MACROECONOMIC AND FINANCIAL EFFECTS OF HIGH AND VOLATILE OIL PRICES

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ABSTRACT

This study assesses the effect of higher and more volatile oil prices on the Central American and Caribbean economies. The focus of the study is on the macroeconomic implications of higher oil prices on economic performance (output and investment growth, inflation, balance of payments), policy instruments and response (interest rates, public debt, subsidies, government expenditure), and effect on financial markets (debt maturity, composition and payments arrears). Once such effects are established, the study provides country-specific policy prescriptions based on the countries' international energy balance, and composition of their power generation structure.

INTRODUCTION

At the heart of every form of economic activity lies the use of energy. While the form and intensity may vary, fluctuations in energy prices build up from the firm- and household-level decisions to the aggregate economy. From transportation, to industrial production, to small firms and self-employed entrepreneurs, high and volatile energy prices have a direct effect on the supply of goods and services in the economy. Moreover, such effects can have an immediate or inter-temporal impact on the government's budget as well as on the country's balance of payments.

As higher energy costs are passed on to consumers, inflation expectations may rise plausibly requiring unnecessary monetary tightening; or in the presence of energy subsidies, higher prices would deteriorate fiscal balance. Either way, the cost of borrowing may rise as a further burden on both the private and public sector, thus reducing the potential for future growth. Moreover, firms can delay investment decisions, thus reducing capital formation and long term growth.

While a country's energy trade balance would determine whether higher energy prices represent a positive or negative terms of trade shock, the inflationary concern remains. For energy rich countries, the fiscal effect becomes uncertain as higher royalty revenues could offset larger subsidy outlays. This way, the bleaker scenario would be for countries that are net importers of energy, thus facing inflationary, fiscal, and balance of payments risk.

A further aspect concerning fluctuations in energy prices is the magnitude of the changes: an economy may find it easier to adapt to a steady increase in fuel prices than to sharp swings. Thus, energy price volatility is likely to lead to less stable economic activity, which in turn can reduce investment and increase the perceived country risk in international capital markets because of a less certain fiscal outlook and exchange rate risk.

The connection between the micro- and macro-economics of higher and more volatile energy prices is to a large extent through the power sector, not withstanding the transportation industry. While electricity generation can be a diversified activity in terms of nature and sources of fuel, from renewable resources to exhaustible fossil fuels, the degree of dependence on hydrocarbon generation provides a direct mechanism to propagate oil price shocks to the rest of the economy through the channels outlined above. Hence, a thorough assessment of the macroeconomic effects of higher and more volatile oil prices on the real economy depends to a large extent on the power sector.

The purpose of this work is to assess the macroeconomic effects of higher and volatile oil prices for Central American and Caribbean countries, which most of them are characterized by a high energy dependence on foreign sources. The contribution of this study is to provide a broad view of all the macroeconomic, international, fiscal, and financing effects of such shocks in Central America and the Caribbean. Furthermore, the study identifies and ranks the countries in these regions according to different dimensions of vulnerability. The study takes as given the underlying trends in energy markets, as these countries' size is unlikely to make their purchases a determinant of international oil prices.

The World Bank (2006) provides an extensive overview of the recent developments in oil and commodity markets, and their effect in the Latin American and Caribbean economies. The primary difference between this study and the aforementioned is: 1) the range of variables analyzed in this study is larger, 2) this study assesses the effect of oil price volatility –beyond higher prices, and 3) this study also provides a preliminary vulnerability ranking for Central America and Caribbean countries in the event of continued rising and volatile oil prices. On the other hand this study is narrower as it only covers oil prices and Central America and the Caribbean economies; and also it does not provide output growth forecasts based on future oil price scenarios as the World Bank (2006) does.

The structure of the paper is as follows. Section II documents the trends in the oil market over the last 25 years; Section III explores the links between higher oil prices and macroeconomic, fiscal, and financial performance (such as growth, inflation, government budget balance, borrowing, and balance of payments) on the selected group of countries; Section IV studies the effect of the volatility in energy on the same dimensions; Section V focuses specifically on the countries' vulnerability to higher oil prices and impact on the power sector; and Section VI concludes and provides policy recommendations.

OIL PRICE TRENDS

The primary component of the study is an overview of oil prices over the last two and a half decades. While fluctuations in oil prices can be measured at very high (e.g. by the hour) or low frequencies (e.g. decades), the stance that the analysis takes is at annual frequency. That is, the focus is on annual changes in oil prices on government finances and on the economy as a whole.

Figure 1 presents the annual average daily price of a barrel of West Texas Intermediate (WTI) barrel of oil (FOB) between 1986 and 2009. While the highest average price in the chart is 99.67 USD in 2008, the highest daily price was 145.31 USD in July 3rd of the same year. As for the lows, the lowest average was 14.42 USD in 1998, while the lowest daily price was 10.25 in March 31st 1986.

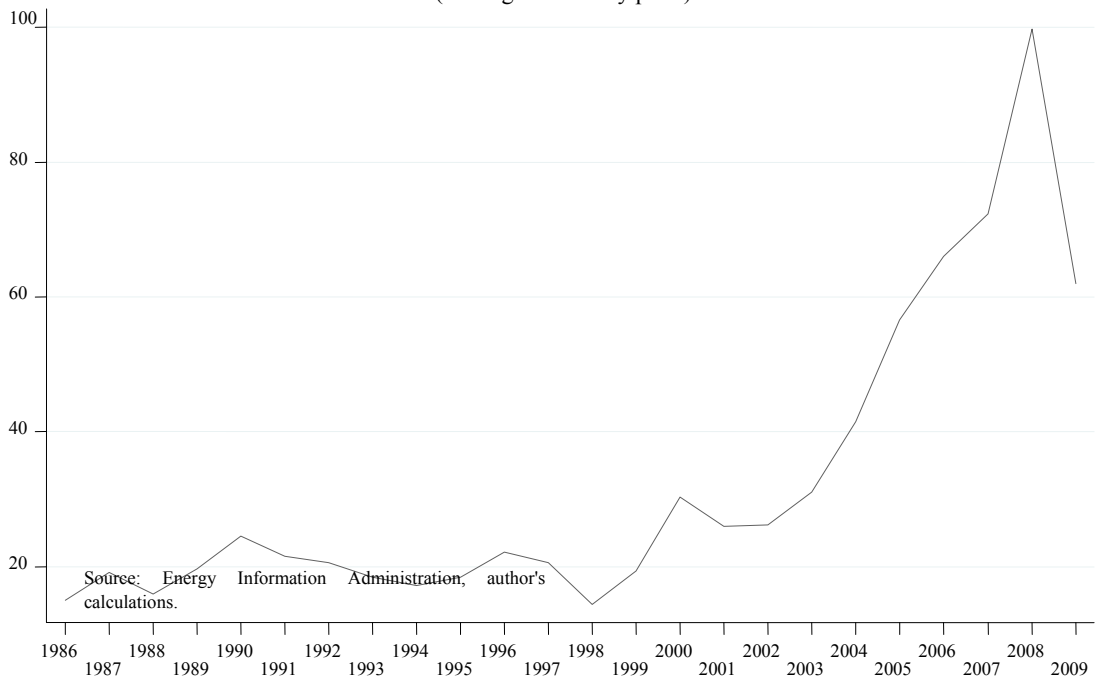
The range of oil prices during these years underscores the volatile nature of oil prices. From geo-political instability, to weather shocks, to global growth, oil markets are affected due to the tradeable and fungible nature of the commodity. Hence, not only higher oil prices, but also the associated volatility can have adverse effects on economic performance, as uncertainty may delay investment projects, as well as increase the risk profile of a country and its government's finances.

To measure the impact of oil price fluctuations over time, the study uses the annual standard deviation of daily oil prices within a year. (While a smoother measure of volatility, such as a one-year rolling-window could be calculated, the study uses within-year variation in order to facilitate the interpretation and matching to individual country annual time series.) Figure 2, presents the annual standard deviation of daily oil prices for the period 1986-2009. These numbers reflect daily deviations from the (annual) mean reported in Figure 1.

The highest annual variation occurred in 2008, in contrast, 1995 exhibited the lowest standard deviation. However, since average prices changed over the sample period, these indicators have to interpreted relative to the annual average price. That is, the highest variation occurred relative to a 99.67 USD average price, compared to the average price of 18.43 USD in 1995. In the subsequent analysis we the measure of volatility becomes the coefficient of variation, defined as the standard deviation divided by the average price. This way, the yearly volatility is normalized by the average price, which accounts for the fact that the higher the price of oil, the higher the dollar variation.

Figure 1. Oil Prices

(Average WTI daily price)



Based on the observations above, next, we turn to analyze the effect of these trends on key macroeconomic, public, and financial variables.

OIL PRICES AND THE ECONOMY

The goal of this section is to present the effect of higher energy prices on a set of key economic variables: output and investment growth, inflation, real interest rate, real exchange rate, current account, fuel imports, international reserves, debt, government balance, public debt, maturity of new debt issuance, and both interest and principal arrears.

The source of non-oil price data is the World Bank's *World Development Indicators*, and *Global Development Finance*. These databases include the key economic indicators that the study seeks to assess. Oil prices correspond to the WTI Spot Price FOB quoted in US Dollars. Daily prices are available starting January 1986.

The countries under study are as follows. The seven Central America countries: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama. The Caribbean region includes 16 countries: Antigua and Barbuda, Barbados, Cayman Islands, Dominica, Dominican

Republic, Grenada, Guyana, Haiti, Jamaica, Netherlands Antilles, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, The Bahamas, and Trinidad and Tobago.

Figure 2. Oil Price Volatility

(Standard Deviation WTI daily price)

Source: Energy Information Administration, author's calculations.

The dataset consists of an unbalanced panel that spans the period between 1986 and 2008. Prior to 1986, the Energy Information Administration does not report daily prices, which are necessary to estimate the annual volatility. Although oil prices are available up to the year 2010, the macroeconomic and government time series are available up to the year 2008 for most countries.

The study first presents an aggregate view of the effect of higher oil price on the region, and then uses individual country observations to conduct a series of econometric tests. The regional analysis aggregates country variables weighted by the countries' share of the region's real GDP.

To refine the sample, the first distinction we make is between net oil importing countries versus net oil exporting countries. Since the focus of the study is on the adverse effect of higher oil prices, the final sample covers only net importing countries of oil. Thus we focus on rising oil prices as a negative shock on the country's terms of trade. The following countries reported

positive fuel net exports in certain years: Netherlands Antilles, Barbados, and Trinidad and Tobago.

There is a vast literature on the effects of higher energy prices on oil exporting countries. This literature is closer to the 'resource curse' and 'Dutch disease', where the primary concern is the intertemporal management of natural resources, and the government's response to positive terms of trade windfalls. Both Spatafora and Warner (1995) and Villafuerte and Lopez-Murphy (2010) provide an overview of such channels and survey the literature.

Another key aspect of the study is that, because of the non-stationarity of oil prices, the empirical analysis focuses on identifying the effect of oil price *changes* on the chosen economic indicators.

The effect of oil price changes is split into four sets of variables: macroeconomic, international, government, and financial. All the results reported below control for time and include a regional dummy to account for differences between Central America and the Caribbean with the least informational expense.

The regional analysis starts by identifying the relation between rising oil prices and four core macroeconomic series: GDP growth, investment growth, inflation, and the real interest rate. Throughout the study we hypothesize about the expected sign of higher oil prices on the variables under study and then compare them to the econometric findings.

For this set of variables, in principle, the expectation is that rising oil prices negatively affect output and investment growth, and are (positively) associated to higher inflation and higher real interest rates.

In a related line of research, Blanchard and Gali (2007) set out to study why in industrialized economies the recent increases in oil prices have had milder effects than in the 1970s. They find that this is attributed to higher energy efficiency, better monetary policy, more flexible labor markets, and good luck (lack of concurrent adverse shocks). Though beyond the scope of this study, whether the same holds true for Central America and the Caribbean raises an interesting research question.

While higher oil prices initially appear as an increase in the relative price of energy, through different price and wage setting mechanisms, they can cause that a change in headline inflation results in higher core inflation as workers demand higher wages, and both energy and labor costs pass through to final goods and services prices. (Hunt et al. (2002) explore the mechanisms through which higher oil prices can pass through to core inflation in industrialized economies.) Furthermore, in an attempt to control inflation, a tightening of interest rates by the central bank can lead to a slowdown in output and investment. (The importance of this channel was first identified by Bernanke et al. (1997). The exact magnitude has been subject to debate and is extensively discussed in Hamilton and Herrera (2004)). A second mechanism, through which rising energy prices lead to slower growth, is as capital investment projects are postponed reducing investment and thus GDP in short- and long-run.

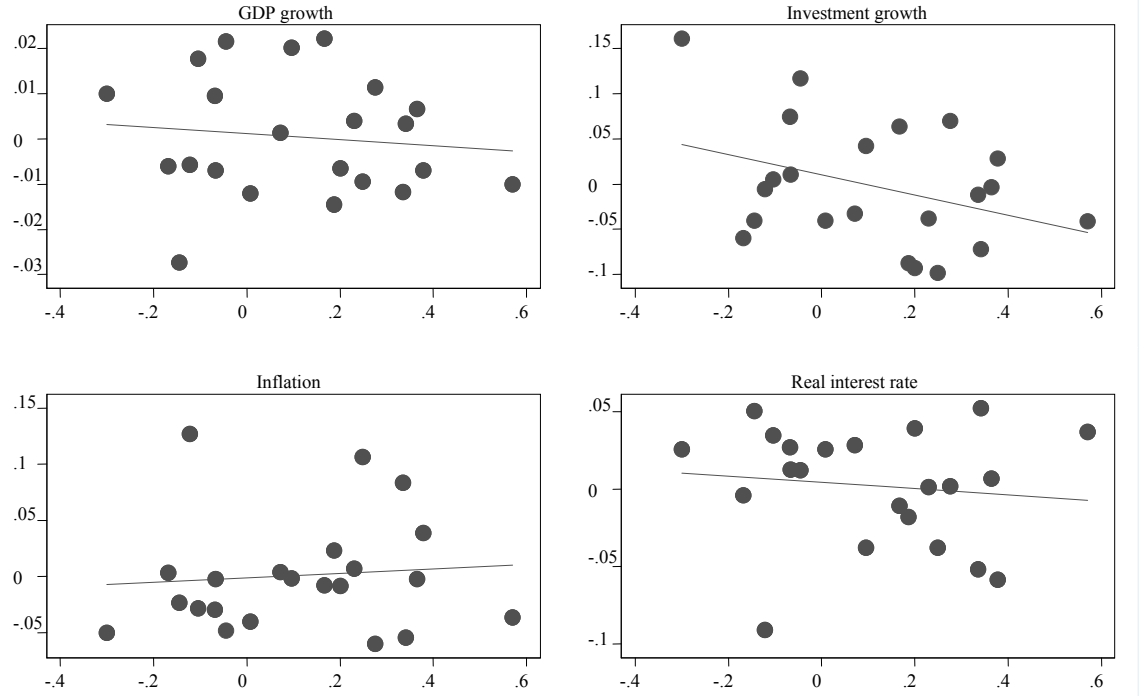
Lee and Ni (2002) and Fukunaga et al. (2010) conduct an industry-level analysis of the impact of higher oil prices. Their findings for the U.S. and Japan suggest that rising oil prices can have both negative supply and demand effects that reduce economic activity. In particular, oil shocks reduce the supply of oil-intensive industries like petroleum refining, industrial chemicals and paper; and reduce the demand of other industries, especially the automobile industry.

Figure 3 presents scatter plots (controlled for time and region) of the relation between changes in oil prices (horizontal axis) and output and investment growth, inflation and real interest rates. The top two panels illustrate the negative effect of oil prices on GDP growth and gross capital formation. Also, as expected, higher oil prices seem to feed into overall prices, leading to higher inflation.

Contrary to the expectation, higher oil prices appear to be negatively associated with real interest rates. This preliminary finding may suggest even though nominal rates might increase upon higher energy prices, the increase might not be enough to compensate the increase in inflation, thus leading to lower real interest rates. If this were to be the case, it might reflect the trade-off monetary authorities face between fighting inflation and balancing the economy around its potential growth rate. (While these results are indicative of the possible connections, no meaningful statistical inference can be done with the aggregate regional data because of the small sample size. In one of the models described below, higher oil prices appear to trigger an increase in real interest rates with a lag.)

Next, we turn to a series of selected international indicators such as the real exchange rate, fuel import dependency, international reserves (in months of imports), and short-term debt as a fraction of reserves. These variables taken together, point to the potential for heightened vulnerability due to higher oil prices. If higher oil prices are linked to weaker local currencies, this would result in an amplification mechanism of the initial shock. Also, the larger the share of fuel imports relative to other imports, higher oil prices weaken the countries' balance of payments sustainability, which can feedback through the further depletion of international reserves, which would put further pressure on the exchange rate and on the financing of imports. And finally, if the countries' response to rising oil prices includes additional international borrowing that may strain as well the countries' international debt position.

Figure 3. Oil prices and the Macroeconomy



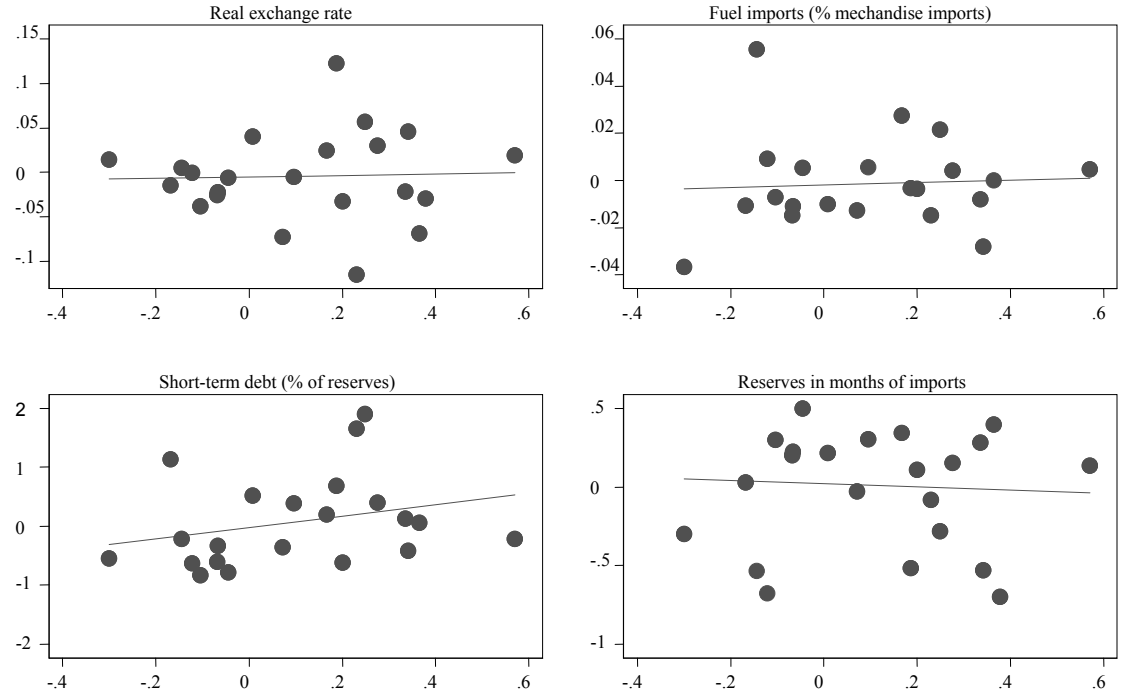
Source: WDI, author's calculations.

The relationship between higher oil prices and these variables for Central America and the Caribbean region is presented in Figure 4. In this case all variables exhibit the expected sign. Meaning that rising oil prices seem to be linked to weaker currencies (in real terms), to a larger share of fuel imports in total imports, to an increase in short-term debt relative to reserves, and to a decrease in reserves measured as months of imports.

Hence, these variables point to a weakened international position in the face of higher oil prices. In the analysis below, it is shown that based on country-level observations these relations are statistically significant in a variety of models.

Another set of important variables is the government's response and exposure to oil price shocks. For this, the study analyzes the effect of rising oil prices on the government's balance, debt, purchases, and subsidies. If smoothing mechanisms are in place, or political pressure rises demanding isolation from international market developments, then the government's finances (and country's as a whole) can be hampered.

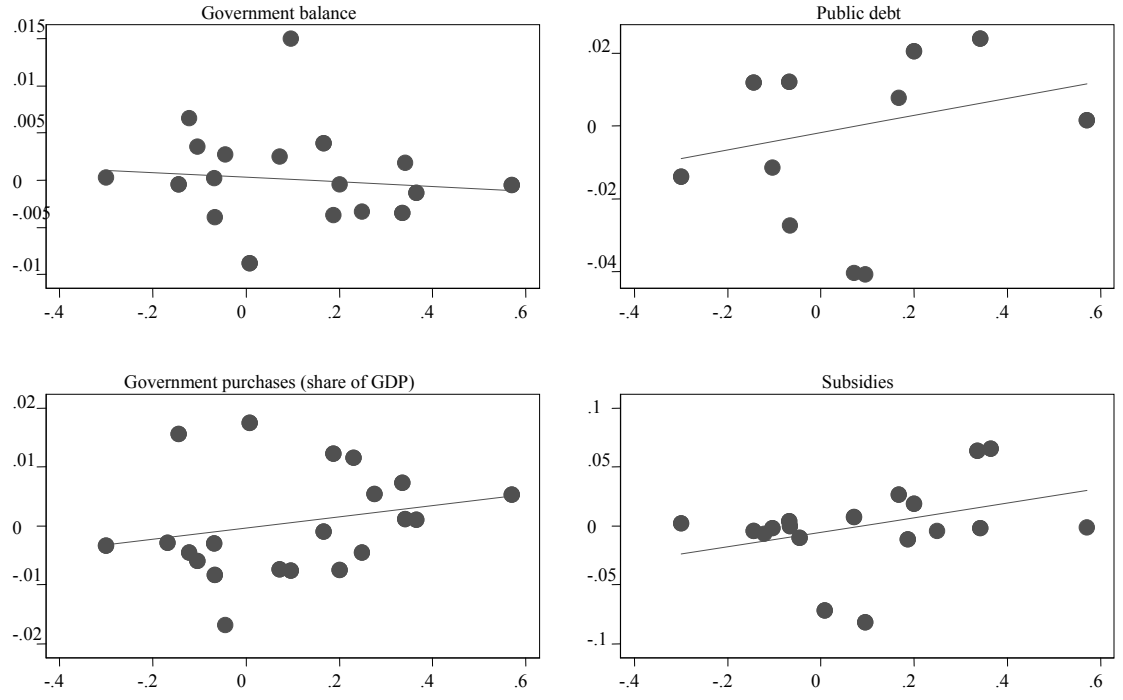
Figure 4. Oil prices and Key international variables



Source: WDI and GDF, author's calculations.

Kojima (2009) provides an in depth analysis of the policy response to rising oil prices in 49 developing countries. While most of them are microeconomic in nature, the fiscal repercussions are in line with those reported in this study, namely a weakening of the government's finances. The World Bank (2006) also presents detailed case studies on the policy responses for ten Latin American and Caribbean countries, including the Dominican Republic, El Salvador, Guyana, and Honduras.

Figure 5. Oil prices and Government sector



Source: WDI, author's calculations.

The overall view that Figure 5 presents, suggests a bleak horizon upon higher oil prices for Central American and Caribbean governments. The scatter plot shows a deterioration of the government's balance, an increase in government debt, an increase in government purchases, and higher subsidies.

While greater subsidies and a weakening of the government balance were expected, the larger share of government purchases as a fraction of GDP might suggest a form of counter-cyclical response to a weakening economy.

The last set of variables under study, correspond to a selection of international financing indicators. An inter-temporal smoothing mechanism suggested from the results above is temporary borrowing to face the oil price shock, and to counteract the plausible downturn in the economy. To understand further, Figure 6, presents the effect on the composition of short- and long-term debt, the change in new debt issuance maturity, and the performance of public debt given by principal and interest arrears. (Arezki and Bruckner (2010) analyze the effect of higher commodity prices on external debt in commodity exporting countries. Their main finding is that such windfalls are used to decrease the level of external debt in democracies. This study takes the opposite view, as the focus is on higher oil prices in oil importing countries.)

The top panel of Figure 6 suggests an increase in long term debt. While *a priori* one could expect an increase in maturity, the overall short- and long-term composition mix is harder to anticipate. However, the figure indicates that countries seem to increase long-term debt relative to short term borrowing. This may respond to allow a recovery period after which international commitments can be fulfilled.

As for the managing of the previous debt obligations, higher oil prices appear to delay both interest and principal payments. Public interest and principal arrears are positively related to rising oil prices. This provides another insight on how fiscal resources are allocated during such episodes: while subsidies and government spending increase, some international obligations are postponed.

Having established an initial characterization of the response of the selected variables to oil price changes within Central America and the Caribbean, next the study presents the disaggregated sample where each country represents an individual unit of observation. This allows us to have a larger sample on which to apply different econometric specifications, and infer the significance of the identified relations. The empirical strategy is to apply a battery of symmetric tests to assess the effect of higher oil prices on the chosen variables.

To allow for some time for oil price shocks to be reflected in the economies' aggregate indicators, we pursue four models that account for different adjustment periods. (For instance Lee and Ni (2002) report that at the industry-level, the decline in output occurs ten months after the oil price shock. For the U.S., Bernanke et al. (1997) report a seven-month lag on the VAR specification.) Model 1, includes a contemporaneous and a lagged effect of oil price changes as the independent variables. Model 2, accounts for a contemporaneous and two lagged effects of oil prices. Model 3, is based on a different strategy; it takes three-year averages of both regressors and dependent variables. Model 4, takes a similar approach using the five-year average of the variables to reduce the short-term noise that may independent of underlying trends in oil prices.

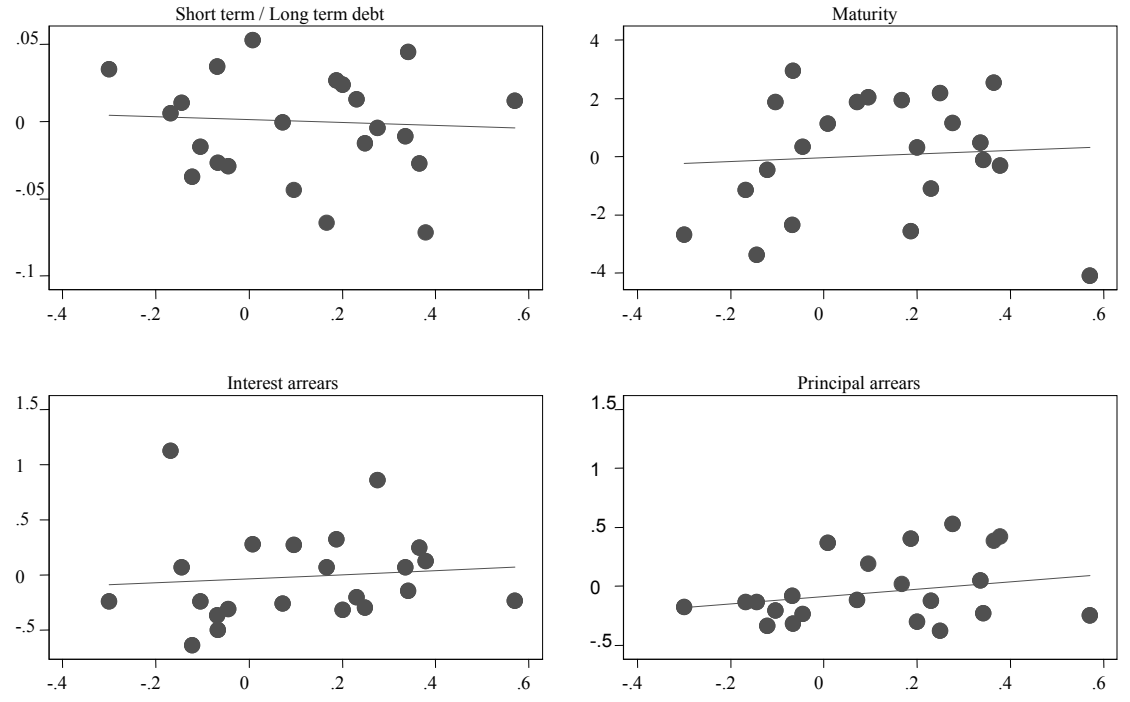
In all the diagnostic tests, the chosen variables are regressed on the same set of independent variables within each model specification. While this may come at the expense of richer variable-specific models, or of the quantitative interpretation of the coefficient magnitudes, it eases the comparison across variables and sheds light on the direction of potentially fruitful research.

Table 1. Oil Prices and the Economy

Dependent Variable	Expected Sign	Model 1 oil price change		Model 2 oil price change			Model 3 oil price change	Model 4 oil price change
		t	t-1	t	t-1	t-2	3y ave	5y ave
GDP growth	< 0	-	Yes	-	Yes*	-	-	Yes
Investment growth	< 0	Yes*	Yes	Yes*	Yes	Yes	Yes*	Yes
Inflation	> 0	Yes	Yes*	Yes	Yes*	Yes	Yes	Yes
Real interest rate	> 0	-	Yes	-	-	-	-	-
Real exchange rate	> 0	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Current Account/GDP	< 0	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fuel Imports (% Merchandise Imports)	> 0	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*
Reserves (months of imports)	< 0	Yes	Yes	Yes	Yes	-	Yes	-
Short-term debt (% of total reserves)	> 0	Yes	Yes	Yes*	-	Yes*	Yes*	Yes
Government balance (% GDP)	< 0	-	-	Yes	-	Yes	Yes	-
Government debt (% GDP)	> 0	-	Yes	-	Yes	-	-	Yes
Governement purchases (% GDP)	> 0	Yes	Yes	Yes	-	Yes	Yes	Yes
Subsidies (% of expense)	> 0	Yes	Yes	Yes	Yes	-	Yes	-
Maturity on new debt (years)	> 0	Yes	-	Yes	-	Yes	-	Yes
Public interest arrears (% change)	> 0	Yes	Yes	Yes	Yes	Yes	Yes*	Yes
Public principal arrears (% change)	> 0	Yes	-	Yes	-	Yes	Yes*	Yes
Short-term debt (% of total external debt)	> 0	-	-	-	-	-	-	-
Observation range		296-331		281-314			104-112	61-64

Notes: * denotes 10% statistical significance.
Source: WDI and GDF, author's calculations.

Figure 6. Oil prices and International financing



Source: GDF, author's calculations.

Table 1 presents the effect of oil prices on the selected variables grouped by their Macroeconomic, International, Public, and (International) Financing nature. In one or another version of the models we found the expected effect of higher oil prices on the economy. The only exception is short-term debt (as percentage of total debt), where long-term debt is the preferred instrument. This does not mean that short-term debt does not increase, but rather that long-term rate increases at a faster rate.

Among all variables, not surprisingly, the effect of rising oil prices on the share of fuel imports on merchandise imports is positive and significant across all models. Also, the negative effect on investment growth is consistent in all models and exhibits statistically significant contemporaneous effect in the lagged models and in the three-year average model. This effect is of particular importance since it has short- and long-term implications on growth. Similarly, all models identified the positive effect of higher oil prices on inflation and the negative effect on the current account; however, these effects are not statistically significant in all cases. For the rest of the variables the models did identify the expected effects though not in all models or with a high degree of statistical confidence.

From the above, the study can draw the following conclusions. Higher oil prices 1) slow down growth, through investment and overall output; 2) feedback into generalized price increases (inflation); 3) deteriorate external accounts (current account and fuel imports), and also are associated to a depletion of reserves and a depreciation of the local currency; 4) worsen the government's balance, increase public debt, purchases, and subsidies; and 5) increase the overall indebtedness of the countries and could lead to default on the debt obligations through higher interest and principal public arrears.

Beyond the partial effect of rising oil prices on these variables, in many cases they feed into each other. For instance the draining of reserves, along with higher arrears might trigger a speculative attack on the currency depreciating it further. Higher government purchases and public debt can crowd-out private investment decreasing further capital formation and overall growth.

OIL PRICE VOLATILITY AND THE ECONOMY

While higher oil prices imply an array of negative effects on the Central American and Caribbean economies, a second aspect worth analyzing is that of frequent changes in oil prices, beyond the underlying trend. In other words, oil price volatility. Taking daily prices as given, the question is what is the impact of large deviations around the yearly average price?

With this in mind, we estimate coefficient of variation of oil prices for every year. This statistic is defined as the standard deviation of oil prices within a year, divided by that year's average price. Then, we follow the same strategy as in the previous section: regress each of the selected variables through a series of model specifications with oil price volatility as the independent variable (along with time and regional controls).

A first step is to establish the expected effect of higher volatility on the chosen indicators. For most of the series, the predicted effect of greater oil price volatility is akin to that of higher oil prices, for instance on growth and inflation. For the latter, prices are more likely to be sticky downwards than upwards; thus frequent jumps in oil prices can result in higher inflation. In other cases it is harder to establish the likely effect such as on government purchases, for which the study uses the working hypothesis that higher prices and higher volatility have the same effect. Nonetheless, there are two cases on which the effect of volatility is likely to be opposite to that from higher prices: foreign exchange reserves and debt maturity.

Based on a precautionary savings argument, countries could in principle self-insure against volatile oil prices through higher international reserves. This in turn would decrease foreign borrowing and thus reduce longer term debt.

Table 2. Oil Price Volatility and the Economy

Dependent Variable	Expected Sign	Model 1 oil price change		Model 2 oil price change			Model 3 oil price change	Model 4 oil price change
		t	t-1	t	t-1	t-2	3y ave	5y ave
GDP growth	< 0	Yes	Yes*	Yes	Yes*	Yes	-	-
Investment growth	< 0	Yes*	-	Yes*	Yes	Yes	-	Yes
Inflation	> 0	Yes*	Yes	Yes*	Yes*	-	-	Yes
Real interest rate	> 0	-	-	-	-	Yes	-	-
Real exchange rate	> 0	Yes*	Yes	Yes*	Yes	Yes*	Yes	-
Current Account/GDP	< 0	Yes	Yes	Yes	Yes	-	Yes	Yes
Fuel Imports (% Merchandise Imports)	> 0	Yes	Yes	Yes	Yes	Yes*	Yes	Yes*
Reserves (months of imports)	> 0	-	-	-	-	Yes	-	-
Short-term debt (% of total reserves)	> 0	Yes	-	Yes	-	-	Yes*	Yes
Government balance (% GDP)	< 0	-	-	-	-	Yes	-	-
Government debt (% GDP)	> 0	-	-	-	-	Yes	-	Yes
Governement purchases (% GDP)	> 0	-	Yes	-	-	Yes	-	Yes
Subsidies (% of expense)	> 0	Yes	Yes	Yes	Yes	-	-	-
Maturity on new debt (years)	< 0	-	-	-	Yes	Yes	Yes	-
Public interest arrears (% change)	> 0	-	Yes	Yes	-	Yes*	-	Yes
Public principal arrears (% change)	> 0	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Short-term debt (% of total external debt)	> 0	-	-	-	-	-	Yes	-
Observation range		308-350		281-314			104-112	61-64

Notes: * denotes 10% statistical significance.
Source: WDI and GDF, author's calculations.

Table 2 presents the effect of higher oil price volatility on the selected series. As before most of the expected effects were found, however not as consistently as in Table 1. The most significant findings are the aggregate effects on output and investment growth, and investment. The more volatile oil prices are, the slower investment and output grow. On the other hand, the only fiscal effect seems to be on subsidies. One reason for this is that once aid measures are granted, they are (politically) harder to withdraw (see Kojima, 2009). Finally, the data does not seem to provide strong evidence of precautionary savings associated with the greater volatility.

However, such approach could provide an avenue to mitigate the increased strain on the exchange rate and external accounts; similar in spirit to a strategic oil reserve.

In sum, greater oil price volatility reinforces the effects from higher oil prices. This additional factor strengthens the argument for improving energy efficiency and designing mechanisms to hedge this type of risk.

VULNERABILITY

From aggregate performance, to public finances, to international borrowing, the findings from the two previous sections paint a bleak picture of the effects of higher and more volatile oil prices on countries that are net importers of oil in Central America and the Caribbean.

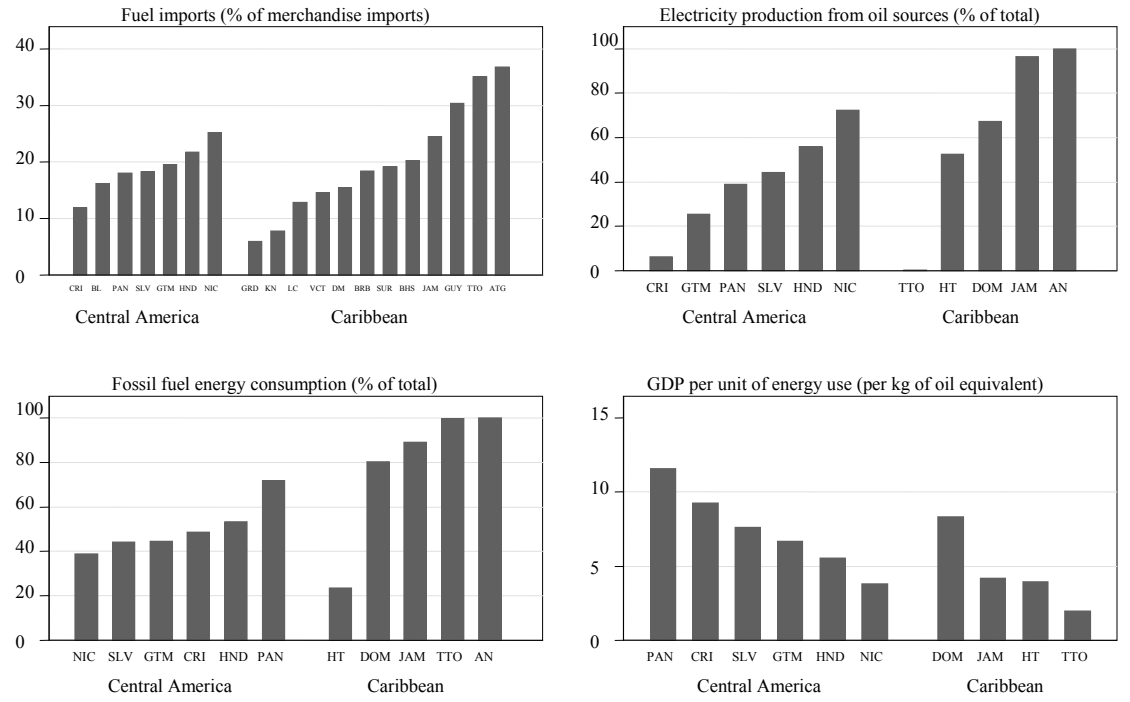
The objective of this section is to identify the countries in which these effects would be stronger because of their oil dependence, power generation mix, or inefficient use of energy. This as well, will provide insights to potential areas of improvement across countries. Bacon and Kojima (2008) follow a similar approach to assess the vulnerability associated with higher oil prices on a sample of countries from around the world. They find a large number of countries for which their vulnerability score increased between 1996 and 2006.

Figure 7, shows four variables that combined can proxy for the countries' vulnerability to higher and more volatile oil prices for the year 2006. The first concerns the share of oil sources on electricity production; the second, fossil fuel energy consumption as percentage of total; the third, the share of fuel imports in merchandise imports; and the fourth, the countries' economies energy intensity, that is, the amount of output per unit of energy used. (The statistics for fossil fuel energy consumption might include coal, and thus potentially overstate the countries' vulnerability to higher and more volatile oil prices.)

The interpretation of the first three panels of Figure 7, is that the further to the left a country is, the less vulnerable to higher oil prices is. And for the fourth panel is that the further to the left a country is, the more efficient the country is in its energy use. For instance, Costa Rica scores well on both vulnerability and efficiency measures as its fuel imports as a share of merchandise imports are low, the share of oil in electricity production is low, and has the second highest energy efficiency in Central America, and in the sample as a whole. On the other hand, Nicaragua amongst Central American countries, exhibits the highest fuel share of imports, the highest electricity production from oil sources, and the lowest energy efficiency. As for the Caribbean region, Trinidad and Tobago is a cause for concern because of its high dependence on fuel imports, high fossil fuel energy consumption, and low energy efficiency. Note that low energy efficiency can reflect high technical power losses, or as well a large underground economy, usually associated with high commercial losses.

Note that low energy efficiency can reflect high technical power losses, or as well a large underground economy associated with high commercial losses.

Figure 7. Country Vulnerability



Source: WDI, author's calculations.

CONCLUSIONS AND POLICY PRESCRIPTIONS

The purpose of this study was to determine the effect of higher and more volatile oil prices in the Central America and Caribbean region. After assessing such impact on aggregate, international, fiscal and financing time series, the following conclusions are derived.

At a macroeconomic level higher oil prices are associated with lower GDP and investment growth; with higher inflation and a weaker exchange rate. Moreover, oil price shocks also lead to a deterioration of the current account and to the depletion of foreign exchange reserves. On the fiscal side, the government balance worsens, public debt rises, and government purchases and subsidies increase. And finally, rising oil prices lead to a weakening of the countries' international debt position, as long-term debt increases, and arrears on public debt interest and principal increase. Taken together, these effects hurt the short- and long-term prospects of the economy, as growth decreases and higher instability and inflation build up.

Higher oil price volatility reinforce the effects above, though slightly less on the fiscal side. Nevertheless, such symmetry is a concern as well as it amplifies the effect of the initial oil price shock.

Based on the above, the study sought also to identify the degree of vulnerability of the different countries in the region, based on their fuel imports, oil share in power generation, and overall energy efficiency. The outcome is that countries like Nicaragua and Trinidad and Tobago, which exhibit the highest vulnerability ought to diversify their power generation mix, reduce the use of fossil fuels in their overall energy use, and to increase their energy efficiency (including the reduction in transmission and distribution power losses). This way, the effects of higher oil prices in international markets will be mitigated. Furthermore, since volatility seems to act as an amplification mechanism of the oil price dynamics, financial and hedging strategies seem key to a smoother functioning of the Central America and Caribbean economies in the presence of ever higher and volatile oil prices.

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