



IMF Working Paper

Oil-Price Boom and Real Exchange Rate Appreciation: Is There Dutch Disease in the CEMAC?

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Is There Dutch Disease in the CEMAC?**

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Abstract

The paper employs a heuristic comparative approach suggested by Ismail (2009) to search for evidence of Dutch disease in oil-rich countries of the Central African Economic and Monetary Community (CEMAC). While these countries have benefitted from high international oil prices in recent years, they have also experienced relatively large real exchange rate appreciations, raising concerns regarding the presence of Dutch disease and casting doubts on their ability to achieve high growth and employment in the long run. To isolate from any dynamics related to the exchange rate regime, we focus on the 14 member countries that constitute the CFA franc zone. We separate them into net oil importers and net oil exporters and look at economic growth, the real exchange rate, and the agricultural and external sectors. Based on traditional models, our findings are broadly consistent with the presence of Dutch disease in the second group during the oil-price boom. Departing from these models yields mixed results, suggesting the need to employ a case-by-case approach.

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I. INTRODUCTION

The Dutch disease (DD) phenomenon emerges when the development of a natural resource-based sector, induced from sudden abundance or a price increase, occurs at the expense of a non-resource traded goods sector.² The most commonly observed effects of DD are the reallocation of factors of production, a sustained appreciation of the real exchange rate and de-industrialization. These observations arise from what has been dubbed in the literature as the resource-movement and spending effects.

In this paper we search for indications of DD in the oil-rich countries of the Central African Economic and Monetary Community (CEMAC). In recent years, these countries have benefitted from high international oil prices and new discoveries. However, they have also experienced sustained real exchange rate appreciations, making non-resource sectors less competitive and casting doubts on their ability to diversify and achieve high output growth and employment over the long term, especially once oil is depleted.³

We employ a heuristic comparative approach suggested by Ismail (2009), focusing on the 14 member countries that constitute the CFA franc zone and separating them into net oil-importers and net oil-exporters (Figure 1). Along with various structural similarities such as high unemployment, poor business environment and limited infrastructure, these countries are all pegged to the euro. Also, by limiting the analysis to CFA zone countries, we remove any dynamics related to the exchange rate regime. In this sense, net oil importing countries are considered as a counterfactual to net-oil exporters.

Figure 1. Classification of Countries in the CFA franc Zone

	Net Oil Exporters	Net Oil Importers
CEMAC ¹	Cameroon Chad Congo Equatorial Guinea Gabon	Central African Republic
WAEMU ²	Cote d'Ivoire	Benin Burkina Faso Guinea-Bissau Mali Niger Senegal Togo

¹ Economic and Monetary Community of Central Africa.

² Western African Economic and Monetary Union.

² The term “Dutch disease” was coined by *The Economist* newspaper in 1977 to describe the decline of the manufacturing sector in the Netherlands after the discovery of a large natural gas field in 1959.

³ See Rodrik (2007) for a detailed discussion on the long-term growth effects of real exchange rate overvaluations: “Overvalued exchange rates are associated with shortages of foreign currency, rent-seeking and corruption, unsustainably large current account deficits, balance of payments crises, and stop-and-go macroeconomic cycles, all of which are damaging to economic growth” (p. 2).

As a first step, we explore the presence of possible benefits from oil abundance and high international prices by comparing overall economic performance in the two groups of countries over time. We then compare the evolution of their real exchange rates and how they correlate with economic growth. Then, departing from traditional DD models, we also analyze the developments in the agricultural and external sectors and the evolution of various fiscal indicators, because some of these models' assumptions and implications may not suit the reality of the countries analyzed.

We find a relatively large appreciation of the real exchange rate and a rapid shift of labor away from the agricultural sector at the aggregate level in oil-rich countries. Based on traditional models, this is fully consistent with the presence of DD. However, this phenomenon seems not to affect overall economic performance, because we find no significant long-term relationship between real exchange rate dynamics and (non-oil) GDP growth at the aggregate level. In fact, we find that real exchange rate appreciation is associated with higher rather than lower growth in some cases.

Departing from traditional models yields mixed results and the observed differences across countries warrant a case-by-case approach. While in some countries the presence of DD appears evident, in others the evidence is less clear-cut. Traditional models rely on the assumption of full employment and ignore the role of fiscal policy regarding the use of oil-related revenue for public investment, as in Equatorial Guinea for example. Moreover, in most countries the manufacturing sector was already very small (if not absent) before oil was discovered, and there is significant dependence on imports of intermediate and capital goods.

II. THE RESOURCE CURSE AND THE DUTCH DISEASE

DD is one of various explanations of the (natural) resource curse, which refers to the seemingly counterintuitive observation that resource-abundant countries often appear to grow more slowly than those with fewer resources.⁴ As Iimi (2010) puts it, "...abundant natural resources could promote growth, since resource richness can give a 'big push' to the economy through more investment in economic infrastructure and more rapid human capital development. Therefore, any resource-rich country must attain higher growth rates..."

While there is a general perception among applied economists and policymakers of a resource curse, empirical evidence is mixed. Sachs and Warner (1997, 1999 and 2001) and Gylfason, Herbertson and Zoega (1999) are among the most adduced studies that find

⁴ Other explanations for the resource curse at the theoretical level include the volatility of resource-based commodity prices (Ramey and Ramey, 1995), poor linkages between resource and non-resource sectors in an economy (Van Wijnbergen, 1984), and weak institutions and rent seeking (Lane and Tornell, 1994).

evidence of a *negative* relationship between resource abundance and economic performance.⁵ There are, however, various studies that find evidence in the opposite direction, namely, that resource abundance increases growth, such as van der Ploeg (2011), Lederman and Maloney (2007) and Cavalcanti Mohades and Raissi (2009).⁶

The DD phenomenon arises when the development of a natural resource-based sector (owing to the existence of increasing returns in that sector) occurs at the expense of a non-resource traded goods sector (Corden and Neary, 1982).⁷ Relative-price changes induce a reallocation of factors of production away from the resource-based sector (the resource-movement effect) and an increase in the demand for non-traded goods (the spending effect), favoring an appreciation of the real exchange rate.⁸

While the theoretical literature on DD is extensive, little analysis has been done regarding its welfare effects and implications for long-term growth.⁹ Nonetheless, the general perception derived from the literature is that potential losses in competitiveness and de-industrialization (or specialization rather than diversification), may lead to lower long-term growth. However, as Hausmann and Rigobon (2002) put it, “[the logic behind the DD phenomenon in the literature] by itself does not imply any inefficiency or welfare loss. It only states that booms in resource income would be associated with contractions in manufacturing, not in overall growth. It cannot explain why a country would grow more slowly, just because it has oil.” In fact, recent literature on DD has started to dispute the negative implications of this phenomenon.¹⁰

⁵ In a recent paper, Frankel (2010) explores how the various aspects of resource abundance could lead to “sub-standard” economic performance and provides policy recommendations based on actual measures taken in some resource-abundant countries.

⁶ A third group of studies find that natural resource abundance has not been a significant structural determinant of economic growth. See for example Gelb (1988), Davis (1995), Manzano and Rigobon (2001), Stijns (2005) and Collier and Hoeffler (2009).

⁷ More recently the DD phenomenon has also been associated with any development that induces a large inflow of foreign currency; including foreign aid (IMF 2003).

⁸ Hausmann and Rigobon (2002) proposed an alternative mechanism for explaining the resource curse through DD based on the interaction between the degree of specialization in non-tradables activities and the existence of financial market imperfections.

⁹ There is a recent line of research on this matter (see Magud and Sosa, 2010 for a comprehensive survey), focusing mainly on the role of productivity, the degree of flexibility in labor markets, employment and the existence of rigidities. Early theoretical contributions on the relationship between DD and economic growth include Van Wijnbergen (1984), who shows that DD negatively affects growth if the latter is determined by learning-by-doing in the tradables sector. On the study of the welfare impact of a resource-based exports sector boom, Edwards and Aoki (1983) show that DD is not really a disease under a permanent appreciation of the real exchange rate.

¹⁰ See for example Nkusu (2004).

Empirically, the study of the DD phenomenon has focused on the impact of resource-abundance on the real exchange rate and the reallocation of resources across sectors.¹¹ As such, it has been typically identified through the observation of a decline in manufacturing output or de-industrialization, an expansion of services activities, and an appreciation of the real exchange rate. Evidence, however, shows mixed results and, to some extent, it departs from pure DD arguments, because the resource curse is in many cases a function of factors such as human capital, quality of institutions and public policy actions.

Case-studies on African countries include Sala-i-Martin and Subramanian (2003), who argue that in Nigeria the negative and nonlinear impact of natural resource abundance on growth arises from its effect on institutional quality. They conclude that waste and corruption from oil (rather than DD) is responsible for Nigeria's poor long-run economic performance. Iimi (2006) explores the case of Botswana, a strong resource-abundant performer in sub-Saharan Africa, concluding that governance determines the extent to which the growth effects of resource wealth can materialize, and that the DD argument has little effect on the linkage between natural resource abundance and economic development (Sarraf and Jiwaji, 2001).

Another study for Africa by Benjamin, Devarajan and Weiner (1989) explores the case of Cameroon. The authors argue that the treatment of tradables in traditional DD models may not be plausible for some countries. They separate tradables into *exportables* (mainly agriculture) and *importables* (manufactures) and assume that locally produced goods are imperfect substitutes for importables. In this fashion, they calibrate a multi-sector model for Cameroon under an oil-abundance scenario. Because the effects of real exchange rate appreciation vary across sectors, oil abundance results in fast growing nontraded activities, a large decline in exportables and a boom in importables.

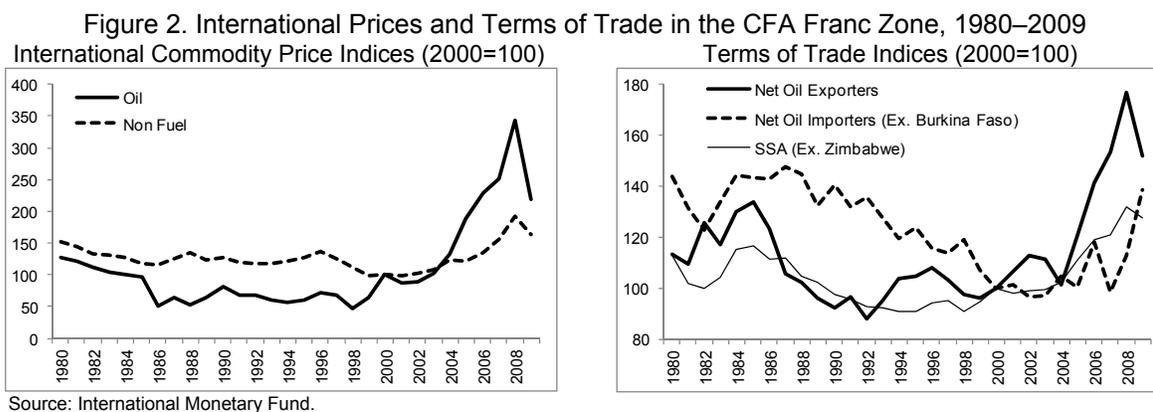
Finally, IMF (2009) analyzes the case of Chad, concluding that the effects of DD are hard to evaluate, not only because of lack of information but also because the non-oil sector is highly underdeveloped (agriculture was the most important activity before the discovery of oil); cotton production has been mired in problems not worsened by oil production, yet oil rents might have reduced the incentives to proceed with reforms in that sector. After exploring the dynamics of several indicators, the paper concludes that there is little evidence to support the presence of DD, with the exception of a significant increase of the wage bill, likely explained by the expansion of government expenditure during the oil boom (expenditure effect), rather than by shifting labor toward oil production/refining (resource-movement effect).

¹¹ More recently, research has focused on the real exchange rate effects stemming from remittance flows to Latin America and the Caribbean (see for example Amuedo-Dorantes and Pozo, 2004) and foreign aid to low income countries in Africa (see Rajan and Subramanian, 2005, 2009, and IMF, 2005).

III. RESOURCE CURSE AND DUTCH DISEASE IN CEMAC: WHAT DO THE DATA SUGGEST?

A. Oil Abundance and Economic Performance

This section compares the evolution of economic activity between the two groups that make up the CFA franc zone, namely net oil exporters and net oil importers, to identify the so-called resource curse. Because net oil-exporting countries discovered and started exploiting oil at different times (Box 1 and Appendix 1), we look at total and non-oil GDP growth for various subsamples between 1970 and 2009. We take into account the regional devaluation that occurred in 1994 and consider 2002–09 an oil-boom episode, because high international prices of oil led to significant terms-of-trade improvements in oil-rich countries (Figure 2).¹²



At a first glance, evidence appears to support the presence of a resource curse in the CFA franc zone (Table 1). With the exception of 2002–09, since 1990 average annual growth of total real GDP in net oil-exporting countries has been lower and more volatile than in net oil-importers.¹³ However, the non-oil component of GDP has grown at least as much in all but one episode (1994–2001), and the difference in favor of net oil exporters is especially high since 2002. Moreover, non-oil GDP growth exhibits an upward trend for net oil-exporting countries over time (Figure 3), which is not the case for net oil importers.¹⁴

¹² Coudert, Couharde and Mignon (2008).

¹³ At the country level, it appears that the discovery and exploitation of oil tends to induce a relatively short-lived increase in total GDP growth with virtually no long-lasting effects (Appendix 2).

¹⁴ An ordinary least squares (OLS) regression of non-oil GDP growth against a linear trend in the net oil-exporting group yields a positive and significant coefficient of 0.52. The estimated coefficient for net oil importers of 0.36 is not significant.

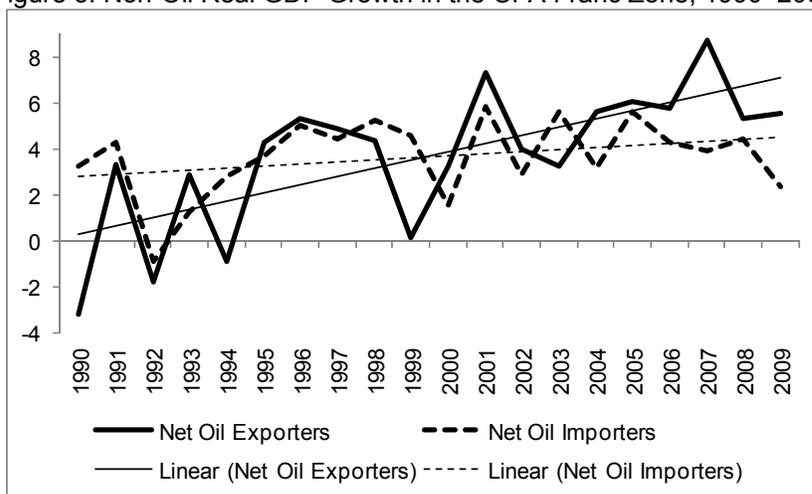
Table 1. Average Annual Growth in the CFA Franc Zone¹

	Total Real GDP		Non-Oil Real GDP
	Net Oil Exporters	Net Oil Importers	Net Oil Exporters
1970–2009	3.5 (3.5)	2.9 (2.3)	--
1990–2009	3.2 (2.7)	3.7 (1.7)	3.7 (3.0)
1994–2009	3.9 (2.4)	4.1 (1.3)	4.5 (2.4)
1994–2001	3.7 (2.8)	4.1 (1.4)	3.6 (2.7)
2002–2009	4.1 (2.1)	4.0 (1.2)	5.5 (1.6)

¹ Standard deviations in parentheses.
Source: International Monetary Fund.

These observations suggest a positive spillover from the oil sector into the rest of the economy, contradicting the idea of a resource curse or a “disease”.¹⁵ However, they may also reflect that the expansion of the non-tradables sector (services activities) has more than compensated a possible contraction of non-resource tradables activities, fully consistent with the traditional DD hypothesis (more specifically the resource-movement effect) and of potential concern in the sense that oil-rich economies may become increasingly undiversified.¹⁶

Figure 3. Non-Oil Real GDP Growth in the CFA Franc Zone, 1990–2009

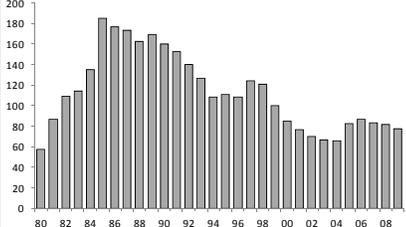
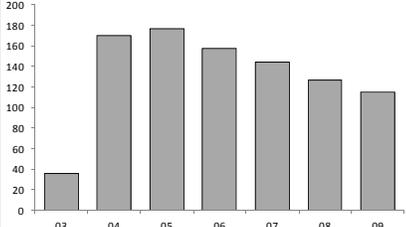
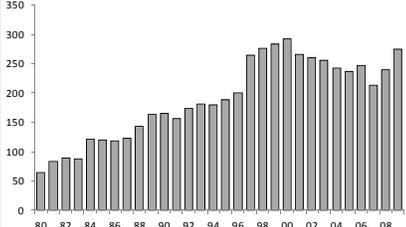
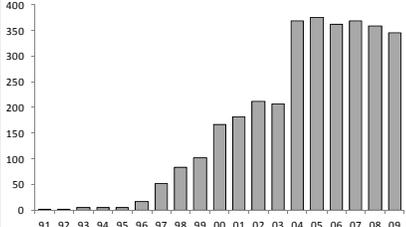
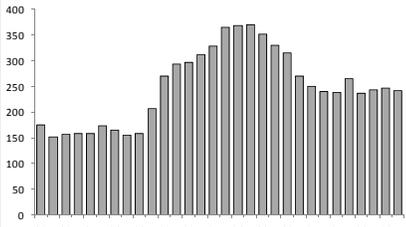
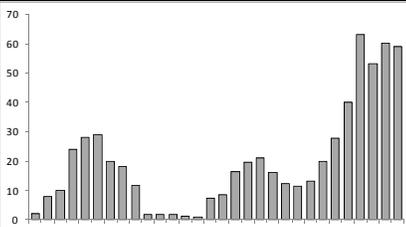


Source: Author's calculations with IMF data.

¹⁵ Part of this observation may reflect the role of public investment in economic activity. In Equatorial Guinea, for example, virtually the entire oil windfall has been used to finance infrastructure investment, supporting construction activity (computed as part of non-oil GDP).

¹⁶ Theoretically, under the assumption of DD, changes in total GDP growth depend on whether the effect of faster-growing resource-based and services activities is larger than the effect of slower-growing (or possibly contracting) non-resource tradable activities. Also, traditional models do not focus on the growth or welfare implications of DD. They analyze only the resource-movement effect (manifested as a relocation of labor across sectors) and the spending effect (manifested as a [sustained] appreciation of the real exchange rate (Section II).

Box 1. Crude Oil Production in Oil Rich Countries of the CFA Franc Zone

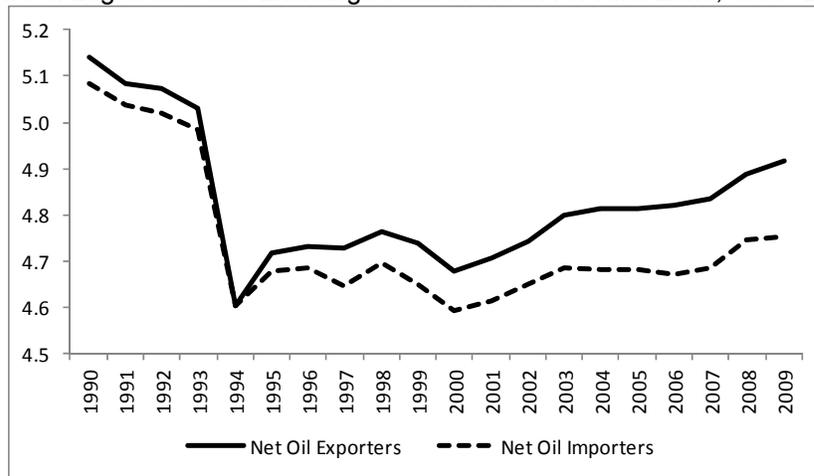
Country	Crude Oil Production (thousand barrels per day)
<p>Cameroon Oil was discovered in 1976, with production peaking in 1985. The construction of the Chad-Cameroon pipeline was launched in late 2000, but it did not become operational until 2001.</p>	
<p>Chad Oil was discovered in the early 2000's and became commercially viable in 2003, with production peaking in 2005. The construction of the Chad-Cameroon pipeline was launched in late 2000, but it did not become operational until 2001.</p>	
<p>Congo Congo is currently the fifth-largest oil producer in sub-Saharan Africa. The first oil wells were discovered by the French in the late 1950s. However, various sources report that larger-scale commercial exploitation started in the late 1970s. Oil production is expected to peak in 2011.</p>	
<p>Equatorial Guinea Equatorial Guinea is currently the third-largest oil producer in sub-Saharan Africa. Oil was discovered in the 1960s, but commercial production started in 1991. The largest field (Zafiro) was discovered in 1995. Oil production peaked in 2008 and newly discovered wells may boost production in the coming years.</p>	
<p>Gabon Oil was discovered in the early 1970s and production started around 1976 (the country was a member of the Organization of the Petroleum Exporting Countries (OPEC) from 1975 to 1995). Oil production increased significantly between 1989 and 1997. Gabon is currently the fourth-largest oil producer in sub-Saharan Africa.</p>	
<p>Cote d'Ivoire Oil refining started in 1975. That same year Petroci, the oil company, was established. Various sources consider 1993 a "breakpoint year" in oil production and refining. Oil production jumped substantially in 1994, although it remains low compared to most countries.</p>	

Sources: United States Energy Information Administration (<http://www.eia.doe.gov/>) and IMF.

B. The Spending Effect

One of the most common manifestations of the spending effect is a sustained appreciation of the real exchange rate. Put simply, real exchange rate appreciation results from an increase in the relative prices of domestic goods and services owing to an increase in aggregate demand. Higher wages in the resource-based sector lead to higher wages in other activities. The wealth effect associated with the increase in overall wages leads to higher demand for domestically produced goods and services and hence higher prices.

Figure 4. Log of the Real Exchange Rate in the CFA Franc Zone, 1990–2009¹



Source: Author's calculations with IMF data.

¹ An increase denotes an appreciation.

Real exchange rate dynamics are fully consistent with the spending effect (and hence with DD) in oil-rich countries of the CFA franc zone. Jointly, these countries have experienced a large and sustained appreciation of their real exchange rate relative to net-oil importers since 1994, accelerating after 2000 (Figure 4). While the latter group experienced a cumulative real exchange rate appreciation of about 10 percent between 1994 and 2009, the former accumulated about 30 percent. Similarly, real exchange rate appreciation in net oil exporters has doubled that in net oil importers since 2000.

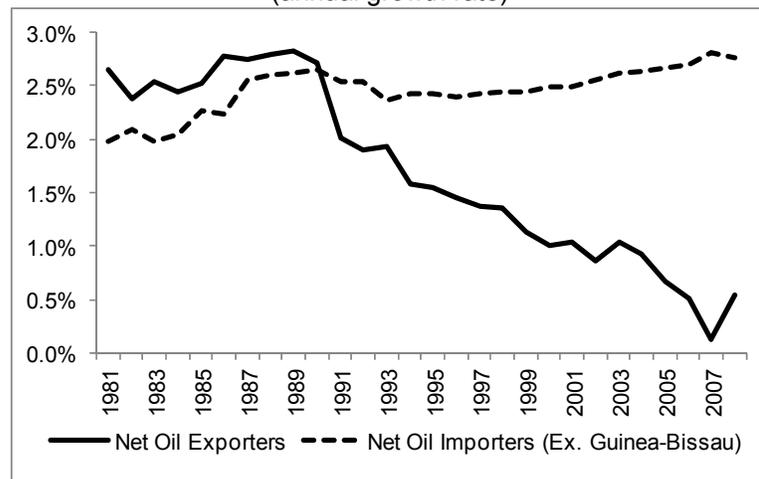
Alternatively, this higher real exchange rate appreciation in oil-rich countries may simply reflect the relative size of the terms-of-trade shock, because the international price of oil increased more than nonfuel commodity prices (Figure 2). From an equilibrium perspective, if the oil-price shock and its impact (or oil abundance) were permanent and therefore the terms-of-trade gains were also permanent, then the observed real appreciation in net oil-exporters would be fully consistent with a transition toward a new equilibrium real exchange, contradicting the DD argument (Edwards and Aoki, 1983). To the extent that productivity

gains supporting real exchange rate appreciation were present in these countries, one could also refute DD in the sense that such gains might be indicative of productive diversification.¹⁷

C. The Resource-Movement Effect

An empirical implication of the resource movement effect is the relocation of labor away from traditional activities and into the resource-based sector. We look at the annual growth rate of the number of individuals employed in agricultural activities over time.¹⁸ This variable has declined steadily in oil-exporting countries since 1990 (Figure 5), and the decline accelerated between 2003 and 2007. In oil-importing countries, on the contrary, this variable has remained relatively stable, with a slight upward trend since 1994.¹⁹ This observation is consistent with the DD phenomenon, as it may reflect a shift of potential labor away from traditional activities and into oil-related activities that is not present in net oil-importing countries.^{20, 21}

Figure 5. Economically Active Population in Agriculture in the CFA Franc Zone, 1990–2009
(annual growth rate)



Source: Author's calculations with WB data.

¹⁷ While it is difficult to accurately measure the evolution of productivity in these countries, we look at the dynamics of employment in the following section.

¹⁸ Ideally, we would like to look at payroll and/or employment/unemployment indicators. Unfortunately, job-market data is very limited.

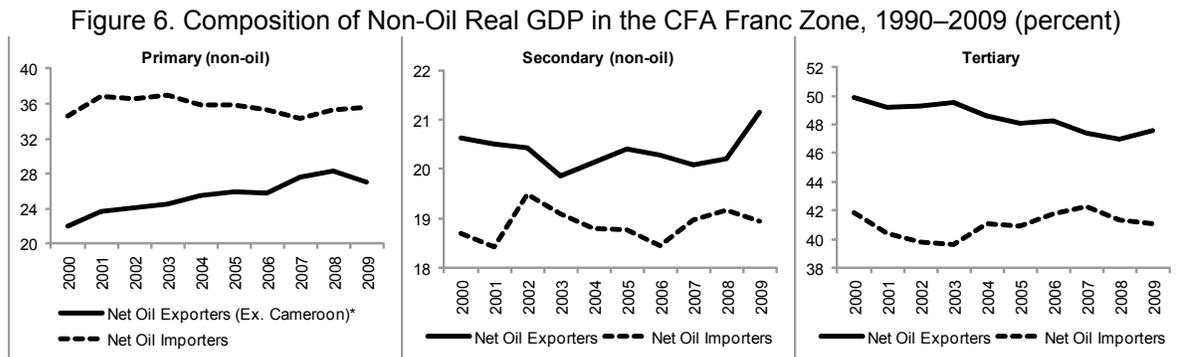
¹⁹ We exclude Guinea-Bissau from the group of net oil importers on account of limited data availability.

²⁰ An alternative explanation could be that the productivity gains in the agricultural sector of oil-exporting countries are such that the relative demand of labor is shrinking when compared with that in oil-importing countries. We think this is less plausible, and in fact we would not be surprised to find otherwise: that is, productivity gains in the agricultural sector may be larger in oil-importing countries, precisely because of the absence of oil. Also, it is worth noting that the resource-movement effect assumes full employment, which is not the case in many of the countries considered in this chapter. As noted earlier, this assumption is among those questioned by nontraditional models of DD.

²¹ This is likely to hold taking into account demographics or population growth.

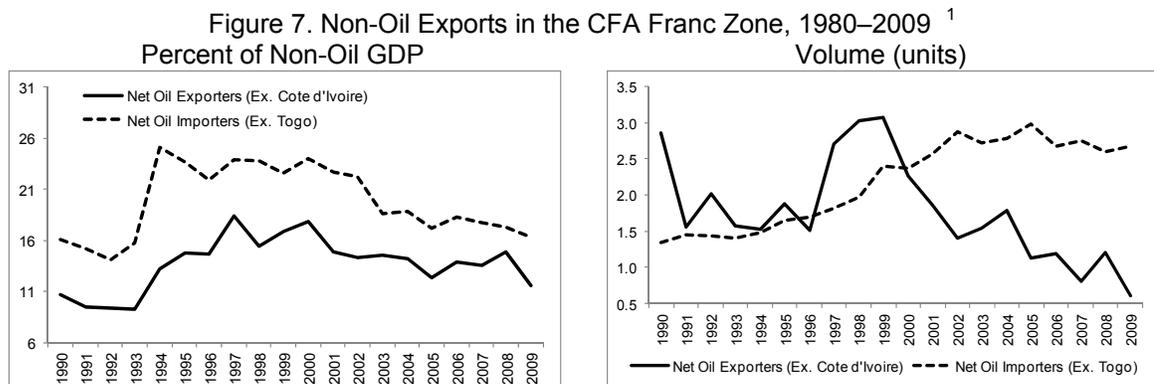
Sectoral Output

A shift of resources away from traditional (tradable) activities into the resource-based sector would imply a change in the contribution of each sector to (non-oil) output over time. The share of non-oil primary activities to (non-oil) GDP in net oil-exporting countries has risen over time ((Figure 6, leftmost panel), with a hump in 2007–08. At the same time, after a mild trend decline, the share of secondary non-oil activities to non-oil GDP in these countries increased notably in 2009 (center panel), while tertiary activities declined steadily (rightmost panel). Admittedly puzzling, the first and third observations, namely, an increase in traditional traded activities (agriculture) and a decline in non-traded activities (services) in net oil-exporting countries, appear to contradict the DD paradigm.



Non-Oil Exports

Another indication of the resource movement effect is a deterioration of the non-oil trade balance owing to a decline in non-oil-related exports. Between 2001 and 2008 non-oil exports to non-oil GDP were consistently lower in oil-rich countries relative to net oil-importing countries (Figure 7), consistent with DD. Interestingly, they appear to decline less rapidly in net oil-exporting countries during the period, contrary to a DD argument during the oil boom. However, the volume of non-oil exports declined sharply in oil-rich countries since 1998, while it showed a steady increase since 1999 in the group of oil importers, supporting the presence of a resource movement effect and consistent with DD.



IV. REAL EXCHANGE RATE APPRECIATION AND GROWTH: A POSITIVE CORRELATION?

As we have mentioned, existing empirical literature on the growth effects of resource abundance and DD is sparse, and the results are mixed. For the group of countries under study here, however, the observation (Figure 3) that non-oil real GDP growth has a positive and significant slope in net oil exporters since 1990, combined with a relatively more rapid appreciation of the real exchange rate after the 1994 devaluation, appears to contradict what conventional models suggest. Thus, as a first approach, we look at the statistical relationship between economic growth (both oil and non-oil) and real exchange rate changes.²²

The correlation coefficient (ρ) between real exchange rate changes and GDP growth is not significant for either subgroup between 1990 and 2009 regardless of the GDP measure (Table 2, left panel). For 2000–09 (Table 2, right panel), however, there is a negative and weakly significant correlation between changes in the real exchange rate and non-oil GDP in oil-rich countries, suggesting the presence of DD. For net oil importers the sign of the correlation is positive and significant, pointing to the idea that real exchange rate appreciation can be associated with *higher* growth in those countries.²³

Table 2. Real Exchange Rate Changes and GDP Growth in the CFA Franc Zone

1990-2009				2000-2009			
Net Oil Exporters		Net Oil Importers		Net Oil Exporters		Net Oil Importers	
Total GDP	Non-Oil GDP	Total (Non-Oil) GDP		Total GDP	Non-Oil GDP	Total (Non-Oil) GDP	
Aggregate				Aggregate			
ρ	0.07	0.07	0.00	ρ	0.36	0.27	0.16
(s.e.)	(0.10)	(0.08)	(0.04)	(s.e.)	(0.24)	(0.27)	(0.10)
Country-specific				Country-specific			
ρ	0.02	0.03	0.01	ρ	0.01	-0.26*	0.19*
(s.e.)	(0.09)	(0.07)	(0.04)	(s.e.)	(0.21)	(0.13)	(0.09)

Standard errors in parenthesis.

* 90% of confidence.

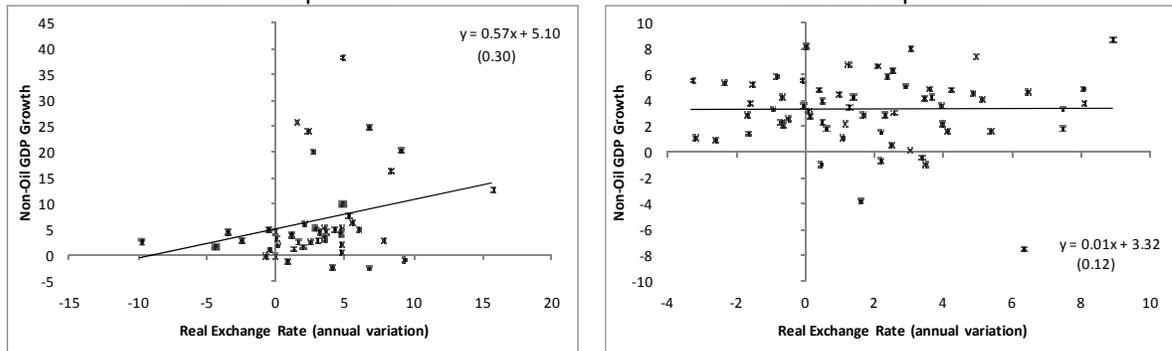
The correlation coefficients are highly sensitive to the sample period. If the sample is reduced by two years (2002–2009), the correlation between non-oil GDP growth and real exchange rate changes switches to positive (and significant) for oil-rich countries (Figure 8). This supports the idea that the real exchange rate appreciation observed during the period

²² We calculate the (partial) correlation coefficient and its statistical significance between the series for growth and real exchange rate changes without making any exogeneity assumptions. We implicitly estimate an equation of the form $y_{i,t} = \alpha_i + \beta x_{i,t} + u_{i,t}$ and attempt to exploit the panel information by estimating fixed effects and country-specific coefficients, where $x_{i,t}$ is the change in the real effective exchange rate in country i at time t and $y_{i,t}$ is GDP growth in country i at time t . We do not make any assumptions regarding causality, but rather explore whether there is a statistically significant correlation between these variables. A negative and significant correlation would suggest DD symptoms.

²³ Eichengreen (2008) provides an ample discussion on the role of the real exchange rate in the growth process, the channels through which it influences other economic variables, and various policy options to affect it. See also Krugman and Taylor (1978) and Edwards (1986, 1989), who discuss the contractionary effects of nominal (and real) devaluations.

(associated with the terms-of-trade gains) favored higher growth in non-oil-related activities of oil-abundant countries. Alternatively, this could indicate that higher aggregate spending (possibly reflecting public spending of the oil wealth) resulted in both an increase in non-traded goods prices (and hence real exchange rate appreciation) and higher (non-oil) GDP growth, through higher construction and services output. This, however, is not fully supported by the observation in the previous section that the share of tertiary activities in non-oil GDP declined in net oil-exporting countries, while the share of secondary non-oil activities spiked only in 2009.

Figure 8. Non-Oil GDP Growth and Real Exchange Rate Changes, 2002–09
Net Oil Exporters Net Oil Importers



Source: International Monetary Fund
Standard errors of slope in parenthesis

The results also are very sensitive to the inclusion of Equatorial Guinea. Allowing for cross-section-specific slopes yields a negative and strongly significant correlation coefficient only for Equatorial Guinea (-0.98) and the Congo (-0.59). In fact, the correlation coefficient estimated in Figure 8 falls to 0.06 and is not significant when Equatorial Guinea is excluded from the regression. As of 2008, Equatorial Guinea was the third largest hydrocarbons producer in sub-Saharan Africa (Box 1), behind only Angola and Nigeria. Moreover, in Equatorial Guinea an important share of the oil windfall has been poured into the economy through public investment in infrastructure (construction), favoring strong growth in the non-oil sector.²⁴ Hence, the evidence presented should by no means be considered conclusive and a case-by-case analysis is warranted.²⁵

²⁴ The Republic of Congo was among the continent's largest oil producers. However, it endured a conflict that ended in 2003. Since then, it has made significant progress on stimulating recovery with the cooperation of multilaterals, while the economy has become more resilient. Yet, important development challenges remain. See IMF (2011).

²⁵ This is consistent with Eichengreen (2008), which concludes that analyses of the correlation between growth and the (level or volatility) of the real exchange rate produce a variety of statistical results. See also Harberger (2003).

V. THE ROLE OF FISCAL POLICY

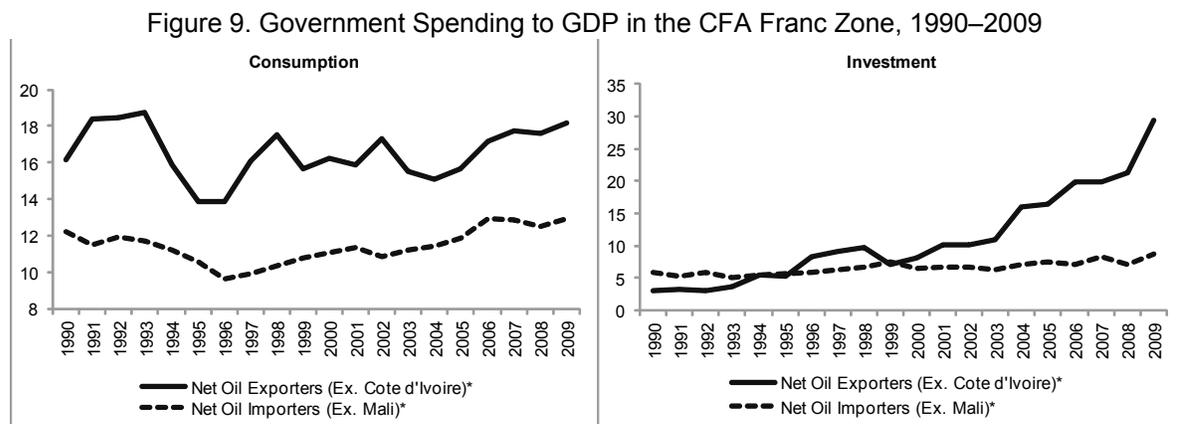
The effects of fiscal policy on both the real exchange rate and economic growth have been widely explored. Early work by Sachs and Wyplosz (1984) for example, provides analytical work on the impact of public spending on the real exchange rate. In their setup, the authors assume full price flexibility (and hence no effects on real economic activity). The broad result is that the response of the real exchange rate to changes in public spending is ambiguous, as opposed to the conventional belief that higher public spending induces an appreciation on impact and a long-run depreciation. The authors explain that their findings are not robust to varying assumptions about the degree of asset substitutability (foreign *versus* domestic bonds) or to the composition of government spending (tradables *versus* nontradables).

More recently, Vegh (2011) provides a more conventional microfounded framework for the analysis of the impact of various policy changes on the relative price of traded to non-traded goods (the real exchange rate). In his setup, the real exchange rate effect of an increase in public spending depends on the composition of such spending. A *permanent* increase in public spending will lead to a real exchange rate appreciation if such spending is biased toward nontradables *relative to private spending*. The effect of a temporary increase in public spending on the real exchange rate will depend on the substitutability between tradables and nontradables and the composition of public spending. Assuming that there is some degree of substitutability (rather than complementarity), a temporary increase in public spending of non-traded goods leads to a temporary real exchange rate appreciation, whereas a temporary increase in public consumption of tradables leads to a real exchange rate depreciation.

Empirically, Vegh (2011) explains that regression methods focusing on Asian and Latin American developing countries point toward the idea that increases in public spending induce real exchange rate appreciations, in line with both existing models and conventional belief. Conversely, Monacelli and Perotti (2007), estimate a structural vector autoregression (VAR) for the US, Canada, the UK and Australia and find that an increase in public spending induces a real exchange rate depreciation. The authors argue that conventional models predict, contrary to the data in those countries, that private consumption falls as a result of an increase in public spending owing to a negative wealth effect.²⁶ Monacelli and Perotti explain that “ranging from the traditional apparatus of the Mundell-Fleming model to the more recent New Open Economy Macroeconomics, the issue of how changes in fiscal policy affect the competitiveness of a country and its external balance remains a classical textbook question in macroeconomics.” As Vegh (2011) puts it, “estimating the impact of changes in fiscal spending on the real exchange rate has proved to be a hard task.”

²⁶ In Vegh’s setup, this outcome would be obtained if government spending were biased toward tradables, although government spending continues to produce a negative wealth effect on the private consumer.

Little has been done empirically for sub-Saharan African countries on how fiscal policy affects the real exchange rate. Related work by Aydin (2010) finds no significant explanatory effect of government consumption (to GDP) on the determination of the equilibrium real exchange rate for a panel of 182 countries from 1973 to 2014 (using IMF forecasts).²⁷ The author shows that the results remain unchanged when looking at the group of countries in sub-Saharan Africa and at the subset of net oil-importing countries in that region. This nonsignificance is somewhat surprising given the relative size of the government in many of the countries considered. A possible explanation is that rather than public consumption, it is public investment that matters for real exchange rate determination in these countries (or their sum). From a theoretical point of view, it is possible that the assumption of a non-tradables bias in government spending does not hold; and the effect cancels out.²⁸



Source: Author's calculations with IMF data.

* Data for Cote d'Ivoire and Mali are not available.

In the present case, we see that oil-related revenue rose from about 8 percent of GDP in 2003 to a peak of nearly 17 percent in 2008 in oil-rich countries. This supported an increase in government spending, especially in investment, compared to previous years (Figure 9), likely affecting growth (at least in the short term) and the real exchange rate. The extent to which this increase in public spending has a positive impact on productivity and growth in the long term remains to be seen. While infrastructure investment may provide a base for sustained growth and improve welfare, there is concern that oil-rich economies become less diversified and increasingly vulnerable to oil-price developments, posing a risk to maintaining external stability.²⁹

²⁷ Explanatory variables include terms of trade, a measure of relative productivity, net foreign assets, foreign aid flows, and remittance flows.

²⁸ Aydin (2011) explores the resource curse for a group of 150 low and middle-income countries between 1973 and 2008. The author finds evidence suggesting that growth benefits from availability of natural resources after taking into account differences in macroeconomic management and structural indicators. Interestingly, the author also finds that real exchange rate depreciation improves competitiveness and thus growth, but also that fiscal austerity leads to higher growth.

²⁹ In this sense, the “disease” nature of oil-abundance could be posed as a question of using oil-related revenue to improve welfare for the current *and* future generations.

VI. CONCLUSIONS AND FURTHER RESEARCH

In this paper we found mixed evidence of DD in oil-rich countries of the CEMAC region. Using a heuristic comparative approach suggested by Ismail (2010), we looked at the 14 member countries that make up the CFA franc zone, separating them into net oil exporters and net oil importers. By limiting the analysis to this set of countries, any dynamics related to the exchange rate regime were removed and net oil-importing countries were considered counterfactual to net oil exporters.

Based on traditional models, the observed appreciation of the real exchange rate and the rapid shift of labor away from the agricultural sector in oil-rich countries are both fully consistent with the presence of DD at the aggregate level. However, there is no strong evidence in favor of a resource curse, as oil abundance does not appear to be correlated with overall economic performance in the long term. In fact, real exchange rate overvaluation is associated with higher rather than lower growth in some cases. The question is what the welfare implications might be once oil is exhausted given the seemingly absent impact on long-term growth.

Because departing from traditional models yields mixed results, we suggest the need for a case-by-case approach. Many of the DD assumptions appear not to suit the reality of some of the countries analyzed here and the results are very sensitive to the sample period and the inclusion of specific countries. Moreover, traditional models ignore the role of fiscal policy regarding the use of oil-related revenue for public investment. Therefore, the evidence presented here should be taken as preliminary and suggestive of further study.

An interesting path of research is to assess whether the long-term implications of resource abundance depend entirely on fiscal policy actions. Because the resource sector is the single most important source of revenue to the government in oil-exporting countries, the idea is to explore the extent to which the oil windfall has been channeled toward productive investment rather than current expenditure, because its “proper” use may contribute to the development of adequate conditions for improving competitiveness, achieving external sustainability and supporting higher growth.

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Appendix 1. Country Summaries: Net Oil Exporters

Country	Discovery	Oil Industry Production	Export	Comment	Dutch Disease Symptoms	Post Conflict
Chad		2003	2004	FDI in sector (Chad-Cameroon pipeline) started in 2000 with WB support and participation of US oil company Exxon-Mobil.	<ul style="list-style-type: none"> • Effects of Dutch disease hard to evaluate because the non-oil sector is underdeveloped. • Oil rents may have reduced the incentive to proceed with the reform of the cotton sector. • Nontradables price dynamics show no evidence. • The only variable showing evidence is the wage bill. • The [suboptimal] use of oil resources for infrastructure, education and health to help building up the non-oil sector, [partially] addresses the risk of Dutch disease. • It appears that labor availability and costs in the agricultural sector has not been affected by the emergence of the oil sector or the expansion of government employment. Rather, increased government spending has helped agriculture by providing essential infrastructure. • Difficulties in transforming the oil production; it has fueled fiscal expansion pushing public expenditure to an unsustainable path and weakened financial discipline. • The global financial crisis has affected the country mainly through the sharp decline in oil prices, which imply a decline in oil revenue and a sharp deterioration of the fiscal position. • Program based on the implementation of a revised budget for 2010 with realistic oil price assumptions and rescheduling of investment expenditures. • [Volatile] Oil revenue provides a unique opportunity for Chad to lay the foundation for sustained growth and lasting poverty reduction. • The oil revenue has financed an increase in public spending in priority areas, but also in military spending. • Concerns over absorptive capacity are prompted by fast growth of investment spending and insufficient attention to the multi-year implications of investment decisions, including inadequate allocation for recurrent spending in health and education. 	Yes (2007)
Central African Republic					(SEE BELOW)	Yes (2004)
Cameroon		1976		Private oil companies are responsible for exploration and exploitation activities.	<ul style="list-style-type: none"> • The Chad-Cameroon pipeline favored construction, transportation and telecommunications between 2001 and 2003 (most of the equipment for its construction was imported) 	
Equatorial Guinea	1960's	1991/1995	1997e		<ul style="list-style-type: none"> • Although oil was first discovered in the 1960's, it was first produced offshore in 1991 from the Alba oilfield discovered by Mobil. The Zafiro field (major producer) was discovered in 1995. • The discovery of large oil reserves and their subsequent exploitation have contributed to a substantial increase in government revenue. • Timber is the third source of foreign exchange after oil and gas. • Since 2004, the country is the third-largest oil producer in Sub-Saharan Africa (behind Angola and Nigeria). • The agricultural sector, historically known for cocoa, has collapsed. 	

Gabon	Early '70s	1976e	Gabon was member of OPEC from 1975 to 1995.	<ul style="list-style-type: none"> • The lack of transformation of primary materials is associated with a small (local) market, and the oil "rent". • Resource-based income was not invested in modernizing or diversifying the economy. 	
Republic of Congo		Early '80s		<ul style="list-style-type: none"> • The fifth largest oil producer in sub-Saharan Africa. Oil accounts for a large portion of GDP, exports and fiscal revenue.. • The country has the fourth largest proven natural gas reserves in sub-Saharan Africa. • In the early 1980s, rapidly rising oil revenues enabled the government to finance large-scale development projects, some of which were subsequently deteriorated by civil war. • Production in currently active fields is expected to peak in 2011. • The main fuel products are gasoline, diesel, kerosene, jet fuel, and propane. • Forestry led exports before the discovery of oil and continues to generate 10% of export earnings, although high transportation costs, high wages, and low productivity have hurt that industry in recent years. • The downstream oil industry, predominantly run by foreign companies, is also an important element in the economy 	Yes (1999)

Appendix 2. Country Summaries: Net Oil Importers

Country	Main export	Comment	Post Conflict
Benin	Cotton	The manufacturing sector is confined to some light industry, mainly processing primary products and production of consumer goods.	<ul style="list-style-type: none"> • Cotton production and export play a pivotal role in the economy. Cotton exports constitute on average about three quarters of total annual merchandise exports, and contribute around 7 percent to GDP. Nearly 30% of the population depends on the cotton sector. • At the end of the 1980s, the government embarked on a series of reforms to modernize the sector, from a monopolistic and centrally administered system to a more competitive structure. However, the process the reform process has been affected by various setbacks. • There is no clear impact (as of 2004) of the reform on production and producer prices. After production increased rapidly during the first phase of the reform, it has stagnated since 1996. • The prospects for growth and poverty reduction are also affected by developments in the international markets, especially trade restrictions and subsidies that affect world prices (the subsidy systems in the United States, the European Union, and China). • The government annulled the privatization of the state cotton company in November 2007 after the discovery of irregularities in the bidding process. • In October 2008, the authorities concluded the privatization of 33.5 percent of the SONAPRA ginneries (the government will retain a 33.5 percent stake in the newly established ginning company. An additional 17.8 percent stake will be sold through an initial public offering in the regional stock market. The remaining shares will be distributed to local authorities, cotton producers, and workers).
Burkina Faso	Cotton	Few natural resources and a weak industrial base. Cotton is the main cash crop.	<ul style="list-style-type: none"> • In 1998, Burkina Faso embarked upon a gradual but successful privatization of state-owned enterprises. Having revised its investment code in 2004, Burkina Faso hopes to attract foreign investors. • The country has seen an upswing in gold exploration and production. • More than 80 percent of the population relies on subsistence agriculture, with only a small fraction directly involved in industry and services. • Many Burkinabe migrate to neighboring countries for work, and their remittances provide a substantial contribution to the balance of payments. Burkina is attempting to improve the economy by developing its mineral resources, improving its infrastructure, making its agricultural and livestock sectors more productive and competitive, and stabilizing the supplies and prices of cereals. • Manufacturing is limited to food processing, textiles, and other import substitution heavily protected by tariffs. Some factories are privately owned, and others are set to be privatized. • Burkina's exploitable natural resources are limited, although a manganese ore deposit is located in the remote northeast. Gold mining has increased greatly since the mid-1980s and, along with cotton, is a leading export money earner.

Cote d'Ivoire	Oil Cocoa	<p>Oil refining started around 1975. Gas reserves were discovered in the 1980's. 1993 and 1994 also marked breakpoints in gas and oil production/refining. Since 2006, oil and gas production have become more important engines of economic activity than cocoa. Since the end of the civil war in 2003, political turmoil has continued to damage the economy, resulting in the loss of foreign investment and slow economic growth.</p>	<ul style="list-style-type: none"> • The energy sector has emerged as a major source of growth and fiscal revenue over the past few years (oil, gas, electricity and fuel production). • Crude oil production grew from 7.6 million barrels in 2003 to 22.2 million barrels in 2006. • Rich in hydrocarbons with significant refinery and electricity production capacities. • Almost all oil is exported, while natural gas is used by domestic electricity producers and refineries (car, jet and heavy fuels for export and local consumption). • A substantial part of domestic electricity production is exported. • Since most oil and gas production takes place offshore and with the involvement of foreign companies, technical efficiency is close to industry standards • By developing country standards, the country has an outstanding infrastructure. Public investment programs stepped up after the stagnation of the pre-devaluation era. • Known more as an oil refining country rather than as an oil producing one. While it does not have the prolific offshore oil fields of Nigeria, it does possess a modest upstream oil industry. • The national oil company, Petroci, was established in 1975. Petroci was restructured in 1998 and four new entities were created. • The gas reserves discovered in the 1980's have begun to be developed and utilised. The Foxtrot offshore gas field was discovered along with the Panthere gas and condensate field in 1993 and the Lion oilfield in 1994, both of which came on stream in the mid 1990's. • Offshore oil and gas production has resulted in substantial crude oil exports and provides sufficient natural gas to fuel electricity exports to Ghana, Togo, Benin, Mali and Burkina Faso. 	Yes (2004)
Guinea Bissau	Cashew/rice Fish/seafood		<ul style="list-style-type: none"> • Depends mainly on farming and fishing. Rice is the main crop. • Cashew crops have increased remarkably in recent years, and the country now ranks fifth in cashew production. • The country exports fish and seafood along with small amounts of peanuts, palm kernels, and timber. • Intermittent fighting between Senegalese-backed government troops and a military junta destroyed much of the country's infrastructure and caused widespread damage to the economy in 1998; the civil war led to a 28% drop in GDP that year, with partial recovery in 1999-2002. • Because of high costs, the development of petroleum, phosphate, and other mineral resources is not a near-term prospect. Offshore oil prospecting is underway in several sectors but has not yet led to commercially viable crude deposits. • In December 2003, multilaterals provided emergency budgetary support (\$107 million) for 2004, representing over 80% of the total national budget. Government drift and indecision, however, resulted in continued low growth in 2002-06. • Higher raw material prices boosted growth in 2007 and 2008. • After a slow 2006, growth bounced back in 2007, in part due to a recovery in cashew production (the country's principal cash crop). The 	Yes (1999,2003)

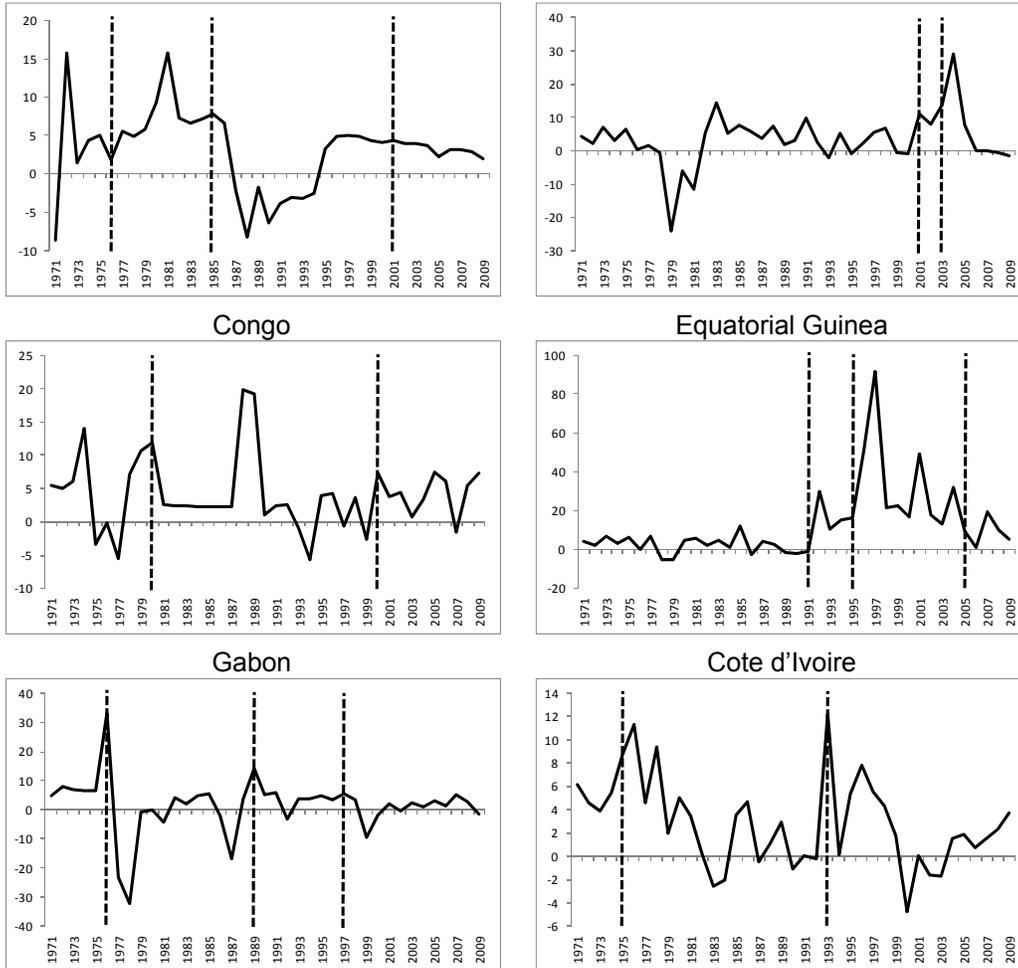
			economy also benefited from robust growth in tourism.
Mali	Gold Cotton	In 2008-2009(?), gold accounted for about 80 percent of exports.	<ul style="list-style-type: none"> • During the past few years, the mining of gold resources has provided a large portion of budgetary revenue and export receipts. Yet, the country's principal gold mines will probably be exhausted within a few years. • Cotton production, a mainstay of Mali's agriculture for decades, is facing many difficulties. Since 2004, production has declined rapidly, partially due to a reduction in procurement prices paid by cotton ginners. This, in turn, reflected a decline in world market prices for cotton driven mainly by rising production in China and Brazil, as well as cotton subsidies in industrialized countries. • Also, the cotton sector is almost exclusively rain-fed and thus at risk from planting to harvest. Other problems include lack of vertical integration (imported inputs), high transportation costs, low technical efficiency and inadequate financing systems. • The authorities are committed to privatizing the cotton state enterprise (CMDT) in early 2010. • Because of crop diversification, the impact of the decline in cotton output on farm incomes is unclear.
Niger	Uranium/ gold Onion/ cowpeas	Uranium exports are reported since the '70's.	<ul style="list-style-type: none"> • The economy is concentrated around subsistence and some export agriculture clustered in the more fertile south, and the export of raw materials—especially uranium ore. • The decline in uranium exports during the 1990s was reversed after 2002 when world prices rose dramatically due to years of underinvestment in production and revived world demand. • Because modern production and marketing techniques have been introduced, agricultural exports like onions and cowpeas are growing annually at double-digit levels. • Livestock exports were stagnant in 2003–07 because of a drought in 2004 that led to a decline in the stock. • Data on annual wages, employment, and value added of the modern sector show that since 2000 productivity has improved in all sectors except services. Value added per worker has increased especially in manufacturing, energy, and transportation. • The labor market is characterized by shortages of skills, rigidities, and wages cost that are higher than in comparable countries in sub-Saharan Africa. • The existing oil deposit had been commercially unviable until recently. About 2 years ago, with the support of China, exploitation is expected to start in 2012.

Senegal	Fish Phosphate (chart in Selected issues paper)	<p>The fishing sector has replaced the groundnut sector as Senegal's export leader. Fish accounts to about 30 percent of total exports.</p> <p>Phosphate production, the second major foreign exchange earner.</p> <p>Phosphate products do not compete in world export markets. ICS, the main producer of phosphate products, is contracted to export close to its entire production to India.</p>	<ul style="list-style-type: none"> • Predominantly rural and with limited natural resources, the Economy of Senegal gains most of its foreign exchange from fish, phosphates, groundnuts, tourism, and services. • Exports are not well diversified, mainly from the primary sector, and concentrated in products that have experienced below-average growth in volumes compared to world exports. • Structural performance indicators suggest that substantial barriers to private sector development hinder Senegal's external competitiveness. Reforms should focus on improving infrastructure, education, the provision of health services, the legal, regulatory, and administrative framework, labor markets, financial sector intermediation, and governance. • Senegal is ranked as one of the least competitive countries in the world. Its stable macroeconomic and political environment, as well as technological readiness, rank relatively high, but the survey points toward a need to develop institutions, labor market efficiency, education, and infrastructure. In these areas, Senegal ranks well below other African countries, including Kenya and South Africa. • Firms face high costs of doing business. According to the World Bank's Doing Business Report, in 2007–08 Senegal ranked 162 out of 178 countries in terms of the ease of doing business—below all WAEMU countries, except Guinea-Bissau and Niger • (Dakar is) home to banks and other institutions which serve all of Francophone West Africa, and is a hub for shipping and transport in the region. It also boasts one of the best developed tourist industries in Africa, the country's fourth largest source of income.
Togo	Cement Phosphate Cotton	<p>Cotton and phosphate's share in total exports declined from 50 percent at the end of the 1990's to around 13 percent in 2008 and could fall further with the crisis. In the industrial sector, phosphates are Togo's most important commodity.</p> <p>Cement exports, which represent about 20 percent of total exports, are expected to continue to increase, but declining regional demand should not be ruled out.</p>	<ul style="list-style-type: none"> • Subsistence agriculture accounts for about 25 percent of GDP. • The main sources of medium-term growth are expected to be agricultural production (especially food); construction fueled by higher public investment; a recovery in phosphate production; the competitive cement industry; and a recovery in trade-related services capitalizing on Togo's role as a regional hub. • International comparisons highlight the importance of Togo's priorities for boosting productivity and growth—infrastructure and human capital, financial intermediation, and a business friendly environment. • Indicators of business climate and infrastructure endowment show that Togo is positioned below its main regional competitors. • The country faces the challenges of rehabilitating transport infrastructure; providing quality education to more of the population (following the advice of the World Bank), and improving the business environment. • Encouraged by the commodity boom of the mid-1970s, which resulted in a fourfold increase in phosphate prices and sharply increased government revenues, Togo embarked on an overly ambitious program of large investments in infrastructure while pursuing industrialization and development of state enterprises in manufacturing, textiles, and beverages. However, following declines in world prices for commodities, its economy became burdened with fiscal imbalances, heavy borrowing, and unprofitable state enterprises.

Central African Republic (CEMAC)	Diamonds Timber	Timber has accounted for about 16% of export earnings and the diamond industry, for 40%.	<ul style="list-style-type: none">• Subsistence agriculture, together with forestry, remains the backbone of the economy.• Despite CAR's rich endowment in natural resources and arable land, political instability since independence is still affecting economic performance.• The agricultural sector generates more than half of GDP.• The country is characterized by its poor transportation system and a largely unskilled work force.• Factional fighting between the government and its opponents remains a drag on economic revitalization.
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Appendix 3. Real GDP Growth in Oil Rich Countries

Figure A2.1. Real GDP Growth in Oil Rich Countries*
Cameroon Chad



Source: IMF, Indexmundi and United States Energy Information Administration (<http://www.eia.doe.gov/>).
*The vertical lines indicate a relevant breakpoint in the oil industry as indicated in Box 1 above.