Characterization of The Impact of Fiscal Policy on Output in Oil-Exporting, Developing Countries*

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Abstract

In this paper, we assess the multiplier effect of fiscal policy in 27 oil-exporting, developing countries, using real-time fiscal spending forecast errors, 1990-2017. Employing the identification approaches suggested in the literature, the results propose that the impact multiplier is between 1.4 and 1.6. However, once we control for the spurious relationship between the fiscal spending and output, the size of the multiplier decreases significantly to 0.4. Furthermore, we estimate state-dependent multipliers that depend on boom-bust cycles in the global oil market as well as domestic business cycles. The results suggest that the multiplier effect is larger (than the baseline) during a recession or when global oil prices are low, 0.8, and smaller (and negative) during an expansion or when oil prices are high, -0.2.

JEL: D84, E32, E62, F02, H30, Q41, Q43, Q48

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1 Introduction

The price of global oil prices saw an unprecedented plunge in 2014, followed by a further weakening in 2015 and 2016 that it has yet to recover from. Given the dependency of oil-exporting, developing countries on oil income, it is key to adopt a new (fiscal) policy paradigm that helps to stabilize the economic growth in the face external shocks, and the multiplier effect has to be considered a key concept in the new paradigm, we believe. Studies that focus on the role of fiscal policy in oil-exporting, developing economies suggest that fiscal policy is one of the most effective policy tools available to policymakers. They suggest that the size of the fiscal multiplier in these economies is usually greater than one and large enough to boost economic activity. In this paper, however, we estimate that the impact multiplier is around 0.4, after controlling for non-discretionary changes in fiscal spending, i.e. changes in fiscal spending that are in response to endogenous changes in economic activity.

We estimate government spending multipliers for an unbalanced panel of 27 oil-exporting, developing economies over the period 1990-2017.[1] We show that while the approach to identifying fiscal shocks by using fiscal spending forecast errors (Auerbach and Gorodnichenko, 2013; Abiad et al., 2016) is the most appropriate methodology for developing countries, mostly due to lack of high-frequency data in developing economies, it requires modification to remove the part of changes in government spending that is correlated with contemporaneous economic shocks. We show that fiscal spending forecast errors are partly due to growth forecast errors–*expectational errors*. To prepare forecasts of government spending, forecasters make some assumptions about future economic growth that determine the automatic (non-discretionary) part of the fiscal spending and so there is always a part of fiscal spending forecast errors that is attributable to expectational errors. Failing to remove this endogenous part would result in over-estimation of the multiplier. To isolate changes in government spending that plausibly are uncorrelated with contemporaneous economic shocks, we introduce oil price shocks as an instrument for expectational errors. Our identification method relies on a feature unique to oil-exporting, developing economies: *global oil prices are key drivers of domestic business cycles*. This means that economic fluctuations in a given year are largely determined by fluctuations in global oil prices that are exogenous–driven mostly by global demand than supply disruptions (Kilian, 2009). Furthermore, we measure forecast errors using the IMF World Economic Outlook (WEO) forecasts released in the fall of every year (usually in September or October). Since all information about oil

[1] For the list of sample countries and periods considered for each country, please refer to Table (3).

prices up until the fall is incorporated in the fall forecasts, the likelihood that the changes in fiscal spending for the rest of the fiscal year (presumably between October and December) are driven by unexpected changes in global oil prices are very little. Thus, using fluctuations in the oil market as a proxy for economic fluctuations seems plausible.

One possible objection to this basic identification strategy, which deserves immediate mention, is that although the fall forecasts incorporate all the information up until fall, forecast errors may nevertheless be correlated with current shocks if these shocks are persistent over time, or are otherwise predictable in some way. We address this concern by controlling for lagged oil price changes and allowing for longer lags.

Our baseline panel estimate of the multiplier is 0.4 (its cross-country average is 0.3) which is almost one-fourth of the other multipliers that correspond to the specifications that do not control for expectational errors. Directly controlling for oil price forecast errors, instead of using them as an instrument for growth forecast errors, results in a multiplier of about 1.4.

In the baseline model, we assume the economy starts in a steady-state in which capital is fully utilized and workers are fully employed. A key question is whether government spending multipliers can be greater if the economy starts with under-utilized resources, which is widely believed to be the case for oil-exporting, developing economies.

Several recent studies consider the possibility that the multiplier may differ according to the state of the economy. Pereira and Lopes (2014) and Kirchner et al. (2010) use time-varying parameters and Bayesian estimation techniques and find that government spending multipliers are not very different in expansions and contractions. In contrast, Auerbach and Gorodnichenko (2012b) uses a regime-switching model to estimate multipliers that can differ according to whether the economy is in a recession or not. The different estimated dynamics imply very large multipliers in recessions compared to expansions, 2.2 in recessions and –0.3 in expansions. To allow for output response differentiated across recessions and expansions, we introduce a smooth transition function into the baseline model similar to smooth transition autoregressive (STAR) models developed in Granger and Terasvirta (1993).

Our results show that, in recessions, multipliers are positive and larger than the baseline, 0.7 (vs. 0.4 in the baseline), and negative during expansions, -0.4. Furthermore, we estimate another set of state-dependent multipliers where instead of using the state of the domestic economy, we use the state of the global oil market, defined as the deviation of the global oil price from the trend. As expected, results are similar with the multiplier estimated to be 0.8 when global oil prices are low and -0.2 when prices are high.

In both the baseline and the state-dependent case, the estimated multipliers are significantly smaller than the multipliers that are estimated based on specifications that do not control for expectational errors. Our analysis suggests that without controlling for expectational errors what is measured as a multiplier may be an automatic response to economic conditions by fiscal spending. Thus, we observe a large increase in output in response to what appears to be a modest increase in current government spending. An alternative interpretation is that the large increase in output is the result of firms gearing up for anticipated large future increases in government spending.[2]

As highlighted in Kraay (2014), several limitations of the evidence in this article are also worth acknowledging at the outset. First, this article shares with much of the literature the difficulty that econometrically estimated government spending multipliers are not deep structural parameters, but reflect the confluence of a wide variety of factors, including preferences, the type of government spending and how it is financed, and the state of the economy at the time of fiscal policy implementation. For this reason, the term multiplier as we use it is perhaps best understood simply as a short-hand for the empirical correlation between a plausibly discretionary component of changes in government spending and changes in output. As such, the estimates of the multiplier herein may not be a good guide to the effects of particular types of spending increases in particular situations, even within our sample of countries. Second, out of necessity, the empirical results in this article are based on data for a particular set of developing, oil-exporting economies in which oil price shocks are an important driver of business cycles. The short-run effects of government spending on output in other countries outside this particular sample may very well be different. Third, data are measured at annual frequency, given the unavailability of quarterly data.

Section 2 reviews the literature. Section 3 presents the empirical framework and identification strategy we use to estimate the baseline government spending multipliers. Section 4 reports the baseline estimates of the multipliers, explores the cyclical properties of fiscal multipliers and investigates whether the spending multipliers vary across boom-bust cycles in the global oil market. Section 5 concludes.

2 Literature Review

The Great Recession of 2008–09 led to the revival of interest in the macroeconomic effects of government spending when monetary policy lost its effectiveness as interest rates hit the zero lower bound (Ramey, 2011a). Illustrated in the Keynesian models, the fiscal multiplier

[2]For more on anticipation effects, please refer to Ramey (2011b).

is given by $1/(1-mpc)$, mpc is the marginal propensity to consume, and thus anything that reduces mpc decreases the size of the multiplier. E.g., allowing for marginal propensity to import or rises in interest rate lowers the multiplier. As indicated in neoclassical models, fiscal policy affects output through its impact on hours worked and it does so via two key channels: first, an increase in government spending represents a negative "wealth effect" which for an optimizing household means increasing labor supply. Second, an increase in government spending means that taxes will be higher in the future, and so individuals "intertemporally substitute" more labor to the present when taxes are relatively low. While neoclassical models (Aiyagari et al., 1992; Baxter and King, 1993) predict positive and negative values for fiscal multiplier, depending on the type of government spending, its persistence, how it is financed, and the state of the economy at the time of fiscal policy implementation, New Keynesian models (Smets and Wouters, 2007; Cogan et al., 2010) introduce nominal and real rigidities to neoclassical models and predict a much smaller multiplier, equal to or less than unity. However, introducing some features such as rule-of-thumb households who have much larger marginal propensity to consume than optimizing households (Galí et al., 2007) or when there is a slack capacity in the economy (Auerbach and Gorodnichenko, 2012a,b) can result in large multiplier estimates even in the context of New Keynesian models.

Building on the above-mentioned general equilibrium theoretical models, many studies have been conducted on advanced economies (Leigh et al., 2010; Beetsma and Giuliodori, 2011; Blanchard and Leigh, 2013; Auerbach and Gorodnichenko, 2013; Ramey and Zubairy, 2018).[3] However, there are very few studies that have been conducted on developing economies due to a lack of data and identification difficulties. Among those that study developing economies, Kraay (2012) is a notable example. Using World Bank project-level disbursement data as an instrument for total government spending in low-income countries, it estimates multipliers in a sample of 29 aid-dependent developing countries where variation in government spending from World Bank finances is large relative to the size of the economy. The multipliers are estimated to be in the vicinity of 0.5. Using an extended sample of 102 developing countries over the period 1970-2010, Kraay (2014) estimates the one-year spending multiplier to be around 0.4. Ilzetzki et al. (2013) is another example. Employing a structural VAR approach, similar to Blanchard and Perotti (2002) and using a panel of 44 countries–including 24 developing countries, it finds that, in developing countries, the response of output to increases in government consumption is negative (and

[3] Ramey (2011a) surveys this literature and summarizes a consensus view that spending multipliers for the United States are between 0.8 and 1.5.

not statistically significantly different from zero) and die out quite fast. The multiplier on government investment in developing countries is positive and larger than one. It provides evidence on the negative correlation between trade openness and exchange rate flexibility and the size of the multiplier. Furceri and Li (2017) investigates a panel of 79 developing economies and finds an average public investment multiplier of about 0.2. Furthermore, it shows that the multiplier is larger during periods of slack, when the exchange rate is fixed and the economy is closed, and when public investment efficiency is higher. Another example is Espinoza and Senhadji (2011). Employing a panel approach, it estimates the size of the fiscal multiplier to be between 0.3 and 0.7 for the six GCC economies (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) during 1980-2009.

2.1 Fiscal Policy Shock Identification

The biggest challenge in assessing the growth impact of fiscal policy is identification, i.e. how to isolate changes in government spending that plausibly are uncorrelated with contemporaneous economic shocks. Three main alternative approaches have been proposed in the literature: *narrative approach*, *structural vector autoregression (SVAR)*, and using *fiscal spending forecast errors as fiscal shocks*. Barro (1981), Ramey and Shapiro (1998), and Romer and Romer (2010) are among the studies that employ a *narrative approach* and use published information about the nature of fiscal changes. Barro (1981), for example, uses military build-ups during a war period to assess the effectiveness of fiscal policy in the US, or Romer and Romer (2010) finds a large fiscal multiplier for legislated U.S. federal tax changes during the postwar period. While the narrative approach is easier to justify, it limits the evaluations to a specific class of shocks, such as military spending build-ups, and a specific period. Moreover, the implementation of the narrative approach in a panel study faces difficult challenges such as cross-country consistency of events considered as shocks and data availability for all the sample countries.

The *SVAR analysis*, developed by Blanchard and Perotti (2002), is easier to employ in a panel study since it does not depend on a specific shock incident. In this approach, the dynamic effects of fiscal shocks are characterized by imposing identifying assumptions, based on institutional information about the government's tax or social transfer programs. Blanchard and Perotti (2002), for example, identify the shocks under the assumption that economic activity does not affect the fiscal policy within the same quarter, except for the automatic feedback built in the tax code and the transfer system. Ilzetzki et al. (2013) implement a similar approach to a panel of countries. The issue for us to use this approach is data availability. Most country-level data, such as GDP, government expenditure/revenue, is at best available annually and the assumption that fiscal variables do not respond to economic activity within a one year is unrealistic. As stated in the Blanchard and Perotti (2002), this approach works best with quarterly data.

Finally, the most recent approach to identifying fiscal shocks, that unlike the structural approach does not require strong identifying assumptions or data available at the higher-than-yearly frequency, relies on *fiscal spending forecast errors*. The last approach could be applied to any period, unlike the narrative approach. According to this approach, fiscal shocks are defined as government spending forecast errors (Abiad et al., 2016) or the residuals of a regression of real-time, one-period-ahead forecast errors for government spending on a set of lagged macroeconomic variables, such as or output, government spending, inflation, etc. (Auerbach and Gorodnichenko, 2013). This approach helps with the concerns over expectations emphasized in Ramey (2011b) and others–the timing of shocks plays a critical role in identifying the effect of fiscal policy shocks. Auerbach and Gorodnichenko (2012b) show that a sizable fraction of fiscal innovations is predictable, raising concerns about measures of unanticipated shocks to government spending. Employing professional forecasts, this approach helps to align the researcher's information set with that of the forward-looking economic agents, who make their decisions based on 'news' rather than 'actual' changes in fiscal spending (Leeper et al., 2012, 2013).

In this paper, we will pursue this recent approach and use fiscal spending forecast errors to identify fiscal policy shocks. The rest of this section provides more details about how fiscal spending forecast errors have been used to identify fiscal shocks in the literature.

Using a panel of annual data for advanced economies, Abiad et al. (2016) estimate the investment multiplier to be 0.4 in the same year the shock hits. They measure the shocks using public investment forecast errors, as a share of GDP: $FE_t = \Delta \ln PI_t - \Delta \ln PI_{t|Oct't}$, where $\Delta \ln PI_t$ is the growth rate of actual real public investment in year t and $\Delta \ln PI_{t|Oct't}$ is the forecast rate of real public investment, prepared by IMF country teams, as of October of year t. Next, the shocks are used in the following regression to assess the impact of fiscal shocks in country i over different horizons $k = 0, 1, \ldots, K$,

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + \vartheta_t^k + \beta_1^k F(z_{it}) FE_{i,t} + \beta_2^k (1 - F(z_{it})) FE_{i,t} + \epsilon_{i,t}^k,$$

where y is (alternatively the log of output, the private investment-to-GDP ratio, and the unemployment rate) and $F(z_{i,t}) = exp(-\gamma z_{i,t})/(1 + exp(-\gamma z_{i,t}))$, $\gamma > 0$ is a smooth transition function with z indicating the state of the economy, measured by contemporaneous GDP growth.

Auerbach and Gorodnichenko (2013) takes a slightly different approach and identifies the shocks not as fiscal spending forecast errors but as residuals of fiscal spending forecast errors regression on lagged macroeconomic variables:

$$(g_{i,t} - g_{i,t|t-1}) = A(L)X_{i,t} + \varepsilon_{it},$$

where $g_{i,t|t-1}$ is real-time one-period-ahead forecast for government spending for country i, $A(L)$ is the polynomial lag operator and X includes macroeconomic variables (output, government spending, exchange rate, inflation, investment, and imports) as well as a set of country and time fixed effects. The ε_is are policy shocks for source country i.

Next, it analyzes the impact of fiscal spillover shocks[4] over the business cycle:

$$\Delta y_{i,t+h} = \alpha_{R,h}F(z_{i,t-1})g_{it}^{shock} + \alpha_{E,h}(1 - F(z_{i,t-1}))g_{it}^{shock} + \sum_{s=1}^{m}\beta_{R,hs}F(z_{i,t-1})\Delta y_{i,t-s} + \sum_{s=1}^{m}\beta_{E,hs}(1 - F(z_{i,t-1}))\Delta y_{i,t-s} + \sum_{s=1}^{m}\delta_{R,hs}F(z_{i,t-1})\Delta g_{i,t-s} + \sum_{s=1}^{m}\delta_{E,hs}(1 - F(z_{i,t-1})) \Delta g_{i,t-s} + \phi_{hi} + \mu_{ht} + \epsilon_{iht},$$

where y is GDP and g is government purchases and t and i index time and country. The smooth transition model includes a transition function of the form $F(z_{it}) = (e^{-\omega_i z_{it}})/(1 + e^{-\omega_i z_{it}})$, $\omega_i > 0$. z_i is a mean-zero index of the business cycle in country i that has a unit variance, which allows for a scale-invariant ω, and is set to real output growth, with positive z indicating an expansion. The parameter ω controls the number of years that a country on average was in recession during a specific period and is set exogenously. The findings show that fiscal spillovers are significant and their effect varies over the business cycle with the impacts being particularly high in recessions and quite modest in expansions.

Blanchard and Leigh (2013) takes a similar approach and at the same time avoids the complication of identifying fiscal shocks. It investigates the relationship between growth forecast errors and planned fiscal consolidation during the Great Recession for 26 advanced European countries,

$$\Delta y_{i,t:t+1} - \Delta y_{i,t:t+1|t} = \alpha + \beta \Delta F_{i,t:t+1|t} + \epsilon_{i,t:t+1},$$

[4]Since the focus in Auerbach and Gorodnichenko (2013) is the impact on the output of fiscal spillover shocks–fiscal shocks emanated abroad, the estimated fiscal shocks are used to calculate the spillover shocks as the weighted average of fiscal shocks across sample countries (OECD) using bilateral import values as weights,

$$g_{i,t}^{shock} = \frac{\sum_{j \neq i}(m_{ij,B}/g_{j,B}) \times \varepsilon_{j,t} \times g_{j,t-1} \times e_{j,B}}{e_{i,B}},$$

where $m_{ij,t}$ is country j's imports from country i in year t, $e_{j,t}$ is country j's US dollar exchange rate in year t, and B is a base year.

where $\Delta y_{i,t:t+1}$ denotes cumulative (y-o-y) growth of real GDP in economy i; $\Delta y_{i,t:t+1|t}$ is the associated forecast of growth conditional on the information set available early in year t; and $\Delta F_{i,t:t+1|t}$ is the forecast of the change in the general government structural fiscal balance in percent of potential GDP. Under rational expectations, the paper proposes that fiscal consolidation forecasts should be unrelated to subsequent growth forecast errors, $\beta = 0$. The only reason fiscal consolidations could explain the error between actual growth and its forecast, the paper suggests, would be an incorrect underlying assumption about the effectiveness of fiscal policy–fiscal multiplier. Their results show that "stronger planned fiscal consolidation has indeed been associated with lower than expected growth" which implies that "fiscal multipliers were substantially higher than implicitly assumed by forecasters."

The next section presents the empirical framework and identification strategy we use to estimate the baseline government spending multipliers.

3 Empirical Framework

3.1 Identification Strategy

The simplest model to think about the two-way causality between output and fiscal policy is the following

$$\Delta g_t = \alpha^g + \beta \Delta y_t + \sum_{s=1}^{S} \gamma_s^g \Delta g_{t-s} + \sum_{s=1}^{S} \kappa_s^g \Delta y_{t-s} + \varepsilon_t, \tag{1}$$

$$\Delta y_t = \alpha^y + \varphi \Delta g_t + \sum_{s=1}^{S} \gamma_s^y \Delta g_{t-s} + \sum_{s=1}^{S} \kappa_s^y \Delta y_{t-s} + \eta_t, \tag{2}$$

where y_t and g_t denote GDP and government spending, both measured in constant local currency units; α^g, α^y, β, φ, γ^g, γ^y, κ^g, and κ^y are parameters; η_t and ε_t are i.i.d shocks with mean 0, variances σ_ε^2 and σ_η^2, and $E[\eta_t \varepsilon_t] = 0$; η_t denotes all sources of GDP fluctuations, such as oil price shocks, terms of trade shocks, productivity shocks, etc. other than government spending shocks and ε_t represents the discretionary changes in fiscal spending that is orthogonal to economic output y_t; Δ is the first difference operator. Equation (1) captures a fiscal reaction function whereby government spending responds to contemporaneous output, with β representing the response of fiscal policy to changes in output. Equation (2) allows for a contemporaneous impact on output of fiscal spending represented by φ.

The parameter φ is the government spending multiplier.[5] The OLS estimation of equation (2) will lead to biased estimates of the multiplier since changes in government spending are likely to be correlated with other contemporaneous shocks to output. Substituting equation (2) in (1):

$$E[\Delta g_t \eta_t] = (\frac{\beta}{1-\varphi\beta})\sigma_\eta^2 > 0. \tag{3}$$

As discussed previously, various approaches have been applied to tackle this issue. The high-frequency VAR-based approach of Blanchard and Perotti (2002) hinges on the assumption that $E[\Delta g_t \eta_t] = 0$ within a quarter. The rationale for this assumption is that discretionary fiscal policy changes take sufficiently long to implement that they cannot react to economic activity within a quarter. The narrative approach, on the other hand, focuses on a component of government spending that is driven by an exogenous factor, such as an expansion in military spending during war periods (Barro, 1981), or uses the changes in government spending driven by international aid disbursements, assuming that international aid approval has happened sometime in the past (Kraay, 2014). A more recent approach, pioneered by Auerbach and Gorodnichenko (2013), proposes that fiscal spending forecast errors (even with annual frequency) are not affected by contemporaneous movements in economic activity, $\beta = 0$ in equation (1), and so one can identify the discretionary fiscal policy by estimating

$$\Delta g_t - E_{t-1}\Delta g_t = \alpha^g + \sum_{s=1}^{S} \gamma_s^g \Delta g_{t-s} + \sum_{s=1}^{S} \kappa_s^g \Delta y_{t-s} + \varepsilon_t, \tag{4}$$

where $E_{t-1}\Delta g_t$ is year t forecast of fiscal spending at year $t-1$. Equation (4) can be estimated using OLS with the residuals ε_t representing the discretionary fiscal policy. Once fiscal shocks are identified, one can replace Δg_t by ε_t in equation (2) and estimate

$$\Delta y_t = \alpha^y + \varphi\varepsilon_t + \sum_{s=1}^{S} \gamma_s^y \Delta g_{t-s} + \sum_{s=1}^{S} \kappa_s^y \Delta y_{t-s} + \eta_t, \tag{5}$$

using OLS. Given that $E[\varepsilon_t \eta_t] = 0$ in the above equation the multiplier $\hat{\varphi}$ can be estimated accurately using OLS.

Similarly, Abiad et al. (2016) estimate the fiscal multiplier using equation (5) where instead of estimating equation (4) and using the residuals as fiscal shocks, they define the

[5] As noted in the introduction, φ is difficult to interpret as a deep structural parameter. It should simply be interpreted as a reduced-form empirical summary of the contemporaneous relationship between annual fluctuations in government spending and output.

shocks simply as fiscal spending forecast errors:[6]

$$\varepsilon_t \equiv \Delta g_t - E_{t-1}\Delta g_t. \tag{6}$$

The results of Abiad et al. (2016) and Auerbach and Gorodnichenko (2013) could be accurate if their assumption that fiscal spending forecast errors are not affected by contemporaneous movements in economic activity was valid, i.e. $\beta = 0$. In what follows, however, we show that this assumption is incorrect and results in fiscal multipliers that are large not because fiscal policy is more effective but because they reflect the response of output to a combination of discretionary fiscal policy and the automatic stabilizers, which are themselves caused by changes in output. In this section, we develop a framework to remove the endogenous part of fiscal spending and identify the discretionary part of fiscal policy.

To start, we take the expectation of equation (1),

$$E_{t-1}\Delta g_t = \alpha^g + \beta E_{t-1}\Delta y_t + \sum_{s=1}^{S} \gamma_s^g \Delta g_{t-s} + \sum_{s=1}^{S} \kappa_s^g \Delta y_{t-s}. \tag{7}$$

and subtract the above equation from equation (1) to obtain the fiscal spending forecast errors

$$\Delta g_t - E_{t-1}\Delta g_t = \beta(\Delta y_t - E_{t-1}\Delta y_t) + \varepsilon_t. \tag{8}$$

where ε_ts are orthogonal to $(\Delta y_t - E_{t-1}\Delta y_t)$.

According to equation (8), fiscal spending forecast errors represent, but are not limited to, fiscal policy shocks ε_t. They reflect a combination of fiscal shocks and growth expectational errors, $(\Delta y_t - E_{t-1}\Delta y_t)$. In other words, the unpredicted fiscal spending is still due partly to unpredicted movements in economic activity and since the causality goes both ways, we cannot use OLS to obtain fiscal policy shocks.

We, therefore, need to use an instrumental variable that is correlated with the output growth forecast errors $(\Delta y_t - E_{t-1}\Delta y_t)$ but uncorrelated with the discretionary part of fiscal spending (ε_t).

One potential candidate for our instrument is the global oil price forecast errors since global oil prices are an important driver of business cycles in developing, oil-exporting countries.[7] Furthermore, we assume that global oil price shocks and fiscal spending forecast errors are uncorrelated in our sample.

[6] In the section where we report the results, we report also the results for fiscal shocks identified following Abiad et al. (2016) and Auerbach and Gorodnichenko (2013).

[7] Sadeghi (2017) provides a review of the literature on the correlation between movements in global oil prices and domestic business cycles in developing, oil-exporting economies.

Since we measure our forecast errors using the IMF projections available in the Fall release of the World Economic Outlook, the forecast period is usually between 3-6 months depending on whether the fiscal year ends in December or the spring of the next year. With 6-9 months already in, we assume that the chances are very low that the government makes any spending adjustments in the annual budget, in response to changes in global oil prices, either because higher oil income, due to higher prices, is not collectable immediately and/or because in almost all of our sample countries a sort of a parliamentary approval is required in order to make changes to public spending which could be very unlikely to happen if the remainder of the fiscal year is not sufficiently long for such a process to complete. Economic agents, on the other hand, take any information, including the latest changes in global oil prices, into consideration when making business decisions and their decisions are reflected in output with no lag.

Using oil price forecast errors as an instrument, the first-stage regression for equation (8) is

$$\Delta y_t - E_{t-1}\Delta y_t = \mu + \theta(\Delta o_t - E_{t-1}\Delta o_t) + u_t, \tag{9}$$

where $(\Delta o_t - E_{t-1}\Delta o_t)$ denotes the oil price forecast errors. Because Δo_t is an important source of variation in Δy_t, this will result in a strong estimated first-stage relationship between oil price and output growth forecast errors. Moreover, the residuals of equation (8), estimated with 2SLS, will be uncorrelated with the error term in equation (5) and satisfy $E[\varepsilon_t, \eta_t] = 0$.

The results are reported in Table (1). According to panel A, growth expectational errors are statistically significantly different from zero and have a positive sign that means that the non-discretionary (or automatic) fiscal policy is procyclical in the sample countries. The first-stage regression results, reported in panel B, indicate that the statistical identification of discretionary fiscal policy comes primarily from a strong first-stage relationship between oil price forecast errors and growth expectational errors.

As a robustness check, we regress fiscal spending forecast errors on oil price forecast errors. According to panel C, the correlation between oil price and fiscal spending forecast errors are not statistically significantly different from zero. This finding supports our assumption about the choice of the instrumental variable.

In the next section where we report our results, we report also the results that are based on a specification where fiscal shocks are identified as residuals of an OLS regression of fiscal spending forecast errors on oil price forecast errors,

$$\Delta g_t - E_{t-1}\Delta g_t = \mu + \vartheta(\Delta o_t - E_{t-1}\Delta o_t) + \varepsilon_t. \tag{10}$$

Table 1: Fiscal Shocks Panel Regression

Panel A. 2SLS estimates (Dependent variable is government spending growth forecast error)	
Real GDP growth forecast error	3.663*
	(1.994)
Weak instrument consistent 95% confidence interval	[-0.245, 7.571]
Panel B. First-stage regression (Dependent variable is real GDP growth forecast error)	
Oil price growth forecast error	0.111***
	(0.0334)
First-stage F-statistic on excluded instrument	11.02
Panel C. OLS estimates (Dependent variable is government spending growth forecast error)	
Oil price growth forecast error	0.489
	(0.422)
Observations	533
Number of countries	27

Notes: Heteroskedasticity-consistent standard errors are clustered at the country level. All regressions are estimated using pooled country-year data and include a full set of country and year fixed effects. All regressions include first and second lags of the changes in real GDP and fiscal spending. Weak instrument consistent confidence interval is computed using the Moreira (2003) conditional likelihood ratio statistic. Significance levels: $***$ p$<$ 0.01, $**$ p$<$ 0.05, $*$ p$<$ 0.1

Fiscal policy shocks ε_ts are orthogonal to oil price forecast errors ($\Delta o_t - E_{t-1}\Delta o_t$).

To maintain the cross-country heterogeneity, we perform the regressions for each country[8] and save the residuals as country-specific fiscal shocks. Figure (1) displays the distribution of fiscal shocks that correspond to different identification methods. The distributions are symmetrical with zero mean, regardless of the identification methodology. Figure (2) illustrates the correlation between fiscal shocks corresponding to different identifications. While there is an almost perfect correlation between shocks that correspond to Abiad et al. (2016), those that correspond to Auerbach and Gorodnichenko (2013), and the OLS shocks, there seems to be no meaningful correlation between 2SLS and the other shocks.

3.2 Baseline (Linear) Model

Adding the panel aspects of the data, we estimate a modified version of equation (5) as our baseline at different horizons $h = 0, 1, \ldots, H$,

$$y_{i,t+h} - y_{i,t-1} = \alpha_{ih} + \varphi_{ih}\varepsilon_{i,t} + \sum_{s=1}^{S} \gamma_{is}\Delta g_{i,t-s} + \sum_{s=1}^{S} \kappa_{is}\Delta y_{i,t-s} + \sum_{s=0}^{S} \theta_{is}\Delta o_{t-s} + \nu_{ih} + \tau_{th} + \eta_{ith}, \tag{11}$$

where $y_{i,t}$ and $g_{i,t}$ are the logarithm of real GDP and government spending for country i at time t, τ_{ht} and ν_{hi} control time and country effects at horizon h and Δ is the first difference operator. The parameter of interest in this model is φ, which reflects the output effect of fiscal shocks ε. We employ the local projection approach of Jorda (2005) to construct the impulse responses $\{\hat{\varphi}_h\}_{h=0}^{H}$. The projection approach, as advocated by Stock and Watson (2007) and Auerbach and Gorodnichenko (2012a), is more flexible than its alternatives, vector autoregression and autoregressive-distributed lag models, and does not impose any dynamic restrictions embedded in the alternatives.[9] Furthermore, we control for lagged fiscal spending and growth as well as global oil prices, to remove any movements predictable by lags of government spending, output, and oil price.

4 Estimates of the Government Spending Multiplier

In this section, we show the results for four specifications, each corresponding to one of the identification schemes: (1) fiscal shocks are identified as fiscal spending forecast errors (Abiad et al., 2016); (2) fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables (Auerbach and Gorodnichenko,

[8]Table (3) provides the list of sample countries along with a summary of their statistics.

[9]Later, when we analyze non-linear dynamic responses, this feature becomes of particular interest.

2013); (3) fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors (OLS); and (4) fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors (2SLS).

As noted before, using fiscal spending forecast errors to identify fiscal shocks does not address the endogeneity issue, i.e. government spending can respond endogenously to the state of the economy. We propose to employ the 2SLS methodology to address this issue. Therefore, when reading the results, one should consider the 2SLS as our results while the other results are presented for comparison.

4.1 Baseline Government Spending Multiplier

According to panel A in Table (2), benchmark fiscal multipliers are all highly statistically significant. The multipliers are calculated using fixed-effect panel coefficients on fiscal shocks (Table 4) divided by the sample average government spending-to-GDP ratio, 29.28%. The first column in Table (2) reports the benchmark (linear model) multipliers based on equation (11). Moving from the crudest fiscal shock measure (equation 6)–fiscal shocks are identical to fiscal spending forecast error, to 2SLS (equations 8 and 9)–fiscal shocks are purified from expectational errors, the size of the multiplier decreases significantly. This is consistent with our previous discussion that without controlling for simultaneity, i.e. expectational errors, we can see the biased effect on parameter estimates reflected in the large increase in output due to what appears to be a modest increase in current government spending. The shock, in this case, is partly due to an automatic response to macroeconomic shocks.

The highest multiplier (1.6) corresponds to Abiad et al. (2016) identification scheme where fiscal shocks are identical to fiscal spending forecast errors. Using fiscal shocks obtained from equation (4) (Auerbach and Gorodnichenko, 2013) results in a similar multiplier (1.5) which indicates that fiscal spending forecast errors are almost identical to residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables. In other words, there is not much information in lagged macroeconomic variables to explain fiscal spending forecast errors, hence the equal size of the multipliers. More importantly, the size of the multiplier seems to remain unchanged when we introduce oil price shocks directly (instead of using them as instrument variable) by estimating equation (10). This is an important finding. It means that oil price forecast errors are orthogonal to fiscal spending forecast errors and hence an appropriate instrument for expectational shocks. Finally, the multiplier is estimated to be 0.41 based on fiscal shocks that are purified from expectational errors based on 2SLS estimation of equation (8).

The evidence seems to be in favor of the lowest multiplier (0.41). Overall, oil-exporting, developing economies are highly dependent on import and imports offset the effect of fiscal policy (Ramey, 2011a). Fiscal spending expansions crowd out private consumption (Auerbach and Gorodnichenko, 2012b). The mechanisms through which fiscal policy works in these economies are inefficient (Sadeghi, 2018; Berg et al., 2012) and in the absence of an accommodating and independent monetary policy, the rise in interest rates, in response to an expansion in government spending, crowds out private investment and offsets any positive impact that fiscal policy may have (Leeper, 1991, 1993).

Given the noisy and highly-imperfect data on government spending and output in many of the developing countries that comprise our sample, a somewhat generic first concern is that the results might be driven by a small number of influential observations. To investigate this possibility, we re-estimate the multipliers for each country. Table 5) reports the country multipliers. To calculate the country multipliers, we divide the fiscal shock coefficient $\hat{\phi}$ by the average of government spending-to-GDP ratio for each country during its sample period.

Figure (3) displays the sample distribution of country multipliers for each identification methodology. According to the top two and the bottom left histograms, the estimated multiplier for more than half of the countries ranges between 0.0 and 2.0 while another 40% fall in between 2.0-3.8. Once we control for expectational errors (the bottom right panel), more than 60% of country multipliers fall below 0.4 while the rest range between 0.4-1.0. The only country that has an expectational-error-adjusted multiplier above (but close to) 1.0 is Kuwait with a multiplier of 1.13.

Figure (4) shows the country rankings across the sample. Comparing panel (a) with (b), we can see that purifying fiscal shocks from the automatic response moves Algeria, Ecuador, Iran, Oman, Qatar, and UAE down, implying the pro-cyclicality of fiscal policy in these countries and that once the automatic response of fiscal spending to economic conditions is removed, the output effect of fiscal policy decreases. The rest of the countries remain almost unchanged. Kuwait and Chad have the largest multipliers while Angola, Bahrain, Republic of Congo, Libya, Nigeria, Turkmenistan, Venezuela, and Yemen are among the ten lowest multipliers, regardless of the identification methodology. Figure (5) shows that country multipliers are positively correlated across different identification methodologies. It means that, in oil-exporting, developing economies, there is a good amount of homogeneity with regards to how fiscal policy responds to economic shocks, hence removing expectational

Table 2: Short-Term Government Spending Multipliers

	Benchmark	State-dependent multipliers			
		Domestic business cycles		*Global oil price cycles*	
	(Linear)	*Recession*	*Expansion*	*Recession*	*Expansion*
Panel A. Panel estimates					
Abiad et al. (2016)	1.6***	6.5***	-5.2***	5.2***	-3.8***
Auerbach et al. (2013)	1.5**	4.4***	-2.1	5.6***	-4.2***
OLS	1.4**	4.3***	-2.0	5.7***	-4.1***
2SLS	0.4***	0.7**	-0.4	0.8**	-0.20*
Panel B. Average country estimates					
Abiad et al. (2016)	1.9	4.9	-4.6	5.1	-3.0
Auerbach et al. (2013)	1.9	3.4	-2.4	4.3	-3.2
OLS	1.8	3.1	-1.9	4.0	-2.4
2SLS	0.3	0.5	-0.2	0.5	-0.4
Observations:	533				
Number of countries:	27				

Notes: Panel A reports short-term fiscal multipliers based on fixed-effect panel regressions. Panel B reports the average fiscal multipliers based on robust OLS regressions at the country level. All regressions include first and second lag of changes in real GDP, fiscal spending, and oil price as well as changes in current oil prices. (Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1) errors affects each country in the same way–lowers the multiplier.[10]

Figure (6) provides further information on the response of output to fiscal spending shocks, estimated based on equation (11). According to the top left panel, a 1.0 percent fiscal spending shock brings about 0.5 percent real GDP growth within the same year and 0.33 percent growth in the year after. Given that the sample average for the total government spending-to-GDP ratio is about 29.28 percent, it means that a \$1.0 increase in government spending brings about a \$1.61 increase in real GDP within the first year. In contrast, the output gain, due to a \$1.0 increase in government spending, reduces to \$0.41 once expectational errors are controlled for (bottom right panel). Over the first two years, the cumulative output gain, in response to a \$1.0 increase in government spending, reaches \$2.5, according to the top left panel, and \$0.66, according to the bottom right panel. The effect of the shock seems to be short-lived as it dies out by the third year. The output responses based on other identification strategies (the top right and the bottom left panels) are in between the two cases discussed above and closer to the top left analysis. Figure (7) provides the cumulative impulse responses.

In summary, the benchmark results in this section suggest that the one-year government spending multiplier is in the vicinity of 0.4, and moreover is reasonably precisely estimated. Specifically, I find that the multiplier is significantly different from zero and also significantly less than one. The findings are robust to the incorporation of country-specific information.

4.2 Cyclical Properties of State-Dependent Fiscal Multipliers

The panel structure of our dataset allows us to empirically examine a variety of possible hypotheses regarding differences in spending multipliers across countries and over time. This section explores the role of the state of the business cycle as a potential source of heterogeneity in estimated multipliers. To investigate this possibility, we extend equation (11),

$$\begin{aligned} y_{i,t+h} - y_{i,t-1} &= \alpha_{ih} + \varphi_{ih}^{R} F(z_t)\varepsilon_{it} + \varphi_{ih}^{E}(1 - F(z_t))\varepsilon_{it} + \sum_{s=1}^{S} \kappa_{is}^{R} F(z_{t-s})\Delta y_{it-s} \\ &+ \sum_{s=1}^{S} \kappa_{is}^{E}(1 - F(z_{t-l}))\Delta y_{it-s} + \sum_{s=1}^{S} \gamma_{is}^{R} F(z_{t-l})\Delta g_{it-s} + \sum_{s=1}^{S} \gamma_{is}^{E}(1 - F(z_{t-l}))\Delta g_{it-s} \\ &+ \sum_{s=0}^{S} \theta_{is}^{R} F(z_{t-l})\Delta o_{t-s} + \sum_{s=0}^{S} \theta_{is}^{E}(1 - F(z_{t-l}))\Delta o_{t-s} + \nu_{ih} + \tau_{th} + \eta_{ith} \end{aligned} \tag{12}$$

[10] There is abundant evidence on the pro-cyclicality of fiscal policy in oil-exporting, developing economies (Villafuerte and Lopez-Murphy, 2010; Frankel, 2011; El Anshasy and Bradley, 2012).

where $y_{i,t}$ and $g_{i,t}$ are the logarithm of real GDP and government pending for country i at time t, o_t is the logarithm of real oil price, ν_{ih} and τ_{th} control country and time fixed effects, and Δ is the first difference operator. The parameters of interest are φ^R_{ih} and φ^E_{ih}. They represent the output response to fiscal shocks during recessions (R) and expansions (E).

Following Granger and Terasvirta (1993), we introduce a transition function $F(z)$ that allows distinguishing between recessions and expansions:[11]

$$F(z_t) = \frac{e^{-\omega z_t}}{(1+e^{-\omega z_t})}, \omega > 0$$
$$var(z_t) = 1, E(z_t) = 0,$$

where z is a mean-zero index (normalized to have unit variance so that ω is scale invariant) of the business cycle, with positive z indicating an expansion. The parameter ω controls the rate of transition between boom and recession. In the limit when $\omega = 0$, the model degenerates into a threshold model. As its value increases, the rate of transition between the two states of the market increases. Following (Chan, 1993), we use a grid search method to set the value of ω endogenously. Auerbach and Gorodnichenko (2012b) calibrate $\omega = 1.5$ for the US. Abiad et al. (2016) and Furceri and Li (2017) use 1.5 based on Auerbach and Gorodnichenko (2012b). To calibrate ω at the country level, we start at 1.1 for each country and end up with a range of ωs between 1.1 and 1.9. [12] The estimates $(\alpha, \varphi^R, \varphi^E, \kappa^R, \kappa^E, \gamma^R, \gamma^E, \theta^R, \theta^E, \nu, \tau, \omega)$ jointly minimize the sum of squared residuals $(\eta'\eta)$. Since $(\eta'\eta|\omega)$ is linear in $(\alpha, \varphi^R, \varphi^E, \kappa^R, \kappa^E, \gamma^R, \gamma^E, \theta^R, \theta^E, \nu, \tau, \omega)$, we estimate equation (12) sequentially for each possible value of $\omega_i \in [\underline{\omega}_i, \overline{\omega}_i]$, yielding a ω-dependent sum of squared errors, $(\hat{\eta}_i'\hat{\eta}_i|\omega_i)$. The estimate ω_i^* is the value that minimizes $(\hat{\eta}_i'\hat{\eta}_i|\omega_i^*)$:

$$E[inf_{\omega_i \in \Omega_i}(\hat{\eta}_i'\hat{\eta}_i|\omega_i)] \rightarrow \omega_i^*.$$

The results are shown in columns 2 and 3 of Table 2. Column 2 reports the results for recessions and column 3 for expansions. Each column shows two sets of results: panel A reports the multipliers that are estimated based on panel estimates (Table 6) and panel B

[11]The key advantage of using a smooth-transition function rather than a threshold is that we can use the full sample for estimation, which makes our estimates as precise and robust as possible, and it helps to prevent the selection of an ad hoc threshold. Moreover, it avoids the discontinuity in the dynamics of the model or any misspecification that may be caused by that.

[12]We specify a bounded set between 1.1 and 1.9 for ω for each country i, $\Omega_i = [\underline{\omega}_i, \overline{\omega}_i]$. This would ensure that the model is well defined.

reports sample average of country multipliers based on Table (7) for recession and Table (8) for expansion.

Consistent with the theory, we find that estimated multipliers are much larger during recessions than booms in all four specifications, i.e. Abiad et al. (2016), Auerbach and Gorodnichenko (2013), OLS, and 2SLS. The average country estimates (panel B) are consistent with fixed-effect panel estimates (panel A). The multipliers are positive and significantly different from zero during recessions and negative but insignificantly different from zero during booms.

The difference in the estimates (recession versus expansion) is statistically significantly different from zero with Wald test F-statistics above 8 in all cases. In the case where expectational errors are not controlled for, the multipliers range between 4.3 to 6.5 in recession and -2.0 to -5.2 in expansion and they are larger than the baseline in absolute terms. Similarly, in the case of 2SLS, the estimated multiplier is larger during a recession than the baseline, 0.68 versus 0.41, and the multiplier is negative (-0.41) during a boom. This evidence is broadly consistent with the view that there is greater scope for spending increases to stimulate economic activity during recessions rather than during booms.

Figure (8) displays the sample distribution of country multipliers, for all four cases, in two panels. Panel A corresponds to recession and panel B to expansion. According to panel A, more than 95% of country multipliers are positive in recession. In the case of 2SLS, 90% of spending multipliers fall below 1.0. According to panel B, results are mixed during expansion. The multiplier distributions cover both negative and positive areas, although the mean is in the negative territory. Figure (9) provides a country snapshot of fiscal multipliers during economic expansion and recession.

Figure (10) illustrates the correlation between country multipliers across different identification schemes. Panel A reports the results for recession and panel B for expansion. According to panel A, the correlation is positive, although it is weak between the multipliers that are based on Abiad et al. (2016) and the 2SLS multipliers. The correlation is positive and stronger during economic expansion.

Figures (11) and (12) provide further information on the response of output to fiscal spending shocks during recessions and expansions, estimated based on equation (12). In all four cases, the output response to a fiscal shock is positive and statistically significant. According to the top left panel in Figure (11), a 1.0 percent increase in fiscal spending during a recession brings about 1.9 percent real GDP growth within the first year and 1.0 percent growth in the second year. Given that the sample average for the total government spending-to-GDP ratio is about 29.28 percent, it means that a $1.0 increase in government spending in recessions brings about a \$6.5 increase in real GDP within the first year. In contrast, a \$1.0 increase in government spending during recessions, when we control for expectational errors, brings about only \$0.70 in the first year (the bottom right panel in Figure (11)). As in the baseline, the effect of the shock seems to dissipate completely in two years (one year, in the case of 2SLS). According to Figure (12), the output response to a fiscal shock is negative during expansions. Although the immediate negative response by output makes sense economically, the coefficients are small relative to estimated standard deviations, leaving the impulse responses statistically insignificantly different from zero. Figures (13) and (14) provide the cumulative impulse responses for the recession and expansion periods.

In summary, the state-dependent results in this section suggest that the one-year government spending multiplier during recessions is near 0.7, and is statistically significantly different from zero. The multiplier in booms is -0.4, although it is not significantly different from zero. The findings are robust to the incorporation of country-specific information.

4.3 Fiscal Multipliers And Global Oil Price Cycles

Oil-exporting, developing countries often experience large movements in their exports receipts as a result of sharp swings in global oil prices. A major part of oil revenue, if not all of it, is accrued to governments, in oil-exporting, developing economies, and thus governments play an important role in how the resource-related revenue is used. In this section, we investigate the behavior of expenditure policy during boom-bust in oil price cycles and its implication for output movements. The model is similar to the equation (12). Variable z is an index of the global oil price cycles rather than domestic business cycles, with positive z indicating a boom in the oil market. To match the data, we set the value of $\omega = 1.7$.

The results are reported in columns (4) and (5) of Table (2) in two panels. Panel A presents the multipliers that are based on fixed-effect panel estimates of Table (9) and panel B reports the sample-average country multipliers during busts based on estimates reported in Table (10) and during booms based on estimates reported in Table(11). First, the multipliers are statistically significantly different from zero during both oil price booms and busts. Second, the multipliers during oil price busts are positive while the multipliers during booms are negative and smaller (in absolute terms). According to column (4) in panel A, the 2SLS multiplier is in the vicinity of 0.8 while the other multipliers range between 5.2 and 5.7 during oil market downturns. The 2SLS multiplier is -0.2 during oil price booms while the other multipliers range between -3.8 and -4.2. The sample averages of country multipliers seem to be consistent with the multipliers that are based on fixed-effect panel estimates.

Figure (15) illustrates the distribution of country multipliers during downturns (panel A) and upturns (panel B) in the global oil market. According to 2SLS estimates, 85% of countries in the sample have a multiplier that is less than one during oil price busts. The results are mixed during oil price booms. Figure (16) provides further information in regards to where every country stands in terms of the size of its multiplier during the oil market downturns (panel A) and upturns (panel B). Finally, Figure (17) depicts the correlation of country multipliers across different identification schemes. There is a positive correlation between country multipliers across the various identification schemes, although the correlation weakens once expectational errors are removed.

Figures (18) and (19) provide further information regarding how output responds to a fiscal shock when global oil prices are persistently low, or high. The immediate output response to a unit fiscal shock is strong and statistically significantly different from zero. The response dies out completely within two years, regardless of the state of the oil market. In the case of 2SLS, a \$1.0 increase in fiscal spending increases the real GDP by \$1.2 in two years (\$0.75 in the first year and \$0.45 in the second year). Failing to control for expectational errors, the fiscal multiplier suggests that a \$1.0 increase in fiscal spending results in an \$8.0 increase in real GDP in two years (\$5.0 in the first year and \$3.0 in the second year). This is too high to be true for any country in our sample. Cumulative impulse responses during oil market downturns are displayed in Figure (20) and during upturns in Figure (21).

In summary, we estimate the multiplier to be 0.8 during oil price busts and -0.2 when the global oil market is in a boom. In other words, a discretionary fiscal stimulus could have a limited ability to boost domestic demand and support growth during global oil price busts but an expansion in government expenditure, when global oil prices are high, hurts the output. The output response to fiscal policy shocks, in developing, oil-exporting countries, is short-term and the effect of a fiscal stimulus disappears by the end of the second year. We find these findings robust to individual country specifications.

5 Conclusion

In this paper, we have used a novel strategy to identify fiscal shocks and estimate government spending multipliers. Our identification strategy exploits the fact that global oil price shocks are the main source of macroeconomic shocks in oil-exporting, developing countries. We identify fiscal shocks by using fiscal spending forecast errors. We measure forecast errors using the IMF WEO forecasts released in the fall of every year (usually in September or October). The key identifying assumption is that the oil price forecasts contribute to growth forecasts and so they contribute to the growth forecast errors within the same period, i.e. between September or October and December. Furthermore, we assume that adjustments in the fall oil price forecasts are factored in fiscal spending forecasts indirectly, i.e. only through their impact on growth forecasts and are lagged. Given this assumption, the adjustments in oil price forecasts in the fall of every year are attributable to adjustment in real GDP growth and are plausibly exogenous to contemporaneous fiscal spending forecast errors. Thus, oil price forecast errors can be used as an instrument for expectational errors to remove the endogeneity between fiscal spending and output. Deploying this strategy in a sample of 27 oil-exporting, developing countries, the resulting 2SLS estimates of the government spending multiplier are small and reasonably precisely estimated to be in the vicinity of 0.4. Concerning the timing and persistence of the shocks, the local projections show that the impact of fiscal shocks on output is short-lived. The output response becomes statistically significantly indifferent from zero by the end of the second year.

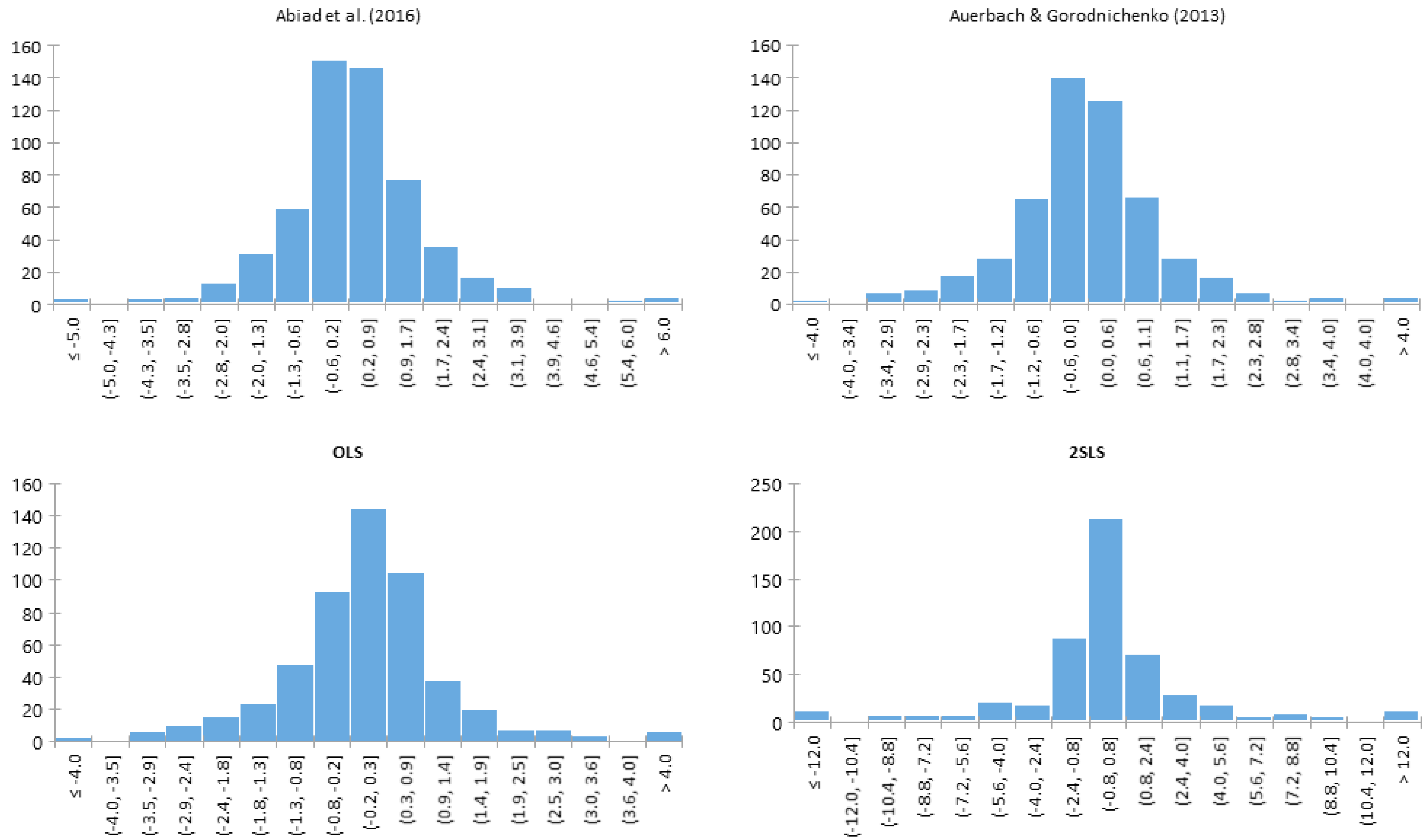
In the baseline model, we assume the economy starts in a steady-state in which capital is fully utilized and workers are fully employed. A key question is whether government spending multipliers can be greater if the economy starts with under-utilized resources, which is widely believed to be the case for oil-exporting, developing economies. The different estimated dynamics imply very large multipliers in recessions compared to expansions, between 0.7 and 0.8 in recessions and between -0.2 and -0.4 in expansions. Given the noisy and highly-imperfect data on government spending and output in many of our sample countries, a somewhat generic first concern is that the results might be driven by a small number of influential observations. To investigate this possibility, we re-estimate the multipliers for each country for the baseline (the linear model) and the state-dependent case (non-linear model). Then, we estimate the cross-sample average of country multipliers. The findings are robust to the incorporation of country-specific information.

To put these findings in context, it is useful to compare them with estimates of the government spending multiplier in the empirical literature, which has overwhelmingly been based on evidence from developed countries, most notably the United States. For the United States, Auerbach and Gorodnichenko (2012b) suggests that estimates of the federal government spending multiplier are 2.2 in recessions and -0.3 in expansions, while Ramey (2011a) suggests an overall multiplier ranging between 0.8 to 1.5. Moreover, Kraay (2012) suggests that estimates of the total government spending multiplier in low-income countries are in the vicinity of 0.5, while Kraay (2014) estimates the one-year spending multiplier for developing countries to be around 0.4. Ilzetzki et al. (2013) finds that, in developing countries, the response of output to increases in government consumption is negative (and not statistically significantly different from zero) and die out quite fast. The multiplier on government investment in developing countries is positive and larger than one. Furceri and Li (2017) finds an average public investment multiplier of about 0.2 for developing countries, while Espinoza and Senhadji (2011) suggests that estimates of the fiscal multiplier are between 0.3 and 0.7 for the six GCC economies (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates). The multipliers estimated in this paper for developing, oil-exporting countries are somewhat consistent with the short-term modest multipliers estimated for developing countries.

The small multipliers estimated in this paper suggest that the output effect of countercyclical discretionary fiscal policies are rather limited in response to economic downturns in developing, oil-exporting countries or when global oil prices are persistently low. Furthermore, the findings do not lend support to fiscal expansions at times when oil prices are favorable, and if anything, vote against it.

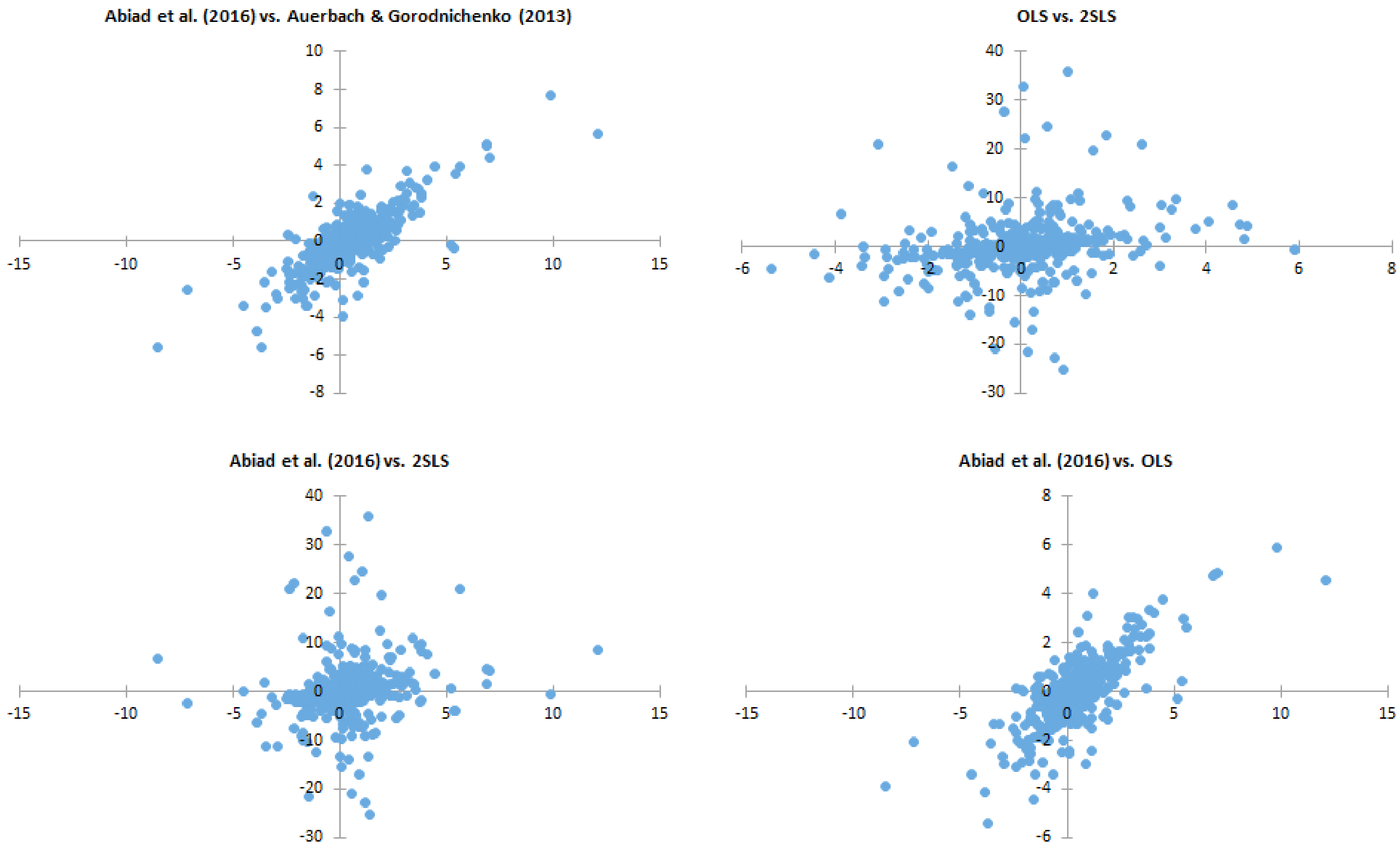
Finally, as noted in Kraay (2014), the findings of this paper should be interpreted with caution. Our empirical results apply only to the small set of countries and years included in our dataset, while the actual effects in particular situations might very well be different. Indeed, the limited evidence on cross-country heterogeneity in multipliers reported at the end of each set of results suggests that such differences may be important in reality, even if they are difficult to measure empirically. Furthermore, as noted in the introduction, our empirical estimates of aggregate multipliers are not "deep" structural parameters. As such, they are better interpreted as contributing a stylized fact on the correlation between changes in output and plausibly discretionary changes in government spending that can serve as an empirical reference point for further theoretical work on this issue, particularly as it applies to developing, resource-rich economies.

Figure 1: Shock Distribution Histograms



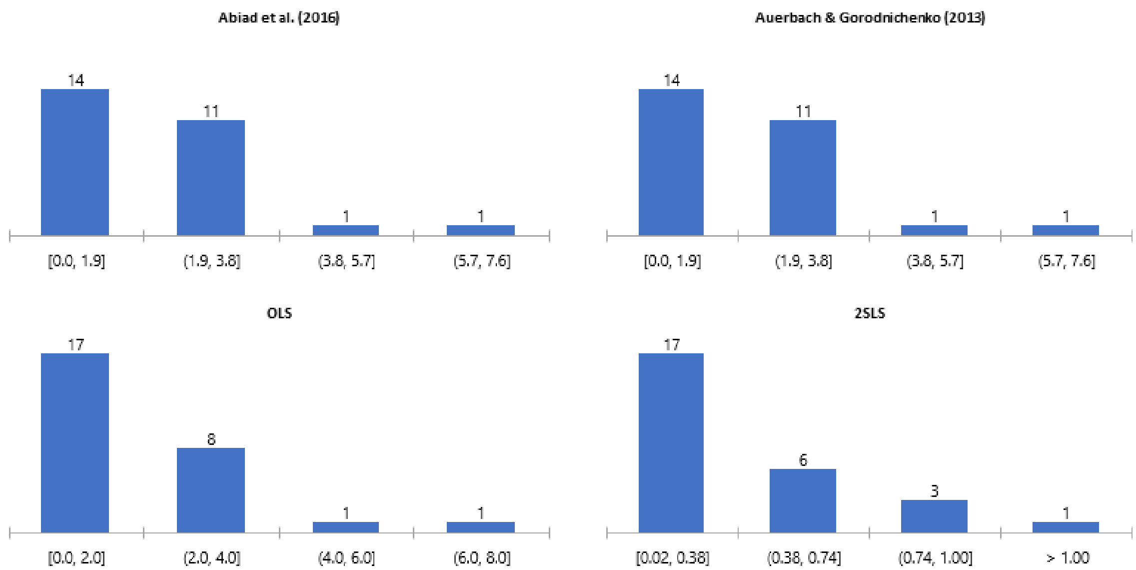
Note: Each panel corresponds to a different identification: Abiad et al. (2016): fiscal shocks are fiscal spending forecast errors; Auerbach & Gorodnichenko (2013): fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables; OLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and oil price forecast errors; 2SLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and output forecast errors proxied by oil price forecast errors.

Figure 2: Shock Correlation Scatter Plots



Note: Each panel corresponds to a different identification: Abiad et al. (2016): fiscal shocks are fiscal spending forecast errors; Auerbach & Gorodnichenko (2013): fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables; OLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and oil price forecast errors; 2SLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and output forecast errors proxied by oil price forecast errors.

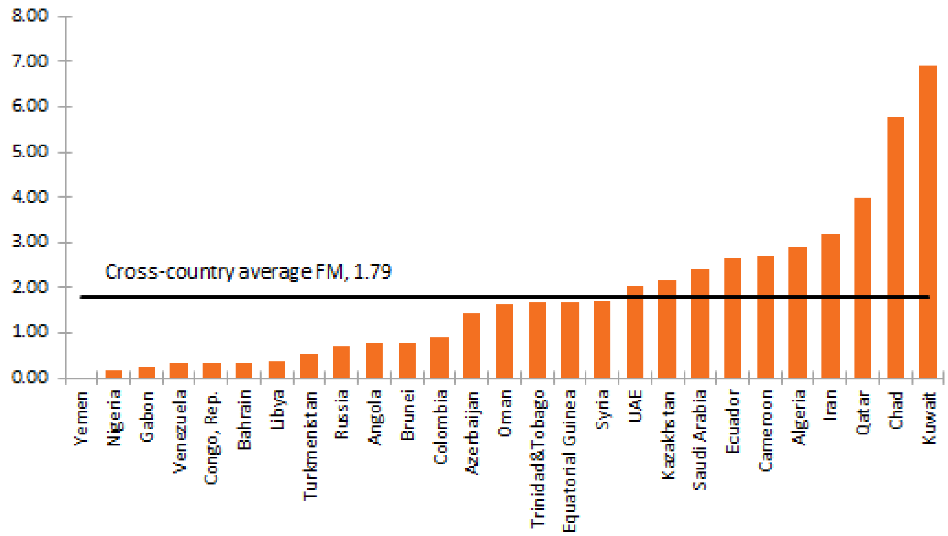
Figure 3: Distribution of Cross-Sample Country Fiscal Multipliers, Linear Model



Note: Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 4: Ranking of Cross-Sample Country Fiscal Multipliers, Linear Model

(a) Exogenous-Expectational-Errors-Adjusted (OLS)



(b) Endogenous-Expectational-Errors-Adjusted (2SLS)

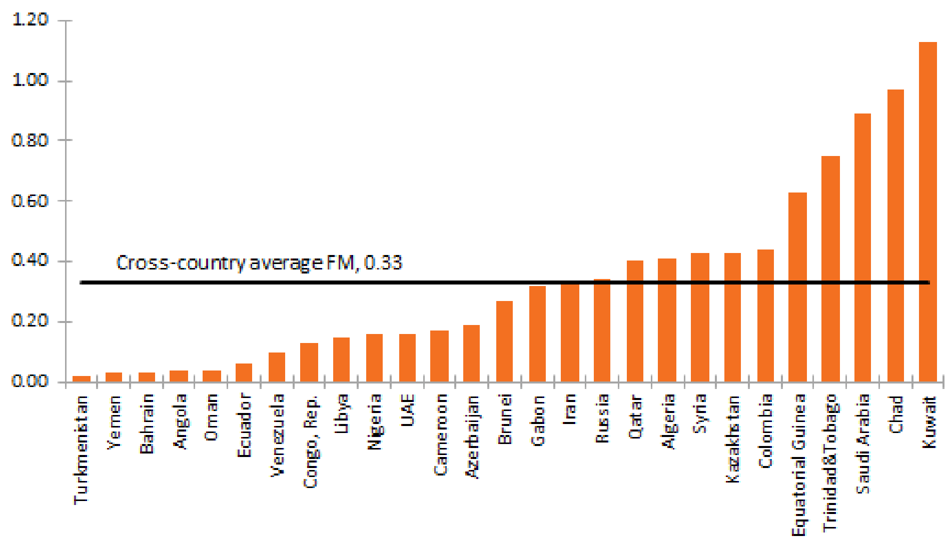
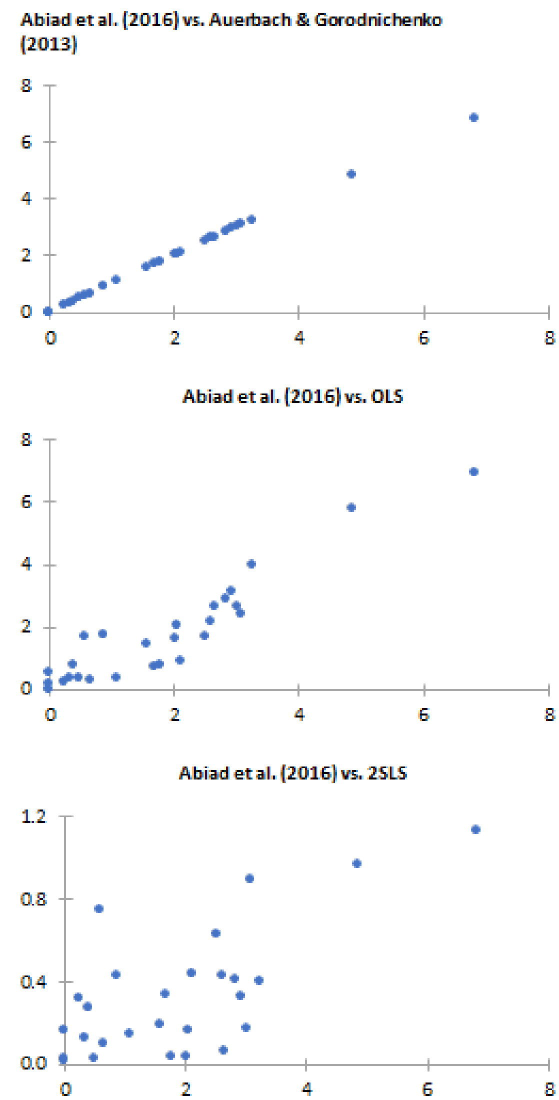
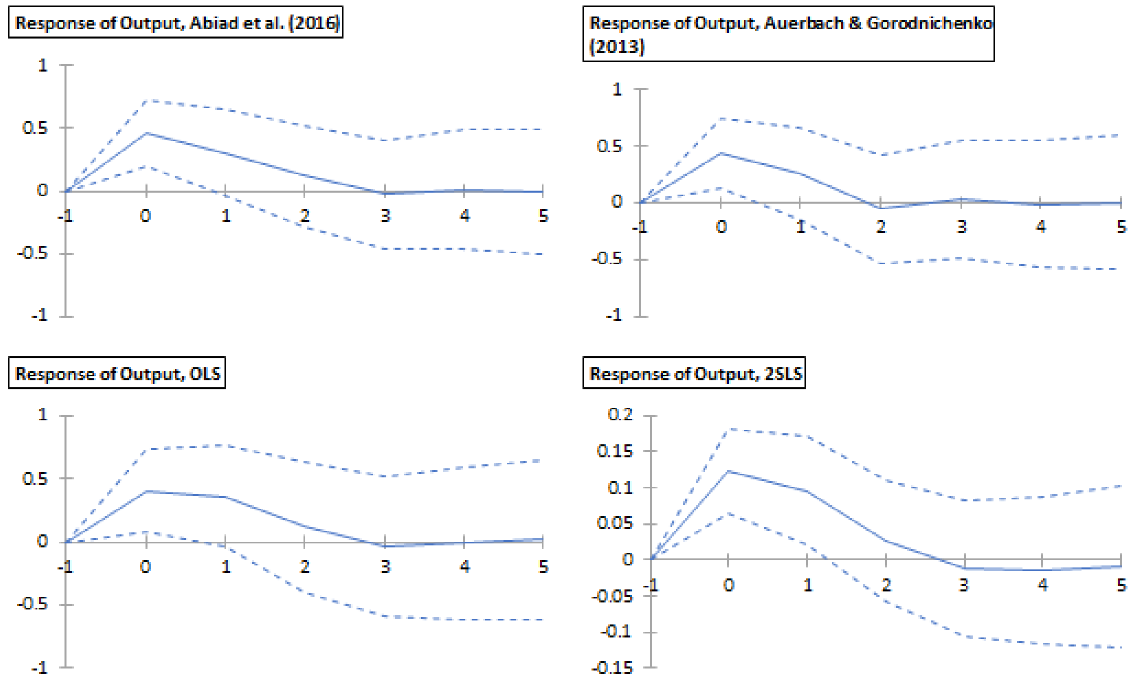


Figure 5: Correlation of Cross-Sample Country Fiscal Multiplier, Linear Model



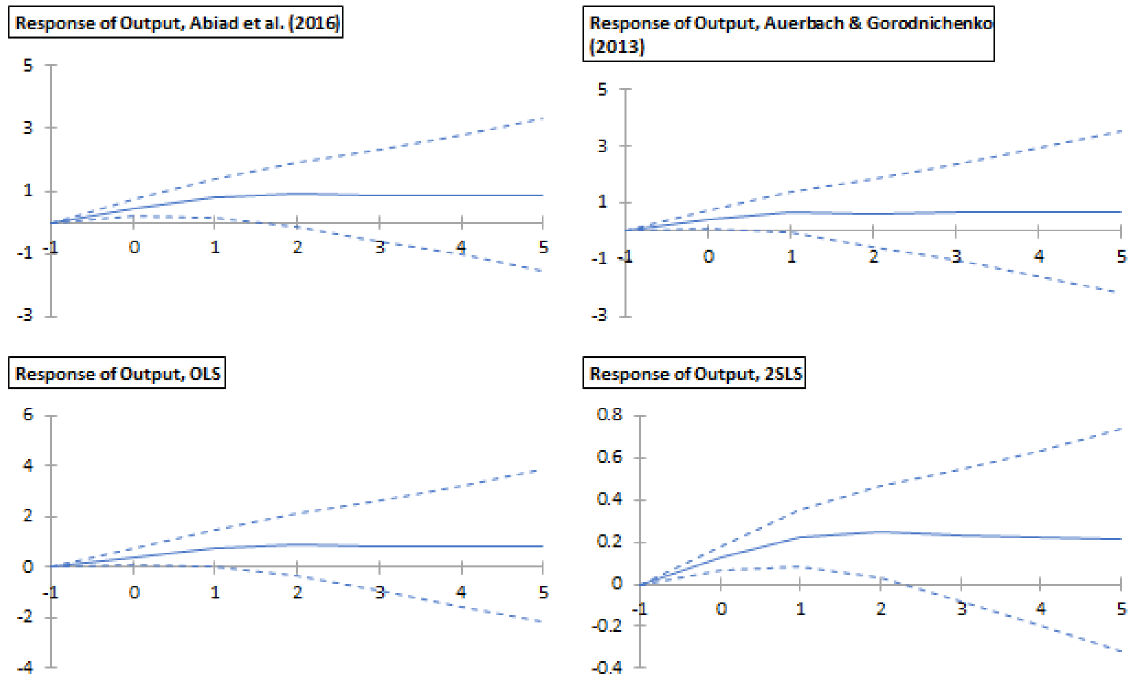
Note: The results are based on the following identification methodologies: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 6: Impulse Responses in The Baseline (Linear) Model



Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

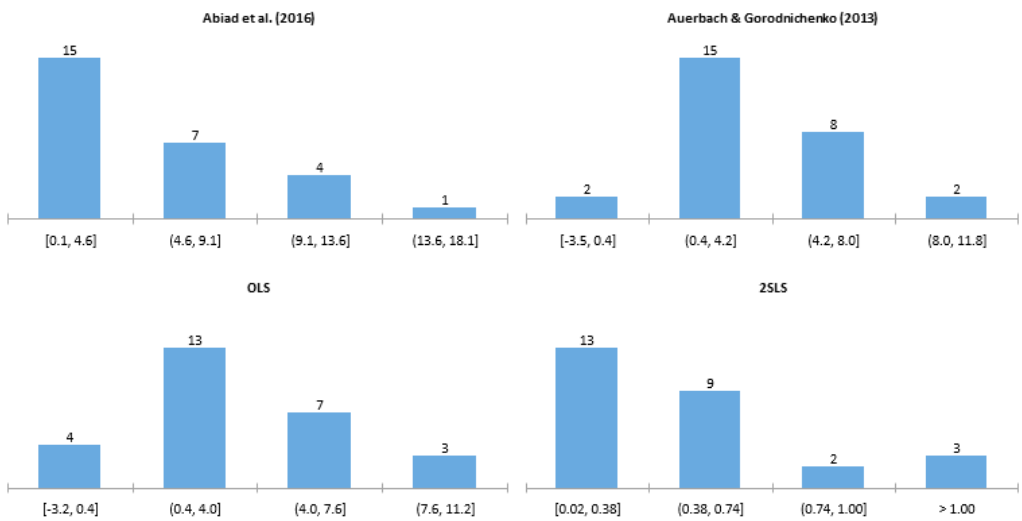
Figure 7: (Cumulative) Impulse Response in the Baseline (Linear) Model)



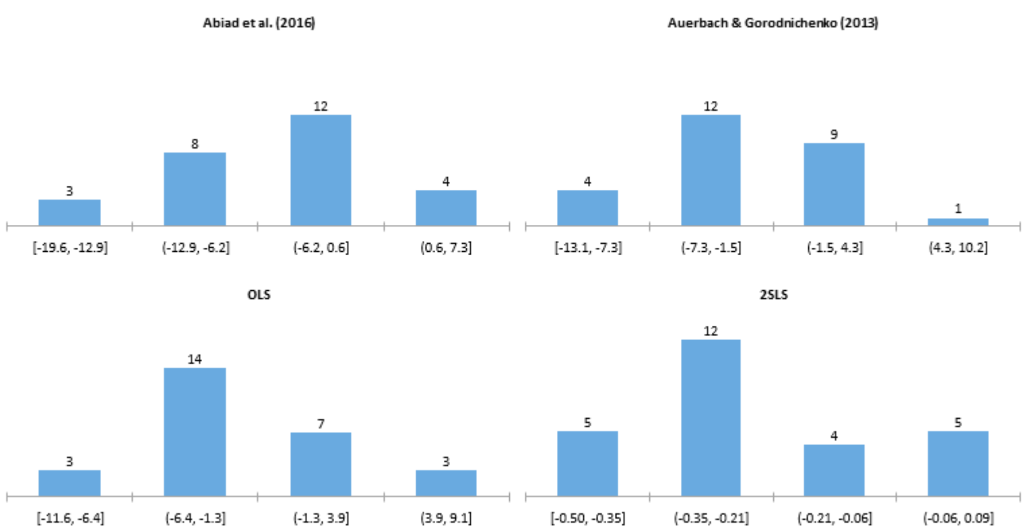
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 8: Distribution of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Recession



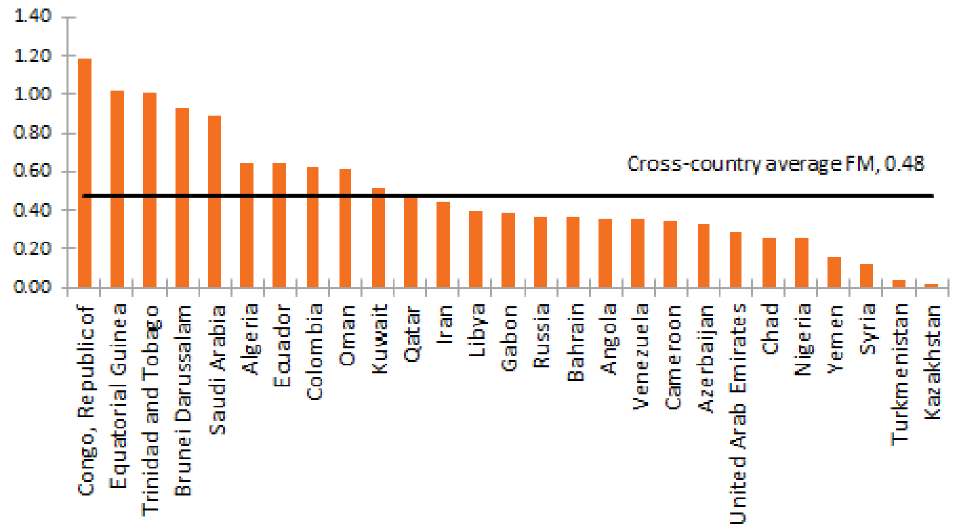
(b) Expansion



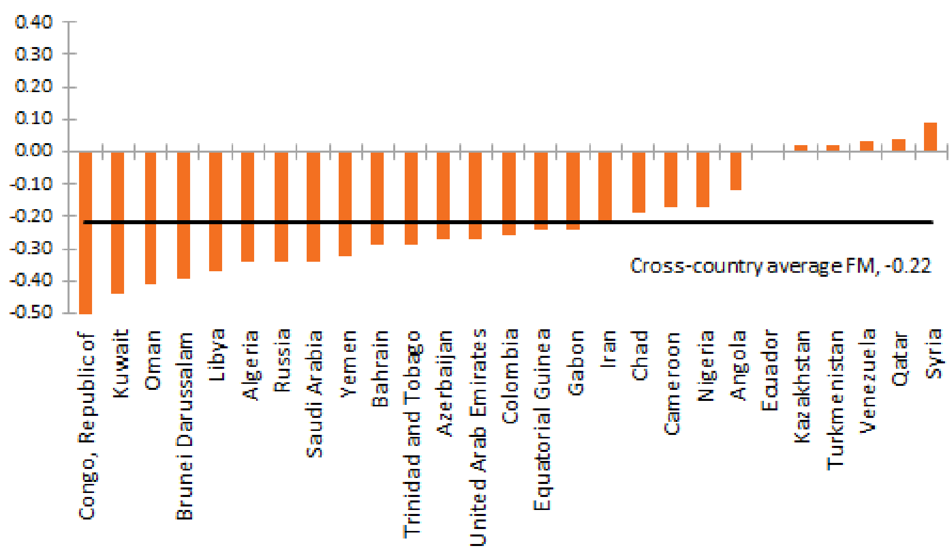
Note: Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 9: Ranking of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Recession



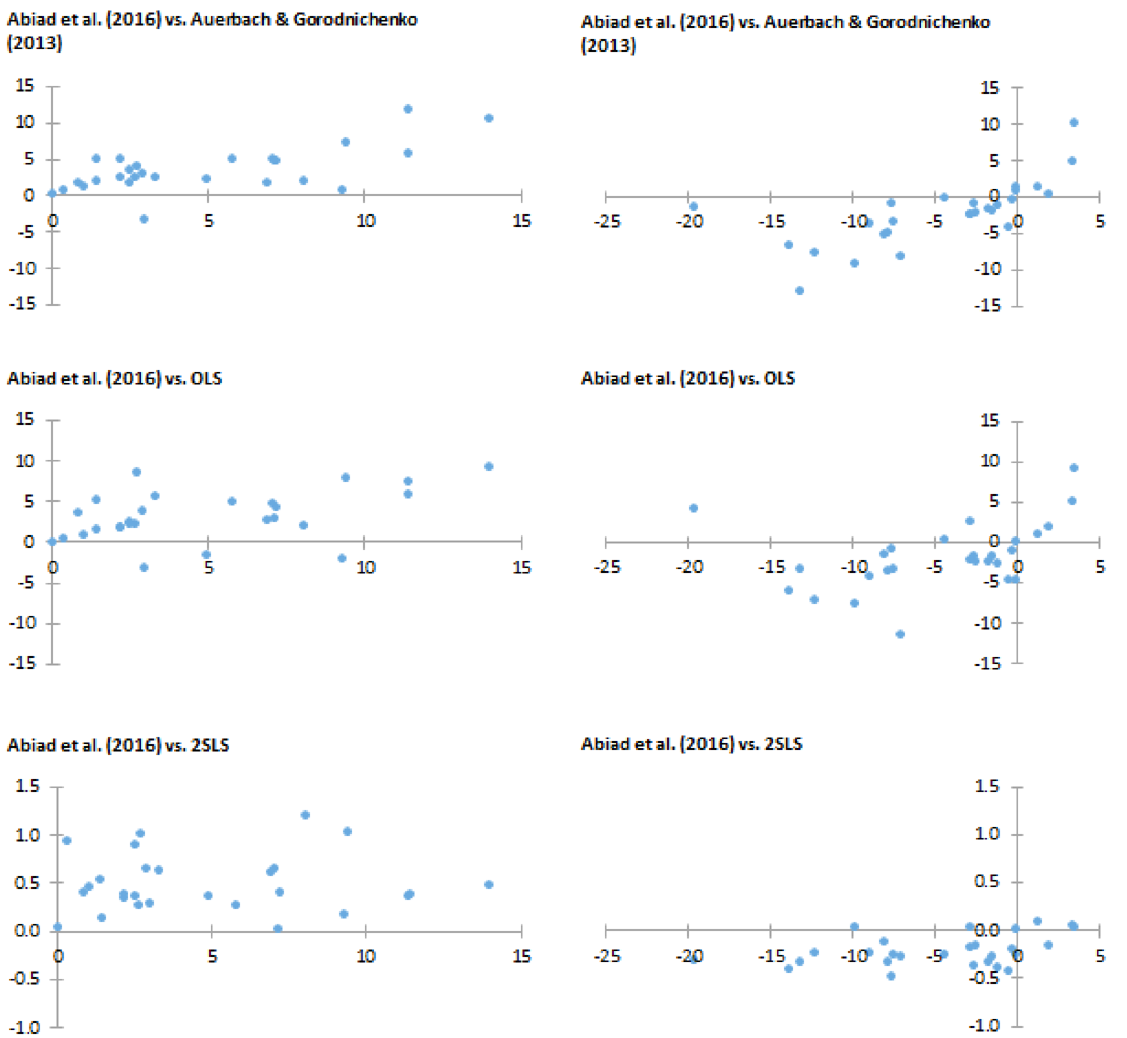
(b) Expansion



Note: This figure is based on the 2SLS identification strategy.

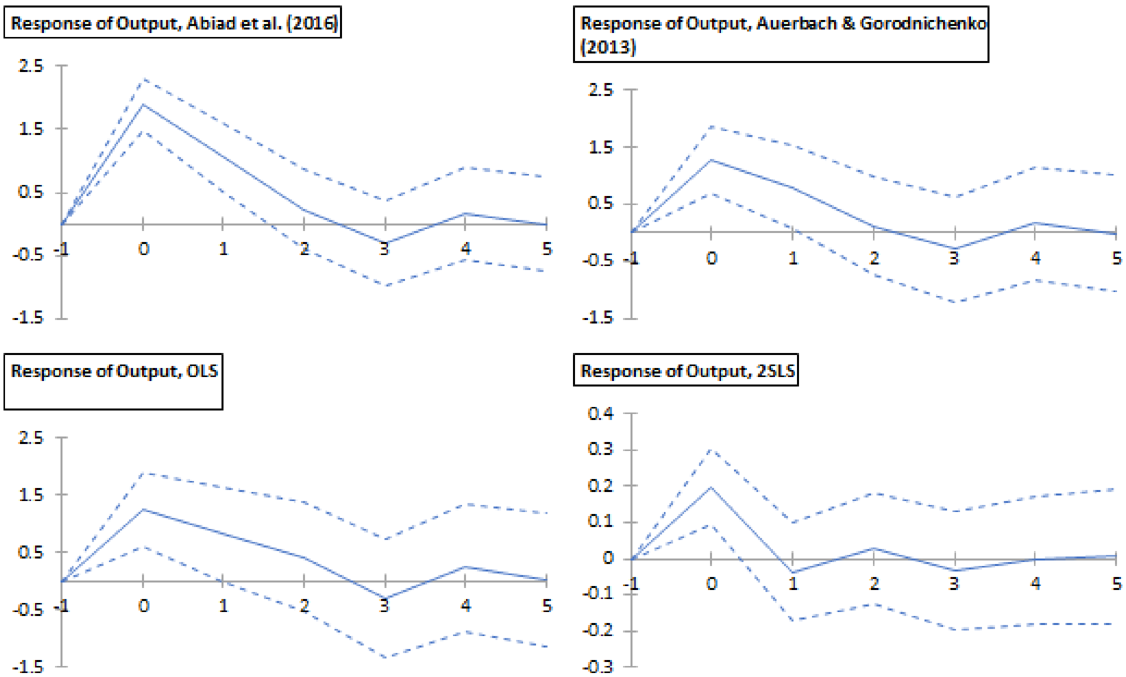
Figure 10: Correlation of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Recession (b) Expansion



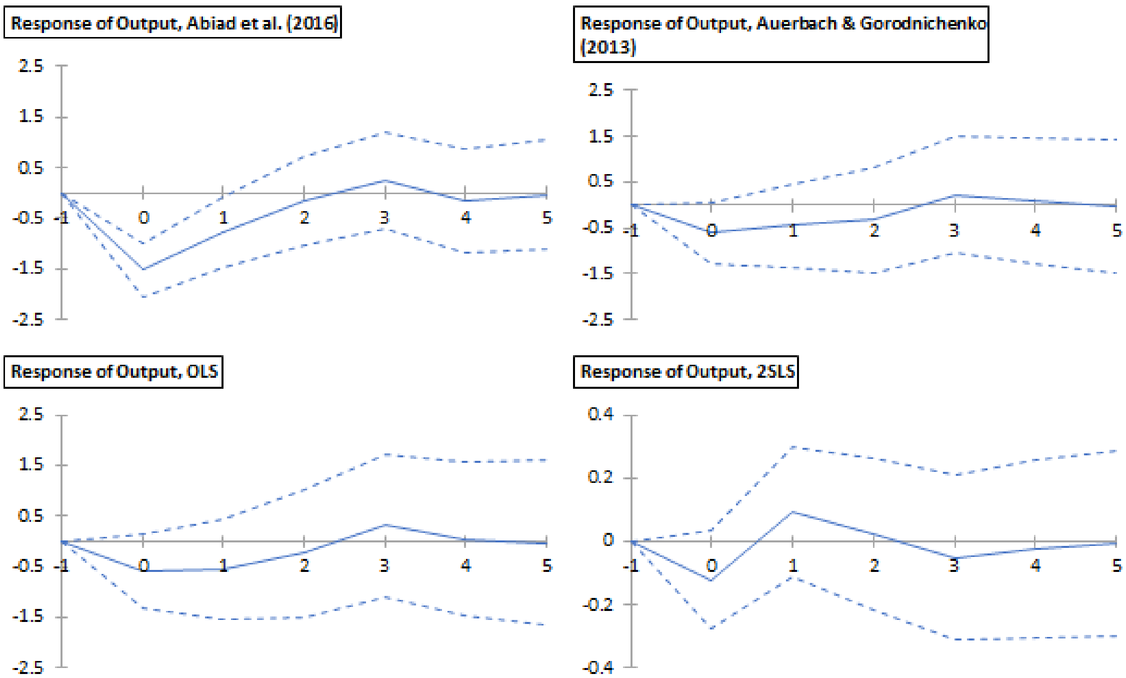
Note: The results are based on the following identification methodologies: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 11: Impulse Response During Recessions in the Non-Linear Model



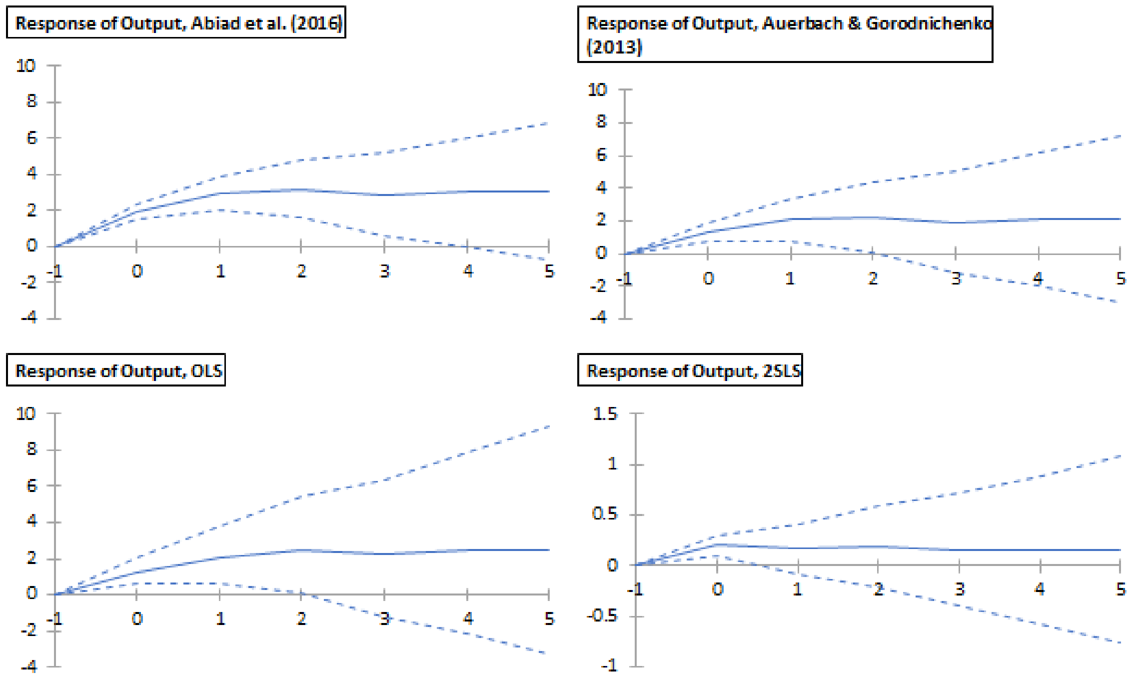
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 12: Impulse Response During Expansions in the Non-Linear Model



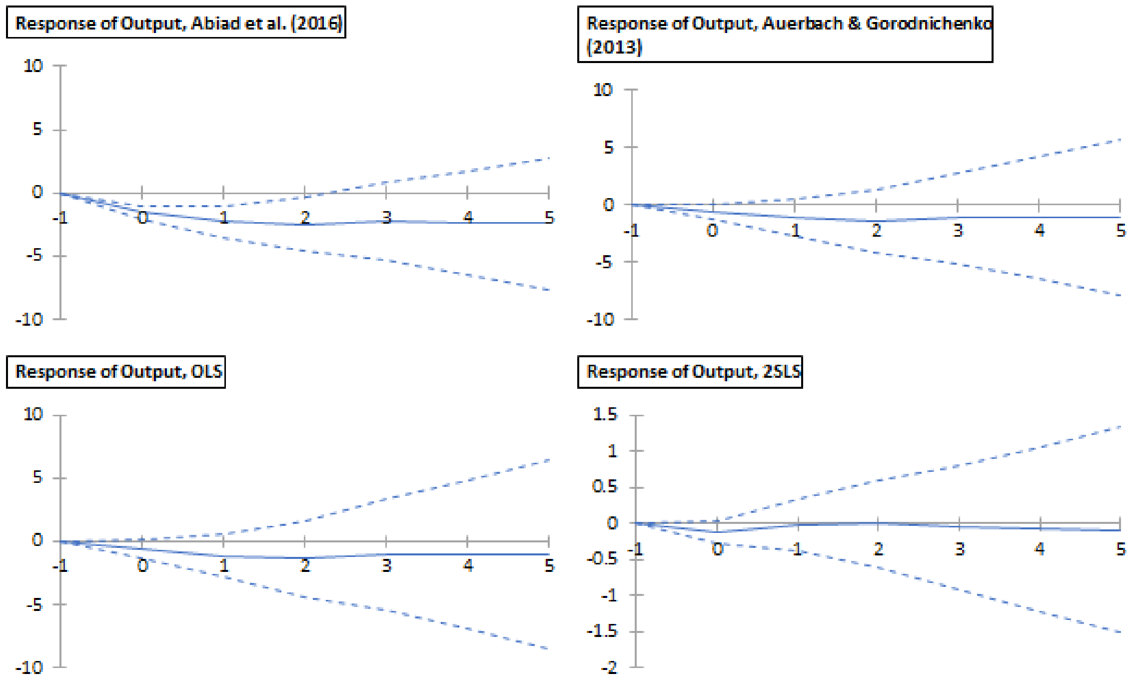
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 13: (Cumulative) Impulse Response During Recessions in the Non-Linear Model



Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

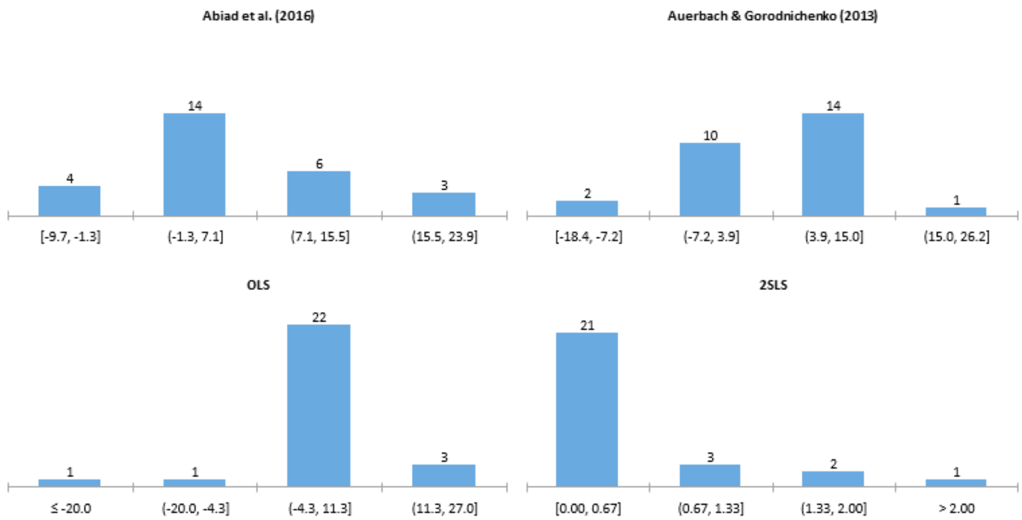
Figure 14: (Cumulative) Impulse Response During Expansions in the Non-Linear Model



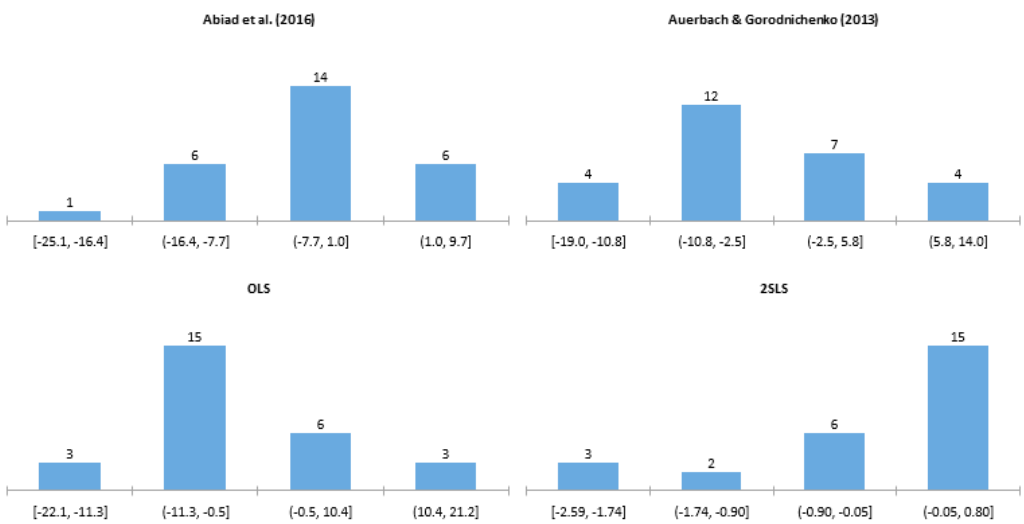
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 15: Distribution of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Oil Market Downturn



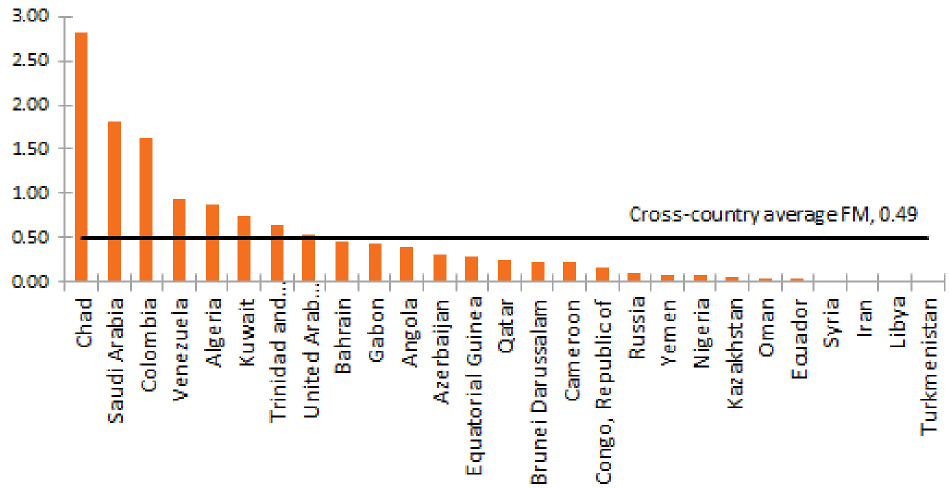
(b) Oil Market Upturn



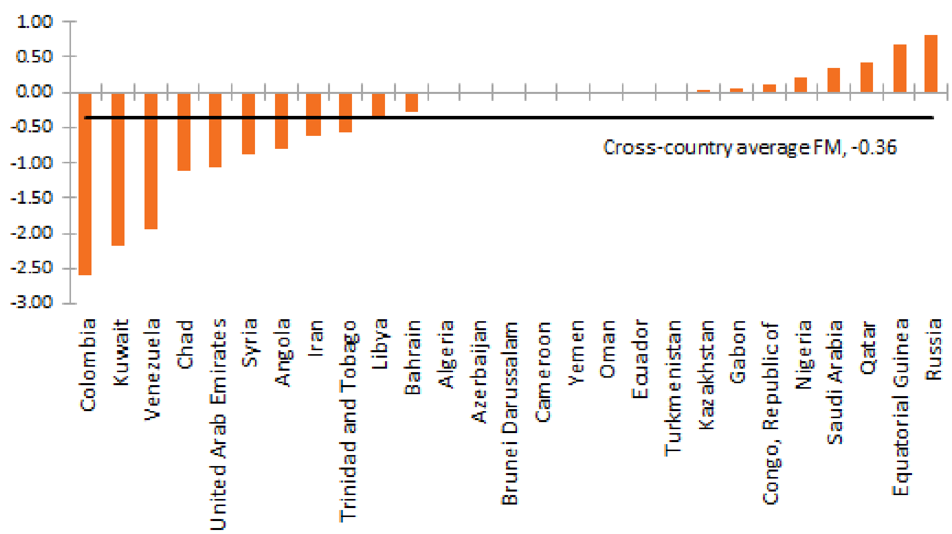
Note: Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 16: Ranking of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Oil Market Downturn



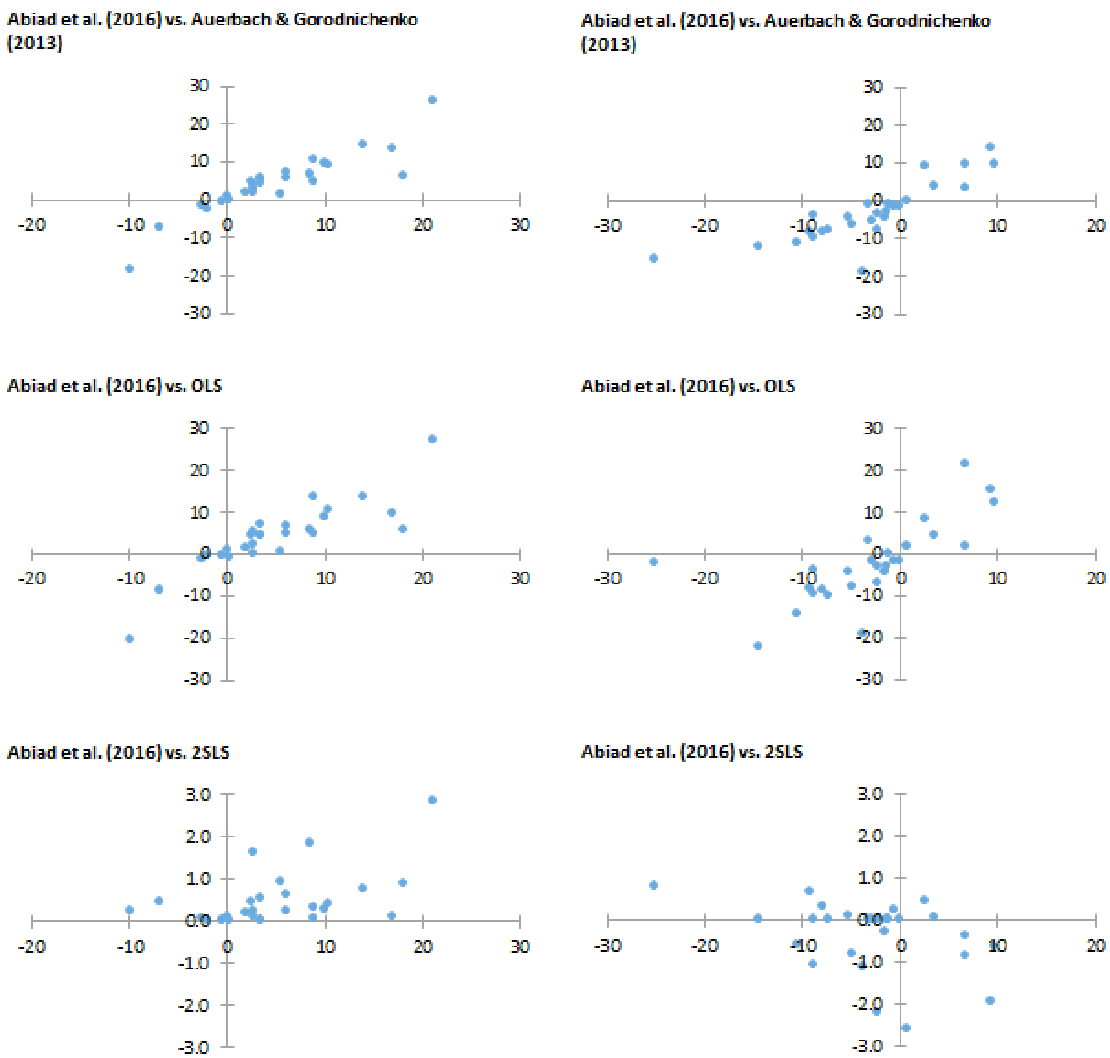
(b) Oil Market Upturn



Note: This figure is based on the 2SLS identification strategy.

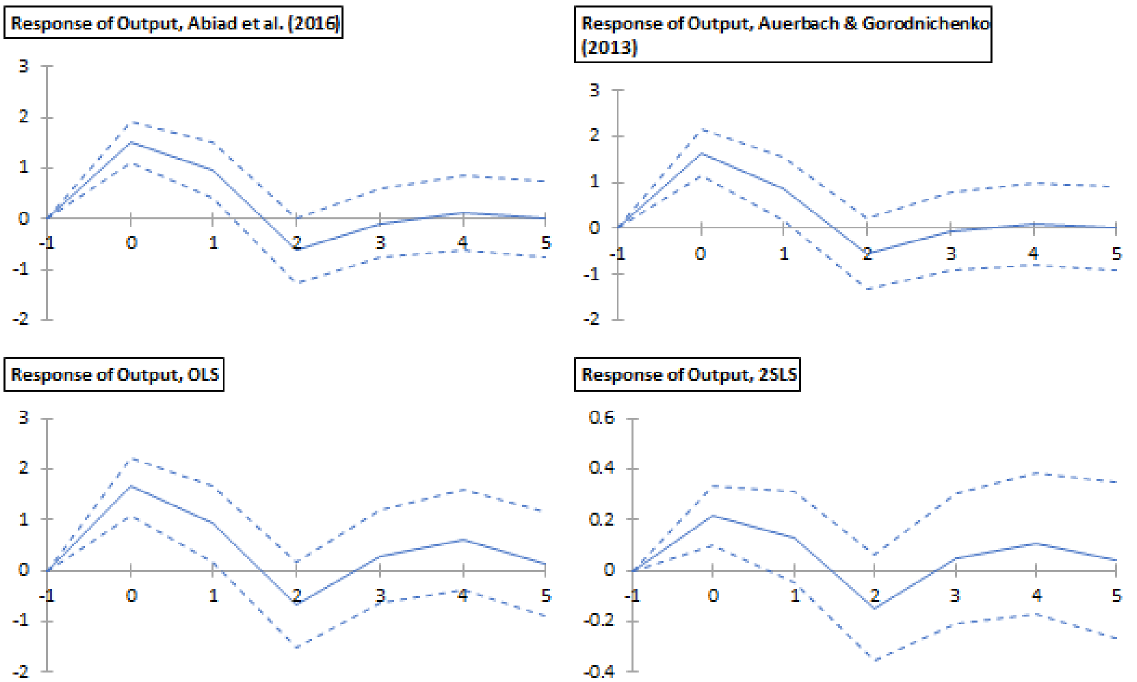
Figure 17: Correlation of Cross-Sample Country Fiscal Multipliers, Non-Linear Model

(a) Oil Market Downturn (b) Oil Market Upturn



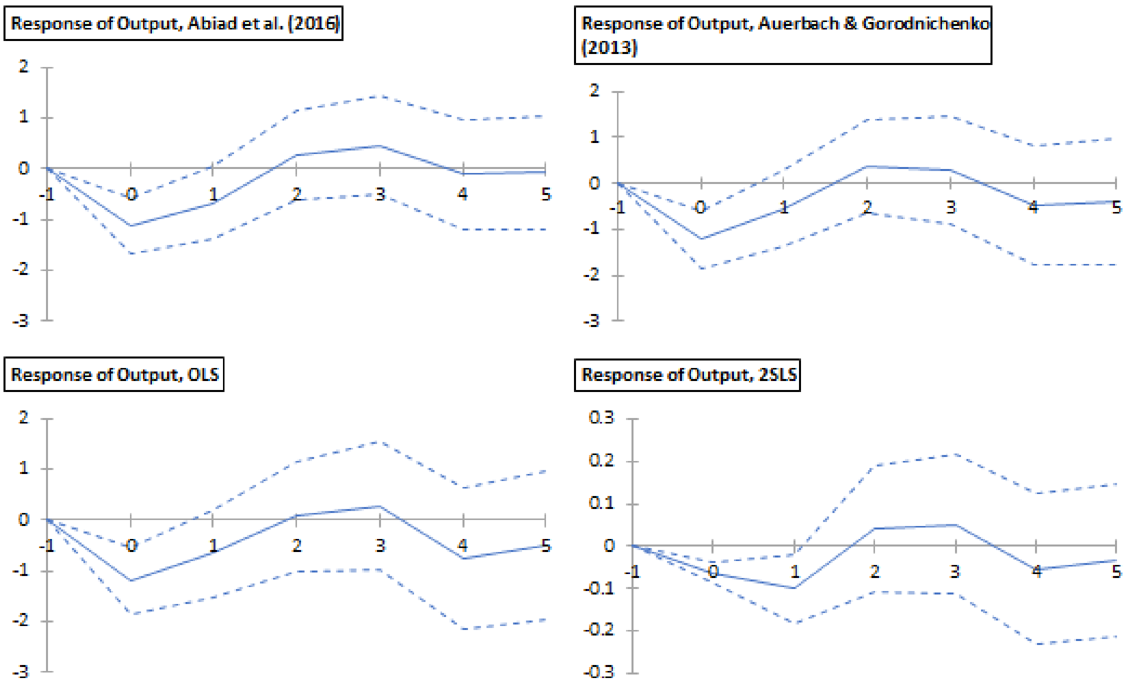
Note: The results are based on the following identification methodologies: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors.

Figure 18: Impulse Response During Oil Market Downturns in the Non-Linear Model



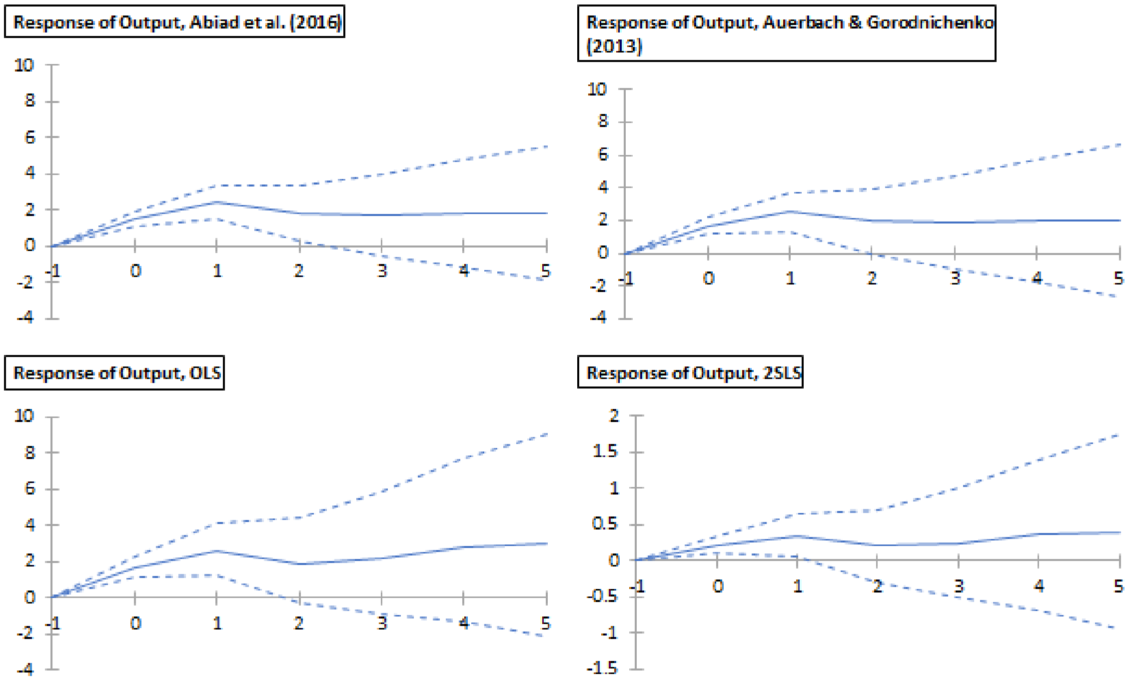
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 19: Impulse Response During Oil Market Upturns in the Non-Linear Model



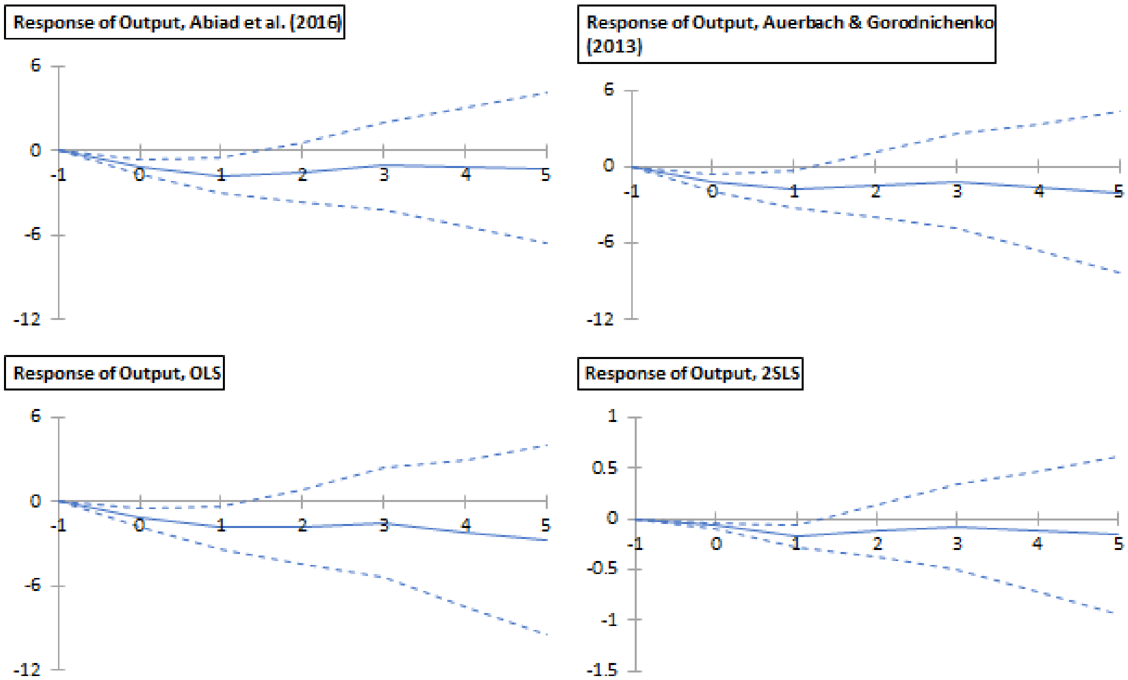
Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 20: (Cumulative) Impulse Response During Oil Market Downturns in the Non-Linear Model



Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Figure 21: (Cumulative) Impulse Response During Oil Market Upturns in the Non-Linear Model



Note: (1) Each panel represents the results that correspond to a separate identification strategy: Abiad et al. (2016): fiscal shocks are identified as fiscal spending forecast errors; Auerbach et al. (2013): fiscal shocks are identified as residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables; OLS: fiscal shocks are the residuals of a regression of fiscal spending forecast errors on lagged macroeconomic variables and oil price forecast errors; 2SLS: fiscal shocks are the residuals of a 2SLS regression of fiscal spending forecast errors on lagged macroeconomic variables and real GDP forecast errors where real GDP forecast errors are instrumented by oil price forecast errors. (2) t = 0 is the year of the shock. (3) Dashed lines represent a 90 percent confidence interval around the estimated impulse response function.

Table 3: List of Sample Countries

Country	Sample	Breaks	Δg^x	Δg^e	Δg^a	Δy	g^x/y	g^e/y	g^a/y
Algeria	1990-2017	-	6.32	6.08	6.76	2.85	33.77	22.6	11.17
Angola	1998-2017	-	5.71	5.22	8.03	7.11	40.3	31.32	8.98
Azerbaijan	1992-2017	1992-1995	9.06	7.97	20.08	4.49	27.15	19.86	7.29
Bahrain	1990-2017	-	5.57	5.85	4.07	4.48	28.67	23.48	5.19
B. Darussalam	1990-2017	-	1.63	1.82	1.07	1.23	38.83	27.94	10.89
Cameroon	1990-2017	-	5.05	2.74	11.56	3.11	16.8	12.57	4.24
Chad	2004-2017	-	4.57	8.3	-1.25	3.42	18.67	11.23	7.44
Colombia	1990-2017	-	4.95	4.48	2.13	3.44	25.94	21.03	6.73
Congo, Rep.	1990-2017	-	3.56	2.66	9.2	2.66	33	22.19	10.81
Ecuador	1990-2017	-	-3.71	-3.77	7.85	3.17	28.93	20.85	9.15
Eq. Guinea	1997-2017	-	12.88	10.83	15.57	12.35	24.2	7.24	16.96
Gabon	1990-2017	-	3.58	3.39	4.45	2.18	24.37	17.86	6.5
Iran	1990-2017	2012-2017	6.23	5.85	4.13	3.62	20.63	14.51	5.04
Kazakhstan	1992-2017	1992-1995	10.51	9.84	10.4	3.54	21.68	18.5	4.38
Kuwait	1990-2017	1990-1993	3.07	2.92	4.05	3.4	43.5	38.37	5.13
Libya	1990-2010	-	11.65	9.81	15.48	2.13	36.64	23.52	13.12
Nigeria	1990-2017	-	4.88	1.3	-1.89	4.73	17.25	12.1	4.7
Oman	1990-2017	-	5.08	4.71	6.79	3.7	40.58	31.45	9.13
Qatar	1990-2017	-	7.14	5.46	12.72	8.18	36.06	28.38	7.68
Russia	1992-2017	1992-1995	4.46	4.53	4.52	1.53	33.52	28.22	5.3
Saudi Arabia	1990-2017	-	4.36	4.38	4.23	3.13	34.27	28.81	5.46
Syria	1990-2010	-	6.26	5.44	8.07	4.54	28.86	18.4	10.46
Trinidad & Tobago	1990-2017	-	2.25	2.2	2.92	4	28.94	26.05	2.89
Turkmenistan	1992-2017	1992-1995	10.95	9.45	16.55	6.78	17.55	14.33	3.22
UAE	1990-2017	-	3.62	3.66	3.28	4.2	26.63	23.01	3.61
Venezuela	1990-2017	2016-2017	3.56	3.35	-0.22	2.65	32.43	31.45	1.04
Yemen	1990-2010	-	-0.23	0.51	-3.02	4.85	31.53	25.05	5.47
Average			5.29	4.77	6.57	4.12	**29.28**	22.23	7.11
Minimum			-3.71	-3.77	-3.02	1.23	16.8	7.24	1.04
Maximum			12.88	10.83	20.08	12.35	43.5	38.37	16.96

Source: World Economic Outlook, IMF.

Note: (1) Azerbaijan, Kazakhstan, Russia, and Turkmenistan start at 1992 following the collapse of the Soviet Union. Furthermore, we dummy out 1992-1995 due to data quality issues pertaining to the adjustment period after their independence from Soviet Union. Libya, Syria, and Yemen stop at 2010 due to ongoing conflict and instability. We dummy out 2012-17 for Iran due to international sanctions and 2016-17 for Venezuela on account of ongoing economic crisis. Angola starts at 1998 following the civil war. Chad starts at 2004 following the completion of a major pipeline that allowed oil export through sea. Eq. Guinea starts at 1997 following a major discovery in 1996. We dummy out 1990-93 for Kuwait due to Iraqi invasion. (2) The first four columns, following the *Breaks* column, refer to percent annual growth rate of fiscal spending g^x, fiscal consumption g^e, fiscal investment g^a, and output y, all in real terms. (3) The last three columns refer to spending-to-GDP ratio for total, consumption, and investment spending in percent.

Table 4: Panel Regression, Baseline

	Pooled OLS (cluster robust)				Fixed-Effect Panel			
	Abiad (2016)	*A & G (2013)*	*OLS*	*2SLS*	*Abiad (2016)*	*A & G (2013)*	*OLS*	*2SLS*
fiscal shock	0.465*	0.437	0.406	0.124**	0.465***	0.437**	0.406**	0.124***
	(1.870)	(1.430)	(1.505)	(2.264)	(2.880)	(2.317)	(2.030)	(3.461)
$L1.\Delta Log(spending)$	-0.0647	-0.0627	-0.0626	-0.0646	-0.0647***	-0.0627***	-0.0626***	-0.0646***
	(1.145)	(1.117)	(1.115)	(1.127)	(4.279)	(4.138)	(4.127)	(4.289)
$L2.\Delta Log(spending)$	-0.00106	0.000613	0.000632	-0.00101	-0.00106	0.000613	0.000632	-0.00101
	(0.119)	(0.0631)	(0.0647)	(0.104)	(0.0728)	(0.0422)	(0.0434)	(0.0701)
$L1.\Delta Log(GDP)$	0.483***	0.486***	0.487***	0.482***	0.483***	0.486***	0.487***	0.482***
	(7.672)	(7.993)	(7.965)	(7.959)	(10.78)	(10.81)	(10.81)	(10.81)
$L2.\Delta Log(GDP)$	0.0138	0.0165	0.0161	0.0133	0.0138	0.0165	0.0161	0.0133
	(0.389)	(0.426)	(0.418)	(0.347)	(0.313)	(0.373)	(0.364)	(0.302)
$\Delta Log(oilprice)$	0.0274**	0.0266**	0.0276**	0.0249***	0.0213	0.0210	0.0219	0.0238
	(2.748)	(2.745)	(2.755)	(3.002)	(0.377)	(0.370)	(0.386)	(0.423)
$L1.\Delta Log(oilprice)$	-0.00496	-0.00628	-0.00668	-0.00767	0.0382	0.0393	0.0398	0.0476
	(0.205)	(0.265)	(0.290)	(0.368)	(0.908)	(0.931)	(0.941)	(1.135)
$L2.\Delta Log(oilprice)$	0.0440***	0.0421***	0.0425***	0.0443***	0.0297	0.0279	0.0282	0.0349
	(4.947)	(4.664)	(4.773)	(4.318)	(0.415)	(0.389)	(0.392)	(0.490)
Constant	1.038**	0.985**	1.000**	0.853*	1.636	1.763	1.783	2.031
	(2.573)	(2.290)	(2.349)	(1.783)	(0.415)	(0.446)	(0.450)	(0.518)
No. Observations	533	533	533	533	533	533	533	533
R-squared	0.506	0.503	0.502	0.510	0.390	0.386	0.384	0.394
Number of countries	27	27	27	27	27	27	27	27
Fixed Effect	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year
Adjusted R-squared	0.450	0.447	0.445	0.454	0.321	0.317	0.315	0.326

Notes: (1) Each column corresponds to an identification : Abiad (2016): fiscal shocks are fiscal spending forecast errors; Auerbach & Gorodnichenko–A& G(2013): fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables; OLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and oil price forecast errors; 2SLS: fiscal shocks are residuals of fiscal spending forecast errors regressed on lagged aggregate variables and output forecast errors proxied by oil price forecast errors. (2) Pooled OLS estimates are robust to heteroskedasticity and clustered at country level. (3) Δ and $L(.)$ are first difference and lag operators. (4) Robust t-statistics in parentheses.
Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 5: Benchmark Estimates of The Government Spending Country Multipliers

Country	$\hat{\phi}$				g/y	Fiscal Multiplier			
	AFT	AG	OLS	2SLS	(%)	AFT	AG	OLS	2SLS
Algeria	0.96	0.96	0.98	0.14	33.77	2.84	2.84	2.9	0.41
Angola	0.71	0.71	0.31	0.02	40.3	1.77	1.77	0.77	0.04
Azerbaijan	0.43	0.43	0.39	0.05	27.15	1.57	1.57	1.44	0.19
Bahrain	0.14	0.14	0.1	0.01	28.67	0.49	0.49	0.34	0.03
Brunei	0.15	0.15	0.3	0.1	38.83	0.39	0.39	0.78	0.27
Cameroon	0.51	0.51	0.45	0.03	16.8	3.02	3.02	2.67	0.17
Chad	0.91	0.91	1.08	0.18	18.67	4.85	4.85	5.79	0.97
Colombia	0.54	0.54	0.24	0.11	25.94	2.1	2.1	0.91	0.44
Congo, Rep.	0.11	0.11	0.11	0.04	33	0.33	0.33	0.33	0.13
Ecuador	0.77	0.77	0.77	0.02	28.93	2.66	2.66	2.66	0.06
Eq. Guinea	0.61	0.61	0.41	0.15	24.2	2.52	2.52	1.69	0.63
Gabon	0.06	0.06	0.06	0.08	24.37	0.24	0.24	0.24	0.32
Iran	0.6	0.6	0.65	0.07	20.63	2.93	2.93	3.16	0.33
Kazakhstan	0.56	0.56	0.47	0.09	21.68	2.6	2.6	2.17	0.43
Kuwait	2.97	2.97	3.01	0.49	43.5	6.83	6.83	6.92	1.13
Libya	0.4	0.4	0.14	0.05	36.64	1.1	1.1	0.37	0.15
Nigeria	0.0	0.0	0.03	0.03	17.25	0.0	0.0	0.17	0.16
Oman	0.82	0.82	0.66	0.02	40.58	2.03	2.03	1.62	0.04
Qatar	1.17	1.17	1.43	0.14	36.06	3.25	3.25	3.97	0.4
Russia	0.56	0.56	0.23	0.11	33.52	1.68	1.68	0.7	0.34
Saudi Arabia	1.06	1.06	0.82	0.31	34.27	3.08	3.08	2.4	0.89
Syria	0.25	0.25	0.5	0.12	28.86	0.87	0.87	1.73	0.43
Trinidad&Tobago	0.17	0.17	0.49	0.22	28.94	0.58	0.58	1.68	0.75
Turkmenistan	0.0	0.0	0.09	0.0	17.55	0.0	0.0	0.53	0.02
UAE	0.55	0.55	0.55	0.04	26.63	2.05	2.05	2.05	0.16
Venezuela	0.21	0.21	0.1	0.03	32.43	0.65	0.65	0.32	0.1
Yemen	0.0	0.0	0.0	0.01	31.53	0.0	0.0	0.0	0.03
Average	0.55	0.55	0.52	0.1	29.28	1.87	1.87	1.79	0.33
Panel estimates	0.47	0.44	0.41	0.12		1.61	1.5	1.4	0.41

Notes: (1) The first four columns refer report the estimates of fiscal shock ($\hat{\phi}$) for each country in the sample. (2) Column 5 presents the total government spending-to-GDP ratio (g/y) for every country in the sample. (3) The last four columns present the country multipliers ($\hat{\phi}/(g/y)$). (4) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 6: Panel Regression, Non-Linear Model (Business Cycles)

	Pooled OLS (cluster robust)				Fixed-Effect Panel			
	Abiad (2016)	*A & G (2013)*	*OLS*	*2SLS*	*Abiad (2016)*	*A & G (2013)*	*OLS*	*2SLS*
fiscal shock (R)	1.894**	1.280	1.251	0.198	1.894***	1.280***	1.251***	0.198**
	(2.446)	(1.453)	(1.359)	(1.344)	(7.515)	(3.684)	(3.194)	(2.315)
fiscal shock (E)	-1.523	-0.611	-0.577	-0.121**	-1.523***	-0.611	-0.577	-0.121
	(1.634)	(1.039)	(0.972)	(2.259)	(4.793)	(1.493)	(1.311)	(1.201)
$L1.\Delta Log(spending)$	-0.0510	-0.0589	-0.0595	-0.0646	-0.0510***	-0.0589***	-0.0595***	-0.0646***
	(1.054)	(1.132)	(1.130)	(1.126)	(3.514)	(3.899)	(3.930)	(4.285)
$L2.\Delta Log(spending)$	-0.00643	-0.00198	-0.00108	-0.00103	-0.00643	-0.00198	-0.00108	-0.00103
	(0.793)	(0.237)	(0.126)	(0.105)	(0.465)	(0.137)	(0.0744)	(0.0712)
$L1.\Delta Log(GDP)$	0.453***	0.494***	0.494***	0.482***	0.453***	0.494***	0.494***	0.482***
	(7.143)	(7.225)	(7.215)	(7.922)	(10.58)	(11.06)	(11.00)	(10.79)
$L2.\Delta Log(GDP)$	0.0118	0.0178	0.0184	0.0134	0.0118	0.0178	0.0184	0.0134
	(0.323)	(0.426)	(0.436)	(0.351)	(0.280)	(0.406)	(0.416)	(0.303)
$\Delta Log(oilprice)$	0.0212*	0.0253**	0.0251**	0.0247**	0.0162	0.0171	0.0179	0.0238
	(1.799)	(2.073)	(2.056)	(2.138)	(0.302)	(0.303)	(0.316)	(0.423)
$L1.\Delta Log(oilprice)$	0.0538**	0.0502**	0.0495**	0.0483**	0.0505	0.0446	0.0446	0.0477
	(2.268)	(2.312)	(2.306)	(2.514)	(1.257)	(1.062)	(1.057)	(1.135)
$L2.\Delta Log(oilprice)$	0.0339**	0.0373**	0.0367**	0.0360**	0.0277	0.0270	0.0276	0.0350
	(2.126)	(2.107)	(2.084)	(2.128)	(0.407)	(0.379)	(0.386)	(0.490)
Constant	1.601**	1.507**	1.454**	1.348**	1.899	1.601	1.619	2.034
	(2.689)	(2.277)	(2.160)	(2.090)	(0.507)	(0.408)	(0.411)	(0.518)
No. Observations	533	533	533	533	533	533	533	533
R-squared	0.554	0.511	0.508	0.510	0.449	0.396	0.392	0.394
Number of countries	27	27	27	27	27	27	27	27
Fixed Effect	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year
Adjusted R-squared	0.502	0.455	0.451	0.453	0.385	0.327	0.322	0.324

Notes: (1) Each column corresponds to an identification strategy as explained in the footnote in Table (4). (2) R: recession and E: expansion. (3) Pooled OLS estimates are robust to heteroskedasticity and clustered at country level. (4) Δ and $L(.)$ are first difference and lag operators. (5) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 7: Estimates of The Government Spending Country Multipliers, Recession

Country	$\hat{\phi}$				g/y	Fiscal Multiplier			
	AFT	AG	OLS	2SLS	(%)	AFT	AG	OLS	2SLS
Algeria	2.394	1.665	1.55	0.216	33.77	7.09	4.93	4.59	0.64
Angola	1.999	0.83	-0.649	0.145	40.3	4.96	2.06	-1.61	0.36
Azerbaijan	0.597	1.349	0.464	0.09	27.15	2.2	4.97	1.71	0.33
Bahrain	0.634	0.674	0.502	0.106	28.67	2.21	2.35	1.75	0.37
Brunei	0.151	0.272	0.167	0.361	38.83	0.39	0.7	0.43	0.93
Cameroon	0.427	0.561	0.412	0.059	16.8	2.54	3.34	2.45	0.35
Chad	0.502	0.422	0.398	0.049	18.67	2.69	2.26	2.13	0.26
Colombia	0.861	0.612	1.406	0.161	25.94	3.32	2.36	5.42	0.62
Congo, Rep.	2.67	0.653	0.663	0.393	33	8.09	1.98	2.01	1.19
Ecuador	0.845	0.853	1.07	0.185	28.93	2.92	2.95	3.7	0.64
Eq. Guinea	2.284	1.733	1.892	0.247	24.2	9.44	7.16	7.82	1.02
Gabon	1.764	1.123	0.997	0.095	24.37	7.24	4.61	4.09	0.39
Iran	0.217	0.252	0.157	0.093	20.63	1.05	1.22	0.76	0.45
Kazakhstan	1.557	1.025	0.592	0.004	21.68	7.18	4.73	2.73	0.02
Kuwait	0.626	2.084	2.214	0.226	43.5	1.44	4.79	5.09	0.52
Libya	0.322	0.619	1.275	0.147	36.64	0.88	1.69	3.48	0.4
Nigeria	1.001	0.849	0.816	0.045	17.25	5.8	4.92	4.73	0.26
Oman	2.816	0.674	1.071	0.248	40.58	6.94	1.66	2.64	0.61
Qatar	5.059	3.732	3.253	0.169	36.06	14.03	10.35	9.02	0.47
Russia	3.841	3.955	1.934	0.124	33.52	11.46	11.8	5.77	0.37
Saudi Arabia	0.87	0.6	0.727	0.305	34.27	2.54	1.75	2.12	0.89
Syria	0.424	0.525	0.442	0.035	28.86	1.47	1.82	1.53	0.12
Trinidad&Tobago	0.796	1.14	2.471	0.292	28.94	2.75	3.94	8.54	1.01
Turkmenistan	0.012	0.021	-0.032	0.007	17.55	0.07	0.12	-0.18	0.04
UAE	0.802	-0.921	-0.852	0.077	26.63	3.01	-3.46	-3.2	0.29
Venezuela	3.704	1.829	2.41	0.117	32.43	11.42	5.64	7.43	0.36
Yemen	2.942	0.18	-0.697	0.05	31.53	9.33	0.57	-2.21	0.16
Average	1.438	0.99	0.896	0.141	29.28	4.91	3.38	3.06	0.48
Panel estimates	1.894	1.28	1.251	0.198		6.47	4.37	4.27	0.68

Notes: (1) The first four columns refer report the estimates of fiscal shock ($\hat{\phi}$) for each country in the sample. (2) Column 5 presents the total government spending-to-GDP ratio (g/y) for every country in the sample. (3) The last four columns present the country multipliers ($\hat{\phi}/(g/y)$). (4) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 8: Estimates of The Government Spending Country Multipliers, Expansion

Country	$\hat{\phi}$				g/y	Fiscal Multiplier			
	AFT	AG	OLS	2SLS	(%)	AFT	AG	OLS	2SLS
Algeria	-2.624	-1.712	-1.253	-0.115	33.77	-7.77	-5.07	-3.71	-0.34
Angola	-3.248	-2.112	-0.649	-0.048	40.3	-8.06	-5.24	-1.61	-0.12
Azerbaijan	-1.178	-0.073	0.043	-0.073	27.15	-4.34	-0.27	0.16	-0.27
Bahrain	-0.41	-0.576	-0.493	-0.083	28.67	-1.43	-2.01	-1.72	-0.29
Brunei	-0.45	-0.45	-1.056	-0.151	38.83	-1.16	-1.16	-2.72	-0.39
Cameroon	0.344	0.049	0.304	-0.029	16.8	2.05	0.29	1.81	-0.17
Chad	-0.523	-0.454	-0.418	-0.035	18.67	-2.8	-2.43	-2.24	-0.19
Colombia	0.013	0.355	-1.211	-0.067	25.94	0.05	1.37	-4.67	-0.26
Congo, Rep.	-2.505	-0.327	-0.327	-0.165	33	-7.59	-0.99	-0.99	-0.5
Ecuador	0	0.234	0	0	28.93	0	0.81	0	0
Eq. Guinea	-2.166	-0.937	-1.055	-0.058	24.2	-8.95	-3.87	-4.36	-0.24
Gabon	-2.971	-1.901	-1.781	-0.058	24.37	-12.19	-7.8	-7.31	-0.24
Iran	-0.043	-0.085	-0.256	-0.043	20.63	-0.21	-0.41	-1.24	-0.21
Kazakhstan	-2.116	-2.021	-1.646	0.004	21.68	-9.76	-9.32	-7.59	0.02
Kuwait	-0.191	-1.892	-2.084	-0.191	43.5	-0.44	-4.35	-4.79	-0.44
Libya	-0.938	-0.403	-0.671	-0.136	36.64	-2.56	-1.1	-1.83	-0.37
Nigeria	-0.417	-0.386	-0.447	-0.029	17.25	-2.42	-2.24	-2.59	-0.17
Oman	-5.6	-2.8	-2.471	-0.166	40.58	-13.8	-6.9	-6.09	-0.41
Qatar	1.248	1.756	1.796	0.014	36.06	3.46	4.87	4.98	0.04
Russia	-4.381	-4.381	-1.123	-0.114	33.52	-13.07	-13.07	-3.35	-0.34
Saudi Arabia	-0.586	-0.586	-0.822	-0.117	34.27	-1.71	-1.71	-2.4	-0.34
Syria	0.384	0.375	0.251	0.026	28.86	1.33	1.3	0.87	0.09
Trinidad&Tobago	-2.011	-2.428	-3.351	-0.084	28.94	-6.95	-8.39	-11.58	-0.29
Turkmenistan	-0.493	-0.462	0.446	0.004	17.55	-2.81	-2.63	2.54	0.02
UAE	-1.987	-0.921	-0.921	-0.072	26.63	-7.46	-3.46	-3.46	-0.27
Venezuela	1.167	3.292	2.945	0.01	32.43	3.6	10.15	9.08	0.03
Yemen	-6.164	-0.498	1.293	-0.101	31.53	-19.55	-1.58	4.1	-0.32
Average	-1.35	-0.709	-0.55	-0.064	29.28	-4.61	-2.42	-1.88	-0.22
Panel estimates	-1.523	-0.611	-0.577	-0.121		-5.2	-2.09	-1.97	-0.41

Notes: (1) The first four columns refer report the estimates of fiscal shock ($\hat{\phi}$) for each country in the sample. (2) Column 5 presents the total government spending-to-GDP ratio (g/y) for every country in the sample. (3) The last four columns present the country multipliers ($\hat{\phi}/(g/y)$). (4) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 9: Panel Regression, Non-Linear Model (Oil Price Cycles)

	Pooled OLS (cluster robust)				Fixed-Effect Panel			
	Abiad (2016)	*A & G (2013)*	*OLS*	*2SLS*	*Abiad (2016)*	*A & G (2013)*	*OLS*	*2SLS*
fiscal shock (R)	1.505*	1.653	1.656*1	0.2149**	1.505***	1.653***	1.656***	0.2149**
	(1.780)	(1.574)	(1.707)	(2.204)	(6.090)	(5.353)	(4.900)	(2.528)
fiscal shock (E)	-1.119	-1.222	-1.198	-0.0636	-1.119***	-1.222***	-1.198***	-0.0636*
	(1.546)	(1.636)	(1.668)	(1.432)	(3.385)	(3.174)	(2.964)	(1.727)
$L1.\Delta Log(spending)$	-0.0681	-0.0676	-0.0655	-0.0651	-0.0681***	-0.0676***	-0.0655***	-0.0651***
	(1.174)	(1.196)	(1.161)	(1.136)	(4.637)	(4.556)	(4.400)	(4.322)
$L2.\Delta Log(spending)$	-0.0120	-0.00804	-0.00600	-0.00159	-0.0120	-0.00804	-0.00600	-0.00159
	(1.410)	(1.079)	(0.824)	(0.166)	(0.846)	(0.561)	(0.418)	(0.110)
$L1.\Delta Log(GDP)$	0.466***	0.459***	0.460***	0.481***	0.466***	0.459***	0.460***	0.481***
	(9.206)	(11.18)	(10.71)	(7.871)	(10.67)	(10.39)	(10.34)	(10.77)
$L2.\Delta Log(GDP)$	0.0142	0.0311	0.0290	0.0129	0.0142	0.0311	0.0290	0.0129
	(0.380)	(0.601)	(0.585)	(0.328)	(0.331)	(0.717)	(0.666)	(0.295)
$\Delta Log(oilprice)$	0.0240*	0.0296**	0.0284**	0.0235*	0.0206	0.0263	0.0261	0.0230
	(1.940)	(2.364)	(2.309)	(2.022)	(0.376)	(0.475)	(0.469)	(0.409)
$L1.\Delta Log(oilprice)$	0.0512**	0.0521**	0.0522**	0.0498**	0.0489	0.0499	0.0506	0.0494
	(2.225)	(2.174)	(2.157)	(2.495)	(1.194)	(1.206)	(1.218)	(1.178)
$L2.\Delta Log(oilprice)$	0.0388**	0.0312*	0.0294*	0.0354**	0.0346	0.0272	0.0264	0.0347
	(2.281)	(2.048)	(1.930)	(2.103)	(0.498)	(0.388)	(0.375)	(0.487)
Constant	1.623**	1.379**	1.352*	1.354**	1.972	1.840	1.931	2.067
	(2.751)	(2.079)	(2.020)	(2.126)	(0.515)	(0.477)	(0.498)	(0.527)
No. Observations	533	533	533	533	533	533	533	533
R-squared	0.535	0.527	0.522	0.511	0.425	0.415	0.410	0.396
Number of countries	27	27	27	27	27	27	27	27
Fixed Effect	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year	cntry-year
Adjusted R-squared	0.481	0.472	0.467	0.455	0.359	0.348	0.342	0.326

Notes: (1) Each column corresponds to an identification strategy as explained in the footnote in Table (4). (2) R: recession and E: expansion. (3) Pooled OLS estimates are robust to heteroskedasticity and clustered at country level. (4) Δ and $L(.)$ are first difference and lag operators. (5) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 10: Estimates of The Government Spending Country Multipliers, Recession

Country	$\hat{\phi}$				g/y	Fiscal Multiplier			
	AFT	AG	OLS	2SLS	(%)	AFT	AG	OLS	2SLS
Algeria	6.14	2.12	1.91	0.3	33.77	18.18	6.28	5.66	0.89
Angola	4.22	3.64	4.29	0.16	40.3	10.47	9.03	10.65	0.4
Azerbaijan	2.4	1.26	1.28	0.08	27.15	8.84	4.64	4.71	0.29
Bahrain	0.72	1.33	1.26	0.13	28.67	2.51	4.64	4.39	0.45
Brunei	1.1	0.63	1.99	0.09	38.83	2.83	1.62	5.12	0.23
Cameroon	1.02	1.17	0.78	0.04	16.8	6.07	6.96	4.64	0.24
Chad	3.94	4.89	5.04	0.53	18.67	21.1	26.19	27	2.84
Colombia	0.71	0.96	0.0	0.42	25.94	2.74	3.7	0.0	1.62
Congo, Rep.	0.66	0.52	0.5	0.06	33	2.0	1.58	1.52	0.18
Ecuador	1.0	1.64	1.24	0.01	28.93	3.46	5.67	4.29	0.03
Eq. Guinea	2.42	2.31	2.08	0.07	24.2	10.0	9.55	8.6	0.29
Gabon	-1.66	-1.78	-2.08	0.11	24.37	-6.81	-7.3	-8.54	0.45
Iran	-0.08	-0.13	-0.13	0.0	20.63	-0.39	-0.63	-0.63	0.0
Kazakhstan	-0.56	-0.33	-0.23	0.02	21.68	-2.58	-1.52	-1.06	0.09
Kuwait	6.07	6.25	5.92	0.32	43.5	13.95	14.37	13.61	0.74
Libya	1.29	1.95	2.58	0.0	36.64	3.52	5.32	7.04	0.0
Nigeria	0.03	0.17	0.12	0.02	17.25	0.17	0.99	0.7	0.12
Oman	3.62	4.22	5.42	0.02	40.58	8.92	10.4	13.36	0.05
Qatar	-3.51	-6.63	-7.41	0.09	36.06	-9.73	-18.39	-20.55	0.25
Russia	5.68	4.56	3.19	0.03	33.52	16.95	13.6	9.52	0.09
Saudi Arabia	2.94	2.31	1.94	0.62	34.27	8.58	6.74	5.66	1.81
Syria	-0.58	-0.67	-0.17	0.0	28.86	-2.01	-2.32	-0.59	0.0
Trinidad&Tobago	1.78	1.69	1.92	0.19	28.94	6.15	5.84	6.63	0.66
Turkmenistan	0.06	0.0	-0.18	0.0	17.55	0.34	0.0	-1.03	0.0
UAE	0.94	1.15	1.16	-0.14	26.63	3.53	4.32	4.36	0.53
Venezuela	1.8	0.44	0.14	-0.21	32.43	5.55	1.36	0.43	0.93
Yemen	0.85	0.86	0.7	0.03	31.53	2.7	2.73	2.22	0.1
Average	1.49	1.25	1.17	0.11	29.28	5.08	4.27	3.99	0.49
Panel estimates	1.51	1.65	1.66	0.22		5.16	5.64	5.67	0.75

Notes: (1) The first four columns refer report the estimates of fiscal shock ($\hat{\phi}$) for each country in the sample. (2) Column 5 presents the total government spending-to-GDP ratio (g/y) for every country in the sample. (3) The last four columns present the country multipliers ($\hat{\phi}/(g/y)$). (4) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

Table 11: Estimates of The Government Spending Country Multipliers, Expansion

Country	$\hat{\phi}$				g/y	Fiscal Multiplier			
	AFT	AG	OLS	2SLS	(%)	AFT	AG	OLS	2SLS
Algeria	0.0	-0.46	-0.57	0.0	33.77	0.0	-1.36	-1.69	0.0
Angola	-1.95	-2.6	-3.09	-0.33	40.3	-4.84	-6.45	-7.67	-0.82
Azerbaijan	-2.36	-1.03	-1.03	0.0	27.15	-8.69	-3.79	-3.79	0.0
Bahrain	-0.41	-1.23	-1.23	-0.08	28.67	-1.43	-4.29	-4.29	-0.28
Brunei	-5.58	-4.68	-8.59	0.0	38.83	-14.37	-12.05	-22.12	0.0
Cameroon	-0.48	-0.9	-0.28	0.0	16.8	-2.86	-5.36	-1.67	0.0
Chad	-0.7	-3.55	-3.59	-0.21	18.67	-3.75	-19.01	-19.23	-1.12
Colombia	0.2	-0.07	0.46	-0.67	25.94	0.77	-0.27	1.77	-2.58
Congo, Rep.	-1.74	-1.42	-1.42	0.03	33	-5.27	-4.3	-4.3	0.09
Ecuador	-0.34	-0.25	0.0	0.0	28.93	-1.18	-0.86	0.0	0.0
Eq. Guinea	-2.23	-1.99	-2.05	0.16	24.2	-9.21	-8.22	-8.47	0.66
Gabon	0.87	0.93	1.04	0.01	24.37	3.57	3.82	4.27	0.04
Iran	2.0	2.01	2.5	-0.13	20.63	9.69	9.74	12.12	-0.63
Kazakhstan	-0.28	-0.61	-0.61	0.0	21.68	-1.29	-2.81	-2.81	0.0
Kuwait	-0.95	-3.41	-3.03	-0.95	43.5	-2.18	-7.84	-6.97	-2.18
Libya	2.51	1.28	7.76	-0.14	36.64	6.85	3.49	21.18	-0.38
Nigeria	-0.09	-0.27	-0.3	0.04	17.25	-0.52	-1.57	-1.74	0.23
Oman	-2.96	-3.13	-4.12	0.0	40.58	-7.29	-7.71	-10.15	0.0
Qatar	0.96	3.24	2.95	0.16	36.06	2.66	8.99	8.18	0.44
Russia	-8.43	-5.17	-0.67	0.27	33.52	-25.15	-15.42	-2.0	0.81
Saudi Arabia	-2.7	-2.82	-2.94	0.12	34.27	-7.88	-8.23	-8.58	0.35
Syria	1.92	2.81	0.5	-0.25	28.86	6.65	9.74	1.73	-0.87
Trinidad&Tobago	-3.02	-3.18	-4.1	-0.17	28.94	-10.44	-10.99	-14.17	-0.59
Turkmenistan	-0.55	-0.22	0.57	0.0	17.55	-3.13	-1.25	3.25	0.0
UAE	-2.34	-2.55	-2.55	0.28	26.63	-8.79	-9.58	-9.58	-1.05
Venezuela	3.06	4.55	4.95	0.65	32.43	9.44	14.03	15.26	-1.94
Yemen	-0.7	-1.09	-0.9	0.0	31.53	-2.22	-3.46	-2.85	0.0
Average	-0.88	-0.92	-0.7	-0.04	29.28	-2.99	-3.15	-2.38	-0.36
Panel estimates	-1.12	-1.22	-1.2	-0.06		-3.83	-4.17	-4.1	-0.20

Notes: (1) The first four columns refer report the estimates of fiscal shock ($\hat{\phi}$) for each country in the sample. (2) Column 5 presents the total government spending-to-GDP ratio (g/y) for every country in the sample. (3) The last four columns present the country multipliers ($\hat{\phi}/(g/y)$). (4) Robust t-statistics in parentheses. Significance levels: $***$ p< 0.01, $**$ p< 0.05, $*$ p< 0.1.

References

Abiad, A., Furceri, D., and Topalova, P. (2016). The macroeconomic effects of public investment: Evidence from advanced economies. *Journal of Macroeconomics*, 50:224 – 240.

Aiyagari, S. R., Christiano, L. J., and Eichenbaum, M. (1992). The output, employment, and interest rate effects of government consumption. *Journal of Monetary Economics*, 30(1):73–86.

Auerbach, A. J. and Gorodnichenko, Y. (2012a). Fiscal multipliers in recession and expansion. In *Fiscal policy after the financial crisis*, pages 63–98. University of Chicago press.

Auerbach, A. J. and Gorodnichenko, Y. (2012b). Measuring the output responses to fiscal policy. *American Economic Journal: Economic Policy*, 4(2):1–27.

Auerbach, A. J. and Gorodnichenko, Y. (2013). Output spillovers from fiscal policy. *American Economic Review*, 103(3):141–46.

Barro, R. J. (1981). Output effects of government purchases. *Journal of Political Economy*, 89(6):1086–1121.

Baxter, M. and King, R. G. (1993). Fiscal policy in general equilibrium. *The American Economic Review*, pages 315–334.

Beetsma, R. and Giuliodori, M. (2011). The effects of government purchases shocks: review and estimates for the eu. *The Economic Journal*, 121(550):F4–F32.

Berg, M. A., Portillo, R., Buffie, M. E. F., Pattillo, M. C. A., and Zanna, L.-F. (2012). *Public investment, growth, and debt sustainability: Putting together the pieces*. Number 12-144. International Monetary Fund.

Blanchard, O. and Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output*. *The Quarterly Journal of Economics*, 117(4):1329–1368.

Blanchard, O. J. and Leigh, D. (2013). Growth forecast errors and fiscal multipliers. *American Economic Review*, 103(3):117–20.

Chan, K. S. (1993). Consistency and limiting distribution of the least squares estimator of a threshold autoregressive model. *The Annals of Statistics*, 21(1):520–533.

Cogan, J. F., Cwik, T., Taylor, J. B., and Wieland, V. (2010). New keynesian versus old keynesian government spending multipliers. *Journal of Economic dynamics and control*, 34(3):281–295.

El Anshasy, A. A. and Bradley, M. D. (2012). Oil prices and the fiscal policy response in oil-exporting countries. *Journal of Policy Modeling*, 34(5):605–620.

Espinoza, R. A. and Senhadji, A. (2011). How strong are fiscal multipliers in the gcc? an empirical investigation.

Frankel, J. A. (2011). A solution to fiscal procyclicality: The structural budget institutions pioneered by chile. Technical report, National Bureau of Economic Research.

Furceri, D. and Li, B. (2017). The macroeconomic (and distributional) effects of public investment in developing economies.

Galí, J., López-Salido, J. D., and Vallés, J. (2007). Understanding the effects of government spending on consumption. *Journal of the European Economic Association*, 5(1):227–270.

Granger, C. W. J. and Terasvirta, T. (1993). *Modelling Non-Linear Economic Relationships*. Number 9780198773207 in OUP Catalogue. Oxford University Press.

Ilzetzki, E., Mendoza, E. G., and Végh, C. A. (2013). How big (small?) are fiscal multipliers? *Journal of Monetary Economics*, 60(2):239 – 254.

Jorda, O. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182.

Kilian, L. (2009). Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market. *American Economic Review*, 99(3):1053–69.

Kirchner, M., Cimadomo, J., and Hauptmeier, S. (2010). Transmission of government spending shocks in the euro area: Time variation and driving forces.

Kraay, A. (2012). How large is the government spending multiplier? evidence from world bank lending. *The Quarterly Journal of Economics*, 127(2):829–887.

Kraay, A. (2014). Government spending multipliers in developing countries: evidence from lending by official creditors. *American Economic Journal: Macroeconomics*, 6(4):170–208.

Leeper, E. M. (1991). Equilibria under ‘active’and ‘passive’monetary and fiscal policies. *Journal of monetary Economics*, 27(1):129–147.

Leeper, E. M. (1993). The policy tango: Toward a holistic view of monetary and fiscal effects. *Economic Review-Federal Reserve Bank of Atlanta*, 78(4):1.

Leeper, E. M., Richter, A. W., and Walker, T. B. (2012). Quantitative effects of fiscal foresight. *American Economic Journal: Economic Policy*, 4(2):115–44.

Leeper, E. M., Walker, T. B., and Yang, S.-C. S. (2013). Fiscal foresight and information flows. *Econometrica*, 81(3):1115–1145.

Leigh, D., Guajardo, J., and Pescatori, A. (2010). Will it hurt? macroeconomic effects of fiscal consolidation. *IMF World Economic Outlook*.

Moreira, M. J. (2003). A conditional likelihood ratio test for structural models. *Econometrica*, 71(4):1027–1048.

Pereira, M. C. and Lopes, A. S. (2014). Time-varying fiscal policy in the us. *Studies in Nonlinear Dynamics & Econometrics*, 18(2):157–184.

Ramey, V. A. (2011a). Can government purchases stimulate the economy? *Journal of Economic Literature*, 49(3):673–85.

Ramey, V. A. (2011b). Identifying government spending shocks: It’s all in the timing. *The Quarterly Journal of Economics*, 126(1):1–50.

Ramey, V. A. and Shapiro, M. D. (1998). Costly capital reallocation and the effects of government spending. *Carnegie-Rochester Conference Series on Public Policy*, 48:145 – 194.

Ramey, V. A. and Zubairy, S. (2018). Government spending multipliers in good times and in bad: Evidence from us historical data. *Journal of Political Economy*, 126(2):850–901.

Romer, C. D. and Romer, D. H. (2010). The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks. *American Economic Review*, 100(3):763–801.

Sadeghi, A. (2017). *Oil Price Shocks and Economic Growth in Oil-Exporting Countries: Does the Size of Government Matter?* International Monetary Fund.

Sadeghi, A. (2018). *How Public Investment Could Help Strengthen Iran’s Growth Potential: Issues and Options*. International Monetary Fund.

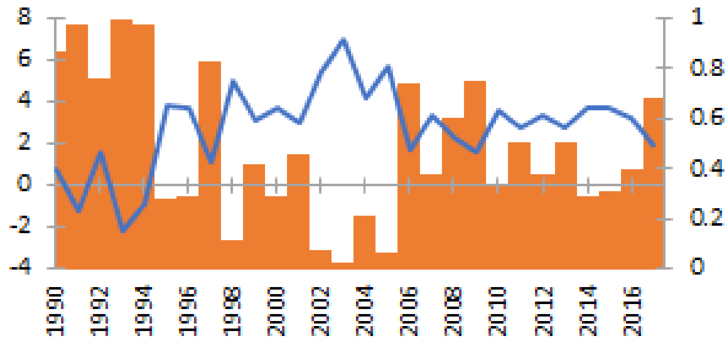
Smets, F. and Wouters, R. (2007). Shocks and frictions in us business cycles: A bayesian dsge approach. *American economic review*, 97(3):586–606.

Stock, J. H. and Watson, M. W. (2007). Why has u.s. inflation become harder to forecast? *Journal of Money, Credit and Banking*, 39(s1):3–33.

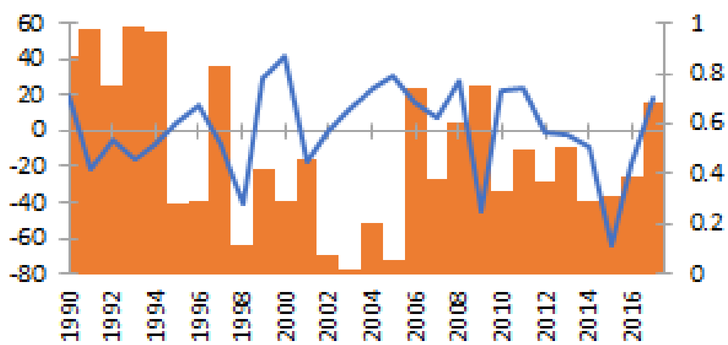
Villafuerte, M. and Lopez-Murphy, P. (2010). Fiscal policy responses of oil producing countries to the recent oil price cycle. In *IMF Working Paper No. 10/28*. International Monetary Fund Washington DC, USA.

Algeria

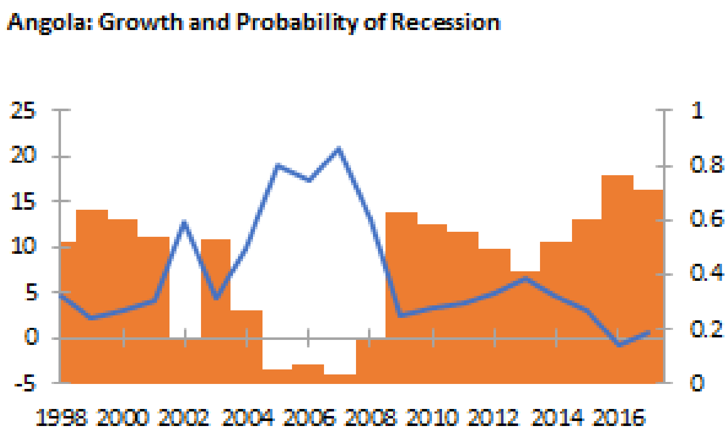
Algeria: Growth and Probability of Recession



Algeria: Oil Price Evolution and Probability of Recession



Angola


Angola: Growth and Probability of Recession
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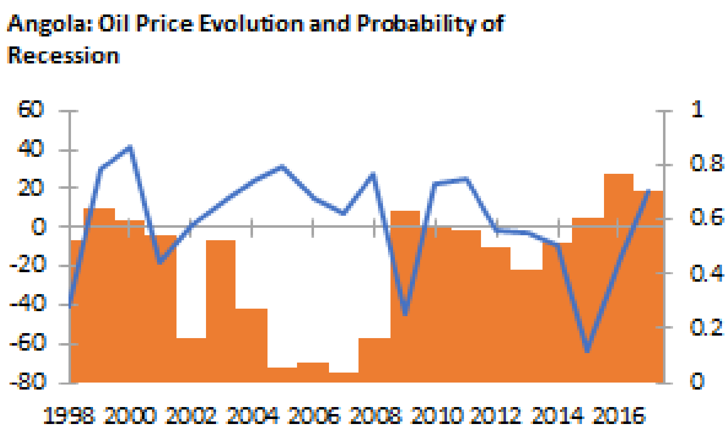
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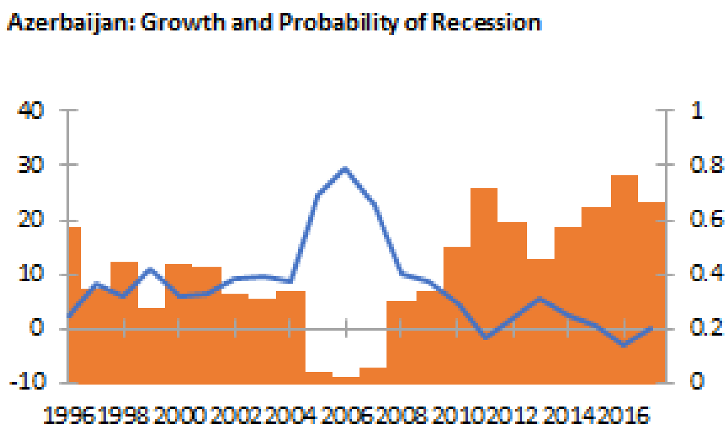
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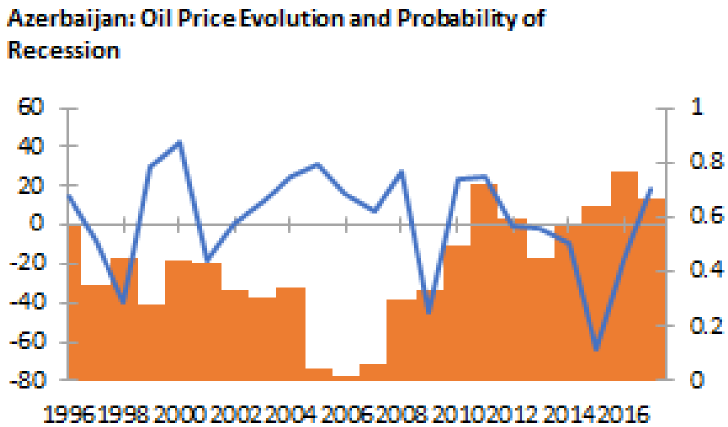
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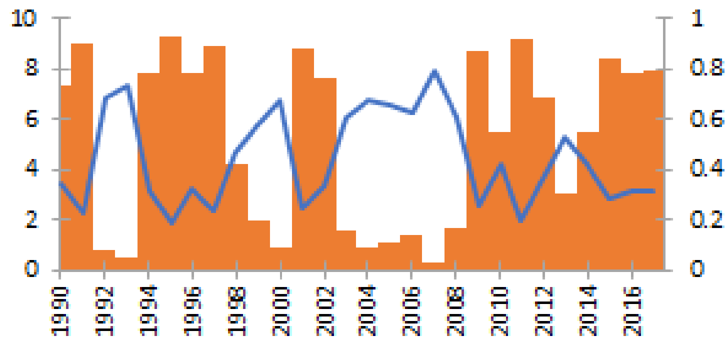
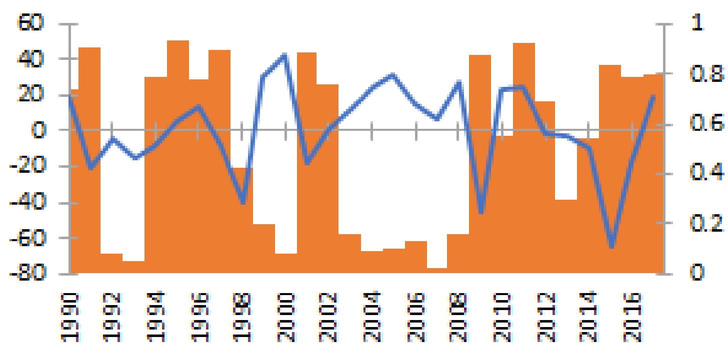
Bahrain

Bahrain: Growth and Probability of Recession



Bahrain: Oil Price Evolution and Probability of Recession



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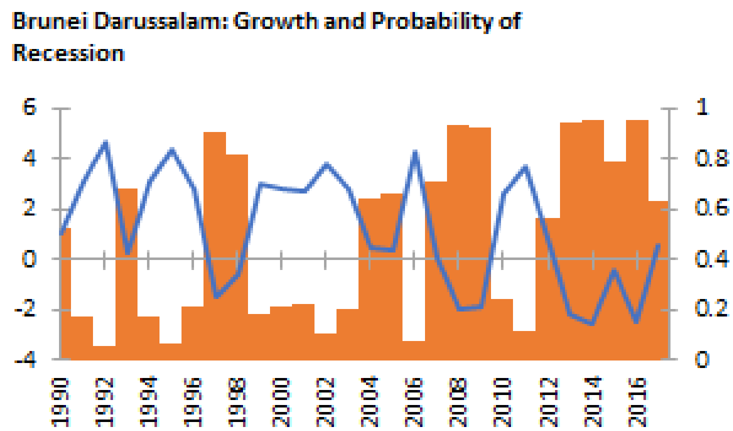
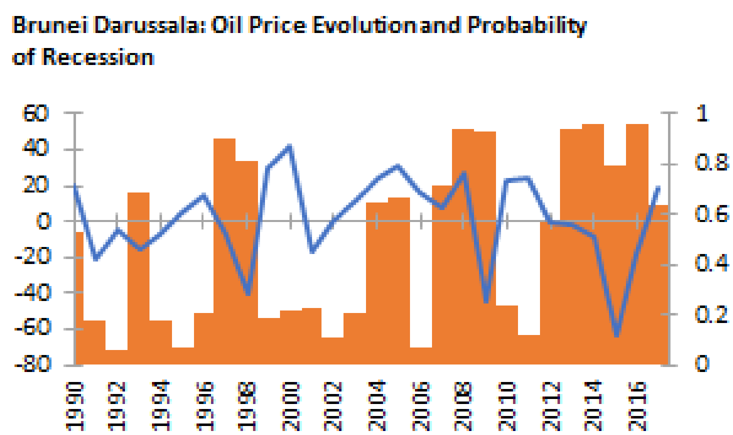
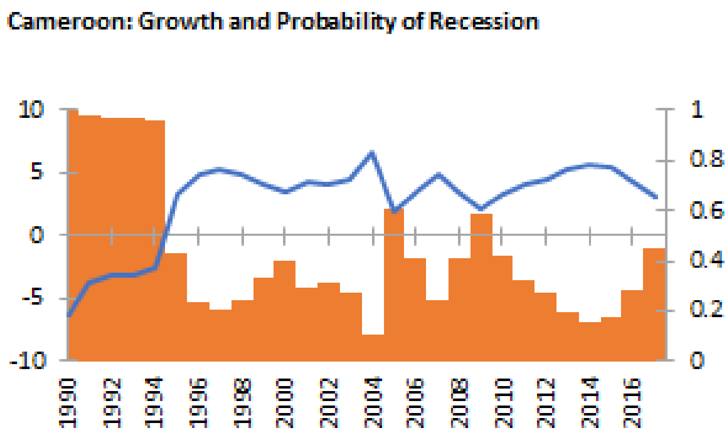




Cameroon



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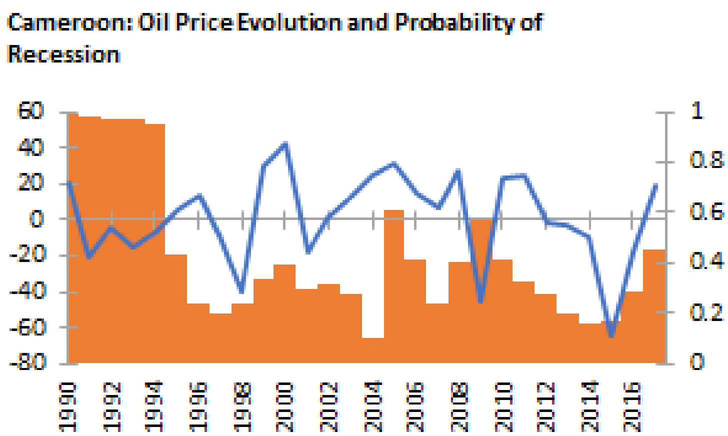

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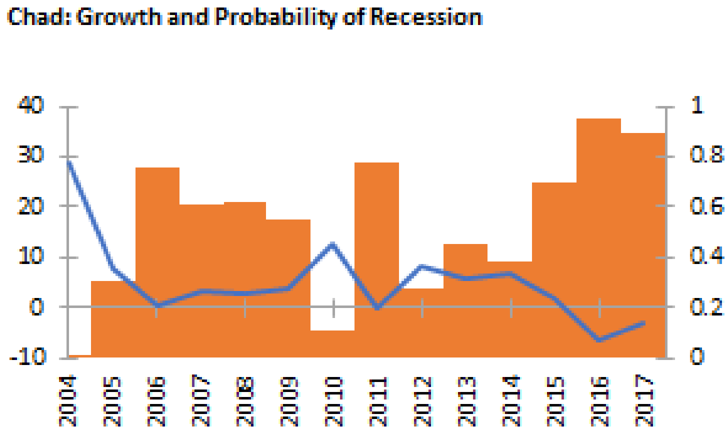
Chad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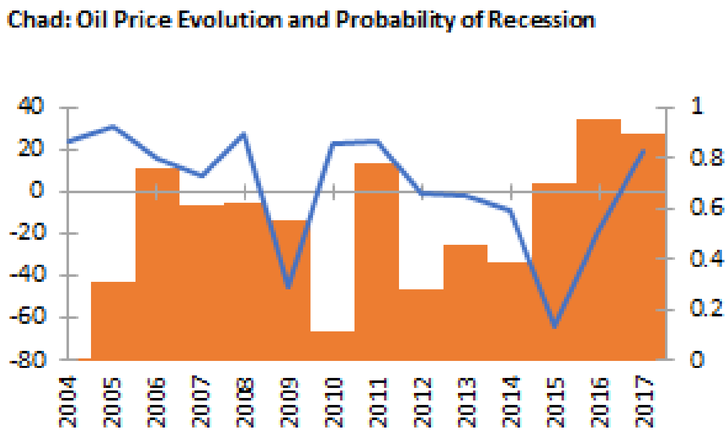
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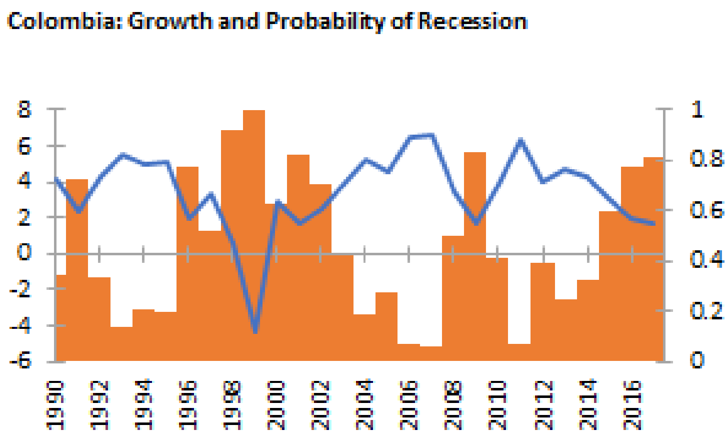
Colombia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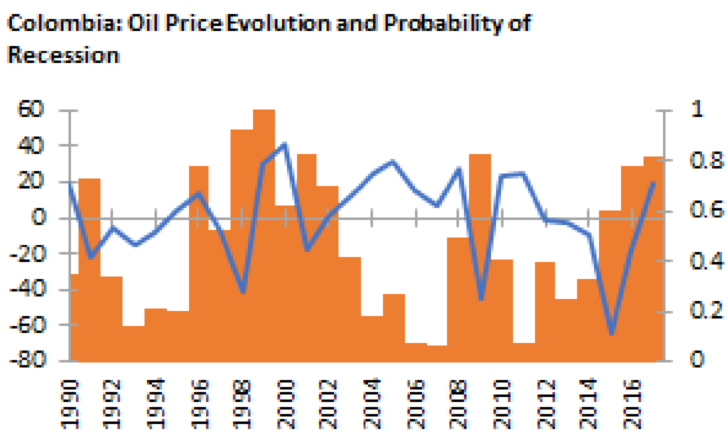
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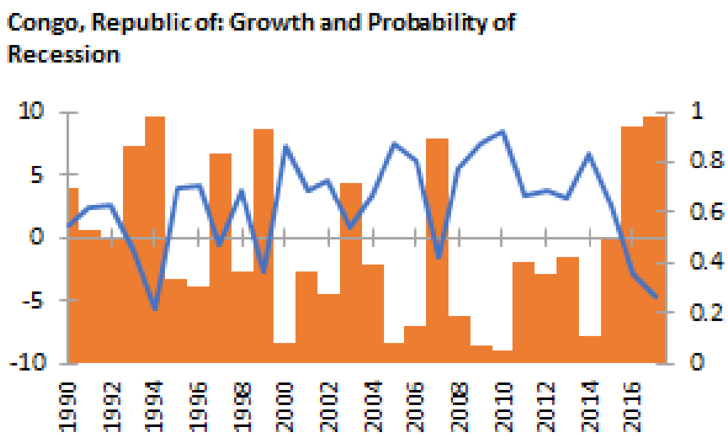
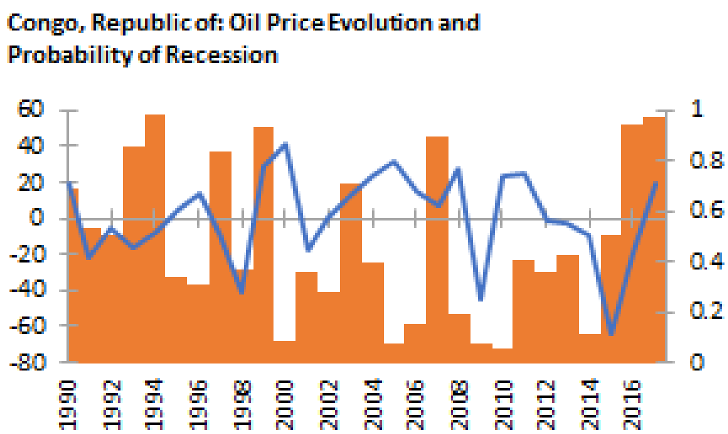
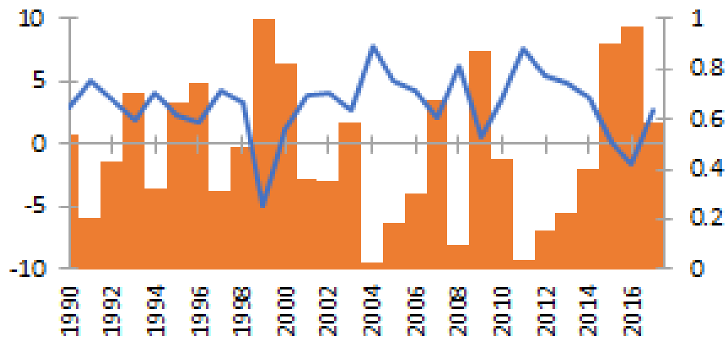
Congo, Republic of





Ecuador

Ecuador: Growth and Probability of Recession



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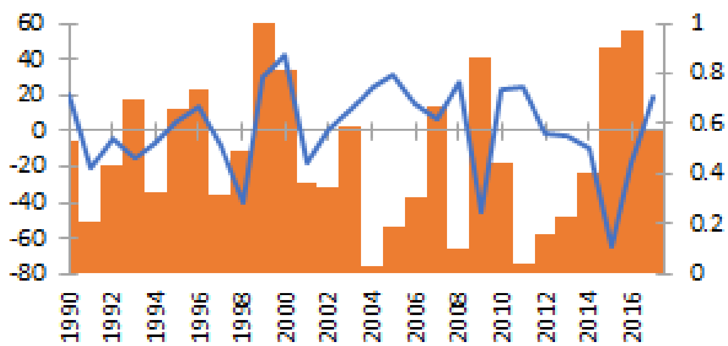
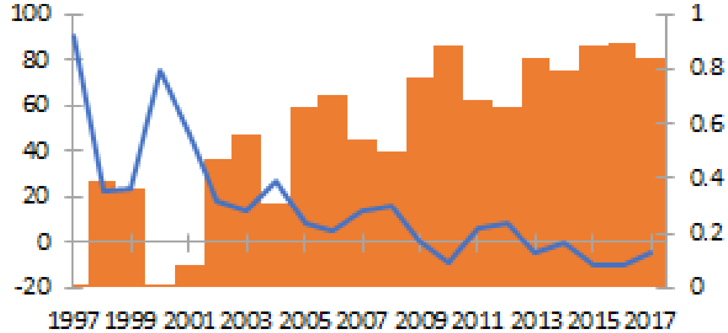
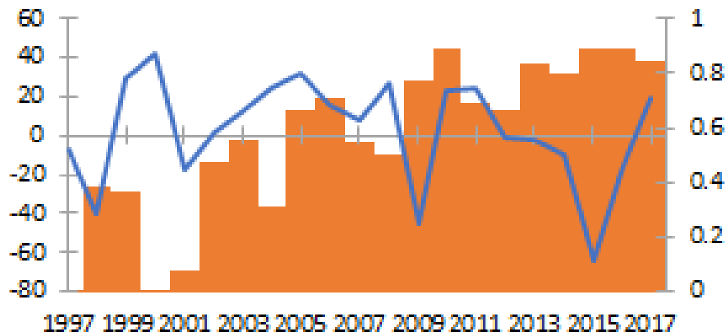


Equatorial Guinea

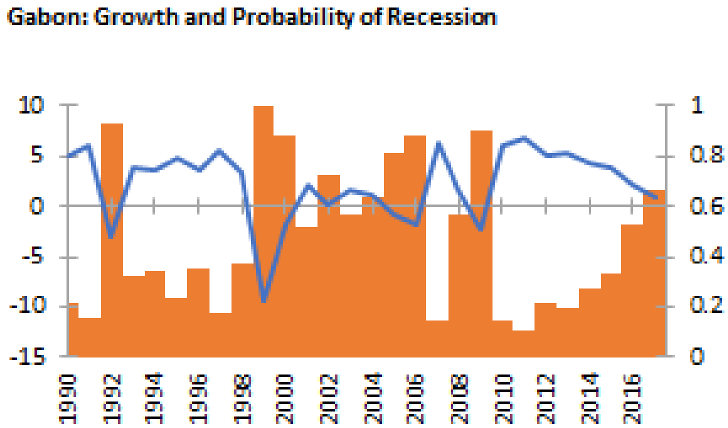
Equatorial Guinea: Growth and Probability of Recession



Equatorial Guinea: Oil Price Evolution and Probability of Recession



Gabon


Gabon: Growth and Probability of Recession
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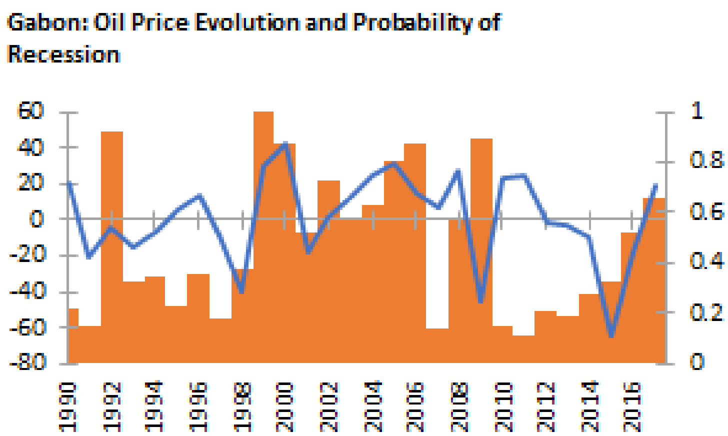
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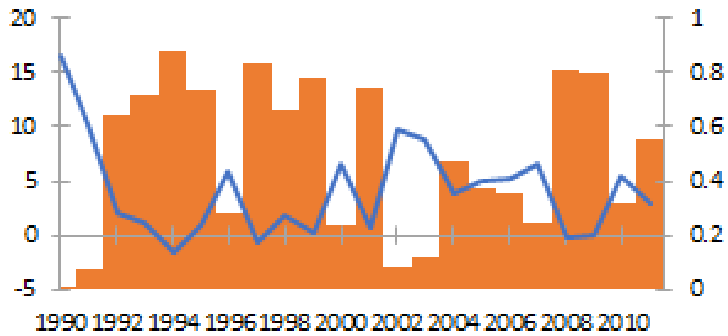
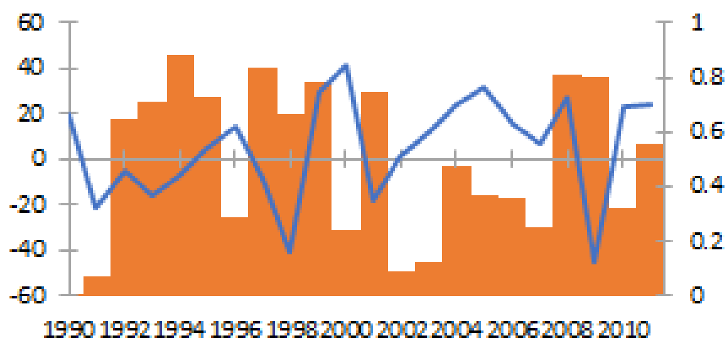
Iran

Iran: Growth and Probability of Recession

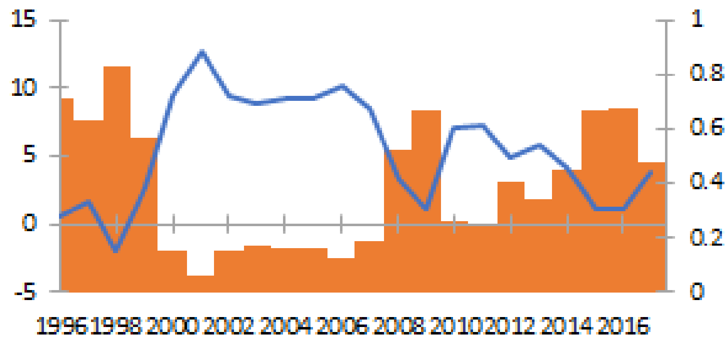


Iran: Oil Price Evolution and Probability of Recession

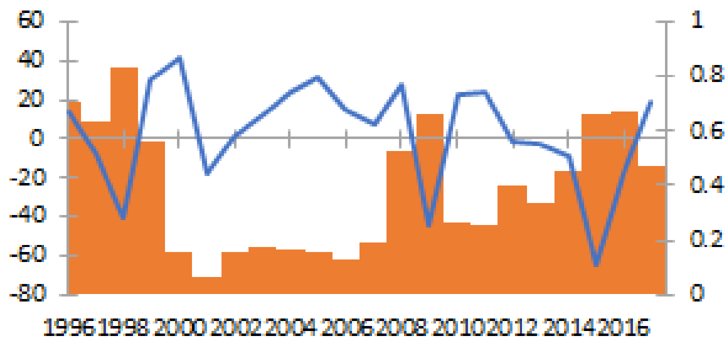


Kazakhstan

Kazakhstan: Growth and Probability of Recession

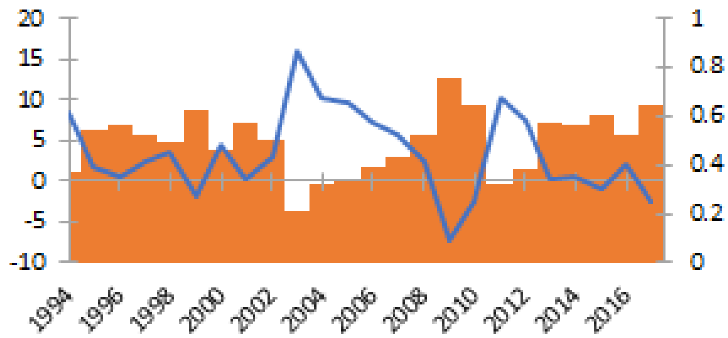


Kazakhstan: Oil Price Evolution and Probability of Recession

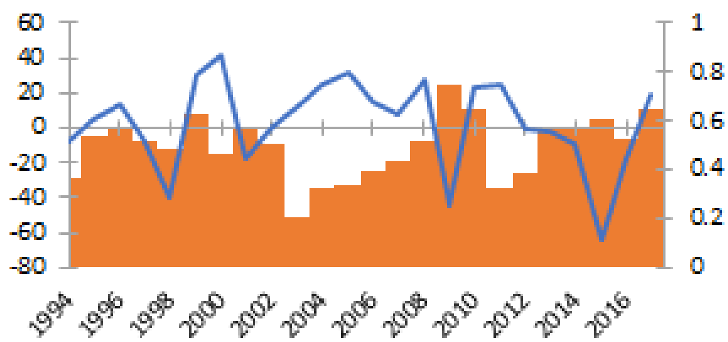


Kuwait

Kuwait: Growth and Probability of Recession

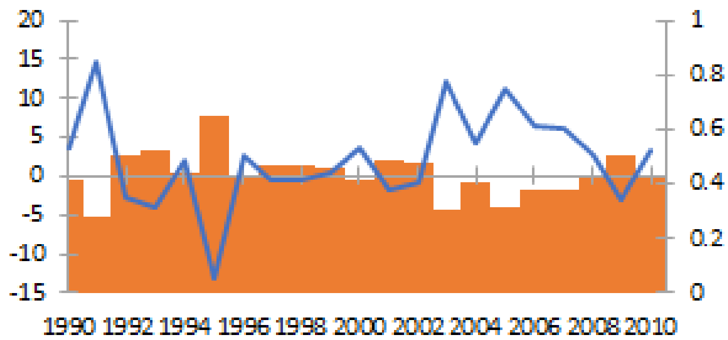


Kuwait: Oil Price Evolution and Probability of Recession

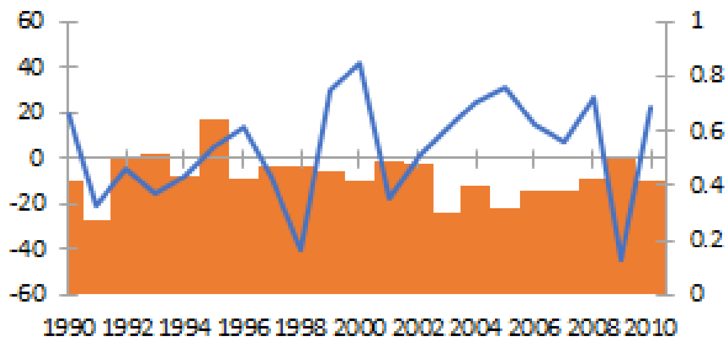


Libya

Libya: Growth and Probability of Recession

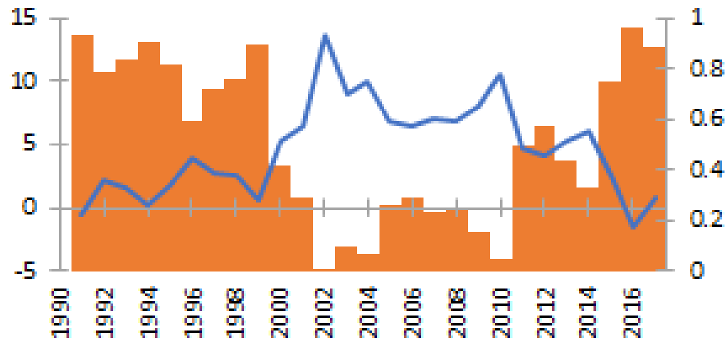


Libya: Oil Price Evolution and Probability of Recession

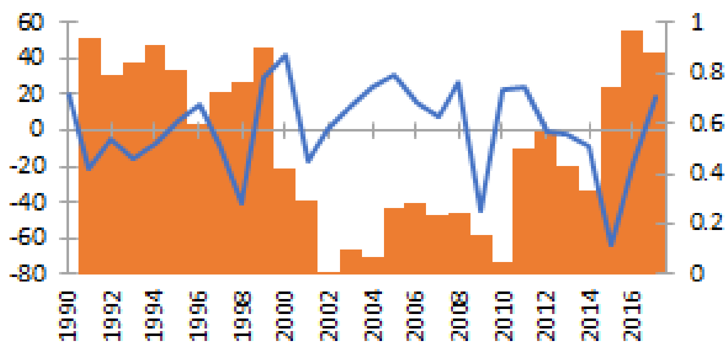


Nigeria

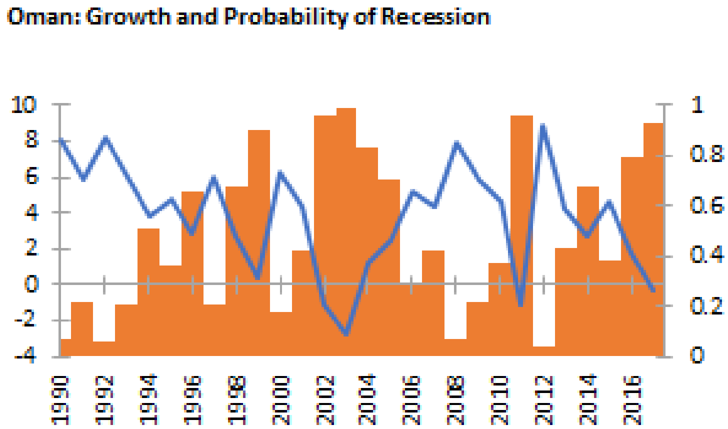
Nigeria: Growth and Probability of Recession

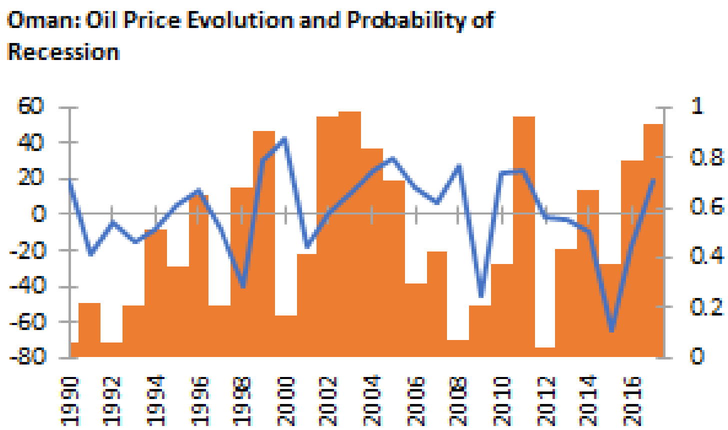


Nigeria: Oil Price Evolution and Probability of Recession



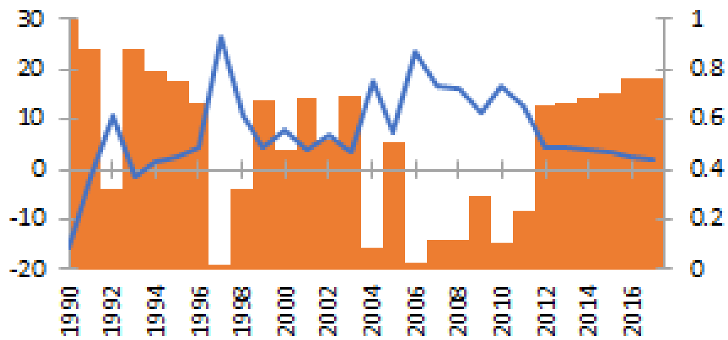
Oman


Oman: Growth and Probability of Recession
10
8
6
4
2
0
-2
-4
1
0.8
0.6
0.4
0.2
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016

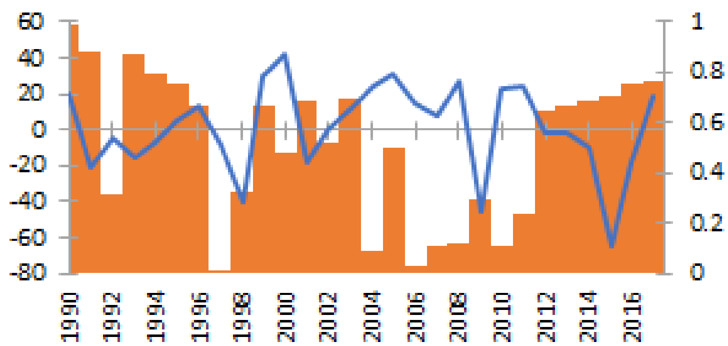

Oman: Oil Price Evolution and Probability of Recession
60
40
20
0
-20
-40
-60
-80
1
0.8
0.6
0.4
0.2
0
1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016

Qatar

Qatar: Growth and Probability of Recession

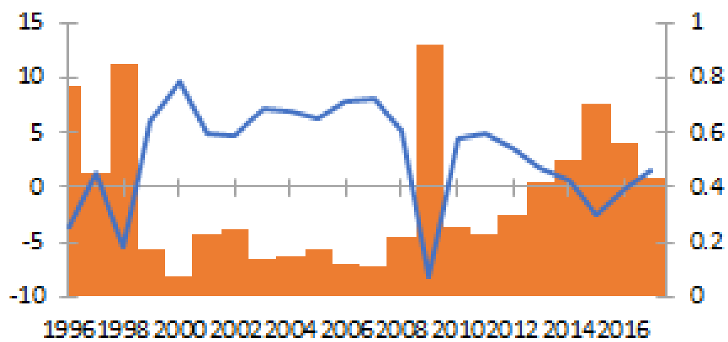


Qatar: Oil Price Evolution and Probability of Recession

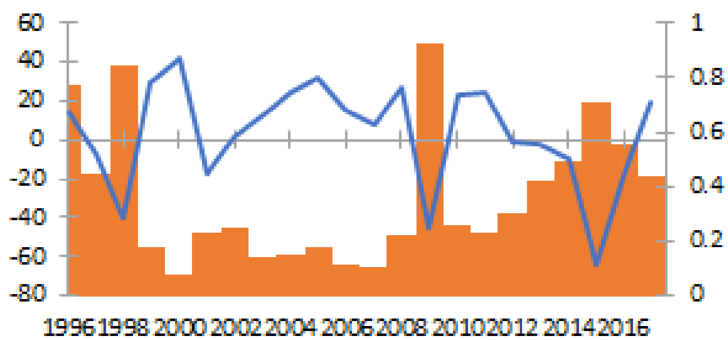


Russia

Russia: Growth and Probability of Recession

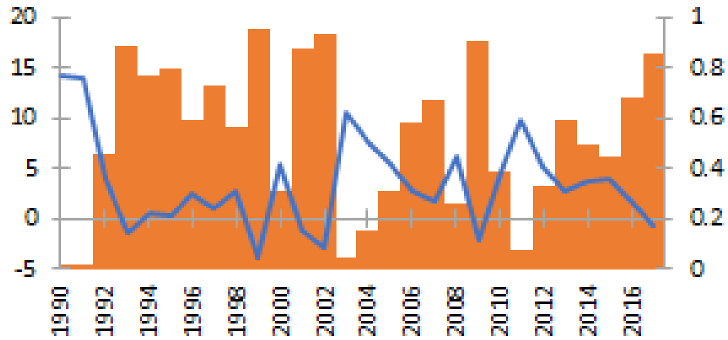


Russia: Oil Price Evolution and Probability of Recession

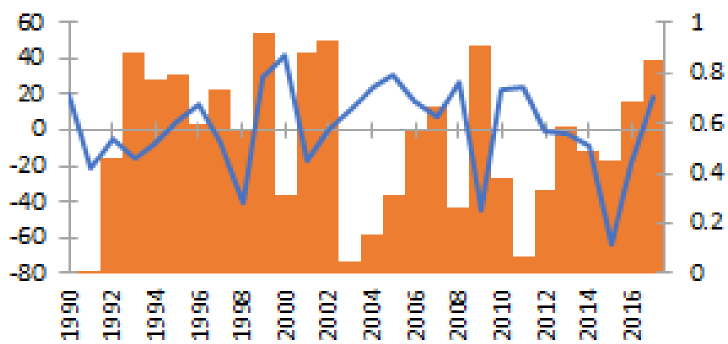


Saudi Arabia

Saudi Arabia: Growth and Probability of Recession

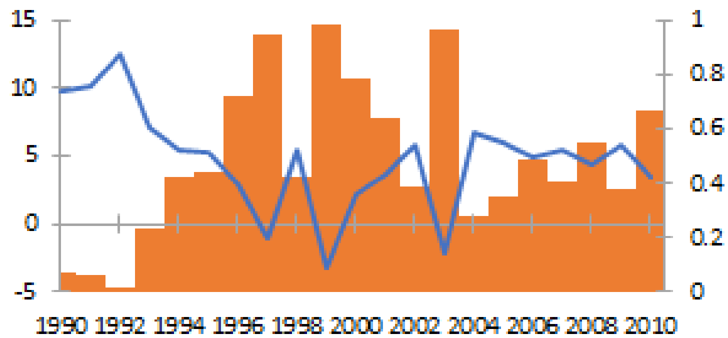


Saudi Arabia: Oil Price Evolution and Probability of Recession

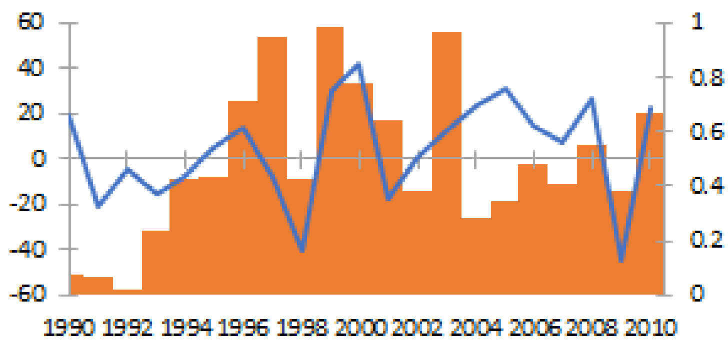


Syria

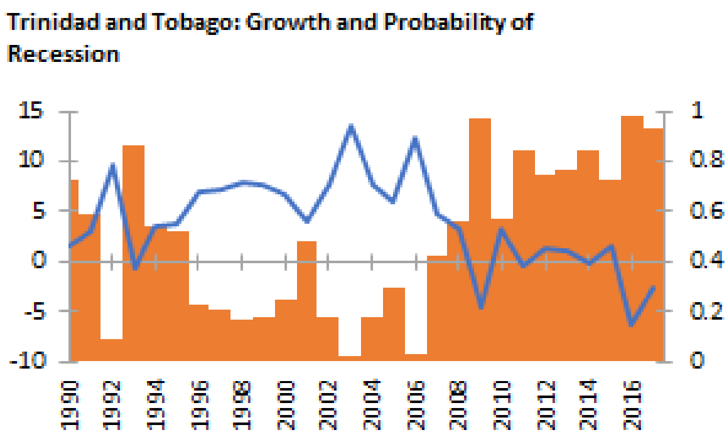
Syria: Growth and Probability of Recession

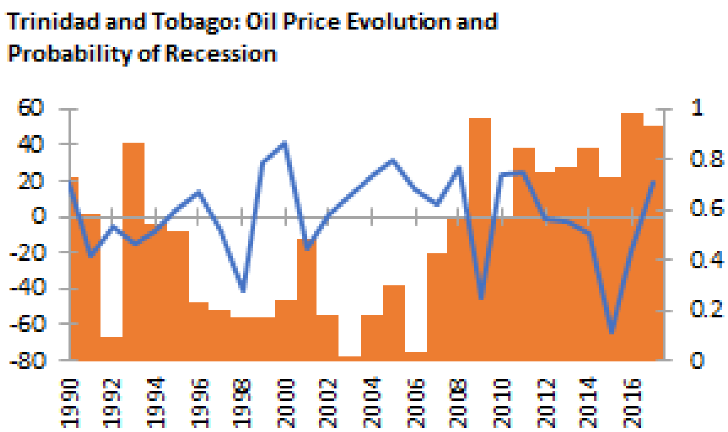


Syria: Oil Price Evolution and Probability of Recession



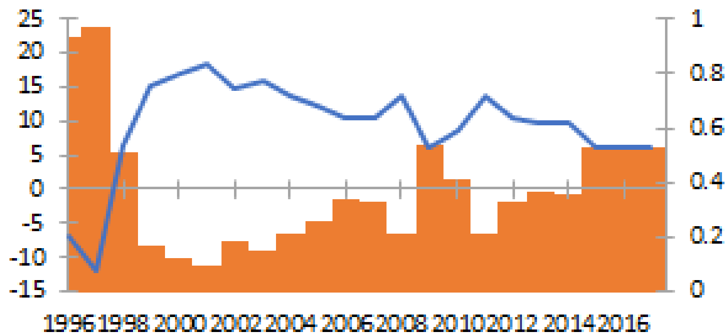
Trinidad and Tobago



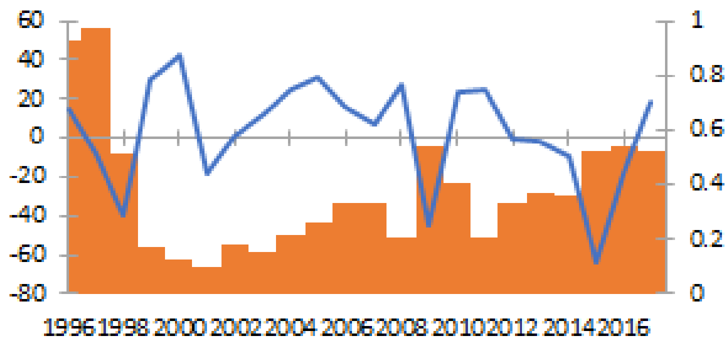


Turkmenistan

Turkmenistan: Growth and Probability of Recession

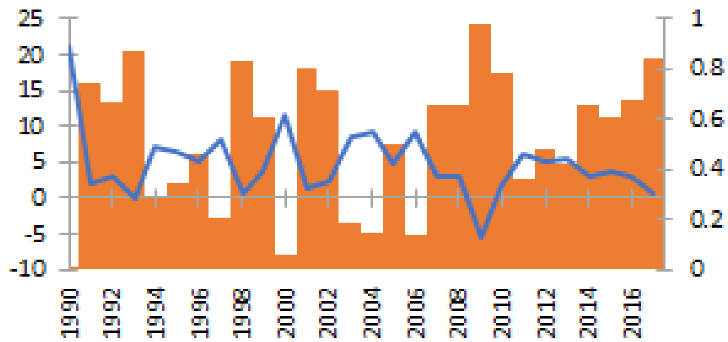


Turkmenistan: Oil Price Evolution and Probability of Recession

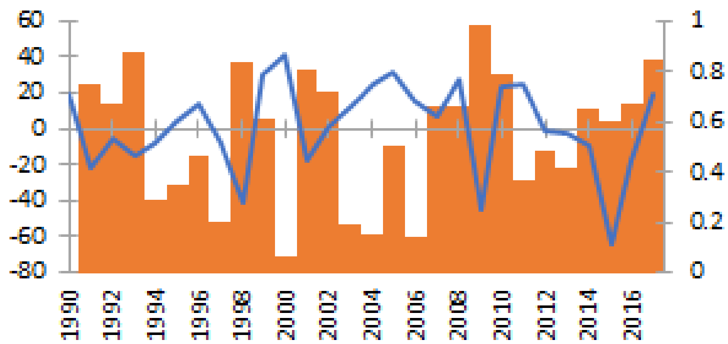


UAE

United Arab Emirates: Growth and Probability of Recession

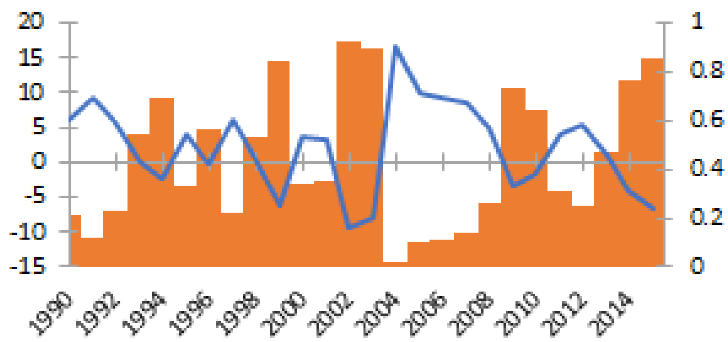


United Arab Emirates: Oil Price Evolution and Probability of Recession

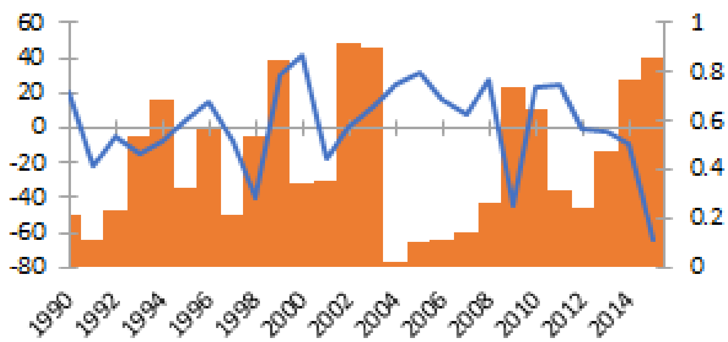


Venezuela

Venezuela: Growth and Probability of Recession

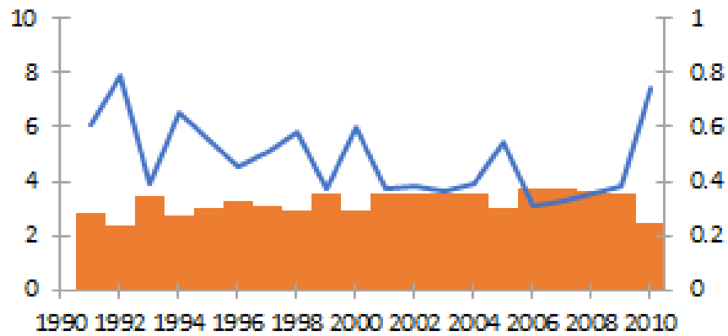


Venezuela: Oil Price Evolution and Probability of Recession



Yemen

Yemen: Growth and Probability of Recession



Yemen: Oil Price Evolution and Probability of Recession