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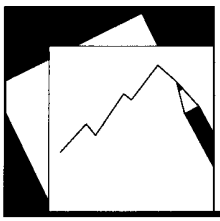

IMF Working Paper

Ghana: Will It be Gifted or Will It be Cursed?

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Ghana: Will It be Gifted or Will It be Cursed?

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Abstract

Will Ghana's oil production from 2011 accelerate progress toward middle-income status, or will it retard gains in living standards through a possible "resource curse"? This paper examines the likelihood of "resource curse" effects, drawing on a dataset of 150 low and middle income countries from 1973 to 2008 using static and dynamic panel estimation techniques. Results confirm that resource rich countries in Ghana's income range do experience slower growth than their more diversified peers, an effect that appears to be related to weaker governance. Provided that Ghana can preserve and improve its economic governance and also strengthen fiscal management, prospects look good for converting its oil wealth into sustained strong economic growth.

JEL Classification Numbers: C33, O10

Keywords: Ghana, growth, resource-rich, panel data

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I. INTRODUCTION

Ghana has discovered offshore oil wealth, which should come on stream in 2011. Ghana's share of export revenues is projected at around 6-7 percent of GDP over a 5- to 10-year period, falling gradually thereafter. But new discoveries are being announced, and the level and duration of oil income could increase.

A much-debated policy issue is to what extent economic growth and living standards in Ghana can be expected to improve as a result of the move to oil producer status. On the one hand, oil revenues relax external and fiscal constraints. If oil incomes are invested prudently—whether in improved infrastructures, or in better education or health—this would be expected to boost incomes and living standards. Against this, many resource-based countries have not seen strong growth, and living standards have stagnated. This provides a cautionary note as to the likely impact of Ghana's oil wealth.

There are three broad strands to the literature on the impact of natural resources on economic growth. A first group of papers supports the concept of a resource curse, with resource-rich countries observed to grow less rapidly than their peers. In an early paper, Prebisch (1959) argued that weak growth in Latin America reflected the limited possibilities for technological growth for natural resource industries. Both Neumayer (2004) and Mehlum et. al. (2006) support the concept of a resource curse, noting the slower growth of resource-rich countries since the 1960s. Gylfason and Zoega (2001) argue that physical capital may be crowded out in resource-rich countries, slowing down their economic growth. Sachs and Warner (2001) analyze whether previously omitted geographical and climate variables can explain the resource curse, and find little evidence on that or any bias resulting from other unobserved growth deterrents; and further conclude that resource-abundant countries in general are high-price economies and hence they miss-out on export-led growth.

A second strand of literature argues the opposite—that resource-rich countries are blessed, growing faster than non-resource countries. In this literature, Lederman and Maloney (2007) argue that natural resources promote growth when combined with accumulation of knowledge. Doppelhofer et. al. (2000) show that mining production as a share of GDP is a robust predictor for higher economic growth when analyzed by bayesian averaging methods.

In a third strand of literature, researchers question whether natural resources have any significant impact on countries' growth paths. Stijns (2005) shows that natural resource abundance has not been a significant structural determinant of economic growth. Davis (1995) questions the resource-curse hypothesis in a larger scale of cross-country data, and finds little evidence supporting this hypothesis. Manzano and Rigobon (2001) show that, after controlling for initial levels of foreign debt relative to GDP, the negative correlation between natural resources and growth disappears (Sachs & Warner, 2001).

This paper studies the impact of natural resources on growth, and the main contribution of this paper to the literature is on two folds. First, the paper is one of the few analyses, which

gathers a numerous dataset for low- and middle- income countries (LMIC). The panel dataset starts from 1970s and contains 150 LMICs, comprised of both resource-rich and diversified economies. Second, the paper contributes to the growth impact of resource wealth literature by acknowledging the difference between institutional backgrounds of LMICs. The paper incorporates a rich dataset on institutions covering both governance and stability across LMICs.

In order to analyze this rich dataset, we employ static and dynamic panel estimation methods. We test whether resource-rich countries on average grow more slowly than non-resource countries by controlling for macroeconomic, structural and institutional variables. On the macroeconomic side, indicators for initial income levels, openness, and competitiveness are explored, while structural and institutional effects are considered in regard to demographics, the quality of economic governance, checks and balances on governance, and political stability.

Results show that there is a poverty trap for poor resource-rich countries due their low institutional quality. Notwithstanding this, resource wealth can boost growth if supported with strong governance and good macroeconomic management. We show that for Ghana, a country with relatively strong institutions, oil wealth could boost its per capita income growth by up to 2 percentage points in the long-run, if macroeconomic policies are also strengthened by reducing the fiscal deficit in line with current plans.

In what follows, Section II introduces the data. Section III analyzes the impact of income and resource wealth on the growth path. Section IV studies the impact of macroeconomic and structural policies and Section V the institutional structure on the growth rate of an economy. Then, Section VI applies the findings from the preceding section to Ghana. Last, Section VII draws conclusions.

II. DATA

Data are drawn from an annual unbalanced panel dataset of 150 LMICs from 1973 through 2014. The dataset up to 2009 is based on realized historical data, and this section is used for model estimations, and the remaining five years are IMF Staff's projections and these are used for forecasting purposes in Section VI. Macroeconomic variables for this dataset are obtained from the World Economic Outlook (International Monetary Fund, 2009). Variables on demographics are obtained from the World Bank's World Development Indicators database. Effective exchange rate and trade weight data are from the IMF Information Notice System; and net foreign asset data are from the IMF Balance of Payments database.[1]

[1] The dataset was adjusted in a number of ways. The following are treated as data errors and excluded from the estimation sample: negative values for nominal GDP, GDP at constant prices, government consumption, exports, imports, population, employment, exchange rate, and terms of trade; and absolute values greater than 100 percent for dependency ratio, population growth, and for fiscal balance, government spending, current account balance and trade balance as a percent of GDP. Trade weight data are replaced by the data reported by country authorities whenever there is a large discrepancy.

Data on institutional indicators are obtained from the Worldwide Governance Indicators dataset (World Bank, 2009) (see Box 1 below), while data on armed conflict are from the Uppsala Conflict Data Program (2009).

Box 1. Governance Indicators

The governance indicators reported in Table 1 cover the period from 1996 to 2008. Country values range from -2.6 to 1.5, with higher magnitudes indicating better governance. This paper examines six measures of governance:

- *Control of Corruption*: the extent that public power is exercised for private gain;
- *Government Effectiveness*: the quality of public services and policy formulation, capacity of civil service and its independence from political pressure.
- *Political Stability*: the likelihood of a government becoming destabilized by unconstitutional or violent means.
- *Regulatory Quality*: the capacity of a government to provide sound policies and regulations which would promote private sector development.
- *Rule of Law*: the confidence of citizens in law, and the extent that they abide by the rules of the society, such as contract enforcement, property rights, police, and courts
- *Voice and Accountability*: the degree of capacity of a country's citizens in selecting the government, and freedom of expression, freedom of association and free media

Countries are classified as resource-rich based on their main exports, as reported in the IMF's World Economic Outlook (Appendix A). Of the 150 low- and middle-income countries, 45 are classified as resource-rich. Of this total, 26 countries are classified as fuel exporters, with around half coming from the Middle East, and a little less than one third from Africa. The remaining 19 countries export other primary commodities, with more than half representing African countries.

Table 1 provides summary statistics for the variables of interest obtained from the common estimation sample. Statistics show that average growth rate for the LIMC was at 5 percent; however, there is a high variance across these countries, of 5 percent standard deviation, ranging from a negative of 33 percent to a maximum of 86 percent. Initial real income per capita for the LIMC countries was around 3,400 US dollar, again with a high variation amongst these countries of around 3,000 US dollars per standard deviation.

Table 1. Summary Statistics for the Common Estimation Sample

	Min.	Mean	Max.	Std. Dev.	Skewness	Kurtosis
Per Capita Growth[1]	-0.33	0.05	0.86	0.05	2.21	41.22
Resource[2]	0.00	0.30	1.00	0.46	0.89	1.79
Fuel[2]	0.00	0.13	1.00	0.34	1.79	4.20
Initial Income[3]	-1.20	1.22	4.45	1.10	-0.03	2.28
REER[3]	-1.49	-0.01	1.47	0.24	-1.24	14.60
Imports/GDP	0.00	0.47	6.28	0.29	6.45	115.62
Terms of Trade[3]	-0.95	0.00	0.87	0.22	-0.13	6.10
Fiscal Balance/GDP	-0.49	-0.02	0.43	0.07	1.29	15.33
Control of Corruption	-1.76	-0.35	1.51	0.66	0.54	2.72
Government Effectiveness	-1.88	-0.32	1.49	0.66	0.31	2.55
Political Stability	-2.61	-0.27	1.40	0.83	-0.35	2.57
Regulatory Quality	-2.44	-0.25	1.58	0.75	-0.15	2.76
Rule of Law	-1.88	-0.36	1.40	0.71	0.30	2.28
Voice and Accountability	-2.24	-0.32	1.46	0.84	-0.01	2.07
Armed Conflict[2]	0.00	0.17	1.00	0.37	1.78	4.16
Old Age Dependency[4]	0.01	0.09	0.26	0.05	1.51	4.41
Population Growth[1]	-0.17	0.02	0.26	0.02	2.13	39.92

Notes: Number of observations drawn from the common sample is 1543.

[1]: Calculated from the log-difference.

[2]: 0-1 indicator variable.

[3]: in logs: REER and terms of trade ratioed by 100, and income in thousands of US dollar.

[4]: is the ratio of retirees to working age population (= age 65+ / ages 16 to 65])

Regarding the stationarity of the variables of interest, panel unit root test statistics are provided in the Appendix B, Unit Root Test Results. Based on these statistics, none of the variables have a unit root that cannot be rejected by a majority of the test results.

Last, for refraining from the impact of multicollinearity on the regression coefficients, pairwise correlation coefficients within variables of interest are reported in Appendix C,

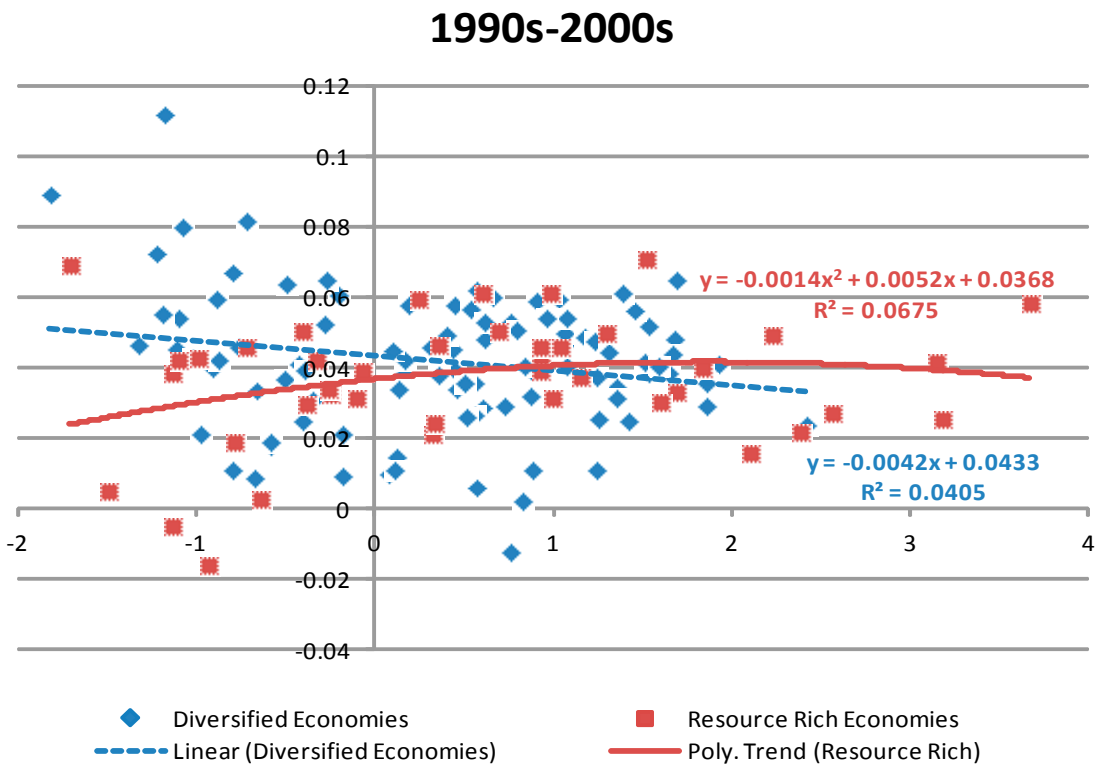
Correlation across Variables of Interest. Results show high and significant correlation across governance indicators, and between the governance indicators and income.

III. Are Resource-Rich Countries Cursed?

A. Introduction

In this paper, the first question that we will study is whether resource-rich countries are cursed, or in other words, whether these countries grow less than other economies on average. To illustrate this point, Figure 1 plots the average real per capita GDP growth rate of the resource-rich and diversified economies from 1990 to 2008, controlling for the initial real income per capita.

Figure 1. Real Per Capita GDP Growth of Resource-Rich and Diversified economies



Note: y-axis plots the average real per capita income growth over the 1990s and 2000s. x-axis plots the average real per capita income over the 1970s and 1980s (measured in thousands of US dollar and in logs)
Equatorial Guinea -a resource rich economy- and Zimbabwe -a diversified economy- is excluded from the graph as outliers.

The dotted blue line in Figure 1 shows the inverse relationship between trend growth of diversified LMICs and their initial income level. Consistent with the economic growth literature, poorer countries tend to grow faster than the rich, contributing to a gradual convergence of per capita incomes.

Per capita income growth rates of resource-rich LMICs in Figure 1 tend to fall below the dotted blue line at low income levels (i.e., in the left hand side of the chart, where per capita incomes are less than $1,000 in purchasing power parity prices). This implies that resource-rich countries grow more slowly than their diversified peers. By contrast, at higher income levels, resource-rich LMICs grow in line with, or perhaps even faster than their diversified peers. As illustrated in Table 2, per capita GDP growth in resource-rich countries with incomes of less than $500 per capita is 3 percentage points less per annum than in diversified countries, a difference that is largely eliminated at higher income levels.

Table 2. Growth of Resource-Rich and Diversified LMICs 1/

Initial income 2/	Diversified	Resource-rich	Difference
< $500	5.7	2.7	-3.0
$500 to <$1,000	3.5	3.3	-0.2
$1,000 to <$5,000	3.9	4.5	+0.6
Over $5,000	4.1	3.5	-0.6

1/ Average per capita income growth, 1990-2008.
2/ Average income per capita in 1973-1989.

One implication of these preliminary findings is the apparent lack of income convergence in resource-rich countries. Resource-rich countries with incomes of less than $500 per capita are estimated to grow by nearly 2 percentage points less per annum than countries with incomes of $1,000-5,000 per capita (Table 2). This suggests a resource-based poverty trap, in which low income resource-rich countries fall increasingly behind their resource-rich and more diversified peers in higher income brackets.

Based on Figure 1 and Table 2 we explore several policy questions. First, is there an underlying resource curse (or blessing), independent of incomes? Figure 1suggests that a resource curse may exist, and that it may be limited to the poorest countries. However, this finding may not hold up when a richer group of explanatory factors is considered. Second, we consider the nature of any possible resource curse. Does it constitute a poverty trap that precludes catch-up growth, as suggested by Figure 1and Table 2?

B. Methodology

We use panel data analysis models to study the impact of resource wealth on economic growth. Model (1) below provides the panel least squares and model (2) the dynamic generalized method of moments presentation of growth.

$$G_{i,t} = c + \beta_1 \mathrm{R}_i + \beta_2 Y_{i,t-1} + \beta_3 R_i I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_{i,t-1} + \delta_1 I_{i,t}^{Z} + \delta_2 I_{i,t}^{EG} + \varepsilon_{i,t} \quad (1)$$

$$G_{i,t} = c + \alpha G_{i,t-1} + \beta_1 \mathrm{R}_i + \beta_2 Y_{i,t-1} + \beta_3 R_i I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_{i,t-1} + \delta_1 I_{i,t}^{Z} + \delta_2 I_{i,t}^{EG} + \varepsilon_{i,t} \quad (2)$$

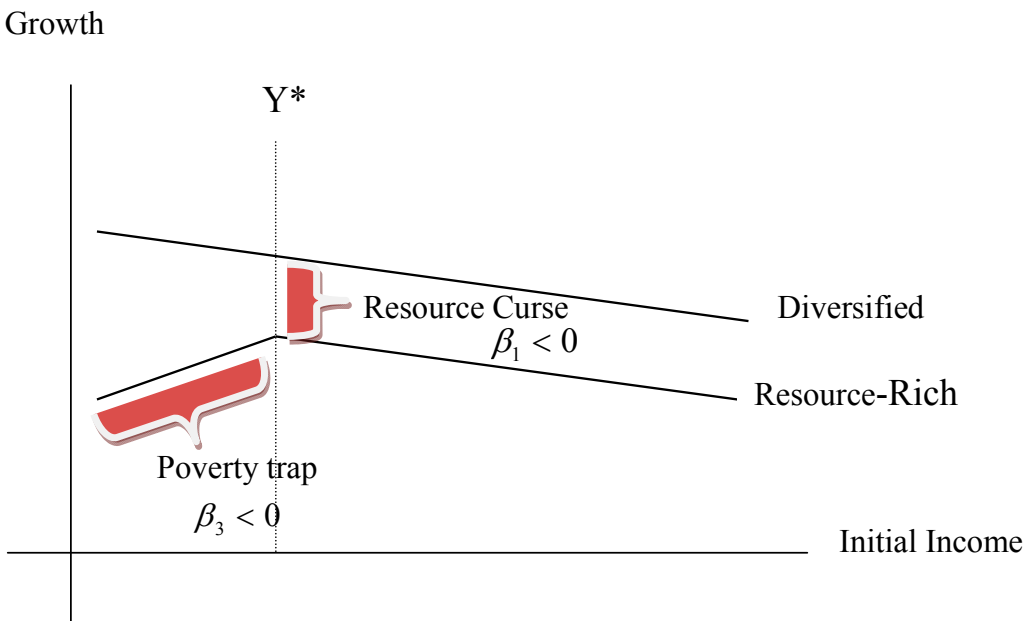
In these equations, $G_{i,t}$ is the logarithmic growth rate of real income per capita of country *i* at time *t*. R_i is a 0-1 indicator variable, which takes value 1, if country *i* is a resource-rich economy. $Y_{i,t-1}$ is the initial income measured as the one period lagged value of the logarithm of real income per capita. $I_{i,t-1}^{Y \le Y^*}$ is another 0-1 indicator variable, which takes value 1, if initial income of country i is less than Y*. $I_{i,t}^{Z}$ and $I_{i,t}^{EG}$ are two other indicator variables to account for the outstanding growth rates of Zimbabwe, a diversified economy with an average growth rate of negative 12 percent during the last two decades, and Equatorial Guinea, a fuel exporting country with average growth rate of positive 20 percent during the same period.

In equations (1) and (2), β_1 coefficient will test the existence of a resource curse. If there is a resource curse, then the estimated coefficient of this variable should be significantly smaller than zero.

For testing the existence of poverty trap for poor resource-rich economies, we will test whether the coefficient estimate of β_3 is significantly smaller than zero. In other words, the poorer is a resource-rich country, measured by the widening of the variable $(Y^* - Y)$, the slower that it grows.

Figure 2 visualizes the two hypotheses: $\beta_1 < 0$, for the resource curse; and $\beta_3 < 0$ for the poverty trap of the poor resource-rich economies. Poverty line is determined for those economies with initial income less than Y*.

Figure 2. Economic Convergence versus Divergence



C. Results

Estimation results of equations (1) and (2) are reported in the first two columns of Table 3[2]. And these results provide some support for both an underlying resource curse as well as a low-income poverty trap effect. However, the latter effect dominates, and the resource curse is significantly different from zero only at the 20 percent confidence level of the static model.

In the static model (first column of Table 3), the coefficient on initial income suggests only a weak convergence effect. A country with an initial per capita income of $2,000 would grow 0.5 percent per annum faster than a country with a per capita income of $4,000 (Table 4), implying a full convergence period of 350 years.

[2] When equations (1) and (2) are solved for six different levels of Y*, from $500 to $3,000, with increments of 500, both the static and the dynamic models' error variances indicated that the optimal model is for a Y* value around $2,000. It should also be noted that the error variance across these models is quite small, particularly for values of Y* of $1,500 and above. Due to space limitations only the estimation results of Y* = 2000 is reported in this table.

Table 3. Growth Regression Results

	Panel LS (Annual Data)	Dynamic Panel (Annual Data)	Panel LS (Non-overlapping 9-Year Averages	Dynamic Panel (Non-overlapping 9-Year Averages
Resource	-0.004 *	-0.002	-0.003	-0.005
	0.003	*0.002*	*0.005*	*0.007*
Initial $Income_{pc}$	-0.007 ****	-0.003 ****	-0.004 **	-0.005 *
	0.001	*0.001*	*0.002*	*0.004*
Resource $I^{y^*>y}(y^*-y)$ [1/]	-0.009 ****	-0.004 ***	-0.008 *	-0.019 **
	0.003	*0.002*	*0.006*	*0.011*
Growth (-1)		0.542 ****		-0.747 ***
		0.075		*0.302*
Zimbabwe dummy	-0.134 ****	-0.073 ****	-0.125 ****	-0.191 ****
	0.014	*0.011*	*0.022*	*0.015*
Equatorial Guinea dummy	0.080 ****	0.036 ****	0.099 ****	0.239 ****
	0.012	*0.006*	*0.022*	*0.026*
Constant	0.060 ****	0.026 ****	0.045 ****	0.073 ****
	0.001	*0.005*	*0.002*	*0.013*
Number of Observations	5044	4744	431	284
Adjusted R Squared	0.0306	0.1553	0.1033	0.0017
Std Error of Regression	0.0726	0.0672	0.0366	0.0423
Sum of Squared Residuals	26.532	21.421	0.5699	0.496

[1/] Results shown on this table is for y* = 2000.

Notes: Standard errors are provided beneath the coefficient estimates in smaller italic font.
Two-sided statistical significance at 1, 5, 10 and 20 percent level are indicated by ****, ***, ** and *, respectively.

Again in the static model, estimation results suggest that resource-rich countries grow by 0.4 percent per annum more slowly than their diversified peers, though, as noted above, this effect is poorly determined and barely significant. Nevertheless, this effect would offset the convergence effect noted above for resource-rich countries. Thus, a resource-rich country with per capita incomes of $2,000 would grow at broadly the same rate as a diversified economy with per capita incomes of $4,000 (Table 4).

Table 4: Estimated Growth at Different Initial Income Levels 1/

Initial income level:	$500	$1,000	$2,000	$4,000
Diversified LMICs	6.5	6.0	5.5	5.0
Constant term	6.0	6.0	6.0	6.0
Growth convergence effect: -0.7 * ln(Income)	0.5	0.0	-0.5	-1.0
Resource-rich LMICs	4.8	5.0	5.1	4.6
Constant term	6.0	6.0	6.0	6.0
Growth convergence effect: -0.7 * ln(Income)	0.5	0.0	-0.5	-1.0
Resource-rich dummy	-0.4	-0.4	-0.4	-0.4
Low-income poverty trap effect: -0.9 * ln(2000-Income)	-1.3	-0.7	0.0	0.0

1/ Based on regression coefficients estimated from equation (1), as shown in the first column of Table 3.

In this paper, the poverty trap term is used to capture the fact that the poorest resource-rich countries grow the least. And the estimated low-income poverty trap effect is found to be highly significant. The estimated coefficient suggests that for countries with initial incomes of less than $2,000, there is a growing resource curse as incomes decline. For instance, a resource-rich country with an initial income of $1,000 would grow 0.7 percent and another with income of $500 would grow 1.3 percent slower than otherwise (Table 4). And this income divergence effect would fade away over time, as the resource-rich country grows and reaches the $2,000 threshold level, which would take around 30 years for a country with initial income of $500.

In the dynamic model (second column of Table 3), the coefficient estimate of the lagged growth term as modeled in equation (2) is significant and positive. This coefficient estimate indicates that around half of growth this year is due to last year's growth performance. In other words, this coefficient shows the persistence or business cycles in the growth path of a country.

The coefficient estimates reported in the first two columns of Table 3 show that there is no loss of information by the use of the static panel estimation methods rather than the dynamic. As an illustration, one can re-write the dynamic model given in equation (2) in the long-run, when the economy operates at its potential output, as:

$$(1-\alpha)G_i = c + \beta_1 \mathrm{R}_i + \beta_2 Y_i + \beta_3 R_i I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_i + \delta_1 I_i^Z + \delta_2 I_{i,t}^{EG} \qquad (3)$$

As shown in the first column of Table 3, $\alpha = 0.5$, multiplying both sides of the above equation by 2, yields the same coefficient estimates as reported in the first and the second columns of Table 3.

D. Robustness

In this section we test the robustness of the model specification given in equations (1) and (2) and the results based on these models. First we test whether the poverty-trap is observed only for the poor resource-rich countries by adding the following uninterrected term $I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_{i,t-1}$ into equations equations (1) and (2). Regression results indicate that this term is statistically insignificant at 20-percent confidence interval level, and all other coefficients remain robust (Results available upon request).

Second we question whether results may be affected by events like business cycles. For this, we solve equations (1) and (2) by using nonoverlapping 9-year averaged data. 9-year averages are assumed to be long enough to capture the business cycles in the LMICs; and hence remove the impact of business cycles from the coefficient estimates[3].The last two columns of Table 3 reports estimation results of equations (1) and (2) solved for non-overlapping of 9-year averaged data

Results show that the coefficients estimated from the annual data and the 9-year averaged data are quite similar in magnitude, except the coefficient estimate of the lagged growth variable in the dynamic panel GMM. The coefficient estimate of the lagged growth variable is negative 0.75, as shown in the last column of Table 3, unlike the positive 0.5 estimated from the annual sample (second column). One should note that these results are not contradictory to each other. The positive coefficient estimated from the annual sample shows that there is persistence in growth, i.e. high growth years are followed by further high growth. However, the negative coefficient estimated from the 9-year averaged data indicates convergence in growth. Confirming the economic growth literature, the negative coefficient implies that in the long-run, growth converges to the potential of an economy.

[3] However, one should note the caveats of using averaged data rather than annual data. First, the start date and duration of business cycles across countries may not overlap with the start dates of the 9-year averages. Second, 9-year averaging excludes many countries that have few time series data and eliminates variations in the dataset which would decrease the efficiency of the econometric estimates.

IV. Impact of Macroeconomic and Structural Policies

A. Introduction and Methodology

This section explores whether the findings above hold under a more richly-specified model, in which growth is influenced by a range of macroeconomic, structural and institutional influences. As in the previous section, we use panel estimation methods with the following model:

$$G_{i,t} = c + \beta_1 \mathrm{R}_i + \beta_2 Y_{i,t-1} + \beta_3 R_i I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_{i,t-1} + \beta_4 X_{i,t} + \beta_5 S_{i,t} + \varepsilon_{i,t} \quad (4)$$

The terms in equation (4) are defined as in equations (1) and (2) with the addition of two groups of new explanatory variables, $X_{i,t}$ and $S_{i,t}$.

$X_{i,t}$ is a matrix of macroeconomic variables:

- Real Effective Exchange Rate (REER): is a variable measuring the global competitiveness of a country. A decline in the magnitude of REER indicates depreciation, and hence an increase in its competitiveness in international trade. This variable is expected to have a negative coefficient estimate for growth.

- Terms of Trade (TOT): measures the return on the exports of a country. An increase in TOT should increase the export earnings and hence yield higher growth rate.

- Fiscal balance: measures the fiscal discipline of a country, in the long-run it should yield higher growth path.

- Imports/GDP: is an indicator for international openness of an economy. Open economies are expected to benefit from higher growth.

$S_{i,t}$ is a matrix of structural variables:

- Old Age Dependency: Measures the share of people over 65 in the total working-age population, people in ages from 16 to 65. This variable measures the quality of health services, nutrition and wellbeing of people in an economy. A higher ratio of old age dependency is expected to be achieved due to improvement in these variables, and hence it would be expected to have a positive impact on economic growth.

- Population Growth: This variable is expected to affect growth negatively.

B. Results

Estimation results of equation (4) are reported in Table 5. The first three columns in this table is solved with annual data, by using dynamic and static panel data estimation methods; and the last column is solved with the 9-year averaged data by using panel least squares. All these models include cross-section random effects to account for the cross-country variance in growth.

Table 5. The Impact of Macroeconomic and Structural Variables on Economic Growth

Dependent: Real Per Capita Income Growth				
	Annual Data			9-year Average
	GMM	LS	LS	LS
Constant	0.011 ****	0.033 ****	0.027 ****	0.032 ****
	0.003	*0.005*	*0.005*	*0.009*
Growth(-1)	0.500 ****			
	0.055			
Resource	0.008 ***	0.012 ***	0.019 ****	0.013 ***
	0.003	*0.005*	*0.005*	*0.006*
Initial $Income_{pc}$	-0.003 ***	-0.007 ****	-0.015 ****	-0.010 ****
	0.001	*0.002*	*0.002*	*0.002*
Resource $I^{y^*>y}$ (y*-y)	-0.008 ***	-0.021 ****	-0.028 ****	-0.009 *
	0.003	*0.006*	*0.006*	*0.007*
REER(-1)	-0.004 *	-0.004 **		-0.005 **
	0.003	*0.002*		*0.003*
Imports/GDP	0.010 **		0.029 ****	0.037 ****
	0.005		*0.005*	*0.008*
Terms of Trade			0.003	0.011 **
			0.003	*0.006*
Fiscal Balance/GDP	0.038 ***	0.086 ****	0.103 ****	0.190 ****
	0.018	*0.015*	*0.015*	*0.028*
Old Age Dependency	0.140 ****	0.272 ****	0.289 ****	0.203 ****
	0.025	*0.044*	*0.046*	*0.060*
Population Growth				-0.436 ***
				0.184268
Number of Observations				
Adjusted R Squared	0.136	0.024	0.039	0.261
Std Error of Regression	0.052	0.056	0.057	0.022
Sum of Squared Residuals	7.62	9.72	10.98	0.15

Notes:

Standard errors are provided beneath the coefficient estimates in smaller italic font.

Two-sided statistical signifincance at 1, 5, 10 and 20 percent level are indicated by ****, ***, ** and *, respectively.

Results show that all the variables have expected signs: real exchange rate depreciation improves competitiveness and hence growth. Open economies have higher growth rates, and economies benefit from positive TOT shocks. Fiscal austerity leads to higher growth rates.[4] Better demographics, through longevity and sustained population, are associated with high economic growth rate.

Importantly, in contrast to the results in Section III, the dummy coefficient for resource-rich economies is positive and significant, suggesting that growth in these economies benefits from availability of natural resources, after taking into account differences in macroeconomic management and structural indicators. Specifically, resource-rich countries are calculated to grow around 1 percent per annum faster than more diversified economies, other factors equal.

Nevertheless, the coefficient estimate of poverty-trap coefficient for poor resource-rich countries remain significant at 1-percent confidence interval in all the regressions done for the annual data; and remains vaguely significant at the 20-percent confidence level for the estimations solved by using the non-overlapping 9-year averaged data. This indicates that the macroeconomic and structural variables do not overturn the explanatory power of poverty trap.

Table 6. Estimated Growth Impact of the More Richly Specified Model

	A	B	C	D	E
	Mean: Resource-rich LMICs	Mean: Diversified LMICs	Difference (A - B)	Model (4) Coefficients	Estimated Growth Impact (C x D)
Real effective exchange rate 1/	-0.002	-0.016	0.014	-0.005	-0.01%
Import/GDP	0.419	0.487	-0.068	0.037	-0.25%
Terms of trade 1/	-0.006	0.003	-0.009	0.011	-0.01%
Fiscal balance/GDP	-0.008	-0.037	0.029	0.190	0.56%
Old age dependency	0.068	0.100	-0.032	0.203	-0.65%
Population growth	0.02	0.01	0.008	-0.436	-0.35%

1/ Logarithmic index, where 2000 = 0

[4] In the estimations, fiscal balance is lagged in order to breakdown the impact of growth on the cyclical component of the fiscal balance. Nevertheless, there may be some persistence over time. However, on should note that the coefficient on fiscal balance can be asymmetric, i.e. fiscal austerity improves growth but fiscal deficits may not be as detrimental, especially if they are financed by aid.

The change in sign on the resource rich dummy variable from a negative resource curse in the initial equations shown in Table 3 to a positive resource blessing in the more richly modeled equations (Table 5) warrants further examination. Table 6 breaks down the mean macroeconomic and structural explanatory variables across resource-rich and diversified LMICs. As shown in this table, *even* though resource-rich countries on average have better fiscal accounts, on all other macroeconomic indicators these economies have worse statistics compared to diversified economies. The resource-rich are on average less externally competitive, less internationally open, and did not experience as desirable terms of trade shocks as did the diversified economies. On the structural side, the resource rich economies have younger populations with a higher population growth rate keeping it harder to sustain.

Table 6 shows the estimated growth impact of each of these macroeconomic and structural variables under column E. Because resource-rich countries have on average worse statistics, these explanatory variables help to explain on average 0.7 percent per annum slower growth rate for the resource rich countries. The negative coefficient of the resource dummy estimated in the simple model (Table 3) may merely reflect the impact of the macroeconomic and structural differences between the resource-rich and the diversified economies, and once these explanatory variables are introduced into the more richly defined model (Table 5) the resource dummy has changed sign.

V. And It is the Institutions That Matter

A. Introduction and Methodology

This section discusses the factors contributing to the low-income resource trap observed in the above analysis. Although the resource dummy changed between the basic equations (Table 3) and the more richly specified model (Table 5), the low-income poverty trap effect remained broadly unchanged in size and significance. This suggests that this effect was unconnected to the macroeconomic and structural variables considered in Table 5. Given this finding, we consider whether institutional factors may play a role in explaining this poverty trap effect.

Second, we will study whether the positive coefficient found on the coefficient estimate of the resource dummy holds significant for both fuel and commodity exporters. We will test this hypothesis by adding the fuel-exporters dummy into equation (4).

In order to test these two hypotheses, we build on top of the model presented in equation (4) by adding institutional indicators and the fuel-exporter dummy. This is given in the equation below.

$$G_{i,t} = c + \beta_1 \mathrm{R}_{i,t} + \tilde{\beta}_1 F_{i,t} + \beta_2 Y_{i,t-1} + \beta_3 R_{i,t} I_{i,t-1}^{Y \le Y^*} (Y^* - Y)_{i,t-1} + \beta_4 X_{i,t} + \beta_5 S_{i,t} + \beta_6 Z_{i,t} + \varepsilon_{i,t} \quad (5)$$

Equation (5) is specified in line with equation (4) with the addition of $F_{i,t}$ dummy, which is equal to 1 for fuel-exporting resource-rich economies, and a matrix $Z_{i,t}$ of institutional

indicators: Control of Corruption, Government Effectiveness, Political Stability, Regulatory Quality, Rule of Law, Voice and Accountability and Armed Conflict. An increase in the magnitude of all institutional variables, except the last, indicates an improvement in the institutional quality of a country. An increase in institutional quality would be expected to affect growth positively.

B. Results

Estimation results of equation (5) are solved by using the 9-year averaged data with cross-sectional random effects; and they are reported in Table 7[5]. In this table, columns (1) through (7) report estimation results of equation (5) with a different institutional variable at a time, in order to reduce the collinearity across these institutional variables. Columns (1') through (7') report the reduced form of equation (5), by using general to specific model selection[6].

As might be expected, strong institutions are estimated to have a significant and positive impact on economic growth. On average, improvement in these indicators by one point in institutional scale increases the growth rate by 0.5 to 2.3 percent. Amongst these indicators, control of corruption, government effectiveness and rule of law are estimated to have the largest positive impact on growth.

Interestingly, once these institutional factors are added to the growth equation, the coefficient on the low-income poverty-trap falls in size and becomes insignificantly different from zero. This suggests that poverty trap effects may arise because of a relationship between resource intensity and weak institutions in the lowest income countries. One possibility is that this effect does not emerge for less poor countries with strong institutions is because checks and balances are sufficiently strong to resist any corrosive impact of resource exploitation on governance.

[5] As shown in Appendix, Correlation across Variables of Interest, institutional indicators are highly and significantly correlated with income at the annual data frequency. In order to reduce the multicollinearity issues, 9-year averages are used for these estimations.

[6] Reduced form of model (5) is obtained through the specification that minimizes the error variance of the regression.

Table 7. The Impact of Institutional Quality on Economic Growth

Dependent: Real Per Capita Income Growth
Sample: Non-Overlapping 9-year averaged data

	(1)	(2)	(3)	(1')	(2')	(3')
Constant	0.048 ****	0.053 ****	0.048 ****	0.051 ****	0.056 ****	0.047 ****
	0.007	*0.007*	*0.007*	*0.006*	*0.006*	*0.006*
Resource	-0.015 **	-0.012 *	-0.013 *	-0.013 **	-0.011 **	-0.010 *
	0.009	*0.009*	*0.009*	*0.007*	*0.007*	*0.007*
Fuel Exporters	0.028 ****	0.032 ****	0.024 ***	0.027 ****	0.030 ****	0.022 ***
	0.010	*0.010*	*0.010*	*0.010*	*0.009*	*0.009*
Initial $Income_{pc}$	-0.013 ****	-0.016 ****	-0.009 ****	-0.014 ****	-0.017 ****	-0.010 ****
	0.003	*0.003*	*0.003*	*0.003*	*0.003*	*0.003*
Resource $I^{y^*>y}$ (y*-y)	0.003	0.002	0.005			
	0.010	*0.010*	*0.010*			
Imports/GDP (-1)	0.009	0.010	0.003			
	0.008	*0.008*	*0.009*			
Terms of Trade (-1)	0.023 ***	0.026 ***	0.024 ***	0.021 **	0.024 ***	0.023 ***
	0.011	*0.011*	*0.011*	*0.011*	*0.011*	*0.011*
Fiscal Balance/GDP (-1)	0.230 ****	0.224 ****	0.218 ****	0.221 ****	0.215 ****	0.209 ****
	0.048	*0.048*	*0.049*	*0.047*	*0.047*	*0.048*
Dependency Ratio	0.130 ***	0.107 ***	0.104 **	0.149 ****	0.125 ***	0.122 ***
	0.053	*0.053*	*0.053*	*0.051*	*0.051*	*0.051*
Control of Corruption	0.015 ****			0.015 ****		
	0.005			*0.005*		
Government Effectiveness		0.023 ****			0.023 ****	
		0.005			*0.005*	
Political Stability			0.009 ****			0.009 ****
			0.003			*0.003*
Number of Observations	248	248	247	251	251	250
Std Error of Regression	0.03613	0.03532	0.03632	0.0360	0.0352	0.0362
Sum of Squared Residuals	0.3107	0.2969	0.3127	0.3143	0.3014	0.3170

Notes: Standard errors are provided beneath the coefficient estimates in smaller italic font.
Two-sided statistical signifincance at 1, 5, 10 and 20 percent level are indicated by ****, ***, ** and *, respectively.

Table 7. Continued

Dependent: Real Per Capita Income Growth
Sample: Non-Overlapping 9-year averaged data

	(4)	(5)	(6)	(7)	(4')	(5')	(6')	(7')
Constant	0.044 ****	0.048 ****	0.045 ****	0.037 ****	0.048 ****	0.051 ****	0.048 ****	0.042 ****
	0.007	*0.007*	*0.007*	*0.006*	*0.006*	*0.006*	*0.006*	*0.005*
Resource	-0.010	-0.012 *	-0.012 *	-0.006	-0.009 *	-0.010 *	-0.010 *	-0.008 *
	0.009	*0.009*	*0.009*	*0.007*	*0.007*	*0.007*	*0.007*	*0.006*
Fuel Exporters	0.026 ***	0.026 ****	0.021 ***	0.012 *	0.023 ***	0.025 ****	0.020 ***	0.012 **
	0.010	*0.010*	*0.010*	*0.008*	*0.009*	*0.009*	*0.010*	*0.007*
Initial $Income_{pc}$	-0.011 ****	-0.013 ****	-0.008 ****	-0.009 ****	-0.011 ****	-0.014 ****	-0.009 ****	-0.009 ****
	0.003	*0.003*	*0.003*	*0.002*	*0.003*	*0.003*	*0.003*	*0.002*
Resource $I^{y^*>y}$ (y*-y)	0.002	0.004	0.003	-0.003				
	0.010	*0.010*	*0.010*	*0.007*				
Imports/GDP (-1)	0.014 **	0.007	0.011 *	0.014 **				
	0.008	*0.008*	*0.008*	*0.007*				
Terms of Trade (-1)	0.028 ***	0.025 ***	0.027 ***	0.009 *	0.026 ***	0.024 ***	0.025 ***	0.006
	0.011	*0.011*	*0.011*	*0.006*	*0.011*	*0.011*	*0.011*	*0.006*
Fiscal Balance/GDP (-1)	0.217 ****	0.227 ****	0.239 ****	0.220 ****	0.209 ****	0.218 ****	0.230 ****	0.209 ****
	0.048	*0.048*	*0.048*	*0.030*	*0.047*	*0.047*	*0.047*	*0.029*
Dependency Ratio	0.096 **	0.128 ***	0.086 *	0.145 ****	0.118 ***	0.146 ****	0.106 ***	0.158 ****
	0.053	*0.053*	*0.054*	*0.044*	*0.051*	*0.051*	*0.052*	*0.044*
Regulatory Quality	0.012 ****				0.011 ****			
	0.004				*0.004*			
Rule of Law		0.014 ****				0.015 ****		
		0.004				*0.004*		
Voice and Accountability			0.005 *				0.005 *	
			0.003				*0.003*	
Armed Conflict				-0.004				-0.008 *
				0.006				*0.006*
Number of Observations	248	248	248	357	251	251	251	369
Std Error of Regression	0.03618	0.03603	0.03664	0.0334	0.0362	0.0358	0.0365	0.0328
Sum of Squared Residuals	0.3115	0.3089	0.3195	0.3870	0.3179	0.3123	0.3239	0.3881

Notes: Standard errors are provided beneath the coefficient estimates in smaller italic font.
Two-sided statistical signifincance at 1, 5, 10 and 20 percent level are indicated by ****, ***, ** and *, respectively.

VI. What Does It Imply for Ghana?

A. Where Does Ghana Stand Within the LMIC?

In this section, we apply the results found in the preceding section to Ghana. First, we analyze where Ghana stands compared to its LMIC peers in terms of growth progress, macroeconomic and structural policies, and institutional qualities; and then based on these indicators, we decompose the model growth projections for Ghana.

The World Bank governance indicators database is available only after 1996; and hence in order to have a common sample of comparison, for macroeconomic and structural variables, we analyze the Ghanaian performance from 1996 to 2008 with respect to its LMIC peers.

Table 8, Table 9 and Table 10 provide the comparison statistics for Ghana on macroeconomic, institutional, and structural variables. These tables are composed into four sections. The upper panel provides the whole sample mean, from 1996 through 2008. The lower three panels provide the sub-sample means, in order to present how Ghana had performed throughout this period. On the cross-sectional side, we compare the mean statistics of Ghana with all, resource-rich, and diversified LMICs[7].

Table 8 provides the growth and macroeconomic performance of Ghana in a cross-country context. Looking at the whole sample panel, Ghana had a poorer growth path compared to other LMICs. It grew on average 4.6 percent during the last two decades, which is less than the average of both resource-rich and diversified LMICs. Further, looking at the lower panels of Table 8, despite the increasing trend in Ghana's per capita growth rate from 1996 and onwards, its economy grew less than its peers during all the sub-sample periods.

Similarly, Ghana is significantly poorer than its peers. During the last two decades, it had less than one third of the average per capita income of both resource-rich and diversified LMICs. Due to the lower per capita growth rate of Ghana in comparison to its peers, the income gap between Ghana and its peers had increased throughout the 1996-2008 period.

Ghana's real exchange rate appreciated on average 17 percent during the whole sample period, whereas the LMIC exchange rates depreciated on average by 1 percent. Hence Ghana did not enjoy a competitive exchange rate in international markets throughout the 1996-2008 period.

Looking at Table 8, Ghana's economy is more open than its peers. Looking at the import-to-GDP ratio, Ghanaian economy increased its international trade more over time, starting from an average of 43 percent during the late 1999s to 64 percent in the late 2000s.

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[7] Currently, Ghana is defined as a diversified economy by the WEO (International Monetary Fund, 2009); and it will become an oil-exporter in 2011.

Table 8. Macroeconomic Indicators for Ghana

	Growth	Initial Income($)	REER	Imports to GDP	Terms of Trade	Fiscal Bal. to GDP
			Whole Sample			
All LMICs	5.3%	$3,394	-1%	47%	0%	-2.4%
Resource-Rich	5.8%	$3,487	-1%	42%	-3%	0.2%
Diversified	5.2%	$3,356	-1%	49%	1%	-3.5%
Ghana	4.6%	$1,051	17%	55%	15%	-9.1%
			1996 - 1999			
All LMICs	3.7%	$2,816	-2%	45%	-2%	-3.6%
Resource-Rich	3.8%	$2,925	-3%	43%	-13%	-3.5%
Diversified	3.7%	$2,768	-1%	45%	3%	-3.7%
Ghana	3.4%	$ 879	34%	43%	16%	-12.6%
			2000 - 2004			
All LMICs	5.2%	$3,218	-1%	46%	-1%	-3.5%
Resource-Rich	6.3%	$3,261	0%	42%	-6%	-1.0%
Diversified	4.8%	$3,201	-1%	47%	1%	-4.5%
Ghana	4.2%	$1,027	9%	58%	12%	-8.2%
			2005 - 2008			
All LMICs	6.9%	$4,271	-1%	50%	3%	0.1%
Resource-Rich	7.0%	$4,473	-1%	41%	12%	5.3%
Diversified	6.9%	$4,190	0%	53%	0%	-2.0%
Ghana	6.4%	$1,294	10%	64%	17%	-6.6%

When we compare terms of trade trends on Table 8, this variable shows that Ghana had benefited from positive terms of trade shocks during the last two decades.

Last, on the fiscal stance, Ghana did poorly compared to its resource-rich and diversified LMIC peers. Even though Ghana's fiscal deficit as a percent of GDP had declined from a trough of 12.6 percent in the late 1990s to 6.6 percent in the late 2000s, Ghana had significantly worse fiscal accounts than its peers in any sub-sample period, on average by around 7 percent of GDP. In particular during the 2005-2008 period of exceptionally high worldwide commodity prices, the gap between the fiscal stance of Ghana and the resource-rich country's increased to a high of 12 percent, despite Ghana being a coco and gold exporter.

Table 9 presents the sample statistics for governance indicators for Ghana, all LMICs, and resource-rich and diversified LMICs. Governance indicators take value from a low of around -2.6 to a high of around 1.5. An increase in these indicators indicates improvement.

Table 9. Governance and Fiscal Indicators for Ghana

	Control of Corruption	Government Effectiveness	Political Stab. and Number of Violence	Regulatory Quality	Rule of Law	Voice and Accountability
			Whole Sample			
All LMICs	-0.35	-0.32	-0.27	-0.25	-0.36	-0.32
Resource-Rich	-0.45	-0.51	-0.41	-0.53	-0.54	-0.64
Diversified	-0.30	-0.23	-0.22	-0.13	-0.28	-0.18
Ghana	-0.25	-0.22	-0.04	-0.10	-0.19	0.04
			1996 - 1999			
All LMICs	-0.35	-0.31	-0.30	-0.19	-0.35	-0.32
Resource-Rich	-0.41	-0.50	-0.43	-0.51	-0.51	-0.60
Diversified	-0.32	-0.22	-0.23	-0.04	-0.27	-0.19
Ghana	-0.36	-0.28	-0.19	-0.01	-0.39	-0.33
			2000 - 2004			
All LMICs	-0.34	-0.32	-0.27	-0.27	-0.36	-0.31
Resource-Rich	-0.42	-0.50	-0.44	-0.52	-0.53	-0.64
Diversified	-0.31	-0.25	-0.20	-0.17	-0.29	-0.17
Ghana	-0.25	-0.22	-0.12	-0.25	-0.12	0.01
			2005 - 2008			
All LMICs	-0.35	-0.32	-0.25	-0.28	-0.37	-0.32
Resource-Rich	-0.51	-0.54	-0.35	-0.55	-0.58	-0.68
Diversified	-0.29	-0.23	-0.21	-0.17	-0.28	-0.17
Ghana	-0.13	-0.15	0.21	-0.02	-0.07	0.44

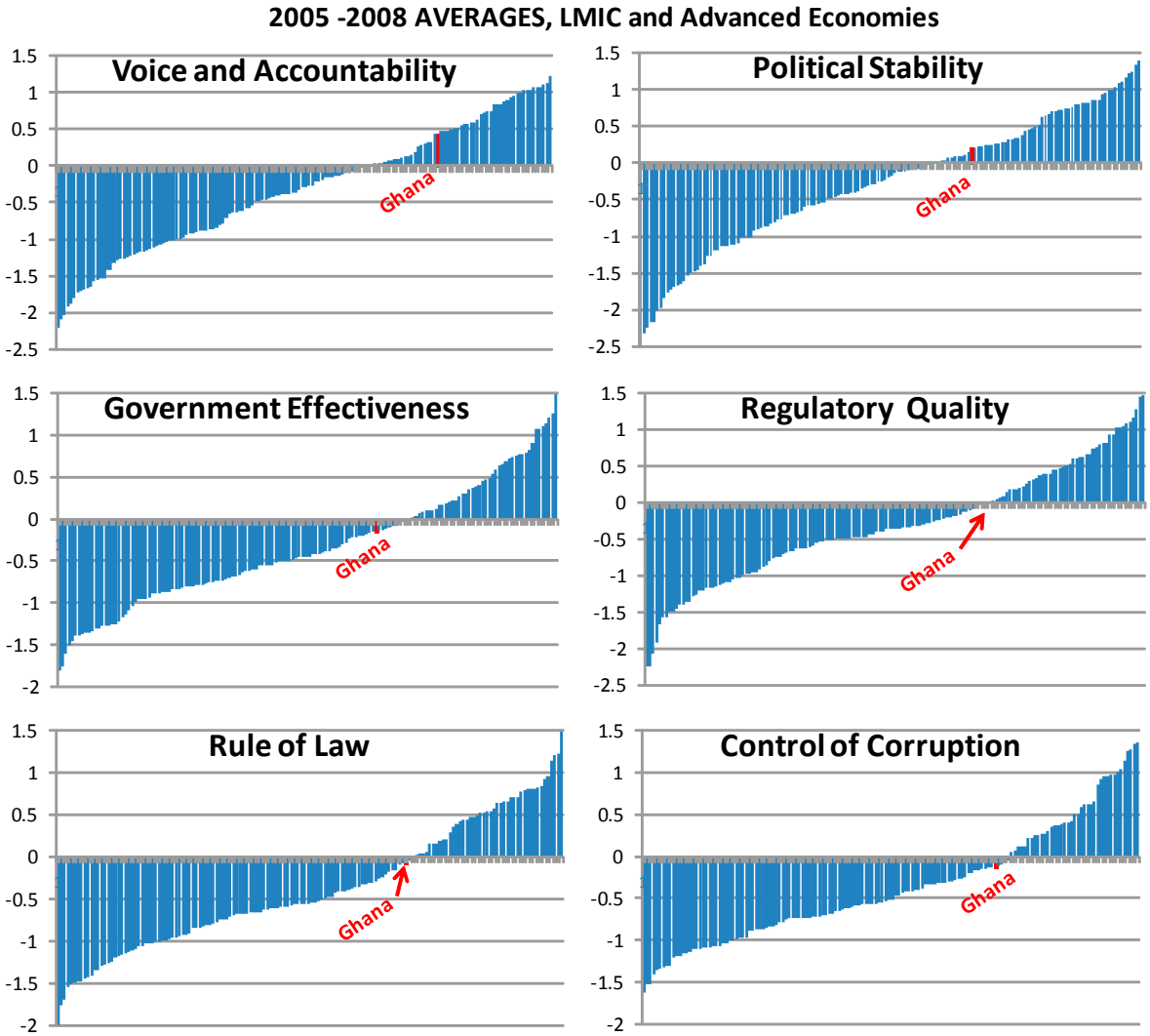
Note: Governance indicators range [-2.5, 2.5]. An increase in magnitude shows improvement.

Looking at the governance indicators, on Table 9, one can see that Ghana does better than both the resource-rich and the diversified LMICs in all indicators. Further, looking the trend in these indicators over time, one can see that Ghana not only performs better than its peers in all the sub-periods, but also keeps on improving on its institutional indicators over time.

Even though, Ghana has a value assigned below zero, for four out of six governance indicators during the most recent period, 2005-2008, one should pay attention that these

variables are skewed negatively. As an illustration, Figure 3 plots the governance indicators across all countries in the WEO dataset, including those for the advanced economies. Looking at these bar charts, one can see that, Ghana not only does better in the LMIC sample, but also in the whole sample including advanced economies. A negative mean or a small positive value for the governance indicators is due to the negative skewedness of the distribution of these variables.

Figure 3. Governance Indicators for Ghana



Last, we compare the structural indicators for Ghana on Table 10. The first indicator shows that there had been no armed conflict in Ghana throughout the 1996-2008 period. The following structural indicator shows that Ghana receives on average more aid inflows as a ratio of GDP.

Regarding the variables on demographics, old age dependency shows a lower and population growth shows a higher mean for the whole sample average for Ghana compared to both resource-rich and diversified LMICs. An increase in the former variable and a decline in the latter are associated with a higher growth rate for a country.

Table 10. Structural Indicators for Ghana

	Armed Conflict	Aid/GDP	Old Age Dependency	Population Growth
		Whole Sample		
All LMICs	0.17	6%	9%	2%
Resource-Rich	0.19	7%	7%	2%
Diversified	0.16	5%	10%	1%
Ghana	0.00	10%	6%	3%
		1996 - 1999		
All LMICs	0.20	6%	9%	2%
Resource-Rich	0.21	8%	7%	2%
Diversified	0.20	5%	10%	1%
Ghana	0.00	9%	6%	3%
		2000 - 2004		
All LMICs	0.16	6%	9%	2%
Resource-Rich	0.18	7%	7%	2%
Diversified	0.15	6%	10%	1%
Ghana	0.00	11%	6%	3%
		2005 - 2008		
All LMICs	0.15	6%	10%	2%
Resource-Rich	0.18	7%	7%	2%
Diversified	0.13	5%	11%	1%
Ghana	0.00	11%	6%	3%

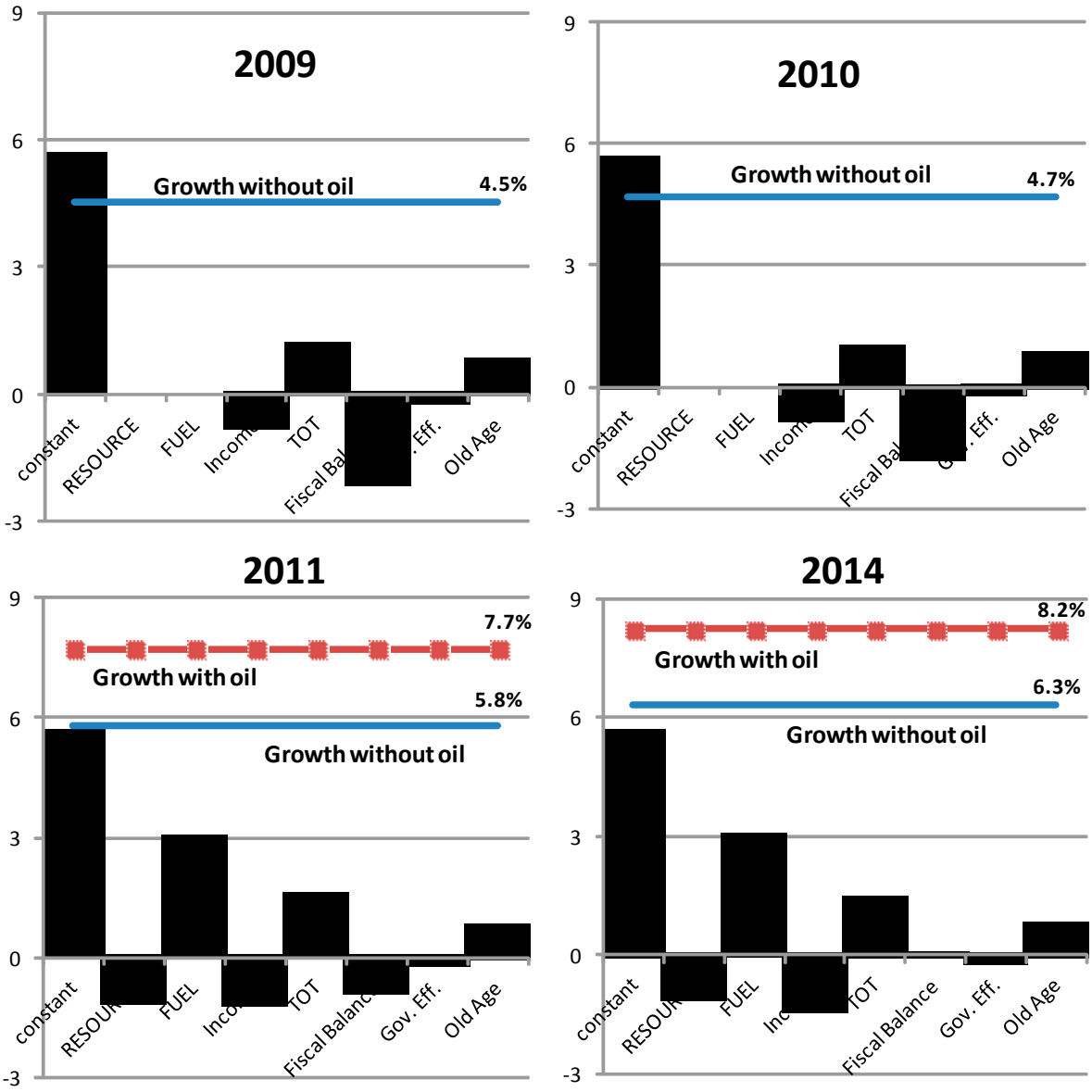
B. Where Will Ghana Be in 2014

After doing a quantitative comparison of statistics across Ghana and its economic peers, we now apply the regression results of equation (5) to Ghana. As mentioned in Section IV, due to the high correlation between the institutional variables, we can only introduce institutional

indicators one at a time into the regression equation. Due to this problem, for the application of results to Ghana, we choose the regression model on Table 7 with the smallest error variance, which is the one estimated with government effectiveness as the institutional variable of interest.

Based on this model, we report the growth forecasts on Figure 4 for 2009, 2010, 2011 and 2014 –the last year as the medium term. In these graphs, the blue line is the growth forecast based on Ghana as a diversified economy. From 2011 and onwards, we include a red-line on the lower two graphs of Figure 4 to show how Ghana's growth projections will change once it starts exporting fuel.

Figure 4. Decomposition of Growth for Ghana



Growth projections on Figure 4 show that Ghana's growth rate will increase from 4.5 percent in 2009 to 8.2 percent in 2014. Looking at the decomposition of growth, one can see that this increase is due to two main factors: (1) the improvement in the fiscal accounts of Ghana and (2) oil production. Figure 4 shows that the negative impact of fiscal deficit will fade away in the medium-run due to better fiscal management of the authorities, and this will lead to positive spill over of around 1.5 percent additional growth rate; and Ghana with its strong institutions will benefit from a higher growth rate of additional 2 percent of growth as an oil exporter.

VII. CONCLUSION

This paper studies the impact of resource revenue on the growth path of an economy; and applies the results of this analysis to Ghana, soon to-be an oil-exporting economy. For this, a dataset of 150 low and middle income countries from 1973 to 2008 is analyzed by static and dynamic panel estimation techniques. The results show that there is a poverty trap for the poor resource-rich countries due to their low institutional quality. On the other hand, for countries with good governance and strong macroeconomic management, oil wealth can be utilized to achieve higher economic growth. Based on these results, Ghana will achieve an additional growth rate of 2 percent in the medium-term, as an oil-exporting economy.

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APPENDIX

A. Country Classification

Fuel exporters
Africa: Angola, Chad, Republic of Congo, Equatorial Guinea, Gabon, Nigeria, Sudan *Asia and the Pacific:* Brunei, Timor-Leste *Middle East:* Algeria, Bahrain, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, United Arab Emirates, Yemen *Latin America*: Ecuador, Trinidad & Tobago *Transition economies*: Azerbaijan, Kazakhstan, Russia, Turkmenistan
Other primary commodity exporters
Africa: Botswana, Burkina Faso, Burundi, Democratic Republic of Congo, Guinea, Guinea-Bissau, Malawi, Mali, Mauritania, Mozambique, Namibia, Sierra Leone *Asia and the Pacific:* Papua New Guinea, Solomon Islands *Latin America*: Chile, Guyana, Suriname *Transition economies*: Mongolia, Uzbekistan
Other emerging and developing economies
Africa: Benin, Cameroon, Cape Verde, Central African Republic, Comoros, Côte d'Ivoire, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Mauritius, Niger, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, South Africa, Swaziland, Tanzania, Togo, Tonga, Uganda *Asia and the Pacific*: Afghanistan, Bhutan, Cambodia, Fiji, India, Indonesia, Kiribati, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Philippines, Samoa, Sri Lanka, Thailand, Vanuatu, Vietnam, *Middle East*: Djibouti, Egypt, Jordan, Lebanon, Morocco, Syrian Arab Republic, Tunisia, Turkey *Latin America:* Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Uruguay *Transition economies:* Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, China, Croatia, Estonia, Georgia, Hungary, Kyrgyz Republic, Lao People's Democratic Republic, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Tajikistan, Ukraine

B. Unit Root Test Results

Table 11. Panel Unit Root Test Result for Relative Economic Growth

Panel unit root test: Summary
Series: GYNRAT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-24.3770	0.0000	176	5753
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-27.6450	0.0000	176	5753
ADF - Fisher Chi-square	1517.52	0.0000	176	5753
PP - Fisher Chi-square	1821.10	0.0000	176	5903

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 12. Panel Unit Root Test Result for Relative Income per Capita

Panel unit root test: Summary
Series: LYNRAT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-24.3593	0.0000	176	5836
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.16383	0.0000	176	5836
ADF - Fisher Chi-square	750.977	0.0000	176	5836
PP - Fisher Chi-square	1161.86	0.0000	176	6079

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 13. Panel Unit Root Test Result for Openness

Panel unit root test: Summary
Series: MYRAT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.30442	0.3804	173	5339
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.60176	0.0546	173	5339
ADF - Fisher Chi-square	564.888	0.0000	173	5339
PP - Fisher Chi-square	521.392	0.0000	173	5469

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 14. Panel Unit Root Test Result for REER

Panel unit root test: Summary
Series: LREER
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.8863	0.0000	178	4328
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-9.55476	0.0000	178	4328
ADF - Fisher Chi-square	693.021	0.0000	178	4328
PP - Fisher Chi-square	561.375	0.0000	178	4532

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 15. Panel Unit Root Test Result for Terms of Trade

Panel unit root test: Summary
Series: LTOT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.34702	0.0004	167	5638
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-5.34190	0.0000	167	5638
ADF - Fisher Chi-square	540.428	0.0000	167	5638
PP - Fisher Chi-square	624.123	0.0000	167	5776

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 16. Panel Unit Root Test Result for Fiscal Balance-to-GDP

Panel unit root test: Summary
Series: FBPYRAT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.3214	0.0000	161	4646
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-13.7415	0.0000	161	4646
ADF - Fisher Chi-square	833.424	0.0000	161	4646
PP - Fisher Chi-square	881.245	0.0000	161	4798

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 17. Panel Unit Root Test Result for Old Age Dependency

Panel unit root test: Summary
Series: NONWRAT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.04149	0.0000	175	5553
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-3.82243	0.0001	175	5553
ADF - Fisher Chi-square	654.016	0.0000	175	5553
PP - Fisher Chi-square	325.408	0.8230	175	6089

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 18. Panel Unit Root Test Result for Population Growth

Panel unit root test: Summary
Series: GN
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-17.1764	0.0000	176	5747
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-29.9143	0.0000	176	5747
ADF - Fisher Chi-square	1797.96	0.0000	176	5747
PP - Fisher Chi-square	2145.50	0.0000	176	5920

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 19. Panel Unit Root Test Result for Voice and Accountability

Panel unit root test: Summary
Series: VA
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-8.48415	0.0000	178	1731
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.87053	0.0000	178	1731
ADF - Fisher Chi-square	592.319	0.0000	178	1731
PP - Fisher Chi-square	485.000	0.0000	178	2136

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 20. Panel Unit Root Test Result for Rule of Law

Panel unit root test: Summary
Series: ROFL
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.01729	0.4931	165	1636
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.27357	0.3922	165	1636
ADF - Fisher Chi-square	501.835	0.0000	165	1636
PP - Fisher Chi-square	598.813	0.0000	165	1980

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 21. Panel Unit Root Test Result for Regulatory Quality

Panel unit root test: Summary
Series: REGQ
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.3516	0.0000	177	1729
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.85862	0.0000	177	1729
ADF - Fisher Chi-square	689.668	0.0000	177	1729
PP - Fisher Chi-square	838.642	0.0000	177	2124

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 22. Panel Unit Root Test Result for Political Stability

Panel unit root test: Summary
Series: PSTAB
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-10.9528	0.0000	174	1724
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-8.53260	0.0000	174	1724
ADF - Fisher Chi-square	658.006	0.0000	174	1724
PP - Fisher Chi-square	494.517	0.0000	174	2088

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 23. Panel Unit Root Test Result for Government Effectiveness

Panel unit root test: Summary
Series: GEFF
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-13.1734	0.0000	176	1727
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.82574	0.0000	176	1727
ADF - Fisher Chi-square	611.570	0.0000	176	1727
PP - Fisher Chi-square	725.679	0.0000	176	2112

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 24. Panel Unit Root Test Result for Control of Corruption

Panel unit root test: Summary
Series: COFC
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	2.24651	0.9877	148	1474
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.91771	0.1794	148	1474
ADF - Fisher Chi-square	451.495	0.0000	148	1474
PP - Fisher Chi-square	593.337	0.0000	148	1776

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Table 25. Panel Unit Root Test Result for Armed Conflict
Panel unit root test: Summary
Series: CONFLICT
Date: 03/30/10 Time: 19:15
Sample: 1973 2008
Exogenous variables: Individual effects
User-specified maximum lags
Automatic lag length selection based on AIC: 0 to 4
and Bartlett kernel

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-3.15244	0.0008	51	1744
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-7.54563	0.0000	51	1744
ADF - Fisher Chi-square	252.671	0.0000	51	1744
PP - Fisher Chi-square	325.694	0.0000	51	1785

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

C. Correlation across Variables of Interest

Table 26. Pairwise Correlation across Variables of Interest

	Growth	Resource	Income	REER	Import/GDP	TOT	Contr. of Corrup.	Gov Effect.	Pol. Stab.
Resource	**0.05**	1							
	0.05	-----							
Income	**0.07**	0.02	1						
	0.01	0.53	-----						
REER	-0.02	-0.01	-0.04	1					
	0.53	0.83	0.09	-----					
Imports/GDP	**0.14**	-0.11	0.14	0.02	1				
	0.00	0.00	0.00	0.54	-----				
TOT	**0.07**	-0.08	0.02	0.17	-0.08	1			
	0.01	0.00	0.33	0.00	0.00	-----			
Contr. of Corrup.	**-0.06**	-0.10	**0.62**	-0.03	0.14	0.04	1		
	0.02	0.00	0.00	0.18	0.00	0.08	-----		
Gov Effect.	0.02	-0.19	**0.68**	-0.03	0.14	0.01	**0.87**	1	
	0.38	0.00	0.00	0.19	0.00	0.66	0.00	-----	
Pol. Stab.	**0.07**	-0.11	**0.49**	-0.02	0.31	0.04	**0.70**	**0.67**	1
	0.00	0.00	0.00	0.33	0.00	0.10	0.00	0.00	-----
Reg. Qual.	-0.02	-0.24	**0.56**	0.02	0.08	0.03	**0.76**	**0.87**	**0.56**
	0.43	0.00	0.00	0.55	0.00	0.32	0.00	0.00	0.00

Note: p- values are provided beneath the correlation coefficients.

Table 26. Continued

	Growth	Resource	Income	REER	Import/GDP	TOT	Contr. of Corrup.	Gov Effect.	Pol. Stab.	Reg. Qual.	Rule of Law	Voice & Acc.	FB /GDP	Armed Conf.	Old Age	Pop. Growth
Rule of Law	-0.03	-0.17	**0.62**	-0.04	0.19	0.00	**0.91**	**0.89**	**0.76**	**0.80**	1					
	0.29	0.00	0.00	0.14	0.00	0.87	0.00	0.00	0.00	0.00	-----					
Voice & Acc.	-0.03	-0.25	**0.43**	0.06	0.14	0.01	**0.66**	**0.71**	**0.59**	**0.75**	**0.68**	1				
	0.19	0.00	0.00	0.02	0.00	0.66	0.00	0.00	0.00	0.00	0.00	-----				
FB /GDP	**0.09**	0.25	0.25	-0.02	-0.11	0.14	0.05	0.04	0.10	0.05	0.05	-0.08	1			
	0.00	0.00	0.00	0.44	0.00	0.00	0.04	0.08	0.00	0.04	0.07	0.00	-----			
Armed Conf.	**-0.05**	0.04	-0.25	0.07	-0.25	0.05	-0.27	-0.24	**-0.57**	-0.23	-0.28	-0.28	-0.08	1		
	0.04	0.14	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----		
Old Age	**0.17**	-0.31	0.36	0.04	0.19	0.11	0.21	0.33	0.27	0.34	0.23	**0.45**	-0.08	-0.15	1	
	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-----	
Pop. Growth	**-0.19**	0.22	-0.19	0.00	-0.10	-0.01	-0.09	-0.21	-0.15	-0.21	-0.12	-0.32	0.10	0.09	**-0.57**	1
	0.00	0.00	0.00	0.99	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	-----

Note: p- values are provided beneath the correlation coefficients.