Oil Windfall Shocks, Government Spending, and the Resource Curse

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I find evidence that the "curse" outcome in oil-abundant economies only holds when large oil windfall shocks of the 1970s and 2000s are considered. The "curse" stems from and its magnitude is determined by: (i) the effect of oil windfall shocks; (ii) the composition of public spending. Therefore, oil resources may or may not be a "curse" depending on how oil rents are put to use and on the quality of windfall management. The policy implication for oil-exporting countries is that institutional reforms which lead to better and transparent resource management are essential ingredients to any diversification and growth strategy.

INTRODUCTION

The "resource curse" refers to a situation where resource abundance is associated with sluggish long run growth. Since the seminal contribution of Max Cordon and Peter Neary (1982), explaining the negative effect of natural gas discoveries on the Dutch economy, known as the "Dutch disease", many competing theories have emerged trying to understand how natural resource-abundance could be detrimental to growth.[1] But, evidence on whether natural resources indeed *cause* growth retardation is far from being conclusive. However, when oil recourses are particularly considered, most studies usually find a negative effect of oil on economic performance (Gelb, 1986 and 1988; Ross, 2001; Sala-i-Martin and Subramanian, 2003; Smith, 2004; Isham et al., 2005; Collier and Goderis, 2007). This result is robust to the change in the measure of oil dependence.[2] One exception is Alexeev and Conrad (2009) who find a positive effect of oil and mineral rents on income per capita.

If oil resources indeed matter to the growth of the non-resource sector we should expect oil rents relative to the size of the economy to have some bearing on the magnitude of the non-oil sector's growth. In particular, according to the "resource curse" hypothesis, countries with a larger share of resource income are ill-positioned to diversify and grow their non-resource sectors. For a sample of 16 oil exporters, figure 1 depicts a negative correlation between the World Bank's measure of hydrocarbon rents as a percentage of GNI and the growth rate of the non-oil sector. However, this relationship is not warranted when the sample is split into highly and moderately oil-dependent countries. Against what we would expect, the negative relation ironically holds only for the less-oil-dependent group.[3] In fact, there is slightly positive but insignificant correlation in highly-oil-dependent economy.

FIGURE 1
OIL RENT AND NON-OIL SECTOR GROWTH

All countries
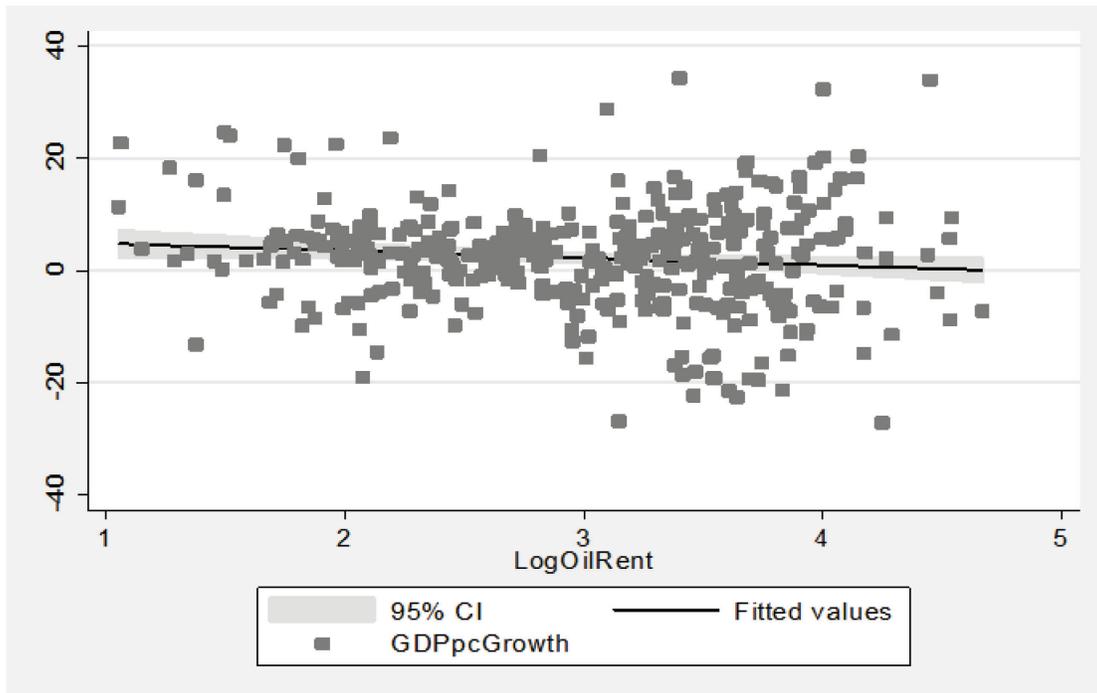
Highly-oil-dependent
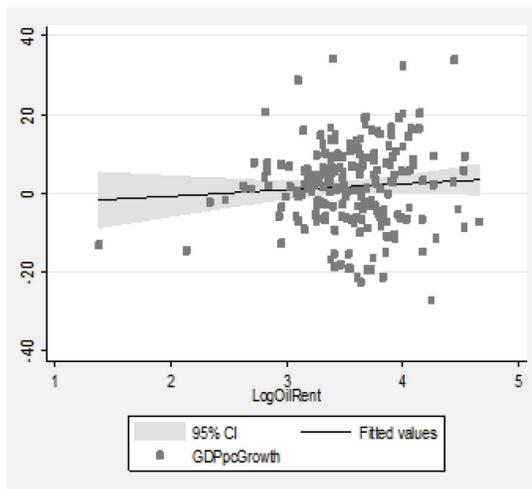
Moderately-oil-dependent
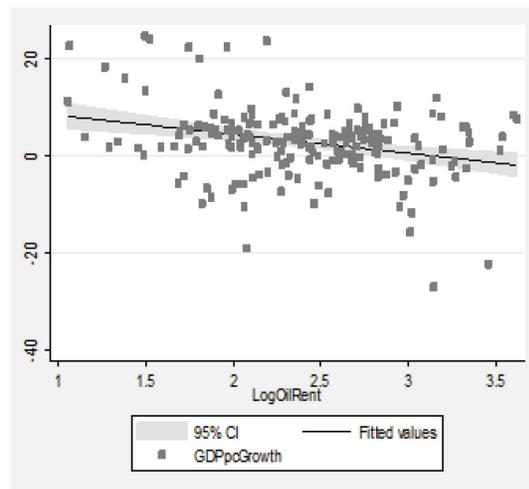
The literature on the link between fiscal policy and oil revenue windfalls is also growing. Some studies found evidence that causality runs from oil revenues to government spending, suggesting a procyclical expenditure policy (Fasino and Wang, 2002; Ossowski et al., 2008). Bornhorst et al. (2008) found a negative impact of hydrocarbon revenues on the domestic tax effort. Other studies argue that the effect of oil prices on the non-oil sector is mediated by fiscal policy, suggesting that the latter is a key transmission

mechanism of oil shocks to the economy (Husain et al., 2008; El Anshasy, 2009; Pieschacon, 2009). Another study by Arezki and Brückner (2010) finds that commodity revenue windfalls work through the fiscal channel, namely an increase in government spending, to suppress net foreign assets as private investment shrinks. This voracity effect is only detected in highly polarized countries where the windfall will increase political corruption and government spending.

Despite the growing number of studies, fiscal policy remains one of the empirically under-investigated resource curse economic channels, but ironically most mentioned. In this study, I ask the question of whether fiscal policy, namely government spending financed by a revenue windfall, can capture the presumably negative effect of oil abundance, if any, on the non-oil economy. Put differently, would there be any "curse" effect after fully accounting for the fiscal channel? In particular, the study controls for the composition of government spending and the interdependence between the financing decisions and the spending decisions of the government. To the best of my knowledge, no resource curse study fully controlled for the composition of public spending.

This paper also departs from the previous literature by making the distinction between the traditional effect of high dependence on oil (higher share of hydrocarbon rents in total GNI), and the effect of oil windfall shocks on the growth performance of the non-oil sector.[4] To this end, I use oil rents, drawing on the World Bank's recent dataset on *adjusted* national savings, to specify and identify rent windfall shocks, and then use it as an explanatory variable in the model.

In a panel cointegration-error correction framework, I find that, indeed, oil windfalls are detrimental to the growth of the non-oil sector. In addition, the "curse" effect of oil abundance on non-oil sector growth depends on how oil rents are put to use. In particular, the magnitude of the negative effect of oil rents depends on the composition of public expenditures. For example, an increase in public sector wages retards growth in the non-oil sector. On the other hand, public capital, confirming the findings of many previous studies, is insignificant to the growth of the non-oil sector in the long-run.

The remainder of this paper is organized as follows. Section two is a review of the resource curse literature. The empirical model and the data are discussed in section three. Section four presents the empirical results. Section five concludes, highlighting some policy implications**.**

THE CURSE OF NATURAL RESOURCES: A SURVEY

Two major strands of research can be spotted in the resource curse literature; the first emphasizes a host of economic factors and the second emphasizes political and institutional factors. The "Dutch Disease" is one of the earliest and most known economic explanations (see: Corden, 1984; van Wijnbergen, 1984; Gleb, 1988; Auty, 1994; Sachs and Warner, 1995 and 2001). The key mechanism in the Dutch Disease works through an appreciation of real exchange rates in the wake of natural resource booms, which induces resource reallocation between the tradable and the non-tradable sectors. In particular, the wealth effect resulting from an oil boom increases the demand for non-tradables (e.g., real estate), raising their prices relative to traded goods. Government spending increases, especially on non-traded goods (e.g. education and health). As a result, resources shift away from the (non-oil) tradable sector and move to the non-traded goods sector. Not only do resource movements have significant adjustment costs, but also they tend to crowd out the industrial sector. To the extent that the manufacturing sector provides positive spillovers to other sectors, the "de-industrialization" of the economy resulting from the resource windfall will have a negative depressive effect on long-run growth.

In a different vein, Rodriguez and Sachs (1999) suggest that resource-rich economies usually afford to live beyond their means for some time, overshooting their long-run equilibrium consumption and investment. Therefore, they are likely to converge to their steady state growth rates from above, experiencing negative growth rates on the transition. Other economic explanations focus on the negative effects of terms of trade and output volatility on capital accumulation and growth (See: Basu and McLeod, 1992; Blattman et al., 2007; Mendoza, 1997; van der Ploeg and Poelhekke, 2009). Other studies, such as Gylfason (2001), argue that natural resources reduce the returns to education. Gylfason and Zoega, (2002), on the other hand, see resource abundance as a *cause* for less equitable income

distribution; hence it is the human capital channel in the first and the income inequality channel in the second that hinders growth.

The second strand of literature emphasizes political and institutional factors. Some of these studies argue that natural resources are detrimental to growth *conditional* on weak institutions and others see dependence on natural resources as *causing* weak institutions, and hence poor growth performance. Tornell and Velasco (1992) argue that in resource-rich developing economies, where systems of property rights are weak, a windfall gain can lead to capital flight *as an attempt to place one's wealth beyond the reach of competing interest groups*. Lane and Tornell (1998) and Tornell and Lane (1999) added a new channel: the "voracity effect". Following a windfall, given weak legal and political institutions, competing interest groups will try to influence the fiscal process in order to appropriate national resources, each for their own constituencies. Such *redistributive struggles* divert resources to unproductive rent-seeking activities. Rodrik (1998) provides a very similar argument. Since external shocks usually give rise to social conflicts, the quality of conflict management institutions will determine the quality of policy responses to external shocks. Countries with better established institutions will make better policy choices in response to a shock, and hence exhibit better growth performance and vice versa. These studies would lead us to believe that the occurrence of a resource curse is *conditional* on bad quality institutions. Collier and Goderis (2007), find evidence supporting this notion.

On the other hand, Isham et al. (2005) find that natural resources negatively affect the quality of the national socioeconomic institutions, and that the latter is endogenously determined by the nature of dependence on natural resources. While *defused-source* resources (e.g., agriculture) do not necessarily lead to poor institutions, *point-source* resources (oil and minerals) do. Sala-i-Martin and Subramanian (2003) also find that natural resources have a significant detrimental impact on the quality of domestic institutions and, through this channel, on long-run growth. More literature is also growing to understand the effects of political factors. Collier and Hoffler (2004) and Aslaksen and Torvik (2006), for example, show that higher resource rents are associated with more violent conflicts. Mehlum et al. (2006), find evidence that natural resources are detrimental to growth because they feed corruption, and rent-seeking. Arezki, and Brückner (2009) and Bhattacharyya and Holder (2010) arrive to a similar conclusion that the effect of natural resources on increasing corruption is conditional on the poor quality of democratic institutions.

The general consensus among researchers now is that natural resources are not a curse per se, but rather it is their possible negative impact on political incentives, institutions, government spending levels and composition, income distribution, educational returns, industrialization, and economic stability that leads to a relatively poor growth performance.

THE EMPIRICAL MODEL AND DATA

First, we test for unit roots in the panel. To this end, two tests are used: a fisher test, proposed by Maddala and Wu (1999), and a cross-sectional augmented version of Im, Pesaran and Shin's (2003) test, developed by Pesaran (2007).[5] Both tests consider panel heterogeneity. But, Pesaran's test corrects for cross-sectional dependence resulting from unobserved common factors. After verifying that our variables are non-stationary and of the same order of integration (results are shown in table A2), the following error correction model is estimated in order to analyze both the short run and the long run effects of oil windfalls and government spending policy.[6]

$$\Delta y_{i,t} = \alpha_0 - \phi_i y_{i,t-1} + \sum_{s=1}^{k} \alpha_s X^s_{i,t-1} + \sum_{s=1}^{k} \beta_s \Delta X^s_{i,t-1} + \sum_{j=1}^{m} \gamma_j \Delta Z^j_{i,t} + \mu\ Rigt + \varphi\ Dt + \varepsilon_{i,t}$$

Where $y_{i,t}$ is the log of real non-oil income per capita, ϕ_i captures the rate of output convergence, X are k variables that are believed to affect the non-oil output in both the long and the short run, α_s is the long run estimates and β_s is the short run estimates, Z are m variables that are believed to affect output only in the

short run, *Rigt* is a regional time dummy that captures the time-specific fixed effects for of the regions (Asia, Middle East, Africa, Latin America, and Europe) Dt is a time dummy, ε_i is country-specific error term. Noteworthy, the country-specific-effects are modeled as random effects, inseparable from the error term.[7]

The model has three groups of variables: oil-related variables (discussed in much detail below), fiscal policy variables, and conventional growth controls. In the group of fiscal variables we include different decompositions of government spending. Noteworthy, because of the fact that government spending decisions are inseparable from the financing decisions and that they are linearly tied through the government budget constraint, the full constraint is specified in the regression. In order to avoid co-linearity, government revenues will be omitted throughout the empirical estimation, leaving expenditures and the budget balance. By doing so, we impose the restriction that expenditures (surpluses) are financed through larger government revenues. The direct implication of that is to interpret the marginal effects of expenditures as being the effect of a particular spending net of the effect of the change in government revenues.[8] This specification better corresponds to our question of whether government revenue windfalls impact growth through government spending and its composition. Lastly, the control variables are: openness, inflation, private investment, school enrolment, exchange rate regime, democratic institutions, and ethnic fractionalization.

THE DATA

We use annual-frequency data for a panel of 16 oil exporting countries.[9] The data covers all or part of the period 1972-2006, depending on data availability.[10] A full description of the fiscal data and other non-oil control variables is provided in table A1. The oil-related variables include five variables as follows:

1- The yearly real oil prices: We use the world's crude oil prices deflated by the US producer price index (both obtained from the IFS).

2- The volatility of oil prices: Is constructed using a GARCH (1, 1) model following the specification of Lee, Ni, and Ratti's (1995). The model uses monthly crude oil prices extracted from the IFS (1957-2008) to generate the conditional variance. The yearly-frequency volatility is then taken to be the maximum conditional standard deviation within the 12 month of a particular year. But, since the volatility of oil prices affects countries differently depending on the extent to which they depend on oil, volatility is weighted by the average share of oil rents in each country's GNI. So, this variable varies across both time and countries.

3- Hydrocarbon rents:[11] Is a recently developed measure by the World Bank that encompasses rents from oil and gas (as a percentage of GNI). Resource unit rent is calculated as the difference between unit world prices and the average unit extraction costs (including a 'normal' return on capital). The total resource rent is the product of its unit rent and production volume each year.

4-Hamilton's Oil price shocks: One of the frequently cited specifications of oil price shocks in the literature is Hamilton's (1996, and 2003) "net oil price increase". We use quarterly data on oil prices to identify Hamilton's shocks as the max $\{0, p_t - \max (p_{t-1}, p_{t-2}, p_{t-3}, p_{t-4})\}$. In words, a shock in the current quarter is identified when there is a *net* price *increase* this quarter over the *highest* price that prevailed in the previous four quarters. The yearly shocks were constructed as the highest such a net increase within the four quarters of a particular year. The intuition is that an oil price increase becomes a "shock" only when it registers "new highs", distinguishing it from the increases that are merely reversals of previous price falls. Hence, this specification eliminates negative price shocks and is expected to be associated with oil windfall gains.

5- Oil windfall shocks: To directly capture the notion of rent windfall shocks, in the spirit of Hamilton's oil price shock, we construct a variable that reflects unanticipated rent windfalls. However, the specification we use here slightly differs from Hamilton's. Because energy rents are available only on yearly basis, we specify a rent windfall as the positive current change in energy rent if such a change is larger than those of the past 3 years. If the current change is negative or less than the positive changes of the past three years, the variable takes the value zero.

$$rentwindfall_t = \{ \begin{matrix} \Delta rent_t = rent_t - rent_{t-1}; if: \Delta rent_t = \max(\Delta rent_t, \Delta rent_{t-1}, \Delta rent_{t-2}, \Delta rent_{t-3}) \\ zero \end{matrix}$$

In particular, this specification is closer to the concept of windfalls than that of Hamilton. At times when rents are steadily rising, applying Hamilton's method on oil rents will yield a positive shock since current year's rent is higher than that of last year, and the latter is the highest in the past four years. The windfall method, on the other hand, will ignore a current positive change unless it is high enough to exceed the increases of oil rents in the past three periods. So, unlike Hamilton's method, the windfall shock will pick a positive change in current period only if that change is larger than the changes in the past periods. This measure also considers a windfall a positive change in rent after a steady period (four years) of falling oil rents. In addition, the windfall in such a case will be larger than that using Hamilton's method.[12]

THE EMPIRICAL RESULTS

We estimate the error correction model using same control variables in all estimations. All control variables, except secondary school enrolment, have the expected signs. Openness to trade exposes the non-oil economy to external shocks that negatively affect its performance in the short run, but, as the economy adjusts, the long run effect of trade openness is positive. Fixed exchange rate regimes tend to lead to higher short run growth rates as compared to flexible exchange rate regimes. One explanation is that, in countries that rely on large foreign exchange receipts from a primary commodity, a fixed exchange rate regime reduces exchange rate, and hence income, uncertainty. Democracy and political competition have a robust long run positive effect on the growth of the non-oil sector. However, this positive effect becomes less significant once oil rents are introduced in latter estimations.[13] Democratic states have better and more transparent resource rent management, and that tend to improve long-run economic performance. Ethnic fractionalization measures ethnic diversity and is commonly used to control for social institutions. More ethnic groups tend to depress growth. Lastly, private investment, school enrolment, and inflation continued to be insignificant in both the short and the long run.

Regressions (1) to (5), presented in tables 1 and 2, start by investigating the effect of oil prices on non-oil output growth. The intuition is that if the oil resource is an important economic driver, then oil prices should matter for the growth of non-oil output. So, the coefficient of oil prices should pick up the effect of the oil resource on economic performance. All table 1 estimations show a highly significant negative long-run coefficient of oil prices. That is, higher oil prices retards non–oil growth in the long run, providing preliminary evidence on a possible resource curse effect. In the short run, oil prices do not have a significant effect on non-oil sector performance. Column (1) presents the estimation results of the basic model before introducing fiscal policy variables. In column (2) we add government consumption as widely used in empirical growth studies. Contrary to the conventional wisdom that government consumption retards growth, this variable appeared to be significantly positive. This indicates that either government consumption has the "wrong" sign because of the omission of other relevant variables, or that government consumption indeed stimulates long-run growth in oil exporting countries. Therefore, in regression (3) we introduce the fiscal constraint in its most consolidated form (the budget balance= government total revenues – government total expenditure). As noted above, omitting government revenues implies that the coefficient of government spending represents the marginal effect of an increase in spending financed through an increase in revenues, holding the budget balance constant. In (3a), both total government expenditure and the budget balance appeared insignificant. In (3b) we disaggregate government revenues into tax and non-tax revenues. We add non-tax revenues to the regressors, while omitting taxes. The coefficient of government spending thus shows the marginal effect of spending financed through higher taxes, holding the budget balance and non-tax revenues constant. This specification is of special interest to oil exporters. These countries are usually fiscally-dependent on oil receipts, and hence tend to have a weaker tax base than non-oil economies. Indeed, it turned out that spending financed through strengthening taxes has a positive effect on growth at the 10% level. Note that the coefficient of spending in (3a) and (3b) are not readily comparable. because of different source of finance different interpretations as a result of the change in the.

To further test whether the negative effect of oil prices on non-oil sector growth significantly differs between the two groups of highly and moderately oil-dependent countries, we include a dummy for highly oil-dependent countries and its interaction with oil prices. Both turned out to be insignificant (3c). Column (3d) tests the hypothesis that fiscal policy has different growth effects conditional on dependency on oil. The fiscal variables are thus interacted with the dummy for highly oil-dependent countries. When the interaction terms are added, the sign of the coefficient on government spending changed to negative, but remained insignificant. The interaction terms with government spending, on the other hand, are positive and significant. That is, in highly oil-dependent countries, government spending has a significantly positive effect on growth in the long as well as the short run, while it appears to be insignificant in less oil-dependent economies. The budget surplus appears to have a transitional favorable effect on non-oil growth in highly oil-dependent countries.

The results in table 1, tempts to draw the following two conclusions: (1) as postulated by the resource curse literature, oil resources retard non-oil output long-run growth; (2) fiscal policy tends to have no or little effect on the growth of the non-oil sector. The remainder of this paper shows that these two conclusions are not warranted.

We first disaggregate government spending into its capital and current components (table 2, columns (4a) and (4b)). When the whole period (1972-2007) is considered (4a), current spending appeared to be insignificant in the long run. In addition, it stimulates the non-oil sector only in highly-oil-dependent countries. On the contrary, capital spending has a significant long-run negative effect, but to a lesser extent on highly-oil-dependent countries. As a robustness check, the eras of positive shocks in the seventies and in the past decade are excluded from the sample, considering the period 1980-2000. This period is characterized by negative oil price shocks and relatively low oil prices. The results shown in (4b) indicate that the negative long run effect of capital spending disappeared. This leads one to believe that the negative sign could be driven by a huge unproductive surge in capital spending in the seventies (Gelb, 1988). More importantly, when the periods of positive shocks are removed the sign of the oil prices coefficient is reversed and it becomes significantly positive.

In (5a) and (5b), current spending is further disaggregated into three major components: wages, purchases of goods and services, and current transfers. In (5b), the sample covers the period 1980-2000. In column (5a), the negative effect of oil prices becomes insignificant, but the coefficient remains negative. In addition, the coefficient substantially dropped from -0.110 to -0.031. This suggests that the negative impact of the oil resource is transmitted to the economy, mainly, through the use of public funds.

Current transfers appear to be growth retarding. This effect is however smaller in the case of highly oil dependent countries; the net marginal effect of current transfers becomes -.004 (=-.054+.050) and -.011(-0.068+ 0.057) in 5a and 5b, respectively. Similarly, an increase in the public sector wage bill financed by higher revenues retards growth in moderately oil-dependent countries. On the contrary, it has a net positive effect on non-oil sector growth in highly-oil-dependent economies; the net marginal effect of wages becomes 0.077 (=-0.055+0.132) and 0.115 (=-0.077+ 0.192) in (5a) and (5b), respectively. This result seems plausible because highly oil-dependent economies tend to have larger governments. For example, in the countries of the Gulf Co-operation Council (GCC), the government sector is considered a main source of job opportunities to a large proportion of the labor force, especially indigenous labor.[14] Therefore, an increase in the wage bill strengthens aggregate demand, especially at times of low oil prices, contributing to the growth of the non-oil sector. Note the increase in the positive coefficient of the wage interaction term from 0.13 (in 5a) to 0.19 (in 5b). Moreover, as in 4b, when windfall eras are excluded (5b) the long run effect of oil prices becomes significantly positive.

TABLE 1
AN ERROR CORRECTION GROWTH REGRESSION AUGMENTED BY A CONSOLIDATED FISCAL CONSTRAINT

Random Effects Estimation Results (Sample: 1972-2007)
Dependent variable : First-differenced Log of real non-oil GDP per capita

	(1)	(2)	(3a)	(3b)	(3c)	(3d)
	Long –Run estimates					
Real oil prices	**-0.101****	**-0.110****	**-0.103****	**-0.044****	**-0.123*****	**-0.111****
	(0.051)	**(0.052)**	**(0.052)**	**(0.018)**	**(0.046)**	**(0.051)**
Inflation	-0.081	-0.065	-0.072	**-0.104** *	-0.070	-0.019
	(0.053)	(0.057)	(0.054)	**(0.061)**	(0.050)	(0.054)
Democratic institutions	**0.004*****	**0.004*****	**0.003*****	**0.003*****	**0.002****	**0.005*****
	(0.001)	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.001)**
Private investment %GDP	0.005	0.003	0.003	0.020	0.010	0.011
	(0.018)	(0.013)	(0.013)	(0.020)	(0.020)	(0.020)
Trade openness (S-W-W-W) Dummy	**0.044*****	**0.043*****	**0.042*****	**0.051*****	**0.036****	0.026
	(0.011)	**(0.012)**	**(0.011)**	**(0.016)**	**(0.016)**	(0.016)
Government consumption %GDP		**0.020****				
		(0.010)				
Total government expenditure %GDP			0.015	**0.038***	0.011	-0.042
			(0.017)	**(0.020)**	(0.019)	(0.033)
Budget surplus (deficit) %GDP			0.102	0.147	0.051	0.131
			(0.099)	(0.105)	(0.102)	(0.153)
Non-Tax revenues %GDP				-0.014		
				(0.012)		
High oil dependency * real oil prices					0.035	
					(0.021)	
High oil dependency * government expenditure						**0.085****
						(0.041)
High oil dependency * budget balance						-0.135
						(0.167)
	Short-run estimates					
real non-oil GDP per capita $_{t-1}$	**-0.031*****	**-0.034*****	**-0.031*****	**-0.030*****	**-0.035*****	**-0.031*****
	(0.007)	**(0.009)**	**(0.007)**	**(0.005)**	**(0.011)**	**(0.011)**
Δ real non-oil GDP pc $_{t-1}$	**0.116****	**0.128****	**0.127****	**0.120***	**0.126****	**0.103****
	(0.053)	**(0 .059)**	**(0.052)**	**(0.071)**	**(0.053)**	**(0.053)**
Δ real oil prices $_{t-1}$	-0.001	-0.012	-0.009	0.044	-0.008	-0.022
	(0.053)	(0.056)	(0.053)	(0.038)	(0.069)	(0.049)
Δ inflation $_{t-1}$	0.104	0.095	**0.106***	**0.174****	**0.106***	0.077
	(0.067)	(0.064)	**(0.062)**	**(0.084)**	**(0.060)**	(0.056)
Δ Democratic institutions $_{t-1}$	0.004	0.004	0.004	**0.007****	0.005	0.003
	(0.003)	(0.003)	(0.003)	**(0.003)**	(0.003)	(0.002)
Δ Private investment $_{t-1}$	-0.010	-0.014	-0.013	-0.014	-0.011	-0.011
	(0.009)	(0.011)	(0.009)	(0.010)	(0.009)	(0.010)
Δ Trade openness (S-W-W-W) Dummy $_{t-1}$	**-0.102***	**-0.103***	**-0.101***	**-0.105***	**-0.099***	**-0.096***
	(0.059)	**(0.061)**	**(0.060)**	**(0.064)**	**(0.055)**	**(0.056)**
Δ Government consumption $_{t-1}$		-0.066				
		(0.053)				
Δ Total government expenditure $_{t-1}$			-0.018	-0.078	-0.016	-0.099
			(0.058)	(0.051)	(0.060)	(0.058)
Δ Budget surplus (deficit) $_{t-1}$			0.026	-0.004	0.050	-0.282
			(0.109)	(0.121)	(0.109)	(0.218)
Δ Non-Tax revenues $_{t-1}$				0.009		
				(0.015)		
Δ High oil dependency X real oil prices $_{t-1}$					-0.012	
					(0.055)	
Δ High oil dependency X government expenditure $_{t-1}$						**0.113***
						(0.064)
Δ High oil dependency X budget balance $_{t-1}$						**0.407****
						(0.216)
Ethnic fractionalization	**-0.068*****	**-0.075*****	**-0.073*****	**-0.065*****	**-0.071*****	**-0.092*****
	(0.021)	**0.028**	**(0.019)**	**(0.016)**	**(0.020)**	**(0.026)**
Fixed exchange rate regime dummy	**0.040***	**0.044****	**0.038***	**0.037***	**0.040***	**0.040***
	(0.022)	**(0 .022)**	**(0.021)**	**(0.022)**	**(0.024)**	**(0.022)**
Secondary school enrolment ratio 1980	0.010	0.005	-0.002	-0.010	0.017	0.049
	(0.033)	(0.034)	(0 .035)	(0.034)	(0.041)	(0.043)
High oil-dependency dummy					-0.105	0.355
					(0.074)	(0.792)
R-squared	0.31	0.32	0.32	0.32	0.32	0.34
No. Observations	385	385	385	357	385	385
Breusch -Pagan Specification test	121.7***	110.6***	135.5***	141.5***	146.3***	185.2***

All variables are natural logarithms except the index of democracy scores. Reported standard errors (in parenthesis) are robust and clustered by country. ***, **, and * indicates significance at the 1%, 5%, and 10%, respectively. All estimations include time-specific effects and regional time-specific effects.

TABLE 2
GOVERNMENT SPENDING DECOMPOSED INTO CAPITAL AND CURRENT COMPONENTS

Random Effects Estimation Results. a. Full sample (1972-2007); b. Sub-Sample (1980-2000)
Dependent variable : First-differenced Log of real non-oil GDP per capita

	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
Long –Run estimates						
Real oil prices	**-0.110****	**0.120*****	-0.031	**0.068*****		
	(0.051)	**(0.040)**	(0.021)	**(0.024)**		
Oil Rent %GNI					-0.010	-0.017
					(0.029)	(0.032)
Government current spending %GDP	-0.031	**-0.089***				
	(0.032)	**(0.049)**				
Government capital spending %GDP	**-0.027****	0.008	-0.010	0.003	-0.008	0.005
	(0.014)	(0.019)	(0.013)	(0.018)	(0.012)	(0.016)
Government wages %GDP			**-0.055***	**-0.077***	**-0.053***	**-0.076***
			(0 .030)	**(0 .041)**	**(0.030)**	**(0.040)**
Government purchases of goods and services %GDP			0.007	0.025	0.007	0.030
			(0.030)	(0.040)	(0.029)	(0.035)
Government current transfers %GDP			**-0.054***	**-0.068***	**-0.052***	**-0.069***
			(0.029)	**(0.040)**	**(0.031)**	**(0.041)**
Budget surplus (deficit) %GDP	0.140	-0.380	0.094	-0.091	0.082	-0.194
	(0.193)	(0.323)	(0.263)	(0.310)	(0.275)	(0.266)
High oil dependency X government current spending	0.062	0.079				
	(0.043)	(0.051)				
High oil dependency X government capital spending	**0.022***	-0.003	-0.003	-0.024	-0.005	-0.027
	(0.013)	(0.019)	(0 .014)	(0.023)	(0.015)	(0.023)
High oil dependency X government spending on wages			**0.132*****	**0.192*****	**0.121*****	**0.169****
			(0.038)	**(0.074)**	**(0.040)**	**(0.076)**
High oil dependency X government purchases of G&S			0.001	-0.021	0.002	-0.023
			(0.028)	(0.038)	(0.030)	(0.037)
High oil dependency X current transfers			**0.050***	**0.057***	**0.049***	**0.063***
			(0.028)	**(0 .030)**	**(0.028)**	**(0.038)**
High oil dependency X budget balance	-0.140	0.303	-0.008	0.274	-0.013	0.338
	(0.186)	(0.312)	(0 .240)	(0.287)	(0.246)	(0.244)
Short-run estimates						
real non-oil GDP per capita $_{t-1}$	**-0.033*****	**-0.050*****	**-0.053*****	**-0.061*****	**-0.057*****	**-0.072****
	(0.010)	**(0.015)**	**(0.013)**	**(0.023)**	**(0.018)**	**(0.031)**
Δ real oil prices $_{t-1}$	-0.028	-0.013	-0.056	-0.014		
	(0.049)	(0.049)	(0 .037)	(0.051)		
Δ Oil Rent %GNI $_{t-1}$					-0.013	-0.019
					(0.036)	(0.033)
ΔGovernment current spending %GDP $_{t-1}$	-0.089	-0.109				
	(0.064)	(0.082)				
ΔGovernment capital spending %GDP $_{t-1}$	0.019	0.025	0.016	0.012	0.013	0.010
	(0.019)	(0.016)	(0.019)	(0.016)	(0.018)	(0.016)
ΔGovernment wages %GDP $_{t-1}$			-0.068	-0.037	-0.060	-0.057
			(0.083)	(0.141)	(0.080)	(0.138)
ΔGovernment purchases of goods and services %GDP $_{t-1}$			-0.026	-0.047	-0.024	-0.041
			(0.031)	(0.034)	(0.030)	(0.034)
ΔGovernment current transfers %GDP $_{t-1}$			0.015	0.012	0.019	0.022
			(0.033)	(0.032)	(0.037)	(0.040)
ΔBudget surplus (deficit) %GDP $_{t-1}$	-0.194	-0.136	-0.026	-0.030	0.029	0.080
	(0.236)	(0.208)	(0.261)	(0.258)	(0.241)	(0.247)
ΔHigh oil dependency X government current spending $_{t-1}$	**0.123***	**0.232*****				
	(0.070)	**(0.091)**				
ΔHigh oil dependency X government capital spending $_{t-1}$	-0.027	-0.042	-0.018	-0.013	-0.009	-0.009
	(0.022)	(0.031)	(0 .024)	(0.032)	(0.020)	(0.030)
ΔHigh oil dependency X government wages $_{t-1}$			0.131	0.039	0.134	0.076
			(0.091)	(0 .138)	(0.094)	(0.138)
ΔHigh oil dependency X government purchases of G&S $_{t-1}$			-0.064	-0.042	-0.063	-0.044
			(0.047)	(0.048)	(0.046)	(0.048)
ΔHigh oil dependency X current transfers $_{t-1}$			-0.020	0.002	-0.017	0.008
			(0.039)	(0.063)	(0.044)	(0.066)
ΔHigh oil dependency X budget balance $_{t-1}$	0.304	0.319	0.041	0.019	-0.004	-0.065
	(0.231)	(0.213)	(0.241)	(0.244)	(0.231)	(0.244)
R-squared	0.34	0.38	0.39	0.43	0.39	0.43
No. Observations	383	279	341	244	334	241
Breusch -Pagan Specification test	297.2***	240.1***	281.3***	221.3***	279.5***	220***

Except for the fiscal constraint and its interaction with the dummy for highly oil-dependent countries, regressions 4 and 5 are identical to those specified in table 2 and they include all other non-fiscal variables, including a dummy for highly oil-dependent countries. All variables are in natural logarithms except the index of democracy scores. Reported standard errors (in parenthesis) are robust and clustered by country. ***, **, and * indicates significance at the 1%, 5%, and 10%, respectively.

FIGURE 2
GOVERNMENT SPENDING AND NON-OIL SECTOR GROWTH

Highly-oil-dependent   *Moderately-oil-dependent*
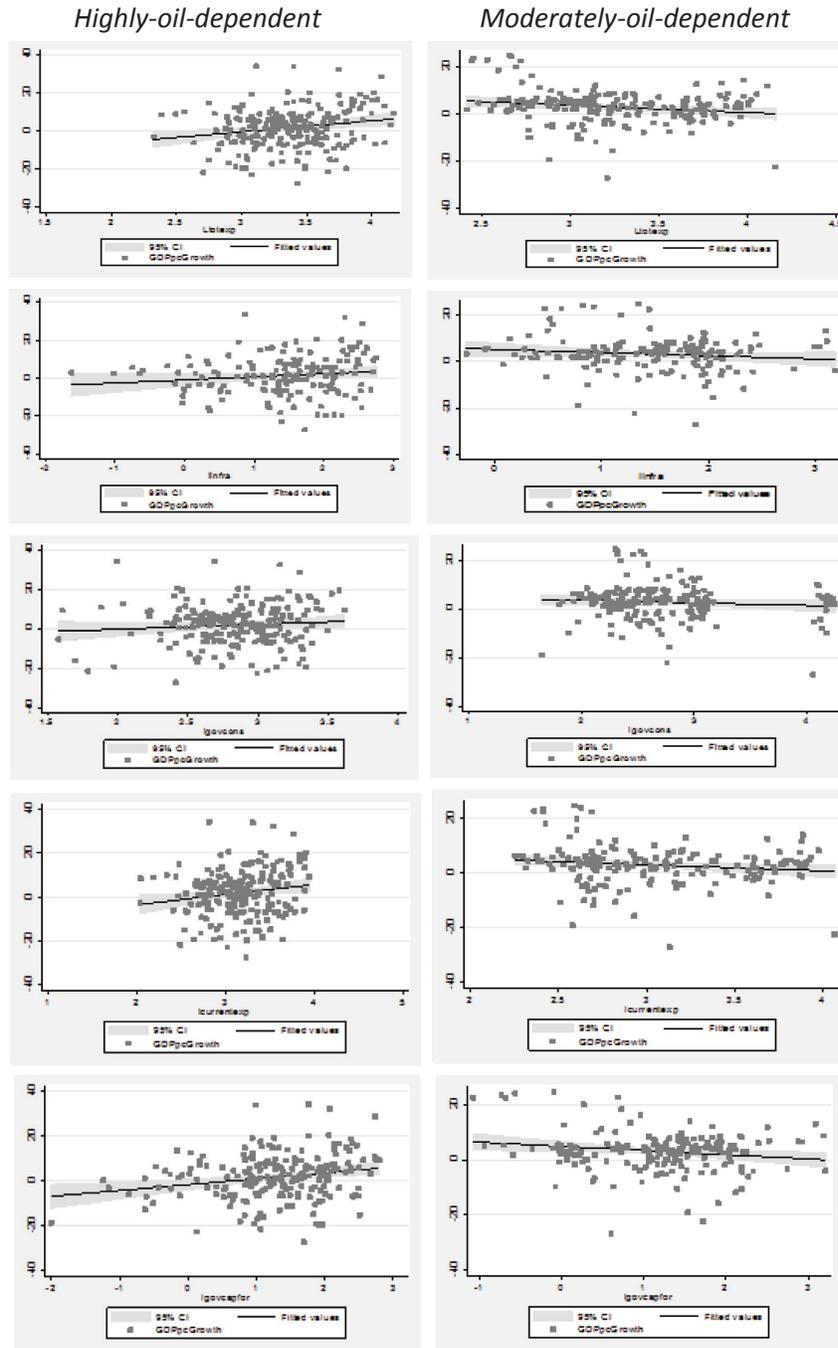
So far, we have used oil prices as a proxy for a unit of the oil resource rent. But, it can be argued that non-oil output would respond to the changes in oil prices only relative to the share of the actual oil rents in a country's income. Therefore, we use oil rents as a measure of resource intensity in (6a) and (6b). Now, in both regressions the coefficient of the rent is insignificant, but remains negative. Two main observations can be drawn from table 2: (1) the negative effect of oil prices on long term growth does seem to break down once the period of oil windfalls are removed from the sample, and when government

spending is disaggregated. In addition, oil rents do not seem to significantly deter growth; (2) while fiscal policy does have some long run growth effects, the short run effects are insignificant.

One important implication of the above-discussed results is that the effects of the oil resource are not homogeneous, but rather vary with the intensity of the rent in an economy. For example, more oil-dependent, less diversified, economies tend to rely more on the government sector; and hence government spending has a significant impact on the growth performance of non-oil sector. Figure 2 depicts the correlation between non-oil growth and different spending classifications in highly and less oil dependent countries. In fact, a very consistent trend emerged. Different types of government spending are negatively correlated with non-oil growth in moderately oil-dependent, while the opposite is the case in highly-oil-dependent countries. That alerts to testing for the non-linearity of the resource rent effects, and whether these effects depend on the size (and type) of government spending. So, instead of using a dummy that imposes the dichotomy of the *zero* and the *one* country, the spending variables are interacted with oil rents.[15] In what follows, table 3 and 4 report the results from conditioning the resource rent effects on two different decompositions of public spending.

Column (7), reports the results before adding the interaction terms. The coefficient of oil rents remains negative but insignificantly different from zero. Once the effect of the rent is conditioned on capital and current spending components (8), the negative coefficient of the rent became highly significant. This provides evidence that the source of the "curse" or negative effect of oil abundance on growth may stem from how oil rents are being used. In particular, the marginal effect of the rent can be expressed as follows:

$$\frac{\partial non-oilGrowth}{\partial oil\,\mathrm{Re}\,nt} = \beta_1 + \beta_2 * wages + \beta_3 * Purch..G \& S + \beta_4 * curr.Transf. + \beta_5 * Capital.Exp.$$

Where, β_i (i= 1,…,5) are the point estimates of the effect of rent conditional on fiscal spending. However, the only interaction term that appeared to be significant is the one with wages. An F-test on the significance of all three remaining interaction terms indicates that their combined effect is not significantly different from zero [Chi2 (3) = 1.8 (p = 0.61)]. Therefore, the effect of the rent reduces to the first two terms. For example, in Kuwait where the wage bill is on average about 10.5 % of GDP, a 1% increase in oil rents will lead to a -0.044 (= -0.95 + 0.05 * ln (10))) percentage point *decrease* in long-run non-oil growth (p-value= 0.015). So, the final long run impact of the resource would depend on the structure and magnitude of public spending. But, a higher share of public sector wages seems to mitigate that "curse". This result can be read differently to determine the marginal effects of the fiscal variables conditional on the level of resource abundance. The long-run marginal effect of wages $= \gamma_1 + \gamma_2 * oilrent$, where γ_1 is the long-run coefficient of wages (-0.143). For example, hydrocarbon resources are, on average, 40% of UAE's income; hence a 1% increase in the government's wage bill *decreases* long-run non-oil growth by about -0.06 (=-0.143 + 0.05 * ln (40)) percentage points [p value= 0.065]. On the other hand, in Norway, in which the size of the oil sector is on average 13% of the size of the economy, the marginal effect of wages is about -0.09. So, higher public sector wages have a net negative effect on non-oil sector performance, and more so in moderately oil-dependent economies. Similarly, government transfers have a negative long-run growth effect that does not depend on the size of the oil rent. The results show no significant short-run effects of the fiscal and interaction terms. To rule out the possibility that the lack of short-run fiscal effects is due to multicolinearity between these variables, we test the significance of these terms combined. An F-test indicated that they are indeed insignificant at the conventional 10% level [Chi2 (9) =14.3 (p-value 0.113)].

We next look at the effects of oil price shocks, oil price volatility, and rent windfall shocks. Results are reported in columns (9), (10), and (11), respectively. To this end, we use Hamilton's "net oil price increase" as a measure of the oil price shock, the conditional standard deviation of oil prices as a volatility measure, and our constructed measure of windfall shocks as described in section 3. The results in (9) and (10) do not differ much from that in (8), and both oil price shocks and oil price volatility turned out to be highly insignificant.

	(7)	(8)	(9)	(10)	(11a)	(11b)
Random Effects Estimation Results. Sample: 1972-2007(6-9a); Sub Sample (9b): 1980-2000 Dependent variable : First-differenced Log of real non-oil GDP per capita						
Long –Run estimates						
Oil Rent %GNI	-0.009	**-0.095***	**-0.095***	**-0.098***	**-0.100***	-0.102
	(0 .010)	**(0.032)**	**(0.033)**	**(0.032)**	**(0.033)**	(0.066)
Hamilton's Oil Price Shock			-0.092			
			(0.133)			
Oil price volatility				-0.070		
				(0.230)		
Rent Windfall shocks					**-0.140***	**-0.241***
					(0.083)	**(0.136)**
Government capital spending %GDP	-0.001	-0.009	-0.010	-0.012	-0.006	0.032
	(0.007)	(0.025)	(0.026)	(0.029)	(0.024)	(0.029)
Government wages %GDP	-0.007	**-0.143***	**-0.143***	**-0.142***	**-0.145***	**-0.200***
	(0.015)	**(0.062)**	**(0.062)**	**(0.060)**	**(0.063)**	**(0.116)**
Government purchases of goods and services %GDP	0.008	0.043	0.045	0.042	0.040	0.074
	(0.010)	(0.038)	(0.041)	(0.50)	(0.037)	(0.058)
Government current transfers %GDP	**-0.014***	**-0.050***	**-0.052***	-0.50	**-0.057***	-0.002
	(0.005)	**(0.030)**	**(0.030)**	(0.038)	**(0.032)**	(0.053)
Budget surplus (deficit) %GDP	**0.151***	0.125	0.124	0124	0.115	0.118
	(0 .082)	(0.097)	(0.096)	(0.092)	(0.095)	(0.109)
Oil rent X government capital spending		0.002	0.002	0.002	0.001	-0.014
		(0.007)	(0.007)	(0.007)	(0.007)	(0.009)
Oil rent X government wages		**0.050***	**0.050***	**0.049***	**0.051***	**0.076***
		(0.021)	**(0.021)**	**(0.022)**	**(0.021)**	**(0.040)**
Oil rent X government purchases of G&S		-0.011	-0.011	-0.011	-0.010	-0.024
		(0.012)	(0.012)	(0.011)	(0.012)	(0.017)
Oil rent X current transfers		0.008	0.009	0.009	0.011	-0.001
		(0.010)	(0.010)	(0.010)	(0.009)	(0.015)
Short-run estimates						
real non-oil GDP per capita$_{t-1}$	**-0.031***	**-0.037***	**-0.036***	**-0.037**	**-0.037***	**-0.053***
	(0.008)	**(0.009)**	**(0.009)**	**(0.009)**	**(0.009)**	**(0.006)**
Δ Oil Rent % GNI $_{t-1}$	-0.012	0.004	0.008	0.006	0.003	0.032
	(0.036)	(0.051)	(0.047)	(0.049)	(0.049)	(0.070)
Δ Hamilton's Oil Price Shock$_{t-1}$			0.147			
			(0.219)			
Δ Oil price volatility$_{t-1}$				-0.002		
				(0.034)		
Δ Rent Windfall shocks$_{t-1}$					**0.107***	**0.213***
					(0.067)	**(0.070)**
Δ Government capital spending %GDP $_{t-1}$	- 0.007	-0.018	-0.017	-0.019	-0.020	-0.014
	(0.014)	(0.048)	(0.048)	(0.047)	(0.048)	(0.046)
Δ Government wages %GDP $_{t-1}$	-0.032	-0.015	-0.018	-0020	-0.016	0.058
	(0 .049)	(0.099)	(0.098)	(0.093)	(0.089)	(0.161)
Δ Government purchases of goods and services %GDP $_{t-1}$	**-0.041***	0.055	0.052	0.054	0.056	0.056
	(0.020)	(0.067)	(0.072)	(0.070)	(0.067)	(0 .060)
ΔGovernment current transfers %GDP $_{t-1}$	0.007	-0.031	-0.032	-0.031	-0.029	-0.094
	(0.026)	(0.062)	(0.059)	(0.061)	(0.067)	(0.077)
ΔBudget surplus (deficit) %GDP $_{t-1}$	-0.014	0.016	0.013	0.015	0.025	0.087
	(0.084)	(0.079)	(0.075)	(0.075)	(0.073)	(0.060)
Δ Oil rent X government capital spending$_{t-1}$		0.005	0.005	0.005	0.005	0.006
		(0.012)	(0.012)	(0.012)	(0.012)	(0.013)
Δ Oil rent X government wages$_{t-1}$		-0.003	-0.002	-0.003	-0.002	-0.037
		(0.028)	(0.028)	(0.27)	(0.025)	(0.033)
Δ Oil rent X government purchases of G&S$_{t-1}$		**-0.033***	**-0.032***	**-0.033***	**-0.033***	**-0.033***
		(0.019)	**(0.018)**	**(0.019)**	**(0.019)**	**(0.020)**
Δ Oil rent X current transfers$_{t-1}$		0.010	0.011	0.011	0.010	0.032
		(0.015)	(0.015)	(0.016)	(0.017)	(0.023)
R-squared	0.33	0.36	0.36	0.36	0.37	0.43
No. Observations	334	334	334	334	334	241
Time Specific effects	Yes	Yes	Yes	Yes	Yes	Yes
Regional*time Specific effects	Yes	Yes	No	No	No	No
Breusch -Pagan Specification test	248.8***	213.3***	250.4***	255.9***	247.2***	209.3***

To save space, only the fiscal variables and their interaction terms, oil variables, and the error correction term are shown. All control variables are identical to those specified in table 2 and they include all other non-fiscal variables (except the dummy for highly oil dependent countries that was dropped). All variables are in natural logarithms except the index of democracy scores. Reported standard errors (in parenthesis) are robust and clustered by country. ***, **, and * indicates significance at the 1%, 5%, and 10%, respectively.

Random Effects Estimation Results. Sample: 1972-2007(10-13a); Sub Sample (13b): 1980-2000 Dependent variable : First-differenced Log of real non-oil GDP per capita					
	(12)	**(13)**	**(14)**	**(15a)**	**(15b)**
Long –Run estimates					
Oil Rent %GNI	0.065	0.065	0.065	0.055	**0.162***
	(0.050)	(0.050)	(0.050)	(0.053)	**(0.044)**
Hamilton's Oil Price Shock		0.037			
		(0.035)			
Oil price volatility			0.007		
			(0.080)		
Rent Windfall shocks				**-0.147***	-0.198
				(0.081)	(0.181)
Government social spending %GDP	0.089	0.090	0.090	0.080	**0.188***
	(0.062)	(0.063)	(0.062)	(0.067)	**(0.052)**
Government infrastructure spending %GDP	**0.095****	**0.098****	**0.096****	**0.087***	**0.143****
	(0.050)	**(0.051)**	**(0.051)**	**(0.050)**	**(0.060)**
All other government spending %GDP	**0.152****	**0.152****	**0.150****	**0.140***	**0.164****
	(0.071)	**(0.072)**	**(0.070)**	**(.082)**	**(0.065)**
ΔBudget surplus (deficit) %GDP	0.060	0.059	0.059	0.035	-0.002
	(0.057)	(0.058)	(0.057)	(0.047)	(0.062)
Oil rent X government social spending	-0.022	-0.022	-0.021	-0.018	**-0.054***
	(0.018)	(0.018)	(0.017)	(0.019)	**(0.012)**
Oil rent X government infrastructure spending	**-0.023****	**-0.024****	**-0.023****	-0.019	**-0.038****
	(0.011)	**(0.010)**	**(0.011)**	(0.013)	**(0.017)**
Oil rent X All other government spending	**-0.040****	**-0.040****	**-0.039****	**-0.035***	**-0.046****
	(0.018)	**(0.019)**	**(0.018)**	**(0.021)**	**(0.020)**
Short-run estimates					
real non-oil GDP per capita$_{t-1}$	**-0.031***	**-0.032***	**-0.032***	**-0.032***	**-0.050***
	(0.008)	**(0.008)**	**(0.008)**	**(0.007)**	**(0.008)**
Δ Oil Rent % GNI $_{t-1}$	-0.083	-0.084	-0.083	-0.093	-0.149
	(0.163)	(0.163)	(0.163)	(0.177)	(0.174)
Δ Hamilton's Oil Price Shock$_{t-1}$		-0.023			
		(0.020)			
Δ Oil price volatility$_{t-1}$			-0.003		
			(0.030)		
Δ Rent Windfall shocks$_{t-1}$				**0.120***	**0.172***
				(0.066)	**(0.084)**
Δ Government social spending %GDP $_{t-1}$	-0.051	-0.051	-0.050	-0.064	-0.111
	(0.234)	(0.234)	(0.232)	(0.243)	(0.228)
Δ Government infrastructure spending %GDP $_{t-1}$	-0.232	-0.232	-0.230	-0.234	-0.264
	(0.208)	(0.208)	(0.209)	(0.224)	(0.216)
Δ All other government spending %GDP $_{t-1}$	-0.230	-0.231	-0.230	-0.242	-0.300
	(0.267)	(0.267)	(0.266)	(0.281)	(0.295)
Δ Budget surplus (deficit) %GDP $_{t-1}$	0.023	0.022	0.022	0.043	0.072
	(0.098)	(0.098)	(0.098)	(0.080)	(0.054)
Δ Oil rent X government social spending$_{t-1}$	-0.0001	-0.0001	-0.0001	0.006	0.021
	(0.069)	(0.069)	(0.069)	(0.072)	(0.071)
Δ Oil rent X government infrastructure spending$_{t-1}$	0.044	0.045	0.044	0.046	0.070
	(0.054)	(0.054)	(0.053)	(0.059)	(0.065)
Δ Oil rent X All other government spending$_{t-1}$	0.045	0.045	0.045	0.050	0.082
	(0.077)	(0.077)	(0.076)	(0.083)	(0.095)
R-squared	0.38	0.38	0.38	0.39	0.46
No. Observations	303	303	303	303	230
Time Specific effects	Yes	Yes	Yes	Yes	Yes
Regional*time Specific effects	Yes	No	No	No	No
Breusch -Pagan Specification test	230.8***	233.4***	231.1***	216.3***	190.3***

To save space, only the fiscal variables, oil prices, and the error correction term are shown. Except for the fiscal constraint and its interaction with oil rents, all regressions are identical to those specified in table 2 and they include all other non-fiscal variables (except the dummy for highly oil dependent countries). All variables are in natural logarithms except the index of democracy scores. Reported standard errors (in parenthesis) are robust and clustered by country. ***, **, and * refer to coefficients significant at the 1%, 5%, and 10%, respectively.

In column (11a), all results are similar to previous estimations, except that the newly introduced oil rent windfall shocks appears significantly negative at the 10% level. In the long run, the extra sudden resources may be diverted to spending on unproductive prestigious investments or on more public sector employment as a result of the a "*voracity*" effect. The powerful competing interest groups struggle to appropriate some of the windfall gains to their own constituencies (Tornell and lane, 1999). Moreover, in the presence of weak conflict management institutions, windfalls can induce bad policy choices that may

result in a failure to properly adjust to the shock (Rodrik, 1998). Our results support these arguments, and show that, indeed, rent windfalls were harmful to the long-run growth of the non-oil sector. In the short run, however, sudden oil windfalls work as a stimulus to the non-oil sector and the booming economy experiences higher than average growth rates. In (11b), even when the episodes of large positive shocks are removed, considering the period 1980-2000, the previous result holds: windfall shocks hinder non-oil sector growth. However, the coefficient of rent became insignificant and its effect is only captured by the *positive* coefficient of the interaction of rent with wages. This leads us to believe that the "curse" outcome is mainly driven by the windfalls of the 1970s and latter in 2000s. In fact, oil rents were a "blessing" to the growth of the non-oil sector during the era of negative shocks and low oil prices.

In table 4, we replicate the regressions in table 3 (8 to 11), but we now decompose government total spending into three categories, spending on infrastructure, spending on core social spending, and all other expenditures. It is interesting to see that once the rent is interacted with the new classification, its sign became positive and insignificant (except for 14b). This again confirms the previous conclusion that the "curse" outcome depends on the way public funds are allocated. In addition, the interaction term of the rent and infrastructure was significantly negative until windfall shocks are introduced, suggesting that the negative effect could be mainly a result of a failure to manage the shock. So, if we take (14a) after the introduction of the windfall rent that remained negative and significant, The marginal effect of a 1% increase in oil rents will be reduced to $\dfrac{\partial non-oilGrowth}{\partial oil \operatorname{Re}nt} = \delta * other\_spending$. So, for example, Oman devotes 23% of its GDP to spending needs other than infrastructure and social expenditures. Therefore, a 1% increase in oil rents would retard growth by almost -0.05 (= -0.035 * log (23)). In a country such as Mexico, which allocates only 7% of GDP in its budget to such spending, a 1% increase in the rent will retard growth by only -0.03 (= -0.035 * log (7)). In addition, either country suffered on average an extra 0.15 percentage point growth loss in the non-oil sector due to windfall shocks.

Finally, our main previous result is reiterated when we limit the period to 1980-2000. The negative effect of oil resources totally disappear. In fact, despite negative interaction terms, the rent coefficient is large and very significant, indicating a positive effect of the resource on all sample countries. Even the effect of oil windfalls became insignificant, despite remaining negative. So, again, the "curse" outcome seems to be driven by the large windfall shocks of the 1970s and 2000s.

CONCLUSION

This paper argues that, in oil exporting countries, one direct channel of the resource curse is the detrimental long-run effect oil windfall shocks have on the growth of the non-oil sector. Failure to manage the sudden windfall gains following a surge in oil prices can curtail growth in the non-oil sector. Oil abundance per se may or may not become a "curse" to non-oil growth performance conditional on fiscal policy. In particular, the magnitude of the oil-abundance "curse", if any, depends on the composition of public expenditures. I find that while public sector wages retards long run growth in the non-oil sector, public capital seems insignificant. The policy implication for oil-exporting countries is that institutional reforms which lead to better and more transparent resource management are essential ingredients of any diversification and growth strategy.

ENDNOTES

1- For a recent detailed survey see: Frankel (2010).
2- The most widely used measure is oil exports as a percentage of total exports. Other used measures include oil rents as a percentage of GNI, oil GDP as a percentage of GDP, and a composite commodity price index weighted by hydrocarbon exports' volume.

3- Highly-oil-dependent countries include: Algeria, Bahrain, Iran, Kuwait, Nigeria, Oman, Qatar, United Arab Emirates, and Venezuela. Moderately-oil-dependent countries include Cameroon, Columbia, Egypt, Indonesia, Malaysia, Norway, and Syria.

4- Hydrocarbon rents refer to rents from oil and natural gas. But since our sample is mainly composed of countries dependent, to various degrees, on oil exports, we will refer to rents throughout the rest of the paper by oil rents.

5- The null hypothesis for both tests is that series are non-stationarity (i.e., has unit root). Meanwhile both can be used with unbalanced panels.

6- To test for panel cointegration, we test for unite roots in the error correction model's residuals. If the model's variables have a long run equilibrium relation (are cointegrated), the residuals from estimating the models should be stationary and contain no unit roots. For more details see table A3.

7- We use random effects after running a Houseman test on the estimated models of table 1. The test was not able to reject the null hypothesis that the difference in coefficients is not systematic and all test statistics turned out to be insignificant, in favor of the random effects model (results available from the author). The validity of the random effects model is checked using a Breusch-Pagan Lagrangian multiplier test (results reported).

8- See for more details Kneller et al (1999) and Bleaney et al (2001).

9- These countries are: Algeria, Bahrain, Cameroon, Colombia, Egypt, Indonesia, Iran, Kuwait, Malaysia, Mexico, Nigeria, Norway, Oman, Syria, UAE, and Venezuela.

10- The methodology of the GFS has changed for data reported after 1990. So, combining fiscal series from before and after 1990 requires consistency and coherence. To this end, we limit the data to central governments' fiscal aggregates on cash bases. In addition, the definitions of the variables were carefully checked and matched.

11- Hydrocarbon rents will be referred to as oil rents, hereafter. Data and description are available from the WB: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20502388~menuPK:1187778~pagePK:148956~piPK:216618~theSitePK:408050,00.html

12- If rents were declining for, say, the past 4 periods, then the highest rent is that of t-4 and the lowest is of t-1. Applying Hamilton's method would mean calculating the change as the rent of this year minus the *highest* rent in the past four periods, i.e., of t-4 (if pt > pt-4, otherwise zero). The windfall method, on the other hand, will pick up the difference between this year's rent and last year's, which will clearly be larger than the former.

13- Democracy remained significant but only at the 10% level in most model specifications after adding oil rents.

14- The highest wage bill in the sample is Bahrain (13% of GDP), followed by Kuwait (10.5% of GDP).

15- To avoid high multicolinearity, we checked the correlation between the fiscal variables, oil rent, and the interaction terms. All correlations appeared to be at the conventional level, including the budget balance. However the interaction of the latter with the rent is almost perfectly correlated with our measure of oil rents (the correlation coefficient = 0.99). Therefore, we use only interaction terms with various types of government spending and not with the budget balance.

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APPENDIX

TABLE A1
VARIABLES AND DATE SOURCES

Variable	Definition	Source
Non-oil real GDP per capita growth	The log difference of [GDP per capita, deflated by countries' GDP deflators from WDI, WB multiplied by (1-the share of the mining and mineral sector's value added in GDP from the country National Accounts, UN)].	Author's calculation
Inflation	The growth rate of the consumer price index	WDI, WB
Ethnic fractionalization	Index of ethnolinguistic fractionalization that reflects the probability that two randomly selected individuals from a given country will not belong to the same ethnic group	Montalvo and Reynal-Querol (2005)
Fixed exchange rate regime dummy	A dummy variable is constructed using the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. It that takes the value 1 in periods when a country adopts a fixed exchange rate regime; zero otherwise	Exchange arrangements annual reports, IMF
High oil dependency dummy	A dummy variable that takes the value 1 for countries that derives at least 30% of its total exports from hydrocarbons; zero otherwise	Author's calculation
Democratic institutions	Polity IV scores; a composite index that scales countries according to the strength of their political institutions. It ranges from 10 (strongly democratic) to -10 (strongly autocratic).	Polity-IV dataset
Private investment	Log of private capital formation- % of GDP = gross fixed capital formation (WDI) minus government capital formation (government net acquisition of fixed capital--GFS) -% of GDP.	Author's calculation
Secondary school enrolment ratio 1980	Log of secondary school enrolment ratio in 1980.	WDI, WB
Trade openness (Sachs-Warner-Wacziarg-Welch Dummy)	An updated Sachs-Warner Dummy that classified countries according to their tariffs, non-tariff barriers, state monopoly of exports, and type of economic system into open and closed.	Wacziarg and Welch (2008)
Total expenditures	Log of Total government outlays (% of GDP)	GFS, IMF
Budget surplus (deficit)	Log of Central government total revenues (% GDP) – Log total government outlays (% GDP)	GFS, IMF
Non-Tax revenues	Log of all other non-tax revenues, inclusive of capital revenues (% of GDP)	GFS, IMF
Government capital spending	Log of central Government net acquisition of fixed assets (% of GDP)	GFS, IMF
Government current spending	Log of central Government expenses (% of GDP)	GFS, IMF
Government consumption		
Government wages	Log of central government wage bill (% of GDP)	GFS, IMF
Government purchases of G&S	Log of central government purchases of goods and services (% of GDP)	GFS, IMF
Government current transfers	Log of current transfers (% GDP)	GFS, IMF
Government social spending	Log of core social expenditures, defined as the sum of education, health, welfare, and housing expenditures (% of GDP). All components are obtained from GFS.	Author's calculation
Government infrastructure spending	Log of infrastructural spending, defined as government's economic services expenditure (includes energy, agriculture, forestry, fishing, mining, transportation and communications) (% of GDP)	GFS, IMF
All other government spending	Log of total outlays' residual = Total central government outlays- core social expenditure – Infrastructure (% of GDP).	Author's calculation

Note: All fiscal variables are on the central government level and valued on cash bases.

TABLE A2
UNIT ROOT TESTS

Variables (natural logarithms)	CIPS test[1]			Fisher Test[2]		
	Level		Difference	Level		Difference
	No trend	*Trend*	*No trend*	*No trend*	*Trend*	*No trend*
Oil Rent % GNI	-0.315	1.430	-10.175***	48.86**	58.393***	149.192***
Total government expenditure %GDP	-0.901	0.194	-9.435***	38.689	40.719	157.508***
Budget surplus (deficit) %GDP	-0.369	0.899	-6.118***	38.141	36.485	138.567***
Non-Tax revenues %GDP	-0.472	1.131	-6.875***	34.593	38.073	157.561***
Government consumption %GDP	-0.700	0.534	-10.045***	29.937	38.409	132.904***
Government current spending %GDP	-1.221	0.630	-9.938***	34.827	39.205	146.478***
Government capital spending %GDP	-0.921	0.371	-7.032***	31.804	35.247	133.566***
Government wages %GDP	-0.245	0.201	-8.250***	31.804	35.247	145.574***
Government purchases of G&S %GDP	-0.628	0.195	-10.156***	27.468	36.379	136.664***
Government current transfers %GDP	-1.020	0.995	-8.130***	37.345	39.896	157.961***
Private investment %GDP	-0.119	1.234	-7.175***	54.59***	48.075**	153.101***
Inflation	-0.807	0.648	-10.07***	155.47***	105.492***	190.911***
real non-oil GDP per capita	3.022	4.048	-7.781 ***	30,075	33.412	104.134***
Government social spending %GDP	-0.134	0.263	-5.417 ***	21.205	18.545	119.094***
Government infrastructure spending %GDP	-0.879	0.948	-8.350 ***	32.121	34.213	136.104***
All other government spending %GDP	-0.982	0.341	-10.324 ***	39.124	39.234	127.123***

Real Oil Prices	ADF Test			Phillips-Perron test		
	Level		Difference	Level		Difference
	No Trend	*Trend*		*No Trend*	*Trend*	
	-1.049	-1.727		-1.690	-2.128	-18.97***

1. Pesaran's (2007) Cross-sectional IPS test. Z[t-bar] statistics reported.

2. Maddala and Wu (1999). χ^2 statistics reported . Two lags are included. P-values are in parenthesis. ***, **, ** indicate significance at the 1%, 5%, and 10%, respectively

TABLE A3
PANEL COINTEGRATION – RESIDUALS UNIT ROOT TESTS

Error Correction Model Specification[1] $\Delta y_{i,t}=\alpha_0-\phi_i y_{i,t-1}+\sum_{s=1}^{k}\alpha_s X^s_{i,t-1}+\sum_{s=1}^{k}\beta_s \Delta X^s_{i,t-1} +u_{i,t}$	CIPS test (no trend)
Oil prices; LR controls; government spending; budget balance	-5.136***
Oil Prices; LR controls; capital spending; current spending; budget balance	-9.177***
Oil Prices; LR controls; capital spending; wages; purchases of goods and services; government transfers; budget balance	-6.085 ***
Oil Rent; LR controls; capital spending; wages; purchases of goods and services; government transfers; budget balance	-8.409 ***
Oil Rent; LR controls; social spending; infrastructure; all other government outlays; budget balance	-9.928 ***

1. The error correction model estimated to test the stationarity of the residuals contains only nonoil output and the variables believed to affect its growth in the long run (X).