Institutional Quality, Petroleum Resources and Economic Growth: A Difference-In-Differences Approach Using Nigeria, Brazil and Canada

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Abstract

Canada and Brazil are endowed with abundant petroleum resource like Nigeria. The GDP per capita figures for Canada, Brazil and Nigeria from 2000 to 2010 show that the economic status of the two countries is significantly better than that of Nigeria. The contribution of oil rents to GDP figure for Nigeria compared to the two countries indicates that Nigeria is over dependent on oil at the expense of other sectors of the economy. Corruption assessment scores for the three countries suggest that Nigeria is more corrupt, implying weak institutions compared to Canada and Brazil. This calls for concern; is the slow Nigeria economic performance in relation to that of Canada and Brazil attributable to over dependence on oil and weak institutions in Nigerian? To examine this, we employed "Difference-in-Differences" method, and obtained difference in per capita GDP between Canada and Nigeria (PCDCN), Brazil and Nigeria (PCDBN), difference in oil rents to GDP ratio between Canada and Nigeria (OILDCN), between Brazil and Nigeria (OILDBN), difference in corruption index between Canada and Nigeria (CORDCN), between Brazil and Nigeria (CORDBN), difference in government effectiveness index between Canada and Nigeria (GOVDCN) and between Brazil and Nigeria (GOVDBN), and difference in annual inflation rate between Canada and Nigeria (INFDCN) and between Brazil and Nigeria (INFDBN). Granger Causality Test Statistics was used to test whether the difference in economic growth proxy by per capita GDP between Canada and Nigeria was caused by differences in petroleum sector proxy by oil rents to GDP ratio, differences in institutional qualities proxy by differences in corruption index (CORDCN) and government effectiveness index (GOVDCN) and differences in annual inflation (INFDCN). We adopted the same approach for the difference between Brazil and Nigeria economies. Ordinary Least Squares (OLS) econometric estimation technique was used to examine the impacts of the differences in oil sector, institutional qualities, and annual inflation on the difference in economic growth between Canada and Nigeria; and Brazil and Nigeria. The Granger causality results shows that, differences in economic growth between Canada and Nigeria (PCDCN) is caused by differences in their corruption (CORDCN) and that there is a bidirectional causation between difference in corruption (CORDCN) and difference in governance effectiveness (GOVDCN). While the OLS results reveals that difference in corruption was the most significant cause of the difference in growth performance between Canada and Nigeria; and Brazil and Nigeria. The coefficient of CORDCN was 0.452 with a probability value of 0.001, while the coefficient of CORDBN was 0.565 with a probability value of 0.001. Hence, ceteris paribus, we are over 99 percent sure that a 10-percent fall in the corruption gap will result to about 4.52 percent and 5.65 percent fall in the growth gap between Canada and Nigeria; and Brazil and Nigeria respectively. Based on the results, we recommended that quality institution (low corruption) is indispensable in bridging the gap in economic performance between Canada and Nigeria as well as Brazil and Nigeria.

Keywords: Institutional quality, petroleum sector, economic growth, Differences, Nigeria, Brazil, Canada

1.0 Introduction

Canada and Brazil are endowed with abundant petroleum resource like Nigeria. On average, between 2000 and 2010 Canada produced 2.390million barrels of oil per day, Brazil produced 1.632 million barrels of oil per day and Nigeria produced 2.333million barrels of crude oil per day.

The GDP per capita figures for Canada, Brazil and Nigeria from 2000 to 2010 show that the economic status of the two countries is significantly better than that of Nigeria. The corruption assessment scores suggest that Nigeria is more corrupt, implying weak institutions compared to Canada and Brazil (*CIA World Factbook, 2011; and Transparency International Agency Annual Publications, Wikipedia 2011)*. This call for concern; the question is, what could be responsible? Is the slow Nigeria economic performance in relation to that of Canada and Brazil attributable to weak institutions in Nigerian? This question formed the primary focus of this paper.

Thus, the main objective of this paper is to examine the difference in the economic performance between Nigeria and Canada on one hand, and between Nigeria and Brazil on the other in relation to their petroleum sector and institutional quality using "difference-in –difference" approach. Specifically, to;

(i) Establish the differences in economic growth (per capita GDP), oil rent to GDP ratio, institutional quality (corruption and governance indices) and some macro-economic indicators between Nigeria- Canada; and Nigeria- Brazil.
(ii) Determine the direction of causations of the differences in per capita GDP, oil rent to GDP ratio and institutional quality between Nigeria- Canada; and Nigeria- Brazil.
(iii) Examine the impacts of the differences in oil sector, institutional quality on the differences in economic performance between Nigeria-Canada; and Nigeria-Brazil.
(iv) Draw lessons from the experience of Canada and Brazil for Nigeria growth path.

2.0 Literature Review

It has been theoretically argued that abundant natural resource endowment should promote economic growth and development. However, there is no consensus among researchers as to the veracity of this assertion. Most studies found that natural resource rich countries tend to have slow economic growth and in some cases negative economic growth. For instance, Sach and Warner (1997) in their cross country studies found that countries that base their economies on natural resources tend to be example of development failures. Gylfason (2000), Kronenberg (2004), Sala-i-Martin and Subramanian (2003) etc., also had similar results in their cross country studies. While few studies found that natural resource abundance is indeed a blessing. For instance, Guajardo (2008) found that endowment of coal in Chile had a positive effect on its economy. He observed that the positive relationship stem from two fundamental sources: institutional strength of the nation and positive political environment. Studies on natural resources and quality of institutions, also shows mixed evidence about their relationship. The first group of studies maintained that natural resources cause the quality of institutions to decay and this in turn, leads to poor economic performance (Barro 1999; Sala-i-Martin and Subramanian, 2003; Ross, 2001; Isham et al, 2005. The second group of studies maintained that natural resources do not affect the quality of institutions nor do institutions have direct impact on economic growth (Arezki & Van der Ploeg, 2007). The third group of studies maintained that quality institutions determines if natural resources are channeled into positive economic growth (Mehlum et al 2006, Boschini et al, 2003).

Sachs and Warner (1997) tested for the determinants of growth (with cross-country data for 77 countries from 1965 to 1990) using a revised set of independent variables: natural resources (measured as natural resource exports to GDP, where exports of natural resources are the sum of exports of primary agriculture, fuels, and minerals); institutions (measured as an un-weighted average of five indexes: rule of law, bureaucratic quality, corruption in government, risk of expropriation and government repudiation of contract); the log of real GDP per economically active population; trade openness; interaction between trade and income; log of life expectancy and its square; government saving rate; inflation rate; ethno linguistic fractionalization; growth of the economically active population; and a number of geographic indicators, including a landlocked dummy variable. They found that natural resources have a negative impact on economic growth; they attribute this result to the Dutch Disease and higher incentives for rent seeking. They also found that weak institutions and poor economic policies (and especially lack of openness to international markets) slow economic growth. They pointed out that the indicators over which societies have control (such as trade policy and quality of institutions) seem to be the most significant for growth. The authors found that nations that have implemented strong economic reforms have seen high rates of economic growth. Boschini et al. (2003) in using cross-sectional data for 80 nations from 1975 to 1998, tested models with several measures of natural resources: value of primary exports; value of exports of ores, metals, and fuels; value of mineral production not including fuels; and value of production of gold, silver and diamonds all as a percentage of GNP or GDP.

Like the authors of many previous studies, they found that natural resources have a negative impact on economic growth while institutional quality had a positive effect. But here, an interactive term (the product of natural resources and institutional quality) was positive and significant. Adding up, this implies that good institutions can turn natural resources into a blessing. The results also indicate that gold, silver, and diamonds have a stronger negative impact on economic growth. As a robustness test, the authors run a two-stage, least squares model to account for the potentially endogenous nature of institutions (using latitude as an exogenous instrument); the results did not change significantly.

Similarly, Mehlum et al. (2006) tried excluding the developed nations from the sample as well as using different measure of institutional quality such as property rights in 1984, rule of law index in 1984, rule of law in 1998, risk of expropriation in 1984, repudiation of contracts in 1984, and combined polity score but, once again, the results did not change significantly.

Leite and Weidmann (1999) argued that possessing natural resources affects growth indirectly through increases in rent-seeking, measured by the level of corruption, and that corruption in turn has a negative impact on economic growth. They argue that the level of rent-seeking (that is, corruption) is determined within the economic system and thus depends on economic interests and government policy. To test this hypothesis, they used cross-sectional data from 1970 to 1990 for 72 nations. They first examined the determinants of corruption with an emphasis on the role of natural resources. Specifically, they investigated the impact of economic growth from 1970 to 1990 (where growth was endogenously determined), initial income, rule of law, political instability, several measures of natural resources (ores, fuel, agriculture, food, and agriculture and food exports, all as a percentage of GNP), trade, a dummy variable for sub-Saharan Africa, and an ethno linguistic fractionalization index on the level of corruption. Then, they examined the impact of the level of corruption (where corruption was endogenously determined), initial income, exports of natural resources as a percentage of GNP, trade openness, investment as a share of GDP, terms of trade, rule of law, a dummy for sub-Saharan Africa, commodity-price variability in Africa, and commodity-price variability in the rest of the world on economic growth. Leite and Weidmann found that fuels and ores increase corruption but that agriculture and food, rule of law, and trade openness decrease it. They also found that both natural resources and corruption have a direct, negative impact on economic growth as well.

Papyrakis and Gerlagh (2004) examine empirically the direct and indirect impact of natural resources on economic growth and the channels through which natural resources affect growth indirectly. Using cross-sectional data, the authors first tested the direct impact of natural resources on economic growth. Specifically, they examined the impact of the log of GDP per capita in 1975, share of mineral production in GDP in 1971 (that is, a measure of natural resources), the level of corruption, average real gross investment from 1975 to 1996, trade openness, terms of trade, and average secondary schooling from 1970 to 1989 on economic growth from 1975 to 1996. They then tested the impact of natural resources on corruption, investment, trade openness, terms of trade and schooling. They found that the negative, direct impact of natural resources on economic growth disappears as control variables were added. They also found that natural resources have a negative impact on investment, trade openness, and schooling and a positive impact on the terms of trade. The impact of natural resources on corruption was not significant.

Brunnschweiler and Bulte (2006) used cross-sectional data from 1970 to 2000, for 29 to 89 countries to examine the impact of natural resources on institutions, resource dependence and economic growth. First, they investigated the impact of resource abundance (measured as the log of total capital per capita in 1994 and log of subsoil assets per capita in 1994), resource dependence (natural resource exports as a percentage of GDP from 1970 to 1980 and mineral exports as a percentage of GDP from 1970 to 1980), regional dummies, and latitude on institutions (measured as the rule of law in 1996 and quality of bureaucracy in 1996). Then they examined the impact of resource abundance, "durable" institutions, as well as "changeable" institutions (rule of law and quality of bureaucracy) and trade openness on resource dependence. Dependence upon resources was measured in three ways in this equation: exports of agricultural raw material, exports of minerals, and exports of natural resources, all as a percentage of GDP from 1970 to 1980. Their results were that, Resource *abundance* has a positive impact on the quality of institutions; resource dependence does not. Resource abundance, openness, and type of regime have a positive impact on the resource dependence; quality institutions have *negative* impact on resource dependence.

Lastly, resource dependence has no direct impact on economic growth whereas resource abundance has a positive impact. Most of the studies established and reviewed are cross-country studies relating to natural resources as a whole, without Nigeria in focus in terms of the institution in linking petroleum resources to economic growth. This study is unique in its approach (difference-in-differences) in examining the cause of the differences in economic performance in relation to oil sector and institutional qualities on one hand between Nigeria and Canada ;and on the other hand between Nigeria and Brazil with the aim of drawing lessons for Nigeria growth path.

3.0 Comparative analysis of the economies of Canada, Brazil and Nigeria from 2000-2011.

Tables 1 and 2 below show crude oil production and export from Canada, Brazil and Nigeria between 2000 and 2010. Table 1 show that, on average, Canada exported 52.89% of the crude oil produced; Brazil exported only 15.49% of her crude oil, while Nigeria exported 88.54% of her crude oil between 2000 and 2010. In Brazil, about 70 million cubic metric of petroleum were being processed annually into fuels, lubricants, propane, gas and a wide range of hundred petrochemicals. The Brazilian government undertook ambitious programs to reduce dependence on imported petroleum. Imports previously accounted for more than 70 percent of the country's oil needs but Brazil became self sufficient in oil in 2006-2007. Brazil is one of the leading producers of hydroelectric power, with a current capacity of about 260,000 megawatts. Nigeria should borrow from this experience to reduce the crude oil export to oil production rate vis-à-vis high petroleum import.

Table 1: Crude oil Production and Export from Canada, Brazil and Nigeria

Year	Canada oil prod.	Brazil oil prod.	Nigeria oil prod.	Canada oil expo	Brazil Oil expo	Nigeria oil expo
2000	1976.89	1269	2165	1047.41	0.59	1834.2
2001	2029.17	1295	2256.16	1171.96	19.52	2069.18
2002	2170.6	1455.19	2117.86	1138.62	20.96	2034.1
2003	2305.73	1496.11	2275	1152.53	234.93	1893.2
2004	2398.42	1477.37	2328	1230.31	241.74	2163.5
2005	2368.88	1633.57	2627.44	1336.45	230.17	2176.1
2006	2525.4	1722.73	2439.86	1360.32	269.6	2260.33
2007	2628.13	3788	2627.64	1439.55	361.67	2190.28
2008	2579.31	1812.23	2165.44	1306.12	427.94	2120.22
2009	2579.48	1950.36	2208.31	1369.78	439.9	1931.94
2010	2733.55	2054.67	2455.26	1355.36	533.2	2051.18
Average	2390.50	1632.27	2333.27	1264.4	252.75	2065.83
Average Export % Prod.	52.89	15.49	88.54			

Source: *CIA World Factbook 2011, Transparency International Agency Annual Publications, Wikipedia 2011, and Researcher's computation.*

Note: Production and Export in thousand barrels per day.

In table 2, the average percentage contributions of oil rents to GDP in Canada, Brazil and Nigeria from 2000 to 2010 were 2.21, 2.43 and 31.43 respectively. Average GDP per capita for Canada, Brazil and Nigeria were 34445.38, 5601.15 and 822.64. Average corruption assessment scores during the period under review for Canada, Brazil and Nigeria were 8.8, 3.8 and 1.7 respectively. The share of oil rents to GDP for Nigeria is higher than that of Canada and Brazil. This suggests that Nigeria depend more on petroleum resources than Canada and Brazil. The GDP per capita figures for Canada, Brazil and Nigeria from 2000 to 2010 show that the economic status of the two countries is significantly better than that of Nigeria. The corruption assessment scores suggest that Nigeria is more corrupt, implying weak institutions compared to Canada and Brazil.

According to Canadian economic survey report 2011; in Canada, private property rights are well secured with an independent and transparent judicial system firmly in place. Contract enforcement is very secure, and expropriation is highly unusual.

Effective anticorruption measures that discourage bribery of public officials and uphold clean government are also in place. This is reflected in the transparency international corruption perception (TICPI) assessment score of 8.7.

The slow performance of Nigeria economy compared to Canada and Brazil is also attributable to over dependence on petroleum sector at the expense of manufacturing, services and agricultural sectors of the economy. Canada and Brazil have made effective use of their petroleum resources by investing in manufacturing, services and agricultural sectors of their economy. Canada for instance, has a sizeable and high valued manufacturing industry centered in central Canada with aircraft and automobile industry. These industries attract major investments from U.S. and Japanese automobile companies with multiple manufacturing plants set up in Canada. The manufacturing sector accounted for 24 percent of GDP in the 1960s, though was hard hit by the 2007-2008 global financial crisis, which resulted in the decline to 13 percent of GDP in 2009. The sector now accounts for 20 percent of the nation's GDP in 2011 (OECD, 2011).

Table 2: Oil Rents, PCGDP and Corruption status of Canada, Brazil and Nigeria from 2000-2010

Year	Canada Oil rents *	Brazil Oil rents *	Nigeria Oil rents *	Canada PCGDP (US $)	Brazil PCGDP (US $)	Nigeria PCGDP (US $)	Canada TICPI	Brazil TICPI	Nigeria TICPI
2000	1.70	1.59	41.85	23,559.50	3696.15	371.77	9.2	3.9	1.2
2001	1.31	1.56	34.40	23,017.37	3129.76	378.83	8.9	4..0	1.0
2002	1.33	1.96	24.40	23,425.23	2812.33	455.33	8.9	4.7	1.2
2003	1.51	2.22	28.95	27,335.37	3041.68	508.43	9.0	3.9	1.6
2004	2.00	2.52.	32.64	33,011.51	3609.88	644.03	8.7	3.9	1.4
2005	2.72	3.08	37.60	35,087.90	4743.26	802.74	8.4	3.7	1.6
2006	2.97	3.20	32.92	39,249.10	5793.40	1014.56	8.5	3.3	1.9
2007	2.82	2.86	29.64	43,245.60	7197.03	1129.09	8.7	3.5	2.2
2008	3.67	3.39	31.27	45,099.61	8627.99	1374.69	8.7	3.5	2.2
2009	1.95	2.09	22.54	39,655.79	8251.06	1091.14	8.7	3.7	2.3
2010	2.30	2.24	29.46	46,212.27	10710.09	1278.37	8.9	3.7	2.4
Total Average	**2.21**	**2.43**	**31.43**	**34,445.38**	**5601.15**	**822.64**	**8.8**	**3.8**	**1.7**

Source: *CIA World Factbook 2011, Transparency International Agency Annual Publications, Wikipedia 2011, NBS 2011 and Researcher's computation* Note: ** means % of GDP, TICPI index ranges from 0-10. A higher score means less (perceived) corruption*

Table2b also reveals that Nigeria is very poor when compare to Canada and Brazil in terms of governance effectiveness, implying poor management of a country's economic and social resources for development, poor quality of policy formulation, and the credibility of the government commitment to such policies

Table 2 b: Government Effectiveness and Annual Inflation

Governance effectiveness index				Annual inflation growth rate (GDP deflector)		
Year	Canada	Brazil	Nigeria	Canada	Brazil	Nigeria
2000	1.96	0.04	-0.94	4.1	6.2	38421
2001	1.96	0.04	-0.94	1.1	9	10171
2002	1.95	0.05	-0.99	1.1	10.6	31151
2003	1.97	0.19	-0.88	3.3	13.7	11323
2004	1.9	0.04	-0.8	3.2	8	20372
2005	1.9	-0.09	-0.84	3.3	7.2	19383
2006	1.94	-0.12	-0.88	2.7	6.2	19267
2007	1.78	-0.09	-0.94	3.2	5.9	4.8.2
2008	1.82	-0.004	-0.97	4.1	8.3	114.1
2009	1.83	0.02	-1.23	-1.9	7.2	-4.4.9
2010	1.87	0.07	-1.19	2.9	8.2	26289
Average	1.89	0.01	-0.96	2.46	8.22	17.26

Source: *CIA World Factbook 2011 and Researcher's computation*
Note: Government effectiveness index ranges from -2.5 (weak) to 2.5 (strong) government performance.

The foregoing data and descriptive statistics, provides evidence that differences exist in economic performance, oil sector contributions and institutional qualities among Canada, Brazil and Nigeria. We proceed further in the next session to test econometrically, whether the difference in economic performance between Nigeria and Canada; and Nigeria and Brazil are Caused by differences in their oil sectors and institutional qualities over time.

4.0 Data, Measurement and Model specification

4.1 Data and Measurement

The differences in oil sector, institutions, and economic growth between Nigeria and Canada; and Nigeria and Brazil was investigated using time series data from various sources. Economic growth was proxy by Per capita GDP (PC). While Petroleum resource was proxy by oil rent as a ratio of GDP (OIL) and the Data were obtained from CIA, World Factbook 2011. Institutional quality variable was proxy by two indices; corruption (COR) and governance effectiveness (GOV) indices obtained from Transparency International Corruption Perception Index annual publication (TICPI, Wikipedia) and CIA, World Factbook 2011 respectively.

Corruption index (CI) measures the degree to which corruption is perceived to exist among public officials and politicians (TICPI, 1995). According to Sachs and Warner, 1997; Papyrakis and Gerlagh, 2004, institutional quality is often simply controlled for by using a measure of corruption. Transparency international corruption perception index ranges from 0-10. A higher score means less (perceived) corruption. Government effectiveness (GOV) index measures the manner in which power is exercised in the management of a country's economic and social resources for development, as well as the quality of policy formulation, and the credibility of the government commitment to such policies. The index ranges from -2.5 (weak) to 2.5 (strong) government performance.

4.2 Method and Model

We employed "Difference-in-Differences" method. We obtained differences in per capita GDP between Canada and Nigeria (PCDCN), Brazil and Nigeria (PCDBN), differences in oil rents to GDP ratio between Canada and Nigeria (OILDCN), between Brazil and Nigeria (OILDBN), differences in corruption index between Canada and Nigeria (CORDCN), between Brazil and Nigeria (CORDBN), differences in government effectiveness index between Canada and Nigeria (GOVDCN) and between Brazil and Nigeria (GOVDBN), and differences in annual inflation rate between Canada and Nigeria (INFDCN) and between Brazil and Nigeria (INFDBN).

Granger Causality Test Statistics was used to test whether the differences in economic growth between Canada and Nigeria (PCDCN) was caused by differences in petroleum sector (OILDCN), differences in institutional qualities (CORDCN and GOVDCN) and differences in annual inflation (INFDCN). We adopted the same approach for the differences between Brazil and Nigeria economies.

To examine the impacts of the differences in oil sector, differences in institutional qualities, differences in annual inflation on the difference in economic growth between Brazil and Nigeria, we specify that:

PCDCN=f (OILDCN, CORDCN, GOVDCN, INFDCN, U)…….(1)
The econometric equation become,
$PCDCN=a_0+a_1OILDCN+a_2CORDCN+a_3GOVDCN+a_4INFDCN+ U$……(2)
We also specify that:
$PCDBN=b0+b1OILDBN+b2CORDBN+b3GOVDBN+b4INFDBN+U$ ……(3)
Where:
PCDCN, OILDCN, CORDCN, GOVDCN and INFLDCN are as defined earlier.
u= stochastic error.
a_0 and b_0 are constant,
$a_1…a_4$; and b1…b4 are coefficients of the variables. The apriori expectation is that: $a_1...a_4$ and $b_1…b_4>0$.

5.0 Results

The Granger causality results in table 3a show that, differences in economic growth between Canada and Nigeria (PCDCN) is caused by differences in their corruption (CORDCN)**.** This is adjudged by the estimated F-statistic figure of 23.9995 with a probability value of 0.00042. Hence, the null hypothesis was therefore rejected and the alternative hypothesis 'CORDCN granger cause PCDCN' was accepted. In other words, we are over 99 percent sure that, differences in economic growth between Canada and Nigeria is caused by differences in their rate of corruption.

Table 3a: results of Granger causality tests for differences between petroleum sectors, institutions and economic growth between Nigeria and Canada.

Null Hypothesis:	Obs	F-Statistic	Probability
OILDCN does not Granger Cause PCDCN	13	0.57159	0.58610
PCDCN does not Granger Cause OILDCN		1.99956	0.19759
GOVDCN does not Granger Cause PCDCN	13	0.15553	0.85849
PCDCN does not Granger Cause GOVDCN		2.06425	0.18929
CORDCN does not Granger Cause PCDCN	13	23.9995	0.00042
PCDCN does not Granger Cause CORDCN		0.63258	0.55584
GOVDCN does not Granger Cause OILDCN	13	1.53071	0.27360
OILDCN does not Granger Cause GOVDCN		0.66872	0.53883
CORDCN does not Granger Cause OILDCN	13	1.94261	0.20527
OILDCN does not Granger Cause CORDCN		0.60192	0.57080
CORDCN does not Granger Cause GOVDCN	13	7.22512	0.01612
GOVDCN does not Granger Cause CORDCN		5.81802	0.02755

Source: Researcher's computation.

Table3a also revealed that there is bidirectional causation between differences in corruption (CORDCN) and differences in governance effectiveness (GOVDCN). This is adjudged by the estimated F-statistic values of 7.225 with a probability value of 0.016 for CORDCN and 5.818 with probability value of 0.0275 for GOVDCN obtained from the test. Thus, the null hypothesis was therefore rejected and the alternative hypothesis was accepted. This means that differences in corruption cause differences in effective governance, and differences in effective governance in turn cause differences in corruption between Nigeria and Canada.

From table3b, it is also obvious that a difference in economic growth between Brazil and Nigeria (PCDBN) is caused by differences in their corruption (CORDBN). Differences in corruption also cause differences in effective governance, and differences in effective governance in turn cause differences in corruption between Nigeria and Brazil.

Table 3b: results of Granger causality tests for differences between petroleum sectors, institutions and economic growth between Nigeria and Brazil

Null Hypothesis:	Obs	F-Statistic	Probability
OILDBN does not Granger Cause PCDBN	13		0.45945
PCDBN does not Granger Cause OILDBN		2.72822	0.12492
GOVDBN does not Granger Cause PCDBN	13	0.67074	0.53790
PCDBN does not Granger Cause GOVDBN		1.58873	0.26241
CORDBN does not Granger Cause PCDBN	13	0.45417	0.65039
PCDBN does not Granger Cause CORDBN		1.17311	0.35746
GOVDBN does not Granger Cause OILDBN	13	0.90181	0.44342
OILDBN does not Granger Cause GOVDBN		0.47451	0.63864
CORDBN does not Granger Cause OILDBN	13	0.97305	0.41855
OILDBN does not Granger Cause CORDBN		0.24327	0.78965
CORDBN does not Granger Cause GOVDB	13	4.18674	0.05699
GOVDBN does not Granger Cause CORDBN		0.24771	0.78636

Source: Researcher's computation

Tables 4a and b below show the impacts of the difference in petroleum sector, difference in institutional qualities and difference in annual inflation rates on difference in economic growth between Canada and Nigeria; and Brazil and Nigeria respectively.

Table 4a: results of the impacts of differences in oil sector institutional qualities and inflation on economic growth gap between Nigeria and Canada

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OILDCN	-0.006958	0.004223	-1.647637	0.1304
GOVDCN	-0.000238	0.151692	-0.001569	0.9988
CORDCN	-0.452570	0.027128	-16.68282	0.0000
INFCN	2.28E-05	0.001380	0.016538	0.9871
C	13.37475	0.447026	29.91943	0.0000
R-squared	0.974776	F-statistic 96.61083		
Adjusted R-squared	0.964686	DW 2.0687		

Source: Researcher's computation

Table4b: results of the impacts of differences in oil sector institutional qualities and inflation on economic growth gap between Nigeria and Brazil

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OILDBN	-0.009366	0.013912	-0.673219	0.5161
GOVDBN	0.703275	0.430873	1.632209	0.1337
CORDBN	-0.565393	0.086729	-6.519103	0.0001
INFBN	-0.001694	0.005381	-0.314727	0.7594
C	8.605407	0.728184	11.81763	0.0000
R-squared	0.828165	F-statistic 12.0488		
Adjusted R-squared	0.759431	DW 1.9610		

Source: Researcher's computation

The results in tables 4a and b show that the difference in corruption was the only significant variable in determining the gap in economic growth between Nigeria-Canada; and between Nigeria-Brazil. Corruption had negative sign in the two models. Its coefficient was -0.4525 with a probability value of 0 .0001 in Nigeria-Canada model. While its coefficient and probability value in Nigeria-Brazil model was -0.5653 and 0.0001 respectively. Thus, ceteris paribus, we are 99 percent confidence that, 1 percent reduction in corruption will lead to about 4.52 and .6.5 percent reduction in economic growth gap between Nigeria– Canada and Nigeria -Brazil respectively.

6.0 Conclusion/recommendations

The paper concludes that corruption is the main cause of Nigeria's economic backwardness. Based on the results, we recommended that quality institution (low corruption) is indispensable in bridging the gap in economic performance between Canada and Nigeria as well as Brazil and Nigeria.

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