Economics

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# Empirical and Thematic Perspectives

## How Much Is This Going to Hurt? – New Evidence on Global Adjustment to Oil Shocks

- This essay extends our previous analysis of global imbalances to focus squarely on external adjustment in the aftermath of global oil shocks and the important role played by the oil-exporting countries. Given ongoing geopolitical uncertainties in the Middle East, and the attendant risk of a sizable oil shock, we see this analysis as providing important insights as to how the global economy and financial system would likely respond in the event of a sharp rise in oil prices.

- For oil-importing countries (such as the United States), we find that external adjustment in the aftermath of oil shocks is driven by a depreciation of the real exchange rate (which stimulates exports and restrains imports) and a decline in real GDP (which further restrains imports). For the United States, there is a powerful additional channel of adjustment: Following an oil shock, direct investment receipts tend to rise markedly, largely reflecting the U.S. energy sector's higher returns on its extensive holdings and operations abroad.

- For the oil-exporting countries, the magnitude of adjustment following an oil shock is notably smaller than for other countries. This may reflect that such shocks are often very large relative to the oil exporter's GDP, which perhaps triggers a differing set of adjustment dynamics and policy responses. Our results also highlight the global demand destruction associated with an oil shock—namely, the oil exporters only partially recycle their higher export earnings back into increased demand for goods and services from abroad.

- For both the United States and a broad set of countries, we find evidence that the non-oil portion of the current account is sensitive to moves in the oil balance. Indeed, over a horizon of roughly three to five years, we find that the decline in the non-oil portion of the current account is sufficient to offset most or (for the United States) all of the increase in the oil bill and to return the current account to it pre-shock level.

- The concluding section of the essay turns to the admittedly speculative question of whether the effects of an oil shock might somehow be different this time around. One important development for the United States is that the country's exports of oil have risen significantly in recent years, reaching about 30 percent of the value of oil imports. The U.S. external position is thus much better hedged than it was several decades ago. On the other hand, work that we have done on the issue of "stall speed" gives us pause: Shocks tend to have more severe effects when growth is already weak and confidence is fragile. Given that the global economy is still struggling to regain solid footing, the effects of a sustained rise in oil prices could be unusually severe.

**Global Head of International Economics**

**Nathan Sheets**
+1-212-816-9297
nathan.sheets@citi.com

**Daniel P Ahn**
+1-212-723-3612
daniel.p.ahn@citi.com

Robert A Sockin
robert.andrew.sockin@citi.com

**See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.**

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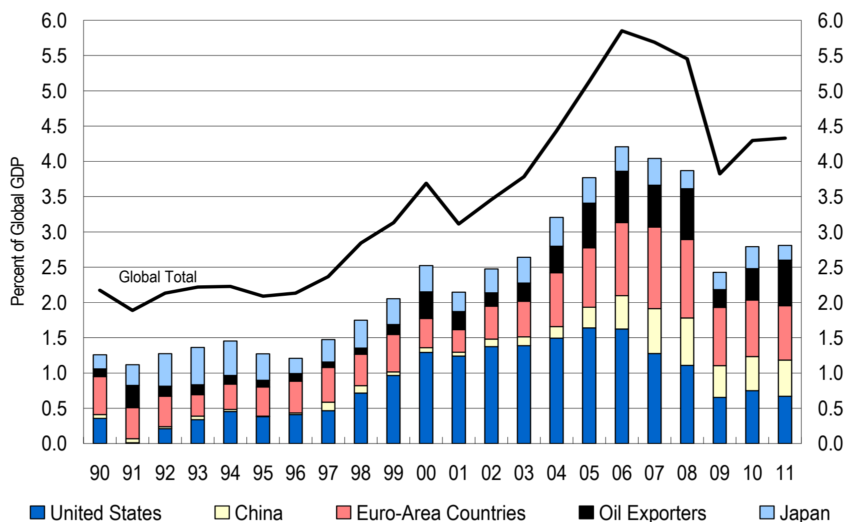
# How Much Is This Going to Hurt? – New Evidence on Global Adjustment to Oil Shocks

Our previous essays have examined some key features of global current account imbalances, focusing on the United States, China, and competitiveness disparities in the euro area. As highlighted in **Figure 1**, the evolution of external imbalances in the oil-exporting countries—and the related rebalancing of global spending and production in the aftermath of oil shocks—represents another crucial piece of the global adjustment puzzle.[1] Indeed, given the secular rise in oil prices over the past decade, the response of current account positions in oil-exporting countries and oil-importing countries has had important implications for both financial markets and global economic performance.

**Figure 1. Sum of Absolute Current Account Balances***




*Sum of absolute current account positions for 182 countries.
Sources: International Monetary Fund, Haver Analytics, and Citi Investment Research and Analysis.

At present, the interest in such issues is heightened by two important developments. First, geo-political uncertainties in the Middle East highlight the risk of a marked increase in oil prices at some point over the next year. A surge in oil prices would bring with it challenges for the global economy, likely including heightened inflationary pressures, painful terms of trade changes for oil importers, and a potentially disruptive adjustment of external balances in many countries. Second, at a somewhat longer horizon, technological innovations in the energy sector suggest that over the next decade the U.S. economy is likely to take significant steps toward energy self-sufficiency, potentially shifting the quantity and composition of its energy imports in a profound way. With both of these issues in mind, we examine how current account balances in the United States and a large set of other countries have adjusted to oil shocks during previous episodes.

In this essay, we present empirical evidence that bears directly on such issues. For the United States, we find that over a three-year period, the non-oil current account balance adjusts sufficiently to fully offset the effects of an oil shock on the overall external balance. We find that this adjustment occurs through three key channels: (1) the dollar typically depreciates, (2) the level of GDP declines (or at least is lower

[1] Specifically, Figure 1 reports the sum of absolute current account positions across countries relative to global GDP. For example, if there were two countries in the world and one had a surplus of 1 percent of global GDP, implying that the other had a deficit of the same magnitude, this measure would be equal to 2 percent of global GDP. For more details, see our previous essay, “The Outlook for Global Imbalances,” February 17, 2012.

than in the absence of the shock), and (3) direct investment receipts from abroad tend to rise, reflecting increased returns on the U.S. energy sector's extensive foreign operations; specifically, in the face of rising oil prices, these operations become more profitable.

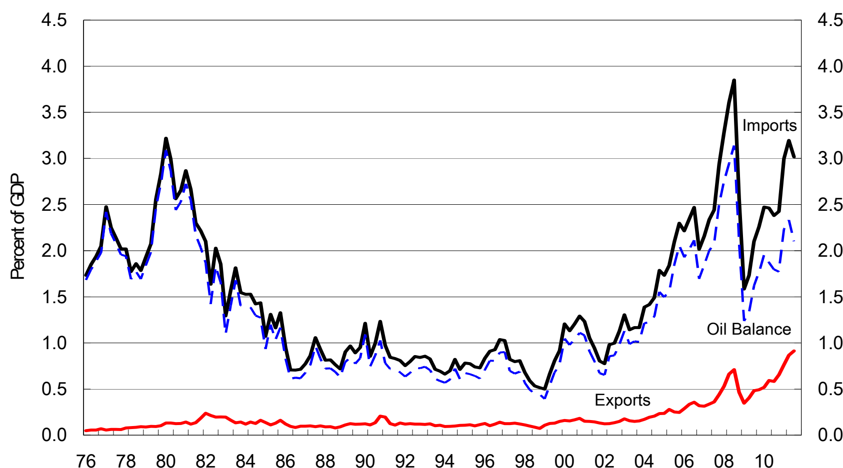
For other countries, the evidence points to a broadly similar story. Non-oil current account balances adjust significantly over a three- to five-year horizon in response to changes in the oil balance. However, we find a marked difference in the extent of adjustment in the oil-exporting countries. In particular, the magnitude of adjustment following an oil shock is notably smaller for oil exporters. These results also highlight the global demand destruction associated with an oil shock—namely, the oil exporters only partially recycle their higher export earnings back into increased demand for goods and services from abroad.

## U.S. External Adjustment to Oil Shocks

The empirical work that we present in this essay seeks to identify key features of global adjustment in the aftermath of oil shocks. Specifically, we ask, "by how much—and how quickly—does the current account balance adjust in response to a change in the oil balance?" The answers to this question shed light on a whole range of other important issues, including the channels through which the economy responds to oil shocks, the effects on external trade, and the adjustment of global current account imbalances more generally.

In this section, we examine how U.S. trade and current account performance responds to oil shocks. Our discussion focuses on the relationship between two variables that we find to be of particular importance:

**Figure 2. U.S. Imports and Exports of Oil and Other Petroleum Products***

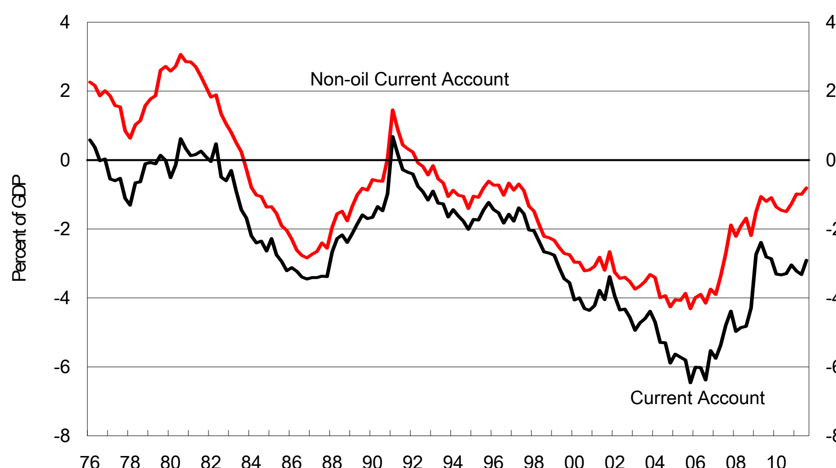



*Oil and petroleum products include crude oil, petroleum preparations (e.g., fuel oils, gas oils, and kerosene), liquefied propane, and butane gas; oil balance is nominal oil imports minus nominal oil exports.
Sources: Bureau of Economic Analysis, Energy Information Administration, Haver Analytics, and Citi Investment Research and Analysis.

- *Net imports of oil and other petroleum products* (i.e., imports of such products less exports).[2,3] As shown in **Figure 2**, the value of oil imports relative to GDP moved sharply higher in the late 1970s, briefly exceeding 3 percent. Over the succeeding five years, oil imports moved back down to around 1 percent of GDP, where they cycled until the early 2000s. Over the past decade, oil imports have again risen and—although volatile of late—were near 3 percent of GDP at the end of our sample period (2011:Q3). Very notably, U.S. oil exports have increased sharply in recent years and are now near 1 percent of GDP. The upshot, as highlighted by the dashed-blue line, is that the net oil balance remains near 2 percent of GDP, still well below the peak reached during the oil shock of the late 1970s.

- *The non-oil current account balance*, which is simply the current account excluding net oil imports. As seen in **Figure 3**, given that the United States has consistently run an oil deficit over the past 35 years, the non-oil current account balance has been somewhat less negative than the overall current account, troughing in the years before the financial crisis at 4 percent of GDP but currently registering a deficit of just 1 percent of GDP.

**Figure 3. U.S. Current Account Balance**




Sources: Bureau of Economic Analysis, Haver Analytics, and Citi Investment Research and Analysis.

*Insights from the academic literature*. We note that an academic literature has previously examined these issues. Perhaps the most useful of these papers is by Bodenstein, et al., which uses a large, theoretical model to study a range of issues bearing on the economy's adjustment to oil shocks.[4] These authors highlight that in response to rising oil prices, households and firms reduce their oil consumption to some extent; but this response is initially very inelastic (i.e., quantities typically decline by much less than prices rise), so the overall trade balance deteriorates. The authors emphasize, however, that the non-oil portion of the external balance tends to improve: the hike in oil prices makes the importing country relatively poorer,

[2] Oil and other petroleum products include crude oil, petroleum preparations (e.g., fuel oils, gas oils, and kerosene), liquefied propane, and butane gas.

[3] We also will at times refer to net imports of oil as the "oil balance" or the "oil bill." For simplicity, we define this variable such that it takes a positive sign when oil imports exceed oil exports.

[4] See M. Bodenstein, C. Erceg, and L. Guerrieri, "Oil Shocks and External Adjustment," International Finance Discussion Papers, No. 897R, May 2010. For a detailed empirical examination of these issues see L. Killian, A. Rebucci, and N. Spatafora, "Oil Shocks and External Balances," March 2008.

which causes its non-oil imports to contract. In addition, the importer's real exchange rate tends to depreciate.

*How does the current account respond to oil shocks*? We begin our empirical work by regressing the non-oil current account balance on lags of the oil balance. Both variables are expressed as shares of GDP, and the data run from 1976:Q1 through 2011:Q3. A feature of this framework, which greatly simplifies the analysis, is that it treats changes in the quantity of oil imports and changes in the price of oil in a symmetric fashion. The basic notion is that moves in the oil balance (relative to GDP) summarize the net impact of an oil shock on domestic income, reflecting both quantities and prices. It neatly captures how much domestic income is being shifted abroad. For this reason, we see moves in the oil bill as a useful metric for parameterizing and interpreting shocks to the external balance and, hence, for understanding the features of global external adjustment.[5]

Our assessment, based on our reading of the academic literature and extensive investigation of the underlying data, is that the process of adjustment occurs gradually over time. As such, we consider one specification that allows the non-oil current account to adjust over three years (12 quarters) and a second that allows adjustment to occur over a five-year (20-quarter) horizon. The results of this exercise are reported in **Table 1**.

Very strikingly, we find that over a twelve-quarter window (line 1), the sum of the estimated coefficients is just slightly larger than one. This indicates that over such a horizon, the non-oil current account has adjusted sufficiently to completely offset the shock to the oil balance, leaving the overall current account little changed on net. We will discuss the dynamics of this adjustment process in detail below.

**Table 1. Sensitivity of Key U.S. Variables to the Oil Balance**

| | Sum of Lagged Coefficients | |
|---|---|---|
| | 12 Lags | 20 Lags |
| (1) Non-Oil Current Account Balance/GDP | 1.050* | 0.726* |
| | *6.3* | *3.9* |
| (2) Non-Oil Exports/GDP | 0.262* | 0.088 |
| | *2.1* | *0.6* |
| (3) Non-Oil Imports/GDP | -0.314* | -0.208* |
| | *-4.2* | *-2.3* |
| (4) Non-Trade Current Account/GDP | 0.474* | 0.431* |
| | *13.0* | *10.0* |
| (5) U.S. Real GDP | -0.034* | -0.031* |
| | *-9.4* | *-7.3* |

Note: Oil balance coefficient is estimated using a pdl; all regressions include an unreported constant and time trend; U.S. Real GDP regression includes NBER recession dummies; t-statistic reported underneath coefficient; * Indicates significance at the 5% level. Source: Citi Investment Research and Analysis.

Equally notably, as shown in the second column of line 1, the coefficient of adjustment at 20 quarters is a little over 0.7, somewhat smaller than at 12 quarters. We have examined this result extensively and find it to be a robust feature of the data. The underlying story is that over the medium term (say, a 20-quarter horizon) the economy gets meaningful traction in finding new sources of energy and economizing on the use of oil. For example, in related regressions, we found that the price elasticity of oil demand at a 12-quarter horizon is -0.1, but it rises to -0.2 at a 20-quarter horizon. As such, the initial dynamics of adjustment mainly tend to

[5] We recognize that other aspects of the economy's adjustment to an oil shock (e.g., the inflationary implications of the shock and the appropriate policy response) may hinge crucially on whether the price of oil or the quantity of oil imports has increased.

compress the non-oil deficit; but over time, the reduced oil demand and increased oil supply prompted by the original shock cause a narrowing in the oil balance. This, in turn, allows the non-oil current account to move back toward its initial (pre-shock) level, in line with the deep determinants of saving and investment in the economy.

*How are the components of the current account affected?* The next three lines of **Table 1** decompose the non-oil current account into three key components: non-oil exports, non-oil imports, and the non-trade current account balance. We regress each of these variables (expressed as a share of GDP) on lags of the oil balance. We find that in response to an increase in the oil bill, non-oil exports rise, non-oil imports decline, and the non-trade current account improves. As expected, these effects tend to peak around the 12-quarter mark and have receded noticeably by 20 quarters.

More specifically, a 1 percent of GDP shift in the oil balance triggers an adjustment of roughly 0.3 percent of GDP in both non-oil exports and imports over a 12-quarter horizon. These results reflect two broad mechanisms of adjustment. First, as emphasized by Bodenstein, et al., a hike in oil prices represents an adverse terms-of-trade shock for an oil-importing country such as the United States, which reduces its effective wealth and thus weighs on its economic activity and compresses imports. As shown in line 5 of **Table 1**, we find that oil shocks are indeed associated with significantly lower levels of real GDP. (The exact size of our estimate is a bit on the high side, but still quite plausible: We find that a 1 percent of GDP increase in the oil balance—which would result if oil prices spiked roughly 50 percent from present levels—would reduce real GDP roughly 3 percent over a three- to five-year horizon.) Fortunately, there is a second channel of adjustment that is likely to be less painful. An increase in net imports of oil is also associated with a weaker real exchange rate, which in turn tends to boost U.S. exports and restrain U.S. imports.

Given that the relationship between the real exchange rate and the oil balance plays a key role in the process of adjustment to oil shocks, **Table 2** assesses this issue in more detail. As a first exercise, we simply regress the broad real dollar on one, four, and eight lags of the oil balance. Notably, this exercise (reported in line 1) yields a negative coefficient at all three horizons, suggesting that a larger oil import bill is associated with a depreciation of the real exchange rate.[6] An important issue, however, is that our efforts to assess the relationship between the exchange rate and the oil balance may be contaminated by so-called "reverse causality." Namely, we may be capturing the effect that moves in the dollar have on dollar-denominated

**Table 2. Sensitivity of the Dollar to the Oil Balance**

| | Sum of Lagged Coefficients | | |
|---|---|---|---|
| | 1 Lag | 4 Lags | 8 Lags |
| (1) Oil Balance | -0.026* | -0.020 | -0.013 |
| | *-2.3* | *-1.6* | *-1.0* |
| (2) Derived Oil Balance | -0.099* | -0.120* | -0.136* |
| | *-4.0* | *-4.3* | *-4.1* |

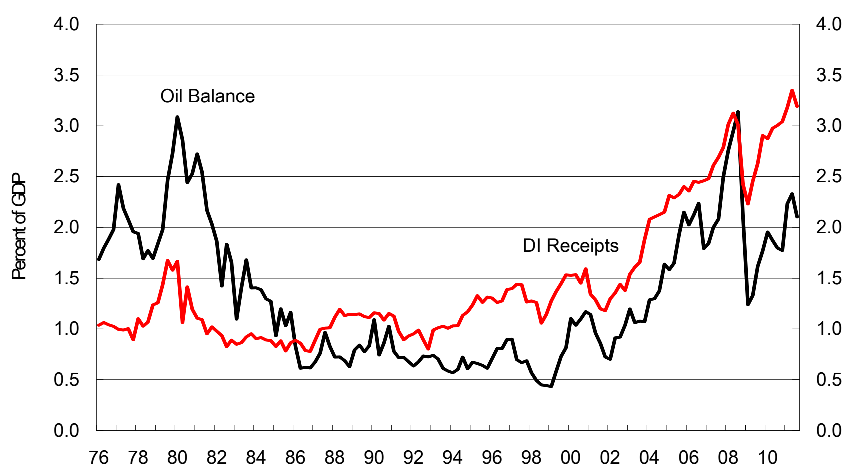
Note: All regressions include an unreported constant; t-statistic reported underneath coefficient; * Indicates significance at the 5% level. Source: Citi Investment Research and Analysis.

[6] It is not surprising that the magnitude of this effect is larger at shorter horizons, as the nominal exchange rate would typically adjust quickly to such a shock and the subsequent response of consumer prices (due to higher oil prices and/or the deprecation of the nominal exchange rate) would tend to offset the initial depreciation.

oil prices—and, hence, on the oil bill—rather than the other way around. When we take steps to control for this possibility (line 2), we find coefficients that are much larger in magnitude than those in line 1 and that are highly statistically significant, consistent with the view that the dollar tends to play an important role in the process of adjustment to oil shocks.[7]

*Impact on U.S. investment earnings abroad.* Returning to **Table 1**, we now focus on the non-trade portion of the current account balance (line 4), which shows a remarkable sensitivity to oil shocks. Specifically, we find that at a horizon of 12 quarters, an improvement in the non-trade current account balance offsets nearly half of the impact of a shock to the oil bill, with the effect declining only slightly at the 20-quarter horizon. One prominent driver of this result is that U.S. firms in the energy sector have significant direct investment holdings and operations abroad. And the investment earnings from those foreign holdings rise and fall along with the oil price and the overall demand for oil. As illustrated in **Figure 4**, the relationship between the U.S. oil bill and direct investment receipts is striking, particularly since the mid-1980s.

**Figure 4. U.S. Oil Net Imports and Direct Investment Receipts**




Sources: Bureau of Economic Analysis, Haver Analytics, and Citi Investment Research and Analysis.

*Results from a broader specification*. As a final test of the features and robustness of these results, we incorporate the oil balance into a more standard model of U.S. external trade. Specifically, as shown in **Table 3**, we now regress the non-oil current account on the broad real dollar, U.S. GDP, aggregate foreign GDP, and net oil imports. All the variables enter with the anticipated signs and are generally significant. Notably, the size of the coefficient on the oil balance falls significantly with the inclusion of the additional variables. But this is not surprising. We argued above that moves in the dollar and U.S. GDP are key channels of adjustment in the face of oil shocks. In this specification, we are explicitly controlling for these variables and thus holding them constant. The one remaining channel that is operative, however, is through direct investment earnings. And the size of the coefficients for the oil balance in columns 2 and 3 are indeed very similar to those reported in **Table 1** for the non-trade current account.

[7] Specifically, we conducted the following two-step exercise: In stage one, we regressed the oil balance on the price of oil; the residual from this regression is the part of the oil balance that is uncorrelated with the oil price. (Intuitively, this residual may be interpreted as moves in the quantity of oil imports and oil exports driven by factors other than the price.) n the second stage, we regressed the broad real dollar on varying lags of this residual. The strong results that we obtain suggest that the exchange rate may be more sensitive to shifts in quantities of net oil imports than to shifts in oil prices. This may reflect the fact that shifts in quantities are more likely to be long lived.

**Table 3. Sensitivity of U.S. Non-Oil Current Account Balance**

| | (1) | (2) | (3) |
|---|---|---|---|
| Broad Real Effective Dollar | -0.112* | -0.108* | -0.114* |
| | *-15.2* | *-14.5* | *-13.5* |
| U.S. Real GDP | -0.125* | -0.115* | -0.104* |
| | *-5.4* | *-4.1* | *-3.6* |
| U.S. Trading Partners' Real GDP | 0.067* | 0.059* | 0.049 |
| | *3.2* | *2.4* | *1.9* |
| Oil Balance (12 lags) | | 0.413* | |
| | | *5.1* | |
| Oil Balance (20 lags) | | | 0.481* |
| | | | *5.0* |

Note: Broad real effective dollar coefficient represents sum of 12 lag pdl; GDP measures represent sum of 4 lag pdls; all regressions include an unreported constant; t-statistic reported underneath coefficient; * Indicates significance at the 5% level. Source: Citi Investment Research and Analysis.

*Conclusions regarding U.S. adjustment to oil shocks*. These results have painted a straight-forward, but also very rich, picture of U.S. external adjustment to oil shocks. We find that full adjustment occurs over a period of roughly three years (i.e., the non-oil current account improves sufficiently to offset the initial energy shock). We also find that the underlying shock begins to slowly die out in subsequent years as the adjustment of oil supply and demand gains traction. In the course of this examination, we have identified three factors that serve to buffer the impact of an adverse oil shock on the U.S. current account and economic activity—first, the exchange rate tends to depreciate; second, U.S. oil exports have risen significantly over the past decade, which means the external balance is more hedged than was the case before; and third, direct investment receipts tend to rise markedly, reflecting the U.S. energy sector's higher earnings on its operations abroad. All of this does not suggest that oil shocks aren't likely to be painful—we find evidence that U.S. GDP nevertheless contracts. But even so, such shocks are not as painful they would be without these buffering factors. Finally, we note that these channels would be expected to operate in a broadly parallel fashion in the event of a favorable shock that reduced the value of net oil imports. In this sense, we see the adjustment process as being broadly symmetric.

## Global Adjustment to Oil Shocks

In this section, we extend the results obtained for the United States to the global economy more generally. Using data from the IMF's World Economic Outlook (WEO) and a methodology broadly similar to that in the previous section, we document the features of external adjustment to oil shocks for a broad group of countries.

As highlighted in **Table 4**, we estimate panel regressions for two sets of countries: first, a broad set of 59 large and medium-sized countries whose central banks are members of the Bank for International Settlements (BIS); and second, an even broader set of 168 countries for which data are available in the IMF WEO database. The regressions are estimated using annual data running from 1980 to 2011. As before, we regress the non-oil current account balance for each country on lags of net oil imports. Similar to our work for the United States, we consider the features of adjustment at three-year and five-year horizons. The resulting coefficients are all of the anticipated sign and highly statistically significant.

The first two lines in **Table 4** report estimates for the broad sweep of countries. Two key results emerge. First, as with the United States, we find strong evidence that the non-oil current account balance adjusts significantly in the face of oil shocks. Over a

**Table 4. Sensitivity of Non-Oil Current Account Balances**

| | Sum of Lagged Coefficients | | |
|---|---|---|---|
| | 3 Years | 5 Years | Number of Countries |
| All Countries | | | |
| (1) Global | 0.603* | 0.637* | 168 |
| (2) BIS members | 0.484* | 0.564* | 59 |
| Oil Exporters | | | |
| (3) Global | 0.433* | 0.427* | 25 |
| (4) BIS members | 0.214* | 0.271* | 7 |

Note: All regressions include unreported cross-sectional fixed effects and an unreported constant;* Indicates significance at the 5% level. Source: Citi Investment Research and Analysis.

five-year window, the average adjustment for both the BIS panel and the global panel is around 60 percent. A second result is that for these countries, the adjustment of the non-oil current account balance appears to continue in years three through five, pointing to a more prolonged period of adjustment in other countries than in the United States. We take this as confirming conventional wisdom that the U.S. economy is somewhat more flexible in its structure and more responsive to shocks than is the case for most other countries.

*Are the oil-exporting countries different?* We now focus our attention explicitly on the behavior of the oil-exporting countries. As there is no cut-and-dry definition of which countries should be included in the set of oil exporters, we adopt the following (admittedly arbitrary) standard: We designate a country as an oil exporter only if it has had positive net oil exports each year in our sample. Using this definition, we identify a plausible list of 25 countries, including 7 BIS members, as oil exporters and estimate our baseline regression model with a panel that includes only these countries.[8]

The most notable feature of our results for these countries is that over a five-year horizon the typical oil exporter in the global sample sees only about a 40 percent adjustment of its non-oil current account balance in response to an oil shock, with an even smaller adjustment coefficient (around 30 percent) for the BIS sample. These coefficients are markedly lower than those for the entire set of countries, suggesting that adjustment among the oil exporters has been less complete (at least relative to the size of the shocks) than for other countries. The underlying drivers of this difference merit further examination. One hypothesis is that the process of adjustment for the oil exporters is simply more prolonged. That said, in the global sample of oil exporters (line 3), the estimated coefficient actually peaks at three years and is slightly lower after five years. But the corresponding estimate for the global panel with all countries (line 1) continues to rise between years three and five. As such, these results hint that, if anything, the timing of adjustment may be more rapid among the oil exporters.

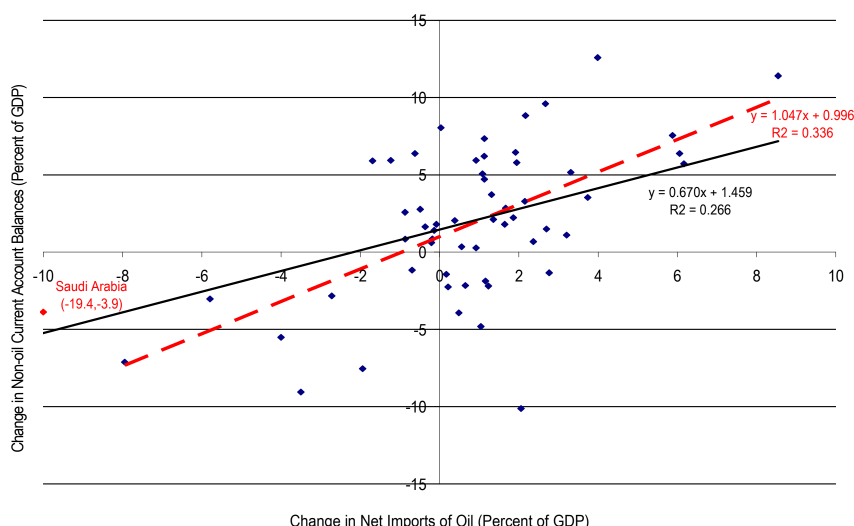
Another hypothesis is that the oil exporters at times face oil shocks that are very large relative to the size of their economies, and this may kick off differing adjustment dynamics and policy responses. At any rate, these results highlight the global demand destruction associated with an oil shock—namely that the oil exporters only partially recycle their higher export earnings back into increased demand for goods and services from abroad. These results also broadly mirror work

[8] This includes the following countries (BIS members are underlined): Algeria, Angola, Bahrain, Brunei, Ecuador, Gabon, Iraq, Iran, Kazakhstan, Kuwait, Libya, Malaysia, Mexico, Nigeria, Norway, Oman, Qatar, Republic of Congo, Russia, Saudi Arabia, Trinidad and Tobago, Turkmenistan, United Arab Emirates, Venezuela, and Yemen.

that we have done examining competitiveness imbalances in Europe, with the bottom line from both sets of findings being that deficit countries tend to bear a disproportionate burden in the adjustment of external imbalances.

*Global adjustment over the past decade*. **Figure 5** shows a scatterplot of changes in net oil imports against changes in non-oil current account balances for our panel of BIS countries from 2001 to 2011. The past decade has seen a secular rise in the price of oil, which has brought with it marked pressures on oil balances in many countries. Consistent with this observation, most countries in the sample saw their oil balances widen, with many recording increases of 2 percent of GDP or more.

**Figure 5. BIS Members: Changes in Non-oil Current Account Balances and Net Imports of Oil, 2001-2011***




*Red trendline shows fit when Saudi Arabia is excluded from the regression.
Sources: International Monetary Fund, Haver Analytics, and Citi Investment Research and Analysis.

To explore the features of these data further, we estimate a simple regression of ten-year changes in non-oil current account balances on ten-year changes of net oil imports. The resulting coefficient is around two-thirds, broadly in line with our work reported in the first two lines of **Table 4**. Saudi Arabia, however, is a remarkable outlier here. Over the past decade, the country has seen nearly a 20 percent of GDP increase in its net oil exports but only a 4 percent of GDP deterioration in its non-oil current account balance—a coefficient of adjustment of just 0.2. Notably, when we exclude Saudi Arabia from the regression, the estimated coefficient rises markedly, to a little above one, indicating that over the past decade most countries have seen their trade performance respond significantly to shifts in their oil balance.

## Concluding Thoughts

In the course of this essay, we have documented some of the key aspects of external adjustment to global oil shocks, drawing on the experience of the past several decades. However, one salient question that remains is whether a shock in the current environment might somehow be different. We approach this question with some trepidation, given that the experience of the global financial crisis highlights that things are rarely as different as they seem. Even so, we have a few thoughts on this issue.

As we have noted, one important development for the United States is that the energy sector is in the process of a rapid evolution. Specifically, U.S. exports of oil-related products have expanded significantly in recent years and are now equal to roughly 30 percent of the value of oil imports. And technological innovations in the energy sector suggest that over the next decade the U.S. economy is poised to take further significant steps toward energy self-sufficiency.

These developments are likely to have two implications. First, the U.S. external sector seems much less exposed to energy shocks than was the case several decades ago, and this should tend to blunt the effects of such shocks. But second, it is possible that a spike in oil prices—at least to the extent that it was perceived as permanent—might serve to accelerate the expansion of the U.S. energy sector. In the near term, such a development would mean increased investment and hiring in the sector, thus lifting U.S. GDP and imports.[9] The higher level of imports would, in turn, temporarily reinforce the deterioration in the trade balance due to the increase in the oil bill. However, over time, the beneficial outcome would be greater energy self-sufficiency for the U.S. economy.

But another important feature of the current global environment, even apart from the persisting uncertainties in Europe, is that the recovery in many countries remains lackluster. The work that we have done on “stall speed” suggests that when growth is already soft, confidence tends to be fragile and the economy is accordingly more vulnerable to shocks.[10] The empirical evidence on this score is most clear for the United States, but we believe that the general insights are broadly applicable. This line of reasoning suggests that under current circumstances a sizable and sustained rise in oil prices might have unusually severe effects on the global economy—at the very least, the risks seem to be tilted in this direction.

[9] This increase in imports would reflect two factors: first, some of the investment in the energy sector would no doubt be on imported capital goods; second, the accelerated investment and hiring in the sector would boost overall levels of domestic income and spending.

[10] See “Is the U.S. Economy Approaching Stall Speed?” November 11, 2011.

# Appendix A-1

## Analyst Certification

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