Effectiveness of Stabilization Funds in Managing Volatility in Oil-Rich Countries

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Abstract

This paper explores whether sovereign wealth or stabilization funds created by governments in oil rich countries are effective in reducing volatility and ensuring a counter-cyclical or acyclical fiscal policy in line with the findings of optimal fiscal policy literature. Existing literature on the effectiveness of stabilization funds suffers from endogeneity problems, namely i) the endogeneity between GDP and government expenditures and ii) the endogeneity of the decision to establish stabilization funds. In this paper, I contribute to the literature by addressing both of these problems by using series of Two Stage Least Square Estimations and find positive evidence in favor of stabilization funds in reducing volatility and procyclicality of fiscal policy. The findings are relevant for the wider discussion of the procyclicality in developing countries, as one third of the countries which are documented to improve fiscal policy cyclicality seem to be the ones that are resource rich and have a stabilization fund in place.

Keywords: Oil Stabilization Funds, Fiscal Policy, Volatility, Business Cycles

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1 Introduction:

Fluctuating natural resource and commodity prices typically create boom and bust cycles in the natural resource rich economies and lead to an erratic growth performance under the absence of prudent fiscal policies. Stabilization Funds are special purpose investment funds or arrangements created by governments for macroeconomic management purposes. They hold and manage assets that are proceeds of natural resource/commodity export revenues, balance of payments surpluses, privatization or foreign currency operations. These special purpose funds include sovereign wealth funds, fiscal stabilization funds, savings funds, reserve investment corporations, development funds, and pension reserve funds without liabilities. According to the data by the Sovereign Wealth Instutite, the total asset size of the sovereign wealth funds worldwide as of December 2015 was about USD 7,193 billion, USD 4,048 billion of which is oil and gas related.[1] The aim of this paper is to investigate the effectiveness of stabilization and savings funds which are established to accumulate oil and gas revenues to finance certain investments and expenditures or smooth the fiscal revenues in the face of highly volatile international prices. By 'effectiveness' I mainly refer to the degree of fiscal countercyclicality or acyclicality given the objective of smoothing fiscal expenditures and revenues through creating a 'tool' for saving.

The question of whether the stabilization funds are effective is an important one because in a way, it relates to the broader discussion of whether the fiscal policy in developing countries have become less procyclical. A study by Frankel, Vegh and Vuletin (2012) show that there is a group of countries that have graduated from fiscal procyclicality, meaning that the fiscal policy have become countercyclical. One third of the countries in the 'graduation list' however comprises countries that are resource rich and have a stabilization fund in place.[2] The study by Frankel et al (2012) argue that the main determinant of whether a country graduates from pro-

[1] http://www.swfinstitute.org/sovereign-wealth-fund-rankings/

[2] Graduated countries in the list are Algeria, Bahrain, Chile, Libya, Nigeria, Norway, Oman, Saudi Arabia, United Arab Emirates, Bolvia, Botswana, Brazil, Costa Rica, Cote d'Ivoire, El Salvador, Germany, Hong Kong, Indonesia, Malaysia, Morocco, Paraguay, Phillipines, Syrian Arab Republic, Turkey, Uganda and Zambia where the first nine have a stabilization fund in place. See Frankel et al. (2013, Fig.4)

cyclicality is the institutional quality. Using instruments for potentially endogenous variables, the study concludes that there is a strong causal link from better institutions to less procyclical policies. As I show below, some part of the graduation is actually due to creating a mechanism to further tie the hands of the governments in oil rich countries, even after controlling for institutional quality differences.

From a theoretical point of view, there would be no reason for any resource rich country to establish stabilization or savings funds if there were perfect insurance markets. However, the experience shows that the number of such funds started to increase dramatically especially towards the end of 1990s and most of the oil producer countries seem to have relied upon funds, rather than relying on insurance markets. Moreover, there is a vast literature showing that the external capital inflows are highly procyclical, making borrowing more difficult during times of negative shocks. Therefore during the times of high capital inflows, the business cycles are further exacerbated through expansionary fiscal policies. This phenomenon is described as 'when it rains, it pours' by Kamisnky, Reinhart and Vegh (2004). Ilzetski (2011) show that a political economy model with resdistributive government policies and borrowing constraints can explain procyclical fiscal policies only during economic downturns, and introducing political polarization to the model significantly improves the ability to explain differences in fiscal policy accross countries.[3]

In this paper, I take an agnostic view on whether the international capital markets are imperfect as well as on why any country would pursue a procyclical fiscal policy that aggrevates the business cycles. In line with the theoretical prescriptions, I assume that the optimal fiscal policy is either countercyclical (in a Keynesian setting) or acyclical following Barro's tax smoothing result (in the Neoclassical setting).[4] I take the view that it might be due to the fact that stabilization funds provide a mechanism for self-insurance to accumulate resources and smooth expenditures, and this might be the reason why resource rich countries which are vulnerable to external conditions have started to rely on them one after another. In

[3]For a discussion of causes of procyclical fiscal policies in developing countries, see Ilzetski (2011) and Jaimovich and Panizza (2007, p.4-6)

[4]For a short discussion, see Ilzetzki and Vegh (2008, p.4-6)

this paper, I ask the question whether such funds indeed help countries to achive better fiscal policy outcomes that are closer to the optimal fiscal policy framework prescribed by the theory.[5]

I use a sample of 29 oil-rich countries, namely; Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Brazil, Cameroon, Chad, Republic of Congo, Ecuador, Gabon, Indonesia, Islamic Republic of Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russian Federation, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, Vietnam and Yemen for the period between 1980-2012. I find that the fiscal policy is indeed highly procyclical in oil-rich countries *without* funds and they are mildly procyclical or acyclical in countries *with* stabilization or savings funds. Moreover, I find evidence that the volatility of major macro variables of interest such as the volatility of real household consumption, real government expenditures and government consumption as well as gross fixed capital investments are lower in those countries with such funds. Running seperate estimations only for countries with funds for the 1980-2012 period show that the procyclicality result becomes statistically insignificant (before and after), supporting the view that countries that establish such saving mechanisms might be more prudent to start with as opposed to countries *without funds*. If so, the results are supportive of the findings by Frankel et al (2012) who suggest that the 'graduating class' are the more prudent ones with better institutions, although I do not find a statistically significant association between fiscal performance and institutional quality in my sample of oil-rich countries.[6].

This paper is among the few to investigate whether stabilization or savings funds deliver more desirable outcomes. The existing results in the literature with respect to the experience with funds are mixed though. A case study by Fasano (2000) suggests that in some countries like Kuwait, Norway and State of Alaska, savings funds have contributed to enhancing the effectiveness of fiscal policy by making the budget expenditures less driven

[5]By 'outcomes', I mean 'directly controllable fiscal policy realizations' such as government expenditures rather than budget balance which is not entirely controllable by the government due to revenue collection aspect. I will elaborate this point in Section 2.

[6]Insignificance of the coefficients for institutional quality measures could be due to the fact that there is not much institutional quality variation across countries, with the exception of Norway

by revenue availability, whereas in other countries the experience has been less successful because of frequent changes to fund rules and the deviation from its intended purposes.[7] Fasano (2000) suggests that such funds have been more successful in countries with a strong commitment to fiscal discipline and sound macroeconomic management and the experience shows that funds should not be considered as a substitute for sound fiscal management. Another study by Husain, Tazhibayeva and Ter-Martirosyan (2008) suggests that the economic output in oil-exporting countries is strongly affected by oil prices and investigate whether the world oil price changes have an independent influence on economic activity or whether the channel is through the impact of procyclical fiscal policies on the economic activity.[8] Findings support the view that procyclical fiscal policies in oil exporting countries is the main mechanism by which oil price shocks are transmitted to the non-oil economy.

The study by Shabsigh and Ilahi (2007) uses a panel data set consisting of 15 oil-rich countries with and without stabilization funds for the period 1973-2003. The study asks whether having a stabilization fund is associated with having lower volatility in an oil-rich economy. The study finds evidence of a robust negative relationship between the existence of an oil fund and inflation, volatility of broad money, real exchange rate and prices in oil-exporting countries. Main challenges in establishing a robust empirical relation between the existence of stabilization funds and better fiscal outcomes are unobserved heterogeneity, endogeneity and the difficulty of distinguishing the impact of the introduction of funds which overlap with the beginning of an oil-boom. The study partially addresses these challenges by using fixed effects estimator to remove the impact of time-invariant variables. The econometric specification however, cannot capture the role of time-variant factors and endogeneity of oil funds.

Ossowski, Villafuerte, Medas and Thomas (2008) also use panel data consisting of 32 oil-rich countries with and without a stabilization fund

[7]The study covers the experience of Norway, Chile, Venezuela, State of Alaska, Kuwait and Oman.

[8]The study estimates impulse responses to oil shocks based on panel VARs of oil prices, fiscal stance and output. The countries analyzed include Iran, Norway, Yemen, Algeria, U.A.E. Nigeria, Saudi Arabia, Libya, Oman and Kuwait.

and/or a fiscal rule in place between 1992 and 2005.[9] The empirical question is whether having a stabilization fund and/or a fiscal policy rule leads to i) lower change in non-oil primary primary balance as a percent of non-oil GDP , ii) lower change in real government expenditures, iii) lower ratio of the change in expenditures to the change in oil revenues in an oil-rich country. Prefered specification is fixed effects estimator again to address the problem of time-invariant factors affecting the outcome variables. In addition, Arellano and Bond (1991) dynamic GMM estimator is introduced to address the possible endogeneity problem, i.e. a fiscal rule/fund could be introduced because of the existence of imprudent fiscal outcomes. The study controls for the institutional factors using International Country Risk Guide data on democratic accountability, bureaucratic quality, government stability and law and order. Contrary to the findings of Shabsigh and Ilahi (2007), Ossowski, Villafuerte, Medas and Thomas (2008) cannot find evidence of a positive impact on fiscal outcomes.

A survey by Devlin and Titman (2004) suggests that the extent to which savings and stabilization funds can smooth out investment and revenues depends on the random process generating the commodity/natural resource prices. When price changes are mean-reverting, the present value of the future revenues are not strongly affected by the spot prices therefore will not diminish the efficiency of funding for expenditures, whereas with a random walk process/permanent price changes, present value of future oil revenues will be large, and so will be the optimal level of investment. In that case, financial instruments rather than stabilization or savings funds will be more effective to deal with the fluctuations caused by price changes. When price changes are permanent, stabilization funds end up constantly accumulating or depleting assets which do not help reduce the volatility in the economy. However, this is a channel which has not been investigated in by the empirical literature on the effectiveness of stabilization funds. The evidence on whether the oil prices are mean-reverting though is mixed. Pindyck (1999) and Barnett and Vivanco (2003) show evidence on mean-reversion whereas Cashin, Liang and McDermott (2000) and Engel and Valdes (2000) find evidence of persistence. Bartsch (2006) makes the point

[9]Their analysis covers the oil-producing countries where fiscal revenue accounted for at least 20 percent of total fiscal revenue in 2004.

that the international oil prices show very weak mean reversion and studies the implications and fiscal policy design for Nigeria. The study suggests that Nigeria as an oil producing country should base its estimates of expected revenues and expenditures on the moving averages of past oil prices because the long-term average oil price is of little use for policy making due to weak mean reversion. Using moving averages of three to five years would lead to smallest forecast error, and reduce the risk of building large and persistent surpluses or deficits given the slow mean reversion of oil prices.

I believe that the existing studies, albeit enlightening do not adequately answer the question whether such funds are effective and should be prescibed for any resource rich country. The existing analyses do not differentiate between long-run trends or cyclical fluctuations, do not investigate the outcomes in line with the optimal fiscal policy prescriptions, do not carefully handle the problem of endogeneity of the following three; i) GDP, ii) the decision to establish a fund, and iii) the institutions. And finally, existing studies do not properly assess the volatility although the economic theory suggests that there are welfare costs of business cycle fluctuations. Moreover, I believe that those studies focus on the wrong fiscal policy outcomes which are usually not directly controllable by fiscal agencies. In this paper, I aim to contribute to the existing literature by addressing all these concerns, especially the endogeneity issue.

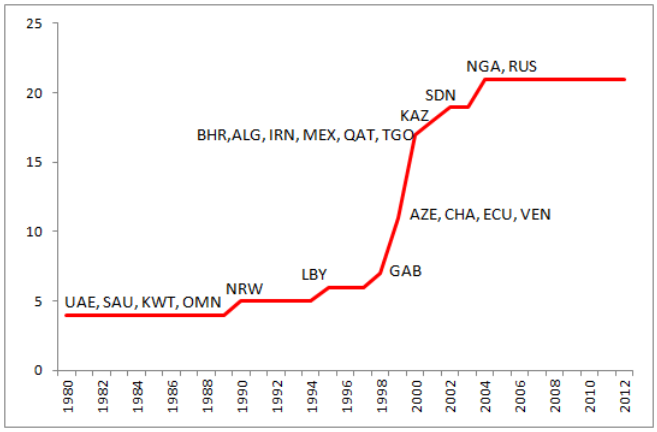
In order to address the endogeneity between the GDP and government expenditures, I use the external shock instrument for the GDP, as proposed by Jaimovich and Panizza (2007). As for the endogeneity of the 'decision to establish a fund', I use urbanization, and the lags of both the average years of schooling and percent of population with tertiary education in order to proxy for awareness for 'better management of people's resources'. As it will be explained in more detail in Section 3, as an extention, I interact the urbanization with the number of other oil-rich countries and use this new variable along the freedom of press rating as an alternative proxy for information for the use of resources. And finally, in order to address the potential endogeneity of the institutions, I use the lags of average ICRG ratings of the neighouring countries for each of the oil-rich country in question. Table 4 summarizes each sets of instruments for the potentially endogenous variables.

The paper is organized as follows: Section 2 discusses the empirical strategy and the data. Section 3 describes the results of the empirical analysis where I; i) investigate the cyclical properties under existence of oil funds using OLS and Two Stage Least Squares Methods, ii) explore the decision to establish a stabilization fund using several instruments, iii) instrument institutions which might potentially be endogenous, iv) investigate the short term growth and volatility of real general government expenditures, general government final consumption, household final consumption, and gross fixed capital formation as the variables of interest. Section 4 concludes.

2 Empirical Specification and Data

The experience with stabilization funds is relatively new as most of the funds were established by the end of 1990s and after year 2000. As Figure 1 shows, there were only 5 countries with oil stabilization funds as of 1994, whereas after that date, 16 more oil-rich countries adopted some sort of a fund arrangement.

Figure 1: Number of Countries with Oil Stabilization, Savings or Sovereign Funds



The major problem with measuring fiscal policy performance by using any definitions of the budget balance is that such outcomes are beyond the full control of the policy makers and can lead to misleading conclusions, as most studies outlined in the introduction section suffered from. Tax

revenues are highly cyclical, and therefore even if government engages in a completely neutral policy of smooth fiscal expenditures, using the budget balance as the dependent variable would tell us that the fiscal policy is countercyclical, being in surplus in good times and in deficit in bad times. This point has been raised by Kamisky, Reinhart, Vegh (2004), Jaimovich and Panizza (2007) and Ilzetzki and Vegh (2008) and Vegh and Vuletin (2013).[10]

In this paper, I follow the critique above and use general government expenditures (in real and detrended log terms) as opposed to budget balance to measure fiscal policy. In other words, I focus directly on the degree of procyclicality and volatility of expenditures when evaluating the performance under stabilization funds. As compared to the previous studies, I am also able to cover more recent data, namely the period between 1980 and 2012 for a sample of 29 oil-rich countries, namely; Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Brazil, Cameroon, Chad, Republic of Congo, Ecuador, Gabon, Indonesia, Islamic Republic of Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russian Federation, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, Vietnam and Yemen.[11] Table 1 provides the list of countries and Table 2, the various oil-dependency measures.

Experience shows that in oil rich countries government expenditures track oil revenues very closely which leads to an erratic fiscal performance and exacerbate the boom and bust cycles due to changing oil prices in the economy. The main rationale for establishing a stabilization fund should be to break this link, and maintain a smoother fiscal policy through savings in a fund. To a degree, it is perhaps unavoidable that the existence of the stabilization funds may be weakly associated with lower growth of real government expenditures because many of the oil-rich countries are on a development trajectory with massive infrastructure needs. According to the World Economic Outlook data of IMF, for instance, the average nominal

[10]Vegh and Vulent (2013) documents tax-policy procyclicality in developing countries and acyclicality in developed countries.

[11]Unfortunately, the panel is unbalanced due to missing data for various countries and due to the fact that some countries only recently gained independence such as Azerbaijan, Kazakhstan. The specifications with institutinal data (ICRG) cover the period 1984-2012)

GDP per capita between 2005-2008 was $11,742 for my sample.[12]. Excluding high per-capita income countries as United Arab Emirates, Qatar, Kuwait and Bahrain, the average in the sample drops to $5,452. The ratio of gross-fixed capital investments to GDP was 23.5% between 1990-2008. Therefore, the objective of the fiscal policy in a developing country might not be achiving a lower expenditure growth profile, but instead a less volatile one where fiscal expenditures do not track revenues closely. While optimal fiscal policy in Keynesian economics prescibes a countercyclical policy and the Neoclassical point of view prescibes a neutral one with tax and expenditure smoothing, there is a growing literature showing that fiscal policy is actually mostly procyclical in many of the developing countries. In this paper, I also document evidence for procyclicality for oil-rich countries but investigate whether those oil-rich countries with a stabilization fund has 'less procyclical' fiscal policy- which should be the objective of establishing the fund in the first place.

The main data source used in this paper is International Monetary Fund's (IMF) World Economic Outlook (WEO) and Country Desk Data. I use annual general government expenditures, however very occasionaly, I rely on central government expenditures when the data is not available for general government. The same applies for total general government revenues, and government oil revenues. Data is reported in nominal terms, and I deflate it using the CPI index from the same database for each country. I extract the oil price data from IMF's WEO as well. The variables in my regressions are in logs and are detrended by using the Hodrick Prescott Filter (except for the ratio of oil revenues to total revenues, oil prices and institutional variables). Using the Augmented Dickey Fuller and Im, Pesaran and Shin tests, I am able to reject the null hypothesis of unit root for the series i) detrended real government expenditures, ii) detrendeded real government revenues and iii) detrended real GDP with 99% confidence level. In order to capture institutional variables, I use International Country Risk Guide (ICRG) data which provides political risk ratings on democratic accountability, bureaucratic quality, law and order, government stability and corruption for 140 countries since 1984. However, my results

[12]Excluding Algeria, Ecuador, Iran, Kazakshtan and Saudi Arabia due to non-existence of compatible data.

are robust to inclusion of any institutional variable, and in fact, suprisingly most variables turn out not to have explanatory power on detrended real government expenditures. The data on household final consumption, general government consumption and gross fixed capital formation data are from WDI. All educational attainment variables are by Barro-Lee (2013) and are linearly interpolated.

The first variable of interest is the oil fund dummy which takes on the value of 1 if there is a sovereign stabilization or a savings fund in place and 0 otherwise. In this paper, I do not differentiate between the stabilization or savings funds as I consider them to serve mostly to the same purpose for the set of countries I focus on in my sample. However as explained above, I am not solely interested in whether the coefficient on the fund dummy is negative, i.e. pointing out to a 'lower level' of government expenditures. Instead, I am interested in the coefficient of the interaction term that shows whether the real expenditures are less procyclical in those countries where there is a stabilization fund, i.e. *a statistically significantly negative coefficient for the interaction term.* More formally, I first estimate the following model:

$$g_{i,t} = \alpha_o + \delta D_{i,t} + \alpha_1 y_{i,t} + \alpha_2 D_{i,t} y_{i,t} + Z'_{i,t,}\beta + \eta_i + \lambda_t + \varepsilon_{i,t} \qquad (1)$$

where $g_{i,t}$ represents detrended real government expenditures, $y_{i,t}$, detrended real GDP, $D_{i,t}$ stands for the stabilization fund dummy, $Z_{i,t}$ is the set of other covariates, and $\eta_{i,t}$, λ_t are country and year fixed effects. In this setting, the relationship between the fiscal expenditures and GDP is given by:

$$\frac{\partial g}{\partial y} = \alpha_1 + \alpha_2 I_D \qquad (2)$$

I_D is the indicator function which takes on the value 1 if there is a fund in place and 0 otherwise.

As econometricians, however, we face few challenges in establishing a robust and sound empirical relationship between the existence of funds and

stability of fiscal policy. As I will explain in more detail in the next section, the endogeneity of GDP and potential reverse causality is a major concern which requires careful instrumental variables methods. Another important challenge is that the decision to adopt a stabilization fund is not truly exogenous, and countries that run high non-oil deficits might be more tempted to establish stabilization funds as a self-disciplining mechanism (Ossowski, Villafuerte, Medas and Thomas; 2008, p.32). In that case, introduction of a fund would seem to be positively associated with higher fiscal expenditures. Another view suggests that countries that set up stabilization funds maybe more prudent to start with, therefore it would be inappropriate to attribute their good performance to the funds (Shabsigh and Ilahi;2007, p.4). In that case, a better fiscal outcome would be associated with the unobserved time invariant factors and not necessarily with the existence of a fund. Under all cases, OLS would yield biased estimates. While I handle the problem of unobserved time-invariant and time-variant factors through adopting the fixed effects estimator, random effects estimators and Arellano Bond estimators, admittedly it is a challange to find good instruments which are highly correlated with introduction of fund dummy but not directly correlated with fiscal expenditures. To handle the problem of the endogeneity of 'introducing a stabilization fund', I rely on two possible instruments in Section 3.3 and I find that my results remain robust. The final challenge I face is that the introduction of an stabilization fund may coincide with the start of a boom in some countries. In that case oil expenditures might go up tracking high oil revenues and this would again appear as if the oil fund is associated with higher expenditure growth. I handle this problem (at least to a degree) by controlling for the ratio of oil revenues to total government revenues, which measures the governments' dependence on oil revenues.

I start by running several sets of estimations in Section 3. In the first set, I focus on the degree of procyclicality and run OLS estimators, ignoring the potential endogeneity problem. In the second set, I handle the endogeneity problem by using instrumental variables for GDP. In the third set of estimations, I address the other potential endogeneity problems, which are namely the decision to establish a fund again and institutions. In Section 3.4 I turn to the question of volatility differences. I measure volatility in

terms of moving standard deviations. In all my regressions in Section 3, I control for the oil dependency (which I measure as the ratio of oil revenues to total revenues), oil price change and institutional quality measures.

3 Results

3.1 Procyclicality of Fiscal Policy

In this section, I first test the degree of procyclicality for oil rich countries by usual OLS methods and then use the 2SLS approach as in Jaimovich and Panizza (2007).[13] For each specification, I run two sets of estimations, one for the whole sample of oil-rich countries, and another for only the countries with stabilization funds, excluding those which do not have a fund. The rationale is to see whether the procyclicality results differ when we focus only on the countries with funds. In all my regressions, I use detrended (log) real government expenditures as the dependent variable and detrended (log) real GDP, oil dummy, oil price (log) and share of oil revenues in total government revenue as independent variables. The latter variable is used to control for the degree of oil-dependency in the economy. I also include WDI's natural resource rents as a percent of GDP as another control for oil dependency.[14] In testing the degree of procyclicality across countries with and without stabilization funds, I am interested in the sign and significance of the following coefficients in equation (1);

$$\frac{\partial g}{\partial y} = a_1 \text{ for those countries without/before stabilization funds} \quad (3)$$

$$\frac{\partial g}{\partial y} = a_1 + a_2 \text{ for those countries with/after stabilization funds} \quad (4)$$

[13] In all 2SLS estimations, I also instrument for the interaction term along with the GDP to avoid the "forbidden regression" problem.

[14] WDI reports total natural resource rents as the difference between the price of a commodity and the average cost of producing it whereby the unit rents are multiplied with physical quantities.

Table 3 shows first set of results. Using the Fixed Effects, Random Effects and Arellano Bond estimators, I find in the first panel of Table 3 that fiscal policy in a sample of 29 oil rich countries are on average highly procyclical. The coefficient is around 0.65-0.73 and highly significant in all specifications using the pooled sample. The results, however also show that the coefficients of interaction terms are negative and highly statistically significant, indicating that the government expenditures are associated significantly less with GDP, i.e. the fiscal policy is acyclical or mildly procyclical in those countries where/after there is a stabilization fund for the whole sample. The coefficient on the stabilization fund dummy is not statistically significant, indicating that there is no difference on the level of government expenditures as deviations from the trend across two groups of countries. Suprisingly, the institutional quality measures are not significant, except for socioeconomic conditions. The institutional quality measures in the ICRG dataset are constructed such that higher points indicate better outcomes and therefore lower risk.[15] Hence, the sign of the socioeconomic conditions is indicating that a higher rating of social conditions (therefore lower social risk) is negatively associated with cyclical fiscal expenditures. The insignificance of other institutional quality measures especially the corruption rating could be due to the fact that in our sample most countries have similar ratings without significant cross country and time variation except for Norway whereas there is enough variability in socioeconomic conditions among the rich income per capita and poor income per capita countries in the sample.

The second panel of Table 3 replicates the results when countries without stabilization funds are excluded. In all specifications, the coefficients on both the GDP and the interaction terms are reduced significantly. The statistical significance of the cyclicality coefficients now are not as significant as in the pooled set of estimations listed in the first panel of Table 3, but the signs are in the expected direction. Institutional quality measures again do not seem to be statistically associated with the cyclical component of the government expenditures except for the socio-economic conditions.

The OLS estimates present evidence in favor of stabilization funds. However, there is vast literature on the evidence of government expen-

[15] http://www.prsgroup.com/ICRG_Methodology.aspx

ditures and GDP in general being endogenously determined. In order to address the endonegenity problem, I rely on 2SLS method, although I believe that the endogeneity problem could be less severe for the oil-producing countries as opposed to a typical developing country without a dominant sector based on natural resources. The rationale is as follows: As Table 2 shows, oil production is the biggest contributor to overall GDP and oil related exports constitute almost the whole exports in many of those countries. Therefore the dependency on oil resources makes it more likely that the GDP driven by oil production is the determinant of government expenditures rather than the other way around. But nevertheless in order to avoid the risk of biased estimations due to reverse causality, I rely on 2SLS.

To address the endogeneity problem for GDP, I use the instrument suggested by Jaimovich and Panizza (2007), namely the weighted GDP growth of each country's trade partners. The authors claim that this is a valid instrument for the GDP growth because those external shocks should be expected to have no impact on government expenditures other than their indirect impact through the GDP. Jaimovich and Panizza (2007) show that the first-stage F statistics are above 10 and the coefficients in the first stage are highly significant for all groups of countries, except the low income countries. More specifically, they define the real external shock instrument as:

$$SHOCK_{i,t} = \frac{EXP_i}{GDP_i} \sum_j \varphi_{i,j,t-1} GDPGR_{j,t} \tag{5}$$

Where $\varphi_{ij,t}$ is the fraction of exports from country i to country j, and EXP_i/GDP_i is country i's average exports expressed as a share of GDP.[16] Using the contemporaneous value and the three lags of the external shocks to instrument the GDP growth, I run 2SLS regressions with country fixed effects. The results are summarized in Table 5. The 2SLS estimations (columns 1-4) also confirm that the fiscal policy is overall procyclical on average in the pooled sample albeit with lower coefficients as compared to

[16]Jaimovich and Panizza (2007: p.13) suggest that using a time-invariant measure of exports over GDP would be less subject to real exchange rate fluctuations and domestic factors.

the OLS coefficients. However, as in the OLS case, coefficient on the interaction term is negative and statistically significant suggesting that the degree of procyclicality falls under the existence of stabilization funds. More interestingly, the coefficient of the stabilization fund dummy is negative and significant suggesting that real expenditure growth is lower on average in countries with funds, an argument that goes in favour of funds. In the second panel of Table 5 (columns 5-8), I replicate the results for countries only with stabilization funds. Once again, similar to the OLS case, the coefficients on GDP growth and the interaction term are no longer significant (except for column 5) albeit with the expected signs. Column 5 shows that among the countries which have stabilization funds if one does not control for the institutional quality differences, fiscal policy seems procyclical however, once institutional quality measures are included, procyclicality is no longer significant in columns to 6-8. In other words, when one excludes the countries that never adopted such funds, the procyclicality result as well as the reduction effect before and after the funds dissappears for those countries which already adopted funds. This might support the view that those countries which adopted stabilization funds were more prudent to start with and procyclicality might not have been a serious fiscal problem initially.

In Table 6, I report the first stage results. The first stage F statistics for the excluded instruments (which test the weak identification of individual endogenous regressors by partialling out the linear projections of remaining endogenous regressors) are all well above 10. Hansen J statistics suggests that the instruments are uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equations. Finally, I run the Wu-Hausman endogeneity test which uses the difference of two Sargan-Hansen statistics: one for the equation with the smaller set of instruments, where the suspect regressor(s) are treated as endogenous, and one for the equation with the larger set of instruments, where the suspect regressors are treated as exogenous.[17]In line with my priors, I cannot reject the null hypothesis that the real GDP growth can

[17]Baum, C.F., Schaffer, M.E., Stillman, S. 2010. ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML and k-class regression. http://ideas.repec.org/c/boc/bocode/s425401.html

actually be treated as exogenous. All first stage statistics point out to the validity of instruments. Generally speaking, earlier findings of OLS remain robust albeit with reduced coefficients, there is evidence of procyclical fiscal policy on average whereas the relationship dissappears when we exclude the countries without funds. The fact that the evidence for procyclicality dissappears across the pooled and seperate regressions might be suggesting that the countries with funds could be more prudent even before establishing such funds as the results show that procyclicality was not statistically significant before or after the establishment. In other words, this might suggest that stabilization funds themselves are no magic tools and a certain degree of prudence is needed to achieve more desirable fiscal outcomes as opposed to the view that such funds necessarily tie the hands of the governments which cannot impose discipline otherwise.

3.2 Potential Endogeneity of the "Decision to Establish a Stabilization Fund"

As discussed in the earlier sections, the decision to adopt a fund might not be truly exogenous and there might be various of reasons why some countries chose to adopt one, and why some other countries don't. A case where there are complications with respect to establishing a sound empirical link between funds and fiscal performance is the following: countries that run high deficits might be more tempted to establish stabilization funds as a self-disciplining mechanism, therefore in a limited time series, introduction of a fund might appear to be positively associated with higher fiscal expenditures as it might require some moderate time for the fund to be fully operational. Or countries which already have a tradition of fiscal prudence might be more tempted to establish funds as a reflection of fiscal accountability and responsibility. However, in that case it would be again wrong to assign causality going from having stabilization funds to achieving more desirable fiscal outcomes especially in a limited time series. In order to address this endogeneity problem (which the previous studies suffer from), in this section I instrument the decision to establish a stabilization fund. Table 4 displays all alternative sets of instruments that are employed for the decision to establish oil stabilization funds.

I contemplate the following hypothesis; a country's willingness to establish a stabilization fund might increase if there is a growing awareness within the society with respect to the best use of "people's resources" -oil endowments in our case. In what follows, I use two sets of measures to proxy for the awareness. In the first set, I use the percent of urban population, lags of Barro-Lee's average years of education and percent of population with tertiary education.[18] The identifying assumption is that urbanization and lags of educational attainment have an impact on the awareness on the best use of country resources, but otherwise has no direct effect on the cyclical component of the contemporary government expenditures. The rationale for using urbanization as an instrument is that the information and participatory ideas are more accessible in urban areas as opposed to the rural areas. Urbanization is a **very slow process**, taking many decades whereas the decision to establish a fund can even happen overnight. It is hard to imagine that such a slowly changing indicator might have a direct impact on cyclical expenditures, or visa versa.

Table 7 displays the results of the first set of instruments. In columns 1-3-5-7 the percent of urban population and 5^{th} lags of educational attainment indicators are used as instruments for the oil fund, whereas in columns 2-4-6-8, 10^{th} lags of educational attainment indicators are used. The coefficient estimates are less than those of OLS, highly significant and showing procyclicality under the absence of funds and acyclicality or mild countercyclicality under the existence of funds for the whole sample. The second panel of estimations, displayed in columns 5-8, excludes non-fund countries and shows the estimations for the countries with funds only. The coefficients of both the GDP and the interaction terms are now significant at the 10% significance level and again point out to a acyclical or mildly countercyclical fiscal policy after the establishment of the funds. None of the institutional quality measures show up as significant. Table 8 summarizes the first stage statistics. Coefficients of the instruments are positive as expected and statistically significant in general, except for the 10^{th} lag of the tertiary education. F statistics are above 10, except for column 4 and 8. According to the Wu-Hausman test, I cannot reject the null hypothesis that oil fund dummy can be treated as exogenous, and Kleibergen-Paap

[18]Barro-Lee series are linearly interpolated using Stata's ipolate command

Wald statistics are also above the Stock-Yogo critical values for 10 percent IV relative bias, again except for column 4 and 8.

One key problem with Barro-Lee educational attainment dataset is that it is missing for some oil-rich countries, reducing the number of countries available to 20 for the whole set, and 14 for the sub-sample of countries with funds. So as a robustness check, I explore an alternative second set for which the data is complete for 24 countries. This alternative instrument set consists of i) *the interaction of the percent of urban population with the number of other oil-rich countries which already adopted a stabilization fund*, and ii) 'freedom of press rating' of the Freedom House. The rationale for the first one is that the awareness might especially spread within an oil rich country, if other resource rich countries have already adopted such funds. This could be because of positive perceptions about how a fund might help as a buffer-stock, it might be because of following international organizations (such as the IMF) "sound policy" prescriptions, it could be due to the transformation in the economy where a need for new reforms arise, or simply it could be because 'stabilization/sovereign funds are the new global fashion'. This alternative instrument can be thought also as a proxy for 'increasing awareness'. My identifying assumptions for this second set of instruments are that i) *the number of other oil-rich countries in which there is a stabilization fund should be purely exogenous for the cyclical component of fiscal expenditures of a country.* In order words, there is no reason to expect that the number of countries with funds should have an impact on the fiscal expenditures in a country, other than its indirect impact through affecting the willingness to adopt a fund in the country in question and ii) *higher fraction of population living in urban areas with better access to information is directly associated with the decision to adopt a stabilization fund, but otherwise it is exogenous to the cyclical component of government expenditures.*

The results using the second set of instruments for the decision to establish funds are provided in Table 9. The coefficients as well as the standard errors are close to the OLS coefficients in Table 3 and institutional quality variables are again not significant. Table 10 reports the first stage statistics. All coefficients with respect to the awareness instrument in the first stage is highly statistically positive (all at 1% level). The Freedom House rat-

ings assign lower values to free press, and higher values to not-free press.[19] Therefore, as expected the sign of our free press indicator is negative and also statistically significant at the 1% level, indicating that more freedom for press is positively associated the decision to establish a fund. F statistics of the first stages are high, and the instruments passes the weak instrument tests under all specifications except for specification 4. Wu-Hausman endogeneity test suggests that I cannot reject the null hypothesis that the specified endogenous variables can actually be treated as exogenous. Overall, earlier findings remain robust; **the government expenditures are highly procyclical in countries under the absence of stabilization funds and they are acyclical or mildly countercyclical in countries with such funds**.

3.3 Endogeneity of the Institutions

In addressing the last of the three endogeneity problems existing in the literature, I finally attempt to instrument the institutional quality measures. The most common instrument used widely in the literature are the settler mortality rates between the 17^{th} and 19^{th} centuries and the latitude, as suggested by Acemolu, Johnson and Robinson (2001). The settler mortality rates and colonial indicators however do not seem to be appropriate for my sample of countries because I have a small subset of countries in my sample (24 with instutional quality data) and mortality data is unfortunately missing almost for half of the countries in the sample which makes the estimates very imprecise. Therefore, I search for another variable which has to be correlated with instutional quality measures of the country in question but should not have a direct impact on the cyclical component of the government expenditures.

One potential instrument is the lags of average institutional quality measures of the neighbouring countries for each oil-rich country. The identifying assumption is that the instutitions are contagious through trade or regional political agreements and the lags of the institutional quality measures of the neighbours might have an impact on the institutions of the

[19]More specifically, ratings between 0-30 indicate Free Press, 31-60 indicate Partly Free and 61-100 indicate Not Free.

country in question, but do not have a direct impact on cyclical component of the government expenditures. One exception might be military conflict with neighbours (which the ICRG index accounts for), however, using the lags rather than the contemporaneous values of the instrument should at least partially address this concern.

Table 12 displays the first stage statistics and Table 11 summarizes the 2SLS findings for the pooled sample and the sub-sample of oil fund countries. As the first stage results show, the 5^{th} and the 10^{th} lags of the average institutional quality measure of the neighbours are highly statisticaly significant for both the whole sample and the sub-sample of countries with stabilization funds only. Statisticaly, the 5^{th} lag of the neighbours institutions seem to be a better instrument, as the F statistics and the weak identification tests show, however, as far as the economics is concerned, 10^{th} lag is more intuitive and more reasonable to address endogeneity concerns as institutions are very slow changing arrangements. As Table 11 shows, even when instrumented, the instutitional quality measure as proxied by the ICRG composite index shows up as insignificant. As mentioned before, this might be due to the fact the oil rich countries with the exception of Norway have similar ICRG ratings. The coefficients of the GDP and the interaction terms are again similar to the OLS estimates for the whole sample and the sub-sample as columns 1-4 show. Therefore the findings under instrumenting institutions also confirm that earlier finding that the fiscal policy is procyclical in countries under the absence of funds and mildly-procyclical or acyclical in countries with funds.

3.4 Treating Both the Fiscal Policy and the Stabilization Fund as Endogeneous

In this section instead of instrumenting the potentially endogenous real gdp and the stabilization fund dummy one at a time, I treat both of them as endogenous and use instruments all at once. Although using multiple instruments is generally not recommended, I attempt to put both sets of instruments together to check whether the results are sensitive to treatment

of variables of interest as exogenous or endogenous. [20] In order to keep the analysis and the interpretation simple(r), I treat the institutions as predetermined with respect to the fiscal policy.[21]

The instrument that is used for real gdp growth is once again the external shocks variable as proposed by Pannizza and Jaimovich (2007) but without any lags.[22] As for the decision to establish a stabilization fund, the instruments I use are the urbanization rate and the fifth lag of the population with tertiary education as a proxy for awareness of best use of countries' resources.[23] Table 13 summarizes the 2SLS findings for the pooled sample and the sub-sample of oil fund countries for the two endogenous variable case and Table 14 displays the first stage statistics.

Starting from the first stage, results show that the coefficients for the instruments are mostly insignificant for the pooled sample whereas the external shocks seem to significantly correlate with real GDP growth and the proxy measures for the awareness seems to be positively and significantly correlated with the decision to establish stabilization funds for the subsample. The F test of excluded instruments are sufficiently higher than the rule of thumb of 10.[24] On the other hand, weak identification test point out that the excluded instruments might be weakly correlated with the endogenous regressors, although the Kleibergen-Paap Wald F statistics were mostly above the critical points when the potentially endogenous regressors were instrumented one at a time in the previous sections. Hansen J statistics suggest that we cannot reject the null hypothesis that the instruments are uncorrelated with the error terms.

Despite the possibly weak identification, the second stage results are similar to the previous sets of estimations: i) for the pooled sample the fiscal

[20]See Angrist and Pischke (2009), "'Mostly Harmless Econometrics" for a discussion of using multiple endogenous variables

[21]The results treating institutions also as endogenous along with the former two are similar to the two endogenous variable case, i.e. treating only the real gdp growth and stabilization fund dummy as endogenous. The results are available upon request.

[22]In the case of multiple excluded instruments per each endogenous variable, the number of clusters turn out to be insufficient to calculate robust covariance matrix, i.e. there are more regressors than the country clusters.

[23]Unlike in the previous section, I exclude the average years of education to reduce the number of instruments due to the restricted number of country clusters which affects the robustness of covariance matrix for the sub-sample of countries with funds.

[24]In order to avoid the " forbidden regression problem" the interaction term is also intrumented in the first stage.

policy on average seems to be mildly counter-cyclical under the existence of funds and, ii) procyclicality does not seem to be an issue before or after when one looks only at the countries which already adopted such funds. Although the signs of the coefficients for the sub-sample are as expected, they are not statistically significant suggesting that there is no evidence for fiscal policy procyclicality in countries which adopted funds.

3.5 Volatility of Fiscal Expenditures

In this section, I focus on the short term cyclical volatility of various variables, which I measure by the standard deviation on a rolling window (after removing the trend). More specifically, I am interested in whether the cyclical volatility of the real household final consumption, real general government final consumption, real gross fixed capital formation, real GDP, real general government expenditures and revenues are reduced in those countries with stabilization funds.[25] As the economic theory outlines, business cycle fluctuations have welfare costs and it is only natural to check whether there is a difference in volatility between the two groups of countries. I am also interested in whether short term growth of the variables of interest is more likely to be higher in oil fund countries. I believe this is important from a developmental perspective: whether we can argue that "having this buffer of savings" helps countries sustain higher growth paths. I focus on short term growth, as measured over 3 and 4 years instead of longer terms because as mentioned before the oil funds are relatively young which restricts the database from looking into longer horizon.

My methodology is the following. I focus on the short term growth and cyclical volatility. I estimate moving growth rates and standard deviations of variables of interest over 3 and 4 year windows. In all volatility estimations, variables are measured as detrended logs except for growth. If oil funds are indeed succesful, I expect to find that short term growth is

[25]The data source for real household final consumption, real general government final consumption and real gross fixed capital formation is World Development Indicators and the data source for real general government expenditures and revenues is WEO and IMF Country Desks.

higher on average and volatility is reduced in oil fund countries. In order to measure this, I generate a new binary variable for the oil fund which takes on the value 1 in the third and correspondingly in the fourth year of the establishment of the fund. I do not divide the fund countries into groups on the basis of establishment year because in that case, the estimates for first couple of years would be wrongly attributed to "after fund" performance. To be more specific, since I am looking at moving rates at 3-4 year windows, the growth and volatility estimates in the first year of the oil fund in fact would measure the performance of the last 3 or 4 years when actually there was no fund in place. Therefore assigning binary variable to the third and fourth years after establishment would only properly account for the fund period. Following this route, I provide t-tests of means and present graphical analysis.

I report the findings with respect to short term growth differences in Table 15 which presents simple means tests without controlling for various possible covariates. The first panel shows the differences over 3 year growth performances of key variables and the second panel shows the 4 year growth differences. In all cases, except for the real government revenue growth over 3 year windows, the countries with stabilization funds have statistically significantly higher growth rates. The results indicate that there is no statistically significant difference between revenue growth for countries with or without funds but growth rates of GDP, consumption, investments are statistically significantly higher for those countries with (or after establishing) stabilization funds.

The findings with respect to cyclical volatility differences are reported in Tables 16 and 17. Simple t-tests in Table 16 show that the volatility of real general government expenditures, government consumption and real gross fixed capital formation is statistically significantly lower in countries with stabilization funds, but there is no significant difference between real household consumption and government revenue volatility across countries. In Table 17, I report the relative standard deviations (relative to GDP) across countries. Once again, simple t-tests show that not only the relative volatility of real general government expenditures, government consumption and real gross fixed capital formation are statistically significantly lower in countries with stabilization funds, but also the relative real house-

hold consumption and government revenue volatility (the latter over 4 year window).

And finally, I present some graphical analysis in Figures 2 to 6. In Figure 2, I show the volatility of household final consumption by the age of the oil fund and the volatility in countries that never established oil stabilization funds. We see in the second figure that the volatility is dispersed over time even though some non-fund countries indeed managed to achieve lower consumption volatility. Figures show a disperse consumption volatility performance across oil fund countries and no-fund countries. In line with the findings of the means tests, graphical analysis also suggest that there does not seem to be a systematic volatility difference in consumption between countries with and without funds. What is though worth-noting is that the consumption volatility seems to be more concentrated in a lower band in those countries with a long history of oil fund. However, these are mainly consisted of top oil producer and high income per capita countries like Saudi Arabia, United Arab Emirates, Kuwait and Oman where consumption risk is lower on average as compared to the rest of the countries. Therefore it is hard to argue for a sound empirical support for the age of the oil fund and consumption volatility.

Figures 3 and 6 show the volatility of gross fixed capital formation across group of countries and by the age of oil fund. Gross investment volatility seem to be decreasing on average for all countries, however, as the figures show it has been decreasing more starkly for countries with oil funds. This is in line with the earlier findings. And finally, Figures 4 and 5 show the scatters of volatility of government expenditures between group of countries over time and by the age of oil fund. In this last case, the pattern is similar, i.e., overall volatility has been declining on average for all countries, but more so for countries with funds. Moreover, as in the consumption volatility case, countries with longer history of oil stabilization funds are more likely to have lower volatility of government expenditures and consumption.

4 Conclusion

The end of 1990s was a period where many oil rich countries started establishing funds with stabilization purposes in light of fluctuating com-

modity prices and the boom and bust cycles associated with it. In a world with perfect insurance markets, we would not expect to see countries to rely on savings or stabilizations funds. However, the evidence shows that more and more commodity rich countries joined the club of stabilization-fund-owners. Moreover, there is a vast literature following Kaminsky, Reinhart and Vegh (2004) showing that the capital inflows to many developing countries are procyclical whether the recipient country is commodity-rich or not. The problem of boom and bust cycles is more of a problem for oil rich, or commodity rich countries in general, as the rising international prices makes borrowing easier, leading to procyclical fiscal policies while the optimal fiscal policy which the findings of economic literature suggests is either counter-cyclical or acyclical. Under the lack of perfect insurance markets, stabilization funds provide a mechanism to enforce oil-rich countries to save during good times and use these resources during contractionary times, making the fiscal policy either countercyclical or acyclical. Therefore it is an important policy question whether these funds actually help countries to achieve better fiscal policy outcomes. I believe that the current literature puts too little emphasis on the impact of stabilization funds on the cyclicality of fiscal policy.

The task of establishing a sound empirical relationship between the stabilization funds and fiscal policy performance is not an easy task. First of all, the decision to establish a fund might not be truly endogenous, i.e. countries with strong institutions who already have more desirable fiscal policy outcomes might be inclined to establish funds in the first place. Second the endogeneity between the GDP and the fiscal policy is an important problem that can lead to biased estimations. Moreover, the institutions themselves are not truly exogenous. In my paper, I contribute to the existing literature by addressing all these problems by instrumenting the GDP, the existence of a stabilization fund (or the decision to establish a fund) and the institutions. Under most of my specifications, either using the detrended GDP or using instruments for GDP, I find that the fiscal policy is countercyclical but becomes either acyclical or countercyclical after stabilization funds. The instrument that I use for the detrended GDP is the contemporaneous and three lags of the weighted GDP growth of each country's trade partner.I find that the results when the GDP is instru-

mented are similar to OLS estimations. Running seperate estimations for countries with oil fund only shows that the procyclicality result statistically dissappears.

I address the problem of the 'endogenous decision of establishing funds' by introducing several instruments for the fund dummy. All instruments that I use are aimed to proxy 'awareness for the best use of country resources'. In the first set of 2SLS estimations, I use the 5^{th} and 10^{th} lags of linearly interpolated Barro-Lee educational attainment indicators as well as urbanization. In the second set, I construct a new instrument which is the interaction of the number of other oil-rich countries with funds with urbanization. I include free press index by Freedom House as an additional instrument. The identifying assumptions are that the countries that have better informed citizens (also informed about other countries' performance and the need for saving) are more likely to establish funds, but otherwise these instruments are exogenous to the cyclical component of government expenditures. My first stage results show that these are valid instruments, and that the second stage results show that countries with stabilization funds have either acyclical or midly cyclical fiscal policy.

In order to address the potential endogeneity of the institutions, I construct two new variables which are the 5^{th} and 10^{th} lags of the average ICRG ratings of neighbouring countries for each oil-rich country. The identifying assumption is that institutions might be transmitted through regional trade or political agreements and the lags of the institutional ratings of the neighbour countries do not have a direct impact on the cyclical component of the government expenditures. Instrumented or not, I find no evidence of institutional quality on cyclicality of fiscal policy although all first stage estimations show that institutional measures have an explanatory power over the decision to establish stabilization funds.

And finally, I compare the growth performance and volatility performance of real government expenditures, household final consumption, government consumption and gross fixed capital formation between the oil-rich countries with and without stabilization funds over three and four year windows. I use simple means tests in measuring the growth and volatility performance. I find that the government expenditure growth and gross fixed formation growth rates are higher but less volatile in countries with

stabilization funds. I find no evidence of a statistically meaningful association between household final consumption and existence of a stabilization fund.

In sum, I find that the countries with stabilization funds have fiscal policy performances with more desirable cyclical properties that are in parallel with the prescriptions of the optimal fiscal policy literature. However, there is a clear divide in results when I consider the whole sample or exclude the countries without funds. The countries which adopted such funds seem to have less procyclical fiscal policies before and after as opposed to countries without funds for the whole sample period although degree of procyclicality seem to decline further after the establishment of the funds. This finding might suggest that stabilization funds per se are no magic tools and a certain degree of prudence is needed to achieve more desirable fiscal outcomes as opposed to the view that such funds necessarily tie the hands of the governments which cannot impose discipline otherwise. This is in line with the evidence by Frankel et al. (2012) which suggests that those countries which graduated from fiscal procyclicality into counter or acyclicality are the ones with better institutions.

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Table 1: List of Countries

Country	Stabilization F.	Saving F.	Name	Inception	Natural Resource
Algeria	1	0	Revenue Regulation Fund	2000	oil
Azerbaijan	1	1	State Oil Fund	1999	oil
Bahrain	1	0	Reserve Fund for Strategic Projects	2000	oil
Chad	0	1	Fund for Future Generations	1999-2006	oil
Ecuador	1	0	Oil Stabilization Fund	1999	oil
Gabon	0	1	Fund for Future Generations	1998	oil
Iran	1	0	Oil Stabilization Fund	2000	oil
Kazakhstan	1	1	Kazakhstan National Fund	2001	oil
Kuwait	1	1	KIA	1960	oil
Libya	1	1	LIA/Oil Reserve Fund (replaced in 2006)	1995	oil
Mexico	1	1	Oil Stabilization Fund	2000	oil
Nigeria	1	0	Excess Crude Account	2004	oil
Norway	1	1	The Government Pension Fund of Norway	1990	oil
Oman	0	1	State General Reserve Fund	1980	oil and gas
Qatar	1	1	QIA/Stabilization Fund (replaced in 2005)	2000	oil
Russia	1	0	National Welfare Fund/Oil Stabilization Fund (replaced in 2008)	2004	oil
Saudi Arabia	0	1	SAMA Foreign Holdings	1952	oil
Sudan	1	0	Oil Saving Account	2002	oil
Trinidad and Tobago	1	1	Heritage and Stabilization Fund/Interim Rev.Stab. Fund (replaced in 2007)	2000	oil
Venezuela	1	0	FEM	1999	oil
UAE	0	1	ADIA	1976	oil
Angola	0	0	-	-	oil
Brazil	0	0	-	-	oil
Bolivia	0	0	-	-	oil and gas
Cameroon	0	0	-	-	oil
Republic of Congo	0	0	-	-	oil
Indonesia	0	0	-	-	oil
Vietnam	0	0	-	-	oil
Yemen	0	0	-	-	oil

Note: We exclude Brunei, Equatorial Guinea, and Timor-Leste from the list

Table 2: Oil Indicators, 2005-2008

	Oil GDP to Total GDP	Oil Exports to Total Exports of Goods &Services	Oil Revenue Total Gov. Revenue	Stab. Fund
Africa				
Angola	58.3	94.0	80.4	No
Cameroon	9.6	37.7	33.9	No
Chad	46.1	84.2	61.3	Yes
Republic of Congo	67.1	88.3	83.3	No
Gabon	51.2	80.8	62.4	Yes
Nigeria	37.2	86.2	82.3	Yes
Sudan	18.2	89.4	58.5	Yes
Middle East and Central Asia				
Algeria	44.8	93.7	76.9	Yes
Azerbaijan	52.1	88.8	54.6	Yes
Bahrain	26.3	62.0	79.5	Yes
Islamic Republic of Iran	26.2	76.2	69.6	Yes
Kazakhstan	29.2	56.2	37.9	Yes
Kuwait	57.3	83.5	94.5	Yes
Libya	79.1	95.6	73.9	Yes
Oman	48.5	74.3	84.6	Yes
Qatar	58.5	80.2	62.9	Yes
Saudi Arabia	26.7	84.5	90.3	Yes
United Arab Emirates	35.7	42.3	75.4	Yes
Yemen	32.3	81.3	73.4	No
Asia and Pacific				
Indonesia	9.6	9.7	26.8	No
Vietnam	n.a.	16.8	28.2	No
Western Hemisphere				
Bolivia	6.5	6.3	29.6	No
Ecuador	n.a.	53.6	n.a.	Yes
Mexico	n.a.	15.0	n.a.	Yes
Trinidad and Tobago	35.7	50.1	58.8	Yes
Venezuela	34.9	86.9	n.a.	Yes
Europe				
Russian Federation	n.a.	44.7	30.9	Yes

Source: IMF

Table 3: OLS Estimates of Fiscal Cyclicality

Dependent Variable: (Detrended Log) Real Government Expenditures

	ALL OIL RICH COUNTRIES: (1)-(6)						OIL RICH COUNTRIES WITH FUNDS: (7)-(12)					
VARIABLES	(1) FE	(2) RE	(3) AB	(4) FE	(5) RE	(6) AB	(7) FE	(8) RE	(9) AB	(10) FE	(11) RE	(12) AB
Real GDP (det. log)	0.681***	0.679***	0.655***	0.734**	0.731**	0.729***	0.472**	0.469**	0.335***	0.220	0.227	0.240
	(0.186)	(0.185)	(0.072)	(0.301)	(0.295)	(0.096)	(0.213)	(0.210)	(0.088)	(0.239)	(0.246)	(0.147)
SF Dummy*Real GDP (det.log)	-0.498*	-0.492*	-0.499***	-0.710**	-0.711**	-0.732***	-0.291	-0.283	-0.228**	-0.275	-0.274	-0.326**
	(0.255)	(0.256)	(0.101)	(0.292)	(0.290)	(0.117)	(0.248)	(0.248)	(0.114)	(0.239)	(0.249)	(0.154)
Stabilization Fund Dummy	-0.013	-0.004	-0.013	-0.010	0.004	-0.008	-0.020*	-0.012*	-0.023	-0.031	-0.004	-0.028
	(0.008)	(0.004)	(0.014)	(0.020)	(0.009)	(0.017)	(0.011)	(0.007)	(0.015)	(0.025)	(0.011)	(0.018)
Oil Prices (in logs)	0.005	-0.004	0.029	0.026	0.116**	0.033	0.022	0.010	0.048	0.032	0.133**	0.052
	(0.011)	(0.009)	(0.074)	(0.020)	(0.047)	(0.047)	(0.015)	(0.010)	(0.073)	(0.024)	(0.065)	(0.044)
Nat. Resource Rent	-0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Share of Oil Rev. in Total				0.001	0.000*	0.001**				0.001	0.000	0.001**
				(0.001)	(0.000)	(0.000)				(0.001)	(0.000)	(0.001)
Dem. Accountability				-0.004	-0.001	-0.004				0.004	0.003	0.003
				(0.007)	(0.005)	(0.006)				(0.008)	(0.006)	(0.007)
Bur. Quality				-0.002	0.003	0.001				-0.005	-0.001	-0.002
				(0.011)	(0.006)	(0.011)				(0.012)	(0.006)	(0.012)
Law and Order				0.004	0.004	0.000				0.004	0.006	-0.000
				(0.009)	(0.005)	(0.010)				(0.011)	(0.008)	(0.010)
Government Stability				-0.001	-0.002	-0.001				-0.001	-0.002	0.002
				(0.005)	(0.003)	(0.004)				(0.006)	(0.004)	(0.005)
Corruption				-0.005	-0.002	-0.004				-0.009	-0.004	-0.010
				(0.009)	(0.005)	(0.009)				(0.011)	(0.007)	(0.011)
Socioeconomic Conditions				-0.009**	-0.004**	-0.008*				-0.011**	-0.004	-0.008*
				(0.003)	(0.002)	(0.004)				(0.005)	(0.003)	(0.005)
L.Real Gov. Exp. (det. log)			-0.004			-0.009			0.050			0.127**
			(0.037)			(0.045)			(0.042)			(0.053)
L.Real GDP (det. log)			0.070			0.121*			0.199***			0.281***
			(0.059)			(0.071)			(0.062)			(0.079)
Constant	-0.011	0.024	-0.124	-0.097	-0.515**	-0.140	-0.075	-0.026	-0.192	-0.110	-0.592**	-0.211
	(0.043)	(0.032)	(0.342)	(0.078)	(0.203)	(0.215)	(0.055)	(0.037)	(0.331)	(0.107)	(0.288)	(0.200)
Observations	717	717	660	455	455	426	519	519	477	332	332	311
R-squared	0.230			0.294			0.184			0.211		
Number of countries	29	29	29	24	24	24	21	21	21	17	17	17
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 4: List of Endogenous Variables and Instruments

Endogenous Variable	**Alternative (1)**	**Alternative (2)**	**Alternative (3)**	**Alternative (4)**
GDP Growth	i) Growth of trade partners (Jaimovich and Panizza)	-	-	-
Stabilization Fund	i) Urban Population (% of Total)	i)Urban Population (% of Total)	Urban Population (% of Total) x No. of Oil-Rich Countries with Funds	i) Urban Population (% of Total) x No. of Oil-Rich Countries with Funds
	ii) 5^{th} lag of Average Years of Schooling (Barro-Lee)	ii) 10^{th} lag of Average Years of Schooling (Barro-Lee)		ii) Freedom of Fress
	iii) 5^{th} lag of Pop. With Tertiary Education (%) (Barro-Lee)	iii) 10^{th} lag of Pop. With Tertiary Education (%) (Barro-Lee)		
Institutions	i) 5^{th} lag of ICRG Rating of the Neighbouring Countries	i) 10^{th} lag of ICRG Rating of the Neighbouring Countries	-	-

Table 5: Two Stage Least Squares Estimates Using IV by Panizza and Jaimovich (2007)[(1)]

Dependent Variable: (Detrended Log) Real Government Expenditure Growth

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
Real GDP Growth	0.585***	0.461***	0.489***	0.449***	0.491**	0.244	0.328	0.263
	(0.146)	(0.154)	(0.136)	(0.135)	(0.231)	(0.213)	(0.208)	(0.205)
SF Dummy*Real GDP Growth	-0.437***	-0.305*	-0.338**	-0.323**	-0.371	-0.133	-0.207	-0.193
	(0.167)	(0.169)	(0.156)	(0.155)	(0.251)	(0.231)	(0.227)	(0.222)
Oil Prices (in logs)	0.007	0.014	0.008	0.010	0.010	0.017*	0.010	0.014
	(0.007)	(0.010)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)
Stabilization Fund Dummy	-0.039***	-0.037***	-0.043***	-0.041***	-0.044***	-0.041***	-0.050***	-0.054***
	(0.010)	(0.010)	(0.014)	(0.013)	(0.011)	(0.013)	(0.017)	(0.018)
Natural Resource Rent	0.000	0.000	0.000	0.000	0.001	0.001**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Share of Oil Revenues in Total	0.002**	0.002**	0.002**	0.002**	0.001*	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic Accountability			-0.003				0.000	
			(0.003)				(0.004)	
Bureaucratic Quality			-0.009				-0.015	
			(0.013)				(0.015)	
Law and Order			-0.014*				-0.021**	
			(0.007)				(0.009)	
ICRG Composite Index		-0.001				-0.002		
		(0.001)				(0.002)		
Government Stability				0.000				0.001
				(0.003)				(0.005)
Corruption				0.007				0.007
				(0.005)				(0.007)
Socioeconomic Conditions				-0.005				-0.008*
				(0.004)				(0.005)
Observations	453	449	449	449	331	327	327	327
R-squared	0.195	0.156	0.164	0.157	0.107	0.067	0.077	0.072
Number of countries	24	24	24	24	17	17	17	17
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

(1) Using the contemporeanous value and the three lags of growth of trade partners weighted by export shares
Robust and clustered standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 6: First Stage Statistics: 2SLS Estimations Using IV by Panizza and Jaimovich (2007)

Dependent Variable: Real GDP Expenditure Growth

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Coefficients of Excluded Instruments								
Real GDP Growth								
External Shocks	0.0511***	0.0525***	0.0521***	0.0539***	0.0505***	0.0509***	0.0522***	0.0532***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.01)	(0.012)	(0.010)
L1.External Shocks	0.001	-0.0127	-0.0132	-0.0138	0.007	-0.0187***	-0.0188***	-0.0182***
	(0.015)	(0.006)	(0.005)	(0.006)	(0.025)	(0.004)	(0.005)	(0.005)
L2.External Shocks	-0.0151	-0.0041	-0.0053	-0.0038	-0.0084	0.0106	0.0099	0.0102
	(0.013)	(0.011)	(0.011)	(0.010)	(0.017)	(0.012)	(0.013)	(0.012)
L3.External Shocks	0.0032	0.0014	-0.0027	0.0012	0.0013	-0.0019	-0.0058	-0.004
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)
*Oil dummy*Real GDP Growth*								
Oil Dummy*External Shocks	0.0685***	0.0689***	0.0679***	0.0652***	0.0693***	0.0686***	0.0671***	0.0643***
	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)
Oil Dummy*L1.External Shocks	-0.0119	-0.0124	-0.0132	-0.0145	-0.011	-0.012	-0.0141	-0.0143
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
Oil Dummy*L2.External Shocks	-0.0363***	-0.0363***	-0.0364***	-0.0376***	-0.0381***	-0.0381**	-0.0385**	-0.0393**
	(0.011)	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.0126)	(0.014)
Oil Dummy*L3.External Shocks	-0.0097	-0.0097	-0.0099	-0.0110	-0.0082	-0.0083	-0.0101	-0.0101
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.01)	(0.009)	(0.010)
F test of excluded instruments								
Real GDP Growth	52.98	54.80	42.24	65.72	146.39	691.12	392.54	308.98
Oil Dummy*Real GDP Growth	74.53	48.53	49.01	60.71	100.6	82	151.84	414.49
Tests of Weak Inst.-Robust Inf.								
Hansen J Statistic (Overident. Test)(1)	13.13	12.25	12.98	13.13	13.79	11.81	15.77	13.90
	p-val (0.16)	p-val (0.27)	p-val (0.37)	p-val (0.36)	p-val (0.13)	p-val (0.29)	p-val (0.26)	p-val (0.38)
Wu-Hausman Test of Endogenous Regressors(2)	1.87	0.18	0.28	0.81	1.34	0.049	0.59	0.88
	p-val (0.39)	p-val (0.91)	p-val (0.87)	p-val (0.67)	p-val (0.49)	p-val (0.98)	p-val (0.74)	p-val (0.65)
Weak Identification Test (K.-Paap Wald F)	6.41	6.41	9.09	8.92	23.21	31.55	139.13	51.07
(Stock-Yogo Crit Val. for 10% IV Rel. Bias)	10.69	10.78	10.89	10.89	10.69	10.78	10.89	10.89

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 7: Instrumenting for the Introduction of the Stabilization Fund

Dependent Variable: (Detrended Log) Real Government Expenditures

Instruments:
Columns (1)-(3)-(5)-(7): Urban Population (% of total), 5^{th} Lags of Ave. Years of Education and Population with Tertiary Education (% of total)
Columns (2)-(4)-(6)-(8): Urban Population (% of total), 10^{th} Lags of Ave. Years of Education and Population with Tertiary Education (% of total)

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
Stabilization Fund Dummy	-0.031	-0.057	-0.033	-0.065	-0.051	-0.053	-0.069	-0.077
	(0.051)	(0.060)	(0.055)	(0.070)	(0.053)	(0.057)	(0.064)	(0.074)
Real GDP (detrended log)	0.457***	0.429***	0.460***	0.433***	0.502*	0.497*	0.510*	0.501*
	(0.157)	(0.161)	(0.152)	(0.156)	(0.273)	(0.285)	(0.282)	(0.290)
SF Dummy*Real GDP (detrended log)	-0.508***	-0.499**	-0.508***	-0.497***	-0.583**	-0.580*	-0.557*	-0.550*
	(0.195)	(0.195)	(0.191)	(0.190)	(0.294)	(0.297)	(0.306)	(0.308)
Oil Prices (in logs)	0.010	0.014	0.004	0.009	0.021	0.022	0.024	0.026
	(0.012)	(0.013)	(0.013)	(0.016)	(0.016)	(0.017)	(0.021)	(0.025)
Share of Oil Revenues in Total	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Natural Resource Rent	0.001*	0.001*	0.001	0.001	0.001*	0.001*	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ICRG Composite Index	-0.001	-0.001			-0.001	-0.001		
	(0.001)	(0.001)			(0.001)	(0.001)		
Democratic Accountability			-0.005	-0.005			0.002	0.002
			(0.006)	(0.006)			(0.008)	(0.008)
Bureaucratic Quality			-0.011	-0.014			-0.016	-0.017
			(0.012)	(0.013)			(0.014)	(0.014)
Law and Order			-0.013*	-0.013			-0.013	-0.013
			(0.008)	(0.008)			(0.010)	(0.010)
Government Stability			0.001	0.002			0.004	0.004
			(0.004)	(0.004)			(0.006)	(0.006)
Corruption			0.004	0.002			-0.004	-0.005
			(0.008)	(0.009)			(0.013)	(0.014)
Socioeconomic Conditions			0.001	0.001			-0.003	-0.004
			(0.005)	(0.005)			(0.006)	(0.007)
Observations	382	382	382	382	275	275	275	275
R-squared	0.089	0.075	0.098	0.084	0.076	0.075	0.082	0.076
Number of countries	20	20	20	20	14	14	14	14
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

Robust and clustered standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 8: First Stage Statistics: 2SLS Estimations Using Proxy for Awareness

Dependent Variable: Oil Stabilization Fund Dummy

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Coefficients of Excluded Instruments								
Urban population (% of total)	0.003	0.012*	0.008	0.016**	0.029***	0.039***	0.029***	0.038***
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)
L5.Averge years of schooling	0.165***		0.136***		0.112**		0.035	
	(0.041)		(0.042)		(0.046)		(0.057)	
L5.Population with tertiary edu. (% of total)	0.041**		0.056***		0.025		0.044**	
	(0.016)		(0.016)		(0.017)		(0.018)	
L10.Averge years of schooling		0.108**		0.087*		0.056		-0.024
		(0.042)		(0.046)		(0.046)		(0.059)
L10.Population with tertiary edu. (% of total)		0.022		0.033		-0.013		0.007
		(0.023)		(0.023)		(0.024)		(0.027)
F test of excluded instruments	21.20	10.37	23.46	9.0	26.83	16.33	15.06	7.29
Tests of Weak Inst.-Robust Inf.								
Hansen J Statistic (Overident.Test)[(1)]	1.99	0.702	2.54	1.35	1.76	0.557	4.70	2.67
	p-val (0.36)	p-val (0.704)	p-val (0.28)	p-val (0.51)	p-val (0.41)	p-val (0.75)	p-val (0.10)	p-val (0.26)
Wu-Hausman Test of Endog. Reg.[(2)]	0.23	0.41	0.007	0.14	0.30	0.23	0.008	0.05
	p-val (0.64)	p-val (0.52)	p-val (0.93)	p-val (0.70)	p-val (0.58)	p-val (0.62)	p-val (0.93)	p-val (0.83)
Weak Ident. Test (K-P. Wald F)	21.2	10.37	23.5	9.00	26.8	16.3	15.1	7.3
(Stock-Yogo Crit. Val. for 10% IV Rel. Bias)	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 9: Instrumenting for the Introduction of the Stabilization Fund-All Oil Rich Countries

Dependent Variable: (Detrended Log) Real Government Expenditures
Instruments:
Columns (1) and (3): Proxy for Awareness (Number of Other Countries with a Fund Interacted with Urbanization)
Columns (2) and (4): Proxy for Awareness and Freedom of Press Index

VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS
Stabilization Fund Dummy	-0.029	0.027	-0.047	0.027
	(0.055)	(0.058)	(0.075)	(0.080)
Real GDP (detrended log)	0.757***	0.830***	0.704***	0.786***
	(0.157)	(0.159)	(0.182)	(0.190)
SF Dummy*Real GDP (detrended log)	-0.731***	-0.551***	-0.667***	-0.508**
	(0.205)	(0.183)	(0.210)	(0.203)
Oil Prices (in logs)	0.006	-0.009	0.009	-0.009
	(0.014)	(0.012)	(0.017)	(0.016)
Natural Resource Rent	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Share of Oil Revenues in Total	0.000	-0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Democratic Accountability			0.000	-0.003
			(0.007)	(0.008)
Bureaucratic Quality			-0.012	-0.007
			(0.013)	(0.016)
Law and Order			-0.006	-0.011
			(0.008)	(0.013)
Government Stability			0.001	-0.001
			(0.005)	(0.005)
Corruption			-0.004	0.001
			(0.011)	(0.010)
Socioeconomic Conditions			-0.005	0.001
			(0.004)	(0.006)
Observations	460	409	455	404
R-squared	0.193	0.219	0.165	0.181
Number of countries	24	24	24	24
Country Fixed Effects	YES	YES	YES	YES

Robust and clustered standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 10: First Stage Statistics: 2SLS Estimations Using Urbanization and Freedom of Press as Instruments-All Oil Rich Countries

	(1)	(2)	(3)	(4)
Coefficients				
Proxy for Awareness	0.0003***	0.0003***	0.0006***	0.0003***
	(0.00004)	(0.00005)	(0.00005)	(0.00006)
Free Press		-0.004***		-0.004***
		(0.002)		(0.002)
F test of excluded instruments				
Stabilization Fund Dummy	53.6	21.95	23.85	12.19
Tests of Weak Instruments-Robust Inference				
Hansen J Statistic (Overidentification Test)[1]	0.000	0.63	0.000	1.081
	p-val (0)	p-val (0.43)	p-val (0)	p-val (0.30)
Wu-Hausman Test of Endog. Reg.[2]	0.03	0.69	0.08	0.28
	p-val (0.86)	p-val (0.41)	p-val (0.78)	p-val (0.60)
Weak Identification Test (Kleibergen-Paap Wald F)	53.6	21.95	23.85	12.19
(Stock-Yogo Critical Values for 10 percent IV Relative Bias)	16.38	19.93	16.38	19.93

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 11: Instrumenting for the Institutions (As Proxied by ICRG Composite Index)

Dependent Variable: (Detrended Log) Real Government Expenditures

Instruments:
Columns (1) and (3): 5^{th} Lag of Average ICRG Index of Neighbouring Countries
Columns (2) and (4): 10^{th} Lag of Average ICRG Index of Neighbouring Countries

VARIABLES	(1) 2SLS All Oil Count.	(2) 2SLS All Oil Count.	(3) 2SLS Count. with Oil Funds	(4) 2SLS Count. with Oil Funds
Real GDP (detrended log)	0.699***	0.733***	0.272	0.155
	(0.181)	(0.206)	(0.212)	(0.242)
SF Dummy*Real GDP (detrended log)	-0.661***	-0.514**	-0.276	0.044
	(0.225)	(0.233)	(0.245)	(0.251)
Stabilization Fund Dummy	-0.018	-0.016	-0.028	-0.040
	(0.022)	(0.030)	(0.026)	(0.031)
Oil Prices (in logs)	0.006	0.006	0.017	-0.005
	(0.019)	(0.049)	(0.016)	(0.030)
Natural Resource Rent	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Share of Oil Revenues in Total	0.000	0.000	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)
ICRG Composite Index	-0.001	0.000	-0.002	0.008
	(0.003)	(0.010)	(0.003)	(0.010)
Observations	441	368	318	255
R-squared	0.165	0.199	0.055	0.040
Number of countries	24	24	17	17
Country Fixed Effects	YES	YES	YES	YES

Robust and clustered standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 12: First Stage Statistics: 2SLS Estimations Instrumenting for Institutions

VARIABLES	(1) All Countries	(2) All Countries	(3) Countries with Oil Funds	(4) Countries with Oil Funds
Coefficients of Excluded Instruments				
ICRG Composite Index				
L5.Average icrg index of neighbouring countries	0.327***		0.37***	
	(0.06)		(0.07)	
L10.Average icrg index of neighbouring countries		0.095**		0.096**
		(0.04)		(0.04)
F test of excluded instruments	29.48	5.12	29.13	4.67
Tests of Weak Instruments-Robust Inference				
Wu-Hausman Test of Endogenous Regressors(1)	0.04	0.00	0.18	0.28
	p-val (0.84)	p-val (0.98)	p-val (0.67)	p-val (0.59)
Weak Identification Test (Kleibergen-Paap Wald F)	29.48	5.12	29.13	4.67
(Stock-Yogo Critical Values for 10% IV Relative Bias)	16.38	16.38	16.38	16.38

(1) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 13: Instrumenting for the Real GDP Growth and the Stabilization Fund

Dependent Variable: (Detrended Log) Real Government Expenditures
Instruments: External Shocks (Panizza and Jaimovich (2007)) and Proxy For Awareness
Column (1): ALL OIL RICH COUNTRIES
Column (2): OIL RICH COUNTRIES WITH FUNDS

VARIABLES	(1) 2SLS	(2) 2SLS
Real GDP Growth	0.670***	0.543
	(0.217)	(0.613)
SF Dummy*Real GDP Growth	-0.625**	-0.444
	(0.286)	(0.672)
Stabilization Fund Dummy	-0.024	-0.032
	(0.035)	(0.034)
ICRG Composite Index	0.005	0.017
	(0.008)	(0.013)
Oil Prices (in logs)	0.002***	0.002***
	(0.001)	(0.001)
Natural Resource Rent	0.001	0.001
	(0.001)	(0.001)
Share of Oil Revenues in Total	-0.002	-0.002
	(0.001)	(0.002)
Observations	380	273
R-squared	0.086	0.100
Number of countries	20	14
Country Fixed Effects	YES	YES

Robust and clustered standard errors in parenthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 14: First Stage Statistics: Instrumenting for the Real GDP Growth and the Stabilization Fund

Instruments: External Shocks (Panizza and Jaimovich (2007)) and Proxy For Awareness
Column (1): ALL OIL RICH COUNTRIES
Column (2): OIL RICH COUNTRIES WITH FUNDS

	(1)	(2)
Coefficients		
Real GDP Growth		
External Shocks	0.0378	0.0686***
	(0.023)	(0.012)
Oil dummy		
Urban population (% of total)	0.0128	0.0364*
	(0.027)	(0.018)
L5.Population with tertiary education (% of total)	0.1767	0.3351***
	(0.125)	(0.096)
F test of excluded instruments		
Real GDP Growth	39.91	187.32
Oil Dummy	11.96	53.16
Tests of Weak Instruments-Robust Inference		
Hansen J Statistic (Overidentification Test)(1)	11.08	9.75
	p-val (0.35)	p-val (0.46)
Weak Identification Test (Kleibergen-Paap Wald F)	3.316	10.09
(Stock-Yogo Critical Values for 10% IV Relative Bias)	10.14	10.14

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 15: T-tests of Growth Differences

	Mean(Fund=1)[(1)]	Mean (Fund=0)	Diff.[(2)]
3 Year Growth			
Real Household Final Consumption	0.2015	0.1138	0.0877***
	(0.0172)	(0.0172)	(0.0258)
Real Government Final Consumption	0.2423	0.1298	0.1124***
	(0.0218)	(0.0201)	(0.0308)
Real Fixed Gross Capital Formation	0.3851	0.1585	0.2266***
	(0.0449)	(0.0237)	(0.0464)
Real GDP	0.1601	0.1316	0.0285**
	(0.0125)	(0.0082)	(0.0143)
Real General Government Expenditures	0.213	0.1577	0.0553**
	(0.0201)	(0.0176)	(0.0272)
Real General Government Revenues	0.2483	0.2106	0.0342
	(0.0228)	(0.0206)	(0.0316)
4 Year Growth			
Real Household Final Consumption	0.2799	0.1651	0.1148***
	(0.0227)	(0.0203)	(0.0319)
Real Government Final Consumption	0.3465	0.1931	0.1535***
	(0.0306)	(0.0245)	(0.0398)
Real Fixed Gross Capital Formation	0.5577	0.2282	0.3490***
	(0.0648)	(0.0284)	(0.0618)
Real GDP	0.2232	0.1872	0.0359*
	(0.0169)	(0.0108)	(0.0191)
Real General Government Expenditures	0.3033	0.2168	0.0865**
	(0.0260)	(0.0218)	(0.0347)
Real General Government Revenues	0.3375	0.2984	0.0392
	(0.0307)	(0.0254)	(0.0406)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean Gr.(Fund=1) - Mean Gr.(Fund=0) == 0
(3) Data source for cons. and inv. is WDI and for GDP,
expenditures and revenues data sources are WEO and IMF Country Desks

Table 16: T-tests of Volatility Differences

	Standard Dev.(Fund=1)[(1)]	Standard Dev.(Fund=0)	Diff.[(2)]
Volatility over 3 Year Window			
Real Household Final Consumption	0.0493	0.0514	-0.0021
	(0.0040)	(0.003)	(0.0050)
Real Government Final Consumption	0.0502	0.0744	-0.0242***
	(0.0032)	(0.0038)	(0.0056)
Real Fixed Gross Capital Formation	0.0803	0.0978	-0.0174***
	(0.0046)	(0.0039)	(0.0062)
Real GDP	0.0657	0.0548	0.0109**
	(0.0042)	(0.0026)	(0.0047)
Real General Government Expenditures	0.0724	0.0885	-0.0162***
	(0.0036)	(0.0041)	(0.0056)
Real General Government Revenues	0.1192	0.1131	0.0061
	(0.0061)	(0.0049)	(0.0079)
Volatility over 4 Year Window			
Real Household Final Consumption	0.0524	0.055	-0.0026
	(0.0041)	(0.0030)	(0.0050)
Real Government Final Consumption	0.0546	0.08	-0.0254***
	(0.0033)	(0.0037)	(0.0056)
Real Fixed Gross Capital Formation	0.0816	0.0993	-0.0177***
	(0.0048)	(0.0038)	(0.0062)
Real GDP	0.72	0.058	0.0141***
	(0.0041)	(0.0025)	(0.0045)
Real General Government Expenditures	0.0771	0.0932	-0.0161***
	(0.0035)	(0.0037)	(0.0056)
Real General Government Revenues	0.1267	0.1196	0.0072
	(0.0056)	(0.0045)	(0.0073)

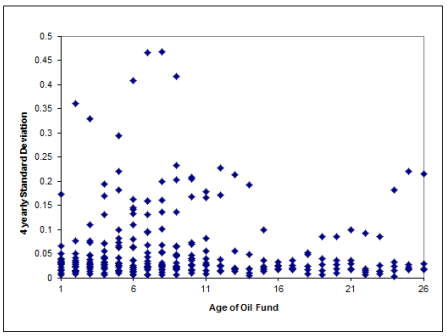
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean Std.(Fund=1) - Mean Std.(Fund=0) == 0
(3) Data source for cons. and inv. is WDI and for GDP,
expenditures and revenues data sources are WEO and IMF Country Desks
(4)All variables are in detrended logs and s.deviations are rolling over 3 and 4 year windows

Table 17: Test of Volatility Differences, Relative to GDP Volatility

	Relative Std.(Fund=1)[(1)]	Relative Std.(Fund=0)	Diff.[(2)]
Volatility over 3 Year Window			
Real Household Final Consumption	1.237	1.628	-0.391*
	(0.1586)	(0.1203)	(0.1991)
Real Government Final Consumption	1.459	2.582	-1.1245***
	(0.1331)	(0.2182)	(0.3050)
Real Fixed Gross Capital Formation	2.251	3.7252	-1.4745***
	(0.2148)	(0.2795)	(0.4027)
Real General Government Expenditures	1.9245	2.9251	-1.0006***
	(0.1732)	(0.2618)	(0.3637)
Real General Government Revenues	2.5948	3.9150	-1.3202
	(0.1742)	(0.6157)	(0.8064)
Volatility over 4 Year Window			
Real Household Final Consumption	0.9598	1.1942	-0.2345*
	(0.1180)	(0.0669)	(0.1258)
Real Government Final Consumption	1.204	2.0856	-0.8816***
	(0.1020)	(0.1074)	(0.1646)
Real Fixed Gross Capital Formation	1.6476	2.8839	-1.2363***
	(0.1409)	(0.164)	(0.2475)
Real General Government Expenditures	1.5488	2.3982	-0.8493***
	(0.1140)	(0.1198)	(0.1810)
Real General Government Revenues	2.2806	3.2265	-0.9458*
	(0.1299)	(0.3692)	(0.5013)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean of Relative Std.(Fund=1)-Mean of Relative Std.(Fund=0) == 0
(3) Data source for cons. and inv. is WDI and for GDP,
expenditures and revenues data sources are WEO and IMF Country Desks
(4)All variables are in detrended logs and s.deviations are rolling over 3 and 4 year windows

Figure 2: Volatility of Household Final Cons. in Countries With and Without Funds



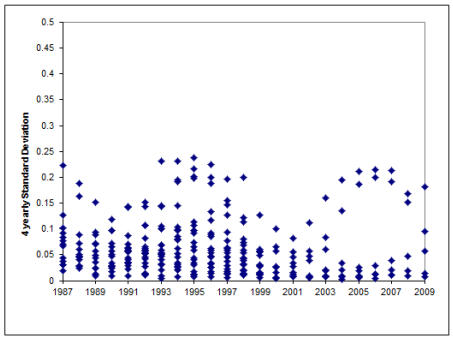
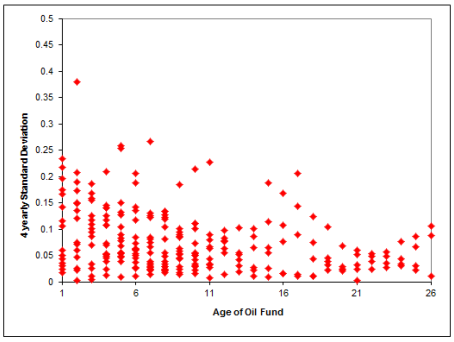


Figure 3: Volatility of Gross Fixed Cap. For. in Countries With and Without Funds



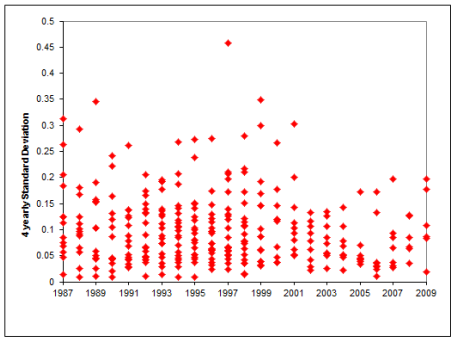
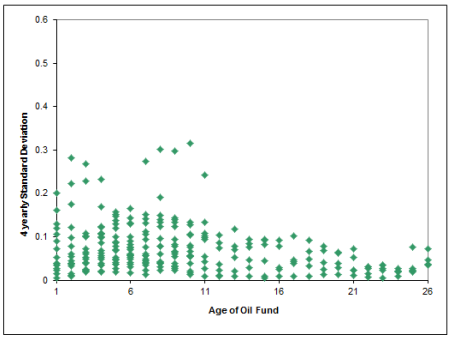


Figure 4: Volatility of Gen. Gov. Exp. in Countries With and Without Funds



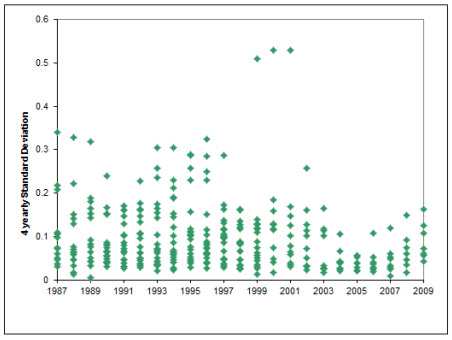


Figure 5: General Government Expenditure Volatility by Country: Fund Countries (Right) versus All Countries (Left)

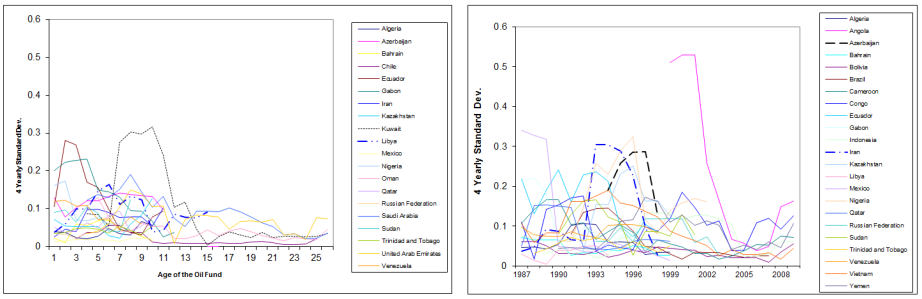


Figure 6: Investment Volatility by Country: Fund Countries (Right) versus All Countries (Left)