

Corruption and Public Debt in Developing Countries: Role of Institutional Quality

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ABSTRACT

This study investigates the effect of corruption on public debt in selected Asian and African developing countries for the time period 1990-2016. The System Generalized Method of Moment (GMM) is applied on three measures of corruption by ICRG, transparency International and Worldwide Governance Indicators. The findings suggest that corruption leads to high public debt accumulation in Asian and African countries however the intensity of this relationship is sharper for the African region than the Asian. The study found the role of institutional quality as mitigating in the corruption-debt relationship. And the computed threshold level of institutional quality provides 4 and 3.66 for Asia and Africa as benchmark, respectively that can offset the adverse effect of corruption on public debt. The study also elucidates the findings by computing marginal effects of corruption on public debt at various levels of country-specific institutional quality which reflect the relative standing of each country. Overall, empirical findings suggest adopting effective measures to combat corruption to reduce public debt burden in both regions. A strong judicial system around the anti-corruption strategies and improvement in institutional quality can lower the debt burden through effective control of corruption. Besides, the debt burden situation of the regions can be improved by bolstering GDP as well.

ملخص

تبحث هذه الدراسة في تأثير الفساد على الدين العام في بلدان نامية آسيوية وأفريقية مختارة للفترة الزمنية الممتدة ما بين 1990 و 2016. ويتم تطبيق أسلوب اللحظات المعمم (GMM) على ثلاثة مقاييس للفساد من قبل الدليل الدولي لتقييم المخاطر في البلدان (ICRG) والشفافية الدولية ومؤشرات الحوكمة العالمية.

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وتشير النتائج إلى أن الفساد يؤدي إلى ارتفاع تراكم الديون العامة في البلدان الآسيوية والأفريقية، ولكن هذه العلاقة أكثر حدة بالنسبة للمنطقة الأفريقية من الآسيوية. ووجدت الدراسة أن الجودة المؤسسية تلعب دوراً في التخفيف من علاقة الفساد بالديون. ويولي مستوى العتبة المحسوبة للجودة المؤسسية معيار 4 و 3.66 لآسيا وأفريقيا، على التوالي، الأمر الذي من شأنه أن يعوض الأثر السلبي للفساد على الدين العام. وتوضح الدراسة أيضاً النتائج من خلال حساب الآثار الهامشية للفساد على الدين العام على مستويات مختلفة من الجودة المؤسسية الخاصة بكل بلد والتي تعكس المكانة النسبية لكل بلد. وبشكل عام، تشير النتائج التجريبية إلى اعتماد تدابير فعالة لمكافحة الفساد للحد من عبء الدين العام في كلا المنطقتين. كما أن وجود نظام قضائي قوي بشأن استراتيجيات مكافحة الفساد وتحسين الجودة المؤسسية من شأنه أن يقلل من عبء الديون من خلال السيطرة الفعالة على الفساد. وإلى جانب ذلك، يمكن تحسين وضع عبء الديون في المنطقتين من خلال تعزيز الناتج المحلي الإجمالي أيضاً.

ABSTRAITE

Cette étude examine l'effet de la corruption sur la dette publique dans certains pays en développement asiatiques et africains pour la période 1990-2016. La Méthode Généralisée des Moments (GMM) est appliquée sur trois mesures de la corruption par ICRG, Transparency International et Worldwide Governance Indicators. Les résultats suggèrent que la corruption conduit à une forte accumulation de la dette publique dans les pays asiatiques et africains, mais l'intensité de cette relation est plus forte dans la région africaine que dans la région asiatique. L'étude a révélé le rôle de la qualité institutionnelle comme facteur d'atténuation de la relation corruption-dette. Et le niveau seuil calculé de la qualité institutionnelle fournit 4 et 3,66 pour l'Asie et l'Afrique comme référence, respectivement, qui peut compenser l'effet négatif de la corruption sur la dette publique. L'étude élucide également les résultats en calculant les effets marginaux de la corruption sur la dette publique à différents niveaux de qualité institutionnelle spécifique au pays, qui reflètent la position relative de chaque pays. Dans l'ensemble, les résultats empiriques suggèrent l'adoption de mesures efficaces de lutte contre la corruption pour réduire le poids de la dette publique dans les deux régions. Un système judiciaire solide entourant les stratégies de lutte contre la corruption et l'amélioration de la qualité institutionnelle peuvent réduire le fardeau de la dette grâce à un contrôle efficace de la corruption. En outre, la situation de la dette des régions peut être améliorée en soutenant le PIB ainsi que la croissance économique.

Key Words: Public Debt; Corruption; Developing Countries; System-GMM

JEL Codes: D73; H63

1. Introduction

Corruption generally refers to the rent seeking behavior of public officials where the discretionary power of public officials leads to the advent of corruption. The issue of corruption started gaining scholarly attention during 1980-90s in the wake of financial and industrial revolution that accompanied with the financial liberalization process in developing countries leading its way to corruption, particularly in the countries where the law and order was weak (Robb, 1992). According to Corruption Perception Index report (2018), two-third of 180 countries are placed below the average score of corruption indicating high corruption where Asian and African countries are among the worst performers.³ Two major events; Asian financial crisis in 1997-98 and corruption scandals of high-level government officials during 90's underscored corruption as a major issue in Asia. While the wave of corruption in African region step in through colonialism when corruption penetrated widely in societies and the post-colonial independence of African countries inherited it as a way of life. The misuse of revenues by the government officials and corruption in the natural resources left the region incapable to improve the living standards of its citizens and it lagged in many ways consequently (Lumumba, 2011). Overall, corruption has remained a major threat to the Asian and African countries' stability and economic growth.

The literature on corruption identified it as detrimental for economic growth through its negative bearing on investment and because it diverts the government expenditure towards non-development sectors ((Mauro, 1998; Tanzi and Davoodi, 2002; Dellavallade, 2006). Moreover, the excessive increase in public expenditures as a cover of corruption can generate large fiscal deficit and the public borrowings to finance this deficit translates into further debt accumulation. According to Benfratello, Monte and Pennacchio (2018), corruption tends to reduce economic growth which in turn enlarges the public debt, on the one hand while the corrupt public officials create fiscal imbalance by widening the gap between expenditures and revenues, on the other and both ways ultimately lead to enlarge the public debt.

After the Global Financial Crisis (2008-09), massively rising public debt has been witnessed due to large fiscal deficits. Though, internal

³ The CPI (2018) used the scale ranging from 0 to 100, where 0 shows highly corrupt and 100 depicts least corrupt country.

borrowings can fill in the saving-investment gap and help the countries in achieving their macroeconomic goals however its success largely hinges on the proper and efficient utilization of borrowed funds. Otherwise, the prevalent corruption can exert a pressure on the economy by exacerbating debt liabilities and can hamper the process of economic development.

With this background, this study aims to empirically investigate the effect of corruption on public debt for a panel of 83 Asian and African developing countries along with providing a comparative analysis of the regions over the time period 1990-2016.⁴ As the weak structural and institutional framework in developing countries is expected to make debt and corruption unmanageable side by side, this study also investigates the intervening role of institutional quality in the corruption-public debt relationship. Literature mostly uses only one or the other measure of corruption, while this study employs three measures of corruption including corruption indexes by Transparency International, International Country Risk Guide and Worldwide Governance Indicator and is expected to provide more robust analysis. The study also elucidates the findings with computed marginal effects of corruption on public debt at various levels of country-specific institutional quality (measured by polity 2) which provides threshold level of institutional quality of both regions. Hence, the study is expected to contribute to literature in many significant ways.

The rest of the paper is organized as follows; section 2 provides the historical evolution of corruption and public debt in developing countries. Third section provides the literature review. Section four presents the methodology including model specification and data description with the justification of variables. Section five reports the empirical results and discussion, and last section concludes the paper with some policy implications.

⁴ The developing countries are selected based on the World Bank classification.

2. Historical Background

2.1. Evidence from Asian Countries

The latest Corruption Perception Index (CPI) of Asian countries shows that more than two third of Asian countries received score below than average global score of forty-three. According to Quah (2003), factors responsible for corruption are low salaries of civil servants, lack of political commitment, high opportunity of corruption and low risk of detection and punishment. During the colonial period, survival became difficult for workers due to low wages which ultimately paved the ways for corruption.

During early 1990s, corruption was comparatively low but printed and mass media started highlighting corruption in government institutions across the Asian region sternly. Later, Asian financial crisis (1997) identified the widespread corruption and nepotism in Thailand, South Korea, Malaysia and Indonesia and stressed on the need of transparency and accountability in these countries (Moran, 1999). The wave of political corruption gained momentum during 2001 when the political leaders in Indonesia, China, Philippines and Thailand were found involved in the act of corruption.

However, after Asian regional crisis, Asian countries especially Indonesia, Malaysia and Thailand adopted various structural reforms and succeeded in implementing the anti-corruption policies effectively. This include anti-corruption initiative in Asia-Pacific under the combined leadership of Asian Development Bank (ADB) and Organization for Economic Co-operation and Development (OECD) that was specifically introduced to control rising corruption in the region.

On the public debt front. Jordan, Iraq and Cyprus have highest debt as percentage of their GDP while in Oman, Kazakhstan and Azerbaijan it is observed as comparatively low (World Economic Outlook, 2018). After recovering from the regional financial crisis, Asian economies started growing again and they started targeting domestic debt markets to reduce foreign currency mismatches and currency risks. Asian capital and bond markets grew faster than many of the mature markets and the share of public debt tremendously increased (Goswami and Sharma, 2011). In the aftermath of financial crises, domestic debt continued to rise with a

declining external debt in Southeast Asian region. Later in years 1998-99, the fiscal consolidations eliminated the budgetary deficits in Asia and minimized domestic financing and excessive public debt (IMF, 2000). However, global financial crisis during 2007-08 intensified the problem that forced the countries to revive their economies through further borrowing. Despite a sharp increase in economic growth and drop down fiscal deficit to 2.6 percent from 3.7 percent in a year from 2010 to 2011, debt to GDP ratio remained high. Not only that the Asian countries borrowed heavily from external sources after financial crises but also the half of the global debt was issued to the emerging economies in Asia.

2.2. Evidence from African Countries

According to Transparency International (2018), Somalia and South Sudan in African region are extremely corrupt countries among one eighty countries. While the Sub-Saharan Africa is declared as worst performing region with an average score of 33 on corruption index. In our sample only six out of fifty-four African countries scored above the average level of corruption indicating relatively better standing on corruption score.

Africa, despite being a resource rich region with abundance of mineral resources, has been lagging behind in terms of economic development since 1960. McFerson (2009) regarded the corruption as main factor responsible for low economic development as the revenues generated from natural resources and more specifically from oil reserves have been misutilized since long. According to the estimates of African Union (2002), 25 percent of GDP is lost in African states due to corruption making it US dollars 148 billion.⁵

Ayee (2002) and Lumumba (2011) identified the poor leadership, inadequate remunerations to public officials, nepotism and patronage, and weak judicial system as the pertinent reasons behind corruption in African countries. Many African countries such as Nigeria, Tanzania, and Democratic Republic of Congo institutionalized corruption during 1960's and 1970's due to civil servants' malpractices. Later, shift from traditional society to modern states created new source of wealth (and power) and provided more avenues for corruption in the public services. According to Brown (2014), police and custom officers were the main offenders in

⁵ C.f. <https://www.oecd.org/cleangovbiz/49693613.pdf>

African countries as they extract the resources from public forcibly. Furthermore, difficult government procedures in public services also became a reason of growing corruption (Masabo, 2014). During late 90s, African countries adopted anti-corruption measures to reduce corruption which could not be materialized due to non-implementation of measures effectively. However, in recent years African countries paid attention to improve their performance due to its damaging effects on the economy. And the average CPI score of the region improved as compared to previous years but it remained below than the average global level.

Regarding the debt situation of region, many African countries started developing domestic debt markets with the support of International Financial Institutions during 2000s. African Development Bank launched African domestic bond fund in 2010 and International Finance Corporation in 2012. The local currency debt markets in Africa were also opened for non-residents and the participation of non-residents widens the investor base. Moreover, external debt relief under the initiatives of International Monetary Fund and World Bank changed the composition of public debt where domestic debt become major component. Specifically, the inability of debt servicing due to sharp decline in petroleum export revenues created debt-overhang in Nigeria. By 2005, country appeared on the list of world's most heavily indebted countries owing to US dollars 35.994 billion. In 2006, the agreement with London and Paris Club reduced almost US dollars 30 billion external debt and the country was removed from the list of highly indebted countries. However, the domestic debt was still over US dollars 10.13 billion and touched a figure of US dollars 30 billion in 2011 (Ogunyemi, 2011).

3. Literature Review

Macroeconomic literature provides contrasting views regarding the public debt where some economists believe that high dependence on public debt generates fiscal and monetary instability leading to economic burden (Say, 1880) while many argued that effective utilization of public borrowings can enhance the economic growth and productive capacity of the economy (Krugman, 1988).

Classical economists believe that public borrowing is not a desirable policy to finance government expenditures because it transfers to the next generation in the form of heavy taxes. Conversely, Keynes' and their

followers justified public debt and stressed on the need of borrowing to take the economy out of recession. In contrast, the New Classical and Rational Expectation Economist, Barro (1974) provided that public debt has no wealth effect.⁶

The public choice theory has remained the major focused theory in explaining the corruption behavior. Rose-Ackerman (1978) regarded the bureaucratic market structure as one of the major reasons of corruption which rolls out the possibility of corruption on the ground of cost-benefit analysis, whenever expected advantage outweighs the cost attached (penalty of being caught and punished) the public officials set to be corrupt. Particularly, rent-seeking model and principal-agent model deals with the causes of corruption in this regard. Krueger (1974) provided a macroeconomic perspective through rent-seeking model and argued that quantitative restrictions imposed by the government results in competition among the individuals for rent which excites the corrupt activities. On the other hand, theory of agency relationship by Ross (1973) focuses on the microeconomic aspect and postulates that agency relationship among two or more parties arises when 'the agent' act on behalf of 'the principal' and both parties tend to maximize their utilities and the deviation from common interest impart a cost on the principal. In the same context, Shleifer and Vishny (1993) connoted the microeconomic theory with its macroeconomic implications and asserted that generally the high-level government acts as principal while the low-level official as agent. And the cost of corruption tends to be higher when the central government is weak in curtailing any outside pressure to handle corruption especially when it comes about government's resource generation and allocation for the provision of public goods and services. The institutional structure of government and the political process plays its own role in determining the level of corruption. Besides, the information asymmetry and uncertainties about costs are the major drivers of bureaucratic corruption. Advertently, corruption may incentivize the low public expenditures and resource allocation among the large and inefficient projects that might provide wider opportunity of rent-seeking leading towards an inefficient expenditure mechanism, as proposed by Pani (2009).

⁶ Ricardo believes that taxation and public borrowing are equivalent forms of financing public expenditures. See Ricardo (1817) for detail.

Overall, this background provides the justification for the inclusion of the role of institutional quality in corruption and public debt relationship. The most obvious cost of corruption is the risk of being caught and being punished that ultimately depends on how much effective the legal system of the country is and how much supportive is the institutional mechanism in the respective country.

A handful of empirical studies are conducted for the world economies on the issue and provides various determinants of public debt where the government expenditures, corruption and shadow economy appeared as major factors responsible for rising public debt. Besides, the domestic price level, foreign direct investment, population and government expenditure are some other determinants of public debt (Bon, 2015; Swamy, 2015).

Particularly, Fry (1997) explored the impact of alternative deficit-financing methods on economic growth for a panel of 66 countries including low income and emerging economies for 1979-1993. The study found market-based domestic debt as the least costly way of financing budget deficit than foreign borrowings. However, Singh (1999) found no co-integrating relationship between public debt and economic growth for India over the time period 1959-1995 and supported Ricardian equivalence which shows neutrality of domestic borrowings on economic growth in the long run.

The indirect role of corruption and shadow economy in rising public debt is highlighted precisely by Fernandez and Velasco (2014) for a panel of 17 regions of Spain for years 2000-2012. They argued that if state government raises funds through tax revenues, it pushes individuals to reduce their consumption which ultimately leads to enlarged shadow economy. And the government has to rely on the public borrowing resulting in public debt accumulation.

The complimentary nature of corruption and shadow economy in determining debt is later confirmed by Cooray, Dzhumashev and Schneider (2016) who investigated it for a panel of 126 countries over 1996-2012. Using two measures of corruption study proved that corruption leads to increase the public debt and the size of shadow economy magnifies the effect of corruption on public debt. For a segregated panel of 64 countries, Benfratello et al., (2018) investigated

the impact of corruption on public debt for the time 1995-2015. The study found a heterogeneous effect of corruption on public debt with sharper effect in high-income countries and weaker in low-income countries. On the other hand, Henri (2018) analyzed the effect of corruption on public debt for a panel of 29 Sub-Saharan African countries for 2000-2015 and the results of system GMM found significantly positive relationship between corruption and public debt because of inefficiencies in public spending. In particular, the inefficient allocation of public spending tends to increase the fiscal deficit which is financed through public and foreign debt in developing countries.

The non-linear relationship between corruption and public debt is recently investigated by Apergis (2019) for 120 countries over the time 1999-2015, who provided a regime-based analysis with a comparison of developed and developing countries. The findings suggest faster response of public debt to highly corrupt regime relative to the low corruption regime.

Regarding the reallocation of resources into non-productive sectors due to corruption, Mauro (1998) and Dellavallade (2006) provided the relationship between corruption and the composition of government expenditure for a cross section and developing countries over the time 1982-1995 and 1996-2001, respectively. The results showed that corruption favors expenditures on defense, fuel, energy and public services at the expense of social sectors which are unattractive for the rent-seekers. Similar result was obtained by Jajkowicz and Drobiszova (2015) for 21 OECD countries for 1998-2011. They argued that diverting the expenditures from social sector to defense and public services is due to maximum opportunity of bribe in later which are not easily monitored by the citizens as compared to social sector.

Although the link between corruption and public debt is widely analyzed but among several factors responsible for high public debt, institutional quality has not gained much attention which is expected to intervene significantly in the debt-corruption relationship. The institutional quality reflects the type of government system existing in respective country where generally the democratic government is supposed to be more vigilant in its transparency of actions due to accountability by the masses as compared with the autocracy. This hypothesis is checked in the study by controlling the indirect effect of institutional quality on public debt

through corruption. Moreover, this study provides country-specific marginal effects of corruption on public debt at various levels of institutional quality. And a comparative analysis of Asian and African countries provides deep insight into region-specific corruption-debt relationship, keeping into account the level of institutional quality in respective regions.

4. Data and Methodology

As discussed in section 3, public debt and corruption relation is based on the rent-seeking behavior of public officials derived from public choice theory that is expected to intensify the public debt burden. However, debt burden itself also gives rise to further debt accumulation ending in circular debt. This provides the justification for using lag value of debt to GDP ratio as regressor to capture its dynamic role. The previous year's debt increases the amortization payments for which government requires more borrowing resulting in public debt accumulation (Liu and Moldogaziev, 2017).

From that context, a dynamic specification of the model for Asian and African countries' panel for the period 1990-2016 is given as below:

$$DEBT_{it} = \alpha_0 + \alpha_1 DEBT_{it-1} + \alpha_2 CORR_{it} + \alpha_3 (CORR * POL)_{it} + \sum_{j=4}^n \alpha_j X_{jit} + \mu_{it} \quad (1)$$

Where, 'i' represents countries, 't' indicates years and 'j' stands for the number of control variables other than focused variables. $DEBT_{it}$ refers to ratio of domestic public debt to Gross Domestic Product, $DEBT_{it-1}$ is the lag of debt to GDP ratio as a measure of amortization payment, $CORR_{it}$ refers to the corruption that is measured in three ways; Corruption Perception Index by Transparency International (1993) which ranges from 0 (totally corrupt) to 10 (absence of corruption); secondly it is measured as the Control of Corruption Index (CCI) provided by Worldwide Governance Indicator (WGI), World Bank and ranges from -2.5 through +2.5 with positive values indicating greater control on corruption. Third measure of corruption is obtained from International Corruption Risk Guide (ICRG) provided by Political Risk Service (PRS) group. The index of control of corruption ranges from 0 (high level of

corruption) to 6 (low level of corruption).⁷ This is pertinent to mention that measures of corruption are rescaled on the same ground for the ease of interpretation following Benfratello et al., (2018) and Cooray, et al., (2016) and minimum value of corruption index for all measures indicates least corruption while the maximum value shows high corruption.

Similarly, $CORR * POL$ is the interaction of corruption and polity2 (an index for institutional quality). The polity index ranges from -10 to +10 where -10 stands for complete autocracy while +10 shows pure democracy. The polity index offers to observe its integrated role in the corruption-public debt relationship. Literature postulates positive link between democracy and quality of government and provides that more consolidated democracies can limit corruption more effectively than autocracies which are least capable in providing the quality government. (Pellegata, 2013; Kolstad and Wiig, 2011; Saha and Campbell 2007). The democratic governments are expected to be more cautious towards their practices due to prevalent competition among the political parties. Accordingly, literature highlights various intervening factors for the said link including level and exposure of democracy, economic development, education and law and order in respective regions (Charron and Lapuente, 2010; Bäck and Hadenius, 2008; Sung, 2004). In contrast Pellegata (2013) postulates that mere transition to democracy does not necessarily restrict the political corruption. Rather a fully formed mature democracy together with high level of economic development is fundamental to make the democratic system affirmative. Hence, the institutional quality can reduce public debt through control of corruption depending on the link between the interactive variables. The positive coefficient of debt would imply that democratic government is not able to curtail the corruption and hence its likely effects on the public debt and vice versa.

X_{jit} is the vector of other control variables including real GDP growth rate, $RGDP_{it}$, inflation, INF_{it} , interest payment on debt proxy for debt servicing, INT_{it} , military expenditures, MIL_{it} , and Population, POP_{it} .

The empirical model is estimated for the Asian and African countries separately and as a panel, with and without controlling interaction

⁷ The outlier countries have been removed from the sample while data screening.

variable. In the pooled regression, an intercept dummy, *dum-reg*, is added to capture the regional differences with assigned value 1 for Asia and 0 for Africa. Similarly, a slope dummy, *dum-CORR*, is included to control the comparative effect of corruption on public debt, with assigned value 1 for Asia and 0 for Africa.

The expected effect of corruption, lag of debt to GDP ratio, interest payment, military expenditure and population on public debt is positive. Corruption is expected to increase public debt by increasing government expenditure and lowering its revenues (Kaufman, 2010; Jajkowicz and Drobiszova, 2015). Similarly, an increase in military expenditure diverts the resources towards non-productive use while population increases the pressures on overall government expenditures which in turn results in more public debt (Thuku, Paul and Almadi, 2013).

In contrast, real GDP growth is considered as an effective tool to reduce the burden of public debt and is therefore expected to affect public debt negatively (Sinha, Arora and Bansal, 2011; Bon, 2015). Inflation can have either positive or negative effect on public debt due to ambiguity it entails. Marion (2009) and Akitoby, Komatsuzaki, and Binder (2014) stated that inflation means high taxes which increases government revenues and hence reduces the requirement of public debt. Comparatively, according to Bildirici and Ersin (2007) countries with high inflation are expected to face high cost of borrowings resulting in borrowings of low maturity domestic debts at high interest rates which eventually increases the debt burden.

The data on debt are extracted from World Economic Outlook (WEO), International Monetary Fund. The data of polity index is extracted from Polity-IV published by the Center for Systematic Peace (CSP) while data on all other variables except corruption are gathered from World Development Indicator (WDI), World Bank.

As the dynamic panel data model is likely to suffer from endogeneity due to presence of lagged dependent variable as regressor, Nickell (1981) and Anderson and Hsiao (1982) pointed out that the Ordinary Least Square yields inconsistent results and therefore Generalized Method of Moment (GMM) is the appropriate estimation technique. Arellano and Bond (1991) introduced first difference GMM technique that estimates the first

difference form of equation and uses lagged values of variables as instruments to solve the endogeneity problem.

However, Arellano and Bover (1995) and Blundell and Bond (1998) provided that for differenced equation the lagged values of variables are weak instruments which can result in biased estimates for small sample. Therefore, they introduced system GMM estimation technique, which is an extension to the difference GMM equation by introducing additional linear moment conditions. This technique combines the difference and level equations and takes first difference form of variables as instruments in the level equation. Moreover, it assumes that the differenced variables are uncorrelated with country specific effects. The Hansen/Sargan test of over-identifying restrictions will be used for instrumental validity. While the second order serial correlation test will be applied using AR (2) at 5% level of significance.

5. Results and Discussion

5.1 System-GMM Estimates for Pooled Data

The empirical findings of System-Generalized Method of Moment (S-GMM) are reported in Table 5.1. The results are reported for ICRG, Transparency International and Worldwide Governance Indicator of corruption in equations 1 through 6 without and with controlling interaction variable, respectively. The lower panel yields the diagnostic tests' results which indicate the goodness of fit of the empirical models. Hansen J-statistic range from 0.253-0.982 and indicate that selected instruments are exogenous. Similarly, AR (2) test ranges from 0.153-0.425 indicating no serial correlation in the residuals. The signs and significance of the variables remain consistent throughout the regressions.

Corruption appeared positive and statistically significant in all equations implying positive impact on public debt during the given time period. The coefficient values show that one unit increase in corruption leads to 0.71, 0.51 and 0.80 unit increase in public debt to GDP ratio in three equations, respectively when interaction of institutional quality with corruption is not controlled. However, after controlling the interaction of corruption and institutional quality, the said effect tends to decline by reasonable margin as reported in equation (2), (4) and (6). The results are in line with Cooray et. al., (2016) and Henri (2018).

Corruption increases the public debt by expanding government expenditures and reducing government revenues. Where, the government expenditure increases due to rent-seeking behavior of corrupt officials who increases the expenditures in those sectors where huge rent can be grabbed like infrastructure and defense. Alternatively, government revenues tend to decline because large portion of it goes into bribery. Overall, this leads to the rising fiscal deficit and distorts public finances in the country resulting in accelerating debt.

The regional dummy shows public debt in Asian countries statistically significantly more than in African countries. Asian financial crisis (1997-98) and global financial crises (2008-09) largely affected Asian countries due to more liberalized financial policies as compared to Africa that resulted in huge public debt. However, the effect of corruption on public debt, measured by the slope dummy, is relatively low in Asian countries than African as the coefficient of slope dummy appeared as statistically significantly negative in all equations. The reason behind may be the better institutions and governance and clear legal and budgetary management in Asian countries as compared to the African countries.

The lag of debt to GDP ratio is statistically significantly positive providing that public debt in previous period tends to increase debt in the next which provides evidence for large amortization payments in selected countries. Due to improper utilization of borrowed funds the capability of government to payback tends to decline that leads to increasing public debt in subsequent periods. The result is consistent with Benfratello, et. al. (2018).

In contrast, the real GDP growth shows negative effect on public debt due to its positive role in generating revenues to meet expenditure obligations and to reduce debt burden. The result is like Sinha et al., (2011). The impact of interest payment on public debt is statistically significantly negative as expected and shows that increase in interest payment increases the cost of borrowing and therefore reduces its demand. Military expenditure has positive but insignificant impact on public debt for the pool of Asian and African countries. Similarly, population and inflation appeared as insignificant with positive sign.

The role of institutional quality in the corruption-public debt relationship as an interaction of corruption and polity index shows negative sign in equations (2), (4) and (6). As the results for interaction are not directly observable, they are discussed in detail in section 5.3.

Table 5.1: SGMM Estimates of Corruption on Public Debt (Pooled Data)

Dependent Variable: Public Debt to GDP ratio						
Variables	ICRG		TI		WGI	
	Without interaction	With interaction	Without interaction	With interaction	Without interaction	With interaction
<i>L. DEBT</i>	0.855*** (0.156)	0.875*** (0.118)	0.608*** (0.208)	0.876*** (0.103)	0.706*** (0.245)	0.859*** (0.109)
<i>CORR</i>	0.718** (0.311)	0.159* (0.087)	0.517** (0.227)	0.129** (0.057)	0.807* (0.415)	0.383** (0.178)
<i>RGDP</i>	-0.039*** (0.014)	-0.002* (0.001)	-0.067** (0.030)	-0.016** (0.006)	-0.033*** (0.013)	-0.024*** (0.009)
<i>INT</i>	-0.038*** (0.014)	-0.013** (0.006)	-0.035** (0.014)	-0.006* (0.003)	-0.026* (0.146)	-0.004 (0.003)
<i>INF</i>	-0.001 (0.001)	-0.001 (0.001)	-0.003 (0.004)	-0.000 (0.001)	-0.002 (0.003)	-0.001 (0.001)
<i>MIL</i>	0.013 (0.028)	0.000 (0.015)	0.002 (0.036)	0.003 (0.020)	0.000 (0.024)	0.001 (0.020)

<i>POP</i>	0.003 (0.002)	0.001 (0.002)	0.013 (0.009)	0.000 (0.000)	0.023 (0.010)	0.000 (0.000)
<i>dum_reg</i>	2.765* (1.636)	1.040* (0.579)	3.287* (1.874)	1.726** (0.827)	0.505* (0.298)	0.377* (0.205)
<i>dum_CORR</i>	-0.838* (0.494)	-0.369** (0.171)	-0.490* (0.261)	-0.242** (0.112)	-0.719* (0.381)	-0.617** (0.297)
<i>(CORR * POL)</i>	-	-0.002* (0.001)	-	-0.001* (0.000)	-	-0.027* (0.015)
N	705	589	712	603	679	547
No. of instruments	24	38	21	31	34	35
<i>Diagnostic Tests</i>						
Hansen J Test	0.253	0.678	0.881	0.689	0.982	0.953
AR(2) Test	0.425	0.157	0.153	0.159	0.337	0.239

Note: 1) *, ** and *** represents significance at 10%, 5% and 1%, respectively. 2) Standard errors in parentheses. 3) Reported results for diagnostic tests are p-values. 4) Instrumented variables used in the estimations are lags (1-4) for *MIL*, lags (1-2) for *DEBT*, lags (1-4) for *INT*, lag (1-2) for *RGDP*, lags (1-4) for *INF*, lags (1-3) for *POP* and lags (1-3) for *C*

5.2 Comparative Estimates for Asian and African Countries

Table 5.2 provides the estimates of Asian and African panel separately. The bottom panel of the table shows the results of diagnostic tests where p-value of Hansen-J test range from 0.817-0.995 validating the instruments. The p-values of AR (2) test range from 0.121-0.975 verifying no second order serial correlation. The results for corruption are by and large the same for both regions in terms of its coefficients signs however the effect is statistically significantly higher for African region than Asian for the corruption measured by TI and WGI. The results are consistent with the result of regional slope dummy as reported in Table 5.1. The underlying reasons are the same as good governance, better budgetary management and the rule of law and property rights tend to reduce the impact of corruption on public debt (Cooray *et. al.*, 2016).

The coefficient of lag of debt is significantly positive and provides the evidence of larger amortization payments in Asian than African countries. The improper allocation of borrowed funds depresses the debt repayment capacity of the country leading towards increasing public debt in subsequent periods. Military expenditures appeared statistically significantly positive only in the equations without controlling the interaction which implies that the controlled institutional quality nullify the effect of defense expenditures on public debt.

Real GDP growth has negative effect on public debt in all equations. Although, Asian countries grew faster after the regional financial crisis but in recent years these economies are slowing down in terms of output growth, the annual GDP growth rate was 6.03 percent in 2003 that declined to 4.75 percent in 2016 while the debt has been increased sharply. On the other hand, African countries are expanding in terms of output growth; the annual GDP growth rate increased to 3.5 percent in 2016.

As the result for population, inflation and interest payment appeared as significant only for African region, the test of equality of the coefficient remains invalid. Specifically, the population has significantly positive

effect on debt while inflation and interest rate have negative effect on the public debt in Africa. Africa region is among the fastest population growing region at average annual rate of 2.5 percent and the rate is expected to increase in coming decades. The growing population put upward pressure on fiscal deficit and hence debt. The result is consistent with Swamy (2015). The effect of inflation is quite negligible though significant. On the same count, the impact of interest payment on public debt appeared statistically significantly negative due to high cost of borrowing.

Table 5.2: SGMM Estimates of Asian and African Countries

Dependent Variable: Public Debt to GDP Ratio												
Variables	Asian Countries						African Countries					
	(ICRG)		(TI)		(WGI)		(ICRG)		(TI)		(WGI)	
	without interact	With interact	without interact	With interact	without interact	With interact	without interact	With interact	without interact	With interact	without interact	With interact
<i>C</i>	-0.038 (0.031)	-0.034 (0.029)	-0.019 (0.020)	-0.010 (0.020)	0.018 (0.015)	0.000 (0.013)	-0.233*** (0.060)	-0.074 (0.071)	-0.136** (0.054)	-0.052 (0.060)	0.042 (0.068)	0.094* (0.049)
<i>DEBT_{i,t-1}</i>	1.024*** (0.009)	1.056*** (0.019)	1.017*** (0.011)	1.032*** (0.012)	1.020*** (0.011)	1.047*** (0.010)	0.767*** (0.042)	0.703*** (0.060)	0.789*** (0.053)	0.722*** (0.079)	0.742*** (0.068)	0.694*** (0.081)
<i>CORR_{it}</i>	0.015* (0.008)	0.015** (0.007)	0.007** (0.003)	0.004** (0.002)	0.013** (0.006)	0.013* (0.007)	0.064*** (0.022)	0.044** (0.020)	0.023** (0.011)	0.022** (0.010)	0.077* (0.044)	0.110*** (0.037)
<i>MIL_{it}</i>	0.002*** (0.000)	0.002 (0.001)	0.001** (0.000)	0.000 (0.002)	0.001** (0.000)	0.003 (0.002)	0.019** (0.008)	0.005 (0.009)	0.029*** (0.007)	0.013 (0.008)	0.036*** (0.013)	0.002 (0.013)
<i>RGDP_{it}</i>	-0.002**	-0.003**	-0.001**	-0.002**	-0.001*	-0.001**	-0.004***	0.004***	0.011***	-0.015***	-0.012*	-0.012***

Dependent Variable: Public Debt to GDP Ratio												
Variables	Asian Countries						African Countries					
	(ICRG)		(TI)		(WGI)		(ICRG)		(TI)		(WGI)	
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.003)	(0.004)	(0.007)	(0.004)
<i>IP_{it}</i>	-0.013 (0.012)	-0.018 (0.011)	-0.053 (0.059)	-0.003 (0.006)	-0.050 (0.063)	-0.006 (0.005)	-0.009*** (0.002)	-0.007*** (0.001)	-0.008*** (0.002)	-0.008*** (0.002)	-0.009* (0.005)	-0.010*** (0.004)
<i>INF_{it}</i>	-0.000 (0.001)	-0.000 (0.002)	-0.003 (0.002)	-0.000 (0.000)	-0.002 (0.002)	-0.000 (0.000)	-0.001** (0.000)	-0.001*** (0.000)	-0.0008* (0.000)	-0.0005* (0.000)	-0.010* (0.004)	-0.008** (0.004)
<i>POP_{it}</i>	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.012*** (0.004)	0.008** (0.003)	0.014*** (0.003)	0.013*** (0.003)	0.017* (0.010)	0.018*** (0.007)
<i>(CORR</i> <i>* POL)</i>	-	-0.0007** (0.0003)	-	-0.001* (0.008)	-	-0.003** (0.001)	-	-0.001** (0.000)	-	-0.006* (0.000)	-	-0.013** (0.006)
N	263	233	269	250	255	208	254	236	234	214	263	205

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Dependent Variable: Public Debt to GDP Ratio												
	Asian Countries						African Countries					
Variables	(ICRG)		(TI)		(WGI)		(ICRG)		(TI)		(WGI)	
Instruments	31	27	32	39	32	35	27	27	35	36	33	34
<i>Diagnostic Test</i>												
Hansen J Test	0.861	0.817	0.987	0.933	0.994	0.988	0.841	0.818	0.977	0.995	0.975	0.994
AR(2) Test	0.975	0.472	0.732	0.421	0.907	0.711	0.729	0.623	0.524	0.453	0.121	0.229
t- test of Equality	-	-1.37	-	-1.80*	-	-2.57***	-	-	-	-	-	-

Note: 1) *, ** and *** represents significance at 10%, 5% and 1% respectively. 2) Standard errors in parentheses. 3) Reported results for diagnostic tests are p-values. 4) Instrumented variables are lags (1-3) for *MIL*, lags (1-4) for *DEBT*, lags (1-3) for *INT*, lag (1) for *RGDP*, lags (1-4) for *INF*, lag (1) for *POP* and lag (1-2) for *CORR*. 4) Test of equality for Asia versus Africa is applied on the corruption's coefficient in equations 2, 4 & 6, respectively.

5.3 Region-Specific Marginal Effects

The impact of corruption on public debt based on institutional quality show statistically significantly negative interaction terms in both regions.⁸ To clarify the findings we have computed the marginal effects of corruption at the average value of institutional quality i.e., 0.004 for Asian and 0.638 for African countries. The impact of corruption on public debt tends to decline from 0.004 to 0.003 (0.004-0.001(0.004)) after controlling the institutional quality in Asia whereas the effect declines from 0.022 to 0.018 (0.022-0.006(0.638)) for Africa.⁹ The result suggests that democratic government effectively monitor the corruption and its likely effects on the public debt and this partially offsets the magnifying effect of corruption.

The marginal effect of corruption at country-level institutional quality for Asia are portrayed in Figure 5.1 which identifies the countries with quality institutions have large declining effect of corruption on public debt. Furthermore, the threshold level of institutional quality at which it offsets the positive impact of corruption is calculated at 4.00.¹⁰ The result shows that twelve out of thirty Asian countries are above that threshold including Armenia, Bangladesh, Cyprus, Georgia, India, Lebanon, Malaysia, Nepal, Philippines, Sri Lanka and Turkey. Similarly, when compared with the calculated threshold level of institutional quality in Africa i.e., 3.66, the trend in Figure 5.2 shows that eighteen out of 45 African countries namely Benin, Botswana, Comoros, Ghana, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Senegal, Sierra Leone, South Africa and Zambia have polity index above the threshold. This overall indicates that the countries where institutional quality is above threshold level, effect of corruption on public is offset and results in net decline in public debt. This is so because better quality of institutions in democratic government system improves the budgetary position of the country hence reduce public debt.

⁸ The empirical findings for models (with interaction) using TI's measure of corruption are interpreted and discussed in detail, for parsimony.

⁹ $\frac{\partial debt}{\partial corr} = coefficientofCORR + coefficientofinterationterm * \overline{CORR}$

¹⁰ $(-\frac{\partial coefficientofcorr}{\partial coefficientofinteractionterm})$

Figure 5.3: Country-Specific Marginal Effects of Corruption in Asia

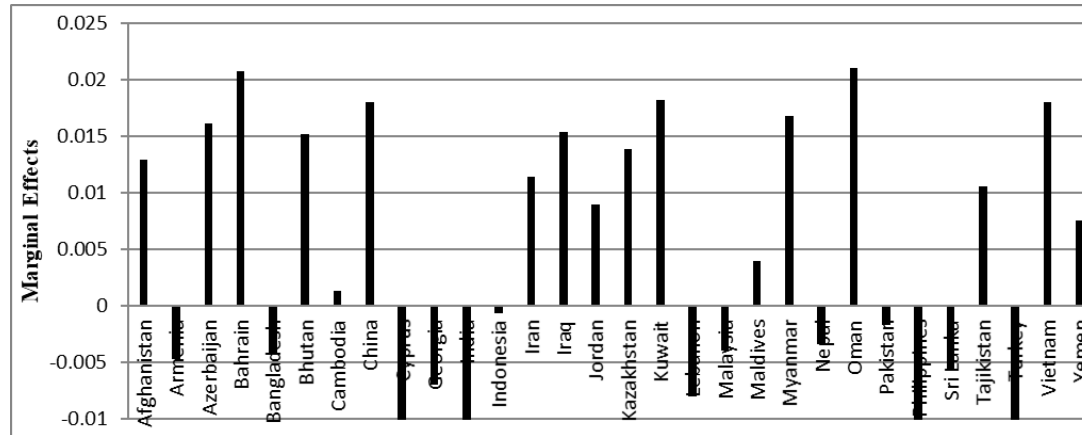
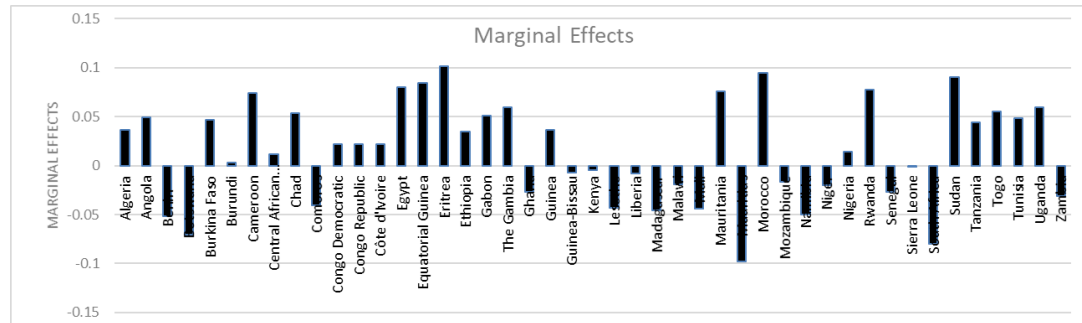


Figure 5.4: Country-Specific Marginal Effects of Corruption in Africa



6. Conclusions and Policy Implications

This study is an attempt to examine the effect of corruption on public debt in Asian and African countries over the time period 1990 to 2016, controlling for the role of institutional quality. The analysis is done first by pooling the data of selected Asian and African countries and introducing intercept and slope dummy for corruption in the model. Secondly, separate models are estimated for Asian and African region for comparative analysis.

The findings show that overall corruption tends to magnify the debt burden in selected Asian and African countries where the effect is found to be sharper in African region than Asian. However, the results suggest that the institutional quality control by the democratic government can reduce the impact of corruption on public debt because of effective government spending and better tax revenue collection management. Moreover, the effect of other control variables on public debt shows that lag of debt has significantly positive effect on public debt. Real GDP growth has negative effect on debt in all equations. The military expenditure appeared as statistically significantly positive and larger in African countries. Furthermore, inflation and interest payment has insignificant coefficient for Asian countries while has a negligible significant and negative effect in African countries. The regional dummy in pooled data shows the public debt in Asian region is more than African region but the effect of corruption on public debt is more acute in African region.

Based on the findings, study recommends that Asian and African countries need to control corruption through effective anti-corruption strategies to reduce public debt burden. An effective anti-corruption strategy requires strong political will, adequate measures of transparency and accountability and strong judicial system that can be supported by the democratic government as proved by the marginal effects at average institutional quality of respective countries. Moreover, the countries must boost the real GDP growth which is helpful in tackling high public debt.

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Appendix**Table A.1: List of Selected Countries**

Asian Countries	
Afghanistan	Jordan
Armenia	Kazakhstan
Azerbaijan	Kuwait
Bahrain	Lebanon
Bangladesh	Malaysia
Bhutan	Myanmar
Cambodia	Nepal
China	Oman
Cyprus	Pakistan
Georgia	Philippines
India	Tajikistan
Indonesia	Turkey
Islamic Republic of Iran	Vietnam
Iraq	Yemen
African Countries	
Algeria	Kenya
Angola	Lesotho
Benin	Liberia
Botswana	Madagascar
Burkina Faso	Malawi
Burundi	Mali
Cameroon	Mauritania
Central African Republic	Mauritius
Chad	Morocco
Comoros	Mozambique
Congo Democratic	Namibia
Congo Republic	Niger
Cote d'Ivoire	Nigeria
Egypt	Rwanda
Equatorial Guinea	Senegal
Eritrea	Sierra Leone
Ethiopia	South Africa
Gabon	Sudan
The Gambia	Tanzania
Ghana	Togo
Guinea	Tunisia
Guinea-Bissau	Uganda
	Zambia

