External Capital Structures for Managing Oil Price Volatility: The Case of Jamaica

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Abstract: We analyze Jamaica's external capital structure (i.e., the composition of its foreign assets and liabilities by instrument, currency, and maturity), and discuss how it can be altered to better protect the economy against external shocks. Specifically, after analyzing the current capital structure, we assess the impact of oil shocks on external accounts. We then discuss the properties of a desirable capital structure that could act as a buffer to such shocks. Finally, we provide recommendations to improve Jamaica's capital structure so as to both limit currency mismatches and better insure against oil shocks. The main takeaway is that Jamaica should consider diversifying the currency composition of its official reserves toward currencies that are positively correlated with oil prices, such as the euro, the Canadian dollar and the Norwegian krone.

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1. Introduction

The Caribbean's small, open economies are particularly vulnerable to severe external shocks, including terms of trade and financing shocks, as well as frequent natural disasters. This vulnerability has been most evident recently as several hurricanes, oil shocks and food price shocks have hit the region, while the US financial crisis and the global economic downturn also threaten to affect capital inflows, remittances, exports and tourism revenues.

Oil-dependent economies, whether importers or exporters, are particularly exposed to large and volatile shocks associated with energy price fluctuations. The impact of the concomitant uncertainty is pervasive, encompassing the government's budget process and balance sheet, as well as private-sector production and consumption decisions (which are fairly inelastic to changes in energy prices in the short- to medium-term). Insuring against the impact of energy price shocks directly through futures contracts or over-the-counter derivative contracts is particularly hard, as the typical maturity of the available instruments is either too short or too costly for smaller, below-investment-grade economies.

It is therefore useful to think about additional insurance and risk-sharing mechanisms that can expand the limited set of available (and tradable) financial instruments. One way to try to improve upon a country's insurance possibilities is to consider its external capital structure, the composition of its foreign assets and liabilities by instrument, currency, and maturity. The external capital structure can mitigate or exacerbate the impact of external shocks. For instance, foreign currency exposure may turn an otherwise benign real exchange response to an oil price shock into a negative financial shock with undesirable contractionary effects. Similarly, the maturity structure and instrument composition of foreign assets and liabilities (i.e., debt versus equity or particular sectors of world equity markets as opposed to others) may significantly affect the response to energy price shocks and other external shocks.

In this paper we focus on Jamaica and explore the scope for an active external capital structure design to limit currency mismatches and insure against oil price shocks.[1] Specifically, the paper is organized as follows. Section 2 describes and analyzes the current capital structure of Jamaica using the most recent data available. In Section 3 we investigate empirically the impact of oil shocks on Jamaica's external accounts. The time series results are interpreted with a particular focus on any evidence of international risk-sharing. In Section 4 we discuss a desirable capital structure to buffer oil price shocks and provide recommendations to improve Jamaica's capital structure of Jamaica. We conclude in Section 5.

2. Jamaica's Current Capital Structure

Before examining empirical evidence on the vulnerability of Jamaica's external balances to various oil market shocks, we first analyze the latest data on its capital structure in order to evaluate future vulnerabilities.

[1] In background research work not reported in the paper (but available from the authors) we have explored the impact of natural disasters and non-fuel commodity price shocks on Jamaica external accounts with the same methodology used to analyze oil price shocks, but we found no significant effects. (Natural disasters data are from EM-DAT: The OFDA/CRED International Disaster Database. Available via the Internet: http://www.em-dat.net (Université Catholique de Louvain, Brussels: Belgium). The alternative non-fuel commodity price series, including food prices, are from the IMF's IFS database). Finding that these other shocks have limited impact on Jamaica's external accounts need not imply that they are unimportant for Jamaica's welfare and growth, but could simply mean that the methodology used in the paper to assess their impact might not be suitable for those shocks.

Table 1 summarizes 2005-2008 data on Jamaica's capital structure. Panel (A) provides details on foreign assets and liabilities. Over the four years Jamaica has experienced an increasingly negative net foreign asset (NFA) position, surpassing negative 100 percent of GDP at end-2007. While Jamaica's foreign assets have been stable (albeit with modest growth in FDI assets and portfolio equity assets), its foreign liabilities have grown rapidly. The strong growth in foreign liabilities owes to a doubling of cross-border bond and bank debt, with noteworthy increases in international bond issuance and international liabilities to BIS reporting banks.[2] Over this period, both private and public sectors have increased their foreign borrowing. In addition, FDI liabilities, which account for roughly half of Jamaica's foreign liabilities, have also grown, albeit not at the rate of bond and bank debt.

In Panel (B) we provide information on the level and the composition of total debt liabilities based on data reported by the Bank of Jamaica. First we focus on *domestic* public sector debt outstanding. This has been relatively stable in recent years and is denominated mostly in domestic currency, with the portion that is US$-denominated falling from 17 percent in 2005 to 12 percent in 2008, although overall reliance on foreign currency borrowing has increased due to rising foreign liabilities of the public sector (see discussion below). Nonetheless, the proportion of floating-rate debt has increased significantly, reaching 62 percent of the domestic public debt portfolio as of December 2007 and exposing the government budget to significant interest-rate risk. For instance, in the current global financial crisis, Jamaican spreads have risen dramatically, widening even relative to the EMBI Global benchmark (Figure 1). Increased risk

[2] Based on the underlying bond issuance data, 80 percent of the outstanding international bonds are denominated in U.S. dollars, with the remaining 20 percent denominated in euros.

aversion by global investors has translated into higher borrowing costs for all emerging markets, and especially those with high debt levels (such as Jamaica). Thus, in the current global economic environment the combination of a large debt burden and floating rate securities could prove problematic.

Panel (B) also presents additional information on Jamaica's *total* debt. At 121 percent of GDP, the total public debt-to-GDP ratio is a well-known concern. In addition, although Jamaica's *domestic* public sector debt is denominated primarily in Jamaican dollars, the rise in *external* debt in line with GDP has resulted in an increasing reliance on foreign currency borrowing. Combined with strong domestic credit growth (a third of which is in foreign currency), this has resulted in a jump in the share of total liabilities denominated in foreign currency of almost 10 percentage points, from 49 percent at the end of 2005 to an estimated 57 percent in September 2008 (bottom of Table 1).

A mismatch in the currency denomination of revenues and debt payments creates vulnerability that has been linked to the increased likelihood and severity of financial crises. Goldstein and Turner (2004) evaluate the extent of a currency mismatch by comparing measures of foreign currency debt to the ability to service the debt via export revenue. They calculate the Aggregate Effective Currency Mismatch (AECM) as follows:

(1) $AECM = (NFCA / XGS) * (FC\%TD)$, if $NFCA<0$,

$AECM = (NFCA / MGS) * (FC\%TD)$, if $NFCA>0$,

where *NFCA* is net foreign currency assets, *XGS* is exports of goods and services, *MGS* is imports of goods and services, and *FC%TD* is foreign currency debt as a percentage of total debt. Jamaica's AECM is negative and deteriorating (Panel (A) of Table 1), signifying an increasingly dangerous currency mismatch.[3]

3. Oil shocks and Jamaica's external accounts

The previous section indicates that Jamaica's external capital structure leaves it vulnerable to external shocks. In this section we focus on its vulnerability to a certain set of shocks, those from the oil market.

For the past few decades Jamaica has been running persistent current account deficits, rarely posting a surplus. Over the last eight years the current account deficit has become sizeable, averaging 10 percent of GDP. This owes, at least in part, to Jamaica's vulnerability to oil price shocks. Much, but not all, of Jamaica's trade deficit owes to trade in oil (top panel of Figure 2). When oil prices were very low (for example, in 1998), oil contributed only about 25 percent to the overall trade deficit. However, in years with more elevated oil prices the contribution of oil to Jamaica's trade deficit often exceeded 50 percent. Moreover, Jamaica receives, in effect, a double penalty; not only does its trade deficit worsen when oil prices surge, but its currency also tends to depreciate against the U.S. dollar (bottom panel), potentially exacerbating the impact of adverse oil shocks on its economy through adverse balance sheet effects that could outweigh any traditional expenditure switching effect.

Using the methodology of Kilian, Rebucci, and Spatafora (2008) (henceforth KRS) we can more formally assess the impact of oil shocks on Jamaica's external balances. The methodology involves two steps. The first step is to trace fluctuations in

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[3] We follow Goldstein and Turner (2004) and calculate *NFCA* as the sum of cross-border BIS deposits and international reserves net of liabilities to BIS banks, international bonds and multilateral loans outstanding.

the real price of crude oil to the underlying demand and supply shocks in the crude oil market. The second step is to assess empirically the responses of Jamaica's external accounts to the demand and supply shocks in the crude oil market identified in the first step. To the extent that the oil market is predetermined with respect to Jamaica's macroeconomic aggregates and external accounts, standard regression methods can be used to estimate the responses of external accounts.

3.1 Identifying Oil Demand and Supply Shocks

In the first step, KRS follow the identification strategy of Kilian (2008a) by estimating a structural VAR model based on monthly data for the vector time series z_t, which consists of the percent change in global crude oil production, a (suitably detrended) measure of global real economic activity in industrial commodity markets, and the real price of crude oil.[4] The model allows for two years worth of lags. The structural VAR representation of the model is

(2) $$A_0 z_t = \alpha + \sum_{i=1}^{24} A_i z_{t-i} + \varepsilon_t \ ,$$

where ε_t denotes the vector of serially and mutually uncorrelated structural innovations. The structural innovations are derived by imposing exclusion restrictions on A_0^{-1} in $e_t = A_0^{-1}\varepsilon_t$. Kilian (2008a) attributes fluctuations in the real price of oil to three structural

[4] Analogous approaches have been employed in Kilian and Park (2008) for studying the effect of oil demand and oil supply shocks on U.S. stock markets and in Kilian (2008b) for studying the relationship between the U.S. retail gasoline market and the global crude oil market.

shocks: ε_{1t}, which denotes shocks to the global supply of crude oil (henceforth "oil supply shock"); ε_{2t}, which captures shocks to the global demand for all industrial commodities (including crude oil) that are driven by global real economic activity ("aggregate demand shock");[5] and ε_{3t}, which denotes an oil-market specific demand shock.[6]

As in Kilian (2008a), the assumptions are that (i) oil producers are free to respond to lagged values of oil prices, real activity, and oil production in setting oil supply, but will not respond to oil demand shocks within the same month, given the costs of adjusting oil production and the uncertainty about the state of the crude oil market; (ii) increases in the real price of oil driven by demand shocks that are specific to the oil market will not lower global real economic activity in industrial commodity markets within the month; and (iii) innovations to the real price of oil that cannot be explained by oil supply shocks or aggregate demand shocks must be demand shocks that are specific to the oil market. These assumptions imply a recursively identified model of the form:

(3) $$e_t \equiv \begin{pmatrix} e_{1t}^{\Delta prod} \\ e_{2t}^{rea} \\ e_{3t}^{rpo} \end{pmatrix} = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{pmatrix} \varepsilon_{1t}^{oil\ \text{supply}\ shock} \\ \varepsilon_{2t}^{aggregate\ demand\ shock} \\ \varepsilon_{3t}^{oil-specific\ demand\ shock} \end{pmatrix}.$$

[5] The term global real economic activity used by KRS refers to real economic activity that affects industrial commodity markets rather than the usual broader concept of real economic activity underlying world real GDP or industrial output. This distinction is necessary because an increase in value added in the service sector, for example, is likely to have a very different effect on global demand for industrial commodities than an increase in manufacturing. Unlike alternative measures of monthly global real activity such as indices of OECD industrial production, this index captures the recent surge in demand for industrial commodities from emerging economies such as China and India. See Kilian (2008a) for a full discussion of the rationale and construction of this index.

[6] The latter shock is designed to capture shifts in precautionary demand for crude oil that reflect increased concerns about future oil supply shortfalls that are by construction orthogonal to the other shocks ("oil-specific demand shock"), although there are other possible interpretations (see Kilian 2008a).

This structural model postulates that that the real price of oil (conditional on lagged values of all variables) is determined by the intersection of the supply and demand curves for crude oil. Oil demand shocks, which do not shift the oil supply curve, move the demand curve along the supply curve, causing the real price of oil to change. The model also allows for oil supply shocks (e.g., an unexpected oil supply disruption caused by a war or driven by an exogenous political decision) to move the vertical supply curve along the downward-sloping demand curve, again causing the real price of oil to change. Thus, all three shocks are allowed to affect the real price of oil within a given month. The model further imposes that the shifts in the real price of oil triggered by oil-market-specific demand shocks will not affect global aggregate demand within the same month. This assumption is consistent with the sluggish response of real aggregates to shocks in oil markets documented in related literature.

3.2 Estimation of Dynamic Effects

In the second step, we estimate the impact of the oil shocks on Jamaica's external balances (as in Kilian 2008a). Let y_t denote a stationary macroeconomic aggregate of interest such as the share of the trade balance in GDP. We are interested in estimating the response of y_t to demand and supply shocks in the crude oil market. We treat the shocks $\hat{\zeta}_{jt}$, $j = 1,...,3,$ as predetermined with respect to y_t. Predeterminedness rules out feedback from y_t to the shocks $\hat{\zeta}_{jt}$, $j = 1,...,3,$ within a given year t.[7] This assumption

[7] In contrast, strict exogeneity imposes in addition Granger non-causality from y_t to $\hat{\zeta}_{jt}$. For further discussion see Cooley and LeRoy (1985). Pre-determinedness and strict exogeneity in our regression framework correspond to the notion of weak and strong exogeneity.

allows us to examine their dynamic effects on the dependent variable based on regressions of the form:

(4) $$y_t = \delta_j + \sum_{i=0}^{h} \psi_{ij} \hat{\zeta}_{jt-i} + u_{jt}, \quad j = 1,...,3,$$

where u_{jt} is a potentially serially correlated error, and $\hat{\zeta}_{jt}$ is a serially uncorrelated shock. The parameter h is chosen to coincide with the maximum horizon of the impulse response function to be computed. In practice, we set the maximum horizon of the impulse responses to five years.[8] By definition the impulse response is $dy_{t+1}/d\,\hat{\zeta}_{j,t}$. Differentiation yields that $dy_t/d\,\hat{\zeta}_{j,t-i} = \psi_{ij}$. Under stationarity, it follows that $dy_t/d\,\hat{\zeta}_{j,t-i} = dy_{t+i}/d\,\hat{\zeta}_{j,t} = \psi_{ij}$.

Regression model (4) allows consistent estimation of the impulse responses under minimal assumptions. Our equation-by-equation approach is built on the premise that the shock series $\hat{\zeta}_{jt}$, $j = 1,...,3,$ are mutually uncorrelated. Whereas the structural VAR residuals $\hat{\varepsilon}_{jt}$, $j = 1,...,3,$ are orthogonal by construction, the annual shocks $\hat{\zeta}_{jt}$, $j = 1,...,3,$ which have been obtained by aggregating over time, need not be orthogonal, but their correlation is very low in our application below, ranging from -0.11 to 0.07, so not much is lost by treating these shocks as orthogonal.

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[8] Given that oil demand may adjust very slowly to higher oil prices, it would be desirable to know how much external balances adjust at much longer horizons, but the short time span of data currently available precludes econometric analysis of that question.

In the empirical analysis we consider the following six measures of Jamaica's external balance:

- Capital Gains on Gross Foreign Assets and Liabilities (CAPGAIN)[9]
- Non-Oil Merchandise Trade Balance (TBNO)
- Oil Trade Balance (OILBAL)
- Merchandise Trade Balance (TB) ≡ TBNO + OILBAL
- Current Account (CA) ≡ TB + Service Trade Balance + Income Balance
- Change in Net Foreign Assets ≡ CA + CAPGAIN

Note that the *merchandise trade balance* (TB) excludes trade in services, in part because in many countries data on trade in services is of poor quality. Both trade in services and the income balance are included in the broader current account balance (CA). A more detailed description of these aggregates is provided in the data appendix of KRS (2008). The NFA data are from Lane and Milesi-Ferretti (2007), updated through 2007.[10] All other data (including the trade balance, current account, and GDP data) are from the IMF's *World Economic Outlook* database. All external accounts are expressed in current U.S. dollars and, as is conventional, are normalized by nominal GDP for the empirical analysis. Estimation is for the period from 1980 through 2007.

3.3 Results

The responses of external balances to oil-specific demand and supply shocks are constructed from regression model (4). Figure 3 shows the estimated responses of each

[9] CAPGAIN is calculated as the change in the net foreign asset position minus the current account balance. As such, it is subject to the caveats raised in Curcuru, Dvorak, and Warnock (2008) and Curcuru, Thomas, and Warnock (2009). For Jamaica, as well as for almost every country, there is a great need for directly measured—and, hence, presumably more accurate—data on international capital gains.

[10] Note that there is some discrepancy between Jamaica's published IIP data—which is available from 2005 to 2007—and the Lane Milesi-Ferretti estimates. We use the LMF estimates, which are available for a much longer time period.

measure of external balance for all three kinds of oil shocks. All responses have been normalized such that a given shock implies an increase in the real price of oil. The impulse response functions are framed by one-standard error bands based on estimated OLS standard errors.[11]

Many of the estimated responses are intuitive. For example, any shock that increases the real price of oil has a negative impact on the oil trade balance and current account for Jamaica. The impact of oil supply shocks is short-lived, while global demand and oil-specific demand shocks have a more sustained and significant impact, consistent with the profile of the oil price response to these shocks reported by KRS. Overall, these results are consistent with the KRS findings for a broader sample of oil-importing countries.

Analyzing the response of the capital gains and net foreign asset variables, we note that there is some evidence that oil shocks have a negative impact (especially within a year) on Jamaica's capital gains. As a result, the effect of oil shocks on Jamaica's NFA is larger than the impact on the current account, and therefore compounding rather than offsetting the negative impact of the shock on the oil trade balance. Note, however, that the response of non-oil trade balance is generally statistically insignificant. This suggests that oil shocks have not required large macroeconomic adjustments in the past, giving rise to non-oil trade surpluses, likely because they could be easily financed in international capital markets.[12]

[11] A correction of the standard errors for autocorrelation and possibly heteroskedasticity could be considered here given the fact that the econometric model omits any dynamics.
[12] Note this is consistent with the limited real income vulnerability to terms of trade shocks documented by Iscan, Powell, and Rebucci (2009).

Nonetheless, the capital gains response is counter to theoretical predictions of risk-sharing under complete markets and to the broader results of KRS. Indeed, theory suggests that in a financially integrated world, oil-importing nations should take equity stakes in oil-exporting countries in order to hedge against oil price volatility. This hedging would allow oil-importing countries to experience capital gains offsetting in total or at least in part the impact of the shock on the oil trade balance and the current account, thereby keeping NFA more stable when oil prices fluctuate. However, for Jamaica, there is no evidence of such a hedging effect. On the contrary, there is some evidence of the opposite; the negative response of capital gains and the response of net foreign assets are larger than the response of the current account to all three oil shocks.

4. Hedging oil shocks and Jamica's external capital structure

4.1 Hedging Oil Shocks

In this section we describe a desirable path of capital gains that could improve Jamaica's resilience to oil shocks. If we assumed international market completeness in an Arrow-Debreu sense—a useful but unrealistic assumption in our setting—it is possible to define an "optimal" (i.e., efficient) path of capital gains. Under market completeness, in fact, real relative allocations (such as the consumption differential between oil importers and exporters in response to an oil shock) are not affected by oil shocks, or any real country-specific shocks, with asset prices instead moving to provide full insulation from such shocks. More specifically, under market completeness the current account is constant in response to country-specific shocks, and movements in net foreign assets are entirely driven by capital gains and losses (Ghironi, Lee, and Rebucci 2007).[13] However, under the more realistic incomplete market hypothesis, Ghironi et al. show that both current account and capital gains contribute to NFA changes, with weights that are not additive (a large current account deficit could be partially offset by a capital gain, and vice versa), thus preventing us from identifying the optimal path of capital gains.

While we cannot use our estimates from the previous section to back out the optimal or efficient path of capital gain and losses that would replicate a complete market scenario, we can still back out a *desirable* path. A *desirable* capital gains and losses path is one that leaves external national wealth (the NFA position) constant in response to the shocks. NFA is what matters for solvency and sustainability. This path is desirable, although requiring that NFA to be constant in response to the shock may seem excessively conservative; emerging market economies often times find it difficult to handle sudden increases in national wealth, or can face severe credit constraints when trying to access international financing when wealth declines.[14] Quantifying the desirable path of capital gain and losses is simple; we just need to construct a capital gain series that offsets exactly the current account.

4.2 Recommendations for Jamaica's External Capital Structure

In this section we discuss Jamaica's external capital structure with a view toward identifying changes through government policy that may improve the hedging properties

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[13] Ghironi et al. show that the current account corresponds to movements in portfolio quantities alone. So if saving and investment are not affected by the shocks, the current account, will also be constant.
[14] Indeed, the efforts that many oil-exporting countries have put into building oil stabilization funds recognize some of these issues. The debate on the establishment of Sovereign Wealth Funds highlights a desire of oil-exporting countries to increase rate of returns from investments in good times. We are arguing in this paper that a better way to approach these issues is to be attempt at insulating the economy from positive and negative contingencies, both over time and across states of nature.

against the risks posed by oil price shocks (based on the above analysis) and external shocks more generally (based on the information from Table 1).

Jamaica's current account balance is strongly affected by oil price changes (top panel of Figure 4). Thus, the "desirable" capital gains path would be one that offsets current account movements, thereby leaving the net foreign asset position unaffected by such shocks. For Jamaica, this would require a country portfolio (or capital structure) that is strongly positively correlated with oil prices.

There is a wide range of assets that are strongly positively related to oil prices. One example is oil company stocks or oil-related exchange-traded funds (ETFs); another, perhaps more feasible, is the broad equity index of a country that has both substantial oil production and deep equity markets (e.g., Norway and Canada). Given the close link between the oil price and the currency of oil-exporting countries (Chen and Rogoff, 2003), one concrete way to implement such a portfolio would be to switch part of the official reserve portfolio into these fully convertible currencies.

Jamaica's current capital structure shows its vulnerability to currency fluctuations (Table 1). In theory, countries with procyclical exchange rates could hedge domestic output fluctuations by taking long positions in foreign currencies. This hedging, consistent with the Lane and Shambaugh (2008) results across a large sample of countries, would provide an *appreciating* foreign asset during domestic economic contractions. Unfortunately Jamaica, like many other emerging markets, displays no such evidence of international risk sharing. As Figure 1 demonstrated, the Jamaican dollar tends to depreciate during troubled macroeconomic times, while the data in Table 1 clearly indicate that Jamaica has a short position in foreign currency (as opposed to the preferred long position).

One way to ameliorate this vulnerability—given that much of Jamaica's international liabilities are US$-denominated—would be to increase the euro's share in Jamaica's international assets. This could also help to hedge Jamaica's exposure to oil prices; at least in recent years, there has been a tight positive relationship between the US$/euro exchange rate and oil prices (bottom panel of Figure 4). Whether this tight relationship will hold in the future is debatable. If it does, increasing the allocation of euro-denominated assets in its foreign portfolio would both ameliorate its currency mismatch (at least to some extent) and help reduce fluctuations in its net foreign asset position.

5. Conclusion

In this paper we have described Jamaica's external capital structure and analyzed how this structure did in the past—and could in the future—mitigate or exacerbate the impact of external shocks. We investigated natural disasters, commodity price, and oil price shocks, but found that only oil price shocks have systematic and significant impact on Jamaica's external accounts.

The analysis of Jamaica's external capital structure and the impact of oil shocks on external accounts, has uncovered its vulnerability to exchange rate fluctuations in general, as well as a pattern of capital gains responses to oil shocks that does not help mitigate the macroeconomic effects of such shocks.

A key consideration going forward is how Jamaica might alter the composition of its (net) international portfolio so as to create capital gains when there are adverse oil market shocks. After discussing and motivating a desirable country portfolio, we have concluded that one simple way to ameliorate both general vulnerability to currency movements and Jamaica's response to oil shocks is to change the composition of official reserves toward the euro and oil currencies such as the Norwegian krone and the Canadian dollar.

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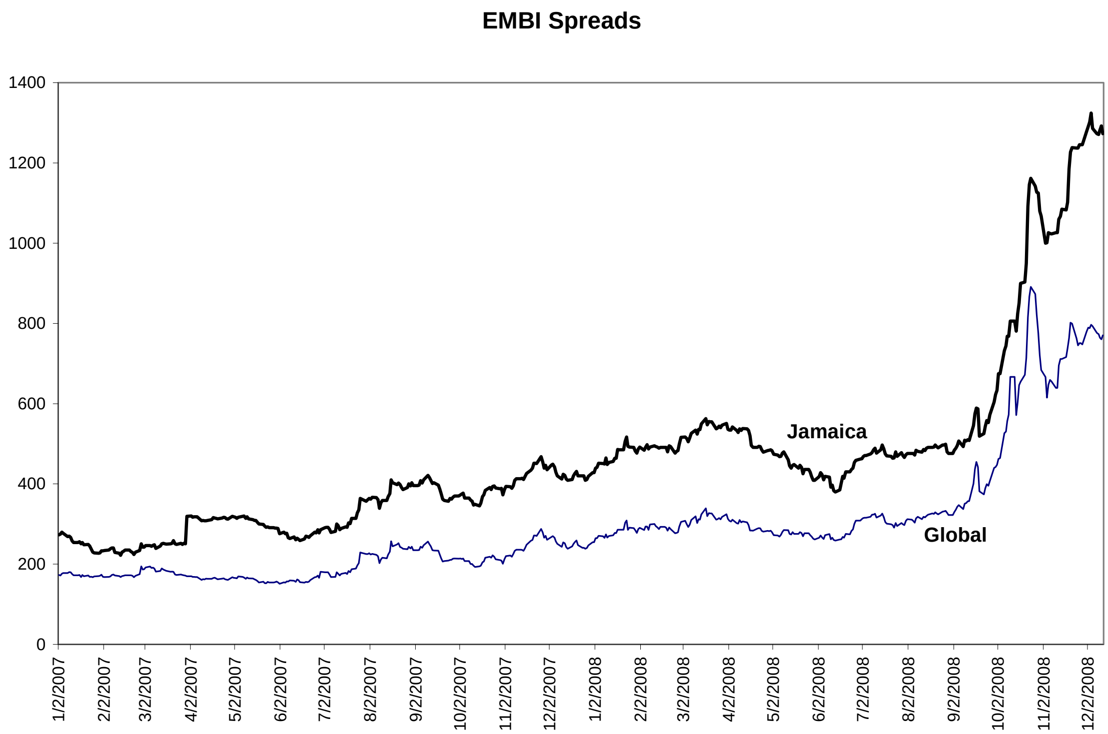
Table 1: Summary Data for Jamaica's Capital Structure
(millions of U.S. dollars, unless otherwise noted)

	end-05	end-06	end-07	Sept-08
(A)				
Foreign Assets	**6561**	**7298**	**7511**	
Cross-Border BIS Deposits	2228	2434	2728	2692
International Reserves less Gold	2170	2318	1878	2257
Foreign Direct Investment	1861	1989	2173	
Portfolio Equity	301	557	731	
Foreign Liabilities	**12942**	**15697**	**18347**	
International Bonds	2999	3774	4260	4587
Public Sector	2499	2824	3005	3512
Liabilities to BIS Banks	1294	2448	3345	4885
Public Sector	531	703	1065	1623
Multilateral Loans	1081	1025	940.1	900
Foreign Direct Investment	7389	8190	9513	
Portfolio Equity	179	259	289	
Net Foreign Assets	**-6381**	**-8399**	**-10837**	
NFA/GDP (%)	-68	-81	-101	
Aggregate Effective Currency Mismatch	**-12**	**-27**	**-43**	
(B)				
Domestic Public Sector Debt	7434	7992	7907	8006
Fixed rate (%)	51	44	38	*38*
US$-indexed or US$-denominated (%)	17	13	12	*12*
Total Public Sector Debt	11545	12544	12918	14041
Public Debt/GDP (%)	123	121	121	
Private Domestic Bank Credit	2299	2744	3248	3698
Foreign Currency (%)	34	34	34	34
Total Debt[1]	15107	17983	19700	22076
Foreign Currency (%)	49	51	54	57
Total Debt/GDP (%)	161	173	184	

Note: Data are primarily from the BIS-IMF-OECD-World Bank External Debt Hub, supplemented by Lane and Milesi-Ferretti (2007) and local sources. Domestic public sector debt characteristics are provided by the 2007 Bank of Jamaica Financial Stability Report; we assumed no changes for 2008. The foreign exchange share of private domestic bank credit is based on February 2008 data from the BOJ. Net Foreign Currency Assets (NFCA) and Aggregate Effective Currency Mismatch (AECM) are calculated as defined by Goldstein and Turner (2004) and therefore exclude equity and FDI.

[1] Total Debt is estimated as the sum of International Bonds, Cross-Border Liabilities to BIS banks, Multilateral Loans, Domestic Public Sector Debt, and Private Domestic Bank Credit.

Figure 1. Spreads and the Exchange Rate



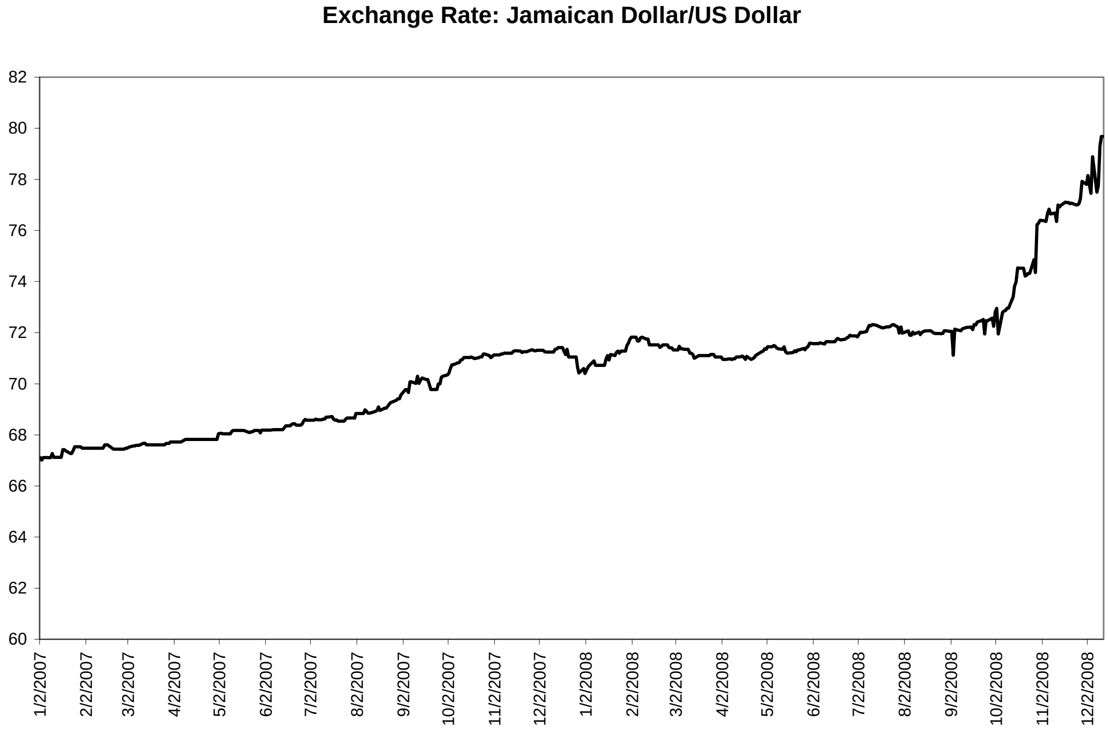
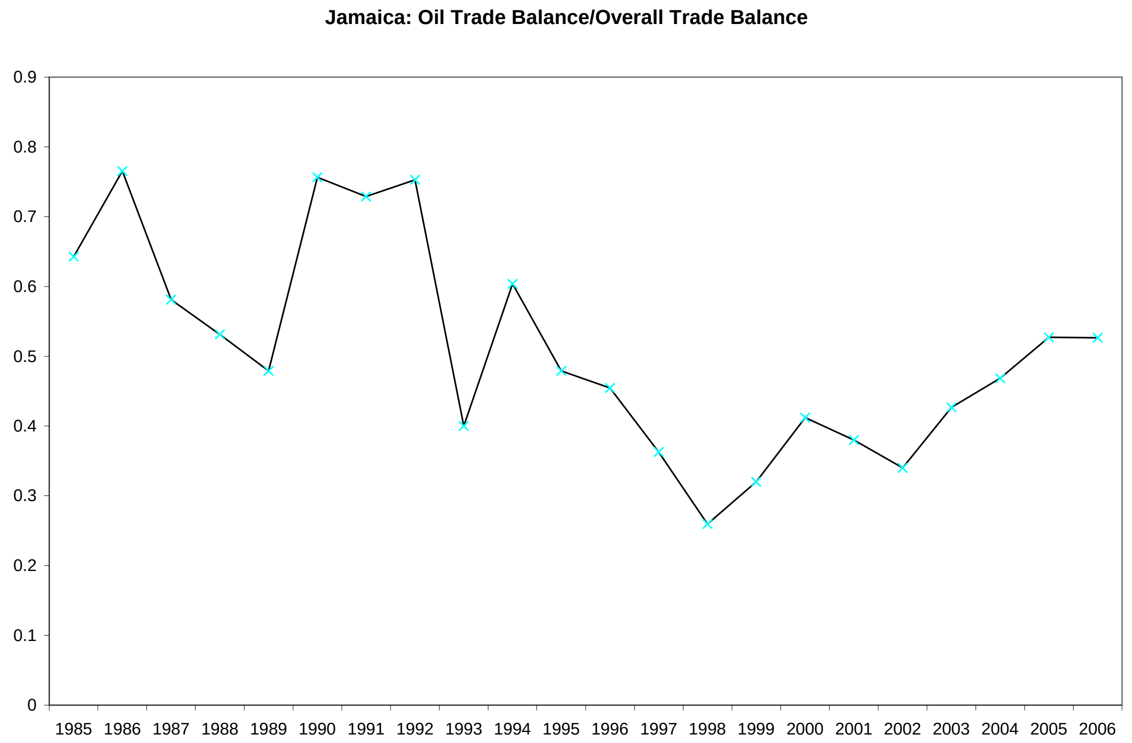


Figure 2. Jamaica: Oil Trade Balance and Exchange Rate



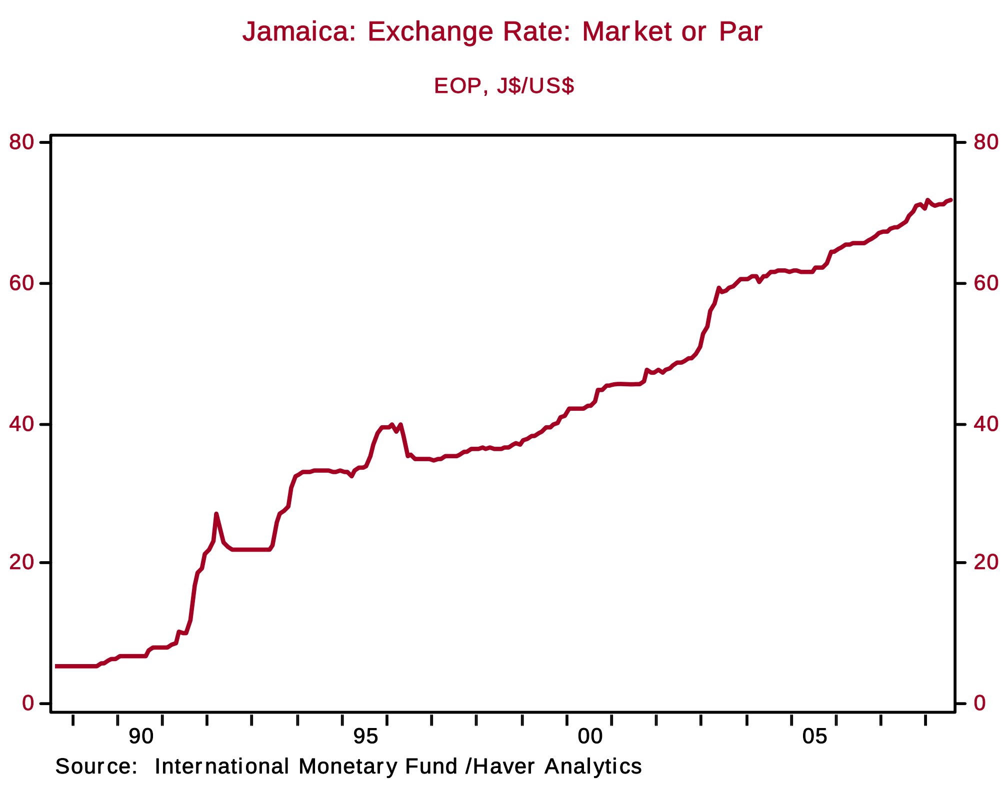


Figure 3. Responses of Jamaica's External Balances to Oil Shocks

The figure shows estimated responses of various measures of external balances to three types of oil shocks: oil supply, global demand, and oil demand. Each shock is defined so that it implies an increase in the real price of oil. Measures of external balances include capital gains on gross foreign assets and liabilities (CAPGAIN), non-oil merchandise trade balance (TBNO), oil trade balance (OILBAL), current account (CA), trade balance (TB), and the change in the net foreign asset position (DNFA). In the figure, all measures of external balances are scaled by nominal GDP.

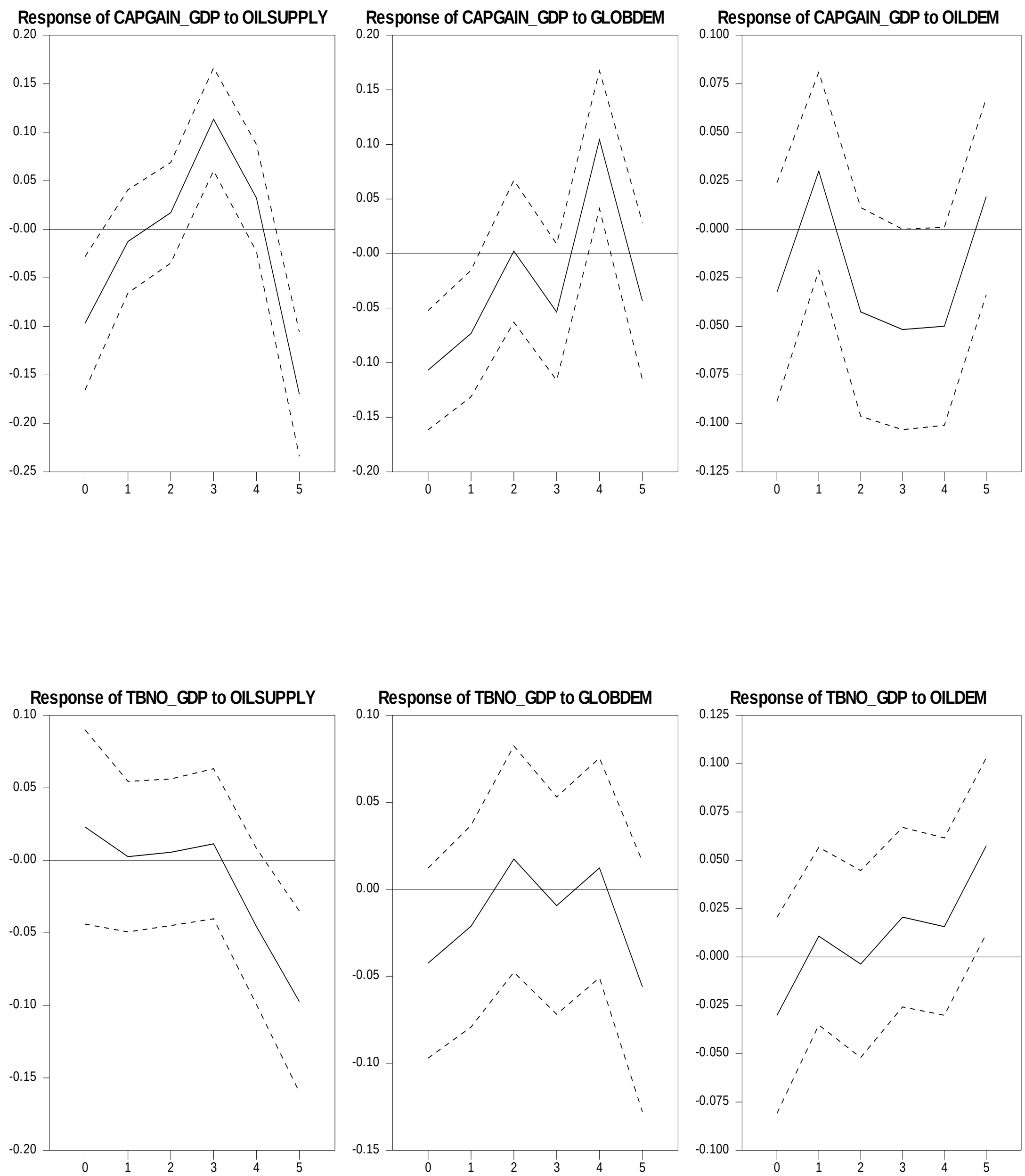


Figure 3 (cont.)

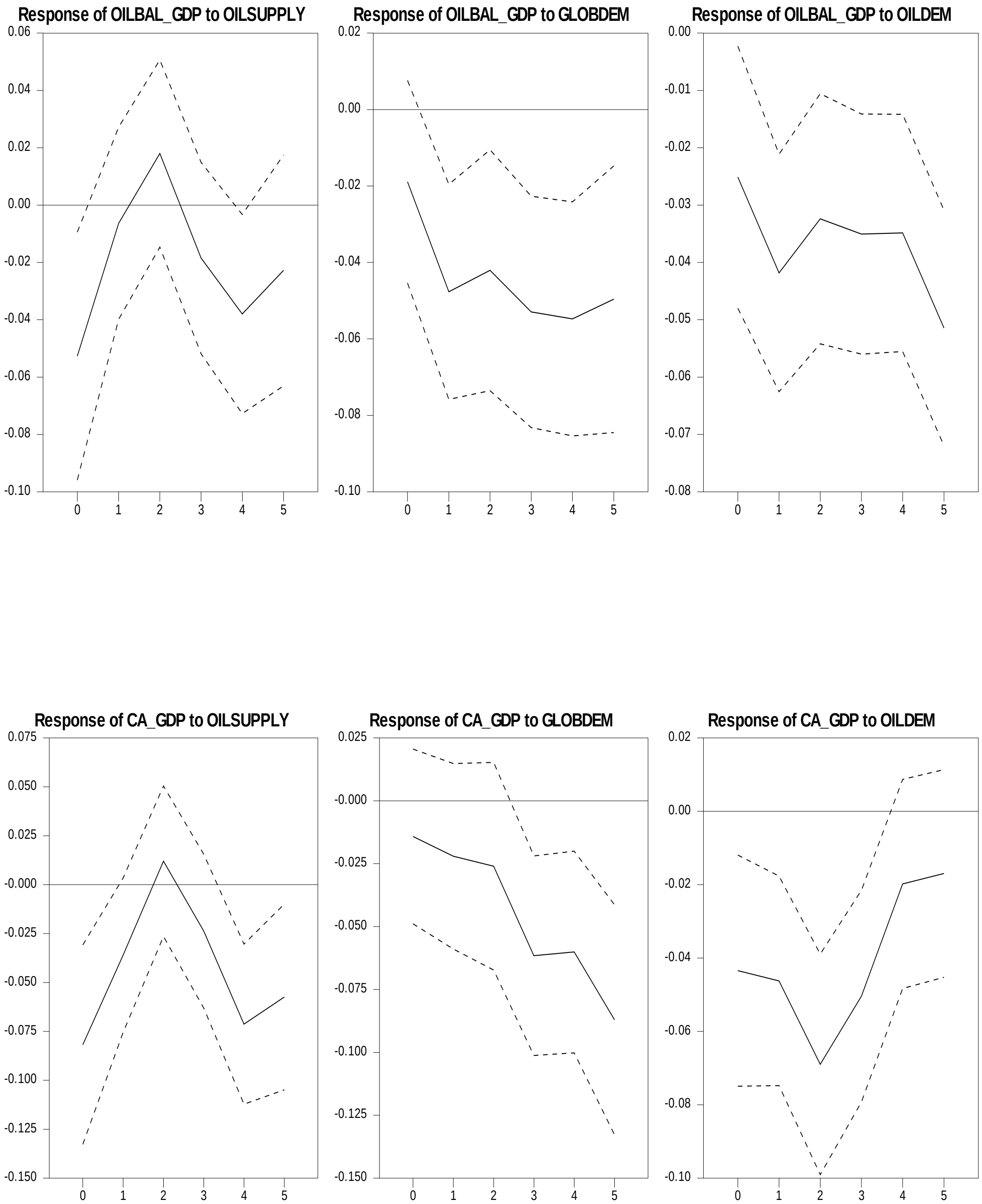


Figure 3 (cont.)

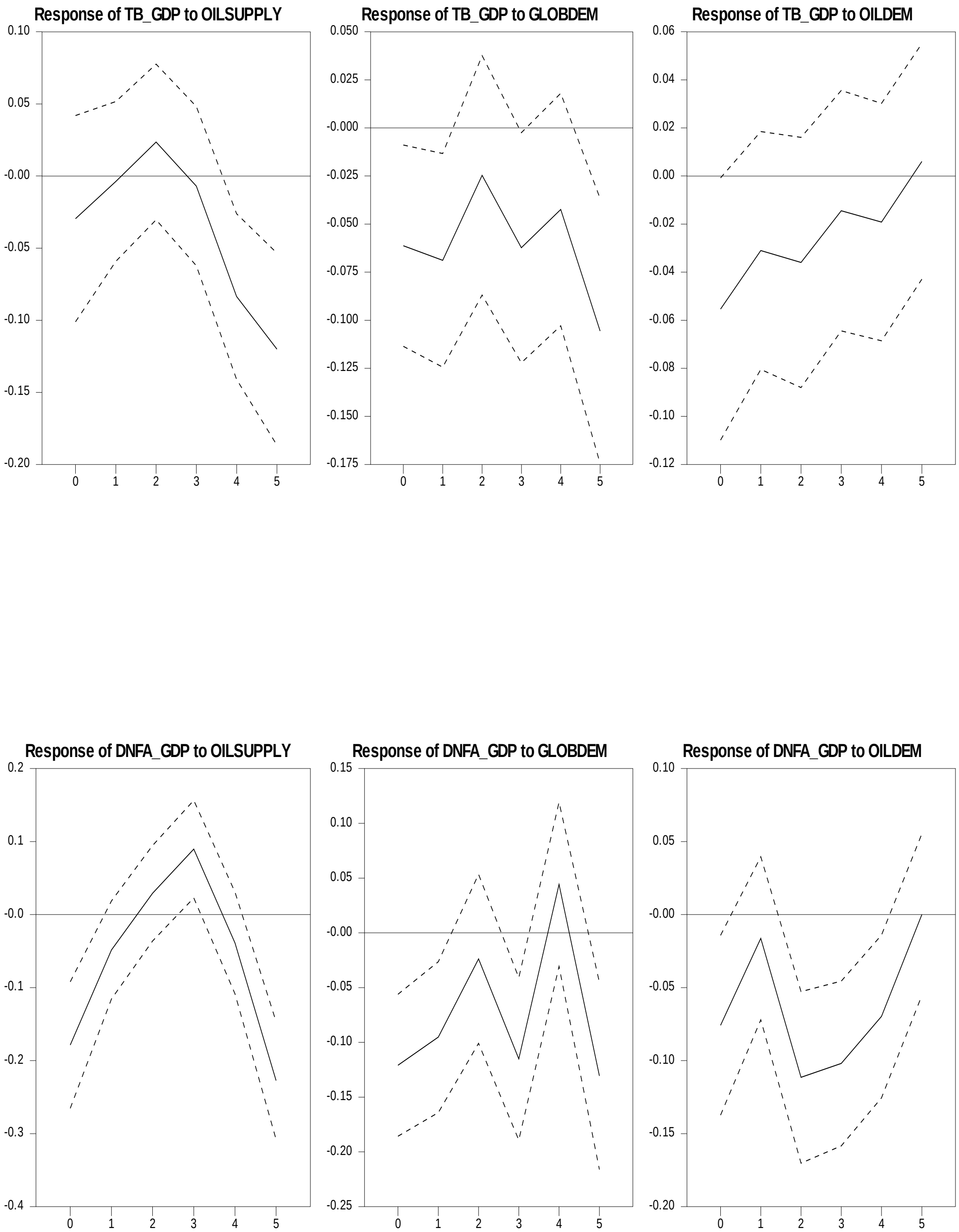


Figure 4. Jamaica Current Account, Oil Prices, and the U.S. Dollar