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Determinants of PPP in Energy: A Comparison between Sub-Saharan and North African Countries

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Abstract
In this study, we investigated the nexus that exists between investment in energy and its determinants for a randomly selected countries in sub—Saharan and North African countries. To account for heterogeneity in these countries, we adopted the one-step diff-GMM technique. Our results showed that for the sub-Saharan African countries, government debt and size have positive impact on investment in energy; while trade openness, aids given to government, protection of private right, tax compliance, level of development and market size are negatively related to investment in energy. However, for the North African countries, trade openness, debt, aids, protection of private right, tax compliance are negatively related to investment in energy but level of development has positive relationship. Thus, we conclude that government motivating factors are negative determinants of investment in energy in North African countries, but positive determinants in sub-Saharan African countries.

Keyword: *PPP, Energy, sub-Sahara, North-Africa, diff-GMM.*

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I. Introduction

The Africa's experiences in public private partnerships (PPP) initiatives have rather left much to be desired as the region is still lagging far behind the global infrastructural standards. These countries still struggle with the problem of infrastructural retardations, despite series of policy efforts coupled with the surge of aids and other revenues that flows into the region. For instance, available data from World Bank database revealed that, the world economic forum report on quality of port infrastructure rated Sub-Saharan Africa (excluding high income) 3.51 in 2007, 3.81, 3.68 and 3.34 in 2010, 2013 and 2015, respectively (1=extremely underdeveloped to 7=well developed and efficient by international standards). The region's rating in quality of port infrastructure however declined to 3.30 in 2017.

Nonetheless, Public-private partnerships have evolved as principal component of capital formation to developing and transition economies in recent times (Oyedele, 2012). In recognition of this fact, many governments of African countries have actively made series of policy efforts and undertaken a wide range of policy reforms to strengthen public-private partnerships predominantly in investments in infrastructure. Consequently, the entire region has been undergoing a remarkable increase in public-private partnerships projects, though, its share of global public-private partnerships investments in infrastructure are declining (World development indicators of the World Bank, 2019).

Mona, Jean-Francois and Etienne (2006) confirm that highly indebted countries with rising aggregate demand and market size commonly adopt PPPs. The study also found that, macroeconomic stability is critical for PPPs. The study further revealed that, private involvement in PPP projects are subject to the anticipated marketability, the nature of the required technology, as well as the extent of "impurity" of the goods or services involved in the project implementation. AbdulGaniyu, Abdullahi, Noor, Abdullah, Mahmoud and Dabo (2013)

said that corruption in government was the major obstacle slowing down the adoption of PPP in developing countries.

Furthermore, Adegboye and Alimi (2017) examine the determinants of public-private-partnership, and confirm a long run relationship between PPP investment and its determinants. The work of Fabi and Awolesi (2019) on public-private-partnership highway projects, revealed that excessive risks associated with public-private-partnership projects is the most significant factor encumbering the implementation of public-private-partnership highway projects.

In Sub-Saharan and African countries, there is an urgent call for a review of the practice of the PPP's ideology and the inherent factors influencing the choice and size of these infrastructural investments' partnerships projects in the regions. It is against this backdrop that, this study aims to examine the determinants of public-private investments in energy with significant testament from Sub-Saharan and North African countries based on panel modeling. The rest parts of this paper are structured as: literature review, data and method, results, conclusion and recommendations.

II. Literature Review

there are limited research materials showing a concrete theoretical establishment on the direct causal linkage between PPP projects and their determining factors. However, a careful study on the relationships between the duo can be done by economic and academic connoisseurs. Because of this peculiar theoretical scarcity, the only participating model having relevant theoretical bearing with the subject matter is the approach advanced by Farquahason, De Mastle, Yescombe, and Encinas (2011). This will be discussed in the next section.

PPP Delivery Model

Basically, the PPP Delivery Model was fallout of the efforts of the Canadian Council for PPPs (2011) as well as UN-Habitat (2011).In the submission of Farquahason, De Mastle, Yescombe, and Encinas (2011), There is a wide range of probable organizational models that can explain the mechanisms through which PPP projects can be successfully executed. However, the most celebrated and widely acknowledged models are displayed in Figure 5.

Essentially, these PPP delivery models encapsulate the extent of public-private involvement and risks apportionment between the public and the private partners. The strategic grouping of several PPP activities into *user-fee* as well as *accessibility-oriented* partnerships was carried out in the study of Farquahason, De Mastle, Yescombe, and Encinas (2011).

Under the user-fee PPP arrangement, the government through its representative offers the legal privilege to a private firm for the purpose of building (or expanding, or renovating), carrying out maintenance, operating, and financing an infrastructure investment project with government ownership. The private firm in turns retrieves its invested capital and returns by leveling some charges on members of the public who utilize such government owned assts. These charges are referred to as user-fees or user-charges in PPP investments. Hence, the private firm takes the full responsibility of the public demand risk as well as the finance, design, construction and operation related risks.

On the other hand, in the case of the availability-oriented PPPs, the private firm also takes the responsibility of building, designing, financing, operating, rebuilding, and maintaining the required projects. However, the government (not the final consumers), pay all financial obligations to the private firm for building, designing, financing, operating, rebuilding, and maintaining the projects owned by the public sector authority.

These financial obligations are usually settled at the point when the services are readily available for consumption. Figure 5 presents the various PPP delivery representations. Nevertheless, this is not an exhaustive entry due to the extreme dynamics of the PPP procedure in addition to the ever-changing circumstances that determine their existences and specific sizes (Nehemiah, Maren and Akande, 2016).

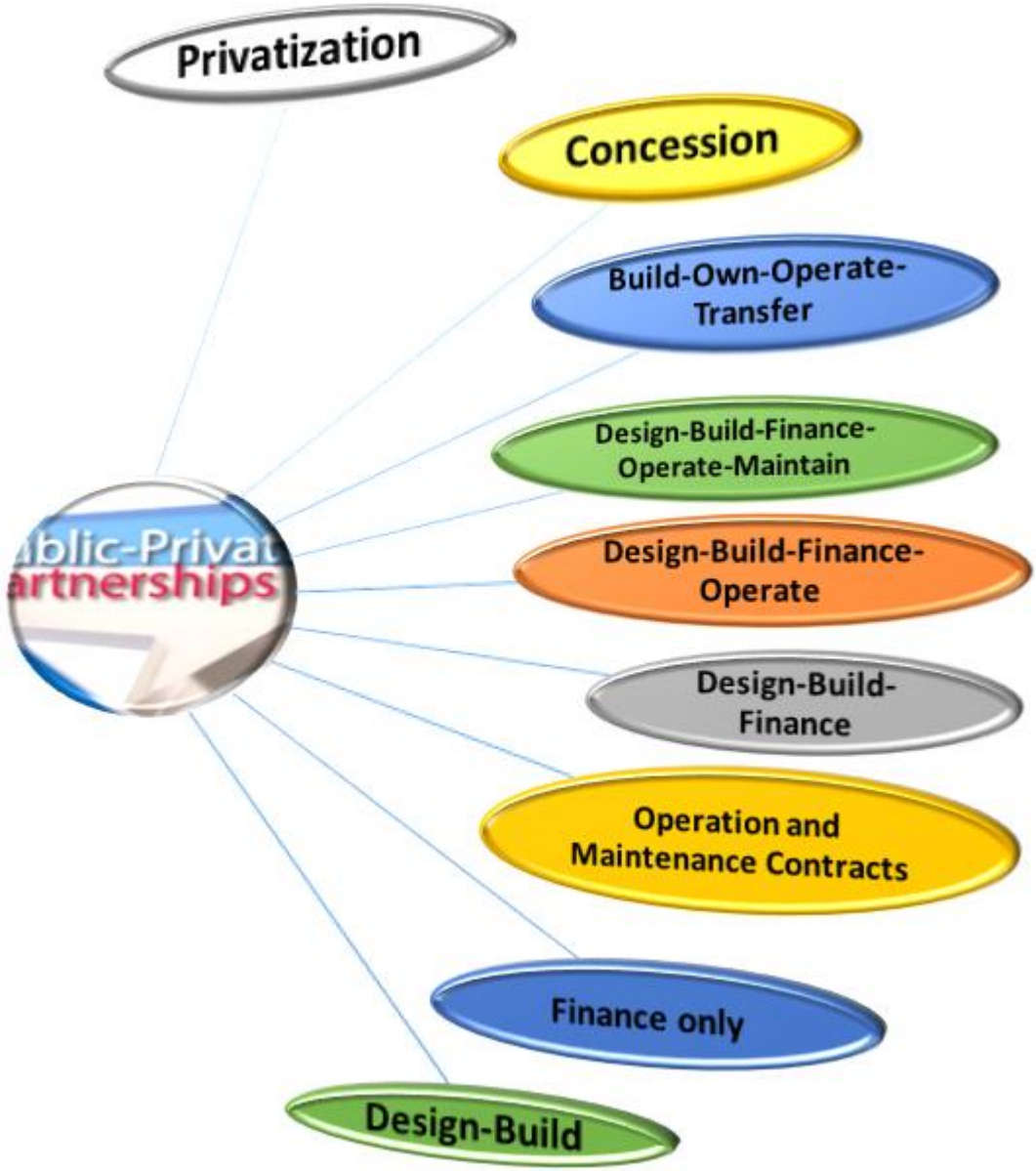

Figure 1: Illustration of PPP Delivery Models (proposed by the Canadian Council for PPPs, 2011; UN-Habitat, 2011).

(a). Design-Build: Under this method, the public sector representatives liaise with the private firm for the purpose of designing and building an investment project in line with the government performance guidelines. In the period of construction, the general contractor/sub-contractor executing the project is checked and inspected by the government representatives and subsequently, the government takes over the ownership right and then takes full responsibility of the operation and maintenance of the completed project, having paid the private partner in full (UN-Habitat, 2011).

The payment and ownership transfer are normally done afterward the defect's liability retention phase. This PPP approach has been subject to intense criticism as the idea of Design-Build is perceived to be outside the PPP scope (UN-Habitat, 2011). This, borders essentially on the simple fact that the role of the private partners does not go beyond design and build (The City of Calgary, 2008).

However, this approach has been promoted by the European Commission (2003) with the perception that an appropriate PPP model encapsulates a cooperative effort between the private partners and the public sector players or their representatives. This is a procedure for transferring or sharing risks and responsibilities among the concerned parties.

(b). Finance-Only: a private firm under this finance-only is usually a financial services firm, with the responsibility of funding an investment project directly or employ other financing styles like bond issue or long-term leasing option. The private firm is solely responsible for financing the construction or extension of the

scope of a public project. This private partner also has the legal right to carry out operations on the facility subject to government oversights.

Also, as Idris, Kura and Bashir (2013) averred, this company often serves as the developer is entitled to some future income that may be earned by way of collecting user fees. Since the financial responsibilities and risks are all burn be the private consortium, any attempt to delay the financing of the project against the approved timelines can cause it to incur extra costs in the form of longer-term debts. Consequently, it borders heavily on the private firm to achieve speedy implementation of the project so as to guarantee early delivery of the required project and services at the appropriate time (Idris, Kura and Bashir, 2013).

(c). Operation and Maintenance Contract: this PPP model encapsulates wide-ranging service activities that include all of the management and operational elements of the public facility or service provider. Granting the fact that, the eventual responsibility of providing the required service rests with the government and its representative, the day-to-day management control and authority rests with the private consortium. The operation and maintenance contract restricts the role of the private firm only to the operation and maintenance of the facility while the public sector reserves the exclusive ownership of the facility.

The advantage of these contracts is that they often offer a good prospect for improved future private entity participation and collaboration in the provision of public service delivery. This is more unique in some sectors witnessing transition from public ownership of long-term assets where prevailing controlling and legal contexts may not permit better private sector commitments. Though, the approach has its own short coming as the procurement process decreases public control over the facility in question. Also, this jeopardizes the ability to easily meet the varying demand for public utilities (British Columba, 1999).

(d). Design-Build-Finance: this another PPP delivery model that entails the public entity contracting a private firm with the aim of designing, building and financing a long-term investment asset where such obligation of the private sector player terminates at the point of completion. The public entity however claims the ownership rights and exercises the legal power over the operation of the facility.

The design, construction and financing risks and responsibilities solely rest with the private firm. The associated payment for the contract is contingent upon the successful accomplishment of the contract. Thus, the private consortium takes responsibility for risks related to unwarranted time and cost overrun. This method is slightly different from the Design-Build for the singular reason that, the private firm takes the risk of financing the facility pending the successful completion and ownership rights transference of the project to the public sector.

(e). Design-Build-Finance-Operate (DBFO)/Design-Build-Finance-Operate-Maintain (DBFOM): The activities under these PPP delivery models entail a private firm taking the responsibility of designing, building and financing an investment project. The private sector partner also has the legal rights to operate the facility subject to a long-term agreement after which the government takes over the final ownership of the asset (UN-Habitat, 2011).

This implies that, the initial ownership rights are wielded to the private partner in the course of the indenture. The long-term period of agreement is to enable the private sector partner to recoup the amount invested with the aid of public subvention. The Design-Build-Finance-Operate necessitates that, the private firm will operate the asset for the contract duration. The attribute of the Design-Build-Finance-Operate-Maintain are analogous to those of Design-Build-Finance-Operate agreements. However, the only variance factor is that, in the case of Design-Build-Finance-Operate, the private firm takes charge of managing the facility after implementing the design, construction, finance and operation activities of the project.

(f). Build-Own-Operate (BOO)/Build-Own-Operate-Transfer (BOOT): In these PPP delivery models, the private consortium takes full responsibility for the financing, building, ownership and operation of the project outcomes perpetually. The role of the public partner, as The City of Calgary (2008) rightly submits, is limited to regulatory activities only. In the case of the Build-Own-Operate-Transfer contract, the private firm takes the responsibility for the design, financing, building, ownership and operation of the asset, while charging a user fee for a certain time period after which the public sector entity reclaims the final ownership rights of the facility.

The key distinction between the Build-Own-Operate and Build-Own-Operate-Transfer is that, in Build-Own-Operate agreement, the private firm has the right over the ownership and operation of the investment project for a life time whereas in the Build-Own-Operate-Transfer, the private firm reserves the exclusive right over the ownership and operation of the facility for a specified period of time. However, the investment risks are burn by the private firms in both delivery models.

(g). Concession: under this PPP delivery model, a public entity contracts a private sector firm for the purpose of designing, building, financing and operating the asset. Under concession arrangements, the private sector partner recoups the funds spent for both initial project activities and subsequent operational outlays (European Commission, 2003).

The X-efficiency/Inefficiency Theory

The X-efficiency/Inefficiency theory is another related theoretical view relating to PPP arrangements. Essentially, the rationale for the enhancement of the delivery of public services is explicated in the works of

Engel, Fischer, and Galetovic (2013) as well as Iossa and Martimort (2015). According to these scholars, economic efficiency stems from the optimal distribution of resources with the aim of promoting the welfare of the citizenry.

Nevertheless, sequel to frequent government ineptitude and recurring policy miscarriages, market failure-oriented risks in emerging economies is higher than those in the industrialized nations. Consequently, after the 1980s, there have been significant policy shift from intense government participation the provision of public facilities to mere regulatory activities. This is achieved by promoting public-private sector collaboration in the provision of long-term public utilities. This form of collaboration facilitates the allocate efficiency and further inhibits the x-inefficiency in the system (OECD, 2008; Béland, Rocco, & Waddan, 2016).

Vining and Boardman (2008) also, due to the fact that, government often involves itself in numerous activities requiring certain professional proficiency or experience coupled with the strong monopoly of the public-sector bureaucracy. This phenomenon of make the government to be susceptible to technical inefficiency (also referred to as X-inefficiency).

These X-inefficiencies are often occasioned by both distortionary government interferences and states heterogeneous organizational arrangements with high bureaucratic proclivity. Thus, this theory explains that, public-private partnerships are essential to mitigate the occurrence of X-inefficiency in public sector. Also, public-private partnership enables the government to respond to market forces with a view to achieving greater competitive (Mohammed, 2019).

Bikram, Jongsu and Birku (2019) used Telecommunication, Transportation, and Water and sewerage management as the dependent variables while, the independent variables in the study include, total reserve (log), GDP per capita, population (log), ODA per capita, experience and government effectiveness. The result revealed that, nations are likely to be involved in telecommunication projects, followed by the energy and transportation and water projects. Water is one of the least preferred sectors among the four major infrastructure sectors provided by the PPI database of the World Bank.

Finally, the study of Obi-Anike, Abomeh and Okafor (2020) employed proxies such as Public Private Partnership as the dependent variables while, the independent variable in the study was Infrastructural Development. The empirical outcome revealed that, public private partnership correlated positively and significantly with infrastructural development in Abuja. The study further submitted that, there is an imperative necessity to adopt the Public-private partnership approach for infrastructural expansion in Abuja, Nigeria.

From the above discussion, it could be realized that, a few studies have been carried out on the determinants of public private investments in infrastructure. However, it can be deduced from all possible investigations that, recent studies such as Abdul Ganiyu, Abdullahi, Noor, Abdullah, Mahmoud and Dabo (2013), Fabi and Awolesi(2019) and Obi-Anike, Abomeh and Okafor (2020) employed primary survey data. This current study will therefore employ secondary data on the variables to be utilized for empirical analysis. Thus, the scope of this study will be stretched to a coverage span of 24 years (1995 to 2018) for eleven (11) sub-Saharan Africa countries.

Also, while studies of Mona, Jean-Francois and Etienne (2006) adopted the ordinary least squares, generalized least squares, poisson, tobit, random effect tobit, ordered probit, ordered logit, negative binomial and zero-inflated poisson, while study of AbdulGaniyu, Abdullahi, Noor, Abdullah, Mahmoud and Dabo (2013) utilised the Analysis of Variance (ANOVA)/Factor Analysis.

Furthermore, Adegboye and Alimi (2017) employed the Autoregressive Distributed Lags estimation and the bounds testing approach, while Fabi and Awolesi (2019) adopred the Kruskal-Wallis Approach was adopted for the study. In addition, Bikram, Jongsu and Birku (2019) used the multiple discrete-continuous extreme value (MDCEV) model, while study of Obi-Anike, Abomeh and Okafor (2020) adopted the Pearson Correlation. However, this present student will be exceptionally unique with the choice of the Generalized Method of Moments (GMM) as the method of data analysis.

III. Data and Methods

Data

The study employs dynamic panel data. The data are collected on investment in energy, aids, government size, tax compliance, protection of private right, market size, the level of development, debt and trade openness from World Bank site (http://wdi.worldbank.org). The data are raw annualized data spooning over 2000 to 2018. The inherent trends are removed by logging. So basically, the data are logged data over the above specified period. The time dimension of the data is 18, while the individual dimension is 14 and 4 units for sub-Sahara Africa countries and North Africa countries respectively. This gives total observations of 252 and 72 for each group.

Methods

Model Specification

Following the study of Adegboye and Alimi (2017), the models specification for this study are presented below.

$$\log invener_{it} = \lambda + \alpha_1 \log top_{it} + \alpha_2 \log deb_{it} + \alpha_3 \log aid_{it} + \alpha_4 \log gsi_{it} + \alpha_5 \log pr_{it} + \alpha_6 \log tacm_{it} + \alpha_7 \log ledev_{it} + \alpha_8 \log mrksi_{it} + e_{it} \quad 1$$

Where: invener is investment in energy, top is trade openness, deb is debt, aid is aids given to government, pr is protection of private right, tacm is tax compliance, ledev is the level of development, gsi is government size and mrksi is market size e is the error or the disturbance term.

IV. Empirical Results

Descriptive Statistic Results

The descriptive statistics of the stated variables under investigation in this study was conducted. This is to observe the behavior or characteristics of the specified variable and make them fit for regression analysis. In table 4.1, the approximated values of these statistics are presented.

Table 4.1
Descriptive Statistics for sub-Sahara Africa Countries

	LOG_INVER	LOG_AID	LOG_DEB	LOG_GSI	LOG_LEDEV	LOG_MRKSI	LOG_TACM	LOG_TOP	LOGPR
Mean	8.117340	10.89824	9.919768	6.736113	3.085100	7.423851	6.574570	-0.097973	5.389778
Median	8.103143	10.83786	9.874052	6.843387	3.059302	7.422367	7.489111	-0.136915	5.278124
Maximum	9.751942	12.80690	11.14673	8.946482	4.033243	8.302801	8.929509	0.311160	10.18921
Minimum	6.477121	8.160754	9.035827	4.023471	2.387215	6.226506	0.000000	-0.414508	2.500000
Std. Dev.	0.746623	1.046237	0.549882	0.953689	0.419095	0.406619	2.344919	0.155994	1.495527
Skewness	0.069277	-0.211331	0.467509	-0.156623	0.486074	-0.180294	-1.863532	0.459641	0.571474
Kurtosis	2.432104	2.274530	2.582344	2.819343	2.352997	3.972671	5.487514	2.984570	3.519262
Jarque-Bera	1.082058	2.232343	3.320871	0.414072	4.318337	3.407693	63.58265	2.676839	4.990548
Probability	0.582149	0.327531	0.190056	0.812990	0.115421	0.181982	0.000000	0.262260	0.082474
Observations	76	76	76	76	76	76	76	76	76

Note: loginvener, logtop, logdeb, logaid, loggsi, logpr, logtacm, logledev and logmrksi are investment in energy trade openness, debt, aids given to government, government size, protection of private right, tax compliance, level of development and market size respectively

Source: Output from E-view

As shown from the above table the first descriptive statistic of the variables used for sub-Sahara Africa countries with investment in energy as the dependent variable. The mean value of investment in energy, aids given to government, debt, government size level of development, market size, tax compliance, trade openness and protection of private right respectively. All the variables excluding trade openness have positive mean value. The variables with positive mean value have tendency to increase thereafter. Market size has the least Standard deviation value among the other variables while tax compliance is the variable with the highest standard deviation. That it is the most volatile variable among the other variables. The skewness values are approximately 0.07, -0.21, 0.47, -0.16, 0.49, -0.18, -1.86, 0.46 and 0.57 for investment in energy, aids given to government, debt, government size, level of development, market size, tax compliance, trade openness and protection of private right respectively. Investment in energy, debt, level of development, trade openness and protection of private right are positively skewed, others have negative skewness value. The kurtosis value of the variables investment in energy, aids given to government, debt, government size, level of development and trade openness have kurtosis value lesser than 3 making them to be platy kurtic in nature. However, market size, tax compliance and protection of private right kurtosis values are larger than 3 that is to say they are leptokurtic. The probability associated with the Jarque Bera statistics is approximately greater than 5 percent for all the variables except tax compliance which has a probability value less than 5 percent alpha value. In this case it is the only variable that its series does not follow a normal distribution.

Table 4.2
Descriptive Statistics for North Africa Countries

	LOG_INVENG	LOG_LEDEV	LOG_MRKSI	LOG_TACM	LOG_TOP	LOGPR	LOG_GSI	LOG_DEB	LOG_AID
Mean	8.661243	3.435580	7.615022	6.018198	-0.071177	5.241454	5.530823	10.33272	10.77358
Median	8.602060	3.482348	7.539874	5.605944	-0.104381	5.576647	6.129863	10.46012	10.75848
Maximum	9.418798	3.747592	7.984269	8.681036	0.354087	6.475854	6.619581	10.81888	11.74736
Minimum	7.477121	3.126876	6.994372	2.030169	-0.307776	2.431694	3.453623	9.392542	9.035390
Std. Dev.	0.553946	0.149175	0.234397	1.574382	0.154253	1.183389	1.083843	0.365937	0.528443
Skewness	-0.564114	-0.524713	-0.239155	-0.367816	1.532685	-0.936761	-0.853896	-1.256710	-1.352162
Kurtosis	2.941801	3.226820	3.709200	3.148690	5.161430	2.858782	2.161020	3.833081	7.088033
Jarque-Bera	1.116751	1.008649	0.640277	0.492856	12.30974	3.088776	3.167888	6.134889	21.02221
Probability	0.572138	0.603914	0.726048	0.781588	0.002123	0.213442	0.205164	0.046540	0.000027
Obs	21	21	21	21	21	21	21	21	21

Note: loginveng arelogtop, logdeblogaid, loggsi, logpr, logtacm, logledev and logmrksi are investment in energy trade openness, debt, aids given to government, government size, protection of private right, tax compliance, level of development and market size respectively.
Source: Output from E-view

Table 4.3 shows the descriptive statistic of the data relating to North Africa where investment in energy is the explained variable. The mean value of investment in energy, level of development, market size, and tax compliance, protection of private right, government size, debt and aids given to government are positive. But trade openness has a negative mean value that is it. Tax compliance has the highest standard deviation. The skewness value for trade openness is approximately 1.53. This variable is positively skewed, indicating that it value is less than the means value also there is greater number of smaller values in the series of this variable. The remaining variables has negative skewness value this implies that there is a greater number of larger values in the series of these variables. All the variables has positive kurtosis value which connote that their distribution has heavier tails and a sharper peak than the normal distribution. The Jarque-Bera statistic which is a goodness of fit test is used to determine whether or not the null hypothesis of the series follows a normally distributed random process. This can be seen from the probabilities of the Jarque-Bera test. From the above table, it is seen that the series of almost all the variables follow a normal distribution pattern.

Inferential Statistic Results
The following tables present the results of the causal relationship between PPP investment in energy and its determinants.

Table 4.3
One-Step Difference GMM Regression Result for Sub-Sahara Africa Countries

Variables	Coef.	Std. Err.	Z-value	P-value
Loginvener(-1)	-0.7712853	0.2362049	-3.27	0.001
logtop	6.285789	6.104904	-1.03	0.303
logdeb	8.294245	3.519148	2.36	0.018
logaid	-4.856524	2.667779	-1.82	0.069
loggsi	0.3885296	0.5185824	0.75	0.454
logpr	-0.4000691	0.3795448	-1.05	0.292
logtacm	-0.000672	0.7117362	-0.00	0.999
logledev	-3.152568	4.742622	-0.66	0.506
logmrksi	-22.25437	19.07983	-1.17	0.243
AR(1)	-1.79			0.074
AR(2)	-1.29			0.198
Sargan	12.96			0.024

Note: loginvener is investment in energy in the log form and it is the regressand, logtop, logdeblogaid, loggsi, logpr, logtacm, logledev and logmrksi are trade openness, debt,aids given to government, government size, protection of private right, tax compliance, level of development and market size respectively and they are the regressors.
Source: Author

As shown in the above table the One-Step Difference GMM result for Sub-Sahara Africa countries using investment in energy as the dependent variable. As seen in the table, the coefficient of investment in energy at lag 1, trade openness, debt, aids given to government, government size, protection of private right, tax compliance, level of development and market size are approximately -0.77, -6.29, 8.29, -4.86, 0.39, 0.40, -0.001, 3.13 and -22.25 with associated probability value of approximately 0.00, 0.30, 0.02, 0.07, 0.45, 0.29, 0.99, 0.51 and 0.24 respectively. These results imply that only government debt and government size that can positively determine the level of public private partnership in investment in energy. Government debt and aids given to the government has a significant influence on investment in energy. Trade openness, aids given to government, protection of private right, tax compliance, level of development and market size have an inverse relationship with investment in energy. Notwithstanding, the probability values of these variables reveal that they are not significant at 5 percent level of significance except aids given to the government, which is significant at 10 percent. The post estimation test results show that the coefficient of the first order autocorrelation is larger than the coefficients of the second order autocorrelation (AR) in this model. The associated probability value for first order autocorrelation is greater 5 percent, meaning that there is no presence of serial correlation, similarly, that of the second order is also larger than 5 percent, showing that there is no serial correlation between the instruments and the disturbance term in the absence of the heterogeneity. The Sargan test in this model has a very low probability value of 0.02, proposing that the instruments of the model are invalid.

Table 4.4
One-Step Difference GMM Regression Result for North Africa Countries

Variables	Coef.	Std. Err.	Z-value	P-value
Loginveng(-1)	0.2562498	2.93e-09	8.7e+07	0.000
logtop	-4.408714	1.92e-08	-2.3e+08	0.000
logdeb	-1.073191	1.65e-08	-6.5e+07	0.000
logaid	-1.299588	2.04e-08	-6.4e+07	0.000
logpr	-1.778267	1.59e-08	-1.1e+08	0.000
logtacm	-0.1022159	2.80e-09	-3.7e+07	0.000
logledev	2.662056	9.22e-08	2.9e+07	0.000
cons	34.12702	2.96e-07	1.2e+08	0.000

Note: loginvener is investment in energy in the log form and it is the regressant and, logtop, logdeblogaid, loggsi, logpr, logtacm, logle dev and logmrksi are trade openness, debt, aids given to government, government size, protection of private right, tax compliance, level of development and market size respectively and they are the regressors.
Source: Author

Table 4.4 above presents result for North Africa countries using investment in energy as the explained variable. The coefficient of investment at lag one, trade openness, debt, protection of private right, tax compliance and level of development are approximately 0.26, -4.41, -1.07, -1.30, -1.78, -0.10 and 2.66 respectively. Investment in energy at lag one and level of development are positively related to investment in energy. The remaining explanatory variables are negative but significant determinants of public private partnership. Whenever government receives aids from either foreign or local sources, there will be enough resources at the disposal of the government to single handedly finance its activities. In the other way round when tax payers are not complying with the payment of tax. The revenue that the government will get would be low. Thus, it will need the partnership of private individuals.

Comparative Analysis of the Determinants of PPP in sub-Sahara and North African Countries

The results of the analysis conducted on sub-Sahara Africa countries and North Africa countries show that all the determinant of PPP were significantly related to the explained variable investment in energy in North Africa countries. However, only aids given to the government and debt have significant relationship with investment in energy. Also past investment in energy has a negative effect on current investment in energy in Sahara Africa countries. Meanwhile, past investment in energy can positively be used to determine current investment in energy in North Africa countries. Finally, it is reveal that the level of development is a positive

determinant of public private partnership in investment in energy in North Africa countries. While in sub-Sahara Africa countries level of development is negatively impacting investment in energy.

V. Conclusion and Recommendation

This study has provided empirical stance on the determinants of PPP in energy for a randomly selected sub-Sahara and North African countries. In respect to the major findings of the study, we conclude that in sub-Sahara Africa countries all the private motivating and environmental factors are negative and insignificant determinants of investment in energy. In the same vein two of the government motivating factors, such as, government aids and tax compliance have negative impact on investment in energy. Trade openness and government size has positive influence on investment in energy. However, in North Africa, trade openness, aids, debt and protection of private property right are indirectly but significantly related to investment in energy. Conversely, level of development drives investment in energy positively in North African countries. Therefore, we recommend that the private investors in these countries should work in partnership with their government to finance its investment on energy and government should put in place some polices to protect private property right as this will encourage the private individuals to participate in governments' projects.

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