credibility across the firm, and ensuring confidence throughout the business, they establish a solid foundation, attract investment, and therefore contribute to its improved financial performance, which leads to economic stability and growth. However, in order for the CEO to bring all this prosperity to fruition, adequate time is required. CEOs, in their tenure, are obliged to maximize corporate profits, yet at the same time they are constrained by short term pressures applied to their long term strategy. But, how is that tenure related to financial performance? In recent years there has been an ongoing debate about the relationship between these two aforementioned variables.

The main purpose of this paper is to establish the relationship between the CEO tenure and the financial performance of shipping firms, and to examine whether there is simultaneity between those two variables. The method employed is General Method of Moments (GMM) because it corrects for the bias caused by endogenous explanatory variables. Findings suggest a positive relationship between CEO tenure and shipping financial performance, as well as confirmation of their reverse causality.

The paper proceeds in the following order. The second section is an extended literature consisting of two parts: The first focuses and analyzes a probable relationship between CEO tenure and financial performance, while the second reports other determinants of the performance of the shipping firm. The third section describes the variables employed, how they were selected and why GMM was preferred to other methods of estimation. The fourth section analyzes the results and proves the positive

relationship and endogeneity of the two variables under scrutiny. The fifth section provides concluding remarks, along with future recommendations.

2. Literature Review

The observed decrease of CEO tenures in corporate practice is supported by the results of a study conducted by Booz & Co. It shows that the average tenure of European CEOs has declined to 5.7 years (Karlsson et al., 2008). Researchers attribute these shorter tenures to the increase in the board of directors' selectivity concerning the performance of the CEO they ultimately prefer. Additional studies have shown that the demands of the board of directors have increased, which is reflected through the fact that they do not hesitate to replace a CEO quickly when positive performance effects are not evident immediately (Lucier et al., 2007).

CEO tenure can have both positive and negative effects on firm performance, depending on the CEO's life cycle seasons (Millerand & Shamsie, 2001). According to the Leader life cycle theory proposed by Hambrick and Fukutomi (1991), there is an inverted curvilinear relationship between a CEO's tenure and corporate financial performance. 5 phases in a CEO's tenure have been documented, namely: 'response to mandate', 'experimentation', 'selection of an enduring theme', 'convergence', and 'dysfunction'. This theory asserts that performance gains are evident in the first phases of a CEO's tenure, due to learning, openness, and high task interest. However, after 6 years roughly, performance decreases as the commitment of the CEO to an obsolete paradigm increases, and task interest along with information sources gradually decrease (Hambrick et al., 1993). Several empirical studies are in line with this view (Miller & Shamsie, 2001; Giambatista, 2004; Henderson et al., 2006).

Another approach suggests that CEO tenure influences firm performance through two channels. The first channel is derived from the firm's relationship with its internal stakeholders, the employees. Longer CEO tenure will result in corporate performance gains, only if positive employee relations are attained (Wang et al., 2009).

Experienced CEOs are also able to utilize their knowledge (March, 1991; Vera & Crossan, 2004) to strengthen employee identifications with the firm, which positively affects firm performance (Skaggs & Youndt, 2004; Berger et al., 2002; Hitt et al., 2001). If this is the case, the extent that CEO tenure affects firm-employee relationships will partially account for the performance impact of CEO tenure. The second channel stems from the firm's relationship with its external stakeholders, the customers. Incompetence to satisfy the customers with the firm's product offerings will result in failure to create competitive advantages for the firm (Day, 1981). New CEOs seem to cater to the demands of the external environment quite easily by leveraging diverse market, utilizing customer-related information sources (Chaganti & Sambharya, 1987), and coming up with new products with diverse features (Wuet al., 2005). Acting in this manner contributes to the strengthening of firm-customer relationships (Musteen et al., 2006), which in turn enhances firm performance (Luo & Homburg, 2007; Luo et al., forthcoming).

However, Luo et al. (2013) examined the impact of CEO tenure on both employees and customers across 365 U.S. companies from 2000 to 2010. They found that a long CEO tenure strengthens the firm-employee relationship, but weakens the firm-customer relationship. Longer tenured CEOs, due to the amount of knowledge they have accumulated, and the extent to which they are entrenched, gradually become less attuned to demands of the market and customers. In other words, due to their extensive investment in the firm and attachment to the status quo, they do not achieve to respond adequately to consumer preferences.

Furthermore, empirical studies have indicated that neither extremely short nor extremely long tenures contribute positively to the financial performance of a business (Hambrick & Fukutomi, 1991). When CEO tenures are very short, it is expected that

their performance would generally be inadequate and would not have fit the corporate standards; hence the short tenure. However, a performance trend is difficult to distinguish due to competing phenomena: upward learning effects versus the downward effects of an incapable CEO. Some CEOs are appointed for very short tenures, sometimes as turnaround specialists, until another CEO can be identified. Therefore performance generalizations for very short tenures are difficult to make.

Conversely, extremely long CEO tenures in a dynamic environment result in increased commitment to an obsolete paradigm and more restricted information processing (Hambrick et al., 1993; Hambrick & Fukutomi, 1991). One might expect that a dynamic environment would create alertness; however, in this case it is more likely for a CEO to become attached to a paradigm that is no longer appropriate, which will result in performance losses. This might be the case if buyer behavior, competitor behavior, or technologies shift abruptly.

The previous authors additionally argue that the relationship between tenure and performance is more complex than was originally thought (Hambrick & Fukutomi, 1991). Top Management Team (TMT) risk taking will influence performance via the firm's pursuit of entrepreneurial initiatives (Zahra, 1996). Short tenured CEOs, due to their lack of experience may not be able to effectively assess strategic risks. Therefore, their effort to spur TMT risk taking will most probably not be satisfactory, even if they are willing to undertake strategic risks. On the other hand, long tenured CEOs, having a track record and accumulated knowledge of the firm’s environment can acquire the resources and coalitions that are needed to facilitate risky initiatives. Therefore, they are more likely to be able to better manipulate the TMT strategic risk taking. A risk averse TMT usually behaves cautiously by overanalyzing the probability of a potential loss depending on the available alternatives. Conversely, a risk taking TMT is more

prone to committing resources to such initiatives even before the possible outcomes are fully understood. Research indicates that firms pursuing entrepreneurial initiatives on average realize an enhanced performance (Zahra, 1996).

From a totally different perspective, Dikolli et al. (2011) introduce CEO turnover in the relationship between CEO tenure and financial performance. They argue that shareholders judge the efficiency of the present CEO based on his financial performance. If the latter is found adequate, the CEO will not be replaced. That means that CEO turnover is negatively related with financial performance. Evidence suggest a four year benchmark, in which a CEO has to show good financial results in order to retain his job. If he succeeds, then the shareholders' evaluation on him is relaxed. As his tenure continues the evaluation becomes even looser. However, this means that the surviving CEOs, while their tenure has been increasing, they have managed to increase the returns of their respective firms. The conclusion is that we might have a case of simultaneity: CEO tenure directly depends on financial performance, and a larger tenure might mean improved financial performance. Dikolli et al. (2011) also report that characteristics of governance and CEO tenure are endogenous and that weaker governance suggests a longer tenure. Tenure is positively related with CEO ownership and duality and negatively related with board independence and director share ownership.

Ultimately, additional literature establishes a link between CEO paradigms and firm performance. The core premise is that each CEO has a specific paradigm, consisting of a worldview and skills to apply it (Miller & Droge, 1986; Miller et al., 1982). When selecting a CEO, the board of directors aims to find an individual whose skills and experience are in line with the conditions addressing the frim at the time and in the estimated future (Finkelstein & Hambrick, 1996; Vancil, 1987). If the board

succeeds in findings a CEO whose paradigm matches with it, then performance will improve with tenure. After initially rising, the rate of the increasing performance will slow down, as the easiest opportunities for within-paradigm refinements are exhausted, and the paradigm itself does not forgo major change. However, if there is a mismatch between CEO paradigms and the external environment, firm performance will diminish at an increasing rate. With each passing year, there is an increase in the deviation of CEO paradigm and the environmental conditions, as well as an increasing inattentiveness of the CEO to new developments.

Excluding the CEO tenure which will be the main variable under scrutiny, regarding financial performance, there are other important variables to consider which affect the latter.

Initially, a variable of utmost importance is the leverage (or solvency) of the firm. It is also a simultaneously defined variable (Coricelli et al., 2011). It is measured by the ratio of debt to equity and it shows how exposed a firm is to a shock in the economy. The higher the ratio-the higher the exposure, with the firm becoming less able to pay debts in a crisis. In other words it is a measure of risk: if firms accumulate debt they become unsustainable and eventually run the risk of bankruptcy by not being able to pay their liabilities. However, researchers are in conflict regarding its sign. A negative relationship between leverage and financial performance is found by Khidman & Rehman (2014) and Abbas et al. (2013), among others. This suggests that as a company accumulates more debt and becomes more exposed, its performance significantly decreases (Abbas et al., 2013). The reason behind this relationship is that all stakeholders associated with a particular firm, take into careful consideration its solvency (Khidman & Rehman, 2014). For example a supplier wants to know if he will get paid, and an investor how risky the firm is, in order to choose whether to invest or

not (ibid). On the other hand some economists argue about a positive sign of leverage; a higher leverage means a higher return on assets (Mwangi & Muringu, 2015). Stierwald (2009) argues that a possible explanation for this estimate is that "profitable firms have had easier access to debt financing and do not need to rely exclusively on equity capital." Finally, in order to invest in a highly leveraged firm an investor requires an appropriate higher compensation.

Another determinant of financial performance is the size of the firm. Many researchers argue that there is a positive relationship between those variables (eg. Abbas et al., 2013). A positive relationship illustrates simply that a larger firm will be more profitable relatively to a smaller one, ceteris paribus. A reason for this is that a larger firm is able to enjoy economies of scale and scope, which will increase its productivity and eventually its financial performance (Mwangi & Muringu, 2015). Another reason is that capital is more easily accessible to larger firms due to smaller costs (Stierwald, 2009). However, Mwangi and Muringu, (2015) despite arguing in favor of the positive relationship of firm size to performance, actually estimated a significant negative coefficient, showing exactly the opposite.

An additional factor that affects the financial performance of a firm is its ownership concentration. This variable shows how the shares of the major stockholders of a publicly listed company are distributed among individual, foreign and institutional investors (Mwangi & Muringu, 2015). Tsionas et al. (2012), argue that concentrated ownership is positively related to the financial performance of the shipping firm and also that it is simultaneously defined. They also argue that this result is independent of the institutional environment (ibid). Mirza and Javed (2013) found similar results and argue that concentrated ownership leads to an increased disperse of information, an increased level of R&D, and last but not least, that high concentrated ownership leads

to a higher monitoring of the managers with a focus to profitable projects. This focus is long term profit; if concentration is low, short run profit is under focus. They conclude that a high concentration offers a good amount of control and monitor which eventually increases the financial performance of the firm.

Finally, Khidmat and Rehman (2014) have additionally focused on another significant variable regarding the financial performance of a firm: its liquidity. They found it to be positively related with the performance. The rationale behind this relationship is that all stakeholders associated with a particular company are well aware of its liquidity. Initially, suppliers choose to sell merchandise to a highly liquid firm since they will be paid on time. Additionally, workers will be paid if the company manages to pay its daily obligations. Eventually, Khidmat and Rehman conclude that a firm should exhibit high liquidity in order to function properly and accumulate a profit, and that their model "may be used effectively to increase liquidity for the profitability of the company (2014)."

3. Methodology and Data

Bloomberg database was used to collect information on 118 listed shipping corporations at the end of 2014.

3.1 Variables

Literature has provided us with 5 determinants: leverage, size of the company, concentration of ownership, liquidity and CEO tenure which is the variable under scrutiny.

Financial Performance (ROA, ROE, q):

The performance of a firm will be approximated by the changes in the company's Return on Assets, Return on Equity, and the least commonly employed variable, the Tobin's Q. All of these variables are ratios:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

$$ROE = \frac{Net\ Income}{Shareholder's\ Equity}$$

$$Tobin's\ Q = \frac{Total\ Market\ Value\ of\ Firm}{Total\ Asset\ Value}$$

Leverage/Solvency (lev):

As mentioned previously, it is measured by the ratio of debt to equity and it shows how exposed a firm is to a shock in the economy.

$$Leverage = \frac{Debt}{Shareholder's\ Equity}$$

Size (assets):

We use the natural logarithm of the million dollar value of assets owned by the company in the year examined.

Ownership Concentration (own):

Ownership can be measured with respect to many different factors, however we are focusing on concentrated ownership which reveals how much stock of a firm is owned by individual shareholders or institutional shareholders. This variable is portrayed by a percentage (ratio).

CEO Tenure (ceoten):

The variable under scrutiny. It is measured in years. We are not required to take logarithms for this variable, since the values are very low.

Liquidity (liqu):

This variable measures how easily a firm can meet its obligations, given the various assets it owns. We employ the most common ratio suggested by researchers:

$$Liquidity = \frac{Current\ Assets}{Current\ Liabilities}$$

Board Size (bsize):

The number of directors in the board.

CEO Duality (ceodual):

It is a dummy variable which states whether the CEO is also a chairman of the board. If he is also a chairman, the dummy takes the value of 1, otherwise it take the value 0.

3.2 General Method of Moments (GMM)

However, the issue of simultaneity between the CEO tenure and the company's financial performance should be addressed. 2SLS of even 3SLS can be employed, but

due to the unjustified patterns of Heteroscedasticity and Autocorrelation, General Method of Moments (GMM) is preferred to correct for the bias caused by endogenous explanatory variables. GMM estimates the parameters of the two simultaneously defined econometric equations. The correct selection of the instruments for both equations that are used in the estimation is of significant importance. The instruments aim to preserve the explanatory power of the variables, but also to get rid of their correlation with the error term. Estimates become more precise as the number of instruments used increases. The instruments have to satisfy two conditions: be highly correlated with the endogenous variable, and be uncorrelated with the error term. In the present model, it is assumed that all other variables are exogenous, except from financial performance and CEO tenure. Naive instruments are used, which are: the constant (c), the size (assets), the leverage (lev), the ownership concentration (own), the liquidity (liqu), the board size (bsize), CEO duality (ceodual), and the two financial performance indicators which are not used for the particular set of equations (eg. if we employ ROA, we use as instruments ROE and Tobin's Q).

3.3 Data and Descriptive Statistics

Data from 118 major shipping companies, all listed in various stock exchanges, have been collected from Bloomberg, for the year 2014.

Descriptive statistics are reported in Table 1. Initially, it is evident that none of the variables are normally distributed, since the values of skewness and kurtosis, deviate a lot from 0 and 3 respectively, which correspond to the values of a normal distribution. It is also confirmed from the Jarque-Bera statistics. However, due to large sample size we can overcome this issue. When observing the descriptive statistics of ROA we derive certain patterns familiar to the shipping industry. The average return is negative, the minimum is highly negative (-7.48) while the maximum is slightly

positive. Regarding the CEO tenure, the maximum is 24 years while there are CEOs who didn't complete a single year. The average tenure however, is 6.27 years. Leverage is of high importance since we can observe highly indebted firms, and on the other hand very solvent ones. The average leverage is 3.15.[1] Finally, regarding the liquidity of the various firms we can observe a maximum of 12.93, a minimum of 0.009 and an average of 2.04.

4. Results and Discussion

4.1 Model Selection and Diagnostics

The following 3 sets of simultaneous equations which have been estimated with their appropriate naive instruments are:

$$\text{roa} = c_1 + c_2 lev + c_3 assets + c_4 own + c_5 ceoten + c_6 liqu + u \quad (1)$$

$$\text{ceoten} = c_{11} + c_{12} roa + c_{13} bsize + c_{14} ceodual + c_{15} lev + c_{16} own + \varepsilon \quad (4)$$

instruments: c, assets, lev, own, liqu, q, roe, bsize, ceodual

$$\text{roe} = d_1 + d_2 lev + d_3 assets + d_4 own + d_5 ceoten + d_6 liqu + v \quad (2)$$

$$ceoten = d_{11} + d_{12} roe + d_{13} bsize + d_{14} ceodual + d_{15} lev + d_{16} own + \zeta \quad (5)$$

instruments: c, assets, lev, own, liqu, q, roa, bsize, ceodual

$$\text{q} = e_1 + e_2 lev + e_3 assets + e_4 own + e_5 ceoten + e_6 liqu + z \quad (3)$$

$$\text{ceoten} = e_{11} + e_{12} q + e_{13} bsize + e_{14} ceodual + e_{15} lev + e_{16} own + \eta \quad (6)$$

instruments: c, assets, lev, own, liqu, roa, roe, bsize, ceodual

[1] This average might be biased due to an outlier with a value of 262.5775

The set that produces the most robust results regarding the bilateral relationship between performance and tenure, along with the expected signs of other variables, is the first set, which employs ROA. Residual diagnostics of the model, that is, normality, autocorrelation, and the correlogram are reported in Tables 2, 3, and 4 respectively. The results indicate an issue with normality and no autocorrelation.

4.2 GMM Estimates and Results

Due to a number of values of certain variables missing, the sample observations have dropped to 89. The J-statistic provided by the model is 0.14, which relatively to the models dropped, gives a similar or smaller value. The model along with the variables is presented in Table 5. Significance of variables will be reported with regard to the two equations:

4.2.1 Firm Performance as a Dependent Variable:

CEO Tenure (ceoten):

The estimate asserts the literature, showing significant and positive effect on financial performance of a shipping firm. **As the tenure of the CEO increases, the financial performance improves.**

Leverage/Solvency (lev):

This estimate was found significant and positively related to shipping firm performance. This result suggest that **as a firm increases its borrowing, and increases its risk of default in case of a shock, its financial performance increases**. This result is partly documented in the literature. As the leverage increases, so does the return on assets (Mwangi & Muringu, 2015). Furthermore, financial institutions will give loans more easily to highly profitable shipping firms, which asserts the increased leverage (Stierwald, 2009). Finally any rational investor, will require higher compensation for higher risk.

Ownership Concentration (own):

The estimate was found significant but with the opposite sign than the one the literature suggests. The result shows that **as ownership becomes more concentrated, financial performance decreases**. Two reasons might justify this result. Initially, due to the shares not being enough spread to outsiders, but mostly owned by the largest investors (individual, foreign or institutional), the latter gain a say on the financial decisions of the firm. This might result to the board of directors not being able to take independently the decisions crucial to the company's well-being. A similar reason is that as shareholders gain power due to increased ownership, they might monitor and control more strictly the CEO, not allowing him to operate freely, for the benefit of the company. This might be amplified in the case of CEO duality, in which the principal-agent problem might become aggravated.

Total Assets (assets):

The coefficient was found to be insignificant in this model.

Liquidity (liqu):

The coefficient was found to be insignificant in this model.

4.2.2 CEO Tenure as a Dependent Variable:

ROA (roa):

Results indicate a significant and positive effect of financial performance on the tenure of the CEO. **As the shipping firm realizes financial improvement, the years the CEO maintains his position increase**. As reported in the literature, if shareholders see a financial improvement, they will keep the same CEO. Eventually after an average of 4 years, their monitoring on him falls and at the same time the company enjoys a financial improvement along with a longer CEO tenure (Dikolli et al., 2011). **This**

finding establishes a bilateral relationship between the financial performance of shipping firms and CEO tenure.

Leverage/Solvency (lev):

It was found to be statistically significant with a negative sign. This estimate suggests that **as the debt over equity ratio increases, the years a CEO maintains his position decrease**. A probable explanation for this inverse relationship is that shareholders simply prefer equity over debt; the opposite reflects poor management choices by the CEO which will eventually lead to his dismissal.

Ownership Concentration (own):

A significant and positive effect is indicated by the results. It suggests that **as ownership becomes more concentrated, CEO tenure tends to increase**. The case might be that as ownership becomes more concentrated, the major shareholders have the power to elect a CEO they are personally affiliated with, and that they personally trust, that will make the optimal financial decisions to maximize their gains.

Board Size (bsize):

The coefficient was found to be insignificant in this model.

CEO duality (ceodual):

The coefficient was found to be insignificant in this model.

5. Conclusions and Recommendations

By employing the GMM method of estimation on the cross-sectional data of 89 listed shipping firms of 2014, we have managed to establish a positive and reciprocal relationship between CEO tenure and firm financial performance. Additionally, we were able to assert the literature regarding other determinants of performance such as leverage, and ownership concentration.

This paper offers an additional insight regarding how shipping firm shareholders should select and monitor CEOs. By granting the latter an additional time period to perform their managerial duties, will lead to increased returns. The rationale is that after a new CEO is appointed, if shareholders observe financial improvement, the CEO will retain his position. As his tenure increases, monitoring becomes more flexible and he continues realizing profits for the firm. Ultimately the shipping firm combines improved performance with simultaneous extended CEO tenure.

Shareholders should take into consideration that by employing the right person for an extended amount of time, doesn't only increase the firm's well-being but the economy's well-being as well. Shipping should be considered a benchmark industry in global economy and decisions should be made with caution.

Regarding future research, additional insight about the prevalent relationship of the two variables can be provided in various ways. Firstly, more variables can be employed, like productivity, dividends, qualitative evaluation of corporate governance, and age of the firm. Regarding simultaneous equations models, 2SLS and 3SLS can be tried as well. We employed only naive instruments, so more advanced ones which satisfy both conditions might give more robust results. Finally, in order to obtain an improved picture of the relationship between CEO tenure and the financial performance

of the shipping firms, panel data might be employed. That way, variables like lagged profit can be introduced.

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Table 1. Descriptive Statistics

	ROA	ROE	Q	ASSETS	BSIZE	CEODUAL	CEOTEN	LEV	LIQU	OWN
Mean	-0.05339	0.144026	1.087334	7.04642	7.721739	0.255102	6.279661	3.152889	2.042765	0.312481
Median	0.019396	0.046855	0.971326	7.17502	7	0	5	0.696965	1.368785	0.2756
Maximum	0.143278	11.28169	9.437988	11.11624	16	1	24	262.5775	12.93294	0.9018
Minimum	-7.47619	-1.4568	0	1.658228	2	0	0	-55.625	0.009329	0.0139
Std. Dev.	0.700133	1.286259	0.870318	1.426471	3.11912	0.43816	5.358731	25.16581	2.181921	0.206744
Skewness	-10.40588	7.151857	8.07654	-0.407739	0.659151	1.123595	1.282244	9.624265	2.876855	0.57507
Kurtosis	110.8195	58.04294	77.90943	4.231754	3.37654	2.262466	4.137887	101.0867	12.15803	2.652038
Jarque-Bera	58281.18	15497.79	27159.59	10.45649	9.006899	22.84143	38.70097	47459.64	555.6299	6.918681
Probability	0	0	0	0.005363	0.011071	0.000011	0	0	0	0.03145
Sum	-6.19329	16.56295	120.6941	810.3383	888	25	741	359.4294	232.8752	35.9353
Sum Sq. Dev.	56.37146	188.6086	83.31983	231.9696	1109.096	18.62245	3359.771	71564.94	537.9682	4.87271
Observations	116	115	111	115	115	98	118	114	114	115

Table 2. System Residual Normality Tests

System Residual Normality Tests				
Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: residuals are multivariate normal				
Date: 12/21/15 Time: 17:00				
Sample: 1 100				
Included observations: 89				
Compone	Skewness	Chi-sq	df	Prob.
1	-0.99066	14.55754	1	0.0001
2	0.390947	2.267123	1	0.1321
Joint		16.82466	2	0.0002
Compone	Kurtosis	Chi-sq	df	Prob.
1	3.140725	0.073438	1	0.7864
2	2.735285	0.259857	1	0.6102
Joint		0.333295	2	0.8465
Compone	Jarque-Be	df	Prob.	
1	14.63098	2	0.0007	
2	2.52698	2	0.2827	
Joint	17.15796	4	0.0018	

Table 3. System Residual Portmanteau Tests for Autocorrelations

System Residual Portmanteau Tests for Autocorrelations					
Null Hypothesis: no residual autocorrelations up to lag h					
Date: 12/21/15 Time: 17:02					
Sample: 1 100					
Included observations: 89					
Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	2.923835	0.5707	2.95706	0.565	4
2	11.0233	0.2004	11.24272	0.1883	8
3	12.49652	0.4067	12.76734	0.3862	12
4	15.91127	0.4592	16.34277	0.4293	16
5	23.69057	0.2562	24.58513	0.2178	20
6	28.33704	0.2461	29.56749	0.1995	24
7	31.47936	0.2962	32.97805	0.2366	28
8	34.31679	0.3572	36.09572	0.2829	32
9	37.50093	0.4002	39.63808	0.311	36
10	46.6753	0.2171	49.97376	0.1341	40
11	51.39515	0.2066	55.35923	0.1171	44
12	60.51909	0.1061	65.90509	0.044	48
*The test is valid only for lags larger than the System lag order.					
df is degrees of freedom for (approximate) chi-square distribu					

Table 4. Autocorrelations with 2 Std. Err. Bounds

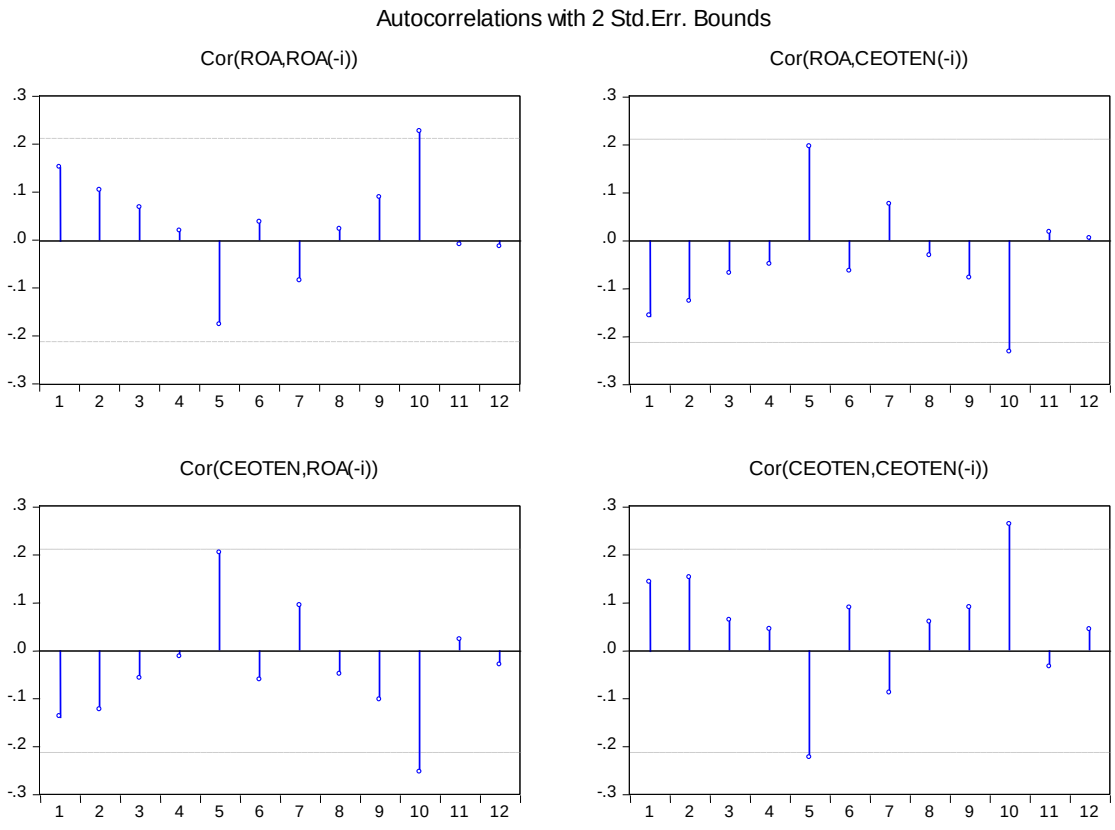

Table 5. Generalized Method of Moments Estimates

System: ROA_NAIVE_CROSS				
Estimation Method: Generalized Method of Moments				
Date: 12/21/15 Time: 11:36				
Sample: 1 100				
Included observations: 89				
Total system (balanced) observations 178				
White Covariance				
Linear estimation after one-step weighting matrix				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.024365	0.044139	-0.552	0.5817
C(2)	0.00064	0.000269	2.380909	0.0184
C(3)	-0.01834	0.016833	-1.089481	0.2775
C(4)	-0.216663	0.068262	-3.173983	0.0018
C(5)	0.033594	0.013044	2.575507	0.0109
C(6)	0.004932	0.003338	1.477633	0.1414
C(11)	3.659914	1.116727	3.277358	0.0013
C(12)	27.05007	9.301331	2.908194	0.0041
C(13)	-0.006087	0.063759	-0.095471	0.9241
C(14)	0.917372	1.127009	0.813988	0.4168
C(15)	-0.020851	0.004232	-4.927375	0
C(16)	7.743203	2.855502	2.711678	0.0074
Determinant residual covariance		0.034199		
J-statistic		0.140837		
Equation: ROA=C(1)+C(2)*LEV+C(3)*ASSETS+C(4)*OWN+C(5)*CEOTEN				
+C(6)*LIQU				
Instruments: C ASSETS LEV OWN LIQU Q ROE BSIZE CEODUAL				
Observations: 89				
R-squared	-4.209225	Mean dependent var		0.012396
Adjusted R-squared	-4.523033	S.D. dependent var		0.083978
S.E. of regression	0.197357	Sum squared resid		3.232828
Durbin-Watson stat	1.611563			
Equation: CEOTEN=C(11)+C(12)*ROA+C(13)*BSIZE+C(14)*CEODUAL				
+C(15)*LEV+C(16)*OWN				
Instruments: C ASSETS LEV OWN LIQU Q ROE BSIZE CEODUAL				
Observations: 89				
R-squared	-0.115622	Mean dependent var		7.157303
Adjusted R-squared	-0.182828	S.D. dependent var		5.553252
S.E. of regression	6.0396	Sum squared resid		3027.572
Durbin-Watson stat	1.557889			