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The effect of corruption, seigniorage and borrowing on inflation

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Abstract

Purpose – Governments may finance its expenditures through multiple resources; however, seigniorage and borrowing are commonly used. The authors think that in the presence of corruption, the use of public finance may result in inflationary effect that leads to higher level of inflation, which in turn affects the whole economy.

Design/methodology/approach – This paper investigates if the variation in corruption levels jointly with public finance means, seigniorage and borrowing, accounts for the variation in the level of inflation. This paper uses panel data of 72 countries through the period 1995-2011.

Findings – The author find that corruption jointly with public finance means, seigniorage and borrowing, increase the level of inflation. This finding can address the misuse of these public finance means where corruption is prevalent.

Originality/value – This paper captures the joint effect of corruption with two different means of public finance, seigniorage and borrowing, on the level of inflation within 72 countries through 1995-2011.

Keywords Inflation, Corruption, Borrowing, Seigniorage

Paper type Research paper

1. Introduction

It is well-known that seigniorage (the revenue a government acquires through its ability to issue new currency) causes inflation. Issuing new money is highly profitable source of financing a government may use[1]. The more important thing, however, is that there are determinants that may change the magnitude effect of this relationship. Studying these determinants potentially ensures a full picture to policy-makers. One variable that may affect the relationship between seigniorage and inflation is corruption. The hypothesis of this study is that corrupt officials in different positions waste government’s resources through their corrupt practices. The government then has to use its available finance options to make up for this loss; seigniorage as the easiest solution followed by borrowing if the central bank independency is an obstacle. Financing this loss will result in expansionary spending, which in turn leads to higher inflation.

Although the effect of corruption on growth has been an interest of many researchers, the effect of corruption on inflation has not received much attention. Among the fewer studies conducted in this regard is Al-Marhubi (2000). The study directly investigated the effect of...
corruption on inflation using cross-section data averaged through 1980-1995. The author found out that a country with more corruption tends to have more inflation levels. Smith-Himillman (2007) examined whether good governance (represented as an index of corruption) and an effective competition policy are significant indicators for relatively low inflation rate. The author used a sample, which consisted of two groups comprising 23 African economies and 20 industrialized economies. The study found out that lower corruption levels and competition policy in place lead to lower level of inflation. Piplica (2011) examined the role of corruption on inflation in the EU[2] countries through their transition of socialist economies to market economies. The author found out that corruption positively affects the rate of inflation. Blackburn et al. (2008) found out that corruption has indirect effect on growth through public finance channels. Corruption drives public finance composition toward more seigniorage and, therefore, lowers growth.

In this study, we investigate the misuse of public finance, namely seigniorage and borrowing, as governments try to exploit funds missing because of corruption practices. Thus, we include seigniorage and debt financing in our model analysis, as seigniorage may not be influenced by corruption level in countries where central bank independence prevails. Moreover, missing from the literature is an empirical study that explicitly account for the joint effect of corruption with public finance means on inflation levels. Previous studies, which examined only seigniorage effect, were built on the assumption that there is a full access to seigniorage, which is far from reality. However, our study accounts for the constraints on using seigniorage by considering the second popular public finance option, namely borrowing. Our model uses a large panel dataset which consists of 72 countries for a long period of time ranging from 1995 to 2011. In addition, our analysis account for endogeneity problems which are typically found in such studies by using Fixed Effects and 2SLS models.

The following section discusses previous studies which are related to our topic. Section 3 identifies data and methodology, whereas Section 4 presents the results of the study. The last section summarizes the conclusion of the study.

2. Corruption and inflation linkage

There are not much empirical studies on the impact of corruption on inflation as we see on the impact of corruption on growth. Al-Marhubi (2000) empirically examined the relationship between corruption and inflation using cross-country data. The author used corruption indicators from Transparency International (TI) for the years 1988-1992 and 1980-1985 and from Business International (BI) for the period 1980-1983. He identified a number of factors crucial to the relationship between corruption and inflation. Corruption can contribute to inflationary finance because of tax evasion and costly tax collections along with capital flight and budget deficits. The author found out that corruption is partly responsible for high inflation, even after controlling for a variety of other determinants of inflation. The author used an OLS estimation for cross-sectional data analysis consisting of 41 countries from 1980 to 1995.

Blackburn et al. (2008) examined the impact of corruption on growth through a public finance channel. The hypothesis of their study is that corrupt bureaucrats embezzle tax revenues, which reduces the amount of revenues available to the government, causing it to increase its reliance on seigniorage. This, in turn, affects the decision of financial intermediaries in such a way that non-productive reserves will be favorable. This bias allocation of portfolio limits productivity in terms of investment, which is the driving force of growth. Blackburn et al.’s (2008) study builds a bridge between the findings of Al-Marhubi (2000) that corruption positively impacts inflation as well as Adam and Bevan (2005) and Bose et al. (2007) that seigniorage negatively impacts growth[3]. Although
Al-Marhubi did not explicitly include seigniorage, Blackburn et al. (2008) indicate that inflation is a possible outcome of seigniorage.

Blackburn et al. (2008) investigate their hypothesis using panel data for 82 countries between 1980 and 1999. The authors were interested in the revenue side of a government’s budget. The main corruption variable is the International Country Risk Guide (ICRG), because of its availability within the period covered. However, the Corruption Perception Index (CPI-TI) and the Kaufmann et al. (2007) index (KKM) are included in their analysis but with less confidence. This is because their annual collection began after 1995 and 1996. The results obtained through the use of these alternative corruption indices were found to be consistent with those obtained through the use of the ICRG with regard to the main variable, the interaction term of corruption and seigniorage. However, there are some differences in the coefficients of the other variables in terms of sign and significance. As far as the role of indirect channels is concerned, Mauro (1995) found out that corruption affects growth only indirectly through inefficient investment choices. Li et al. (2000) reveal that corruption by itself explains little of the continental growth differences. However, corruption causes a large reduction in growth in countries where the asset distribution is less equal. Fiorino et al. (2012) suggest that corruption hinders the positive influence that public expenditure has on economic growth. Mo (2001) indicates that political instability is the most important channel through which corruption reduces growth. Similarly, Blackburn et al. (2008) found out that corruption, if taken separately, has no direct implications for growth. However, corruption has an indirect negative effect through its tilting of the composition of public finance toward more seigniorage with a concomitant reduction in growth.

Piplica (2011) investigated the effect of corruption on inflation in the EU through their transition of socialist economies to market economies. In these cases, there have been numerous privatizations that originated in offshore companies, shell companies, countries with tax havens, etc. All of these privatizations have carried a high financial cost. Such costs are often transferred to the final customer in terms of inflated prices. The author used Transparency International index as a measurement of corruption in the underlying countries covered the period of 1995 to 2008. Smith-Himllman (2007) attempted to test whether good governance (measured by level of corruption) and the existence of competition policy significantly explain lower inflation within 23 African countries and 20 industrial countries. The corruption perception index by Transparency International is used as a proxy for good governance. The author used a cross section data for 2003 testing of two groups of countries separately, which resulted in insignificant coefficients. However, the two groups, when tested as one group, reveal statistical significant results that low corruption and effective competition policy jointly account for lower level of inflation.

There are various ways to illustrate how corruption causes losses in public resources. For instance, government revenue collection may suffer from tax evasion and high tax collection costs. While government spending may suffer from the activities of corrupt procurement officials (Olken (2005)), the increased spending and shrinking revenues caused by corruption may possibly lead to budget deficits. This will, in cases of limited borrowing access, result in increased seigniorage and, therefore, adding to inflationary pressures.

The role that corruption plays in inflation is an important area of research. Only a few empirical studies in this area have been conducted, possibly because of the dearth of long-term series data on corruption. Al-Marhubi (2000) examined this issue with data spanning the years 1980-1995. However, data collection and reporting on corruption have improved significantly since then. A number of other data series have also been identified recently which can be used as a proxy for corruption. The renewed expansion of the role played by good governance in economic growth (Acemoglu et al., 2005, 2004, etc.) warrants a
reexamination of the macroeconomic consequences of corruption; specifically the relationship between corruption and inflation.

Although Al-Marhubi (2000) highlighted the usefulness of a number of channels including tax evasion, tax collection costs, capital flight and budget deficits in examining the inflation/corruption relationship. His work was limited to a cross-section analysis that does not explicitly control these channels. Our study explicitly tests for seigniorage and borrowing. On the contrary, Blackburn et al. (2008) made use of the way in which seigniorage interacts with corruption, but his interest was in its impact on growth and not on inflation. His work was intended to fill the gap between the findings of Al-Marhubi (2000) on the one hand and those of Adam and Bevan (2005) and Bose et al. (2007) on the other. Moreover, as more than a decade has passed by since Al-Marhubi’s (2000) findings were revealed, it would be worthwhile to update them, especially with the improvements in calculating corruption variables in terms of time spans and the recently conducted studies. Many studies concerning corruption have addressed the possible endogeneity problem of corruption along with other macroeconomic variables, making use of techniques such as the two-stage least square and the fixed effect all of which are important techniques. Thus, this study applies the fixed effect and the two-stage least squares (2SLS). We also include more variables representing economic, institutional and political aspects, a richer and wider data set in terms of years and countries and a larger variety of alternative model specifications to examine the relationship between corruption and inflation.

Also, contrary to the often-chosen channel of seigniorage, our study does not constrain public finance channels to seigniorage only but rather adds the possibility of borrowing through the debt-financing channel. There is a number of factors, which draw our attention to this channel. Ghosh and Neanidis (2010) call for new research on a possible extension of their work that:

One line of enquiry would be to estimate the effects of the different types of corruption in public expenditure on growth and inflation using panel data for a large group of countries.

In addition, Dimakou (2008) indicates that governments can cause inflation despite the stringency of their monetary policies. In other words, a government may strategically increase its debt to induce its central bank to pursue an expansionary monetary policy. In the same context, Miller (1983) found that a higher fiscal deficit leads to inflation through the private sector’s response to extra borrowing by the government. Specially, when borrowed money is spent on goods and services used by the private sector, this in turn affects the outcomes of the private sector’s efforts. Although no seigniorage is being created in such cases, the result is high inflation as the same amount of money corresponds to fewer goods and services. Moreover, policies and institutions have improved in terms of greater central bank independence, which raises the use and importance of other public finance channels.

3. Data and methodology
3.1 Data description
We collected a country-set panel data sample of 72 countries. Country selection was largely based on data-availability either debt financing or corruption data. The time studied spans 17 years for each country; (1995-2011) for panel analysis. The starting date choice is because the annual data for the Corruption Perception Index (CPI) began in 1995, with data for some countries being reported later on. Beginning the data set in 1995 makes the availability of data concerning corruption variables similar from one country to another. Finally, missing data caused our unbalanced panel to deliver a maximum of 343 observations. Studies on corruption usually face a lack of data availability because of a lack of corruption data. In
addition, obtaining comparable public finance data across countries is a challenge that adds to the problem of missing data. Table AI in the appendix presents summarized statistics of the data and describes their definitions and sources.

Our main variables are corruption, seigniorage, borrowing and inflation. In addition, we include control variables that have been traditionally known to contribute to inflation. We include GDP per capita to control for the level of development across countries. Typically, countries with lower GDP per capita (indicating a lower level of development) tend to have lower prices. Thus, they are expected to experience higher inflation rates as they catch up to other countries. Openness (exports and imports to GDP) is included; no specific sign can be assumed as the magnitude of export and import in forming openness which may affect the sign either way. However, some studies have assumed that countries, which are more open, tend to maintain their comparative advantages in trade by being more competitive, thereby lowering their rates of inflation. Based on the short-run Phillips curve hypothesis, unemployment rate is also included to represent the labor market effect, which is assumed to have a negative effect on inflation. The unemployment rate is associated with more deflation in the economy and less weight on prices. The lending rate represents the rate that is offered by banks in the short and medium terms. We aim to control for the effect of business expansion on inflation when the lending rate is low; thus, we expect it to have a negative effect on inflation. Finally, we control for exchange rate calculated as the value of the dollar per domestic currency, which controls for the differences in prices across countries so that the higher the value, the lower the prices. We use two variables that represent public finance means that influence the effect of corruption indices on the inflation rate; these are seigniorage and debt financing. Seigniorage is defined in two ways[4]: it is the change in reserve money calculated as a fraction of total revenue, grants and budget deficits. It is also defined as the change in reserve money available to the GDP, following Aisen and Veiga (2008); Blackburn et al. (2008); Fisher (1982) and Cukierman et al. (1992)[5]. The other variable we introduce is debt financing which is constructed in two steps: first, we multiply cash-surplus by minus one to conform to the form of the budget deficit. Second, we subtract seigniorage from the budget deficit to find the volume of other public financing means besides seigniorage, following Adam and Bevan (2005)[6]. We have used two variables in respect to corruption indices, the Transparency International-Corruption Perception Index (TI-CPI) and the International Country Risk Guide (ICRG). We have chosen these two specifically because of their availability and comparability. Both of the variables are constructed by observing the opinions of the general public, business people and experts in corruption matters. The correlation between these two variables in our sample is 87 per cent, where the TI-CPI ranges from 0 to 10 and the ICRG ranges from 0 to 6. Corruption data are originally reported in such a way those higher values refer to lower levels of corruption and lower values indicate larger amounts of corruption. For convenience, however, we have rescaled these indices so that high values indicate more corruption and low values indicate less corruption[7]. Finally, our dependent variable, inflation, is a GDP deflator. We should mention two things regarding the choice of this particular representation of inflation. First, we use inflation level and not its fluctuation because some studies have found reverse causality when using inflation variability. Second, a weak magnitude of corruption’s direct effect on inflation has been claimed to be a result of the fact that some corrupt practices on some goods and services may have been overlooked in the calculation of inflation through the consumer price index.
3.2 Methodology

We will estimate the following equation through different model specifications:

$$Inf_{it} = \alpha + \sum_{l=1}^{m} B_l X_{l, it} + \partial C_{i, it} + \gamma P_{l, it} + \varphi C_{it} * P_{l, it} + \epsilon_{it}$$ (1)

Where $Inf_{it}$ denotes the inflation in $i$ country at time $t$, $X_{l}$ indicates the set of controls: Openness, GDP per capita, unemployment, lending and exchange rate. $C$, Corruption indicators, is represented in the ICRG and the TI-CPI. $P$ reflects the public finance options available to country $i$, which are seigniorage or borrowing. These two variables also interact with our corruption indices one at a time (the TI-CPI and the ICRG). $i$: Takes values from 1 to 72, the number of countries. Moreover, not wanting to be limited to the OLS estimate only, we apply different model specifications to solve potential endogeneity problems among the independent variables using the Fixed Effect and the Two-Stage Least Squares (2SLS) models. Our main variable, besides corruption, is an interaction term between corruption and seigniorage and corruption and borrowing. We have chosen to do this because of our expectation that the effect of corruption on inflation is restricted in terms of the elasticity of using seigniorage across countries. Some highly corrupt countries may make lower use of seigniorage because of their central banks’ constraints; others may not face such constraints. Thus, seigniorage responses may be considered empirically as a non-additive effect variable, which give us the incentive to use an interaction variable between corruption and seigniorage. Moreover, we will consider alternatives to seigniorage for obtaining funds, namely the interaction effects of corruption with borrowing. This variable is used to examine cases in which a given country’s ability to use seigniorage is limited for some reasons and has to meet its needs through borrowing.

4. Results

4.1 Pre-estimation tests and graphs

Figure 1 represents the inflation and corruption rates (ICRG) of 72 countries representing an average of the period 1995 to 2011. From the graph, we can see a considerable degree of coincidence between inflation and corruption; countries with high levels of corruption tend to have a high level of inflation.
Figures 2, 3 and 4 illustrate the relationship between our variables of interest: corruption indices, public finance indices and inflation. Figure 2 shows a positive association between the corruption indices (the CPI and the ICRG) and inflation. Figure 3 shows a positive association between the corruption indices and seigniorage. Figure 4 illustrates our initial expectation of a positive relationship between corruption and borrowing.
Table AI, in the Appendix, reports the summary statistics of the variables. Inflation rises to a maximum of 80.7, but this number represents only a few observations of a few countries’ high inflation levels. As the standard deviation shows the dispersion of the observations, it can be seen that inflation is the noisiest of the variables relative to the other variables, which have standard deviations that show less dispersion from the mean but still exhibit some significant variations. Table AII, in the Appendix, shows the correlation and corresponding t statistic for our variables. There is a positive correlation between the corruption indices and inflation, with high t statistics. There is also a positive correlation between the corruption indices and the public finance means of seigniorage and debt financing. Interestingly, the magnitudes of the correlation and the t statistic are very similar. In regard to the other variables, we observe a high correlation between the corruption indices and some of the other variables such as GDP per capita. This may refer to a sign of possible multicollinearity among the independent variables mentioned in some corruption studies (Blackburn et al. (2008)).

4.2 Panel analysis estimates

We use three model specifications to test our hypothesis: the baseline panel model, the fixed effect model and the 2SLS model. The estimates in Table I contain two model specifications, the base panel model and the fixed effect model, while Table II contains the 2SLS model[8]. Table I has 8 columns showing the estimates for each corruption index representing its interactions with public finance indices. A look at the panel estimations in Table I reveals a great coincidence in terms of the signs and significance of the variable coefficients throughout the different specifications. We can also observe from the table that GDP per capita has the expected sign, minus, and it is significant with one exception. In addition, the coefficient for openness has a positive sign and is significant throughout all the models. The coefficient for unemployment has a negative sign, implying that unemployment causes a higher level of operating, thereby reducing inflation, but is insignificant. The regression models include lending, which represents the interest rate; it has a negative correlation with inflation because a higher lending rate hampers investment.

The lending coefficient has negative coefficients throughout all the models and is mostly significant. The exchange rate is very significant and has a negative sign in all eight models with one exception. Seigniorage is insignificant and has a sign that is mostly positive; however, as we use interaction terms in each model, the significance of individual variables may be affected. The same scenario is revealed in the other public finance variable, debt financing, where it is insignificant. However, as we have used an interaction model that in some models contains debt financing, it is individual significance might have been affected. As we have indicated, our interest lies in the corruption indices and their interactions with the public finance indices of seigniorage and borrowing. In the pool model, the corruption indices, the ICRG and the CPI, have the right sign with a very significant level of 1 per cent. In addition, their interaction terms have the right sign with a level of significance ranging from 1 to 5 per cent with one exception, the interaction term of the CPI with seigniorage. The R squared value for the base estimation model ranges from 24 to 27 per cent.

In regards to the fixed effect, the results improved in comparison with the pool estimates in terms of goodness of fit. The R squared value improved along with the fixed effect models to explain 40 per cent of the inflation rate variations. The corruption indices in the fixed effect models are individually insignificant, which a result literature has indicated that using interaction terms may absorb the effects of individual indices. The interaction terms of the CPI were insignificant but have the right sign, while the interaction term of the ICRG was
### Table I.

<table>
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<td>1.50 [0.00]</td>
<td>1.01 [0.80]</td>
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<td>5.46 [0.00]</td>
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<td>12.68 [0.00]</td>
<td>13.24 [0.00]</td>
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<td>-0.12 [0.53]</td>
<td>-0.08 [0.67]</td>
<td>-0.10 [0.62]</td>
<td>-0.27 [0.19]</td>
<td>-0.28 [0.17]</td>
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<td>-0.19 [0.35]</td>
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<td>-0.01 [0.17]</td>
<td>-0.01 [0.13]</td>
<td>-0.02 [0.01]</td>
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<td>0.001 [0.05]</td>
<td>0.001 [0.00]</td>
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<td>3.04E-14 [0.46]</td>
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<td>40</td>
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<td>2.09</td>
<td>1.64</td>
<td>1.72</td>
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<td>327</td>
<td>343</td>
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**Note:** p-values in brackets
significant and has the right sign, draining the individual effects of the corruption indices so that these indices turn out to be insignificant in the fixed effect models. Regarding the magnitude effects of our interaction terms, 1 standard deviation change in the interaction terms of ICRG with seigniorage results in 0.43 and standard deviation increase in inflation, while 1 standard deviation of the interaction terms of ICRG with debt financing results in 0.39 standard deviation increase in inflation. As a multicollinearity problem is to be expected when dealing with a corruption investigation, we have checked for a status of error term estimated to assess for the presence of misspecifications and autocorrelation. Thus, we checked the estimated error term autocorrelation problem and also regressed it for our independent variables. We found it stationary and insignificant with all our independent variables in all of the models. We now turn to the use of 2SLS model techniques to address the possible endogeneity problem between the independent variables. This possibility can also be seen in the table of correlation where we can see a significant correlation among the independent variables. The instruments we used are the twice-lagged value to four lags of the endogenous variables.

Table II in the IV model follows the same specifications as those given in Table I. A look at Table II shows that, though fewer controls are significant, our interaction terms are significant and have the right sign through all specifications except for the seigniorage interacted with CPI and ICRG. However, the latter variables turn to be significant when their individual corruption indices dropped. In terms of the magnitude effects of our interaction terms, 1 standard deviation change in the interaction terms of ICRG with seigniorage results in 2.64 standard deviation increase in inflation, while 1 standard deviation of the interaction terms of ICRG with debt financing results in 0.35 standard deviation increase in inflation. The R squared value ranges from 16 to 22 percent in all of the models. Thus, there is a potential supplement to this study that one may consider measuring the elasticity of government using different public finance

<table>
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<td>C</td>
<td>1.43 [0.06]</td>
<td>1.07 [0.28]</td>
<td>2.12 [0.03]</td>
<td>1.38 [0.15]</td>
</tr>
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<td>-50.34 [0.31]</td>
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<td>Openness</td>
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<td>10.75 [0.07]</td>
<td>6.08 [0.26]</td>
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<td>0.0002 [0.21]</td>
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<tr>
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<td>-7.33 [0.44]</td>
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</tr>
<tr>
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<td>1.14 [0.00]</td>
<td>1.38 [0.00]</td>
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<td>CPI</td>
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<td>Seigniorage*ICRG</td>
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<td>Debt-financing*ICRG</td>
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<td>Debt-financing*CPI</td>
<td>16</td>
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<td>R-squared (%)</td>
<td>0.60</td>
<td>0.59</td>
<td>0.78</td>
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<tr>
<td>Observations</td>
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<td>276</td>
<td>276</td>
<td>297</td>
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**Note:** p-values in brackets
means upon the level of its central bank independency through panel data of a set of countries.

5. Conclusion
We aimed in this article to contribute to the existing literature concerned with the effects of corruption on inflation jointly with public finance indices. Our contributions are as follows: the use of an updated data set, the application of appropriate techniques and the introduction of a new public finance variable in empirical analysis in this context. We have updated the investigation on the effects of corruption on inflation using data gathered since 2011 across 72 countries. We have also applied techniques that control for the possible endogeneity, autocorrelation and serial correlation problems that have been observed in the literature on corruption studies. We have also added the new public finance variable of borrowing as we assumed the existence of some level of constraints on the use of seigniorage across countries. In all of our various models, the estimated specifications show that corruption contributes to inflation both on its own and jointly with public finance indices. The results are significant and have the right signs, which give evidence of the contribution made by corrupt officials to increasing inflation, thus eventually hurting growth. The positive and significant results linking debt financing with corruption indicate that corrupt officials have alternative sources of funds by which they contribute to high inflation. Thus, the independence of a central bank may not guarantee the elimination of the effects of corruption on inflation. For policy-makers, bringing about a reduction in the effects of corruption on inflation requires a dual strategy involving both central bank independence and government borrowing.

6. List of countries
Algeria, Australia, Austria, Bahamas, Bahrain, Bangladesh, Belgium, Botswana, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Congo, Rep., Cote d’Ivoire, Cuba, Cyprus, Denmark, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Gabon, Germany, Greece, Haiti, Hungary, Iceland, India, Indonesia, Ireland, Italy, Jamaica, Japan, Jordan, Kenya, Luxembourg, Malaysia, Mali, Malta, Morocco, Namibia, Netherlands, New Zealand, Niger, Norway, Papua New Guinea, Paraguay, Philippines, Poland, Portugal, Senegal, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syrian Arab Republic, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, the UK, the USA and Zimbabwe.

Notes
1. There are sufficient literature advocate this relationship include Al-Marhubi (2000); Piplica (2011); A. Vindelyn (2007) and Blackburn et al. (2008).
2. The EU countries are Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia and Slovenia, including Croatia as a future member of the EU based as of the year 2008.
3. I thank Dr. AKM Morshed for first mentioning the connection between the two studies; Blackburn et al. (2008) and Adam and Bevan (2005).
4. Although each seigniorage variables delivers similar results, results in panel estimation are based on seigniorage as the change in money reserve to GDP it contains higher number of observations than the other seigniorage variable.
5. The two common measures of seigniorage are the change in monetary base either to GDP or government total revenues; see Buiter (2007); Aisen and Veiga (2008); Blackburn et al. (2008) and Cardoso and Fishlow (1990). However, there are some exceptions, for instance, Click (2000) uses the change in M1 to GDP as a seigniorage measure to Argentina due to data limitation. Others point out some inappropriate measure of seigniorage; for instance, Bose et al. (2007) have not considered the measure of seigniorage that is given by the ratio product of inflation and money reserve to GDP due to difficulty in comparability across developing countries. He also abstained from using the concept of opportunity cost of seigniorage due to difficulty in choosing the correct interest rate across countries and time.

6. Those authors indicate that poor and incomplete borrowing data makes such a construction reasonable.

7. Corruption is scaled by the outcome of “maximum score minus the country score”.

8. Due to size constraints we separate our estimates into two tables, Table III and Table IV (Click, 2000) (Buiter, 2007).

References


**Further reading**


**Corresponding author**

Hussein Elkamel can be contacted at: husseinaelkamel@gmail.com
## Appendix

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Maximum</th>
<th>Minimum</th>
<th>SD</th>
<th>Observations</th>
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<td><strong>Debt financing</strong></td>
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<td>2397.48</td>
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**Sources:** Data on inflation, on per capita growth, GDP, exchange rate, total reserve of money minus gold, cash surplus/deficit and openness are from the World Development Indicators (World Bank, online); data on total revenue (Tax revenue + Non-tax revenue + grants) are from the Government Finance Statistics (CD-2013); these data are used to compute the seigniorage; GDP per capita: Gross domestic product constant (2000); Unemployment: percentage rate of total labor force; Exchange rate: official exchange rate of domestic currency per US dollar; Seigniorage = change in money reserve as fraction of total revenue; Cash surplus/deficit: Cash surplus or deficit is revenue (including grants) minus expense, minus net acquisition of non-financial assets. For convenience, we multiply this variable by (-1) so positive figures will reflect deficit and negative one will reflect surplus; debt financing is calculated by taking the residuals between budget deficit and seigniorage; TI-CPI: Corruption index, Transparency International Index; ICRG: corruption and other country’s risk indicator, International Country Risk Guide Index

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Table AI.
Summary statistics
### Table AII.
The correlation and corresponding \( t \)-statistics

<table>
<thead>
<tr>
<th></th>
<th>INFLATION</th>
<th>GDP_PER</th>
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<th>UNEMP</th>
<th>LENDING</th>
<th>EXCHANGE</th>
<th>SEIGNIORAGE</th>
<th>D_FINANCING</th>
<th>CPI</th>
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<td>1 [-]</td>
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<td><strong>D_FINANCING</strong></td>
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<tr>
<td><strong>CPI</strong></td>
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<td>0.21 [4.32]</td>
<td>0.2 [4.06]</td>
<td>0.37 [7.88]</td>
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<td>0.11 [2.27]</td>
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</table>
Effects of uses and gratifications on social media use

The Facebook case with multiple mediator analysis

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Department of Management, Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh

Abstract

Purpose – Billions of people around the world are experiencing new ways of interacting with people using the social networking sites (SNS). With the heavy traffic and technological capabilities, SNS offers remarkable gratifications to its users, but there is a lack of knowledge about how gratifications play a role in usage intention and whether there are other factors that influence this relationship. Therefore, this study aims to fulfill these research gaps.

Design/methodology/approach – To explore these issues in depth, this study conceptualizes a comprehensive framework based on the theory of uses and gratification (UGT), habit and the subjective norm. Structural equation model is used to analyze the survey data.

Findings – The results of the study reveal that UGT has a significant direct effect on usage intention. Furthermore, user habit and subjective norm play an important mediating role in the relationship between UGT and usage intention.

Originality/value – The proposed framework would extensively contribute to the SNS literature and managerial insights by integrating personal and social factors in determining the user acceptance of the media.

Keywords Subjective norm, Habit, Usage intention

Paper type Research paper

1. Introduction

Social media such as Facebook, WhatsApp, WeChat, YouTube, Line, Instagram, LinkedIn and Google plus, are changing the way of communication through their innovative features and services. Most of these social networking sites (SNS) offer users the opportunity to present individuals and connect them to existing and new social network users. Facebook is well suited to social interaction and information sharing in the virtual world (Al-Jabri et al., 2015). Facebook users can access, share information, photos, or videos, and upload-download information at any time frequently from online groups and communities to fulfill shared interests. Facebook has a decidedly strong social impact, because of the instant presence in the lives of its users. However, with the rapid explosion of the release of new social apps with a wide variety of functions, Facebook has shown a decline in use because of
privacy issues, especially among teenagers (Cao et al., 2013; Hsiao et al., 2015). Therefore, it is sensible to recognize the factors that affect continuous usage intention of SNS and the factors that intervene in the usage behavior.

In particular, this study examines the usage intention of Facebook users through the judgment of the uses and gratification (UGT) and with some mediation effects in the context. Facebook was the first SNS to surpass 1 billion registered accounts and currently has 2.2 billion active users per month (Statista, 2018). In May 2017, the total number of minutes spent on Facebook every month was 648 million, with an average time spent 18 minutes per visit and 3 million average messages sent in every 20 min (Statistic Brain, 2017).

Few research efforts have invested in studying continuous usage intention of SNS by adopting different theories, such as motivation theory, expectation-confirmation theory, social capital theory and so on. Recently, most SNS studies have incorporated uses and gratification theory (UGT) to measure intention to continue using the SNS (Al-Jabri et al., 2015; Hsiao et al., 2015). Earlier studies have revealed that different gratifications, such as social gratifications, content gratifications, and hedonic gratifications are the driving forces in predicting the behavioral intentions of users. Moreover, previous studies have examined that habit (Limayem et al., 2007; Woisetschläger et al., 2011; Hsiao et al., 2015) and subjective norm (Cheung and Lee, 2010; Choi and Chung, 2013) play a vital role in the formation of usage intention. Indeed, few researchers have discovered separately the effects of UGT, habit and subjective norm on usage intention (Al-Jabri et al., 2015; Gan et al., 2017), but no attention has been paid to habit and subjective norm that these two major variables mediate the usage intention of SNS. Therefore, it would be more relevant to examine the usage intention of SNS under the lens of UGT along with multiple mediation effects.

To fill these research gaps, this study borrows the UGT from the field of media research and integrates the theory of habit and subjective norm into the Facebook context, attempting to examine how the usage intention is measured by UGT with multiple mediating effects. This study, however, advances previous studies and appeals to the following contributions. First, by specifying the systematic classification of Facebook user’s motivation based on UGT. Second, this study sheds new light on the mediating role of user’s habit and subjective norm in the relationship between UGT and usage intention. Third, the important takeaway from the findings is that taking into account these mediating variables provides an alternative understanding of divergent results in previous research works on usage intention of Facebook, potentially important for other SNSs.

Section 2 presents the historical background and the development of hypotheses. Then, Section 3 puts forward the research design, followed by empirical results in Section 4. The paper concludes in Section 5, with extensive discussions, implications and limitations.

2. Historical background and hypotheses
2.1 Antecedents of uses and gratifications theory and usage intention
The UGT refers to the study of the gratifications or benefits that attract and hold users to different media and various contents that fulfill the user’s psychological and social needs (Dunne et al., 2010). The primary objective of UGT is to clarify the causes why people choose a specific type of medium with a view to improving the understanding of social and individual gratifications and also to explain users’ motives when interacting with a media. For example, Cheung et al. (2011) stated that the UGT explains why people use specific media as an alternative communication medium and discovers the needs that motivate the user to use a particular medium. They also noted that users are very much aware of their needs and their behavior is goal-directed.

Researchers have incorporated UGT to measure the motivations behind using the different traditional media like newspaper, telephones, radios, etc. Recently, it has been
widely used to explore new media and communication technologies such as SNS (Al-Jabri et al., 2015; Hsiao et al., 2015), mobile SNS (Gan et al., 2017), online games (Li et al., 2015), virtual communities (Cheung and Lee, 2010). The UGT approach facilitates a homological network for research rather than providing a predefined set of constructs. SNS users often intend to meet certain personal and social needs such as information seeking, social interaction, freedom of expression, enjoyment, social presence and belongingness and social identity (Cheung and Lee, 2010; Cao et al., 2013; Al-Jabri et al., 2015). Cheung et al. (2011) applied UGT to examine the motivations for using Facebook by students and found that social factors had the most significant impact on the intention to use. Dhir and Tsai (2017) also incorporated UGT to understand the intensity of Facebook use and suggested that UGT process plays a significant role in predicting the intensity of Facebook usage.

In addition, researchers considered different gratifications in predicting the behavioral intention of users. For example, Dhir and Tsai (2017) argued that the intensity of Facebook use is motivated by following gratifications: entertainment, exposure, escape, information seeking and social influence. Similar studies by Cheung et al. (2011) conceptualized that we-intention to use online social networks “Facebook” is predicted by UGT paradigm. Another study based on mobile social networks illustrated that user behavior is directed by different types of gratification such as, cognitive gratification, affective gratification, tension-released gratification and social gratification (Gan et al., 2017). In addition, Hsiao et al. (2015) proved, the continued use of mobile social applications is measured by utilitarian motivation, hedonic motivation and social motivation. Based on the studies mentioned above, this study expects a significant positive relationship between UGT and usage intention of Facebook. Hereby, it is hypothesized that:

H1. UGT has significant positive direct effect on usage intention.

2.2 The mediating role of habit

Habit is a learned sequence of actions that have automatic responses to certain cues, and that are functional to obtain specific objectives or end-states (Verplanken and Aarts, 1999). From the definition, the first feature of habit indicates a repetition history. The more frequent the behavior of an individual, the more likely it becomes habitual. To explain the use behavior of information technology, the habit has been included in some continuous intention analyzes, and it is found that those who frequently use information technology devices, their behavior becomes automatic manner (Limayem et al., 2007). Current study considers the user’s habit in the context of social media as the extent to which users tend to automatically use the SNS (Hsiao et al., 2015).

Habit theory supports the relationship between habit and usage intention with the integration of the UGT approach (Hsiao et al., 2015). In the context of information technology, intention and habit have been considered a major antecedent of behavior; however, the relationship among habit, behavior and intention has been quite controversial (Limayem et al., 2007; Woisetschlager et al., 2011; Hsiao et al., 2015). Habit can have both a direct and interactive effect on behavior. While some researchers such as Hsiao et al. (2015) incorporated habit theory into their mobile SNS context and found a significant effect on usage intention. In contrast, some have argued that habit acts as moderating variable in the relationship between intentions and the continued use of WWW (Limayem et al., 2007). They have insisted that habit has relatively less conceptual overlap with intentions that provide additional explanatory power to the use of information technology.

Furthermore, in context of mobile SNS, Gan et al. (2017) has incorporated and found significance impact of the habit to measure usage intention, and habit can be predicted through UGT. Limayem et al. (2007) have argued that satisfaction leads to habit, since it is
assumed that satisfactory experiences will lead to repeating the same activity. In contrast, Shiau and Luo (2013) portrayed that habit has a significant effect on satisfaction. The strong argument is that habit and satisfaction are distinct and parallel, so they do not have a causal relationship (Woisetschlager et al., 2011). In the social media context, when users frequently use Facebook, they may use this service without making conscious decisions and their use becomes repetitive, thus increasing the usage intention. Taking into account the conflicting conclusions of previous studies, this study intends to test the effects of habit as a mediating variable on usage intention, and therefore, the following hypothesis is proposed:

**H2.** Habit has the mediation effect on the relationship between UGT and usage intention.

### 2.3 The mediating role of subjective norm
Subjective norm is caused by the normative beliefs that the individual characteristics of what relevant others expect of a person with respect to continued use of information technology and their motivation is to comply with those beliefs (Karahanna et al., 1999). According to Choi and Chung (2013), subjective norm refers to the degree to which an individual perceives the demands of significant or referent other individuals on him to use social media. Basically, the subjective norm is the perceived social pressure to act on a certain behavior and the motivation to comply with those pressures (Hyde and White, 2009). In addition, the perceived social pressure is significantly correlated with the behavioral intentions of individual (Teo, 2009). This study considers subjective norm as significantly identical to compliance with the use of social media.

In social media research, the reference is appeared to be dominant. Before users have previous usage experience, second-hand information, especially that of the primary reference group (friends and family), is important for using new media. In this context, accepting and using the SNS is inherently related to other people. Choi and Chung (2013) incorporated the subjective norm in their study of the SNS technology acceptance model, and state that the subjective norm establishes a good predictor of usage intention through perceived usefulness and perceived ease of use. Moreover, Cheung and Lee (2010) have portrayed, we-intention to use of online SNS is most significantly affected by the subjective norm. Similar studies by Teo (2009) and Cheung et al. (2011) have incorporated the subjective norm theory to examine the continuous use intention, and found its validation. Managing social networks with others in the virtual world will be considered a universal trend, and the popularity of SNS should generally encourage users to engage in the same activity. However, Karahanna et al. (1999) stated that the subjective norm no longer plays an important role in predicting the use decision for experienced users. In this contradictory context, current study expected that a person who perceives the use of the SNS as normative has a stronger intention to engage in the SNS. This study proposes that usage intention could be comprehensively examined by the mediated effect of subjective norm that will provide an additional understanding of the usage intention of SNS and subjective norm. Hereby, it is hypothesized that:

**H3.** Subjective norm has the mediation effect on the relationship between UGT and usage intention.

### 3. Research design
#### 3.1 Measures
The survey questionnaire was divided into three main parts; first-order constructs for UGT, higher-order constructs for the measurement model, and the demographic
elements. UGT has been measured as a second order construct through first-order constructs; enjoyment, passing time, information seeking, self-presentation, social presence and social interaction. The higher-order constructs for the measurement model comprises four constructs; UGT, user habit, subjective norm and usage intention. Basic demographic elements were included to see the descriptive and demographic distribution of respondents. This study derives the measurements of all constructs from previous studies with some modifications to fit the constructs in the market context. The measurement scales of enjoyment, passing time, information seeking, self-presentation, social presence and social interaction are borrowed from Zhou et al. (2014); Gan (2017), and Ozanne et al. (2017). The measurement of subjective norm, user habit and continuous usage intention of Facebook comes from Al-Jabri et al. (2015); Gan et al. (2017) and Li et al. (2015). Table I shows the detailed view of the measurements objects used in this study. A seven-point Likert scale ranging from strongly disagree (1) to strongly agree (7) with multi-item perceptual scales were used to measure the constructs.

3.2 Data
The empirical data were collected using a structured questionnaire by online survey method. Participants were guided to the online questionnaire by clicking on the questionnaire link provided. The objectives of the study and the instructions were indicated on the first page of the questionnaire, and it was also acknowledged that all the information provided would be kept confidential. Initially, a pilot study was conducted to test the questionnaire whether the instructions and meanings of the questions were simple, clear and beneficial to the subjects. A total of 25 respondents were taken in the pilot study, and changes were made accordingly. All questionnaires were reviewed and incomplete or unlikely responses were removed. The final survey was conducted during the month of January to February 2018 in Bangladesh, and 287 samples were collected using random sampling. After cleaning the data and deleting the invalid responses, 241 valid responses were taken for the final analysis. According to the sample characteristics, 65.97 per cent of respondents are male, 39.83 per cent of them belongs to 23-26 age group. About 84 per cent of respondents spend more than half an hour a day on Facebook, and have over 300 friends on Facebook. Table II presents a detailed view of the demographic profile of respondents.

4. Empirical results
In this study, ten confirmatory factor analysis (CFA) models are developed and examined to investigate the usage intention through UGT along with multiple mediation effects. CFA models are: six first-order measurement models for UGT (enjoyment, passing time, information seeking, self-presentation, social presence, and social interaction), and four higher-order CFA models for measurement model (UGT, user habit, subjective norm, and usage intention).

4.1 First-order measurement model validation for uses and gratification theory
The evaluation of reflective first-order measurement models examines its reliability and validity. To assess the individual item reliability, this study inspects each load of a single item: all items loaded perfectly over 0.60 for the construction to which they belong, thus exceeding the value of suggested thresholds (Fornell and Larcker, 1981). After that, construct reliability is assessed through composite reliability (CR) and Cronbach’s alpha, the critical cutoff value for both measures is 0.70. All reflective
Constructs are reliable (Table III). The average variance extracted (AVE) is assessed to measure the convergent validity of the constructs; shows that their respective value is greater than its critical value 0.50, which represents a good convergent validity (Fornell and Larcker, 1981). Additionally, discriminant validity is examined using the suggestions of Fornell and Larcker (1981), the correlations between items in any two constructs should be less than the square root of the AVE value in a construct. All the square root of AVE exceeds the corresponding correlation, which represents good discriminant validity. Tables III-IV presents the validity and reliability statistics of the first-order measurement model for UGT.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyment</td>
<td>Zhou et al. (2014), Li et al. (2015), Gan (2017; Ozanne et al. (2017)</td>
</tr>
<tr>
<td>Time passing</td>
<td>Facebook is a good place for refreshment</td>
</tr>
<tr>
<td></td>
<td>I feel pleased and relaxed time in Facebook</td>
</tr>
<tr>
<td></td>
<td>Everyone else are use Facebook</td>
</tr>
<tr>
<td>Information seeking</td>
<td>I want to obtain useful information</td>
</tr>
<tr>
<td></td>
<td>I want to obtain helpful information</td>
</tr>
<tr>
<td></td>
<td>I want to obtain new information</td>
</tr>
<tr>
<td>Self-presentation</td>
<td>I want others to think me as “sociable” person</td>
</tr>
<tr>
<td></td>
<td>I want others to think me as “grown-up” person</td>
</tr>
<tr>
<td></td>
<td>I want others to think me as “fashionable” person</td>
</tr>
<tr>
<td>Social presence</td>
<td>I want to give my friends positive support</td>
</tr>
<tr>
<td></td>
<td>I want to give my friends positive reply</td>
</tr>
<tr>
<td>Social interaction</td>
<td>There is a sense of human contact on Facebook</td>
</tr>
<tr>
<td></td>
<td>There is a sense of human sensibility on Facebook</td>
</tr>
<tr>
<td>User habit</td>
<td>I use Facebook as a matter of</td>
</tr>
<tr>
<td></td>
<td>Using Facebook is natural to me</td>
</tr>
<tr>
<td></td>
<td>Using Facebook has become automatic to me</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>habit Other people thinks, “liking” is important to me</td>
</tr>
<tr>
<td></td>
<td>“Liking” is important to my friends and relatives</td>
</tr>
<tr>
<td></td>
<td>I wish I could have good impression if I “like” others post</td>
</tr>
<tr>
<td>Continuous usage intention</td>
<td>I intend to increase my use of Facebook in the future</td>
</tr>
<tr>
<td></td>
<td>I would keep using Facebook as regularly as I do now</td>
</tr>
<tr>
<td></td>
<td>I recommend to use of Facebook among peers and relatives</td>
</tr>
</tbody>
</table>

Source: Previous research

Table I. Measurement items
Table V presents the overall model fit indices for different models used in this study. The results of the model fit indices are examined by the ratio of chi-square to degrees of freedom ($\chi^2$/d.f = 1.832), root mean square error of approximation (RMSEA = 0.059), comparative fit index (CFI = 0.936), adjusted goodness of fit index (AGFI = 0.840), incremental fit index (IFI = 0.937), Tucker-Lewis index (TLI = 0.927), and normalized fit index (NFI = 0.871) indicate a good model fit (Hu and Bentler, 1999; Hair et al., 2010).

4.2 Higher-order measurement model validation

Tables VI-VII demonstrate the summary of the results of higher-order CFA models designed to measure the antecedents of UGT and its correspondence to user habit, subjective norm, and usage intention. All the diagnostic tests indicate that the model is well suited in terms of validity and reliability. The major goodness fit indices are also within their recommended
value (Table V). In addition, this study examines the variance inflation factor (VIF); values range from 1.476-1.910 (Table VII), which are below the threshold of 10 (O’Brien, 2007), even less than the conservative threshold of 2, representing no effect of multicollinearity on the variance of the regression coefficient. Tolerance values are ranges from 0.524-0.678, representing additional strength of the model.

4.3 Structural model validation-mediation effect
Baron and Kenny (1986) noted that full mediation exists if there is an insignificant relationship between dependent and independent variables, and significant relationship exists in the indirect path through mediator. Partial mediation takes place; when a significant relationship exists between a dependent and an independent variable, and also has a significant relation in the indirect path through mediator. Bootstrapping produces an empirical representation of the sample distribution of the indirect effect by considering the

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enjoyment</td>
<td>5.00</td>
<td>1.22</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Passing time</td>
<td>4.76</td>
<td>1.26</td>
<td>0.74</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Information seeking</td>
<td>5.90</td>
<td>1.09</td>
<td>0.40</td>
<td>0.51</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Self-presentation</td>
<td>4.70</td>
<td>1.45</td>
<td>0.45</td>
<td>0.49</td>
<td>0.38</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Social presence</td>
<td>5.63</td>
<td>1.24</td>
<td>0.43</td>
<td>0.38</td>
<td>0.50</td>
<td>0.44</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>6. Social interaction</td>
<td>5.40</td>
<td>1.17</td>
<td>0.64</td>
<td>0.70</td>
<td>0.60</td>
<td>0.59</td>
<td>0.51</td>
<td>0.76</td>
</tr>
</tbody>
</table>

**Note:** Italic diagonal numbers are the square roots of AVE

**Source:** Amos output

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$/d.f.</th>
<th>RMSEA (&lt;0.08)</th>
<th>CFI (&gt;0.90)</th>
<th>GFI (&gt;0.90)</th>
<th>AGFI (&gt;0.80)</th>
<th>IFI (&gt;0.90)</th>
<th>TLI (&gt;0.90)</th>
<th>NFI (&gt;0.90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-order model</td>
<td>2.024</td>
<td>0.065</td>
<td>0.958</td>
<td>0.925</td>
<td>0.879</td>
<td>0.959</td>
<td>0.941</td>
<td>0.921</td>
</tr>
<tr>
<td>Higher-order model</td>
<td>1.832</td>
<td>0.059</td>
<td>0.936</td>
<td>0.872</td>
<td>0.840</td>
<td>0.937</td>
<td>0.927</td>
<td>0.871</td>
</tr>
<tr>
<td>Total effect model [Figure 1(a)]</td>
<td>1.923</td>
<td>0.063</td>
<td>0.948</td>
<td>0.904</td>
<td>0.872</td>
<td>0.949</td>
<td>0.938</td>
<td>0.899</td>
</tr>
<tr>
<td>Mediation effect model [Figure 1(b)]</td>
<td>1.834</td>
<td>0.059</td>
<td>0.936</td>
<td>0.872</td>
<td>0.841</td>
<td>0.937</td>
<td>0.927</td>
<td>0.870</td>
</tr>
</tbody>
</table>

**Source:** Amos output

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Standardized factor loadings</th>
<th>Average variance extracted (AVE)</th>
<th>Composite reliability (CR)</th>
<th>Cronbach’s alpha (α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses and gratification</td>
<td>6</td>
<td>0.599-0.907</td>
<td>0.54</td>
<td>0.89</td>
<td>0.82</td>
</tr>
<tr>
<td>User habit</td>
<td>3</td>
<td>0.730-0.829</td>
<td>0.63</td>
<td>0.83</td>
<td>0.83</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>3</td>
<td>0.664-0.857</td>
<td>0.59</td>
<td>0.81</td>
<td>0.80</td>
</tr>
<tr>
<td>Usage intention</td>
<td>3</td>
<td>0.799-0.826</td>
<td>0.66</td>
<td>0.85</td>
<td>0.85</td>
</tr>
</tbody>
</table>

**Source:** Amos output

Multiple mediator analysis
original data set as a representation of the population, and the bootstrap function performs the construction of the dataset and data analysis several times (Hayes, 2009). AMOS-24 was used to bootstrapping with 241 samples and the process was repeated 5000 times. The bootstrap results of the 95 per cent confidence interval are shown in Table VIII. The structural model [Figure 1(a) and (b)] demonstrates that all direct paths are significant. The majority of the goodness of fit test indices for the total effect model and the multiple mediation effect models show a good model fit (Table V).

Figure 1(a) and Table VIII show that UGT has a significant total effect ($C = 0.788, p < 0.001$) on usage intention. When the mediators are added in the model [Figure 1(b)], UGT reduces its impact on usage intention, but maintains its significant direct effect ($c' = 0.420, p < 0.05$) on usage intention. Therefore, in line with our expectations, UGT has a significant positive effect on usage intention of Facebook ($H1$). Furthermore, the results of study reveal that the two indirect effects of UGT on usage intention are statistically significant. Table IV indicates that both the user habit ($a_1b_1$) and the subjective norm ($a_2b_2$) partially mediate the relationship between UGT and usage intention of Facebook, which supports $H2$ and $H3$, respectively.

5. Discussions and conclusions

The increased popularity of SNS services in the virtual world encourages users to have greater degree of gratifications, in return SNS developers want to have a higher level of

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>SD</th>
<th>Uses and gratification</th>
<th>User habit</th>
<th>Subjective norm</th>
<th>Usage intention</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses and gratification</td>
<td>5.23</td>
<td>0.89</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td>0.524</td>
<td>1.910</td>
</tr>
<tr>
<td>User habit</td>
<td>5.57</td>
<td>1.26</td>
<td>0.73</td>
<td>0.80</td>
<td></td>
<td></td>
<td>0.602</td>
<td>1.661</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>4.56</td>
<td>1.52</td>
<td>0.62</td>
<td>0.57</td>
<td>0.77</td>
<td></td>
<td>0.678</td>
<td>1.476</td>
</tr>
<tr>
<td>Usage intention</td>
<td>4.78</td>
<td>1.37</td>
<td>0.72</td>
<td>0.71</td>
<td>0.67</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Italic diagonal numbers are the square roots of AVE

Source: Amos output

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Coefficient</th>
<th>Point estimate</th>
<th>Percentile bootstrap 95% confidence interval Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C = 0.788$</td>
<td>$H1 = c' = 0.420$</td>
<td>$0.367^{**}$</td>
<td>$0.166$</td>
<td>$0.589$</td>
</tr>
<tr>
<td></td>
<td>$H2 = a_1b_1$ (via habit)</td>
<td>$0.180^{**}$</td>
<td>$0.026$</td>
<td>$0.346$</td>
</tr>
<tr>
<td></td>
<td>$H3 = a_2b_2$ (via subjective norm)</td>
<td>$0.164^{**}$</td>
<td>$0.059$</td>
<td>$0.299$</td>
</tr>
</tbody>
</table>

Notes: *5000 bootstrap samples; ***$p < 0.001$; **$p < 0.05$

Source: Amos output
usage by their users. The intention of use should not merely equate to obliging SNS user to stay with the existing service provider rather because of a greater level of gratifications, and the influence of user habit and subjective norm in the context. The purpose of this study was to validate of the UGT and its influence on usage intention through the mediating effect of the habit and subjective norm. The approach presented here is to commit to validate the UGT as a multidimensional constructs, and set as a main antecedents of usage intention, while user habit and subjective norm play mediating role between UGT and usage intention. The results of the study reveal that UGT has a significant total effect on UGT, and user habit and subjective norm partially mediate this relationship.

Therefore, it can be stated that Facebook users fundamentally seek various gratifications to fulfill their needs and wants. The results of the total effect model [Figure 1(a)] presents that the greater the UGT, the greater the usage intention, which is consistent with previous

Notes: (a) Total effect model and (b) multiple mediation effect models; ***p < 0.001, **p < 0.01; H1: uses and gratification → usage intention = c'; H2: uses and gratification → user habit → usage intention = a_1b_1; H3: uses and gratification → subjective norm → usage intention = a_2b_2

Figure 1. Structural model: multiple mediation models
studies (Cheung et al., 2011; Dhir and Tsai, 2017; Gan et al., 2017, among others). Total effect model explain 61 per cent of the variance in usage intention, however, the direct of effect of UGT drops in the mediation model [Figure 1(b)], the model accounts for 69 per cent of the variance in usage intention. These reveal that UGT is tremendously important in designing the user’s intention in the SNS context. In particular, social interaction, passing time, enjoyment, self-presentation, information seeking and social presence dimensions are sequentially prioritized to form the UGT in this study.

In addition, this study shows that the user habit is an important factor that influences the usage intention, and largely mediates the relationship between UGT and usage intention. The significant relationship between habit and usage intention is consistent with Hsiao et al. (2015) and Gan et al. (2017). Figure 1(b) shows that UGT has a significant positive effect on user habit ($a_1 = 0.76, p < 0.001$), and the habit also has a positive impact on the usage intention ($b_1 = 0.27, p < 0.05$). These reveal that gratifications lead to habit that likely to repeat the usage intention, same activity or long-run relationship. If users experience habitual behavior when using SNS, they will likely use this service more frequently and with greater satisfaction, resulting in continued use. In this regard, pre-use, cognitive or social issues could have significant influences to shape habitual behavior.

Similarly, in accordance with our expectations and earlier studies (Teo, 2009; Choi and Chung, 2013), the subjective norm is considered an important determinant of usage intention. The results show that the UGT has a significant positive influence on the subjective norm ($a_2 = 0.65, p < 0.001$), and that subjective norm has a significant positive effect on usage intention ($b_2 = 0.26, p < 0.001$). Subjective norm is particularly important in determining the user behavior towards the usage intention, which implies that a particular social pressure plays a critical role in Facebook use. The social media user accepting and using SNS is inherently related to the other people. In other words, social media users are strongly influenced by one or more important references, specifically from the primary reference group such as friends and family.

In summary, UGT has significant direct effect on usage intention of Facebook, and user habit and subjective norm are significant mediators in the relationship between UGT and usage intention. User habit and subjective norm in regard to the mediators, represent the good predictors of usage intention in this study, accounting for 61 and 43 per cent of the variance explained, respectively.

Regarding the managerial implications, the results of the study demonstrate that SNS developers, managers or practitioners should focus on the major dimensions of UGT, to maximize user loyalty, minimize irritations or attaining long-run usage intention. To build habitual behavior, service providers should investigate user requirements to spend time on SNS media such as interesting or funny posts, prior use patterns or various social issues. In addition, SNS media managers need to highlight the reference group, especially the members closest to the user, to broaden their user base.

While this study provides a comprehensive understanding of the UGT, habit, subjective norm and usage intention in the context of Facebook, one must be aware of certain limitations in the interpretation of the results. First, to keep the parsimonious model, the proposed study focuses on the four important variables by self-assessment, which could lead to evidence of bias. Second, this study examines the user habit as one dimension. Although the model shows a higher explanatory power, it could still be better to measure the user habit through past behavior. Third, the study considers only one country (Bangladesh) and one SNS (Facebook). It is therefore advisable to be cautious in generalizing the results to other settings. Current study triggers additional theoretical and empirical investigations to achieve better results through an appropriate longitudinal approach.
References


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Abstract

Purpose – This paper aims to provide empirical evidence on the extent of alteration institutional characteristics, i.e. legal origin and corruption levels, may have on the signaling effects of auditors’ reputation, underwriters’ reputation and ownership retention on initial public offering (IPO) initial returns in OECD countries.

Design/methodology/approach – Cross-sectional data composed of 6,182 IPOs from 30 OECD countries are used for 2003-2012. Ordinary least square with multiple linear regressions is used to test the hypotheses.

Findings – The findings indicate that the legal framework and corruption level of a country alters the signaling effects of underwriters’ reputation, auditors’ reputation and ownership retention in an IPO environment. These three variables mitigate information asymmetry, signal firm value to potential investors and ultimately decrease IPO initial returns. This relationship is more significant in the civil law countries. Corruption levels negatively moderate the relationship in the common law and Scandinavian civil law countries but have no significance in the German and French civil law countries, indicating the importance of the signaling variables in these two civil law countries.

Originality/value – This study examines the extent of the alterations that the legal framework and the corruption levels cause to the signaling relationship between auditors’ reputation, underwriters’ reputation and ownership retention on IPO initial returns in selected OECD countries.

Keywords – IPO, Legal origin, Auditors’ reputation, Corruption level, Ownership retention, Underwriters’ reputation

Paper type Research paper

Introduction

The variations in the environment of initial public offerings (IPOs) principally originate from the differences between an IPO’s offer price and its first-day closing price (Ibbotson et al., 1988; Ritter, 1998), which is known as initial return[1]. IPOs have long been a subject of debate and substantial interest among researchers because of the internal (firm-specific) and external uncertainties surrounding the IPO environment. Uncertainty has been documented as being at the heart of an IPO process (Ljungqvist, 2007), which contributes significantly to
the volatility in IPO initial returns across the globe. This study revisits the uncertainty issue in a global context using three signaling variables (auditors’ reputation, underwriters’ reputation, and ownership retention). The main motivation of this study is the exploration of the IPO uncertainty issue from the perspectives of institutional characteristics (legal origin and corruption levels).

Most of the extant literature in this area merely explains the possible reasons and underlying theories for the relationships between the abovementioned signaling variables and IPO initial returns; none has incorporated the alterations that institutional characteristics may create in these relationships. The novel contribution of this study is to fill this gap in the literature and offer important insights to firm owners, fund managers, and investors. Revisiting the issue within the context of institutional characteristics is particularly timely because global capital markets have become more integrated. Firm owners are seeking for opportunities to raise capital in multiple capital markets, while international investors and fund managers, by contrast, are penetrating markets to carefully select financial products that can maximize returns. It is thus predicted that the quality of the legal framework and the corruption levels of a country have an impact on the extent to which the auditors’ reputation, underwriters’ reputation, and ownership retention can signal firm quality.

Our study is motivated by Engelen and Van Essen (2010), Banerjee et al. (2011) and Hopp and Dreher (2013), who examined IPO underpricing in an international setting. They explored the direct relationship between country-level information asymmetry, effective contract enforcement (a reflection of the legal framework), investors’ protection/increased protection to shareholders, and transparency levels (from the perspectives of accounting disclosures) on IPO initial returns. The present study is distinguished in the following respects. First, it examines the strength in the relationship between the signaling variables, i.e. underwriters, auditors and ownership retention and IPO initial returns in the context of common law and civil law countries. Aforementioned studies examined the direct relationships between legal and institutional characteristics on IPO underpricing. Second, this study examines the moderation effects of a country’s corruption level (proxied by the Corruption Perception Index [CPI]) on the relationship between the signaling variables and IPO initial returns in both common law and civil law countries. The study relies on the “perceived level of public sector corruption,” and it is conjectured that corruption levels may alter the roles of the signaling variables on IPO initial returns because of the “invisible hand” interfering in the normal course of business. Here again, the moderation effect of corruption on the relationship between the signaling variables and IPO initial returns is expected to vary between the common and civil law countries. Studies by Engelen and Van Essen (2010), Banerjee et al. (2011) and Hopp and Dreher (2013) justifies the direct relationship between the institutional variables and IPO underpricing. Nevertheless, the current study contributes to the extant literature in a more nuanced manner, i.e. examining the strength of the relationship between the signaling variables and IPO initial returns within different institutional context. Consequently, this study is keen to examine the roles played by underwriters, auditors and IPO firm owners in different institutional context, which could ultimately benefit IPO firms, investors and regulators.

Ibbotson (1975), Ibbotson and Jaffe (1975), Ritter (1984) and Beatty and Ritter (1986) were pioneers in IPO research who predominantly examined the presence of and the contributing factors to IPO underpricing. Leland and Pyle (1977), Kahneman and Tversky (1979), Rock (1986), Tinic (1988) and Welch (1989) have also significantly contributed to the emergence of the underlying theories of IPO underpricing. Over the last decade, a considerable body of literature has documented the relationship between institutional factors, such as legal
origins, investors’ protection, corporate governance, corruption levels, political connections, and rules and regulations, and the impact on IPO initial returns. La Porta et al. (1998, 1999, 2002, 2007) are the authority in the area of law and finance. They highlighted the importance of the legal framework as the key mechanism to understand the patterns of corporate finance. This study will further consolidate the extant literature within the boundaries of institutional arrangements, as raising capital is increasingly borderless and institutional characteristics have become a crucial factor for all stakeholders in their respective decision-making.

In line with that, this study reports several important findings. As suggested by the signaling hypothesis and the information asymmetry model, the signaling variables represented by underwriters’ reputation, auditors’ reputation, and ownership retention do have an impact on IPO initial returns in both the common law and civil law countries. However, the strength of the relationship is stronger in the civil law countries, indicating that the signaling variables have a more powerful effect in the civil law countries because of the legal structure. Our empirical evidence also suggests that the corruption levels of a country negatively moderate the above relationship in the common law and Scandinavian civil law countries but have no significance in the German and French civil law countries, except for underwriters’ reputation. This could be a reflection of low corruption, low government intervention, and a higher level of enforcement of rules and regulations by regulators in common law and Scandinavian civil law countries, which ultimately reduces the importance of the signaling variables when corruption is low.

The above findings contribute to the existing IPO literature, and the outcomes present several practical implications. As has been widely documented, reputable underwriters/auditors and high ownership retention reduce IPO initial returns, which is a reflection of low information asymmetry and ex ante uncertainty, contributing to low pricing error. Minimizing pricing error also means that issuers are “leaving less money on the table” from floatation. This may assist issuers in their listing decision, especially in civil law countries because reputable underwriters/auditors and high ownership retention could assist issuers to lower their cost of capital. Issuers in both the common law and civil law countries may capitalize on the reputation capital of the underwriters and auditors and their affiliation with reputable analysts when deciding to float their company. These signaling variables tend to rapidly increase investors’ confidence and IPO investment decisions and to certain extent, ensure the success of the entire IPO endeavor. As legal origin plays a dominant role in the relationships between the signaling variables and the IPO initial returns, investors can independently diversify their IPO portfolio (according to their risk preference) by investing in foreign stock exchanges. Different legal origins have differing levels of legal protection and degree of institutional execution, and this affects the performance of IPOs. In terms of regulation, priority should be given to reforming the country-level legal and institutional framework and its enforcement. Government and regulators should also intensify their efforts to combat corruption, as this can be detrimental to the long-term sustainability of a country’s economic and social environment. Low corruption levels coupled with a more structured legal framework reduces perceived risks associated with financial markets, thus creating a deeper financial market for investors and international companies wanting to float their IPOs. All these factors put together will ultimately boost the capital market and the sustainability of an economy.

The rest of the paper is structured as follows. Section 2 discusses the hypothesis development. Section 3 presents the data, methodology and discussion of the variables. Section 4 presents the empirical results and discussion, and Section 5 concludes.
Hypothesis development

Background

The Organization for Economic Cooperation and Development (OECD) was officially established on September 30, 1961. In all, 35 member countries span the globe (there were only 34 members during the period of this study), extending from North and South America to Europe and the Asia-Pacific. Brazil, India, the People’s Republic of China, Indonesia, and South Africa are the key partners of the Organization; these countries account for 80 per cent of world trade and investment, rendering OECD a good database to study.

The OECD countries examined in this study include common law (Australia, Canada, Ireland, New Zealand, Israel, the UK and the USA) and civil law (Austria, Belgium, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Italy, Japan, Mexico, Norway, The Netherlands, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, and Turkey) countries. Four countries (Hungary, Slovakia, Slovenia, and Luxembourg) are dropped from the analysis because of the unavailability of data. Table I gives a brief summary of the number of IPOs, initial returns and the CPIs for the respective countries.

A total of 6,182 IPO companies were used in the analysis, with 57 per cent being from the common law countries and 43 per cent being from the non-common law countries. The highest number of IPOs for the study period (2003-2012) is derived from the USA, constituting 22.8 per cent of the total companies studied. As for the initial returns, underpricing varies dramatically across countries; it ranges from a positive 61.34 per cent in Japan to a negative 89.77 in Israel. In the common law countries, the USA, U.K, Australia and Canada had the highest number of IPOs during the period of study. The mean initial returns were relatively stable amongst the common law countries, with the exception of Israel (−89.77 per cent). As for the Civil Law countries, Japan and South Korea had a relatively high number of IPOs. The mean initial returns were quite varied, ranging from a positive initial return of 61.34 per cent in Japan to a negative return of 30.89 per cent in Turkey.

The corruption levels of a given country fluctuate in the range of one point over the study period, with the exception of the USA, Poland, and Turkey, where the fluctuation is relatively higher. The corruption levels are lower among common law countries relative to civil law countries, ranging from 5.9-6.1 (Israel) to 9.4-9.6 (New Zealand). Within the civil law countries, the Scandinavian civil law countries (Finland, Denmark, Sweden and Norway) have low corruption levels, ranging from 8.6-9.6 (Norway) to 9.4-9.7 (Finland). Broadly, within the German civil law countries, Poland, Turkey, Czech Republic, Greece, South Korea, Estonia, Italy, and Portugal, have relatively higher corruption levels, while Iceland, Switzerland, Austria, Belgium, Germany, Chile and Japan have lower corruption levels. Corruption levels are also low in the French Civil Law countries, with the exception of Mexico. These statistics warrant a detailed analysis on the extent of the influence that the corruption level of a country may have on the relationship between the signaling variables used in this study and IPO initial returns.

The following section briefly revisits the literature pertaining to the relevant signaling variables and IPO initial returns.

Underwriters’ reputation and initial public offerings’ initial returns

Underwriters’ reputation has an impact on IPO initial returns because of underwriters’ active involvement in rendering fundamental services in the IPO process, such as legal, administration, certification, market building, and pricing services. Prestigious underwriters offer a wealth of experience in taking companies public and have a reputation for
Effectiveness. These factors serve as a positive signal to potential investors about the future prospects and value of a company.

A substantial body of relevant research found a negative relationship between underwriters’ reputation and IPO initial returns (Beatty and Ritter, 1986; Carter and Manaster, 1990; Carter et al., 1998; Johnson and Miller, 1988; Aggarwal and Conroy, 2000; Kirkulak and Davis, 2005). However, Beatty and Welch (1996) reported a positive relationship between underwriters’ reputation and IPO initial returns, and they suggested that the behavior and preference of underwriters have changed in the 1990s and thereafter.

Table I.
IPOs (by legal origin), mean initial returns and CPI of selected OECD countries for the period 2003-2012

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of IPOs</th>
<th>Initial returns</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Law</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>32</td>
<td>12.60</td>
<td>9.4-9.6</td>
</tr>
<tr>
<td>Australia</td>
<td>915</td>
<td>15.06</td>
<td>8.5-8.7</td>
</tr>
<tr>
<td>Canada</td>
<td>320</td>
<td>16.42</td>
<td>8.4-8.9</td>
</tr>
<tr>
<td>UK</td>
<td>800</td>
<td>12.62</td>
<td>7.6-8.7</td>
</tr>
<tr>
<td>Ireland</td>
<td>25</td>
<td>35.94</td>
<td>7.4-7.5</td>
</tr>
<tr>
<td>USA</td>
<td>1410</td>
<td>8.46</td>
<td>7.1-8.7</td>
</tr>
<tr>
<td>Israel</td>
<td>44</td>
<td>89.77</td>
<td>5.9-6.1</td>
</tr>
<tr>
<td><strong>German Civil Law</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iceland</td>
<td>16</td>
<td>16.47</td>
<td>9.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>46</td>
<td>25.6</td>
<td>8.7-9.1</td>
</tr>
<tr>
<td>Austria</td>
<td>28</td>
<td>4.99</td>
<td>7.8-8.7</td>
</tr>
<tr>
<td>Belgium</td>
<td>64</td>
<td>12.2</td>
<td>7.5-7.7</td>
</tr>
<tr>
<td>Germany</td>
<td>188</td>
<td>11.17</td>
<td>7.3-8.2</td>
</tr>
<tr>
<td>Chile</td>
<td>28</td>
<td>5.80</td>
<td>7.3-8</td>
</tr>
<tr>
<td>Japan</td>
<td>676</td>
<td>61.34</td>
<td>6.9-7.8</td>
</tr>
<tr>
<td>Estonia</td>
<td>12</td>
<td>5.01</td>
<td>6.4-6.7</td>
</tr>
<tr>
<td>Portugal</td>
<td>7</td>
<td>7.26</td>
<td>5.8-6.6</td>
</tr>
<tr>
<td>Italy</td>
<td>104</td>
<td>17.99</td>
<td>4.8-5.3</td>
</tr>
<tr>
<td>South Korea</td>
<td>560</td>
<td>14.25</td>
<td>4.3-5.6</td>
</tr>
<tr>
<td>Greece</td>
<td>52</td>
<td>8.03</td>
<td>4.2-4.7</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>5</td>
<td>9.37</td>
<td>4.2-4.6</td>
</tr>
<tr>
<td>Turkey</td>
<td>52</td>
<td>30.89</td>
<td>3.1-4.6</td>
</tr>
<tr>
<td>Poland</td>
<td>186</td>
<td>5.18</td>
<td>3.4-5.3</td>
</tr>
<tr>
<td><strong>Scandinavian Civil Law</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>18</td>
<td>5.16</td>
<td>9.4-9.7</td>
</tr>
<tr>
<td>Denmark</td>
<td>20</td>
<td>0.16</td>
<td>9.3-9.4</td>
</tr>
<tr>
<td>Sweden</td>
<td>44</td>
<td>16</td>
<td>9.2-9.3</td>
</tr>
<tr>
<td>Norway</td>
<td>146</td>
<td>14.16</td>
<td>8.6-9.6</td>
</tr>
<tr>
<td><strong>French Civil Law</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherland</td>
<td>72</td>
<td>8.56</td>
<td>8.2-8.4</td>
</tr>
<tr>
<td>Spain</td>
<td>39</td>
<td>5.70</td>
<td>6.1-7.1</td>
</tr>
<tr>
<td>France</td>
<td>238</td>
<td>11.48</td>
<td>6.8-7.5</td>
</tr>
<tr>
<td>Mexico</td>
<td>35</td>
<td>6.35</td>
<td>3.3-3.6</td>
</tr>
</tbody>
</table>

Notes: Corruption Perceptions Index (CPI) shows the annual ranking of countries “by their perceived levels of corruption. The Corruption Perceptions Index aggregates data from a number of different sources that provide perceptions of business people and country experts of the level of corruption in the public sector. The CPI generally defines corruption as ‘the misuse of public power for private benefit’. The CPI is scaled ‘on a scale from 10 (very clean) to 0 (highly corrupt)’. Data Source for CPI: Transparency International (www.transparency.org/)
because of economic conditions, structural changes in the USA market after the tech boom, emphasis on analyst coverage, etc. Cooney et al. (2001) and Bates and Dunbar (2002) supported this phenomenon. Influential underwriters tend to inspire greater coverage from analysts for an IPO, which has significantly contributed to demand for IPOs and initial returns (Beatty and Welch, 1996; Loughran and Ritter, 2002; Liu and Ritter, 2011).

Underwriters are critical within the IPO environment. Although initial studies found a negative relationship between underwriters’ reputation and IPO initial returns, trends have changed since the 1990s. Reputable underwriters still represent firm quality, but investors now view this as an opportunity to increase their demand for these IPOs on the first day, thus forcing prices to move upward and contributing to higher initial returns. Regardless of the positive or negative relationship, it is established that underwriters’ reputation signals to the potential investors about firm value.

Auditors’ reputation and initial public offerings’ initial returns
When companies go public, they nominate external auditors to undertake a due diligence audit and publish the reports for potential investors to decide about the prospects of these companies. These audited reports partially resolve the information asymmetry between issuers and the investors. Consistent with the premise that high-quality auditors will reduce uncertainty surrounding the IPOs and bridge the asymmetric information gap, the literature documents a negative association between auditors’ reputation and initial returns. Research by Titman and Trueman (1986) represents one of the major breakthroughs in this context. These authors found that the quality of the auditors has a direct relationship with the quality of the entrepreneur’s private information. Therefore, low-risk firms are associated with reputable auditors, which sends a positive signal on the quality of information provided in the prospectus, reducing the uncertainty between the issuers and the potential investors.

Datar et al. (1991), consistent with Hughes (1986), did not fully concur with the results by Titman and Trueman (1986). Datar et al. (1991) posit that the entrepreneur’s retained ownership could resolve the remaining uncertainty in the IPO environment. They documented that reporting characteristics (disclosure and auditor choice) provided no additional information about a firm’s future market value and viewed the auditing as an attestation. Engaging a high-quality auditor only reduces the likelihood of material misrepresentation in the information provided by the entrepreneurs in the prospectus.

However, evidence provided by Simunic and Stein (1987), Beatty (1989) and Michaely and Shaw (1995) was in line with the results from Titman and Trueman. Similarly, Albring et al. (2007) conjectured that the choice of audit firms is important because the auditors’ reputation may influence IPO pricing. Wang and Wilkins (2007), whose empirical evidence showed that IPOs audited by the Big 6 (at the time) firms experienced significantly less underpricing than IPOs audited by other firms, further supported this. At the empirical level, much of the USA-based research produced results that were in agreement with the predictions of Titman and Trueman (1986) than Datar et al. (1991) Simunic and Stein (1987), Beatty (1989) and Feltham et al. (1991).

Ownership retention and initial public offerings’ initial returns
The final signaling variable in our analysis is ownership retention, which refers to the amount of shares retained by the original owners of the IPOs. Leland and Pyle (1977) analyzed the asymmetric information between issuers and investors and conjectured that entrepreneurs can increase the market value of their firms by retaining a higher fraction of ownership. Since owners of high-performing firms will retain more equity than those of
poorly performing firms, ownership retention offers valuable insights to prospective investors about the true quality of a firm. High ownership retention is theorized to be a signal to investors of the company’s credibility and future prospects. Retained equity signals greater confidence by the issuers in the firm’s future prospects and may help to mitigate the information asymmetry between the issuers and the potential investors. This signal prompts investors to increase demand for the shares on the first day of trading, causing the price to move upward. Similar results were documented by Downes and Heinkel (1986), Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989). Firth and Liau-Tan (1997), Howton et al. (2001), Bradley and Jordan (2002), Ritter and Welch (2002) and Roosenboom and van der Goot (2005) also presented similar findings.

However, the bivariate signaling model by Hughes (1986) contradicts the above findings and indicates a substitution effect that reflects a tradeoff between the two signals (ownership retention and underpricing), depending on the relative marginal costs and benefits. According to Hughes (1986), the greater the fractional insider ownership, the lower the information asymmetry and need to underprice a new issue. The extent of substitutability depends on the relative marginal costs and benefits of the two IPO signals.

Country of legal origin
This study examines the relationship between the signaling variables and IPO initial returns from an international perspective, taking into consideration the legal origins of the 30 OECD countries. We highlight a few landmark papers by LLSV here by way of a brief background on the origins and practices of legal systems. They emphasized that there are two main secular legal traditions: common law and civil law. According to legal origins theory, civil law countries tend to emphasize social stability, while common law countries focus on the rights of an individual. The main point of the theory is that common law, as opposed to French civil law and to a lesser degree German and Scandinavian civil law, is associated with a greater orientation toward market institutions rather than state interventionism, such that common law countries tend to be economically more developed. Common law countries have the strongest protection for outside investors (both shareholders and creditors), whereas French civil law countries have the weakest protection. The German and Scandinavian civil law countries fall in between, although they have comparatively stronger protection for creditors, especially secured creditors.

LLSV (1997, 1998, 2000, 2007) argued that legal rules that protect investors from expropriation by insiders also shape small investors’ willingness to participate in equity markets. They showed that countries with weak legal institutions have narrow capital markets and concentrated inside ownership (i.e. less float) because of low participation by outside investors. In addition, investors’ participation depends not only on the laws in place but also on the confidence that these laws are enforced fairly. Banerjee et al. (2011) studied the impacts of country-level information asymmetry, investors’ home-country bias, effectiveness of contract enforcement mechanisms, and accessibility of legal recourse on IPO underpricing in 36 countries. They documented a significantly positive relationship between country-level information asymmetry and IPO underpricing, while effective contract enforcement and accessibility of legal recourse contributed to a lower level of IPO underpricing. Similarly, Mahoney (2001) analyzed the relationship between IPO underpricing and a country’s legal framework and conjectured that the quality of legal protection offered by a country affects an IPO’s underpricing in two ways: a weak legal system can increase ex ante uncertainty about firm value over firm-level risk factors and also increase ex ante uncertainty of the distribution of (realized) firm value among different corporate constituents. In countries with better legal protections, managers or controlling
shareholders have fewer opportunities to transfer profits or assets out of the firm at the expense of minority shareholders. The authors contended that protection against such expropriation also reduces *ex ante* uncertainty about the returns on investment in IPOs. Engelen and Van Essen (2010) found that country-specific characteristics explain about 10 per cent of the variation in the level of underpricing and consequently face a higher cost of capital. The study examined the relationship between a country’s legal framework and the level of IPO underpricing, using a large firm-level dataset of 2,920 IPOs covering a wide range of 21 countries having different institutional and legal frameworks. They inferred that the quality of a country’s legal framework (as measured by its level of investor protection), the overall quality of its legal system, and its level of legal enforcement significantly reduces underpricing. As for countries with weaker legal protection, investors are more uncertain about realizing the required rate of return on their investment.

By contrast, Hopp and Dreher (2013), using panel data for 24 countries over the period 1988-2005, conjectured that underpricing is greater in countries with stronger protection for outside investors. Their justification was that current managers attempt to use underpricing as a tool to protect their private benefits of control when going public. Since underpricing predominantly attracts more investors, it will dilute both ownership and control of any possible substantial shareholders. However, similar to the studies by Banerjee *et al.* (2011), Hopp and Dreher (2013) contended that stronger law enforcement and the availability of accounting information reduces the value of private benefits of control and the eventual underpricing of IPO initial returns.

The current study addresses the impact of signaling variables (underwriters’ reputation, auditors’ reputation, and ownership retention) on IPO initial returns in a cross-country setting with two distinct legal origins. Thus, the above relationship is tested under both the legal origins; common law and civil law and a further test is undertaken to analyze the impact in the German, Scandinavian and French civil law countries. In the context of this study, it is conjectured that the strength of the relationship between the signaling variables and IPO initial returns to be stronger in the civil law countries. As stated by La Porta *et al.* (1997, 1998), common law countries exhibit a higher degree of investor protection and have more developed financial markets. This obviates managers or controlling shareholders to transfer profits or assets out of the firm at the expense of minority shareholders, consequently reducing the *ex ante* uncertainty about the return on investment in IPOs (Shleifer and Vishny, 1997). On the other hand, Civil law countries have weaker legal structures, barely protect investors from expropriation by insiders, and display increased opportunities to transfer profits or assets out of the firm at the expense of minority shareholders. The credibility of the financial disclosures by reputable auditors acts as certification, coupled with the reputation capital of reputable underwriters minimize uncertainty and information asymmetry surrounding the IPO environment. Thus, in such a legal environment, the presence of reputable underwriters/auditors and high ownership retention is expected to reduce the information asymmetry, *ex ante* uncertainty and increase investors’ confidence in IPO firm quality. It is thus hypothesized that civil law countries are likely to have a stronger relationship between the signaling variables and IPO initial returns compared to common law countries. The following hypotheses are tested:

**H1.** The signaling relationship between underwriters’ reputation and IPO initial returns is stronger in civil law countries compared to common law countries.
The signaling relationship between auditors’ reputation and IPO initial returns is stronger in civil law countries compared to common law countries.

The signaling relationship between ownership retention and IPO initial returns is stronger in civil law countries compared to common law countries.

**Corruption levels of a country**

With global investors, a country’s transparency vis-à-vis corruption has become a necessity. Governments around the world consistently invest significant money, time and effort in mitigating pressing issues of financial market stability, unemployment, and economic growth. However, corruption and greed remain a major obstacle to achieving the desired economic stability and growth. Countries with high transparency levels are associated with low corruption, and this contributes to lower information asymmetry and ex ante uncertainty. As suggested by Sundarasen et al. (2017), legal origins are relatively stable institutional aspects of a country and have some bearing on the risk perception of IPO investors. Nevertheless, the corruption level is a more nuanced view within each country’s context. This study examines whether a country’s corruption levels moderate or alter the relationship between the signaling variables and IPO initial returns in OECD countries.

It is proposed that the corruption level of a given country will negatively moderate the relationship between the signaling variables and IPO initial returns, primarily because low corruption levels will minimize information asymmetry, so investors will not be overly reliant on the signaling variables as a signal of firm quality. Lower corruption levels create better governance structure, advanced investors’ protection mechanisms, and effective enforcement of rules and regulations, and this further mitigates the information asymmetry and uncertainty in an IPO environment. It will also increase investors’ confidence about the future performance of companies. Because of the element of trust in the country’s institutions from the supply side, the IPO issuer can potentially price the IPO closer to the intrinsic value of the security and so capture more of that intrinsic value, rather than underpricing it to incentivize investors (Sundarasen et al., 2017).

We expect this negative moderating effect to be stronger in common law countries, where the legal environment is more predictable and less context specific than in civil law countries. Investors in common law countries may be less reliant on the signaling variables when corruption levels are low, as information asymmetry and ex ante uncertainty are further minimized in a low corruption environment. In the civil law countries, a highly contextualized and less predictable legal system may outweigh the influence of low corruption level. As stated by Banerjee et al. (2011), effective contract enforcement and accessibility of legal recourse contribute to a lower level of IPO underpricing. For the purposes of this study, the CPI obtained from Transparency International is used to gauge corruption levels. The CPI is an international aggregate indicator that ranks 183 countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. The following hypotheses are tested to determine the moderating effects of corruption level on the relationship between the returns:

**H4.** The corruption level of a country negatively moderates the relationship between underwriters’ reputation and IPO initial returns.

**H5.** The corruption level of a country negatively moderates the relationship between auditors’ reputation and IPO initial returns.
The corruption level of a country negatively moderates the relationship between ownership retention and IPO initial returns.

Data and methodology

Data

A final sample of 6,182 IPOs are obtained for 2003-2012 from the 30 selected OECD countries. Data are collected from Bloomberg, DataStream, Thomson-One.com, Thomson Reuters’ Bankscope and Thomson Reuters’ Worldscope. The common law sample contains 3,546 IPOs, whereas the civil law sample has 2,636 IPOs.

Variables description

We adopt the initial return calculation used in Ibbotson and Jaffe (1975) and Ibbotson et al. (1988), which measures initial returns as:

\[ IR_i = \frac{PC_i - PO_i}{PO_i} \]

where, \( IR_i \) is the initial return of IPO for firm \( i \); \( PC_i \) is the first trading day closing price; and \( PO_i \) is the offer price reported in the prospectus. Most studies used the first-day trading price in computing IPO initial returns because using later trading prices (such as the end of the first week of trading) typically makes little difference (Ljungqvist, 2007). We adopted Megginson and Weiss’ (1991) method of using the “relative market share of the underwriters” (in dollar terms) as a proxy for the underwriters’ reputation. Underwriters’ reputation (UwR) is based on the market capitalization of the companies underwritten by the investment bank for a given year. We sourced the relevant information using Megginson and Weiss’ choice of underwriters by companies through the Bloomberg and Bankscope databases. Auditors’ reputation is based on Titman and Trueman’s (1986) and Beatty and Ritter’s (1989) studies. The Bloomberg and Thomson Reuters’ databases were the main sources for information on auditors’ reputation. The final independent variable is ownership retention, which refers to the total number of shares retained by original owners/total number of shares issued to public. This study adopts the Downes and Heinkel (1986) measurement in determining the original owners’ percentage of ownership:

\[ Ownership\ Retention = \frac{N - N_p - N_s}{N} \]

where:
- \( N \) = total number of shares outstanding after the initial offer.
- \( N_p \) = number of primary shares in the initial offer, assumed to be entirely sold to the public by the issuer.
- \( N_s \) = number of secondary shares (previously held by the issuer) and offered by the issuer for resale to the public.

Two main legal origins are considered: common law and civil law. The civil law countries are further divided into Scandinavian, German, and French civil law. The corruption level of a country is proxied by the CPI; this information is available from the Transparency International webpage (www.transparency.org/). The CPI ranges from a score of 0 (high corruption) to 10 (low corruption). Summary of variable description and construct measurement is shown in Table II.
Variables | Operationalization
--- | ---
Initial Returns | Initial return: 
\[ IR_t = \frac{(PC_t - PO_t)}{PO_t} \]
(Ibbotson and Jaffe, 1975; Ibbotson et al., 1988)
Underwriters reputation | Underwriters’ reputation (UwR) is based on the market capitalization of the companies underwritten by the investment bank for a given year. (Megginson and Weiss, 1991)
Source: Bloomberg
Auditors reputation | Big 4 auditors as reputable and the others as non-reputable. If the IPO companies employed the Big 4 auditors, a value of 1 is assigned, and 0 otherwise
Ownership retention | Measures the original owners’ percentage of ownership. Ownership Retention = N - Np - Ns/N
(Downes and Heinkel, 1986)
Where; 
N = total number of shares outstanding after the initial offer 
Np = number of primary shares in the initial offer, assumed to be entirely sold to the public by the issuer 
Ns = number of secondary shares (previously held by the issuer) and offered by the issuer for resale to the public
Legal origin | Two main legal origins are considered: common law and civil law. The civil law countries are further divided into Scandinavian, German, and French civil law
CPI | Corruption level of a country is proxied by the CPI. The CPI ranges from a score of 0 (high corruption) to 10 (low corruption)
Source: Transparency International webpage (www.transparency.org/)
Firm size (FS) | Natural log of total assets
Source: Bloomberg
Firm age (FA) | Difference between year of study and the year of incorporation
Source: Bloomberg
Market condition | Weighted average of percentage change in market index for three months before the listing date of IPOs
Source: Bloomberg

<table>
<thead>
<tr>
<th>Variables</th>
<th>Operationalization</th>
</tr>
</thead>
</table>
| Initial Returns | Initial return: 
\[ IR_t = \frac{(PC_t - PO_t)}{PO_t} \]
(Ibbotson and Jaffe, 1975; Ibbotson et al., 1988) |
Underwriters reputation | Underwriters’ reputation (UwR) is based on the market capitalization of the companies underwritten by the investment bank for a given year. (Megginson and Weiss, 1991) |
Source: Bloomberg |
Auditors reputation | Big 4 auditors as reputable and the others as non-reputable. If the IPO companies employed the Big 4 auditors, a value of 1 is assigned, and 0 otherwise |
Ownership retention | Measures the original owners’ percentage of ownership. Ownership Retention = N - Np - Ns/N |
(Downes and Heinkel, 1986) |
Where; 
N = total number of shares outstanding after the initial offer 
Np = number of primary shares in the initial offer, assumed to be entirely sold to the public by the issuer 
Ns = number of secondary shares (previously held by the issuer) and offered by the issuer for resale to the public |
Legal origin | Two main legal origins are considered: common law and civil law. The civil law countries are further divided into Scandinavian, German, and French civil law |
CPI | Corruption level of a country is proxied by the CPI. The CPI ranges from a score of 0 (high corruption) to 10 (low corruption) |
Source: Transparency International webpage (www.transparency.org/) |
Firm size (FS) | Natural log of total assets |
Source: Bloomberg |
Firm age (FA) | Difference between year of study and the year of incorporation |
Source: Bloomberg |
Market condition | Weighted average of percentage change in market index for three months before the listing date of IPOs |
Source: Bloomberg |

**Hypothesis testing**

Correlation test is conducted to identify multicollinearity among the independent variables in the regression models. All hypotheses are corrected for heteroscedasticity; the Breusch–Pagan Godfrey is used and corrected using White’s test. Subsequent to both diagnostic tests, the ordinary least squares regression method using multivariate regression is run for all the variables tested. The independent variables are centered and interacted using the Aiken et al., (1991) method to determine the moderating effects of corruption level on the relationship between the signaling variables and IPO initial returns. Binary variables are not centered. The following models are tested (Table III):

**Models 1-5:**

\[ IR_{it} = \beta_1 \text{AudR}_{it} + \beta_2 \text{LnUwR}_{it} + \beta_3 \text{LnORtn}_{it} + \text{Control Variables}_{it} \\
+ \text{Year Dummies}_{it} + \text{Country Dummies}_{it} + \epsilon \]

**Models 6-10:**
Empirical results

Descriptive statistics

Table IV summarizes the descriptive statistics of the dependent, independent and moderating variables. It shows the results for mean, maximum, minimum, standard deviation and kurtosis for the period of 2003-2012 for all sample OECD countries. The empirical evidence suggests relatively high variability in most tested variables.

Correlation analysis

A correlations test is performed before further empirical testing. Table V presents the data correlation matrix; the correlations are generally quite low (27 out of 36 estimates
are less than 0.1). The correlation matrix indicates minimal levels of multicollinearity between the independent variables, control variables, and moderating variable.

### Mean difference t-test between common law and civil law countries

A mean difference t-test is performed on the dependent and signaling variables before testing the relationship between the common law and civil law countries; the results are shown in Table VI. The sample of 6,182 IPOs is split into common law and civil law countries. The average initial return in the common law countries is 19.58 per cent, and it is 30.58 per cent for the civil law countries. The differences in the average IPO initial returns between the two groups are significant at the 1 per cent significance level. Similarly, the mean difference t-test results in Table VI indicate a significant difference between underwriters’ reputation, auditors’ reputation, and ownership retention between the common law and civil law countries. This is the basis of further testing undertaken in this study.

### Signaling variables and IPO initial returns in common law and civil law OECD countries

Models 1-2 in Table VII demonstrate the difference in the strength of the relationship between underwriters’ reputation, auditors’ reputation, ownership retention and IPO initial returns in the civil law countries compared to common law. The empirical evidence indicates a significant relationship between all three signaling variables and IPO initial returns in both common law and civil law countries. As hypothesized, the strength of the relationship

<table>
<thead>
<tr>
<th>Variable</th>
<th>Common law (n = 3546) Mean</th>
<th>Civil law (n = 2636) Mean</th>
<th>Mean difference t-test Difference</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial return</td>
<td>19.5993</td>
<td>30.586</td>
<td>10.9867</td>
<td>6.12267***</td>
</tr>
<tr>
<td>Underwriters’ reputation</td>
<td>2.5824</td>
<td>3.5421</td>
<td>0.9597</td>
<td>7.43402***</td>
</tr>
<tr>
<td>Auditors’ reputation</td>
<td>0.5690</td>
<td>0.5161</td>
<td>0.0529</td>
<td>–4.12311***</td>
</tr>
<tr>
<td>Ownership retention</td>
<td>13.7495</td>
<td>16.6474</td>
<td>2.8979</td>
<td>5.24004***</td>
</tr>
</tbody>
</table>

**Note:** ***Denote statistical significance at 1 per cent levels

**Table V.**
Correlation estimates of the dataset

<table>
<thead>
<tr>
<th></th>
<th>LnFA</th>
<th>LnFS</th>
<th>MCon</th>
<th>LnUwR</th>
<th>LnAudR</th>
<th>LnORetn</th>
<th>Legal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnFA</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LnFS</td>
<td>−0.0017</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCon</td>
<td>0.4853</td>
<td>−0.0645</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LnUwR</td>
<td>0.0537</td>
<td>0.0717</td>
<td>0.0265</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AudR</td>
<td>0.0317</td>
<td>0.1977</td>
<td>0.0066</td>
<td>0.2649</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LnORetn</td>
<td>−0.0275</td>
<td>−0.0985</td>
<td>−0.0371</td>
<td>−0.0450</td>
<td>−0.1776</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Legal</td>
<td>−0.0511</td>
<td>0.2846</td>
<td>−0.0163</td>
<td>−0.1064</td>
<td>0.0909</td>
<td>−0.1515</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Notes:** IR refers to IPO Initial return, which is the difference between the first day’s closing price and offer price. LnFS represents natural log of Firm Size and LnFA is the natural log of Firm Age. MCon refers to the weighted average of market returns three months prior to listing. LnUwR is the natural log of Underwriters’ reputation calculated based on Megginson-Weiss underwriter market share measure; AudR represents Auditor’s reputation – big-4 versus non-big-4; LnORtn measures the natural log of ownership retention. Legal refers to the Legal Origin of a country; common law or civil law. Civil Law country includes the French, Scandinavian and German Civil Law countries

**Table VI.**
Comparison of the mean values between common law and civil law countries
<table>
<thead>
<tr>
<th></th>
<th>Common law</th>
<th>Civil law</th>
<th>German civil law</th>
<th>Scandinavian civil law</th>
<th>French civil law</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1</td>
<td>M2</td>
<td>M3</td>
<td>M4</td>
<td>M5</td>
</tr>
<tr>
<td>LnUwR</td>
<td>-0.933***</td>
<td>-2.589</td>
<td>-0.941***</td>
<td>-5.274</td>
<td>-5.274</td>
</tr>
<tr>
<td>AudR</td>
<td>-0.047***</td>
<td>-5.619</td>
<td>-1.868***</td>
<td>-2.123</td>
<td>-5.619</td>
</tr>
<tr>
<td>LnORetn</td>
<td>-0.070***</td>
<td>-3.144</td>
<td>5.921***</td>
<td>4.118</td>
<td>5.921</td>
</tr>
<tr>
<td>LnFirm age</td>
<td>-0.001</td>
<td>-0.035</td>
<td>-0.0110</td>
<td>-0.072</td>
<td>-0.0110</td>
</tr>
<tr>
<td>LnFirm size</td>
<td>-0.047***</td>
<td>-5.619</td>
<td>-0.000***</td>
<td>-2.813</td>
<td>-5.619</td>
</tr>
<tr>
<td>MCon</td>
<td>6.664***</td>
<td>10.210</td>
<td>3.403***</td>
<td>3.258</td>
<td>6.664</td>
</tr>
</tbody>
</table>

| Year dummies           | Yes        | Yes       | Yes              | Yes                   | Yes             |
| Country dummies        | Yes        | Yes       | Yes              | Yes                   | Yes             |
| Adjusted $R^2$         | 0.19       | 0.15      | 0.18             | 0.18                  | 0.16            |
| Observation            | 3546       | 2636      | 2024             | 384                   | 384             |

**Notes:** Standard errors are adjusted for heteroskedasticity, using the White's test; **significant at the 5 per cent level; ***significant at the 1 per cent level; LnUwR is the natural log of Underwriters' reputation calculated based on Megginson-Weiss underwriter market share measure; AudR represents Auditor's reputation – big-4 versus non-big-4; LnORtn measures the natural log of ownership retention. LnFS represents natural log of Firm Size and LnFA is the natural log of Firm Age. MCon refers to the weighted average of market returns three months prior to listing.
for all three signaling variables is stronger in the civil law countries as compared to the common law countries. Thus, H1-H3 are supported.

All three signaling variables have a negative relationship, signifying that IPO initial returns are lower when IPO firms employ reputable underwriters/auditors and retain higher ownership. This is in line with the studies by Simunic and Stein (1987), Beatty (1989) and Michaely and Shaw (1995). Reputable underwriters and auditors create greater certainty among potential investors. Auditors’ attestation of firms’ financial information reduces asymmetric information between owners and investors, (Beatty, 1989; Datar et al., 1991), thus lowering the initial returns of IPOs. Similarly, underwriters portray a strong credibility signal when the company issuing the IPOs hires a reputable underwriter (Beatty and Ritter, 1986). The stronger relationship in the civil law countries for all the three signaling variables is in line with the studies by La Porta et al. (1997, 1998, 2002), who documented that a country’s legal framework explains the differences in the development of financial markets and the decisions of companies and investors. It indicates that the presence of reputable underwriters/auditors and high ownership retention are crucial in the civil law countries because weak legal frameworks provide managers and controlling shareholders with more opportunities to transfer profits and assets out of the firm at the expense of minority shareholders. Investors will be less certain about realizing returns on their investment if a country has weak legal protections and a low-quality legal framework and enforcement (Shleifer and Vishny, 1997). Reputable underwriters and auditors further increase investors’ confidence in civil law countries, thus the stronger relationship. By contrast, investors in common law countries have better investor protection, more developed financial markets, and a lower degree of government intervention, as well as practice stricter regulation and enforcement, compared to French, Scandinavian, and German civil law countries. Accumulatively, these factors reduce information asymmetry and ex ante uncertainty in these common law countries and the presence of reputable underwriters and auditors might not be needed to attest the credibility of IPO firms.

Ownership retention, by contrast, shows a positive relationship in the civil law countries, and the strength of the relationship is greater than that in the common law countries. This indicates that high ownership retention in civil law countries increases IPO initial returns. This could be because of the aforementioned investors’ protection and expropriation of profit and assets by major shareholders at the expense of the minority. Thus, high ownership retention may create more uncertainty among the potential investors, and investors expect a higher compensation for the risk taken. Issuers may also wish to underprice the IPOs to avoid any future litigation charges in an environment where the legal enforcement is less predictable (Sundarasen et al., 2017). In common law countries, the negative relationship may indicate that a fundamentally strong and well-structured legal system minimizes information asymmetry and uncertainty among potential investors.

As a further test, the civil law countries are divided into three legal families (German, Scandinavian, and French civil law). The empirical results in Models 3-5 indicate that the relationship between the signaling variables and IPO initial returns are similar to Model 2, except that the strength of the relationship is strongest among the French civil law countries. No significance is documented in the Scandinavian and German civil law countries. The empirical evidence clearly signifies that the reputation of underwriters and auditors and high ownership retention play a crucial role in French civil law countries to minimize information asymmetry and ex ante uncertainty, as these countries have the weakest legal structure/enforcement and protection of outside investors among the three legal families. As previously stated, the civil law of German and Scandinavian countries falls between common law and French civil law and has a comparatively stronger protection...
for creditors, especially secured creditors. Thus, the presence of reputable underwriters/auditors and high ownership retention are fundamental to minimizing information asymmetry and uncertainty in an environment where law enforcement and legal protection of investors/minority shareholders are relatively weaker.

**Moderating effects of a country’s corruption level on the relationship between the signaling variables and initial public offering initial returns**

Table VIII shows the empirical results for the moderating effects of corruption level on the relationship between the signaling variables and IPO initial returns. Model 6 (M6) documents a negative moderating effect at the 1 per cent significance level for both underwriters’ reputation and ownership retention. This indicates that the corruption level of a country negatively moderates the relationship between underwriters’ reputation and ownership retention and IPO initial returns. Therefore, H4 and H6 are supported. The results for auditors’ reputation is insignificant, indicating that a country’s corruption level has no moderating effect on the relationship between auditors’ reputation and IPO initial returns. H5 is rejected.

The data set is sub-divided into common law and German, Scandinavian, and French civil law. Model 7 (M7) shows a negative moderation effect at the 1 per cent significance level for all the signaling variables (including auditors’ reputation) in the common law countries. Similar results are documented for the Scandinavian civil law countries, except for ownership retention. However, the results differ for French and German civil law countries, as shown in Model 8 (M8) and Model 10 (M10), respectively. Corruption level does not have a moderating effect on the relationship between the signaling variables and IPO initial returns in the German civil law countries. In the French civil law countries, corruption levels moderate the relationship between underwriters’ reputation and IPO initial returns, while the remaining variables are insignificant.

The negative moderation effects of corruption level on the relationship between the signaling variables and the IPO initial returns in the common law and Scandinavian civil law countries indicate that the corruption levels of a country contribute to the decrease in the relationship between the signaling variables and IPO initial returns. As hypothesized, lower corruption levels create better governance structure, advanced investors’ protection mechanisms, and effective enforcement of rules and regulations, and this further mitigates the information asymmetry and uncertainty in an IPO environment. This justifies the negative moderation effect of corruption in the common law and Scandinavian civil law countries. In the German and French civil law countries, corruption level does not seem to have a moderation effect. This could be mainly because of a legal environment that is more contextualized and more risky, in which investors and issuers are more reliant on underwriters, auditors, and ownership retention as signals of firm value, regardless of the corruption level of the individual countries.

**Conclusion**

This study examines the difference in the signaling relationship between underwriters’ reputation, auditors’ reputation, and ownership retention on IPO initial returns in the common law and civil law OECD countries. The moderating role of corruption level on the abovementioned relationship is also studied. A sample of 6,182 companies from 2003 to 2012 is examined, and the results indicate that the institutional arrangements (i.e. legal origin and corruption levels) play a pivotal role in the relationship between the signaling variables and IPO initial returns. The empirical evidence from this study is in line with the signaling hypothesis and the asymmetric information model, suggesting
<table>
<thead>
<tr>
<th></th>
<th>Entire dataset</th>
<th>Common law</th>
<th>German civil law</th>
<th>Scandinavian civil law</th>
<th>French civil law</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M6</td>
<td>M7</td>
<td>M8</td>
<td>M9</td>
<td>M10</td>
</tr>
<tr>
<td>LnUwR</td>
<td>-2.351***</td>
<td>-4.74</td>
<td>-1.83</td>
<td>-14.260</td>
<td>-0.95</td>
</tr>
<tr>
<td>AudR</td>
<td>-0.346</td>
<td>-1.94</td>
<td>-0.030***</td>
<td>-9.96</td>
<td>-0.010</td>
</tr>
<tr>
<td>LnOREtn</td>
<td>-0.000</td>
<td>-1.66</td>
<td>-0.14***</td>
<td>-4.28</td>
<td>-0.004</td>
</tr>
<tr>
<td>UWR × Corr</td>
<td>-0.122***</td>
<td>-3.83</td>
<td>-0.173***</td>
<td>-5.27</td>
<td>0.027</td>
</tr>
<tr>
<td>AuDR × Corr</td>
<td>0.24100</td>
<td>0.19</td>
<td>-0.036***</td>
<td>-2.80</td>
<td>0.005</td>
</tr>
<tr>
<td>OREtn × Corr</td>
<td>-0.142***</td>
<td>-4.28</td>
<td>-0.021***</td>
<td>-3.38</td>
<td>0.002</td>
</tr>
<tr>
<td>LnFirm age</td>
<td>0.73***</td>
<td>2.836</td>
<td>-0.13***</td>
<td>-3.523</td>
<td>-2.662**</td>
</tr>
<tr>
<td>LnFirm Size</td>
<td>0.001***</td>
<td>4.685</td>
<td>0.006***</td>
<td>3.489</td>
<td>0.001***</td>
</tr>
<tr>
<td>MCon</td>
<td>0.086***</td>
<td>3.943</td>
<td>-0.235***</td>
<td>-2.836</td>
<td>0.070***</td>
</tr>
<tr>
<td>Year dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Country dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.19</td>
<td>0.16</td>
<td>0.13</td>
<td>0.20</td>
<td>0.13</td>
</tr>
<tr>
<td>Observations</td>
<td>6182</td>
<td>3546</td>
<td>2024</td>
<td>384</td>
<td>228</td>
</tr>
</tbody>
</table>

**Notes:** Standard errors are adjusted for heteroskedasticity, using the White’s test; ***significant at the 5 per cent level, **significant at the 1 per cent level; UWR × Corr – interaction between underwriters’ reputation and corruption level of a country; AuDR × Corr – interaction between auditors’ reputation and corruption level of a country; Oretn × Corr – interaction between ownership retention and corruption level of a country.

Table VIII. Modulating effect of corruption on the relationship between underwriters’ reputation and ownership retention on IPO initial returns in the common and civil law countries on OECD countries.
that underwriters’ reputation, auditors’ reputation and ownership retention represent attributes and actions that send signals to the potential investors on firm quality and reduce the information asymmetry and *ex ante* uncertainty between issuers and potential investors. The presence of a stronger relationship between the signaling variables and IPO initial returns in the civil law countries highlights the importance of reputable underwriters/auditors and ownership retention in minimizing information asymmetry and *ex ante* uncertainty in these countries. The negative moderation effects of the corruption levels in the common law and Scandinavian civil law countries also indicate that corruption levels also play a role in decreasing information asymmetry and uncertainty in these legal contexts.

There are several avenues of future research. First, expanding this study to a larger sample of jurisdictions (i.e. including the emerging markets) could provide further insights into the evolving roles of institutions on IPO initial returns. Second, a more detailed decomposition of each legal and institutional parameter could offer detailed insights into the specific aspects of the formal institutional framework and their impact on initial returns. Third, including additional institutional arrangements, such as governance, would also add value, as the specific roles of the legal and institutional framework are crucial in offering firms cheaper financing. Fourth, it would be interesting to analyze the evolution of institutional frameworks and the legal and judiciary system within a country over time and the impact on IPO initial returns. Fifth, interacting with the signaling variables and its impact on the IPO initial return could further shed light on the importance of the said variables in an IPO environment. Finally, examining the impact of the signaling variables on the long-run performance of IPO firms within the boundaries of different institutional context should be an added contribution.

**Note**

1. Initial returns are defined as the difference between the IPO’s offer price and the closing market price on the first day of trading in the secondary market (Ibbotson *et al.*, 1988; Ritter, 1998). A positive initial return (a first day’s closing price that is greater than the offer price) is also known as *IPO underpricing* and is so prevalent that the term has become synonymous with the initial returns or first-day returns (Dalton *et al.*, 2003; Ritter and Welch, 2002). The greater the IPO underpricing, the higher the initial returns, and vice versa.

**References**


Further reading


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Relationship between human resource management practices, ethical climates and organizational performance, the missing link
An empirical analysis

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Abstract
Purpose – The purpose of this paper is to investigate the influence of human resource management (HRM) practices, (recruitment and selection) and organizational performance (OP) through mediation role of ethical climates (ECs) in Nigerian educational agencies.

Design/methodology/approach – Quantitative data were collected from 181 educational agencies represented by director of administration; SmartPLS-SEM was used in testing the relationship, as well as testing the mediating effect of ECs.

Findings – The results revealed strong support for the mediating role of ECs on the relationship between HRM practice (recruitment and selection) and OP.

Research limitations/implications – Policy makers and executives in educational agencies need to consider making appropriate decision in terms of effectively adopt and implement performance-based HRM practices that can encourage and create ethical behavior of employees’ and within organization. Through the adoption and utilization of these practices, educational agencies can enhance OP.
Practical implications – This study contributes to the understanding of the relationship between HRM and OP by clarifying a pathway between these variables. This study also generalizes consistent findings on the HRM practices and OP relationship to a different discipline and context, i.e. educational agencies.

Originality/value – This study adds to the domain of resource-based view by incorporating EC as a mediator between HRM practices and OP.

Keywords Human resource management, HRM practices, Organisational performance, Ethical climates, Resource based view theory

Paper type Research paper

1. Introduction

Today’s human resource management practices (HRMP) is a unique approach to employment management that aims to attain competitive advantage through the strategic improvement of well dedicated and competent workers by means of an incorporated collection of cultural, structural and human resources techniques. An effective HRMP in the organization will enable employees to contribute effectively and fruitfully to the attainment of the organization’s goals and objectives. It makes employees to be committed to their work and elicit positive behavior that will increase the organization’s effectiveness. Effective HRMP in an organization will also discourage employees from exhibiting negative behavior like organizational deviant behavior, and counterproductive behavior. HRMP is expected to add value to the strategic utilization of workforce and that worker programs impact the business in quantifiable ways. The study of human resource practices has gained importance in the literature for the last few years (Chang and Chen, 2002) and most importantly its impact on organizational performance (OP), effectiveness and employees’ commitment. HRMP in Nigerian educational sector cannot be totally diffused from what is evidence in other countries. However, because of the peculiarity of the social-cultural characteristics of Nigerian public sector, HRMP in Nigeria is an area open for further research. Good employer-employee relations are therefore critical to the stable and sustainable development of the Nigerian economy as well as the world economy as a whole.

The lack of OP in Nigeria public sector is very critical; more particularly in the performance of Public Educational Sector Administration (PESA) the sector rely on the provision of quality educational services and other services to the entire society which serves as the most significant services required from the system. Even though, Nigerian public service is not performing in the provision of these essential services and other more services that can satisfied individual citizens (Okonjo-Iweala and Osafo-Kwaako, 2007). In this regards, there is a lot of complaints from the public in respect of the declining of performance, quality, and standard of the most significant sector of the economy which is educational sector (Okonjo-Iweala and Osafo-Kwaako, 2007). Similarly, complaints of nonperformance of PESA in Nigeria had been raised by several authorities, governmental organizations, non-governmental organizations, international organizations, politicians, students and the public. These complaints includes inability of the PESA to perform and yield result because of issues of bribery and corruption, mismanagement and under-utilization of resources, abuse of office and indiscipline (Aminu, 2015; Buhari, 2015; Ejike, 2015; Nasiru, 2015; Olugbamila and Sehindemi, 2015; Oluwarotimi, 2015; UNDP, 2013).

Performance appraisal (PA) is a systematic periodic and impartial rating of employee’s excellence in matters about his present job and his potentialities for a better job Performance. Appraisal has a positive correlation with employee performance (Ringim et al., 2017), but the extent of the relationship was insignificant. Available evidence from the previous studies has shown that there are inconsistent, controversies and mixed findings on
the extent of the impact of performance appraisal on OP (Ringim et al., 2017). For instance, some studies documented the insignificant positive relationship between HRMP and Cyber deviant, (Abubakar et al., 2015). On the contrary, others researchers showed that HRMP attributes have a significant adverse relationship with Cyber Loafing, (Ringim et al., 2017). It was further discovered that the few studies that considered the inclusion of mediator or moderator in HRMP and OP relationship. Previous studies confirmed that studies on the connection between performance appraisal and OP are few more particularly in public sector administration (Paauwe, 2009; Paauwe and Boselie, 2005; Prowse and Prowse, 2010, 2016). In a related argument, Parboteeah et al. (2013) stress that HRMP and ethical climate (EC) can influence OP (Parboteeah, Seriki and Hoegl, 2013). However, previous studies reported EC is a strong predictor of OP (Arulrajah, 2015; Hijal-Moghrabi et al., 2015). Despite the aforementioned empirical studies on the role of EC as a predictor of the OP, still, studies indicated that less attention has been paid to the influence of PA, EC and Organization Performance. Performance appraisal is a critical HRMP factor to address OP hence, the adoption of theories of motivation (Goal setting and Expectancy theories) and RBV theory in this study.

Goal setting theory states the importance of employees’ motivation through the setting of targets and is widely recognized as a technique to improve performance. It emphasizes the need to agree and set targets which will act as a standard of performance measurement. Expectancy Theory advocates motivation as a function of personal effort to achieve high performance. The resource-based view (RBV) argued that internal resources considered to be one of the best resources that can improve competitive advantage among the competing organization. In a related argument, performance appraisal can be regarded as internal resources that can create competitive advantage and improve performance. RBV stated that human resource system can leads to competitive advantage through resources that are intangible within the organizational circle like ethics (Barney, 2001; Reed and DeFillippi, 1990; Wright and McMahan, 1992). Also, Baron and Kenny (1986) argued that the inclusion of mediator or moderator variable could best address the inconsistencies in research findings hence the inclusion of EC variable in the current study. In this regards, this study empirically investigated the mediating effects of EC, performance appraisal and OP (Arulrajah, 2015; Manroop et al., 2014). EC had been discussed in the literature by Victor and Cullen (1987, 1988). EC can be defined as “prevailing perceptions of typical procedures as well as organizational practices that have ethical content (Victor and Cullen, 1987, 1988). It is also regarded asset of norms, procedures, policies, and practices walled in the organizational lifecycle that usually guided employees to conducts their behavior with a high level of ethics for organizational development (Martin and Cullen, 2006; Schluter et al., 2008). The need for a better empirical research and evidence about the effect of EC on the link between Performance appraisal and OP is well documented in the literature (Parboteeah et al., 2013; Thite, 2013). In narrowing the research gap identified in the literature, this paper, therefore, seeks to investigate the mediating effect of EC on the relationship between performance appraisal and Organization Performance in Nigerian Public Educational Sector Administration.

2. Review of related literature and hypotheses development
2.1 Organization performance
Performance in schools is increasingly judged on the basis of effective learning outcomes. Information is critical to knowing whether the school system is delivering good performance and to providing feedback for improvement in student outcomes. PESA uses its key performance indicators of balance scorecard to analyze and track performance and base key
strategic decisions regarding resources. Literature shows that many factors were investigated and found significantly related to OP. For instance, quality management practices (Appiah-Fencing et al., 2008; Fencing, 2012; Phan et al., 2011), organizational support (Hau-siu Chow et al., 2006; Joiner, 2007), environment (Chandrasekar, 2011; Cosh et al., 2012), organizational learning (Barba-Aragón et al., 2014; Garcia-Morales et al., 2012; Jiménez-Jiménez and Sanz-Valle, 2011; Lopez et al., 2005; Tippins and Sohi, 2003) and commitment (Ali et al., 2010; Pinho et al., 2014; Rodrigues and Pinho, 2010). Others examined the influence of interpersonal trust (Bakiev, 2013; Paul and Mcdaniel, 2004), personality (Barrick et al., 2001; Soane et al., 2015), attitudes (Gregory et al., 2009; Ko and Smith-Walter, 2013; Ko et al., 2013) among others.

Generally, previous studies above guide us to understand factors that influence OP; however, literature confirmed that studies on the link between performance appraisal and OP are few more particularly in public sector organization (Paauwe, 2009; Paauwe and Boselie, 2005; Prowse and Prowse, 2010, 2016). The previous studies on public sector did not focus on education sector because of some fundamental reasons for why and how performance appraisal influence OP. This has a long argument in the literature and still not clearly discussed extensively. Importantly, Theory of RBV argued that internal resources considered to be one of the best resources that can improve competitive advantage among the competing organization.

2.2 Performance appraisal proxies of human resource management practices

There is a lot of literature which is in favor of HRM practices and its positive influence on the organizational outcome and firm performance. Such that, HRMP can be classified in respect of their influence, skills, and abilities of employees, motivation and the structure of the work (Ulasi, 2011). Some dimensions of HRMP are compensation, career advancement, career development, performance appraisal, employment security, training program, organizational commitment, job satisfaction, employee participation in decision making, teamwork, HR planning, staffing practices among others. However, this current study considered the performance appraisal, and empirically examined the effect of performance appraisal on OP with a mediating factor of EC.

A performance appraisal is known by other terms like employee appraisal, performance review. looked at performance appraisal as a method by which the job performance of an employee is measured in terms of quality, quantity, cost, behavior and time. He further explained that it is conducted by self, peers, seniors, and junior. However, generally, in the formal method, it is conducted by the immediate manager or supervisor under whom the person is directly working. A performance appraisal is a part of measuring, comparing, finding, guiding, correcting and managing career development of the employees, (Mullins, 2007). The Journal of Global Business and Economics (2010) established that performance appraisal is the process of gathering, recording and critically analyzing information about the relative importance of employees to the organization. Performance appraisal is a study of present achievements, and failures, personal strengths and weaknesses, and suitability for incentives, rewards and recognition, increased pay scale, promotion or further training.

An appraisal is the evaluation of worth, quality or merit. The appraisal should measure both performances in accomplishing goals, plans and performance as a manager. It is the evaluation of present performance and future capabilities. “Performance appraisal is a systematic periodic and impartial rating of employee’s excellence in matters about his present job and his potentialities for a better job”. “It is the process of evaluating the performance and qualifications of the employees in terms of the requirements of the job for which he is employed for purposes of administration including placement, selection for
promotions, providing financial rewards and other actions which require differential treatment among the members of a group as distinguished from actions affecting all members equally. In addition, Douglass (1999) sees performance appraisal as a method of acquiring and processing the information needed to improve an individual employee’s performance and accomplishments. Likewise, defined performance appraisal as the process of evaluating the performance of employees, sharing that information with them and searching for ways to improve their performance. Thus, performance appraisal can be seen as the process by which a manager or consultant examines and evaluates an employee’s work behavior by comparing it with preset standards, documents the results of the comparison, and uses the results to provide feedback to the employee to show where improvements are needed. An effective performance appraisal system has five components which include performance planning, managing of performance, performance review/assessment, performance monitoring and rewarding of performance.

Performance appraisals are employed to determine who needs what training, and who will be promoted, demoted, retained or fired (Delery and Doty, 1996).

In addition, HRM perspective stresses that EC shows an imperative window to understand the ethical positioning in the organization. Understanding the existence of EC in the organization can also be very much suitable as an origin for emerging performance appraisal system to foster an EC (Parboteeah et al., 2013). In related content, performance appraisal system promotes ethical behaviors among employees within the organizations, in this regards, human resource experts simply believe that they surely have an ethics management ability to incorporates ethics management (Caldwell et al., 2011; Van Vuuren and Eiselen, 2006). Based on the previous research findings it was argued that performance appraisal is capable of solving complex ethical predicaments (Arulrajah, 2015). Despite the argument in the literature that, still there are needs for more empirical investigation on the link between performance appraisal and EC. Hence, this hypothesis was developed:

HA1. Performance appraisal is significantly positively related to EC

2.3 Ethical climate

Literature argued that EC determines right or wrong of what people trust and shapes their ethical decision making and conduct (Lopez et al., 2005). Relatively, Schluter et al. (2008) stress that EC implies the organization’s policies, practices, and procedures on ethical matters, and it influences employees attitude and behavior and serves as an orientation for employee behavior. In this regards, EC plays an imperative role in improving OP. It considers essential, organizations set ethical values for its employees alongside providing an to enable atmosphere that encourages ethical behavior, capable leadership, trust, commitment and creates workforce value to improve OP (Hijal-Moghrabi et al., 2015).

However, literature established that challenges facing educational sector are surrounded with unethical values between the employees and the organization which is an impressive issue that needs to be an encounter for the OP improvement as well as employee’s behavior. Therefore, disregarding of ethical values that within the organizational system may lead to unfortunate performance as well as inadequate productivity. For that reason, ethical values are regarded as an essential component for sustaining superior performance and encourage competitive advantage (Trust, 2015). Equally, its revealed about the growing concern and the existence of unethical behaviors within the educational sector organization, in this respect, several issues that create some lots of unethical challenges such as poor service delivery, abuses, scandals, mismanagement, lack of performance as well as bribery and corruption. In the same manner, changing the unethical conduct of employees within the
organizations, through the effects of EC may result to huge significant of performance improvement and entire system (Arulrajah, 2015).

In line with the above discussion, EC boosts and enforces the employees to acquire suitable ethical behavior in discharging their responsibilities within the organization. In this regards, ethical behavior of employees viewed as essential in realizing organizational success and performance (Brown et al., 2005; Winstanley and Hartog, 2002). Although the link between performance appraisal and OP has been tested empirically, the procedures through which performance appraisal influence OP needs to make clear. To clarify this, there is need to develop and test the mediating mechanism through which training and development utilization can lead to improved OP.

Previous studies revealed that EC link to OP. For instance, Hijal-Moghrabi et al. (2015) conducted a study in Western Context United State of America (USA) in particular with 1,695 sample in quantitative analysis, the result shows that there is a positive relationship between EC and OP. The study carried out by Sabiu et al. (2016a) in African context Nigeria in particular, investigated the influence of EC on OP using 181 sample from some selected public educational sector from North-western region. It was found that EC significant associated with OP. Similarly, Bowman and Knox (2008) investigate the influence of ethics on public managers in American public sector, it was found that ethics significantly predict OP. Using RBV theory, human resource systems can directly influence OP through resources that are impressively woven in organization’s history ethics and culture (Barney, 2001; Reed and DeFilipp, 1990; Sabiu et al., 2016b; Wright and McMahan, 1992). Despite the argument in the literature, still, there are needs for more empirical investigation on the link between performance appraisal, EC and OP. Therefore, on the basis of theoretical and empirical support, it seems reasonable to hypothesize that:

HA2. Ethical climate is significantly positively related to organizational performance.

Moreover, prior hypotheses highlight the linkages between performance appraisal, EC, and OP. Indirectly, the discussion proposes that performance appraisal affect OP through the influence of EC. That is, organizations can properly utilize HRMP (performance appraisal) to promote EC as well as improve employee’s behavior, which in return will enhance OP. Hence, this study argues that EC may play a mediating role on the link between performance appraisal and OP. Moreover, the study tested the power of EC to mediate the link between performance appraisal and OP, specifically in Nigerian PESA. Therefore, on the basis of previous studies, this study hypothesizes that:

HA3. Ethical climate significantly positively mediates the relationship between performance appraisal and organizational performance.

2.4 Conceptual framework and underpinning theory
The review of related literature above revealed that both performance appraisal and EC may influence OP. Then, the differing impact of performance appraisal and EC determination in OP improvement is still uncertain. Hence, this has put an interest to the researcher towards examining the relationship of both performance appraisal and EC and organization performance. A conceptual model framework was developed by combing the framework of the study carried out by Arulrajah, (2015), Sabiu et al. (2016a) and Bowman and Knox (2008) to demonstrate the relationship between performance appraisal and EC and organization performance as shown in Figure 1. The variables of this study include performance
appraisal as an independent variable, EC as mediating/intervening variable and organization performance as the dependent variable.

On the basis of RBV theoretical perspectives and empirical studies, a research framework for this study as depicted in Figure 1 shows the relationship between the independent variables (performance appraisal) mediating variable (EC) and the dependent variable (organization performance). The model was assessed using two-step approaches such as measurement model and structural model (Hair et al., 2014). In this study, we use RBV with a major focus on how firm resources (tangible and intangible) develop and affect organization performance. The RBV argued that internal resources considered to be one of the best resources that can improve competitive advantage among the competing organization. In a related argument, performance appraisal can be regarded as internal resources that can create competitive advantage and improve performance. RBV, which stated that human resource system can leads to competitive advantage through resources that are indirectly within the organizational circle like ethics (Barney, 2001; Reed and Defillippi, 1990; Wright and McMahan, 1992). In addition, Baron and Kenny (1986) argued that the inclusion of mediator or moderator variable could best address the inconsistencies in research findings hence the inclusion of EC variable in the current study. In this regards, this study empirically investigated the mediating effects of EC, performance appraisal and OP (Arulrajah, 2015; Manroop et al., 2014). EC had been discussed in the literature by Victor and Cullen (1987, 1988). EC can be defined as “prevailing perceptions of typical procedures as well as organizational practices that have ethical content (Victor and Cullen, 1987, 1988). It is also regarded as a set of norms, procedures, policies, and practices walled in the organizational lifecycle that usually guided employees to conducts their behavior with a high level of ethics for organizational development (Martin and Cullen, 2006; Schluter et al., 2008).

3. Methodology
A quantitative survey research approach using exploratory, descriptive and cross-sectional design was employed in this study to understand the mediating effect of EC on the relationship between performance appraisal and OP. The decision to select the type of research design to be used depends on the understanding and clearness of the research problem. In this case, the research is required to understand the problem before developing any model (Zikmund, 2000; Sekaran, 2003). Descriptive research is conducted when there is some understanding of the nature of the problem; such research study is used to provide a more specific description of the problem (Zikmund, 2000; Sekaran, 2003). The research setting was a cross-sectional study design. It involves gathering the data only once or at one point in time to meet the research objectives. A self-administered hand delivery and collection survey questionnaire were used as the main sources of data collection strategy to reach the respondents who are employees of Ministry of Education, Parastatals, Boards and Agencies in the seven (7) States of Northern Nigeria. For this study, a probability sampling method and techniques were used; each unit of the population has an equal chance of being
selected in the sample. Simple random and stratified sampling technique was being utilized in this study. A comprehensive population frame of employees in seven (7) States of Northern Nigeria are accumulated, and the sample size was calculated to be 216 (Krejcie and Morgan, 1970). The steps follow to select the sample of 216 employees from the population involved using a computer-based random number generated in a Microsoft Excel program for application of the mathematical formula \( \text{rand() \times 999} \) that enabled us to generate random numbers aligned to the 1-900 population of the study. The second step followed the selection of the samples that are from the seven states. This respondent from each state is considered to be the most qualified representation that are knowledgeable enough about the operational activities, administration, and performance of their organization operating in Public Education sector in Northern Nigeria. The justification for employing the probability sampling techniques was given each respondent an equal chance of being selected as the sample object (Sekaran, 2003). Furthermore, a representative sample in the probability sampling design guarantees the equal and independent representation of data being chosen. The advantage of this sampling method is that there is no bias of the researcher against the choice of another. It is also regarded for its high generalizability. Furthermore, the aim of this study is to have samples drawn from seven (7) States of Northern Nigeria. A structured closed-ended questionnaire was adapted from previous studies with measurement scale of five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) is adopted to collect response on the items for AP scale and items for EC scale adopted from; items for OP from Wan (2007) and Preko (2014).

The method of analysis used in the study was the structural equation model using PLS path modeling in conjunction with Smart PLS 3.0 software (Ringle et al., 2015). The PLS path modeling was considered appropriate technique of data analysis for some reasons: First, the PLS path modeling considered being suitable data analysis technique in this study, because, it can simultaneously assess the measurement model, which describes the link between theory (latent constructs) and data (corresponding indicators) as well as relationships among constructs, also called the structural model (Hair et al., 2016). Second, the goal of the present study is to predict the mediating effect of EC on the relationship between performance appraisal and OP. Hence, the present study is predictive oriented and PLS path modeling is appropriate (Hair et al., 2017a, 2017b, 2017c). Finally, PLS path modeling is deem appropriate because it has been sucessfully applied in extant management related studies (Kura et al., 2013a, 2013b, 2016).

4. Findings, discussion, and hypothesis testing
This section discussed how the data collected in the course of the study analyzed using SmartPLS 3.2.6 (Hair et al., 2016). Measurement model assessment was commenced where the composite reliability, Average variance extracted (AVE) and item loadings of the study constructs were evaluated as well as discriminant validity were also examined for all the reflective constructs (performance appraisal, OP). For the formative constructs (EC) the collinearity and significance assessment was also carried out. The structural model assessment was commenced by testing the path coefficient (hypotheses) among the variables under study were decisions on the supported or rejected of the hypotheses was also indicated, assessment of \( R^2 \) square, effect size \( f^2 \) and predictive relevance of the whole model.

4.1 Measurement model evaluation
As discussed earlier in the methodology, the study used SmartPLS 3.2.6 (Hair et al., 2016) as the instrument for analysis. This instrument analyses data for measurement models which are filtering the model for all the reflective constructs (PA and OP). The measurement model
fundamentally determines the reliability of the measurement scales used in the study and it also treats the goodness of fit of the model to be able to determine the global applicability (Ramayah et al., 2011).

Table I above shows the results of the factor loadings, composite reliability and AVE calculations of all the reflective constructs (PA, OP) under study. As revealed in Table I, the AVE values that range from 0.51 to 0.53, with consistent composite reliability values also ranging from 0.84 to 0.85, interpret that the items employed in the study measure the constructs and as well show an attainment of convergent validity. Therefore, CR, Factor loadings and AVE in this study are suitable and achieved as recommended by Hair et al. (2014). The following Table II presents the result of discriminant validity evaluation.

Assessment of discriminant validity was conducted to assess the degree to which measures of constructs are related was displays in Table II. To achieve that, the square root of the AVE of each construct was taken into consideration. As revealed in Table II, along the crosswise are the values of the square root of the AVE which are higher than all those values that are off the crosswise and that confirm suitable discriminant validity. In this respect, this means that loadings above are greater than the loadings and cross-loadings (Figure 2).

4.2 Structural model evaluation
In achieving the structural model assessment, the section discussed the testing of hypotheses, $R$-square $R^2$, effect size $f^2$, and predictive relevance. In this research, it was conducted using bootstrapping techniques and the decision on the significant or not significant of the hypotheses was based on $t$-values at 5 per cent level of significance non-directional hypotheses (2-tail).

Table III shown all the three direct relationships hypotheses and confirmed significant. Hence, performance appraisal (PA) and OP proves the significant relationship with a $\beta$ value = 0.28 and a $t$-value of 3.27. In addition, the relationship between performance

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Loadings</th>
<th>Composite reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational performance</td>
<td>OP10</td>
<td>0.75</td>
<td>0.84</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>OP3</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OP5</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OP6</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OP7</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance appraisal</td>
<td>PA1</td>
<td>0.66</td>
<td>0.85</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>PA2</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA3</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA4</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA5</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA6</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table I.
Factor loading, composite reliability and convergent validity analysis

<table>
<thead>
<tr>
<th>Discriminant validity</th>
<th>Constructs</th>
<th>OP</th>
<th>TD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Fornell–Lacker criterion)</td>
<td>OP</td>
<td>0.712</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PA</td>
<td>0.609</td>
<td>0.729</td>
</tr>
</tbody>
</table>
appraisal (PA) and EC revealed a significant relationship with a \( \beta \) value = 0.69 and a \( t \)-value of 15.99. Finally, the speculated relationship between the EC and OP is also supported with \( \beta \) value = 0.48 and a \( t \)-value of 5.53.

4.2.1 Testing the mediating effects of ethical climate. In testing the mediating effects of EC on the link between training and development and OP, the result used in PLS 3.2.6 in estimating the indirect effects among the variables (training and development, EC and OP) at 0.00 level of significance. Table III presents the mediation hypothesis of the study.

Table IV presents the mediation of hypothesized relationship of EC on performance appraisal (PA) and OP is also supported with \( \beta \) value = 0.33 and a \( t \)-value of 4.98. However, Hair et al. (2016) suggested for confidence interval calculation and Smart PLS 3.2.6 automatically generated the confidence interval estimation at 5 per cent lower level (LL) and 95 per cent upper level (UL). Table III presents confidence interval calculation (Table V and Figure 3).

4.2.2 Determination coefficient for mediating relationships \( (R^2) \). Another standard used for assessing structural model is coefficient of determination \( (R^2) \) of the endogenous construct (Hair et al., 2014, 2011, 2012; Henseler et al., 2009). According to Chin (1998); Hair et al. (2011, 2014, 2016) \( R^2 \) values of 0.25, 0.50 and 0.75 indicates small, medium and substantial \( R^2 \) values respectively. Similarly, Falk and Miller (1992) suggest 10 per cent as a minimum acceptable level of \( R^2 \) value.

Table VI shows the \( R^2 \) value of all the endogenous constructs (EC and OP) are small with (0.48) and (0.49) values respectively.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Beta</th>
<th>STD-error</th>
<th>( t )-values</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA -&gt; OP</td>
<td>0.28</td>
<td>0.09</td>
<td>3.27</td>
<td>Supported</td>
</tr>
<tr>
<td>PA -&gt; EC</td>
<td>0.69</td>
<td>0.04</td>
<td>15.99</td>
<td>Supported</td>
</tr>
<tr>
<td>EC -&gt; OP</td>
<td>0.48</td>
<td>0.09</td>
<td>5.53</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Notes: ***\( p < 0.001; ** \( p < 0.01; * \( p < 0.05

Table IV. Mediation hypothesis

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Beta</th>
<th>Std error</th>
<th>( t )-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD -&gt; EC -&gt; OP</td>
<td>0.33</td>
<td>0.07</td>
<td>4.98</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Notes: ***\( p < 0.001; ** \( p < 0.01; * \( p < 0.05

Table III. Hypotheses for a direct relationship and indirect relationship (EC->OP, PA->EC and PA and OP)
4.2.3 Assessment of effect size ($f^2$). Having achieved the coefficient of determination $R^2$ (EC and OP), the next assessment is effect size ($f^2$) as recommended by Hair et al. (2013). Cohen (1988) describes $f^2$ values of 0.02, 0.15 and 0.35 as having small, medium, substantial effects respectively. However, Chin et al. (2003) stress that the smallest strength of $f^2$ of exogenous constructs on endogenous variables should be considered as an effect. Henceforth, the effect size for exogenous constructs could be assessed using the formula below (Cohen, 1988; Selya et al., 2012). Table VII displays the effect size value of mediation model:

\[
\text{Effect size} : f^2 = \frac{R^2_{\text{Included}} - R^2_{\text{Excluded}}}{1 - R^2_{\text{Included}}}
\]

The effect size values of 0.06, 0.92 and 0.20 considered as small, large and medium having suitable effect size displays in Table VII.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Relationship</th>
<th>Path a</th>
<th>Path b</th>
<th>a*b (Beta)</th>
<th>5% LL</th>
<th>95% UL</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4</td>
<td>TD $\rightarrow$ EC $\rightarrow$ OP</td>
<td>0.69</td>
<td>0.48</td>
<td>0.33</td>
<td>0.02</td>
<td>0.12</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Note:** Hypothesis is supported when there is no zero (i.e. when LL has a negative sign and UL has a positive sign) between LL and UL.

**Table VII.**
Assessment of the effect size for mediating relationships: $F$-Square

<table>
<thead>
<tr>
<th>Constructs</th>
<th>$R^2_{\text{Included}}$</th>
<th>$R^2_{\text{Excluded}}$</th>
<th>$f$-squared</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA-OP</td>
<td>0.49</td>
<td>0.46</td>
<td>0.06</td>
<td>Small</td>
</tr>
<tr>
<td>PA-EC</td>
<td>0.48</td>
<td>0.00</td>
<td>0.92</td>
<td>Large</td>
</tr>
<tr>
<td>EC-OP</td>
<td>0.49</td>
<td>0.39</td>
<td>0.20</td>
<td>Medium</td>
</tr>
</tbody>
</table>

**Table VI.**
Variance explained in the endogenous latent constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Variance explained ($R^2$) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>49</td>
</tr>
<tr>
<td>EC</td>
<td>48</td>
</tr>
</tbody>
</table>

**Table V.**
Confidence interval calculation for mediation test

**Figure 3.**
Structural model for mediation relationship
4.2.4 Assessment of predictive relevance. This study further assesses the predictive volume of the full model. It was conducted through blindfolding process to determine how the values are assembled around the model. The result of cross-validated redundancy was used because it explains how capable the model is to predict the endogenous constructs. It is believed that any model above “0” has predictive relevance, it has the ability to predict relationship and if the value is “0” and below means, the model has no any predictive influence (Geisser, 1974; Stone, 1974).

From the Table VIII above, $Q^2$ revealed an outstanding relevance of 0.23 for the endogenous construct (OP). Thus, based on Chin (1998), Geisser (1974), and Stone (1974) the model of this study has medium predictive relevance. However, predictive relevance cannot be conducted on formative construct (EC) (Hair et al., 2014) (Figure 4).

4.3 Discussion of findings and hypothesis testing
This study investigates the mediating effect of EC on the relationship between performance appraisal and OP. Statistically, result revealed that all the study hypotheses were found significantly supported as demonstrated in Table III Hypotheses for a direct relationship and indirect relationship (EC→OP, PA→EC and PA and OP)

4.3.1 HA1: Performance appraisal is significantly positively related to ethical climate. Table III shows that there is a relationship between performance appraisal (PA) and EC. This revealed a significant relationship with a $\beta$ value = 0.69 and a $t$-value of 15.99. The study findings established that PA enables organizations’ ability to develop more EC that can lead to OP.

Similarly, the result of Table III revealed that direct effect between PA and OP shows 0.09 greater than the indirect effect of PA on EC. The result of this study is consistent with some prior studies (Ali, 2015; Giauque et al., 2013). In support of that, RBV theory highlighted that human resource system (performance appraisal) can create and sustain competitive advantage in the organization through resources that are within the organizational capacity for instance; ethics and culture (Manroop et al., 2014). In a related point, RBV theory stress that success is determined by the organization’s resources controls and the uniqueness of the tangible and intangible resources in which this study considered performance appraisal and EC as intangible resources that can be uniquely acquired in the organization (Amit and Schoemaker, 1993).

<table>
<thead>
<tr>
<th>Total</th>
<th>SSO</th>
<th>SSE</th>
<th>1-SSE/SSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>905</td>
<td>697.978</td>
<td>0.23</td>
</tr>
</tbody>
</table>

Note: SSO (sum of square root observations) SSE (sum of square root predictive errors)

Table VIII. Predictive relevance $Q^2$

Empirical analysis

61

Figure 4. Predictive relevance for mediation model
4.3.2 HA2: Ethical climate is significantly positively related to organizational performance. Table III demonstrated that there is a relationship between the EC and OP with β value = 0.48 and a t-value of 5.53. The result revealed that there is a direct effect between EC and OP. In this regards, EC plays an imperative role in improving OP. It considers essential organizations set of ethical values for its employees alongside providing an enable atmosphere that encourages ethical behavior, capable leadership, trust, commitment and creates workforce value to improve OP. The result of this study is consistent with some prior studies (Bowman and Knox, 2008; Hijal-Moghraibi et al., 2015; Sabiu et al., 2016a). In the same manner, changing the unethical conduct of employees within the organizations, through the effects of EC may result to huge significant of performance improvement and entire system (Arulrajah, 2015). EC boosts and enforces the employees to acquire suitable ethical behavior in discharging their responsibilities within the organization. In this regards, ethical behavior of employees viewed as essential in realizing organizational success and performance (Brown et al., 2005; Winstanley and Hartog, 2002; Barney, 2001; Reed and DeFillippi, 1990; Sabiu et al., 2016b; Wright and McMahan, 1992).

4.3.3 HA3: Ethical climate significantly positively mediates the relationship between performance appraisal and organizational performance. Table IV presents the mediation of hypothesized relationship of EC on performance appraisal (PA) and OP is also supported with β value = 0.33 and a T-value of 4.98. The result of this study is consistent with some prior studies (Ali, 2015; Giauque et al., 2013) which show that PA is associated with OP through EC mediating variables. The findings of the study are in conformity with the RBV, the result highlights that PA as an internal valuable resource may improve OP through EC. In addition, the mediation result proves that PA is an important predictor of EC in the context of PESA, which in return enables the organization to improve performance, this also tent to show that if organization focus on proper performance evaluation with higher level of fairness and make it regularly, considering setting goals for personal development can develop ethics within the organization and result to OP. Therefore, it is important for PESA to add more effort in seeing the actual contribution of performance appraisal toward nurturing EC and leads OP.

The mediation hypothesis (EC) on the link between performance appraisal and OP supported RBV theory that highlighted human resource system of performance appraisal can create and sustain competitive advantage in the organization through resources that are within the organizational capacity for instance; ethics and culture (Manroop et al., 2014). Nigerian PESA can appropriately utilize the postulation of the RBV theory in respect of internal resources that can leads to a competitive advantage in an organization that can influence performance and competitive advantage more particularly through ethics.

4.4 Implications of the study
The empirical findings of the study show that the role of ECs’ immediate supervisors is deemed to be at the utmost crucial in transforming the employees especially the front line into a valuable human capital, thus displaying leader as the one who “lead the ship” to move forward. Hence, the study findings provide benefits for the line managers and HR/HC managers in service organization towards choosing suitable styles that could polish their abilities and assist in maximizing the profitability of service organization. Moreover, a good leader should come with a strong character and charisma, caring, good listener, negotiable, positive values, continuously guide and mentor the team, “protective” of his/her subordinates, endurance to dealing with office politics and walk the talk in the real corporate world. Performance appraisal acts an important factor of the function of overall HRM in the State Corporations, ministries and County Governments. On the whole, performance
The appraisal process is supposed to manage and improve effective feedback and communication. The findings of the study highlight ways of improving OP, communication and feedback ensure that employees being assessed are given information about their performance. For prevention of performance-related issues, managers have to communicate vision, mission, and objectives of the organization to ensure employees understand their performance goals. Highly effective communication process should allow one on one discussion of staff performance appraisal issues. The Ministry should give employees opportunity for responding and asking questions that help them improve performance and ensure employees are motivated by appreciating their opinions.

This study contributes to managerial implications for Administrators and Managers, especially in the Public Educational sector setting. Managers are encouraged to invest in terms of time, money, commitment and other resources to implement the effective performance appraisal system. Evidence from this study suggests that organizations should develop EC on the relationship between performance appraisal and OP. Fundamentally, the results of this study will help the managers, administrators, policy makers/stakeholders and policy implementation committee in Nigerian PESA ministries, boards, agencies as well as the parastatals to be encourage and ensure proper and adequate assessment of employees with quick response that can creates ethics among the personnel and the system in general to promote superior performance. The overall results from this study confirm that HRMP factors (Performance appraisal) contribute towards OP. Thus, Nigerian PESA ministries, boards, agencies should strive to associate the implementation of performance appraisal with EC. Staff motivation through an effective reward system has an important role in encouraging employees to accept changes like performance appraisal system approach without fear. The findings from this study of the mediating effect of EC elements have a number of limitations. Recommendations for future study were provided based on the limitations of the research findings.

4.4.1 Limitations and recommendations for future research. Taking into account the above limitations, future research directions are recommended. Future research is highly welcome to look into multiple areas or sectors to gain additional insights into how these concepts apply to another context. Moreover, further expansion of this research to another type of industries, sectors or nations would significantly contribute to providing more evidence to support the adoption of leadership and Islamic human capital development. Besides that, the utilization of longitudinal and observational approach may prove to provide more thorough evidence and limiting the risk of potential bias on employee’s perception. Furthermore, the use of mixed method or incorporation of both qualitative and quantitative methods will potentially yield further understandings into the impact of leadership styles.

5. Conclusion
This study was conducted to understand the mediation effect of EC on the relationship between performance appraisal and OP. The findings established that EC is capable of mediation the relationship between performance appraisal and OP. The study contributes to the existing knowledge by examining the relationship between performance appraisal and OP in Nigerian educational sector administration empirically and statistically. Relatively, many studies established that there is a relationship between performance appraisal and OP without proving the extent of the relationships that exist between Performance appraisal and OP through a mediating factor EC. The study recommends the use of the large sample; another country educational sector administration can also conduct a similar study using other factor or bundles of practice to replicate the result of this study. Future research can validate the model.
References


Further reading


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FCCSP IMC growth under reliability stress follows automotive criteria

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Advanced Semiconductor Engineering Co Ltd (ASE Group Chung-Li), Taoyuan City, Taiwan

Abstract

Purpose – The Kirkendall void had been a well-known issue for long-term reliability of semiconductor interconnects; while even the KVs exist at the interfaces of Cu and Sn, it may still be able to pass the condition of unbias long-term reliability testing, especially for 2,000 cycles of temperature cycling test and 2,000 h of high temperature storage. A large number of KVs were observed after 200 cycles of temperature cycling test at the intermetallic Cu₃Sn layer which locate between the intermetallic Cu₆Sn₅ and Cu layers. These kinds of voids will grow proportional with the aging time at the initial stage. This paper aims to compare various IMC thickness as a function of stress test, the Cu₆Sn₅ and Cu₃Sn IMC do affected seriously by heat, but Ni₃Sn₄ is not affected by heat or moisture.

Design/methodology/approach – The package is the design in the flip chip-chip scale package with bumping process and assembly. The package was put in reliability stress test that followed AEC-Q100 automotive criteria and recorded the IMC growing morphology.

Findings – The Cu₆Sn₅ intermetallic compound is the most sensitive to continuous heat which grows from 3 to 10 μm at high temperature storage 2,000 h testing, and the second is Cu₃Sn IMC. Cu₆Sn₅ IMC will convert to Cu₃Sn IMC at initial stage, and then Kirkendall void will be found at the interface of Cu and Cu₃Sn IMC, which has quality concerning issue if the void’s density grows up. The first phase to form and grow into observable thickness for Ni and lead-free interface is Ni₃Sn₄ IMC, and the thickness has little relationship to the environmental stress, as no IMC thickness variation between TCT, uHAST and HTSL stress test. The more the Sn exists, the thicker Ni₃Sn₄ IMC will be derived from this experimental finding compare the Cu/Ni/SnAg cell and Ni/SnAg cell.

Research limitations/implications – The research found that FCCSP can pass automotive criteria that follow AEC-Q100, which give the confidence for upgrading the package type with higher efficiency and complexities of the pin design.

Practical implications – This result will impact to the future automotive package, how to choose the best package methodology and what is the way to do the package. The authors can understand the tolerance for the kind of flip chip package, and the bump structure is then applied for high-end technology.

Originality/value – The overall three kinds of bump structures, Cu/Ni/SnAg, Cu/SnAg and Ni/SnAg, were taken into consideration, and the IMC growing morphology had been recorded. Also, the IMC had changed during the environmental stress, and KV formation was reserved.

Keywords Automotive, IMC, Cu pillar, Kirkendall void, Solder bump

Paper type Research paper

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Abbreviation
KV = Kirkendall Void;
TCT = Temperature Cycling Test;
uHAST = unbias Humidity Accelerated Stress Test;
HTSL = High Temperature Storage Test;
IMC = Intermetallic Compound;
FCCSP = Flip Chip Chip Scale Package;
GPS = Global Position System;
RDL = Redistribution Layer;
JEDEC = Joint Electron Device Engineering Council;
DOE = Design of Experiment;
HAST = Humidity Accelerated Stress Test;
Min = Minimum;
FCLGA = Flip Chip Land Grid Array; and
RH = Relative Humidity.

1. Introduction
The automotive integrated circuit (IC) market will outgrow by two or even three times of the existing IC market. Market researchers predict that automotive semiconductors will occupy more than 15 per cent of the total semiconductor market by 2025, especially for those analog IC of intelligence vehicle. It is noteworthy that flip chip package becomes the automotive devices solution gradually because of the higher efficiency and complexities of the pin design. More and more design houses are moving toward flip chip or wafer-level fan-out package design for automotive infotainment, radar and GPS application. These changes will enable automobiles to become reliable and intelligent, so as let the packaging industry prioritize the development of advanced package for the next generation of automotive market requirements.

Focusing on the semiconductor industry, more and more devices turn their assembly form from legacy wire bonding to flip chip owing to the higher performance with shorter electrical signal transition path. Also, flip chip package can do more complex design, as the transition outset will not be limited at outer ring but full die area. Wire bonding, the flip chip assembly requires the media-like pillar or solder bump to link signal between the chips and substrate; hence, the interconnection of the microstructural evolution do associate with effectiveness of reliability.

The Kirkendall void issue had been raised up (Wang et al., 2009; Weinberg and Bohem, 2009; Tu, 2007), and lots of experts bring forward the view of why KVs were generated and how to inhibit the existing voids to extend the lifetime for electronic devices (Christine et al., 2012; Liu et al., 2013). The Kirkendall effect is the atomic movement of a diffusion system with the result of mass flow accompanying by a vacancy flow in the opposite direction. Although the voids exist at the intermetallic layer, the electrical signal may still be able to transit through the voids and passes the functional test. Adding Ni layer is the most common solution to extend the lifetime by blocking the Cu/Sn IMC diffusion, as it is more resistant to dissolution into solder joints (Lin et al., 2008); yet, higher resistance will be because of the natural characteristic of Ni layer, and even some of the magnetic sensitive devices may have concern for adding these material; hence, the lifetime and void formation rate is extremely important for the device when to do the design from the initial stage.

2. Experimental works
The FCCSP daisy chain test vehicle applied for the current investigation was 6.64 × 4.98 mm die packaged in 9.60 × 9.60 mm with 211 I/O. The RDL daisy chain was designed not only at...
substrate side but also at die side, so the open/short test could detect the entire signal net. The test vehicle's bonding diagram is shown in Figure 1.

The test vehicle was prepared following mainstream FCCSP manufacturing technology with four-layer die structure and three-layer ETS substrate; the schematic representation is shown in Figure 2. The die design is daisy chain RDL with two polyimide (PI) layers and plating bump, then flip chip onto substrate with mass reflow process. After molding, the substrate was singulated to single unit for open/short testing. Table I shows the configuration of the package information of the daisy chain test vehicle structure.

3. Experimental plan
Three kinds of bump structure were selected and allocated with two passivation types which are well known as PI and polybenzoxazole (PBO). All the DOE legs are listed down in the Table II below.

Those DOE legs were built up with same mask, except for first layer of passivation, but just revised the mask tone for light transferred. The following daisy
chain RDL and UBM process is the same. Hence, the three kinds of electrical connection point and passivation type were comparable for the automotive criteria reliability performance.

4. Testing procedures
The dies after grinding and sawing were assembled into daisy chained ETS test substrate which pad finish is bare Cu pads, and do molding process to protect the whole package. Then, the solder paste will be printed at substrate lead side. Before the long-term reliability testing, all the samples need to do final open short testing to ensure the signal is transmitted. Reliability testing was carried out according to JEDEC specifications and follow automotive AEC Grade 0 as shown in Table III shows.

The failure was judged by open short testing, and the failure criterion is zero failure from structure damage. In addition to the monitoring of IMC growing morphology, cross-section and scanning electron microscopy (SEM) to time zero and every reliability read point were performed.

<table>
<thead>
<tr>
<th>Test vehicle feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Die side</strong> Structure</td>
<td>2 PSV with RDL and UBM</td>
</tr>
<tr>
<td>min pitch (μm)</td>
<td>150</td>
</tr>
<tr>
<td>RDL stackup</td>
<td>Ti/Cu/plated Cu</td>
</tr>
<tr>
<td>UBM stackup</td>
<td>Ti/Cu/plated Cu or Ni and SnAg</td>
</tr>
<tr>
<td>UBM diameter (um)</td>
<td>85</td>
</tr>
<tr>
<td><strong>Substrate side</strong> Structure</td>
<td>FCLGA</td>
</tr>
<tr>
<td>Package size (mm)</td>
<td>9.6 × 9.6</td>
</tr>
<tr>
<td>Package thickness (mm)</td>
<td>775</td>
</tr>
<tr>
<td>min pitch (um)</td>
<td>500</td>
</tr>
<tr>
<td>Lead size (um)</td>
<td>260</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leg</th>
<th>Passivation</th>
<th>Bump structure</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PI</td>
<td>Ni/SnAg</td>
<td>Standard solder bump</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Cu/Ni/SnAg</td>
<td>Standard Cu pillar</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Cu/SnAg</td>
<td>Ni-free pillar</td>
</tr>
<tr>
<td>4</td>
<td>PBO</td>
<td>Ni/SnAg</td>
<td>Plated solder bump with PBO</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Cu/Ni/SnAg</td>
<td>Cu pillar with PBO</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Cu/SnAg</td>
<td>Ni-free pillar with PBO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reliability test item</th>
<th>Criteria (AEC Q100 Grade 0 Criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precondition JESD22-B112A</td>
<td>Level 3:30°C/60% RH 192 h</td>
</tr>
<tr>
<td>Unbias high temperature storage JESD-103</td>
<td>150°C, 500/1,000/1,500/2,000 h</td>
</tr>
<tr>
<td>Unbias HAST JESD22-A118</td>
<td>110°C/85% RH, 96/168/264hrs</td>
</tr>
<tr>
<td>Temperature cycling test JESD22-A104</td>
<td>−55-150°C, 500/1,000/1,500/2,000 cyc</td>
</tr>
</tbody>
</table>

Table I. Configuration of FCCSP TV

Table II. Design of experiment cell of PSV and bump structure

Table III. Reliability testing criteria follow automotive AEC Q100 spec
5. Results and analysis
There are three kinds of bump structure such as Cu pillar with Ni barrier layer, Ni-free Cu pillar and plated solder bump, and the SEM of bumped structure is shown in Figure 3. The process flow is all the same but only different in plating sequence.

![SEM of bumped die](image)

**Figure 3.** SEM of bumped die

Notes: (a) Plated solder bump; (b) plated Cu pillar

<table>
<thead>
<tr>
<th>Leg</th>
<th>Passivation</th>
<th>Bump structure</th>
<th>Reliability test item</th>
<th>Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PI</td>
<td>Ni/SnAg</td>
<td>Precondition Lv3</td>
<td>0/77</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Precon + uHAST 96/168/264 h</td>
<td>0/77</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Precon + TCT 500/1,000/1,500/2,000 cyc</td>
<td>0/77</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>HTSL 500/1,000/1,500/2,000 h</td>
<td>0/77</td>
</tr>
<tr>
<td>5</td>
<td>Cu/Ni/SnAg</td>
<td></td>
<td>Precondition Lv3</td>
<td>0/77</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Precon + uHAST 96/168/264 h</td>
<td>0/77</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td>Precon + TCT 500/1,000/1,500/2,000 cyc</td>
<td>0/77</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>HTSL 500/1,000/1,500/2,000 h</td>
<td>0/77</td>
</tr>
<tr>
<td>9</td>
<td>Cu/SnAg</td>
<td></td>
<td>Precondition Lv3</td>
<td>0/77</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>Precon + uHAST 96/168/264 h</td>
<td>0/77</td>
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<tr>
<td>11</td>
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<td>Precon + TCT 500/1,000/1,500/2,000 cyc</td>
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<td>0/77</td>
</tr>
<tr>
<td>13</td>
<td>PBO</td>
<td>Ni/SnAg</td>
<td>Precondition Lv3</td>
<td>0/77</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>Precon + uHAST 96/168/264 h</td>
<td>0/77</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>Precon + TCT 500/1,000/1,500/2,000 cyc</td>
<td>0/77</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td>HTSL 500/1,000/1,500/2,000 h</td>
<td>0/77</td>
</tr>
<tr>
<td>17</td>
<td>Cu/Ni/SnAg</td>
<td></td>
<td>Precondition Lv3</td>
<td>0/77</td>
</tr>
<tr>
<td>18</td>
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<td></td>
<td>Precon + uHAST 96/168/264 h</td>
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<td>HTSL 500/1,000/1,500/2,000 h</td>
<td>0/77</td>
</tr>
<tr>
<td>21</td>
<td>Cu/SnAg</td>
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<td>Precondition Lv3</td>
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<td>Precon + uHAST 96/168/264 h</td>
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<td>HTSL 500/1,000/1,500/2,000 h</td>
<td>0/77</td>
</tr>
</tbody>
</table>

Table IV.
Reliability testing matrix table
After bumping process, the three kinds of structure are packaged onto three-layer substrate with same process flow. The open/short can sort out functional pass units and then send for long-term reliability testing.

The long-term reliability testing results are summarized in Table IV. All the DOE legs pass automotive reliability criteria followed by AEC Q100 Grade 0 condition. Each condition had released 77 units for testing, and does open/short testing after each read point, and no failure was found when finishing overall conditions. Besides, one sample of each read point was picked up for the cross-section to study the IMC growing morphology.

The IMC growing thickness and analysis are summarized as following. T0 represents the bumped die joint to substrate with one time reflow only, and the sections for Ni-free pillar, Cu pillar and solder bump are shown in Figure 4. The IMC thickness at the interface of pillar Cu and solder, Ni and solder is monitored and recognized because of the KV that will be found at the Ni-free pillar condition and then compared to Ni barrier layer cell.

Among all of the DOE conditions, no recognized key factor related to passivation type, the possible reason is that those dies were protected in the molding under-fill, hence the passivation type not impact to the result, so as only the bump structure and read point are comparable.

IMC layer thickness of time zero and final read point 2,000 temperature cycles are shown in Figure 5. There are two kinds of IMC at the interface of Cu and Pb-free solder of Ni-free pillar cell, due to the atomic inter-diffusion, Cu$_5$Sn$_5$ IMC will be formed at the interface of Cu and solder, then Cu$_3$Sn layer grows accompany with thermal stress. Ni$_3$Sn$_4$ is the IMC

Notes: (a) Ni-free pillar; (b) Cu pillar; (c) solder bump

Automotive criteria

Figure 4.
Cross-section of T0
Figure 5. Cross-section of TCT 2,000 cycles

Notes: (a) Ni-free pillar; (b) Cu pillar; (c) solder bump

Figure 6. IMC growing thickness under TCT stress test
formation of the Ni and Pb-free solder, which can be found at the Cu pillar and solder bump cell. Ni$_3$Sn$_4$ is the first phase to form and grow into observable thickness in a solid Ni/liquid Sn reaction couple during process.

Precondition and temperature cycling test of the IMC growing morphology is shown in Figure 6. The IMCs are growing steadily with thermal stress. From the chart, it is obviously that the Cu$_6$Sn$_5$ and Cu$_3$Sn growing rates are different from Ni$_3$Sn$_4$ IMC with lower growing rate.

If separate, the Cu$_6$Sn$_5$ and Cu$_3$Sn IMC thickness for the analysis is shown in Figure 7, and it can be found that the Cu$_6$Sn$_5$ IMC thickness has slightly decreased, and then grows when the thermal stress has increased. Furthermore, the Cu$_3$Sn IMC thickness has an increasing rate from time zero to precondition but cease to grow up when the temperature...
cycling stress join, but the quality concerned with Kirkendall void was found from 200 cycles at Cu$_3$Sn IMC layer as shown in Figure 8.

The IMC thickness under unbias HAST test result is shown in Figure 9. It is under same phenomenon as temperature cycling stress, Ni$_3$Sn$_4$ grows fast accompany with the

---

**Figure 9.**
IMC growing thickness under uHAST stress test

---

**Figure 10.**
Cu$_6$Sn$_5$ and Cu$_3$Sn IMC thickness under uHAST stress test
thermal stress, but $\text{Cu}_6\text{Sn}_5$ and $\text{Cu}_3\text{Sn}$ IMC thickness not showing much difference. The Figure 10 shows $\text{Cu}_6\text{Sn}_5$ and $\text{Cu}_3\text{Sn}$ IMC thickness separately, and $\text{Cu}_6\text{Sn}_5$ IMC also covert to $\text{Cu}_3\text{Sn}$ IMC when the environmental stress participate in, then keep in steady even the testing hours from 96 to 264. The 110°C is not affected to the IMC growing morphology in evidence, but the atomic interdiffusion still exists. The KV issue as Figure 11 under uHAST test is not as serious as temperature cycling test, as the added stress is less in temperature and time.

The last test condition need to be discussed is high temperature storage which is the most rigorous to IC testing. From the IMC growing thickness analysis in Figure 12, the $\text{Cu}_6\text{Sn}_5$ and $\text{Cu}_3\text{Sn}$ IMC grow faster than $\text{Ni}_3\text{Sn}_4$ IMC, at 2,000 read point, and the total thickness exceed 12 $\mu$m which may be the half of the solder standoff height. The environmental 150°C does affect the Cu-Sn IMC growing morphology but does not affect the Ni-Sn IMC layer, which remains the same growing rate as per the previous two conditions.

The Figure 13 explains the $\text{Cu}_6\text{Sn}_5$ IMC thickness that will be influenced by the continuous heat stress, and part of the $\text{Cu}_6\text{Sn}_5$ IMC converts to $\text{Cu}_3\text{Sn}$ IMC, and then itself grows up accompanying with the stress time and grows up to near average 10 $\mu$m. The

![Figure 11. Zoom in section for Ni-free pillar at uHAST 264 h](image1)

![Figure 12. IMC growing thickness under HTSL stress test](image2)
Cu$_3$Sn IMC also be impacted by the heat stress slightly, it did not keep the layer thickness, but become thicker with the time under heating. Also, the KV quality is critical for those voids that almost connect to each other as Figure 14 shows up. Yet, even under this full of void situation, the open/short testing still gives green light for the electrical signal transition pass.

When Cu contact with liquid Sn under the temperature range of 112-227°C, the diffusivity of Cu in Sn was much faster, and the intermetallic compounds will be formed in the interphase region which can be derived from the binary Cu-Sn phase diagram as in Figure 15. The intermetallic Cu$_6$Sn$_5$($\eta$) is important because of the large number of tin–lead and lead-free solder joints formed directly to copper. This IMC forms an interfacial layer and can be found in the bulk microstructure solder joints where

**Figure 13.**
Cu$_6$Sn$_5$ and Cu$_3$Sn IMC thickness under HTSL stress test

**Figure 14.**
Zoom in section for Ni-free pillar at HTSL 2,000 hrs
**Figure 15.**
Binary Cu-Sn phase diagram

**Figure 16.**
Binary Ni-Sn phase diagram

*Source: Massalski (1996)*
excessive time and temperature are involved during the soldering process, and Cu$_3$Sn ($\varepsilon$) will be converted and grown. The formation of the $\varepsilon$ phase and the interrelationship between the $\varepsilon$ phase and the $\eta$ phase growth are more complicated (Tu, 1973; Tu and Thompson, 1982; Clevenger et al., 1998). However, the Cu$_3$Sn($\varepsilon$) is the IMC that unwilling to be found since the KV usually located in this layer.

The growth kinetics of the Ni$_3$Sn$_4$ phase appeared to be parabolic and diffusion-controlled (Oh, 1994). Ni$_3$Sn$_4$ IMC is the first phase to form and grow into observable thickness in a solid Ni/liquid Sn reaction couple which will be derived from the Ni-Sn binary diagrams as shown in Figure 16. After the formation of continuous Ni$_3$Sn$_4$, further growth occurs as a result of the diffusion of Sn through the intermetallic layer. The other three equilibriums Ni IMCs, Ni$_3$Sn$_2$ and Ni$_3$Sn grow with much slower kinetics and have difficulties in nucleating at the Ni/Sn interface. In both Ni$_3$Sn$_2$ and Ni$_3$Sn, the main diffusing species during the growth is Ni (Bader et al., 1995).

6. Conclusions

- The FCCSP package can pass through automotive reliability criteria that follow AEC Q100 Grade 0 condition, with solder bump or Cu pillar structure, and the molding underfill only can protect fragile dies from the environmental stress.
- The Cu$_6$Sn$_5$ intermetallic compound is the most sensitive to continuous heat which grows from 3 to 10 $\mu$m at high temperature storage 2,000 h testing, and the second is Cu$_3$Sn IMC.
- Cu$_6$Sn$_5$ IMC will convert to Cu$_3$Sn IMC at the initial stage, and then Kirkendall void will be found at the interface of Cu and Cu$_3$Sn IMC, which has the quality concerning issue if the void’s density grows up.
- The first phase to form and grow into observable thickness for Ni and lead-free interface is Ni$_3$Sn$_4$ IMC, and the thickness has little relationship to the environmental stress, as no IMC thickness variation between TCT, uHAST and HTSL stress test.
- The more the Sn exists, the thicker Ni$_3$Sn$_4$ IMC will be derived from this experimental finding compare the Cu/Ni/SnAg cell and Ni/SnAg cell.

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