

More on the Relationship between Corporate Governance and Firm Performance in the UK: Evidence from the Application of Generalized Method of Moments Estimation

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Abstract

This study examines the relationship between corporate governance compliance and firm performance in the UK. We develop a Governance Index and investigate its impact on corporate performance after controlling for potential endogeneity through the use of a more robust methodology Generalized Method of Moments (GMM). Our evidence is based on a sample of 435 non-financial publicly listed firms over the period 1999-2009. In contrast to earlier findings in the UK literature, our results suggest that compliance with corporate governance regulations is not a determinant of corporate performance in the UK. We argue that results from prior studies showing a positive impact of corporate governance on firms' performance may be biased as they fail to control for potential endogeneity. There may be a possibility of reverse causality in the results of prior studies due to which changes in the internal characteristics of firms may be responsible for the corporate governance compliance and performance relationship. Our findings are based on GMM, which controls for the effects of unobservable heterogeneity, simultaneity and dynamic endogeneity and thus present more robust conclusions as compared to the findings of previously published studies in this area.

Keywords: Corporate Governance, Governance Index, Firm Performance, Endogeneity, GMM

1. Introduction

The impact of corporate governance on corporate performance has been the main theme of many research projects in accounting, finance and management literature. While considering governance regulation, it is expected that protection of shareholders' rights is given by firms' compliance with corporate governance recommendations. Thus the theoretical aim of complying with the UK Combined Code on Corporate Governance (2003) provisions is to reduce agency costs and improve corporate performance. This is consistent with agency theory as described in Fama and Jensen (1983) and Jensen (1986). Managerial signalling theory also indicates that complying with the code of corporate governance is a primary signal to markets that the management follows better governance structure. This can lead to an increased demand for shares by investors, which will increase share prices and the shareholders' wealth (Beiner, Drobetz, Schmid, and Zimmermann, 2006; La Porta, Lopez-De-Silanes, Shleifer & Vishny, 2002). It is thus expected that companies which adopt recommendations of the Governance Code are likely to enhance their corporate performance.

However, if compliance with corporate governance is endogenously chosen by firms, then each firm will reach the level of compliance in an optimal manner. In such a situation, no relationship between equilibrium levels of governance and corporate performance should be expected (Love, 2011). More specifically, better compliance with the corporate governance practices might improve the redistribution of rents between shareholders and managers, but not necessarily increase firms' performance. Thus better compliance might reduce agency costs for minority shareholders by disciplining managers and controlling shareholders more effectively.

In this regard, results of previous studies on the relationship between firms' performance and compliance with the corporate governance recommendations are inconclusive. For instance, Conyon and Mallin (1997) and Peasnell, Pope and Young (1998) indicate improvements in corporate performance after issuance of the Cadbury Report in 1992 (which recommends the adoption of some internal monitoring mechanisms with the aim of promoting shareholder interests). By contrast, Weir and Laing (2000) and Weir, Laing and McKnight (2002) do not find a significant relationship between complete compliance with corporate governance as contained in the Cadbury Report and firms' performance. They however, reported an increase in the number of firms which follow good corporate governance practices after the Cadbury Report. Similarly, Gompers, Ishii & Metrick (2003), Brown and Caylor (2006), Bozec, Dia & Bozec (2008) and O'Connor (2012) indicate a positive association between governance and firms' performance. Moreover, other studies, such as, Core, Guay & Rusticus (2006), Gupta, Kennedy & Weaver (2009) and Pandeya, Vithessonthia and Mansi (2015) report an insignificant relationship between governance and firms' performance.

The rationale for an association between corporate governance compliance and firms' performance arises because better governance enhances efficiency in the monitoring of managerial activities. This in turn, encourages managers to pursue value-maximizing projects and to avoid expropriation of firms' resources such as perquisites consumption (Love, 2011). In addition, better governance increases investors' protection by limiting expropriation of firms' resources from the majority shareholders (La Porta et al., 2002; Lemmon and Lins, 2003). There is also evidence of a decrease in the likelihood of corporate insolvency as a function of corporate governance characteristics because governance compliance improves the

prospects for greater access to external funding (Claessens, Djankov & Klapper, 2003; Fich and Slezak, 2008; Amana and Nguyen, 2013). In contrast, firms might comply to an optimal level of corporate governance practices, which would not have a causal effect on performance since corporate governance compliance could be endogenously determined. In such a case there would be no observable relationship between governance and firms' performance (Love, 2011).

Keeping all the above mentioned points in mind, this study specifically controls for the effects of endogeneity and examines the impact of corporate governance compliance on firms' performance in the UK. We choose the UK for this investigation because it offers an environment where corporate governance regulations are optional, unlike the US where compliance is required by the US corporate law. Our findings contribute to the existing literature in at least two different ways. First, we address aspects of endogeneity that have been ignored or treated with arbitrary assumptions in previous research. While doing this we apply a dynamic generalised method of moments (GMM) estimator.¹ More specifically, we control for endogeneity that arises from: (i) unobservable heterogeneity - firm fixed effects; (ii) simultaneity - better corporate governance compliance leads to better performance, or alternatively, better performance leads to better corporate governance compliance; and, (iii) dynamic endogeneity - the possibility that contemporaneous compliance with the Governance Code is a function of past performance.

¹ See Roodman (2009) for a description and details of dynamic generalised method of moments (GMM) estimator.

Second, we develop a governance index with fifteen provisions based on the UK Combined Code of Corporate Governance (2003), which is more comprehensive than prior UK studies (such as, Padgett and Shabbir, 2005; Arcot and Bruno, 2007; Clacher, Doriye & Hillier, 2008; Renders, Gaeremynck, Sercu, 2010; and, Mouselli, Abdulraouf & Jaafar, 2014). We also include further aspects of compliance with respect to audit committees with different measures, such as, the number of meetings held and participation of a financial expert in the committees and believe that the use of all the additional measures would help in identifying and explaining the governance compliance - performance relationship.

We find no significant evidence to suggest that current or past compliance with good corporate governance practices leads to improvements in firms' performance. We arrive at similar conclusions whether we use accounting or market-based measures of firms' performance (i.e., ROA and Tobin's Q). We therefore report two major implications of our results. First, our results show the importance of considering the possibility of an endogenous relationship between governance and performance. Second, our results suggest that the causal link found in previous research, in which good corporate governance practices enhance firm performance, might be reversed in the sense that firms with low levels of performance might improve corporate governance compliance to signal the market about future performance. This effect is also more likely to arise as a result of the increase in institutional investments in firms with high level of compliance. This would mean that improvement in corporate governance compliance by firms is the result of greater monitoring by institutional investors which select high performing firms in their portfolios. We therefore argue that our findings have implications for the regulators and policy makers.

The remainder of this paper is organised as follows. Section 2 explains the process of constructing the corporate governance index used in this paper. Section 3 presents details of model specification, data and the sample used in the study. Section 4 discusses the outcome of our empirical analyses and findings of this study. Finally, section 5 concludes this study by presenting a short summary of the overall findings, and outlines a brief description of the main contributions. This section also highlights the limitations and specifies avenues for future research.

2. Corporate Governance Index

In the UK only a limited number of published studies have considered the impact of corporate governance indexes and corporate performance in their research (see for example, Padgett and Shabbir, 2005; Arcot and Bruno, 2007; Clacher, Doriye & Hillier, 2008; Renders, Gaeremynck, Sercu, 2010; and, Mouselli, Abdulraouf & Jaafar, 2014). For example, Padgett and Shabbir (2005) constructed a compliance index based on 12 corporate governance provisions and investigate the relationship between the index and corporate performance. Their findings suggest that more compliance with the combined code leads to higher stock returns. Similarly, Arcot and Bruno (2007) built a corporate governance index based on eight provisions of the corporate governance code and examine its relationship with corporate performance measured by return on assets (ROA). They find that firms that become non-compliant for good reasons outperform other firms that do comply with the corporate governance code.

In order to examine the effect of corporate governance compliance on two performance measures, Tobin's Q and ROA, Clacher et al. (2008) developed an index which is based on the UK Combined Code (2003) recommendations. The findings indicate that compliance with governance practices improves firm value; however, the effect varies between different governance practices, in particular, quality of disclosure and audit are found to be the most important practices that positively affect corporate value. They also find a positive relationship between ownership structure and remuneration policies and corporate value, however, board structure was found to have no significant effect on corporate value. In a similar vein, Renders et al. (2010) examine the relationship between corporate governance and firm value for all the firms included in FTSE Eurotop 300, including 373 firms from the UK over the period 1999-2003. By employing the Two-Stage Least Square (2SLS) Regression Analysis as their research approach the findings of this study show a positive relationship between corporate governance and firm value.

More recently, Mouselli et al. (2014) investigate the effect of corporate governance provisions on accruals quality and stock returns and employs a corporate governance index provided by the Risk Metrics Group. They not only assessed the overall firms' governance quality but also the quality of four sub-categories namely, board structure, audit practices, compensation and ownership, and takeover defences. Their findings show the audit practice as the most influential provision that positively affect the stock returns of UK firms. These findings are in line with the results of Clacher et al. (2008) that also specify a relationship between audit practice and firm value.

There is also evidence covering the impact of governance indices on corporate performance in the US. For example, Gompers et al. (2003) uses 24 corporate governance provisions for constructing a governance index as a measure of shareholder rights across 1500 US firms. Their findings suggest that firms' performance vary according to shareholder rights. Similarly, Cremers and Nair (2005), Brown and Caylor (2006), Bozec et al. (2008) and Bebchuk, Cohen and Ferrell (2009) use the governance index of Gompers et al. (2003) for investigating the interaction of corporate control and shareholder activism in the US. Their results support the findings of Gompers et al. (2003), suggesting that companies with better corporate governance have higher share returns and value.

In contrast to the above while examining the relationship between corporate governance and performance, Core et al. (2006) employed the G-Index developed by Gompers et al. (2003) and found insignificant relationship between the two variables. Similarly, Lehn, Patro & Zhao (2007) used the E-Index, developed by Bebchuk et al. (2009) and again show an insignificant relationship between firms' corporate governance compliance and performance. Furthermore, Bhagat and Bolton (2008) re-examined the Gompers et al. (2003) results and find no evidence of a significant effect of corporate governance practices on stock returns. With a sample of S&P 500 firms and by employing the corporate governance indexes of Institutional Shareholder Services (ISS), Epps and Cereola (2008) find an insignificant relationship between corporate governance rating and performance. Consistent with the above, Johnson et al. (2008) and Gupta et al. (2009) also document insignificant relationships between corporate governance compliance and firm performance.

It is evident from the above discussions that only a few studies have used corporate governance indexes in their investigations and the evidence is largely inconclusive (see for example, Gompers et al. 2003; Brown and Caylor, 2006; Bozec et al., 2008; Core et al., 2006; and, Gupta et al., 2009). In addition, most of the existing studies in the UK have only used a few aspects of governance compliance in the construction of their corporate governance indexes. As a consequence, we have constructed a governance index (GI) which addresses several aspects of the corporate governance compliance regarding the structure of the board of directors and its sub-committees. The index considers fifteen provisions of the UK Combined Code on Corporate Governance (2003), as it more generally applies to the time period of our study (1999-2009). Under the given guidelines, listed companies are required to comply with the recommendations of the Combined Code on Corporate Governance (2003) or provide justifications in case of non-compliance.

We also apply a dummy coding scheme to evaluate the compliance of UK listed firms with the combined code (see for example, Black et al., 2006a; Gompers, et al., 2003; Henry, 2008). This method of rating gives a value of 1 if a company complies with a particular provision of the Code and zero otherwise. The total score of the Governance Index thus comprises 15 points, which indicates higher compliance with the UK combined code. The factors to construct the governance index (GI) are presented in Table 1 which also displays provisions of the combined code that are used for constructing the corporate governance index. One limitation of our GI is that it only considers the provisions of the Code that can be practically measured and does not include those where information is not observable.

Insert Table 1 Here

3. Research Strategy

Data and Sample

The data covers corporate governance and financial information of a sample of UK non-financial companies listed on London Stock Exchange (LSE) over the period 1999-2009. The sample includes all those firms that have been part of the FTSE All-Share Index at any time during the sample period. We include both listed and de-listed companies in the sample which constitute a total of 1513 firms. We deleted all those firms for which the corporate governance compliance and/or financial data was not available during the sample period. The selection criteria resulted in a reduced sample size of 449 companies. In order to meet the requirements of the method of analysis used in this research we needed at least four consecutive years of data for each company which further reduced the sampled size to 435 firms. As a result, over the eleven years sample period, our final sample constituted 3875 firm-year observations.

We use BoardEx database as the main data source for extracting the number of executive and independent non-executive directors and board sub-committees. In addition, data regarding the number of meetings held by the audit committees and whether or not they have at least one financial expert among their members was collected from annual reports of the sample companies which were obtained in electronic form from the Northcote Website². Financial and accounting data was extracted from Thomson Reuters Datastream database. Outliers are

² <http://www.northcote.co.uk> offers electronic copies of UK companies' annual reports.

controlled in all financial variables by truncating the values to their 99th and 1st percentiles. All values outside this range are set to the highest/lowest value within the specified range.

Model Specification

We initially begin our empirical analysis by considering the number of lags of corporate performance which are adequate for capturing the dynamic completeness of our benchmark model. In this regard, previous literature recommends the use of two lags for capturing the influence of past performance on current data (see for example, Glen, Lee, & Singh, 2001; Gschwandtner, 2005). However, we follow, Wintoki, Linck, & Netter (2012) which suggest the use of four lags for controlling the endogeneity problem in estimating a regression model of current corporate performance. The regression models include a number of control variables with both accounting and market-based measures of corporate performance (ROA and Tobin's Q). We thus employ the following model:

$$CP_{it} = \alpha_1 + \sum_{p=1}^{p=4} \beta_p CP_{it-p} + \beta_x Controls_{it} + \varepsilon_{it} \quad (1)$$

where, CP_{it} represents corporate performance measured by return on assets (ROA) or Tobin's Q (TQ), and controls represent control variables, which include; sales growth (SALESG), capital expenditure (CAPITE), firm size (FSIZE), leverage (LEV), and R&D expenditures. In addition, year and industry dummies are also included in the model as control variables.

1. Tobin's Q is calculated as total assets minus equity plus market capitalisation divided by total assets.
2. Return on assets is calculated as earnings before interest and tax divided by total assets.

3. Sales growth is measured as the ratio of current year's sales minus previous year's sales, divided by previous year's sales. In this regard, Durnev and Kim (2005) document that companies with increased sales are more likely to grow faster than other companies. Growing firms require greater external financing and are therefore more likely to adopt better corporate governance practices for reducing the cost of capital (Beiner et al., 2006). In line with the above arguments, previous studies have found a positive relationship between corporate performance and firms' growth (see for example, Gompers et al. 2003; and Henry, 2008).
4. Capital expenditure is measured by the ratio of total capital expenditure to total assets. This is also consistent with prior studies, where investments and innovative potential of companies are expected to have a positive impact on corporate performance (see for example, Durnev and Kim, 2005, Black et al., 2006b; Dah, 2016).
5. Firm size (FSIZE) is calculated as the natural logarithm of total assets. Firm size is likely to have a positive impact on corporate governance mechanisms as a result of scale differences in costs of compliance, operations, market regulations, and agency problems (see for example, Jensen, 1986; Beiner et al., 2006).
6. Leverage (LEV) is calculated as the ratio of total debt to total assets. On the one hand, debt plays a crucial role in reducing the agency costs of free cash flows by preventing investments in non-positive net present value (NPV) projects and can thus be considered as a corporate governance mechanism. On the other hand, debt may increase the likelihood of bankruptcy and credit risks, which may deprive a firm from investing in profitable investment opportunities (Jensen, 1986).

7. Research and development expenditure (R&D) is measured as the ratio of total research and development expenditure to total assets. As R&D activities result in new technologies, products or production processes, it is expected that it would help in enhancing firms' performance. In this regard, previous UK studies have reported a positive and significant impact of R&D on corporate performance (Akbar and Stark, 2003; Poletti-Hughes, 2008; Shah, Liang and Akbar, 2013).
8. Differentials in industrial sectors are controlled with dummy variables. The industry classification is based on the first digit of the Industry Classification Benchmark (FTSE, 2008) which includes eight non-financial sectors: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Health Care, Consumer Services, Telecommunications, Utilities and Technology.

Next, in line with the arguments raised in previous research findings we consider the possibility of an impact of past performance on current financial variables and on compliance with corporate governance practices (see for example, Hermalin and Weisbach, 1988; Guest, 2009; Wintoki, et al., 2012). In order to examine the presence of this relationship we estimate the following model:

$$\text{Current Variables}_{it} = \alpha_0 + \beta_2 \text{CP}_{t-1} + \sum_{i=1}^n \beta_i \text{Controls}_{t-1} + \varepsilon_{it} \quad (2)$$

In this equation current variables and controls include GI, SALESG, CAPITE, FSIZE, LEV and R&D whereas CP represents corporate performance measured by TQ or ROA. In addition, year and industry dummies are included in the model.

Furthermore, we test for strict exogeneity among the variables by employing the following fixed-effects model:

$$CP_{i,t} = \alpha + \beta_1 GI_{i,t} + \beta_x Controls_{i,t} + \Omega_1 GI_{i,t+1} + \Omega_x Controls_{i,t+1} + \mu_i + \varepsilon_{it} \quad (3)$$

where $GI_{i,t}$ represents the governance index and $Controls_{i,t}$ represents control financial variables as explained in equation (1) above. A fixed effects specification is used to control for one type of endogeneity, in which time-invariant firm characteristics (fixed effects) may be correlated with the explanatory variables. Therefore, if the future values of GI happen to be significant in equation (3), it may suggest that the existent endogeneity of the explanatory variables may not only be the result of fixed effects, but also because of a dynamic relationship, i.e. future realizations of the explanatory variables are associated with current performance. Therefore, equation (3) aims to highlight whether future values of GI and control financial variables adjust in response to firm performance or by contrast are exogenous (Guest, 2009; Wintoki, et al., 2012).

Application of System GMM

In addition to the above analyses, we perform our main analysis through the application of System GMM as our preferred technique, and compare the results with estimators obtained from regressions performed with OLS and fixed effects. We therefore specify a dynamic model, where corporate performance (CP) is either ROA or TQ as follows:

$$CP_{it} = \alpha_1 + k_1 CP_{it-1} + k_2 CP_{it-2} + \beta GI_{it} + \gamma_x Controls_{it} + \mu_i + \varepsilon_{it} \quad (4)$$

where GI represents the governance index, Controls represent control variables as explained above in equation (1).³

We consider the endogeneity tests from our model estimations and present the results with two different specifications with system GMM [GMM^a and GMM^b]. First, we treat all variables except the year dummies as endogenous. This allows the use of instruments from T2 for all the explanatory variables and T4 for the performance variables. Second, we consider all those explanatory variables which are not strictly endogenous and are thus treating those as predetermined. This allows us the use of an additional lag T1 of all such variables as an instrument (i.e., for ROA: GI, LEV and R&D; and, for TQ: GI and R&D).

There is also the possibility that as corporate governance compliance does not present much variation across time, its relationship with TQ could be dissolved as a firm fixed effect. However, a problem with fixed effects estimations is that they do not account for time varying omitted variables that could be present in the model and/or reverse causality. A way to deal with reverse causality is the use of instrumental variables which in our regressions should be correlated with the GI index, but do not have a direct relationship with performance. It has also been argued in the existing literature that, often, the selection of instruments is based on unrealistic assumptions of data, leading to the use of instruments that are not totally exogenous (see for example, Durnev and Kim, 2005; and Aggarval et al. 2007, among others).

³ The selection of lags to capture the dynamic nature of performance is based on the results reported in Table 4.

In order to overcome the aforementioned problems, a dynamic panel data model is estimated with System GMM as it allows for the use of past values of the GI index as instruments without compromising the efficiency and consistency of the estimators. However, a problem with instrumenting explanatory variables with lagged values could cause inconsistency if the relationship of the lagged and current values is weak.

In order to obtain estimates of System GMM we apply `xtabond2` in Stata (Roodman, 2009). We specify the function for small-sample adjustment and report t-statistics and Wald chi-square as opposed to Z-statistics and F-tests. The two-step command is also specified to correct for finite-sample bias. We use robust standard errors which are consistent with panel-specific autocorrelation and heteroskedasticity in the one-step estimation. We report the validity of our System GMM regressions by testing for exogenous instruments with the Hansen test of over-identification and the difference in Hansen test of Exogeneity.

We also take into account the effects of autocorrelation in this study by applying AR(2). This is a method for testing second-order serial correlation in the first-differenced residuals. In relation to the contributions of this study the results of this test has implications because the presence of autocorrelation would specify that lag of the instruments and dependent variable is endogenous. The outcome of AR (2) suggests the presence of no autocorrelation and justifies the validity of our models. Also the instruments appear exogenous and valid as suggested by the results of Hansen and difference in Hansen tests. In addition, the validity of the system GMM models has also been identified as consistent in all the regressions of this study.⁴

⁴ Column (4) of Table 8, is the only exception, where the results of Hansen test of over-identification is significant at the 10% level.

Finally, in order to analyse the possibility that current level of the governance index has an impact on future corporate governance compliance, we follow Wintoki, et al., (2012) and estimate whether past compliance with corporate governance determines current corporate performance with the following model:

$$CP_{it} = \alpha_1 + k_1 CP_{it-1} + \beta GI_{it-1} + \gamma Controls_{it-1} + \mu_{it} + \varepsilon_{it} \quad (5)$$

where CP represents corporate performance, GI represents the governance index, Controls represents control variables as described earlier for equation (1).

4. Results and Discussion

Description Statistics

Table 2 shows the annual means and standard deviations of the GI index, performance measures, and other explanatory variables. We can observe a constant annual increase of the GI index, which may be the result of the review of the code of compliance over the last few years of the sample period. Size, leverage and R&D expenditures show consistent mean values over the sample period. TQ reaches a maximum of 3.14 in 1999 and a minimum of 1.31 in 2008. Furthermore, the maximum of ROA is 0.99 in 1999 whereas the minimum is 0.04 in 2002 and 2003. Table 3 shows the frequency of the governance index scores where 58% of the sample firms have compliance level between 81% and 100% whereas only 3.7% of the sample firms have compliance level below 40%. These figures show that most of the sample firms have

complied with the governance code and suggest an impact of compliance with the governance code on current performance.

Insert Table 2-3 Here

Table 4 presents results from the estimation of model (1). We find that the first, second and fourth lags of ROA are statistically significant (column 1), whereas only the first and third lags are significant for Tobin's Q (column 2). In columns 3 and 4, we use older lags (year 3 and 4) which are significant for ROA, whereas for Tobin's Q only the lag of year 3 is significant. The impact of the estimated coefficients is lower than recent lags, which suggests that although older lags explain current performance, such information is absorbed by more recent lags.

Insert Table 4 Here

Table 5 shows findings from the estimation of the regression (model 2) using ROA in Panel (A) and TQ in Panel (B). We find that the GI index is significantly determined by both past performance measures which raise two important issues. First, it might be that there is reverse causality in which performance would determine corporate governance and not vice versa. Second, corporate governance and performance could be determined simultaneously as a result of omitted variables bias. Most financial variables, with the exception of leverage, are also significantly associated with past performance, Panel (B). Although Leverage is not significantly associated with past TQ, it is significantly associated with past ROA, which suggest a certain degree of dynamic endogeneity with firms' performance. In addition, some of the past values of the other financial variables significantly determine current values, suggesting that not only GI is potentially endogenous with performance through a dynamic relationship but also most of the control variables.

Insert Table 5 Here

Table 6 shows results from the estimation of model 3. It indicates that future values of GI are not significantly associated with firm performance. This is consistent when future values of financial variables are included in the model, as highlighted in columns (2) and (4). Therefore, future compliance with corporate governance practices might not vary as a response to past performance indicators which would allow the GI index to be considered as predetermined, as opposed to endogenous, when applying a more robust technique of analysis that controls for all aspects of endogeneity such as System GMM (Arellano and Bond, 1991; Roodman, 2009; Kryzanowski and Mohebshahedin, 2016).

Insert Table 6 Here

Table 7 and 8 present the results for ROA and TQ as measures of performance, respectively.

Insert Table 7 and 8 Here

The first column of Tables 7 and 8 shows that the estimates for the GI index from a static specification of the model has a positive and significant relationship between the governance index and corporate performance. This finding is similar, in direction and magnitude to previously published studies in this area (such as; Gompers, et al. 2003, and Padgett and Shabbir, 2005, amongst others). Column (2) in Tables 7 and 8 presents an estimation with fixed effects, in which the estimate for the GI index is positive and significant for ROA, but is not significant for TQ, which suggest that fixed omitted variables, such as cross-listings or managerial experience, might be driving the correlation between better governance and higher TQ.

In both Tables 7 and 8, column (3) to (6) present results of the dynamic specification of our models. The impact and significance of the GI index does not hold when System GMM is applied in columns (5) and (6), neither is present in the dynamic OLS regression in column (3), or the fixed effects estimation in column (4), which suggests that lagged performance captures information of future corporate governance compliance. This finding highlights the importance of specifying a dynamic model in the governance and compliance relationship.

After specifying a dynamic model and controlling for endogeneity, Table 7 and 8, show that GI is not a significant determinant of corporate performance. This finding suggests a potential bias that could arise when all aspects of endogeneity are not controlled, such as the dynamic nature of the performance model, simultaneity and omitted variable bias (unobservable heterogeneity). This finding combined with the results reported in Table 5 highlights the possibility of reverse causality where changes in performance levels have a causal effect on corporate governance compliance (but not vice versa). This finding suggests that firms optimally select their level of corporate governance in response to firm characteristics, such as performance (Chidambaran et al., 2008). This finding is also consistent with Shabbir (2008), which suggests that UK firms are more compliant when lagged returns decrease and less compliant when lagged operating performance increases.

We find a significant and negative effect of leverage and R&D in the performance model in Table 7. The negative effect of leverage is in line with Harris and Raviv (1988), suggesting that larger debt might increase the accessibility of private benefits of control as the voting power per unit of equity increases, which negatively impacts on performance. The estimated

coefficient of R&D expenditure is negative for ROA (Table 7) and positive for TQ (Table 8) which is not surprising as the former measures performance from an accounting point of view and the later measures future firm economic prospects. This finding is consistent throughout the paper independently of the method of analysis. We find that firm size is negatively associated with TQ in Table 8, the magnitude and sign of the coefficients of which are consistent with those reported by other scholars (Lang and Stulz, 1994; Durnev and Kim, 2005).

A consistent and significant estimator from GMM regressions is expected to lie between the OLS and the fixed effects estimator, or at least should not be significantly higher from the former or significantly lower than the latter (Bond, 2009). In line with this, we have checked the GMM regression estimators and based on the results reported in Table 7 and 8, it can be confirmed that our significant GMM estimators comply with the above condition. This is demonstrated by the overlapping 95% confidence intervals. Moreover, as can be observed in Table 7, for LEV and R&D, this condition was met at the 1% level of significance. These findings re-confirm the robustness of our results.

Table 9 shows the results for both corporate performance measures (ROA and TQ) calculated by using pooled OLS and System GMM. The results indicate no relationship between the lagged governance index and the contemporaneous performance measures. This finding contradicts Vander Bauwhede (2009) who shows that greater lagged corporate governance compliance regarding the structure and functions of the board is positively significant in determining ROA (estimated with OLS). We find that after considering the likely endogeneity of the variables, lagged R&D expenditure is positive and significant in determining TQ, but

insignificant for the ROA measure of performance. Likewise, past leverage and past firms' size are significant in determining current TQ.

Insert Table 9 Here

In summary, we find that compliance with corporate governance practices do not determine current or future performance of firms. This finding is robust to potential endogeneity problems that could bias the results. We also highlight the possibility of a reverse causality between performance and corporate governance compliance, which posits that firms choose their optimal level of corporate governance practices in response to internal firm characteristics, such as performance. In light of all these points we argue that changes in performance levels might have an effect on changes in corporate governance compliance by UK firms.

These findings have implications as the absence of a link between corporate governance and firms' performance would naturally raise many questions. Theoretically, compliance with corporate governance regulation is expected to help reduce the agency costs and thus positively influence both current and future performance of firms. However, empirical evidence in this paper does not show a relationship of this nature. This leads us to question the recent calls for more stringent regulation and stricter control mechanisms in aftermath of the recent 2007-2008 financial crisis. In line with this, our findings support the arguments of Cloke (2013) who regards the occurring of various financial incidents, after the 2007 financial crisis as not just other episodes in the string of crises which is generally regarded as a normal practice in capitalisteconomies but '...a transitional phase towards an entirely different capitalist topology' (p. 99). In light of this if compliance with the existing corporate governance regulation is not useful in improving firms' performance then alternative solutions needs to be explored. Is the

free market view of regulation adding value to the debate here? This is a question which will need answers in future research paradigm.

5. Conclusion

In the existing literature the impact of corporate governance on firms' performance has been investigated by using performance as a function of the governance index. However, most of the existing studies ignore the dynamic nature of the relationship between corporate governance and performance (Guest, 2009; Wintoki, et al., 2012). This study, therefore, examines the relationship between corporate governance and corporate performance, using a robust GMM specification that accounts for potential endogeneity problems that may have influenced the results of existing studies. The findings in our study suggest that, after controlling for all sources of possible endogeneity, there is no significant relationship between the governance index and corporate performance. This finding is consistent in contemporaneous and intertemporal specifications. By contrast, while using the OLS and fixed-effects models as the methods of analysis we find that the level of compliance has a significantly positive impact on ROA. This suggests that the results of previous studies that do not take into account the dynamic nature of firms' performance may be biased.

In other words, current corporate performance or other control variables in the empirical models of published studies may affect the structure of corporate governance in the future. We thus argue that investigating the relationship between corporate governance and performance has to take into account the possibility of endogeneity arising from three sources: unobservable heterogeneity, simultaneity and the dynamic corporate performance. Theoretically, however, reporting insignificant relationship between the governance index and corporate performance

is unexpected, because complying with the corporate governance best practice should essentially be considered as a good sign for perspective investors. The insignificant relationship between the governance index and corporate performance may indicate that firms that comply with the corporate governance recommendations do not necessarily have higher profitability and higher market value than their counterparts that do not comply. The insignificant relationship between the governance index and corporate performance may be due to the possibility of reverse causality in which firms optimally choose their level of corporate governance compliance depending on internal firm characteristics, such as performance. We therefore argue that our findings have implications for both the regulators and policy makers.

While our study adds to the existing literature on the governance-compliance and performance relationship in different ways, we also acknowledge some potential limitations of our study. Our GI index, for instance, only considers provisions of the Corporate Governance Code (2003) that can be practically measured but does not include those provisions where information is not observable and inclusion of further information about those provisions would certainly add more insights. Also, although the issue of reverse causality is highlighted as a possible outcome, however, it is beyond the scope of this paper to study all other determinants of corporate governance compliance which may have implications on the findings of this research. Covering a detailed investigation of all these aspects is therefore left to future research.

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Table 1
Construction of the Governance Index

Corporate Governance Variables	Acronym	Code Section(s) / Page No.	Explanations
1. Board of Directors			
Chairman and CEO	DUAL	A.2.1(P.6)	A dummy variable equal to 1 if the roles of chairman and chief executive are not combined, 0 otherwise.
Board Structure	NED	A.3.2(P.7)	A dummy variable equal to 1 if half or more of directors are independent non-executive directors, 0 otherwise.
Chairman	CHA	A.2.2(P.6)	A dummy variable equal to 1 if the board chairman is independent non-executive director, 0 otherwise.
Senior independent director	SEN	A.3.3(P.8)	A dummy variable equal to 1 if the firm has an independent non-executive senior, 0 otherwise.
2. Board Sub-Committees			
Remuneration Committee			
Presence	RC	A.1.2 & B.2.1(P.6 & P.15)	A dummy variable equal to 1 if the company has a remuneration committee, 0 otherwise.
Structure	RCS	B.2.1 (P.15)	A dummy variable equal to 1 if the remuneration committee has at least three independent non-executive directors, 0 otherwise.
Chairman of remuneration committee	CRC	B.2.1 (P.65)	A dummy variable equal to 1 if the chairman of the remuneration committee is independent, 0 otherwise.
Audit Committee			
Presence	AC	C.3.1 (P.17)	A dummy variable equal to 1 if the company has an audit committee, 0 otherwise.
Structure	ACS	C.3.1 (P.17)	A dummy variable equal to 1 if the audit committee has at least three independent non-executive directors, 0 otherwise.
Financial expert	ACF	C.3.1 (P.17)	A dummy variable equal to 1 if the audit committee has at least one financial expert, 0 otherwise.
Chairman	CAC	C.3.1 (P.17)	A dummy variable equal to 1 if the chairman of the audit committee is independent, 0 otherwise.
Meetings	ACM	C.3 (P.17)	A dummy variable equal to 1 if the audit committee holds at least three meetings a year, 0 otherwise.
Nomination Committee			
Presence	NC	A.4.1 (P.67)	A dummy variable equal to 1 if the company has a nomination committee, 0 otherwise.
Structure	NCS	A.4.1(P.67)	A dummy variable equal to 1 if more than half of members of the nomination committee are independent non-executive directors, 0 otherwise.
Chairman	CNC	A.4.1(P.67)	A dummy variable equal to 1 if the chairman of the nomination committee is independent, 0 otherwise.

Table 2**Variables Means and Standard Deviations (*Italics*)**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Firms in FTSE-	811	790	754	715	689	695	688	681	673	618	622
All											
No. firms	318	330	345	369	383	408	418	425	425	426	424
% of the sample	39%	42%	46%	52%	56%	59%	61%	62%	63%	69%	68%
TQ	3.14	2.71	1.90	1.45	1.90	2.01	2.15	2.29	2.00	1.31	1.62
	<i>3.14</i>	<i>2.71</i>	<i>1.39</i>	<i>0.81</i>	<i>1.49</i>	<i>1.39</i>	<i>1.41</i>	<i>1.50</i>	<i>1.37</i>	<i>0.94</i>	<i>1.31</i>
ROA	0.09	0.08	0.07	0.04	0.04	0.06	0.07	0.08	0.07	0.07	0.05
	<i>0.16</i>	<i>0.13</i>	<i>0.13</i>	<i>0.17</i>	<i>0.17</i>	<i>0.16</i>	<i>0.15</i>	<i>0.15</i>	<i>0.14</i>	<i>0.14</i>	<i>0.15</i>
GI index	0.70	0.72	0.75	0.78	0.81	0.84	0.84	0.86	0.86	0.88	0.88
	<i>0.19</i>	<i>0.19</i>	<i>0.17</i>	<i>0.17</i>	<i>0.17</i>	<i>0.18</i>	<i>0.18</i>	<i>0.18</i>	<i>0.16</i>	<i>0.15</i>	<i>0.15</i>
SALEG	0.19	0.25	0.21	0.08	0.10	0.13	0.14	0.17	0.16	0.22	0.04
	<i>0.38</i>	<i>0.48</i>	<i>0.46</i>	<i>0.30</i>	<i>0.38</i>	<i>0.39</i>	<i>0.36</i>	<i>0.42</i>	<i>0.38</i>	<i>0.45</i>	<i>0.28</i>
CAPITE	0.08	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.04
	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>								
FSIZE	12.77	12.74	12.86	12.78	12.73	12.66	12.65	12.70	12.82	12.99	13.03
	<i>1.79</i>	<i>1.81</i>	<i>1.73</i>	<i>1.76</i>	<i>1.84</i>	<i>1.88</i>	<i>1.97</i>	<i>1.95</i>	<i>1.93</i>	<i>1.95</i>	<i>1.94</i>
LEV	0.20	0.20	0.20	0.21	0.21	0.20	0.20	0.21	0.22	0.23	0.22
	<i>0.16</i>	<i>0.17</i>	<i>0.17</i>	<i>0.18</i>	<i>0.18</i>	<i>0.18</i>	<i>0.19</i>	<i>0.18</i>	<i>0.18</i>	<i>0.19</i>	<i>0.18</i>
R&D	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>	<i>0.07</i>	<i>0.07</i>	<i>0.07</i>	<i>0.07</i>	<i>0.07</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>

Table 3
Frequency of the Governance Index Scores

Percentage	Observations	% of Sample
0-20%	39	1.0%
21-40%	104	2.7%
41-60%	447	11.5%
61-80%	1021	26.4%
81-100%	2262	58.4%
	3873	100%

Table 4
Lags on Corporate Performance

In this table, we report results from the OLS estimation of equation 1. All t-statistics are based on robust, firm-clustered standard errors. Year and industry dummies are included in all regressions. P-values are reported in parentheses, whereas, ***, **, * represent significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	ROA	TQ	ROA	TQ
Performance (-1)	0.632*** (0.000)	0.632*** (0.000)		
Performance (-2)	0.098** (0.016)	-0.019 (0.774)		
Performance (-3)	0.015 (0.790)	0.133*** (0.008)	0.369*** (0.000)	0.342*** (0.000)
Performance (-4)	0.061* (0.088)	-0.020 (0.444)	0.146*** (0.000)	-0.009 (0.672)
SALESG	0.048*** (0.000)	-0.231** (0.023)	0.056*** (0.000)	0.056 (0.540)
CAPITE	0.003 (0.950)	0.412 (0.226)	0.120* (0.051)	0.770 (0.233)
FSIZE	0.002 (0.145)	-0.018 (0.102)	0.005** (0.032)	-0.031 (0.162)
LEV	-0.018 (0.125)	0.042 (0.762)	-0.044** (0.030)	0.098 (0.732)
R&D	-0.206*** (0.006)	2.94*** (0.000)	-0.502*** (0.000)	4.46*** (0.000)
R ²	0.7255	0.6224	0.5252	0.3559

Table 5**Relationship between the Corporate Governance Index, Control Variables, and Past ROA**

This table reports the results of OLS regressions of current governance index (GI) and current control variables, on past performance and historic values of control variables (equation 2). Performance is measured by return on assets (ROA) in Panel (A) and Tobin's Q (TQ) in panel (B). The control variables include sales growth (SALEG), capital expenditure (CAPITE), firm size (FSIZE), leverage (LEV) and R&D expenditure (R&D). All p-values are based on robust, firm-clustered standard errors. Year and industry dummies are included in all regressions. P-values are reported in parentheses, whereas, ***,**,* represent significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	Panel (A)					
	GI	SALESG	CAPITE	FSIZE	LEV	R&D
ROA(t-1)	0.084* (0.064)	-0.274*** (0.002)	0.048*** (0.003)	2.86*** (0.000)	-0.107* (0.054)	-0.155*** (0.000)
SALESG(t-1)	-0.028*** (0.003)		0.007** (0.013)	-0.203** (0.027)	-0.003 (0.698)	0.007** (0.044)
CAPITE(t-1)	0.030 (0.781)	0.217 (0.260)		-2.77*** (0.010)	0.455*** (0.001)	-0.008 (0.752)
FSIZE(t-1)	0.034*** (0.000)	-0.023*** (0.000)	-0.002** (0.029)		0.032*** (0.000)	-0.003** (0.012)
LEV(t-1)	0.029 (0.372)	-0.060 (0.191)	0.020 (0.127)	3.05*** (0.000)		-0.022** (0.042)
R&D(t-1)	0.218 (0.174)	0.060 (0.773)	-0.027 (0.362)	-3.70*** (0.004)	-0.246* (0.060)	
R ²	0.2684	0.0736	0.1316	0.2764	0.2026	0.4090
				Panel (B)		
TQ(t-1)	0.006** (0.032)	0.037*** (0.000)	0.002* (0.070)	-0.095*** (0.008)	0.001 (0.798)	0.008*** (0.000)
SALESG(t -1)	-0.028*** (0.002)		0.006** (0.036)	-0.182* (0.071)	-0.003 (0.767)	0.010** (0.017)
CAPITE(t -1)	0.045 (0.681)	0.100 (0.602)		-1.97* (0.062)	0.432*** (0.001)	-0.066** (0.028)
FSIZE(t -1)	0.037*** (0.000)	-0.021*** (0.000)	-0.001 (0.154)		0.031*** (0.000)	-0.004** (0.012)
LEV(t -1)	0.022 (0.515)	-0.088* (0.052)	0.019 (0.171)	3.04*** (0.000)		-0.022** (0.036)
R&D(t-1)	0.073 (0.616)	0.116 (0.664)	-0.087*** (0.001)	-5.05*** (0.000)	-0.227* (0.055)	
R ²	0.2675	0.0912	0.1242	0.2530	0.1571	0.3740

Table 6**Test of Strict Exogeneity**

This table reports results from the fixed-effects estimation of the model in equation 3. All p-values are based on robust standard errors. Year dummies are included in all regressions. Dependent variable: ROA in columns (1) and (2); Tobin's Q in columns (3) and (4). P-values are reported in parentheses, whereas, ***,**,* represent significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	ROA	ROA	TQ	TQ
	(1)	(2)	(3)	(4)
GI	0.027* (0.093)	0.022 (0.171)	-0.230 (0.593)	-0.317 (0.427)
SALESG	0.024*** (0.000)	0.018*** (0.000)	0.374*** (0.000)	0.262*** (0.006)
CAPITE	0.172*** (0.003)	0.084 (0.132)	2.33** (0.017)	0.705 (0.411)
FSIZE	-0.006 (0.361)	-0.043*** (0.000)	-0.762*** (0.000)	-1.57*** (0.000)
LEV	-0.065** (0.040)	-0.064** (0.027)	0.516 (0.270)	1.43*** (0.002)
R&D	-0.657*** (0.000)	-0.760*** (0.000)	0.498 (0.886)	1.147 (0.699)
GI(t+1)	0.022 (0.247)	0.020 (0.267)	0.596 (0.126)	0.471 (0.188)
SALESG(t+1)		-0.019*** (0.002)		0.289*** (0.002)
CAPITE(t+1)		0.254*** (0.000)		4.80*** (0.000)
FSIZE(t+1)		0.049*** (0.000)		1.217*** (0.000)
LEV(t+1)		0.033 (0.210)		-1.037** (0.025)
R&D(t+1)		0.258 (0.154)		-2.35 (0.389)

Table 7

The Effect of the Governance Index on Current ROA

This table represents the results of static and dynamic models using return on assets (ROA) as a measure of corporate performance. Industry dummies are included in the OLS regressions, whereas, year dummies are included in all the regressions. Firm clustered standard errors are used in the fixed effects estimation. All t-statistics are based on robust standard errors. AR(2) is a test for second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. P-values are reported in parentheses, whereas, ***, **, * represent significance at the 1%, 5%, and 10% level, respectively. Confidence intervals at the 95% are presented in brackets whereas ^a represent confidence intervals at the 99%.

Dependent Variable (ROA)	Static Model		Dynamic Model			
	OLS	Fixed Effects	OLS	Fixed Effects	GMM ^a	GMM ^b
GI	0.051*** (0.000)	0.046*** (0.007)	0.014 (0.166)	0.016 (0.139)	0.016 (0.566)	0.030 (0.183)
SALESG	-0.001 (0.852)	0.026*** (0.000)	0.033*** [0.020, 0.047] (0.000)	0.033*** [0.017, 0.048] (0.000)	0.019* [-0.001, 0.040] (0.068)	0.012 (0.288)
CAPITE	0.237*** (0.000)	0.171*** (0.002)	-0.028 (0.381)	-0.040 (0.278)	-0.114 (0.219)	-0.155 (0.162)
FSIZE	0.011*** (0.000)	-0.004 (0.540)	0.001 (0.110)	0.001 (0.186)	0.0001 (0.974)	-0.002 (0.746)
LEV	-0.052*** (0.001)	-0.045 (0.150)	-0.019** [-0.041, 0.004] ^a (0.035)	-0.022** [-0.048, 0.003] ^a (0.025)	-0.039 (0.172)	-0.128*** [-0.207, -0.048] ^a (0.000)
R&D	-0.915*** (0.000)	-0.589*** (0.003)	-0.234*** [-0.375, -0.093] ^a (0.000)	-0.247*** [-0.400, -0.094] ^a (0.000)	-0.576*** [-0.879, -0.274] ^a (0.000)	-0.725*** [-1.054, -0.396] ^a (0.000)
ROA(t-1)			0.685*** [0.611, 0.759] (0.000)	0.672*** [0.603, 0.741] (0.000)	0.527*** [0.429, 0.625] (0.000)	0.511*** [0.411, 0.612] (0.000)
ROA(t-2)			0.116*** [0.054, 0.178] (0.000)	0.113*** [0.059, 0.167] (0.000)	0.136*** [0.064, 0.207] (0.000)	0.152*** [0.078, 0.225] (0.000)
R ²	0.2765	0.1855	0.7311	0.7304		
AR(2) test (p-value)					0.317	0.208
Hansen test of over-identification (p-value)					0.236	0.280
Diff-in-Hansen test of Exogeneity (p-value)					0.688	0.561

Table 8**The Effect of Governance Index on Current Tobin's Q**

This table represents results of static and dynamic models using Tobin's Q (TQ) as a measure of corporate performance. Industry dummies are included in the OLS regressions, whereas, year dummies are included in all the regressions. All t-statistics are based on robust standard errors. Firm clustered standard errors are used in the fixed effects estimation. AR(2) is a test for second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. P-values are reported in parentheses, whereas, ***, **, * represent significance at the 1%, 5%, and 10% level, respectively. Confidence intervals at the 95% are presented in brackets.

Dependent Variable (TQ)	Static Model		Dynamic Model			
	OLS	Fixed Effects	OLS	Fixed Effects	GMM ^a	GMM ^b
GI	0.349** (0.036)	0.105 (0.718)	0.161 (0.182)	0.300 (0.169)	0.217 (0.636)	0.261 (0.366)
SALESG	0.310*** (0.001)	0.183** (0.017)	0.216*** (0.002)	-0.056 (0.555)	0.102 (0.573)	-0.029 (0.852)
CAPITE	0.870** (0.071)	4.637*** (0.000)	0.144 (0.628)	0.371 (0.470)	0.022 (0.985)	-0.164 (0.886)
FSIZE	-0.124*** (0.000)	-0.426*** (0.000)	-0.030*** [-0.053, -0.008] (0.009)	-0.360*** [-0.526, -0.194] (0.000)	-0.109* [-0.222, 0.003] (0.057)	-0.109** [-0.211, -0.007] (0.037)
LEV	0.251 (0.182)	0.767** (0.044)	0.082 (0.486)	0.023 (0.940)	-0.373 (0.370)	-0.286 (0.429)
R&D	8.49*** (0.000)	2.904 (0.312)	2.76*** [1.378, 4.141] (0.000)	4.75** [0.891, 8.609] (0.016)	3.58*** [1.348, 5.809] (0.002)	3.17*** [1.267, 5.083] (0.001)
TQ(t-1)			0.608*** [0.523, 0.694] (0.000)	0.325*** [0.254, 0.397] (0.000)	0.376*** [0.256, 0.496] (0.000)	0.374*** [0.254, 0.495] (0.000)
TQ(t-2)			-0.014 (0.642)	-0.061** (0.026)	-0.042 (0.214)	-0.040 (0.230)
R ²	0.2451	0.1227	0.5694	0.2942		
AR(2) test (p-value)					0.130	0.130
Hansen test of over-identification (p-value)					0.075	0.117
Diff-in-Hansen tests of Exogeneity (p-value)					0.955	0.994

Table 9**The Impact of Lagged Governance Index on Current Performance**

All t-statistics are based on robust, firm-clustered standard errors. Industry dummies are included in the OLS regressions, whereas, year dummies are included in all the regressions. AR(2) is a test for second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. Hansen test of over-identification is under the null that all instruments are valid. Diff-in-Hansen test of exogeneity is under the null that instruments used for the equations in levels are exogenous. ***,**,* represent significance at the 1%, 5%, and 10% level, respectively.

	Performance (ROA)		Performance (TQ)	
	Pooled OLS	System GMM ^a	Pooled OLS	System GMM ^b
GI(t-1)	-0.004 (0.690)	-0.012 (0.641)	0.098 (0.449)	0.465 (0.171)
SALESG(t-1)	-0.011** (0.040)	-0.013 (0.125)	0.060 (0.276)	0.166 (0.240)
CAPITE(t-1)	-0.035 (0.142)	-0.067 (0.467)	-0.251 (0.479)	-0.474 (0.685)
FSIZE(t-1)	-0.000 (0.964)	-0.003 (0.378)	-0.012 (0.357)	-0.104* (0.057)
LEV(t-1)	0.023*** (0.003)	0.022 (0.301)	0.051 (0.711)	-1.07*** (0.008)
R&D(t-1)	0.005 (0.925)	-0.104 (0.510)	2.38*** (0.007)	3.55*** (0.007)
Performance(t-1)	0.748*** (0.000)	0.649*** (0.000)	0.597*** (0.000)	0.332*** (0.000)
Performance(t-2)	0.108*** (0.001)	0.154*** (0.004)	-0.003 (0.921)	-0.054 (0.206)
R ²	0.7296		0.5607	
AR(2) test (p-value)				0.256
Hansen test of over-identification (p-value)			0.284	0.176
Diff-in-Hansen test of Exogeneity (p-value)			0.164	0.877