ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2017

working paper series

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Working Paper No. 1116

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July 2017

Authors would like to acknowledge the able research support provided by Hosam Ibrahim and to thank Bassem Kamar and Diaa Noureldin for helpful comments.

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First published in 2017 by
The Economic Research Forum (ERF)
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Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper contributes to the literature on the interdependence between fiscal and monetary policies in resource-dependent economies. In the context of this general theme we analyze the fiscal foundation of the choice of monetary regimes and the extent of pro-cyclicality of fiscal policy during the post mid-1990s oil boom in the relatively under-research oil-dependent Arab economies. We find preliminary evidence on the existence of a threshold effect for oil rents per capita, below which countries tend to be subject to fiscal dominance and pro-cyclical fiscal policy. This might explain the country experiences of low rents per capita and relatively populous Sudan and Yemen, compared to the GCC member countries of Oman, Saudi Arabia, the UAE as well as Algeria. The latter managed to sustain credible de facto pegged exchange rate regimes and convertible currencies (for the GCC) or graduate to flexible regime (for Algeria). Instead, the former had to abandon their pegged regimes as a result of their unsuccessful exchange rate-based stabilization programs. However, the contrast with resource-dependent Chile and Norway suggests that for the Arab oil economies to accommodate future oil busts they need to establish explicit fiscal rules and high technical capabilities for conducting monetary policy.

JEL Classification: E1, F4, Q3

Keywords: Oil Arab economies, pro-cyclical fiscal policy, counter-cyclical fiscal policy, resource rents, GCC, Algeria, Chile, Oman, Norway, Saudi Arabia, Sudan, Yemen, UAE

ملخص

تسهم هذه الورقة في الأدبيات المتعلقة بالترابط بين السياسات المالية والنقدية في الاقتصادات المعتمدة على الموارد. وفي سياق هذا الموضوع العام نقوم بتحليل الأساس المالي لاختيار النظم النقدية ومدى التأييد لدورية السياسة المالية خلال فترة ما بعد منتصف التسعينات من القرن الماضي، في ظل الازدهار النفطي في الاقتصادات العربية التي تعتمد على النفط والتي لا تعتمد على النفط. وجدنا أدلة أولية على وجود أثر عتبة على إيجارات النفط للفرد الواحد، وهي البلدان التي تميل فيما بعد إلى أن تخضع للسيطرة المالية وسياسة المالية العامة الدورية. وقد يفسر ذلك خبرات البلد في انخفاض الإيجارات للفرد الواحد والسودان نسبيا واليمن، مقارنة بالبلدان الأعضاء في مجلس التعاون الخليجي في عمان والمملكة العربية السعودية والإمارات العربية المتحدة والجزائر. وقد تمكنت هذه الأخيرة من الحفاظ على أنظمة سعر الصرف المربوطة بحكم الأمر الواقع والعملات القابلة للتحويل (بالنسبة لدول مجلس التعاون الخليجي) أو التخرج إلى نظام مرن (للجزائر). وبدلا من ذلك، اضطرت الأولى إلى التخلي عن نظمها المربوطة نتيجة لعدم نجاح برامج تثبيت أسعار الصرف. غير أن التباين مع شيلي والنرويج اللذين يعتمدان على الموارد يوحيان بأن الاقتصادات النفطية العربية تستوعب التماثيل النفطية في المستقبل، فإنها تحتاج إلى وضع قواعد مالية واضحة وإمكانات تقنية عالية لتنفيذ السياسة النقدية.

1. Introduction

Over the last two decades or so monetary economics has experienced a paradigm shift towards three major interrelated issues. The main focus of this paper, is the realization of the critical importance of fiscal-monetary interdependence, including the underlining fiscal considerations behind the choice of monetary regimes. The other two are the related focus on monetary rules and optimality of rules rather than specific policy decisions; and the importance for monetary policy of commitment and time-consistency. In this context, the concept of 'regime' entails fundamental questions, such as: should a country adopt a currency peg; if so, should it be soft or hard peg; or, instead, should the country float; if so, should it be managed or free float; and if the latter, should it be through monetary, interest rate or inflation targeting regime? Therefore, the question of the choice of a monetary regime is much more vital even than the question of a monetary rule or action (Cochrane, 2003).

This paper contributes to the literature by analyzing the extent of interdependence between fiscal policy and monetary/exchange rate regimes in the relatively under-reached group of oil-dependent countries of the Arab world. Specifically, we address the two main issues of the fiscal foundations of exchange rate and monetary regimes; and exchange rate regimes and cyclicality of fiscal policy.

Resource dependent economies are more susceptible to external shocks than other regular economies. Moreover, oil and other mineral rents are intrinsically temporary and, therefore, are not reliable as permanent sources of income. The fiscal-monetary interdependence, we will argue, is therefore, particularly important for macroeconomic management in resource-dependent economies. For example, the high volatility of oil economies would require a viable fiscal 'shock absorber' when less flexible exchange rate regimes are adopted. Moreover, under flexible monetary/exchange rate regimes, such as inflation targeting, the high revenue volatility would require strong stabilizing fiscal institutions to support the chosen monetary regime. In turn, under the high and frequent volatility that afflicts oil economies, exchange rate flexibility is required to minimize the burden on fiscal adjustment and to promote efficiency of fiscal policy. Indeed, research suggests that there is a strong symbiotic relationship between the exchange rate flexibility associated with inflation targeting (IT) monetary regime and fiscal rules in the case of the copper-dependent economy of Chile (Elbadawi et al., 2011).

First, we use a simple macroeconomic model- anchored around three equations for monetary equilibrium, a Philip curve relation and a government inter-temporal budget constraint- to discuss the fiscal foundations of the choice of exchange rate/monetary regimes for the case of six oil dependent Arab economies and two comparator non-Arab resource-rich economies. We consider three populous oil Arab economies (Algeria, Sudan and Yemen); three Gulf Cooperation Council (GCC) members (Oman, Saudi Arabia and the UAE); and the two benchmark resource economies of Chile and Norway. We find that the economies of Sudan and Yemen are characterized by fiscal dominance, which explains their choice of relatively soft pegged exchange rate regimes (usually in the form of adjustable peg to the dollar or crawling bands around the dollar). Moreover, the implications of fiscal dominance was manifest in higher inflation inertia and rising disequilibrium real exchange appreciation, which undermined the credibility of the crawling peg regimes and the exchange rate stabilization programs associated with them, and ultimately led to their eventual demise.

On the other hand, monetary policy in the GCC has been free from fiscal dominance thanks to their unusually high oil rents per capita, which allowed the buildup of large fiscal balances that translated into substantial savings to the tune of hundreds of billions of dollars kept as foreign reserves or assets in sovereign wealth funds (SWFs). The GCC countries have been able to sustain credible de facto dollar peg regimes for several decades as well as convertible currencies. While the currency peg has so far served these countries well, given their open

economies and flexible labor markets (Almukhtar, 2014), they have not been immune to destabilizing inflationary or deflationary shocks when their macroeconomic fundamentals diverge from those of the US: the anchor economy (more on this below). Moreover, the drive toward economic diversification, which seems to be a top priority for these countries, suggests that eventually they might need to adopt more flexible exchange rate regimes (Elbadawi and Kamar, 2005). However, the contrast with Chile and Norway makes clear that sustaining flexible regimes would require explicit fiscal rules and high technical capabilities for conducting monetary policy.

Finally, Algeria- though less well-endowed but with high enough rents per capita- has become increasingly free of fiscal dominance, having used the post mid-1990s oil boom to run large fiscal surpluses and rising stock of net foreign assets. This country has, therefore, been able to adopt a stable free-floating regime since the late 1990s. Again, compared to the two benchmark countries, Algeria lacks explicit fiscal rules and sophisticated capabilities for conducting modern monetary policy, which will be required should the country face a major oil bust in the future.

Second, we address the question of exchange rate regimes and cyclicality of fiscal policy. Counter-cyclical fiscal policy has been an elusive goal for most developing countries, especially oil and other commodity exporters. The received literature suggests that the lack of high enough institutional quality in these countries appears to be the main factor explaining the pro-cyclicality of fiscal policy in developing countries. For example, Frankel et al (2011) and Cespedes and Velasco (2011) find that there is a robust causal link running from high institutional quality to less pro-cyclical or counter-cyclical fiscal policy. Moreover, Cespedes and Velasco, who analyze fiscal cyclicality across the commodity cycle, also find evidence of a negative association between flexibility of the exchange rate regimes and pro-cyclicality of fiscal policy.

The theory behind the relevance of exchange rate flexibility to counter-cyclical economic policy is well established. The case of the GCC dollar peg provides the most obvious example, when the economic fundamentals in the US, the anchor currency country, substantially differ from those of the GCC during the oil price cycle. For example, prior to the 2008 global economic crisis the Fed was pursuing low interest rate and weak dollar policy, while the oil prices were steeply rising. Instead, economic stabilization in the GCC required higher interest rate to cool down overheating economies and moderate inflationary pressure. However, due to the dollar peg these countries do not have control over the interest rate policy, which was set by the Fed. This obvious policy incompatibility had magnified the macroeconomic effect of the oil boom experienced by these countries during the decoupling phase of the crisis. The key channel was excessive credit growth and low cost of lending, which at least indirectly contributed to pro-cyclical fiscal expansion.

A more direct channel from exchange rate regimes to overall fiscal outcomes is discussed in Tornell and Velasco (2000), who show that, contrary to conventional wisdom, in economies where fiscal policy is determined endogenously (i.e. akin to fiscal dominance regimes), less flexible exchange rates might lead to less not more fiscal discipline. This is because under flexible regimes the cost of unsound fiscal policy tends to manifest itself almost immediately through destabilizing exchange rate movements, inflationary pressures…etc. On the other hand, fixed regimes allow the authorities more time before the regime comes under attack.

However, the empirical evidence on the causal link between exchange rate regimes and fiscal counter-cyclicality remains rather tenuous, most of all for Arab economies, suggesting that further research is in order. This paper, therefore, contributes to the empirical strand of the literature by estimating a global sample of oil exporters and importers alike to assess the causal

link between fiscal policy, resource rents and exchange rate regimes, while accounting for other standard controls discussed in the received literature.

Our main result was that, except for Sudan and Yemen, all other Arab oil countries have managed to avoid cyclical fiscal policy. This result could be explained by the fact that we only considered the recent episode of the oil boom (1995-2012), which might reflect a learning process on the part of the GCC and Algeria from their past experiences. On the other hand, the less endowed countries of Sudan and Yemen continued to pursue cyclical fiscal policy. So what explained the capacity of most oil-dependent Arab economies for undertaking counter-cyclical fiscal policy during the 2000s oil boom? Our results suggest that fiscal counter-cyclicality is explicable by many of the factors identified in the literature. First of all, we find the floating regime to be more effective that the fixed in promoting counter-cyclicality of fiscal balance, but it has no advantage over the latter for the case of fiscal expenditure. On the other hand, we do not find `intermediate exchange rate regimes to be more effective than the fixed in promoting counter-cyclical fiscal policy in general. Though the evidence on the exchange rate regimes is of relatively limited robustness, nonetheless, it broadly corroborates a key finding from the received literature regarding the importance of exchange rate flexibility for the capacity to mount counter-cyclical fiscal policy. Secondly, we also corroborate the received literature, in that we find reserves accumulation to have promoted counter-cyclical fiscal balances as well as expenditure. However, we do not find the "special fiscal institutions", such as the SWFs, to have any significant effect. To the extent that this effect might be confounded with that of reserves, this result might be plausible. However, it is more likely that the proxy dummies used in the regression model do not sufficiently account for the true effect of these fiscal institutions. Thirdly, we confirm earlier evidence regarding the strong positive association between institutional quality and counter-cyclicality in both fiscal revenue and fiscal expenditure.

Finally, an important result of this paper, not analyzed in the previous literature, was that rents per capita were found to conditionally promote counter-cyclicality of fiscal policy. We find that in models with linear and interactive effects for resource rents, the latter promote counter-cyclical fiscal expenditure and fiscal balance for high institutional quality, beyond a certain threshold. And, for models with non-monotonic rents effects, counter-cyclicality obtains when the resource rents are high enough beyond a certain threshold. Simulating the estimated coefficients, we find that the highly resource endowed GCC, and to a lesser extent Algeria, were able to manage the resource rents in such a way that promotes counter-cyclicality of fiscal balance. However, the quality of their institutions fall short of the levels required to allow them achieve counter-cyclicality of fiscal expenditure. Instead, on view of their high institutional quality, the two comparator countries of Chile and Norway have been able to use the rents from their resource endowments to promote counter-cyclicality of overall fiscal policy. These results, therefore, suggest that the highly resource endowed GCC, and to a lesser extent Algeria, have gained useful lessons from their painful experiences with previous booms, despite that they have yet to reach the levels of institutional quality or fiscal rules already attained by the two benchmark countries.

Section two addresses the issues concerning the fiscal foundations of exchange rate regimes and analyzes the experiences of exchange rate-based stabilization in the six Arab and two comparator countries. Section three estimates an inflation and exchange rate regime credibility model and highlight the role of inflation inertia in explaining the limited success of exchange rate-based stabilization under fiscal dominance. Section four assesses fiscal cyclicality and analyzes its determinants. Section five concludes.

2. Fiscal Dominance, Exchange Rate Regimes and Stabilization Experiences

The fiscal theory of the price level provides an analytical framework for discussing the fiscal considerations behind the prevailing monetary/exchange rate in the GCC and other populous oil Arab economies. We follow Cochrane (2003) and develop the discussion around the following three equations:

Money supply=money demand: $M_t V(r_t,..) = P_t Y_t$ (1)

The Phillips curve relation: $P_t / P_{t-1} = \beta(Y_t - \bar{Y}_{t-1})$, (2)

where $\bar{Y}$ is a measure of potential output

The government inter-temporal budget constraint: $B^f_{t-1} + \frac{M_{t-1} + B_{t-1}}{P_t} = E_t \sum_{j=0}^{\infty} \delta_{t,j} s_{t+j}$ (3)

In words, the last equation states that: Foreign, real or indexed, debt (Bf) + (Nominal domestic debt (B) + nominal base money)/price level must equal the expected present value of future primary surpluses (s), where E_t is the expectation operator at time t and $0<\delta<1$ is a discount factor.

Price determination has been discussed in the context of either equations (1) or (2), while equation (3) provides direction to the fiscal authorities in order to raise or lower taxes so that the surplus term (s) would validate the price level that was ex ante chosen by the central bank. Therefore, in this model equations (1) or (2) determine the nominal anchor or, broadly speaking, the exchange rate regime for the economy. For example, under a hard peg regime the interest rate (r) is exogenously given, hence, MV is endogenous, while the price level is tied down by the fixed nominal exchange rate. This leaves the stock of money (MV) and income Y to be determined by equation 1 and 2, given lagged prices and lagged permanent income. Instead, under flex regimes the interest rate is a policy instrument and, hence the money supply (MV) is 'approximately' determined by monetary policy (i.e. the interest rate), which leaves the price level (P) and income to be determined by equations 1 and 2 as before given lagged prices and permanent income.

This approach, however, implicitly assumes that the economy is in a "money-dominant" regime. However, most developing economies are actually characterized by "fiscal-dominant" rather than money-dominant regimes. In this case, the government sets the sequence of primary surpluses $\{s_t\}$ exogenously. Except for highly endowed resource economies as discussed below, this is likely to be done by necessity rather than by choice, due to limited capacity to control expenditure and/or raise tax revenues. In this case, the price level will be determined by equation (3) rather than equations (1) or (2).

When the channel of the present values of future primary surpluses (RHS of equation 3) dominates the traditional effect due to the composition of government debt (money vs. debt: the second LHS term of equation 3), fiscal considerations essentially determine the price level and the choice of the underlining monetary/exchange rate regime. Fiscal considerations are likely to be at work even when the economy is characterized by a money-dominant regime because there will likely be limits to the capacity of a government to adjust primary surpluses in response to an ex-ante price level.

2.1 Exchange rate regimes in oil Arab economies

We use this analytical framework to analyze the existence of fiscal dominance, or lack thereof, for six oil-dependent Arab economies, three from the GCC (Oman, Saudi Arabia and UAE) and another three from the relatively populous oil-dependent countries (Algeria, Sudan, Yemen). We also benchmark these Arab economies to Chile and Norway. The six Arab and

the two comparator countries reflect an interesting and diverse blend of experiences in terms of level of development; size of the resource rents; as well as fiscal stance and extent of indebtedness (Tables 1). For example, Saudi Arabia is the largest economy with a nominal GDP of more than $746 billion in 2014, more than 17 times the size of the smallest economy of Yemen (at about $43 billion) and almost 150% of the second largest economy of Norway (at about $500 billion). The three GCC countries are vastly richer than the other Arab group, boasting an average per capita income in 2014 higher than $54,000 (in constant 2011 PPP dollars), compared to about $13,888 for Algeria; $3788 for Yemen and $4296 for Sudan. However, Norway is richer than the GCC, with income per capita at $67,166, while Chile's income is less than half the GCC average.

Of more direct relevance to fiscal policy stance, oil rents per capita for Sudan and Yemen in 2012 were very little (at $ 140 and $244, respectively), which is a small fraction of the rents received by Algeria (at $1245). However, even the Algeria rents per capita pales compared to that of the GCC- which reached $12, 352 for Oman; $17,125 for Saudi Arabia and staggering $52,297 for the UAE. The rent for Norway was also high at $11,909, while Chile received $2,677 in terms of rents per capita from copper; still more than twice the Algeria rents from oil.

Therefore, despite the absence of formal income and business taxes in the GCC, it is not surprising that the large rents allow Oman to maintain balanced budgets for almost throughout the last two decades, while Saudi Arabia and UAE actually managed to generate large surpluses since the turn of the 2000 decade (Figure 1.A). Similarly, Chile was able to achieve large surpluses for most of the 2000 decade and to maintain a balanced budget for most of the last 20 years since the mid-1990s. And, Norway was even more impressive, as it was able to achieve large surpluses throughout the period, including more than 10% since the turn of the 2000 decade1 (Figure 1.B). Moreover, compared to Oman and Saudi Arabia, the two benchmark countries are less dependent on the resource base, as reflected by their large shares of non-resource GDP (Table 1) and the high tax revenues they generate (Table 2). On the other hand, the UAE has been able to diversify, where, along with Algeria and Sudan, the share of non-oil GDP exceeds 80%. Furthermore, through the accumulation of fiscal surpluses, most notably through their SWFs, the three GCC countries, Algeria and the two comparator countries are able to amass substantial claims on foreign economies in terms of net foreign assets that, except for the case of Chile, substantially exceed their total domestic and foreign debts (Table 3).

On the other hand, the three populous Arab oil economies have failed to build robust fiscal policy stance, though Algeria managed to amass large fiscal surpluses for most of the 2000 decade. However, its fiscal position has deteriorated in the aftermath of the recent global economic recession (Figure 1.C). While Algeria started to build large foreign assets and clear almost all of its external debts, Sudan and to a lesser extent Yemen accumulated large domestic and foreign debts (Table 3). Moreover, Sudan and Yemen have failed to build a strong tax revenue base, which explains the heavier reliance of these countries on seigniorage revenue as well as the crowding out of the private sector from access to the domestic credit from the banking sector. On the other hand, Algeria was able to generate 12.4%age of GDP in tax revenues in 2013-14, which is almost twice as much the fiscal efforts of each of Sudan and Yemen. However, though the economy of Algeria might not be under serious fiscal dominance as the other two economies, its fiscal efforts remains much lower than that of Chile and, especially, Norway (Table 2).

[1] However, the differences between Chile and Norway is an artifact of the institutional differences in the two country, because the coper savings of the copper proceeds above the planned budget are deposited in a separate SWF, while those of oil were included as part of the budget for the case of Norway.

The above analysis makes clear that monetary and exchange rate policy in Sudan and Yemen are likely to have been characterized by fiscal dominance. Instead, the three GCC countries as well as Chile and Norway are free from fiscal domination. Moreover, Algeria's monetary policy seems to have broken free from fiscal dominance, at least during the current extended oil boom.

The Populous Oil Arab Economies: Subscribing to the above analytical framework, price setting in the two populous Arab oil economies of Sudan and Yemen is likely to have been determined by equation 3. On view of their relatively low resource rents; their limited capacity to raise tax revenues and/or rein on public expenditure, these countries are likely to have adopted the following macroeconomic strategy:

- Minimize deficits (-s in equation 3) to accommodate the already high debt ratios (equation 3) by maximizing seigniorage revenue, including by introducing legal restrictions to boost the demand for base money through: currency controls; banking, financial and interest rate controls; stock and bond market regulations2.
- Undertake exchange rate-based stabilization by adopting managed or adjustable currency peg in order to, at least partially, tie down the price level (via equations 2 and 3) to stem the inflationary consequences of the policy of maximizing the inflation tax and monetary growth
- Avoid hard currency pegs and free-floating exchange regimes, because the former requires strong fiscal fundamentals that they don't have, while the latter entails instant and highly destabilizing price volatility

As we argue above, all three countries have, formally or informally, pursued exchange rate-based stabilization strategies for some time during the last two decades (Table 4). For example, following a stint with variants of managed floating regimes (1988-1995), Algeria adopted a de facto crawling band around the French franc (1995-99); the euro (1999-2004); and the dollar (2005-2010) and a composite exchange rate anchor since 2014. Sudan followed a de facto moving peg to the US dollar since 1990, which covers the sub-period when the country became an oil exporter in 1999; but more recently appears to have shifted to a conventional peg to the dollar after the loss of most of the oil rents to the newly created country of South Sudan in 2011. And, Yemen followed a de facto peg to the dollar (2002-2014) and a pre-announced band around a target rate (2005-2007), before moving to a managed floating regime with a pre-determined path ever since.

However, the evidence analyzed so far suggests that, unlike Sudan and Yemen, the choice of the pegged regime in Algeria does not seem to be driven by fiscal policy considerations.

The GCC economies: These countries, as the above evidence makes clear, are endowed with substantial fiscal resources, essentially due to their high oil rents per capita. It is not surprising, therefore, that the GCC countries are so far able to maintain a credible de facto hard peg to the US dollar that has been in place for several decades now (Table 4). Free from fiscal dominance, the choice of the hard peg exchange rate regime allows these countries to import the monetary stability of the US economy (through equations 1 and 2), though at the expense of having to forfeit their ability to conduct independent monetary policy (the interest rate is exogenously set by the Fed). Nevertheless, on view of their open economies and flexible labor markets it has been argued that the dollar peg has served these economies well, given their current level of institutional development. Moreover, even when impacted by negative price shocks, they have been able to lean on their deep fiscal pockets by drawing from their substantial external assets or borrowing abroad against their reserves. They have, therefore, been able to minimize the costs associated with their choice of the rigid exchange rate regime.

[2] To be corroborated in the revised version of the paper.

Indeed, it is difficult to overestimate the critical role of fiscal institutions, such as sovereign wealth funds (SWFs) and other oil stabilization funds, in shoring up the credibility of the peg and the currency convertibility in the GCC during major negative oil price shocks, such as those of the 1980s, or even in the aftermath of the recent worldwide recession.

In the context of the above analytical framework, the two following points should be made explicit:

- By and large, fiscal constraints ala equation 3 has not being binding for the GCC economies
- When there was speculation about the dollar peg, it was mainly due to concerns about foreign inflation pass through when there is divergence between the optimality of monetary policy in the anchor country (e.g. low interest rate in the USA) and the pegging country (instead, high interest rates in the GCC)- such as during the re-coupling phase of the global economic crisis in the second half of 2008
- Therefore, the short-lived speculation episode about the dollar peg of GCC currencies has not been motivated by anticipation of any fiscal pressures that might be faced by these countries

The Benchmark Economies: Chile and Norway are resource-rich but not as resource-dependent as their Arab counterparts, because they are more diversified and have much more robust institutions. For example, according to the World Bank's institutional indicators of "Government Effectiveness" and "regulatory Quality", Arab oil countries were substantially outperformed by the two comparators (Figure 2.A-2.B). This allows them not only to attain substantial capacity for raising tax revenues but also for managing rule-based fiscal policy as well as adopt more flexible exchange rate regimes, such as inflation targeting or more general Taylor rule-type monetary regimes (Table 4). These two countries should provide useful benchmark cases for assessing the institutional requirements for the GCC and other oil Arab economies in order to graduate to more flex regimes:

- That Chile and Norway (and other similar economies) have a good record of fiscal balance performance (no fiscal dominance)
- However, unlike the GCC, adjustment is not solely borne out by fiscal policy but also by the flex exchange rate regimes

Moreover, unlike the other oil Arab economies, they were able to sustain their flex exchange rate regimes because they maintain strong fundamentals, most notably strong fiscal fundamentals, so much so that they could avoid risking high inflation and extended episodes of real exchange rate appreciation, despite their choice of the flex exchange rate regime

2.2 Exchange rate-based stabilization in oil Arab economies

As discussed, despite, or in fact because of, fiscal dominance, many developing countries have resorted to exchange rate-based stabilization as a strategy for controlling inflation. Especially in those countries that experienced high or stubborn moderate inflation during the 1980s, the adoption of heavily managed or pegged exchange rate regimes has been associated with sharp reduction in inflation and enhanced macro stability. Indeed, one of the key lessons of the 1990s was that the use of the exchange rate anchor has been very effective in controlling inflation at the beginning of the program, especially when public finance was in order. As an anchor, the nominal exchange rate puts a ceiling on the prices of tradables—an important component of the CPI in developing countries; as well as help guide expectations and shore up the overall credibility of the program.

However, the early successes of the pegged exchange rate regimes were mostly temporary, especially for fiscally dominated regimes, and have tended to come at high costs for these economies. The combination of limited exchange rate flexibility and high inflation inertia has been linked to the tendency of exchange rate-based stabilizing economies to experience real

exchange rate (RER)[3] overvaluation over time. The gathering RER overvaluation will likely be left to scale up to levels that would eventually lead to major loss of competitiveness, collapse of the export sector and economic recession. Worse still, as investors and creditors begin to realize that they had been lured by a "fake" sense of stability and high interest rates, major reversals or "sudden stops" in capital flows happen, often times leading to financial and currency crises. The nominal exchange rate peg had to be abandoned, leading to deep real depreciation crises. Moreover, more recent crises have been triggered by speculative attack originating in the capital accounts and have included currencies in countries without major current account imbalances. Moreover, unlike the attacks on traditional pegged regimes, a wider class of "soft pegs"4 became subject to these attacks, including through contagion effects (Masson, 1998, Edwards, 2000). With varying degrees, the experiences of Mexico (1994-95, 1997) and East Asia (1997-98), Russia (1998) and Brazil (1999) resemble the above profile.

Perhaps no other country experience brings this point home than the Argentine stabilization program, which managed to achieve impressive early successes after the country opted for the extreme 'corner' solution of the currency board system in 1991. Argentina grew very fast during the first four years of the program, as inflation declined rapidly and by 1996 it became virtually zero. However, unlike the upbeat predictions of the supporters of the super-fixed regime, the Argentine program proved to be too vulnerable to external shocks and contagion. On the backdrop of the country's high fiscal deficits and debt ratios, the Mexican (1997) and the Russian-Brazilian (1998-99) crises appeared to have exposed the credibility problem of the Argentine program, which eventually led to its eventual collapse by the end of 2001, when the Peso was devalued by the new government in a midst of a major economic and political crisis5. With its highly dollarized economy and history of high and stubborn inflation, Argentina was argued to be in dire need for a super-fixed regime. However, the failure of the Argentine program suggests that, even for such countries, super-fixed regimes cannot deliver credibility in the absence of strong fiscal solvency, solid domestic banking system and avoidance of massive overvaluation.

As for the eight countries analyzed in the paper, the evidence suggests that the stabilization efforts seem to have been successful in maintaining low inflation in all the countries, except for Sudan and Yemen, the two populous Arab oil countries where we show that monetary policy appears to be fiscally dominated (Figures 3.A-3.H). The two countries, therefore, represent a case of failed exchange rate-based stabilization, where for most of the period monthly inflation remained positive and occasionally reaching 5% and above. Since around 2007 for Yemen and 2011 for Sudan, the inflationary pressures seemed to be triggered by large nominal exchange rate devaluations. This clearly suggests the collapse of the pegged regimes in both countries during the second half of the decade. For the case of the Sudan the devaluation of the Sudanese pound was at least partially caused by fundamentals associated with the partitioning of the country and the loss of more than 75% of the country's oil production to the newly created state of South Sudan, where most of the oil fields are located. However, due to the ensuing high inflation the rate of devaluation did not result in real exchange rate depreciation that is much needed for promoting non-oil exports, now that the country's oil resource base has been substantially squeezed. On the other hand, unlike Sudan and Yemen, Algeria, the third populous oil Arab country, has managed to substantially confine month-on-month inflation in the range of -2 to 2%, though inflation remains highly volatile. Shortly after

[3] The real exchange rate concept adopted in this paper is given by the economy-wide relative refers to the price of non-tradables to tradables. A rise (decline) in the RER means appreciation (depreciation); and the RER is overvalued (undervalued) when it is higher (lower) than its corresponding "notional" equilibrium level.

[4] In addition to conventional pegged exchange rate regimes, this would also include crawling peg or crawling band, where the authorities target a path of the exchange rate instead of a level. Moreover, even the target zone regime, which sets a wide range of values the exchange rate could take, has been subject to attacks.

[5] For a detailed analysis of the Argentine experience, see, for example, Edwards (2001, 2002).

the turn of the 2000s decade the nominal exchange rate appears to be closely targeting the real exchange rate; with both following a stable but moderately depreciating trend.

All three GCC group managed to maintain low and relatively stable inflation, with Oman being the most successful in keeping monthly inflation in a very tight interval around the 0% rate. However, all three countries, especially the UAE, had experienced an inflationary impulse during the de-coupling months (in 2007-2008) of the recent global great recession. Moreover, monthly inflation became noticeably more volatile for the case of the UAE during the post 2008 period. As discussed earlier, this inflationary impulse is a consequence of the de facto institutional dollar peg when the economic fundamentals of macroeconomic stabilization in the US and the GCC become incompatible. In the several months prior to the re-coupling the Fed was vigorously adopting a weak dollar policy in order to stimulate the economy while the rising oil prices required stronger local GCC currencies to stem the inflationary consequences of the weakening dollar. This of course is not an option for the GCC due to the de facto institutional dollar peg. Nevertheless, the GCC pegged regime remains credible and the inflationary impulse subsided when the price of oil started to decline. It is also notable that the GCC real exchange rates have experienced steady depreciation since the turn of the 2000s decade, though they started to appreciate since 2010.

Finally, Chile and Norway pursued free floating exchange rate regimes, as discussed above, backed by strong fiscal and institutional fundamentals. Therefore, it is not surprising that despite the relatively high volatility of the nominal exchange rates, a natural consequence of the flex regime, the two countries managed to confine monthly inflation to very low rates, between -1 to 1.5%, as well as achieve stable and competitive real exchange rates.

While low and stable inflation constitutes the core objective of the exchange rate-based stabilization programs, their success, indeed, their sustainability, would also depend on whether or not they have been associated with extended episodes of "disequilibrium" real exchange rate appreciation and large and "unsustainable" current account deficits. These are usually signals for major problems to come, including diminished credibility of the peg and subsequent pressures on the currency, which, in turn, is likely to trigger costly policy responses on the part of weary authorities trying to defend the currency. Though in this process the authorities might end up raising interest rates to exorbitant levels and/or depleting substantial foreign reserves, they rarely succeed in arresting mounting doubts on the part of creditors, leading to the eventual demise of the pegged regime. Worse still, the defunct regime may not go down without "bequeathing" the country with devastating exchange rate and financial crises. This outcome was clearly borne out by the experiences of Sudan and Yemen.

The above analysis suggests that high inflation inertia associated with fiscal dominance is at the heart of the failure and ultimate collapse of exchange rate-based stabilization programs, because it has been linked to the problems of large overvaluations associated with pegged exchange regimes as well as the tendency of crawling peg regimes to produce high inflation equilibriums. We turn to this issue in more depth in the following section.

3. Fiscal Dominance and Inflation Inertia

Initial conditions in developing countries tend to be characterized by some form of wage indexation, rigid labor markets and high inflation inertia. To avert real exchange rate overvaluation and diminished international competitiveness, policy makers are likely to pursue accommodating monetary policy centered on a crawling peg exchange rate regime. While such a program might avoid major real exchange rate overvaluations, it might not be sustainable because it tends to generate "rapid" inflation equilibrium. In this setting adopting an exchange rate anchor would constitute a fundamental change in the exchange rate regime. However, the success of this regime would depend on its ability to significantly bring down inflation inertia on a sustained basis. This is because with an inflexible exchange rate regime

and high inflation inertia, accumulating real exchange rate overvaluation will eventually bring down the program. Edwards (1998) argues that for the exchange rate-based stabilization programs to rapidly reduce inflation inertia, the public must believe that the authorities' preferences have changed and that the new regime is permanent. In other words the success of the program depends on its perceived credibility, which, in turn, determines agents' expectations about future inflation. To test the role of credibility as a determinant of inflation inertia, Edwards build a dynamic model of inflation that, among other things, assumes that the authorities dislike both inflation as well as deviations of the real exchange rate from its "notional" target. The minimization of a quadratic loss function defined over the two variables results in the following empirical equation:

$$\pi_t = \alpha + \theta\,\pi_{t-1} - q\theta\,\pi_{t-1} + \theta\,(\pi_t^* - \pi_{t-1}^*) + (1-\theta)\;\pi_t^* + q\theta\,\pi_{t-1}^* + \lambda\,\Delta\log M2_t + \phi_t \quad (4)$$

Where, π *and* π^* are, respectively, the rates of domestic and foreign inflation; θ is the degree of inflation inertia, q is the public perceived probability that the pegged exchange rate regime is maintained (i.e. probability of authorities credibility); $\Delta\log M2$ is the rate of growth of broad money; and, ϕ is a random disturbance term.

We estimate the above equation for three GCC countries as well as Yemen and Norway, using quarterly data over the period 1980: Q1-2012:Q4, where we follow Edwards and proxy the probability, q, by dummies for the periods of exchange rate-based stabilization programs. For the cases of Chile and Sudan we adopt the regression results of the same model due to Elbadawi and Kamar (2005). However, due to large gaps in the Algerian CPI data we are unable to estimate the model for this country.

The two most pivotal estimates in this regression are the coefficients of lagged domestic inflation, which suggests how large the inflation inertia is; and, the coefficient of the interaction variable between the pegged regime dummy and lagged inflation, which accounts for whether, relative to other episodes, the exchange rate anchor regime has actually managed to bring down the inertia coefficient. Except for the GCC countries, and using the episodes described in Table 3, at least one regime dummy was identified for each country (the period dummies are reported in the notes to Table 5.A). For the case of the three GCC countries, which have consistently adopted a de facto institutional peg to the dollar (or a basket for the case of Kuwait since 2008, following the onset of the recent global economic crisis), half decadal and decadal dummies are used to trace the evolution of inertia over time (Table 5.B).

First, the results suggest that inflation inertia was high and close to one in three countries, including Sudan (1.0), Yemen (0.94) and Chile (0.72); and significant but low for the case of Norway (0.29), UAE (20) and Saudi Arabia (0.15); while there is no evidence of inflationary inertia for the case of Oman[6]. However, it should be noted that the evidence for Chile pertains to an earlier period, aimed at accounting for the pegged regime that predates the subsequent reforms that were initiated in the post 1982 era. Moreover, the extent of inflation inertia is rather limited for the cases of Norway, Saudi Arabia and the UAE. Instead, by eyeballing the dynamics of domestic inflation, it appears that inflation inertia should be a major concern for Sudan and Yemen only (Figure 4.A), while no discernible trends could be identified for the three GCC economies, where inflation remains oscillating between negative and very low

[6] Though the estimated inflation inertia are based on a standard model, nonetheless, it is worth mentioning that regressions such as equation (4) may be problematic to the extent that omitted-variable bias and structural breaks result in coefficients on lagged inflation close to unity. However, there is no evidence that there such systematic biases, since the estimated coefficients vary quite significantly across countries. Moreover, the estimate for Sudan predates the major structural break that affected this country in 2011 as a result of the loss of most of the oil rents to the newly created state of South Sudan.

positive rates (Figure 4.B). And, for the two benchmark economies, the data suggests that inflation has been virtually contained in a (-1, 1) band since the early 1990s in Norway and later in the same decade in Chile (Figure 4.C). This should not be surprising, given the success of the de facto institutional peg in the GCC and the successful transition of Chile to fully flexible exchange rate regimes. On the other hand, Norway has consistently and successfully pursued flexible bands around the strong DM or the Euro since the early 1990s.

Second, with regard to the effects of the exchange rate-based stabilization programs on inertia, there is evidence that they have reduced inertia for the case of Sudan and for the case of the first (but not the second) stabilization program in Yemen. However, the fact that stabilization programs had to be abandoned cast some doubt about the robustness of the estimated impacts attributed to these two countries' programs. For the GCC economies, it appears that the second half of the 2000s decade was relatively inflationary in Saudi Arabia; while the UAE experienced inflationary pressures during the four years (2006-2008) of the decoupling phase of the recent global economic crisis, during which the country's macroeconomic fundamentals diverged from those of the US economy.

Third, as for Chile, compared to the subsequent periods, inflation inertia was higher (not lower) during the famous stabilization program of the early 1980s, which was associated with the widely discussed Chilean real exchange rate overvaluation episode. The net value of the inertia coefficient during this period is close to 1.0, which is comparable to the value of 0.998 estimated by Edwards (1998). However, we are hastened to stress that this obviously only ertains to an earlier period of the country's macroeconomic history.

Fourth, monetary growth is robustly associated with inflation for the four cases of Chile, Sudan, Saudi Arabia and the UAE. As for foreign inflation, it appears to have had significant impact on inflation in Chile, Norway and the UAE. On view of their globally integrated economies, it is surprising that foreign inflation does not turn out to be significant in the other two GCC economies.

Finally, on view of the rather surprising results regarding the estimated effects of stabilization programs in the Chile and Sudan, we contrast the regressions results for the two countries by reporting evidence from a model free measure of inflation inertia, given by Cochrane's variance ratio test[7]:

$$Var(k) = (1/k)\{\text{var}(\pi_t - \pi_{t-k}) / \text{var}(\pi_t - \pi_{t-1})\} \quad (5)$$

Elbadawi and Kamar (2005) estimate the above variance ratio for the episodes of exchange rate-based stabilization programs as well as other periods for several MENA and other benchmark countries, using monthly data during 1980-2003. The results are contained in Figures 5.A and 5.B.

The higher (lower) the values of V(k) for large ks, the more (less) important is the permanent components of changes in inflation, and, hence, the larger (smaller) is inertia in shaping the inflationary dynamics. The ratio test suggests that there is no strong evidence that the pegged exchange rate regime in Sudan produced lower inflation, suggesting that the pegged regime was met with serious credibility problems, which eventually resulted in its collapse (Figure 5.A). Instead, the Chilean program appeared to have led to lower inflation inertia (Figure 5.B). Contrasting the regression estimates with the Cochrane's ratios suggests that two methods are somewhat contradictory for the case of Sudan. In our view, the evidence of the variance ratios appears closer to reality, given that the pegged regime was eventually abandoned in Sudan. Finally, the two methods also agree with regard to the significant decline in the inflation inertia

[7] See, for example, Elbadawi (1997) for the application of the variance ratio analysis of inflation for Sudan; and Edwards (1998) for Chile and Mexico.

in Chile in the post 1982 period, when more flexible regimes were pursued as economic fundamentals become stronger over time.

In assessing the above evidence, we note the following. First, inflation inertia was high for most of the countries that experienced difficulties in sustaining inflexible exchange rate regimes and had to eventually abandon them. Second, even when some of these countries managed to reduce inflation inertia during these programs, the reductions might not have been deep enough, or sustained long enough, to avert the eventual collapse of these programs. Third, the experience of Chile[8] and Norway suggest that lower inertia could be achieved under more flexible regimes. The moral of the above evidence suggests that inflexible exchange rate regimes are not likely to reduce inflation inertia, and even when they do, these reductions may not be sustainable. The exception, however, are the GCC economies, which also happened to be endowed with exceptionally high rents per capita that allow them to be free from fiscal dominance.

We have so far analyzed in the previous sections the role of fiscal policy, strictly speaking fiscal dominance, in shaping the choice of exchange rate regimes. We consider next the potential impact of exchange rate regimes, among other factors, on the capacity of fiscal policy in oil-dependent economies to counter the external economic cycles associated with the price of oil.

4. Exchange Rate Regimes and Countercyclical Fiscal Policy

Optimal monetary policy in resource dependent economies should be largely determined by their capacity to support effective counter-cyclical fiscal policy for insulating (protecting) the non-oil economy from oil price volatility and its medium-to long-term cycles. Subscribing to this widely held view in the received literature this section assesses the causal link between cyclicality of fiscal policy and exchange rate regimes, while controlling for overall institutional quality, stock of foreign reserves as well as other hedging institutions, such as oil funds, fiscal rules, fiscal responsibility legislation, and fiscal responsibility legislation, which are all referred to as special fiscal institutions (SFIs)[9].

In addition to the above standard controls, this paper explicitly accounts for the potential impact of dependence on oil rent on countercyclicality, including testing for the existence of non-monotonic effect of the former using a global panel data set of 52 Arab and other oil exporting countries over 1990-2012.

4.1 The econometric methodology

Building on recent work in the literature[10], we estimate a country-specific measure of cyclicality using regression techniques.

First, in order to obtain measures of the cyclicality of fiscal policy variables, we use heterogeneous panel data regressions of the form:

$$d\ln F_{it} = \alpha_i + \beta_i d\ln p_{it} + \varepsilon_{it} \qquad (6)$$

Where, F_{it} stands for fiscal variable in country i at time t; P_{it} is the commodity price index for country i at time t, and β_i is the coefficient of cyclicality, which measures the elasticity of F_{it} with respect to the commodity price index. For the case of F_{it} given by fiscal expenditures, a negative value of β_i implies a countercylical behavior. Instead, when fiscal

[8] The result for Chile agrees with Edwards (1998).

[9] See IMF (2007) for a detailed discussion of the impact of SFIs on fiscal outcomes in oil economies.

[10] See for example, Cespedes and Velasco, 2011; Frankel et al, 2011; Gavin and Perotti, 1997; and Alesina et al, 2008.

balance is the fiscal variable of interest, a positive coefficient suggests that fiscal policy was countercyclical.

To identify the random coefficients model, we assume the following stochastic structure:

$$\beta_i = \beta + \mu_i \quad with \quad \mu_i \to N(0, \sigma_\mu^2) \quad and \quad \varepsilon_{it} \to N(0, \sigma_\varepsilon^2)$$
$$\text{cov}(\mu_i, \varepsilon_{it}) = 0 \tag{7}$$

We use the two-step GLS procedure suggested by Swamy (1970) [11] to obtain the feasible best linear predictor of β_i.

Secondly, we also consider the following extended model, which replaces the change in observed commodity prices with its cyclical components as well as accounts for a measure of output gap:

$$d\ln F_{it} = \alpha_i + \beta_i C_{it} + \varphi_i (Y_{it} - \overline{Y}_{it-1}) + \varepsilon_{it} \tag{8}$$

Where, C_{it} is the cyclical component of the commodity price index for country i, obtained by HP filtering technique (Hodrick and Prescott, 1997); and $(Y_{it} - \overline{Y}_{it-1})$ is the output gap for country i at time t. The transitory component of the commodity price index rather than the actual price is the relevant variable here because theory predicts that the transitory rather than total increases in revenues should be saved.

Thirdly, in order to respond to the key issue of what causes the change in fiscal behavior, we estimate different specifications to explain the cross-sectional variation of our cyclicality measures, estimated by equations (6) and (8), as a follows:

$$\hat{\beta}_i = \gamma + Z_i'\beta + \eta_i \qquad \text{i=1..N} \tag{9}$$

Where $\hat{\beta}_i$ is the estimated cyclicality parameter using either of equation (6) or (8). The vector Z contains indicator variables for three types of exchange rate regimes (Dum_Peg, Dum_Inter, Dum_Float); an index of institutional quality (IQ); a dummy variable that takes the value 1 if an SFI is in place, 0 otherwise; oil and mineral rents per capita (Rentpc) and international reserves (Resv/Imports). Specification (9) is also extended by introducing interaction terms between oil rent per capita, exchange rate regime and institutional quality.

4.2 Data and some stylized facts

The construction of an aggregate commodity price index has been a challenging task, as it requires the selection of representative commodities and determination of their corresponding export shares, which are not readily available in standard databases. Hence, we had to confine the analysis to the oil price, as a proxy for commodity price index for the 52 oil-exporting countries retained in the panel.

For the three exchange rate regimes, we use an updated version of the regime classification database, due to Ilzetski Reinhart and Rogoff (2011), to construct three broad exchange rate regimes (institutionally and de facto pegged: dollarization, currency boards, fixed under monetary unions, and GCC; intermediate systems: from adjustable and crawling pegs to managed floats; and free floats).

[11] Swamy(1970) suggest a test of parameter constancy β_i, to validate the random coefficient approach. In Practice, this test is not strictly a test for the random coefficient models, but it can be constructed as such. (Greene 2012).

The resource rent is obtained from the World Bank database on resource rents, which is derived as the difference between world prices and the average unit cost of extraction. The total net rents are simply the unit measure of rents times the quantity extracted or harvested.

For the institutional quality index (ICRG), we use the one proposed by Frankel et al (2011), which is the average of four normalized variables from the ICRG data set:

- Investment profile: This is an assessment of factors affecting the risk to investment that are not covered by other political, economic and financial risk components. The risk rating assigned is the sum of three subcomponents: contract viability/expropriation, profits repatriation, and payment delays.
- Corruption: This is an assessment of corruption within the political system.
- Law and order: This is an assessment of the strength and impartiality of the legal system and the popular observance of the law.
- Bureaucratic quality: This is an assessment of the strength and expertise to govern without drastic changes in policy or interruptions in government services.

In our sample, the ICRG index ranges between 0 (lowest institutional quality) and 1 (highest institutional quality).

Finally, the SFI is taken from IMF fiscal rules database (2013), and is equal to one when specific fiscal institution exists and zero elsewhere

The history of the evolution of crude oil prices suggests a volatile path of booms and busts (Figure 6). For example, during the last three decades the price of oil declined by 20% in 1998 and 2009, the latter being the year when the recent global recession started to impact the entire global economy as the result of the rec-coupling between the advanced and emerging market economies. Moreover, the year 2008 could be considered as marking the end of the last oil price boom that started in 2003. As in Cespedes and Velasco (2001), we consider this oil boom episode in our analysis, which covers the 1990-2012.

4.3 The cyclical behavior of fiscal policy

We first estimate the cyclicality parameters for the three measures of fiscal policy performance (fiscal expenditure, fiscal revenue, and fiscal balance), using the models of equation (6) and (8); and then we discuss the determinants of the estimated cyclicality parameters, based on the estimation results of regression (9). Due to the dependency between the three indicators, it suffices to estimate the determinants of only two performances indicators, which we chose to be fiscal balance and government expenditure.

The regression results of estimating equation 6 with GLS random coefficient models are presented in Appendix Table 6.A for all three fiscal variables (expenditure, revenue and fiscal balance). Starting with government revenue we note that 27 out of 52 elasticities are positive and significant at the 10% or lower significance level. On average, the elasticity of government revenue with oil price index is 0.4 so that a 10% increase in oil price induces a 4% increase in government revenues. The estimated elasticities were much larger for some leading oil-exporters, including Angola (0.7); Nigeria (0.6) and Saudi Arabia (0.8). This rather large pro-cyclicality effect could be explained by the fact that in these countries, commodity-linked revenues (taxes, royalties, profits) can be a large portion of government revenue. As result, overall revenues tend to be quite volatile and the behavior of commodity prices is plausibly the main driver of fiscal policy outcomes (especially total revenue).

Concerning the cyclical behavior of government expenditures, the findings do not support a pro-cyclicality response of government spending to commodity price movements. For all countries in the sample (developed and developing), 29 of the 52 estimated elasticities are negative and statistically significant. However, the average estimated counter-cyclicality effect

on fiscal expenditure was rather modest (at -0.13). Nevertheless, these estimates suggest that, unlike previous oil booms, countries have on average pursued relatively tight fiscal policy in response to the 2000s commodity boom. This is consistent with the evidence obtained by Cespedes and Velasco (2011) and Frankel et al (2011).

Moreover, fiscal balance exhibits comparable countercyclical behavior as government expenditures, where out of 52 estimated elasticities, 29 are positive and statistically significant. However, as expected, the estimated oil price elasticity for fiscal balance was quantitatively very small (at 0.07); with most estimated coefficients very close to zero and less than a maximum value of 0.18. This suggests a week relationship between the fiscal balance and movements in commodity prices.

To check the robustness of these results when both the cyclical components of the price oil and output gap are accounted for, we consider the estimates of equation (8). The results are reported in Appendix Table 6.B for fiscal expenditure and fiscal balance only[12]. The estimates are similar to the basic model of equation 6, regardless of whether we control for the output gap or not. However, very few of the estimates for the output gap coefficient are statistically significant. Our estimates corroborate Cespedes and Velasco (2011), who find that once the effect of cycle has been taken into account, the output gap does not have a great deal of power for explaining the behavior of government revenues across the cycle[13].

Finally, focusing on our set of eight oil-dependent Arab and comparator economies, we glean some interesting contrasts among the three groups of populous oil-dependent Arab economies; the GGC and the comparator group (Table 6). The estimates make clear that Sudan and Yemen pursued highly pro-cyclical policy. For example, while fiscal expenditure remains unchanged following the boom, the pro-cyclical revenue elasticities (at 0.3 and 0.5, respectively) were more than three times the counter-cyclical fiscal balances elasticities.

However, unlike the two populous oil-dependent economies, Algeria's fiscal policy stance became closer to those of the GCC group, albeit falling short of their somewhat impressive counter-cyclical fiscal policy performance during the 2000s. All four counties (Algeria, Oman, Saudi Arabia and the UAE) responded to the strong cyclical growth in revenues with high enough counter-cyclical reduction in expenditure, which allowed a large counter-cyclical growth in budget surpluses. According to our evidence, the counter-cyclical fiscal performance of these four countries compares very favorably with the high performing resource-rich countries of Chile and Norway.

It is clear, therefore, that Algeria and the GCC countries have gained useful lessons from their painful experiences with previous booms, despite that they have yet to develop the levels of institutional quality and fiscal rules already attained by the two benchmark countries.

4.4. The determinants of fiscal cyclicality

Understanding the factors underlying fiscal cyclicality across commodity prices fluctuations episodes is obviously of profound policy significance, especially for the oil-dependent Arab economies[14]. Nevertheless, it remains a relatively under-researched issue. As stipulated in equation (9), we estimate the impact on the cyclicality of fiscal expenditure and fiscal balance

[12] In the context of regression 5, the null hypothesis of parameter constancy is rejected for all models except for government expenditures.

[13] In fact matching our estimates to those of Cespedes and Velasco (2011) for the set of countries included in both samples shows remarkable similarity, despite the differences in the periods of estimation (1990-2012 for ours and 1995-2009 for the two authors) and the sample of countries.

[14] The period of analysis, 1990-2012, is one of the shortcomings of the present study. It includes just the recent boom episode (2003-2008) for oil exporting countries. This prevents us from estimating time variant cyclicality measures, which allow performing panel data regression for the determinants of fiscal cyclicality.

of a host of potential factors, including exchange rate regimes, fiscal rules, international reserves, oil rents per capita as well as the overall quality of institutions.

The estimation results of the cross sectional regressions are presented in Tables 7.A and 7.B[15], which suggest that fiscal counter-cyclicality is related to many of the factors identified in equation (9). We find that the oil rent per capita is positively associated with cyclicality in fiscal balance (Table 7.A, regressions 1, 2 and 3) and negatively associated with expenditure cyclicality (Table 7.B, regressions 1 and 2). Thereby, the direct effect of oil rent per capita is countercyclical suggesting that highly resource endowed countries (GCC countries and Algeria) have better capacity to mount countercyclical fiscal policy in comparison to less endowed countries of, Sudan and Yemen. Moreover, we introduce in the specification of equation (9) the square of oil rent per capita to capture the nonlinear relationship between oil rent per capita and counter-cyclicality of fiscal balance and expenditure. The estimated coefficients on the linear and quadratic terms of oil rent per capita are of opposite signs suggesting the presence of a threshold effect for oil rents per capita. Threshold levels of oil rent per capita below which fiscal balance and fiscal expenditure are likely to be counter-cyclical are, respectively, equal to $ 21,345 and $ 19516. Therefore, save for Kuwait, all the sample countries, with rents per capita less than these thresholds for most of the period under consideration, fall in the right side of the Laffer curve for both fiscal balance and expenditure.

However, accounting for the scale of the counter-cyclical effect presents a more nuanced story (Figures 7.B and 8.B). For example, the response of two populous oil economies (Yemen and Sudan) in terms of the magnitude of the elasticity of fiscal performance to rents pc is very low, hence essentially making these countries cyclically neutral. Instead, the six GCC countries and to a lesser extent Algeria achieved much stronger counter-cyclical fiscal policy response[16]. This result has important policy significance, as it suggests that the latter group of countries have benefited more from previous experiences and, hence, managed to avoid over spending the windfall from the recent boom. The evidence might reflect a learning process on the part of the GCC and Algeria from their past experience.

Furthermore, the received literature suggests that natural resource dependence is believed to have potential impact on institutional development, and there is growing consensus in the academic literature that institutional weakness is central to the explanation of the negative effects of resource booms, most notably and the failure to convert resource rents into other forms of renewable human and physical capital. However, the relationship between the quality of institution and natural resource dependence is not unidirectional, because natural resources rents can damage institutions by removing incentives to conduct reforms, much less to build a well-functioning bureaucracy.

We examine the connection between institution quality and natural resource abundance by including in the regression an interaction term between the measure of institutional quality and oil rent per capita. We find that, once we control for the interactive effect, counter-cyclicality of the resource rents is conditional on high level of institutional quality, as measured by the ICRG index. This finding constitutes an important qualification to our earlier results, in that counter-cyclicality of resource rents could no longer be obtained as an unconditional effect. These results also confirm the earlier findings of Frankel et al (2011) and Cespedes and Velasco (2011) suggesting that there is a robust causal link running from high quality of institutions to less pro-cyclical or more countercyclical fiscal policies.

[15] We use a panel of 30 Net Exporting Countries including Algeria, Angola, Azerbaijan, Argentina, Bahrain, Canada, Chad, Colombia, Congo, Denmark, Ecuador, Equatorial Guinea, Iraq, Iran, Kazakhstan, Kuwait, Libya, Malaysia, Mexico, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, Sudan, Trinidad Tobago, UAE, Venezuela, Vietnam and Yemen

[16] This includes Kuwait, despite that it was located on the wrong side of the curves (Figures 7 and 8).

A minimum standard of institutional quality of 0.57 (in the ICRG scale: 0-1) is required for rents per capita to have a counter-cyclical effect on fiscal balance (regression 4 of Table 7.A); and for fiscal expenditure the threshold was higher at 0.68 (regression 3 of Table 7.B). The profile of the countries in the (ICRG, Rents pc) space suggests that all the GCC countries were well above the institutional quality threshold for the case of fiscal balance, while the populous oil economies (Algeria, Sudan, Yemen) were not (Figure 9.A). However, both the GCC and the populous group could not match the required threshold consistent with counter-cyclical fiscal expenditure. Though the GCC ICRG levels were only marginally below the threshold, they significantly lag behind the frontier countries of Denmark (0.96) and Norway (0.94). Hence, unlike the populous oil group, the prevailing institutions in the GCC are good enough to allow them manage their resource rents in a way that promote counter-cyclicality of fiscal balance; while they fall short for the case of the case of fiscal expenditure.

As regards the other standard determinants from the received literature, reserves accumulation was found to promote counter-cyclicality of fiscal policy. It has the expected negative and positive effects on expenditure and fiscal balance, respectively. In fact high oil rent per capita has allowed countries to build up large fiscal balances that translated into substantial savings kept as foreign reserve or assets in Sovereign Wealth Fund (SWF). Such ownership provides extra "fiscal space" to governments, which they can use to finance their expenditures during time of oil price slumps. These evidences are consistent with the finding regarding the importance of oil rent per capita and foreign reserve accumulation as factor promoting countercyclical fiscal policy. However, we do not find that "special fiscal institutions", such as the SWFs, have any significant effect. To the extent that this effect will likely be confounded with that of reserve, this result seems to be plausible.

Concerning the exchange rate regimes, the evidence was mixed (regression 3 of Table 7. A and regression 3 of Table 7.B), but could be succinctly summarized in the following three main results.

First, relative to the fixed exchange regime (the excluded regime), the intermediate regime effect is not significant in both the fiscal balance and the expenditure regressions; hence the intermediate regime does not seem to be more effective than the fixed regime in terms of promoting countercyclical fiscal policy

Second, instead, the results for the floating regime is more nuanced, as it appears to be more effective in promoting fiscal balance counter-cyclicality than do the fixed regime, but is less effective for the case of fiscal expenditure

Third, however, on view of the fact fiscal balance counter-cyclicality means that the response of revenues must be higher than the response of expenditure to a resource boom, the floating regime appears to be more effective overall.

5. Conclusion

Focusing on the relatively under-research oil-dependent Arab economies, this paper analyzes the fiscal foundation of the choice of monetary regimes and the extent of procyclicality of fiscal policy during the post mid-1990s oil boom. Obviously these two issues are of profound policy relevance to these countries. Also they have been the subject of high profile academic research in the context of the paradigm shift of monetary economics research toward focusing on the fiscal-monetary policy interdependence and on institutions and regimes rather than just policies.

We analyze the first issue for a sample of six Arab oil economies and two comparators: Oman, Saudi Arabia and the UAE from the highly resource endowed GCC; the relatively populous Algeria, Sudan and Yemen, with far less rent per capita than the former group; and, the two non-Arab resource-dependent countries of Chile and Norway. These two comparators provides

a useful contrast to the Arab group in terms of their vastly superior fiscal institutions and sophisticated capabilities for conducting monetary and exchange rate policy, which allow macro stabilization under flexible exchange rate and open capital account regimes. For the second issue we estimate a two-step standard empirical model for assessing the nature and extent of cyclicality (or lack thereof) and its potential determinants, using a global panel data base of oil countries over 1995-2012. As for the former issue, we articulate the findings of global regressions for the case of the eight country case studies. A summary of the main results follows.

First, we find the economies of Sudan and Yemen to have been subject to fiscal dominance, which explains their choice of relatively soft pegged exchange rate regimes. As discussed earlier, it is not surprising that these fiscally dominated economies were also characterized by high inflation inertia and rising disequilibrium real exchange rate appreciation, which eventually led to the failure of their exchange rate-based stabilization programs.

Second, by and large, due to their very high rents per capita and their ability to accumulate substantial foreign reserves and long-term investment in the form of SWFs, the GCC has been free from fiscal dominance. Hence, they were able to maintain a stable de factor institutional peg to the dollar and to support the convertibility of their currencies. On the other hand, these countries have not been immune to destabilizing external shocks due to their rigid exchange rate regimes. Moreover, though the dollar peg has so far served these economies well, it might cease to be optimal for them in the future as their economies and trade partners become more diversified. However, the contrast between the experiences of Chile and Norway and those of the populous Arab countries makes clear that a sustainable transition to flexible regimes requires explicit fiscal rules and high technical capabilities for conducting monetary policy.

Third, Algeria has become increasingly free from fiscal dominance, having used the post mid-1990s oil boom to run large fiscal surpluses and build rising stock of net foreign assets. This country has, therefore, been able to adopt stable crawling band exchange rate regimes since the mid-1990s. Again, to sustain its chosen monetary regime in the face of a future oil bust, Algeria would need explicit fiscal rules and more sophisticated capabilities for conducting modern monetary policy.

Fourth, we find that the oil rent per capita is positively associated with cyclicality in fiscal balance and negatively associated with expenditure cyclicality suggesting that highly resource endowed countries (GCC and Algeria) have better capacity to mount countercyclical fiscal policy in comparison to less endowed countries of Sudan and Yemen. On view of the relatively low levels of rents per capita in these two countries, this result suggests that there appear to be a threshold of rents per capita, below which countries are unable to run countercyclical fiscal policy.

Fifth, however, once we control for the interactive effect, counter-cyclicality of the resource rents is conditional on high level of institutional quality, as measured by the ICRG index. This finding constitutes an important qualification to the above results, in that counter-cyclicality of resource rents could no longer be obtained as an unconditional effect. In this context, we find that, unlike the populous oil group, the prevailing institutions in the GCC are good enough to allow them manage their resource rents in a way that promote counter-cyclicality of fiscal balance; while they fall short for the case of the case of fiscal expenditure.

Sixth, we corroborate the received literature, in that we find reserves accumulation to have promoted counter-cyclical fiscal policy with regard to both fiscal expenditure and fiscal balance. Country experiences suggest that high oil rent per capita have allowed countries to build up large fiscal balances, which could be used to accumulate reserves or establish SWFs. Such ownership provides extra "fiscal space" to governments, which they can use to finance

their expenditures. However, we do not find SWFs to have any significant impact on the counter-cyclical parameters. This suggests that perhaps any potential counter-cyclical fiscal policy effect SWFs might have might be confounded with that of reserve accumulation.

Finally, concerning exchange rate regimes, our evidence suggests that the intermediate regime does not seem to be more effective than the fixed in terms of promoting countercyclical fiscal policy. However, assessing the counter-cyclicality of the floating regime relative to the fixed produced a less clear-cut result. The floating regime appears to be more effective in promoting fiscal balance counter-cyclicality than do the fixed regime, but is less effective for the case of fiscal expenditure. However, on view of the fact fiscal balance counter-cyclicality means that the response of revenues must be higher than the response of expenditure to a resource boom, the floating regime appears to be more effective overall.

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Figure 1A: Budget Balance in the Gulf Cooperation Council (% of GDP)

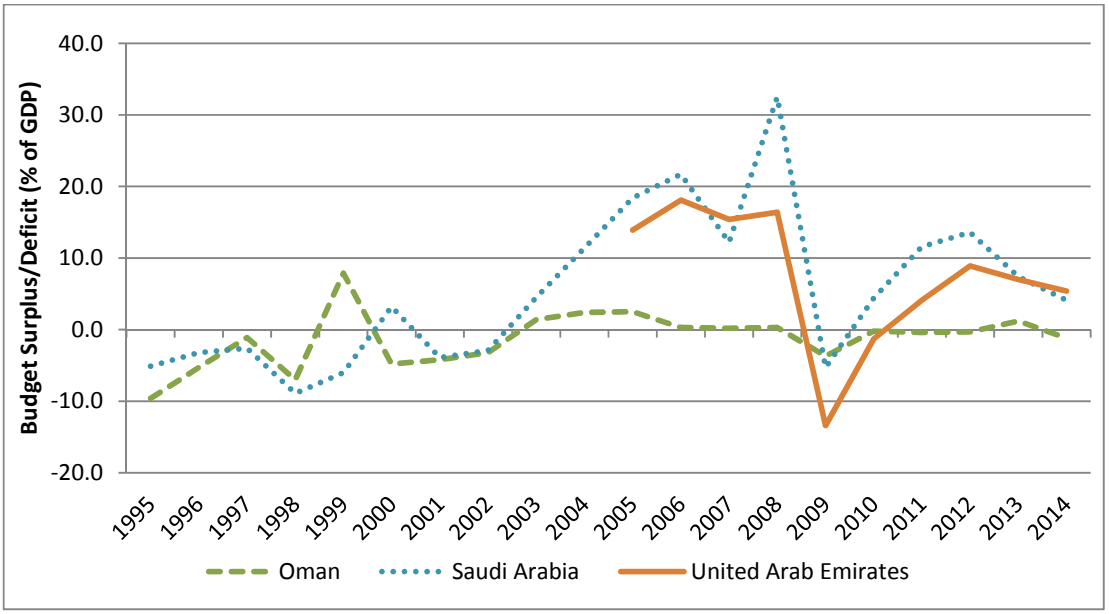


Figure 1B: Budget Balance in Comparator Economies (% of GDP)

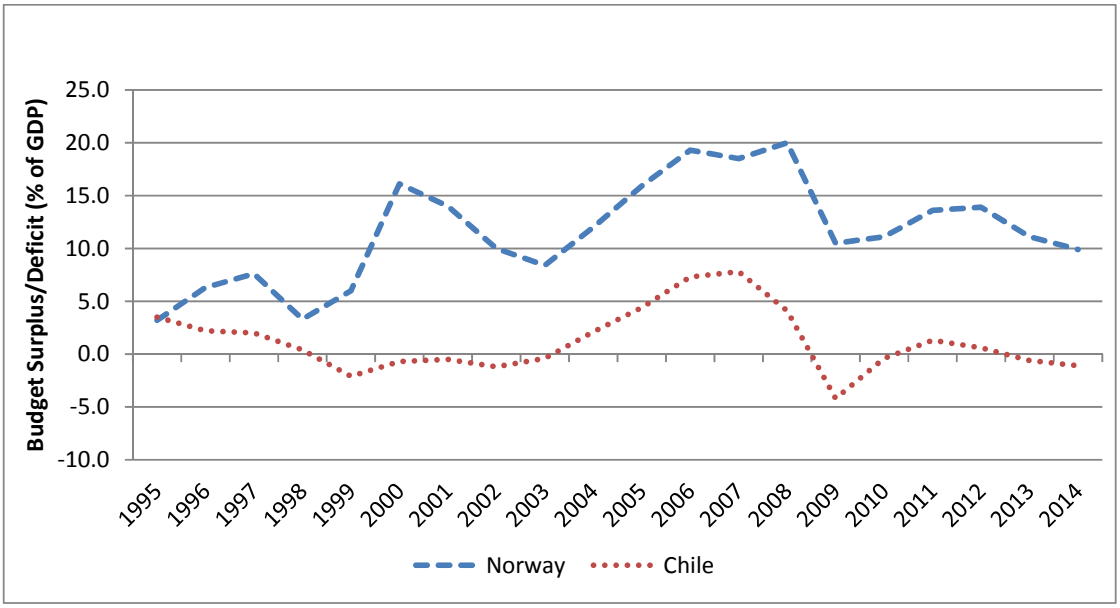
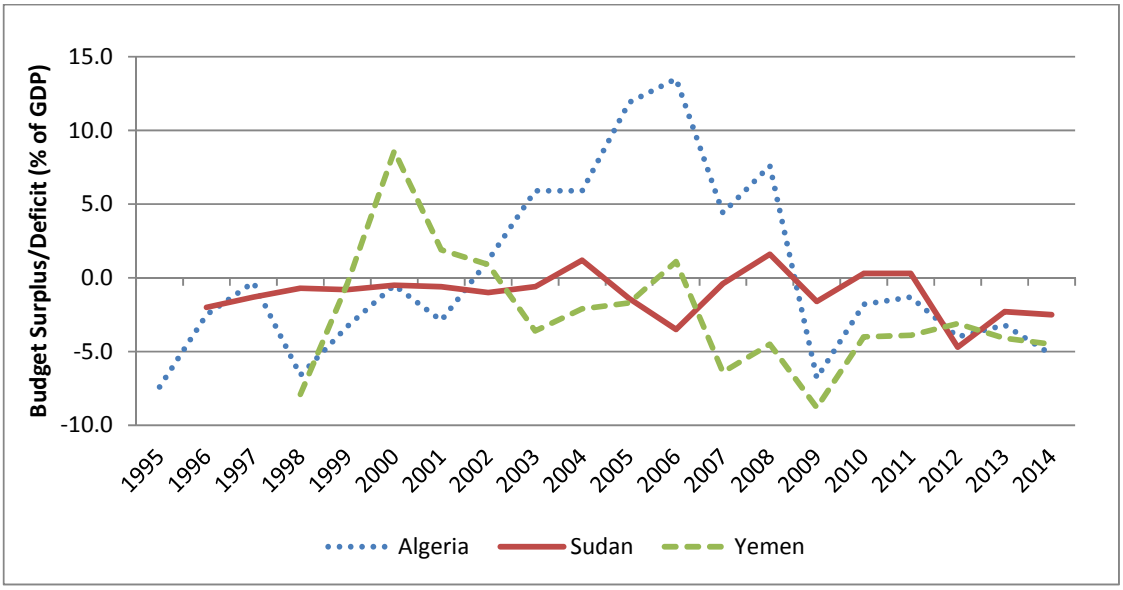
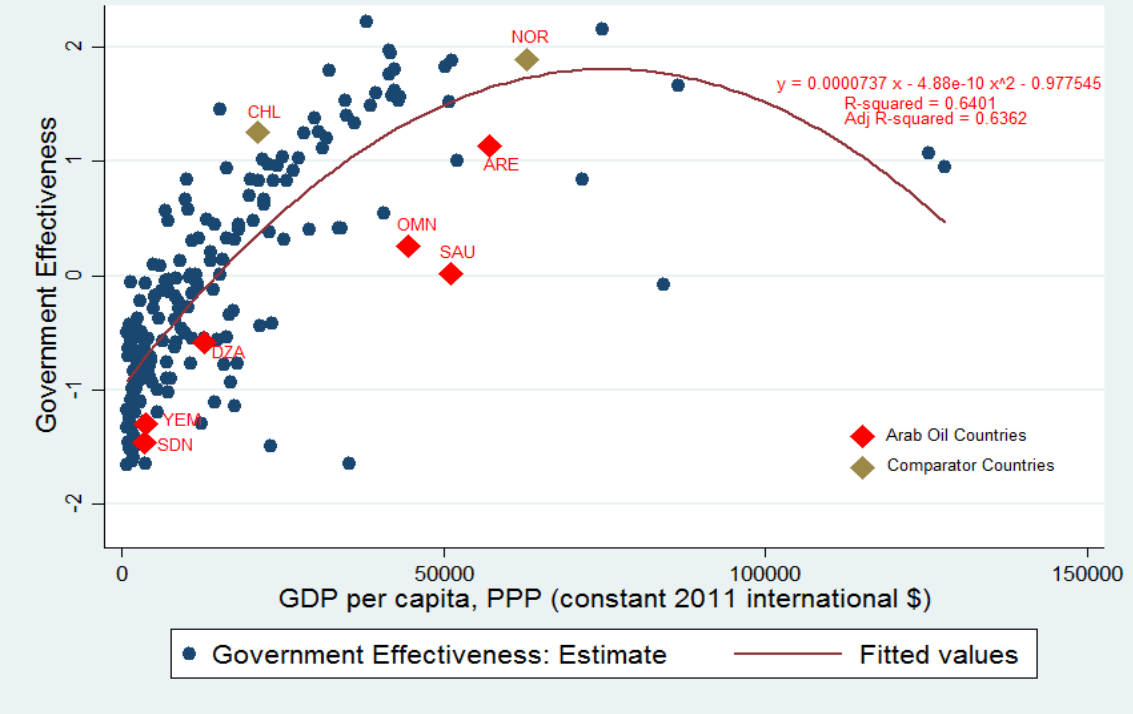


Figure 1C: Budget Balance in Populous Arab Oil Economies (% of GDP)



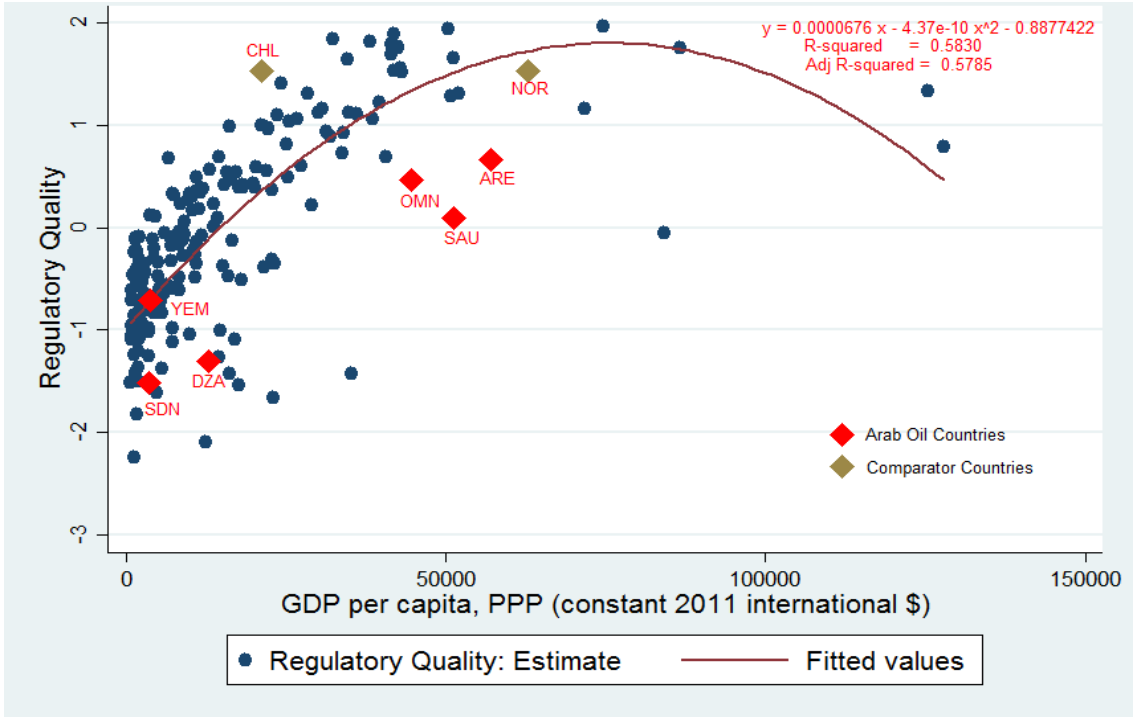
Notes: 1. Data sources: Authors' own elaboration, using data from International Monetary Fund's IFS data base; International Bank of Settlement; Business Monitor International; Ministry of National Economy, Oman; Ministry of Finance, Saudi Arabia; Central Bank of Yemen; and Eurostat database, July 2014. 2. A government budget balance is a government document presenting the government's proposed revenues and spending for a financial year, including interest payments and liabilities from previous years.

Figure 2A: Government Effectiveness in Arab Oil and Comparator Economies



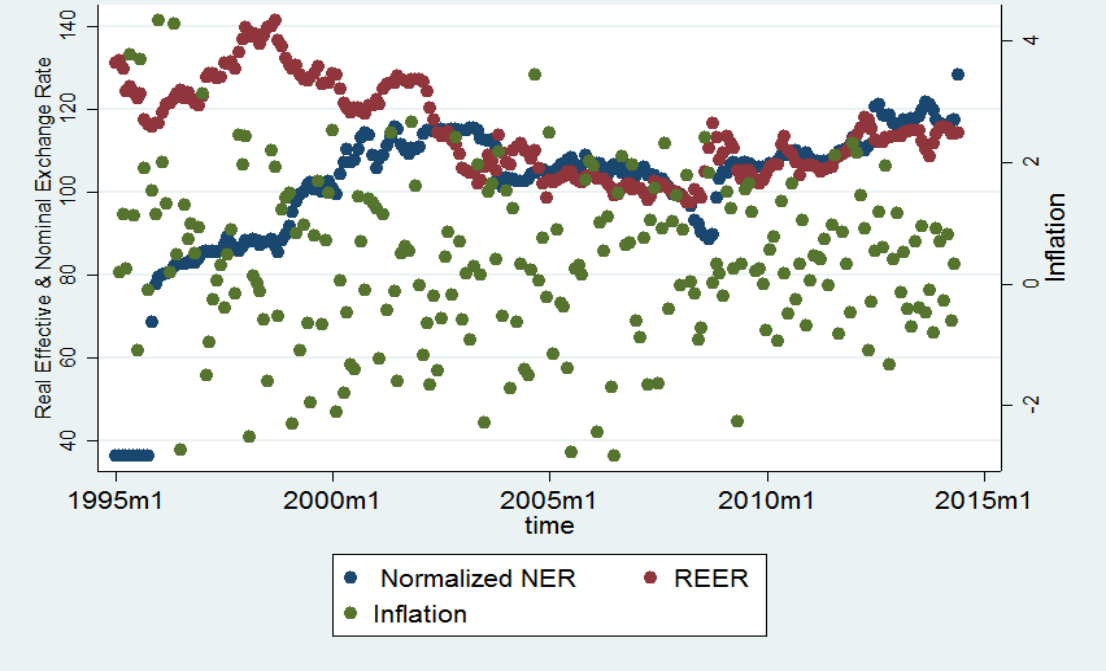
Notes: 1. Data sources: Authors' own elaboration, using World Bank's World Governance Indicators. 2. Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Figure 2B: Regulatory Quality in Arab Oil and Comparator Economies



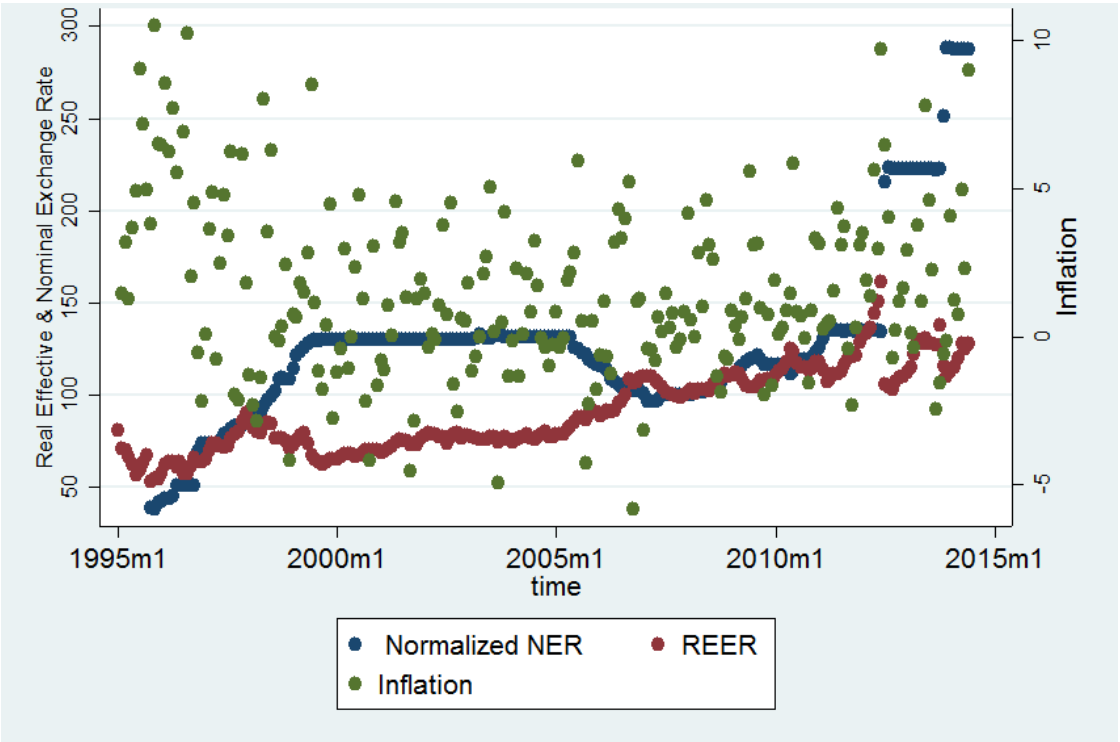
Notes: 1. Data sources: Authors' own elaboration, using World Bank's World Governance Indicators. 2. Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

Figure 3A: Exchange Rates and Inflation - Algeria



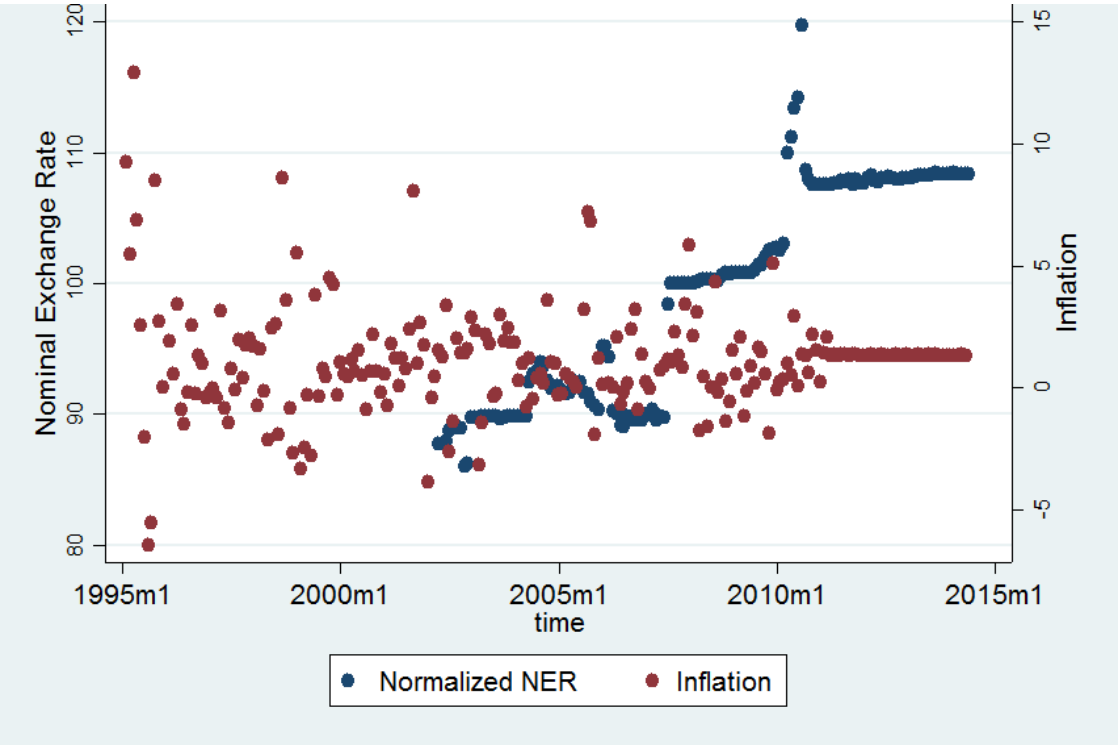
Notes: 1. Data sources: Authors' own elaboration, using data from Oanda Nominal Exchange Rates database, oanda.com; International Monetary fund, IFS 2014; and Bruegel data base for the real exchange rate. 2. Real Effective Exchange Rate, as calculated in Bruegel data base, is based on 172 trading partners and is CPI based (Darvas, 2012). 3. Nominal Exchange Rate data is in LCU per USD, a daily average, and are normalized (scaled to 100) in relation to the normalized REER data (where December, 2007=100).

Figure 3B: Exchange Rates and Inflation - Sudan



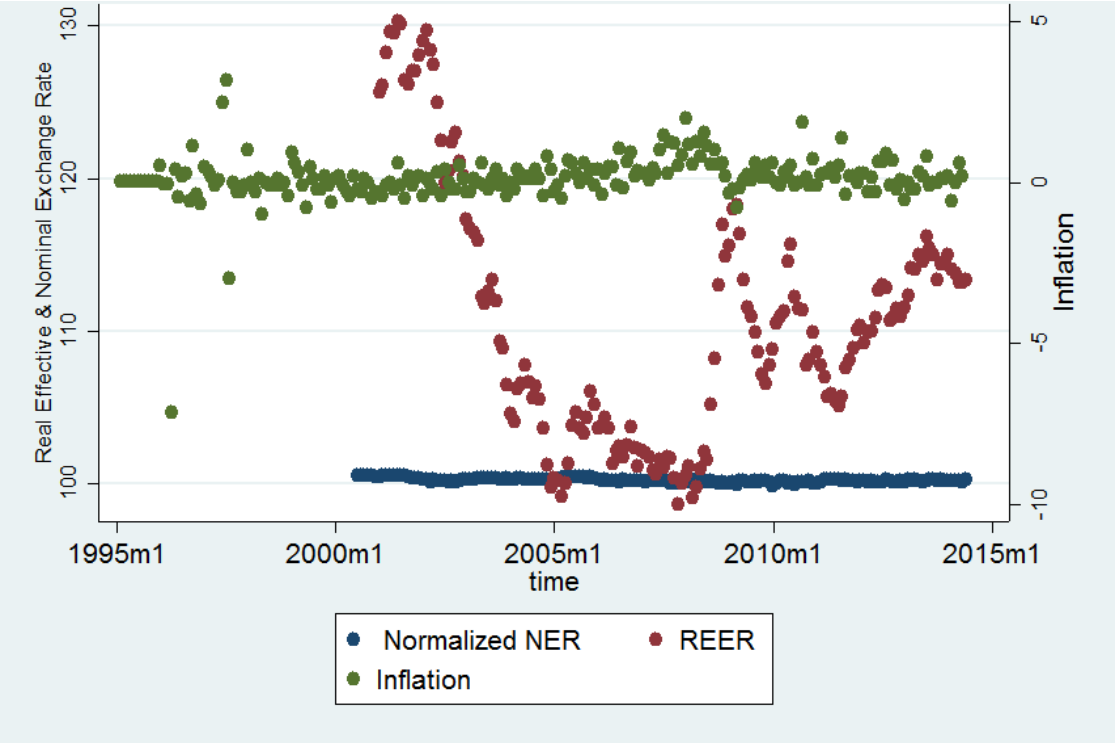
Notes: 1. Sudan's Nominal Exchange Rate data from January 1995 to 2007 was created by converting the Old Sudanese Pound (ignoring the Sudanese Dinar) to the New Sudanese Pound by scaling the data to 100. 2. Sudan's Inflation rate for Jun 1996 with value 25%, has been removed from the graph for representation purposes and treated as an outlier.

Figure 3C: Exchange Rates and Inflation - Yemen



Notes: 1. Nominal Exchange Rate data is in LCU per USD, a daily average, and are normalized (scaled to 100) in relation to the NER's minimum and maximum. 2. Yemen's Inflation rates for Jul 2005; Feb, 2006; Mar, 2007; Apr, 2007; and Jan, 1996 with values 192%, -67%, 218%, and -68%, 18% respectively, have been removed from the graph for representation purposes and treated as outliers.

Figure 3D: Exchange Rates and Inflation - Oman



Notes: Oman's Inflation rates for Jan, 2001 with value -25%, has been removed from the graph for representation purposes and treated as an outlier.

Figure 3E: Exchange Rates and Inflation – Saudi Arabia

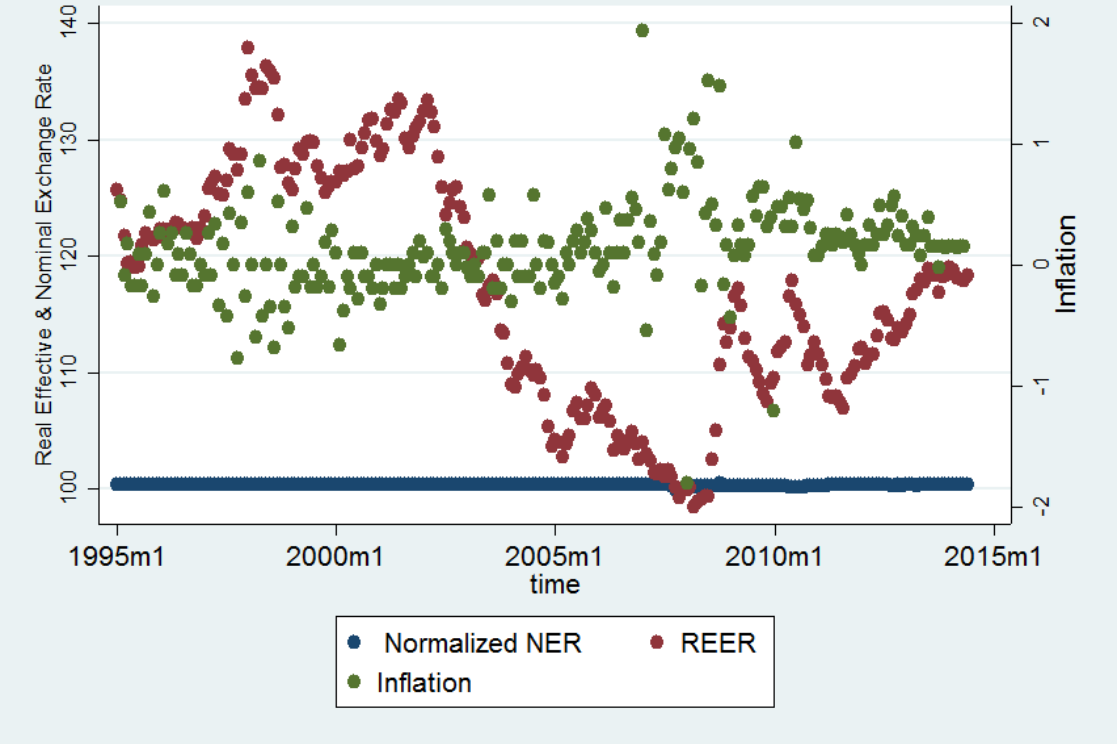


Figure 3F: Exchange Rates and Inflation – United Arab Emirates

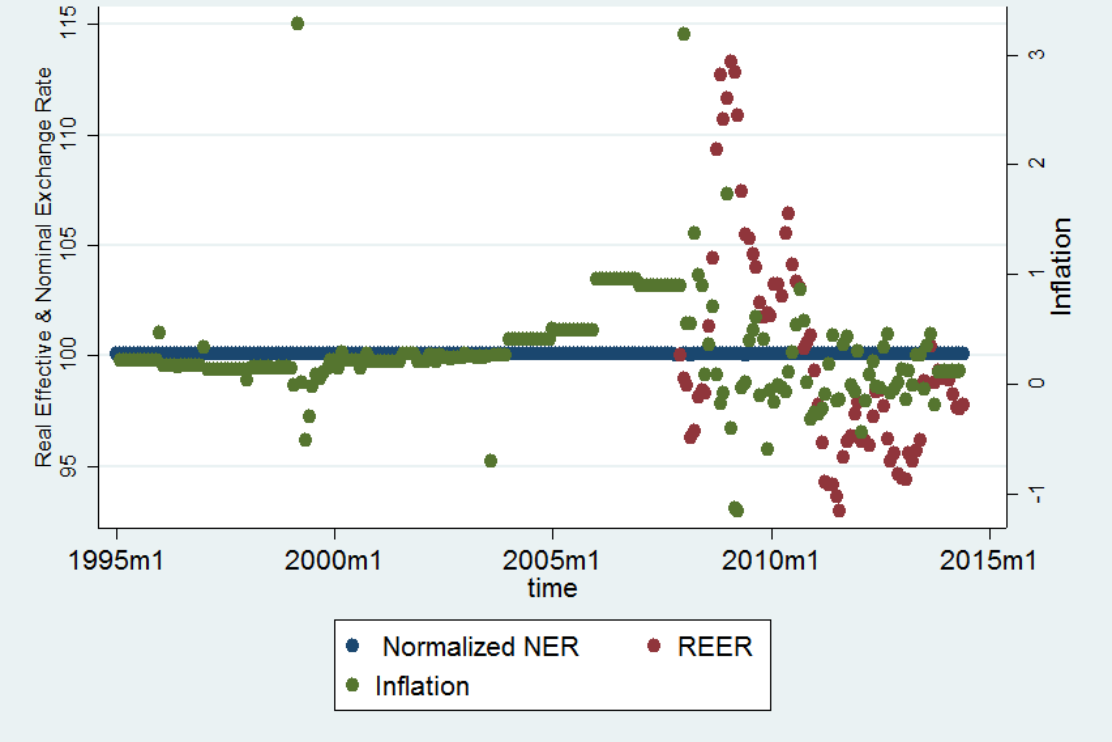


Figure 3G: Exchange Rates and Inflation – Chile

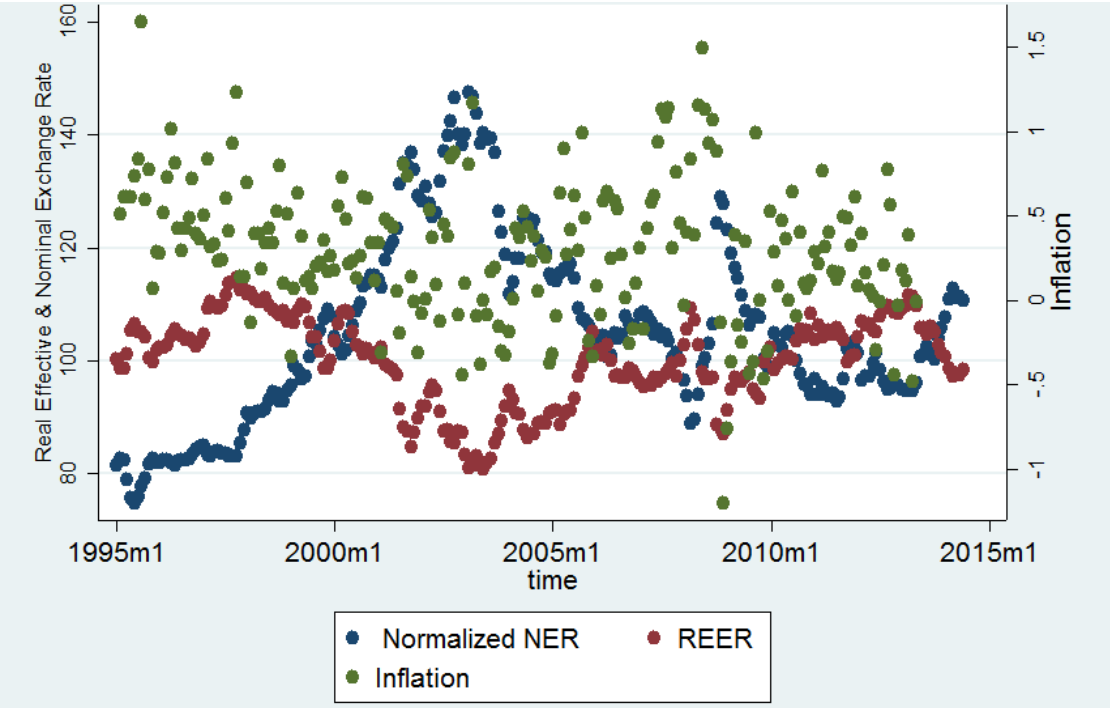


Figure 3H: Exchange Rates and Inflation – Norway

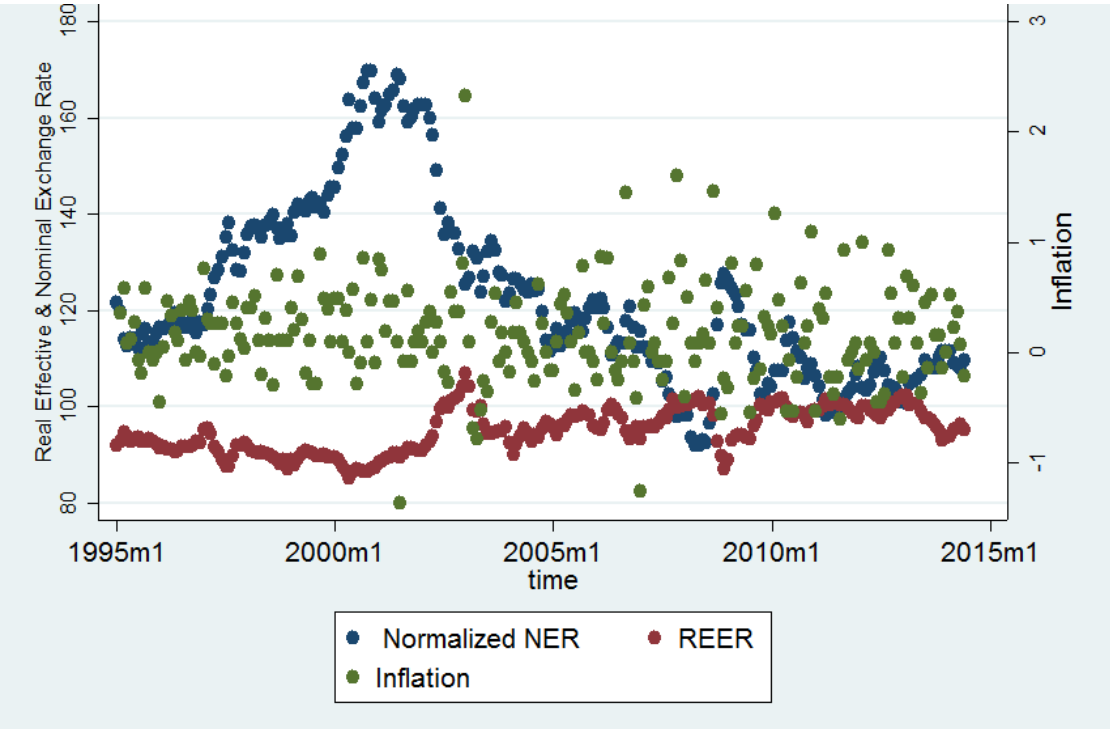


Figure 4A: Inflation in Populous Arab Oil Economies

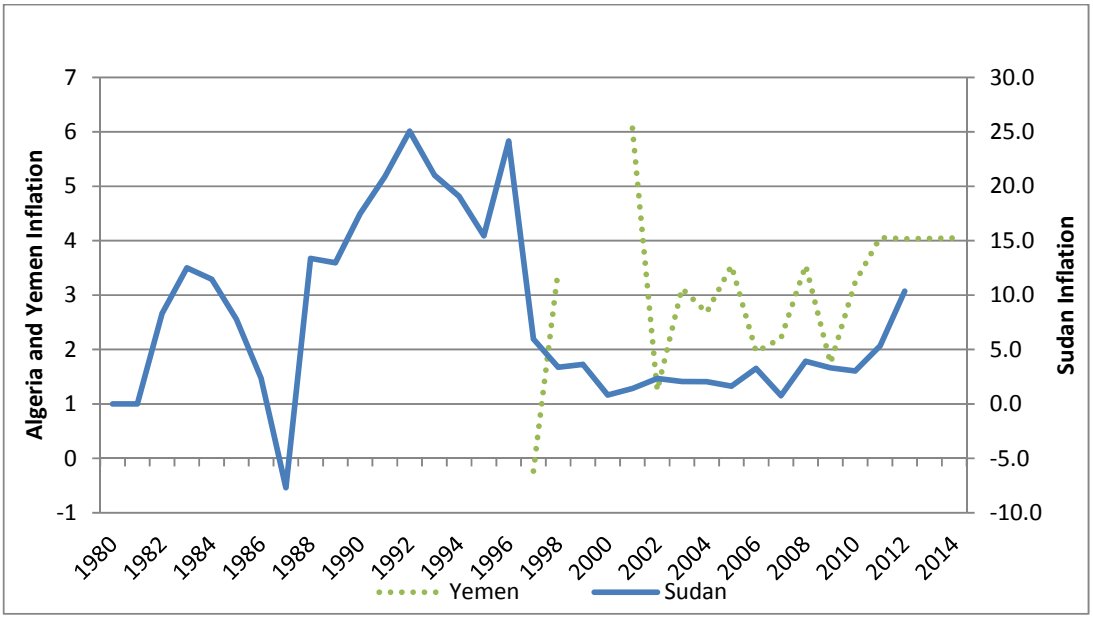


Figure 4B: Inflation in GCC Economies

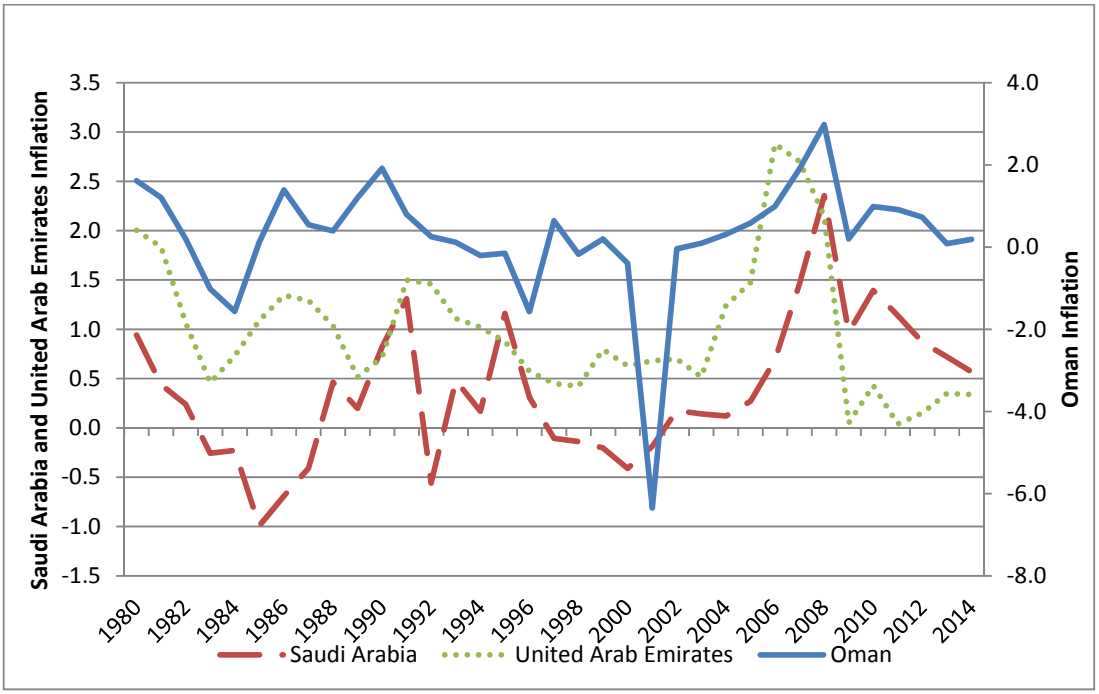


Figure 4C: Inflation in Comparator Economies

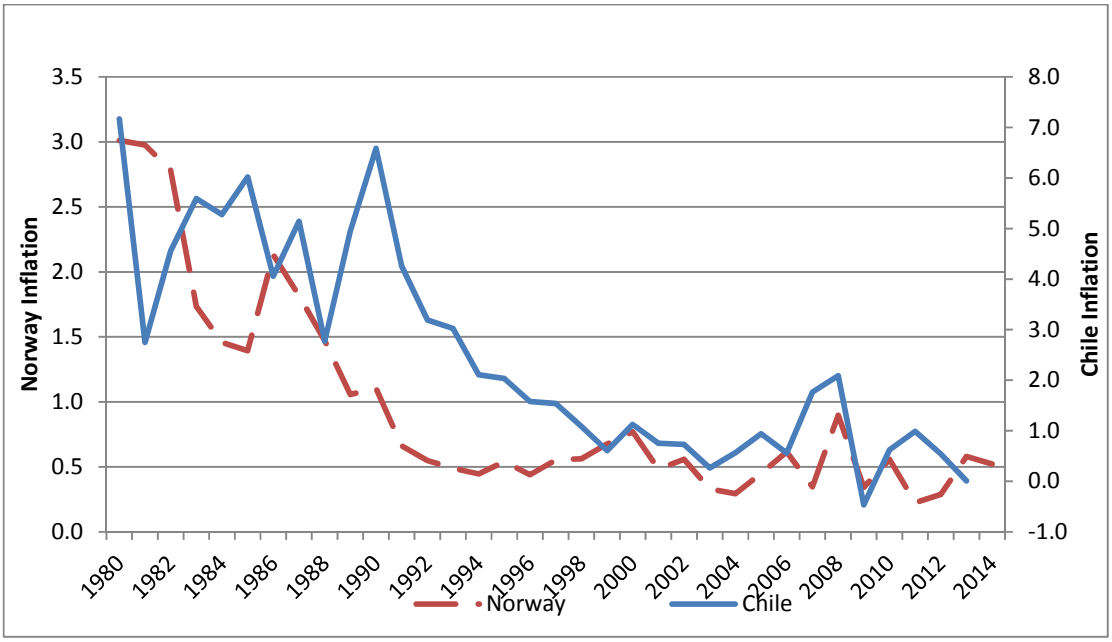
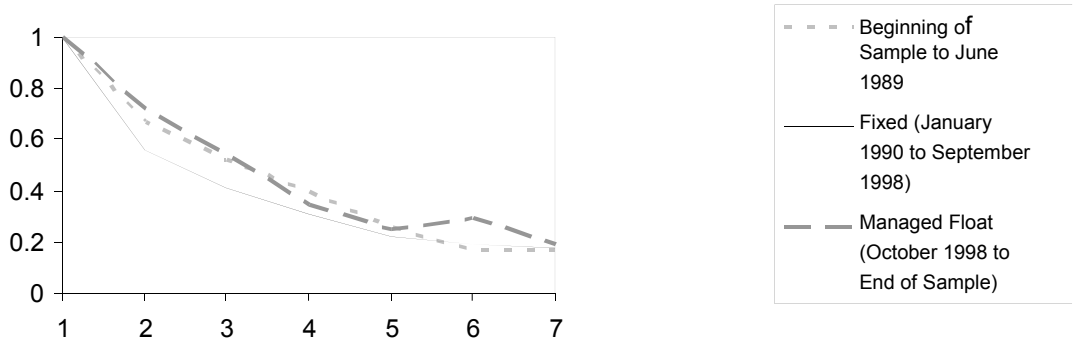
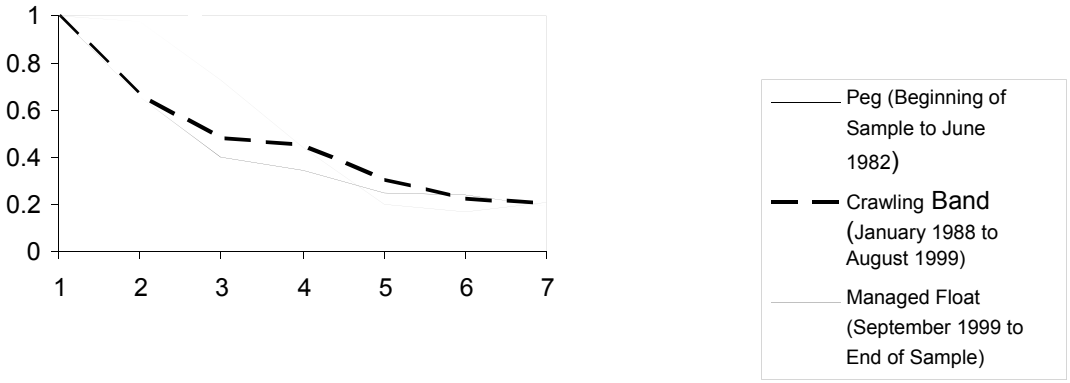


Figure 5A: Sudan: Inflation Inertia and Cochrane Variance Ratios



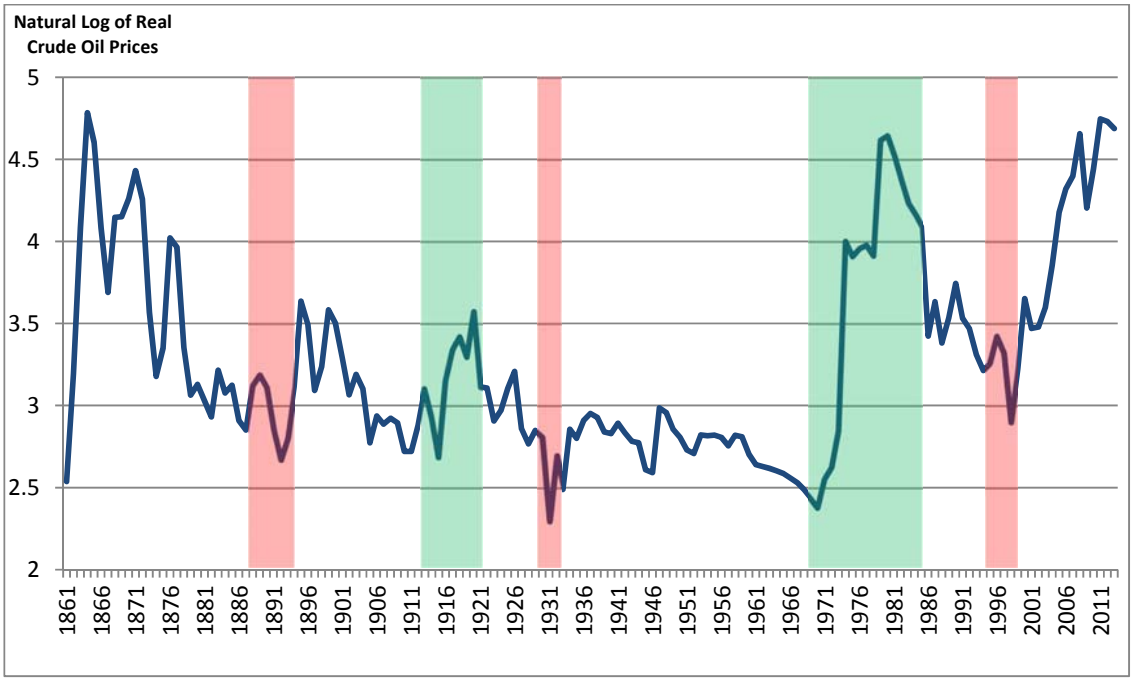
Source: Elbadawi and Kamar (2005).

Figure 5B: Chile: Inflation Inertia and Cochrane Variance Ratios



Source: Elbadawi and Kamar (2005)

Figure 6: The History of Oil Price Booms and Busts



Notes: 1. Source: Authors' own elaboration using data from British Petroleum. 2. Crude Oil prices are in constant 2013 USD, 1861-1944 US Average, 1945-1983 Arabian Light posted at Ras Tanura, and 1984-2013 Brent dated.

Figure 7: Impact of Oil Rent per Capita on Fiscal Balance Counter-Cyclicality. (regression 2, Table 7.A)

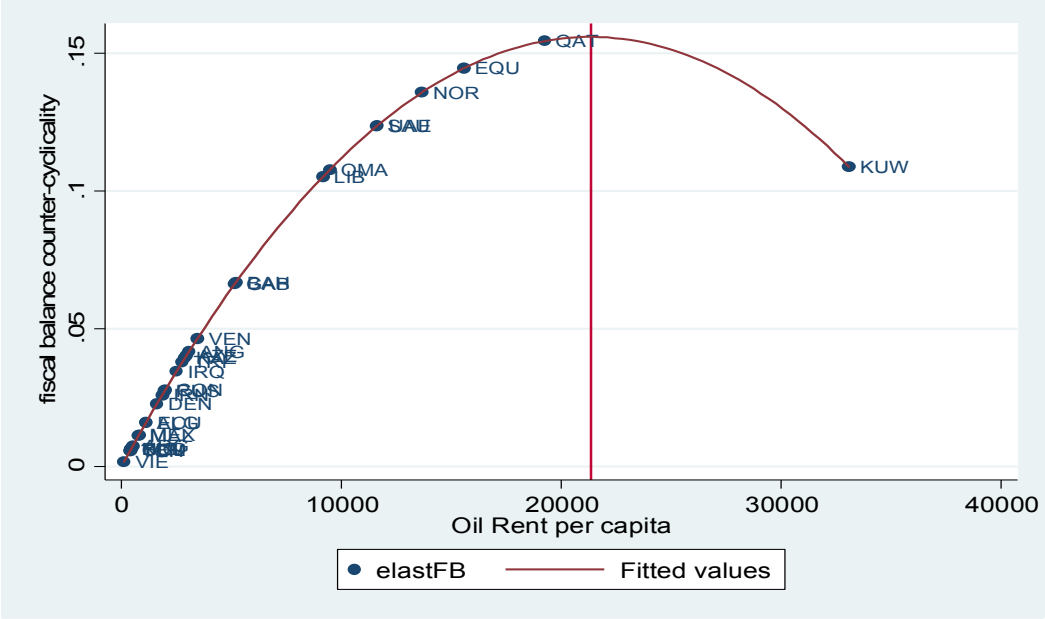


Figure 8: Impact of Oil Rent per Capita on Expenditure Counter-Cyclicality. (regression 2, Table 7.B)

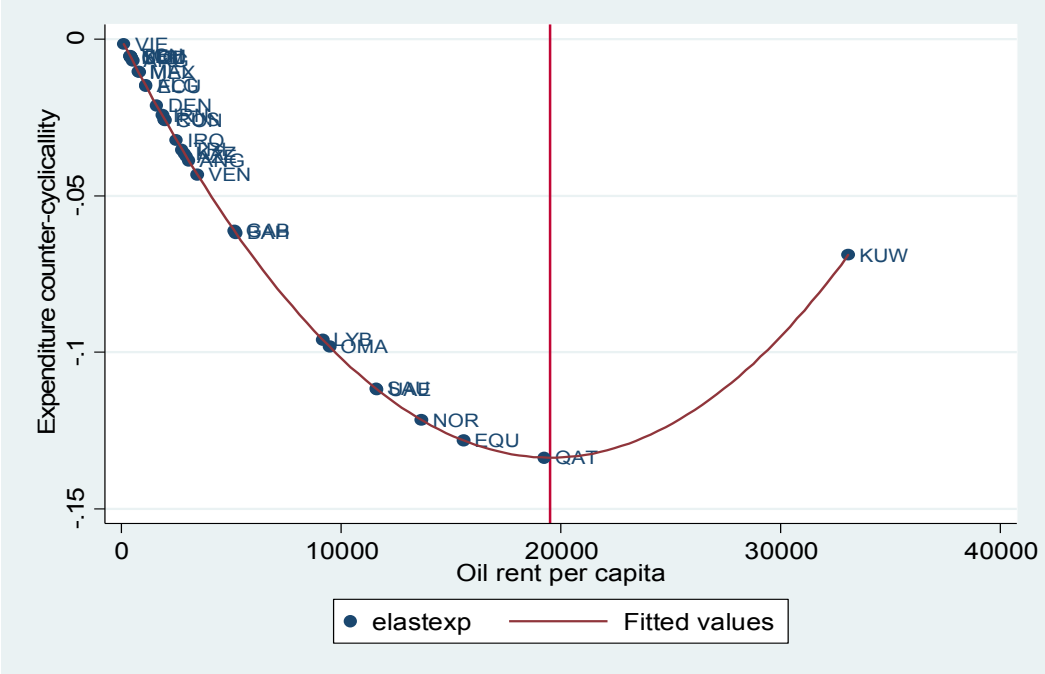


Figure 9A: Impact of Institutional Quality on Fiscal Balance Counter-Cyclicality: Arab Oil Economies (Model 4)

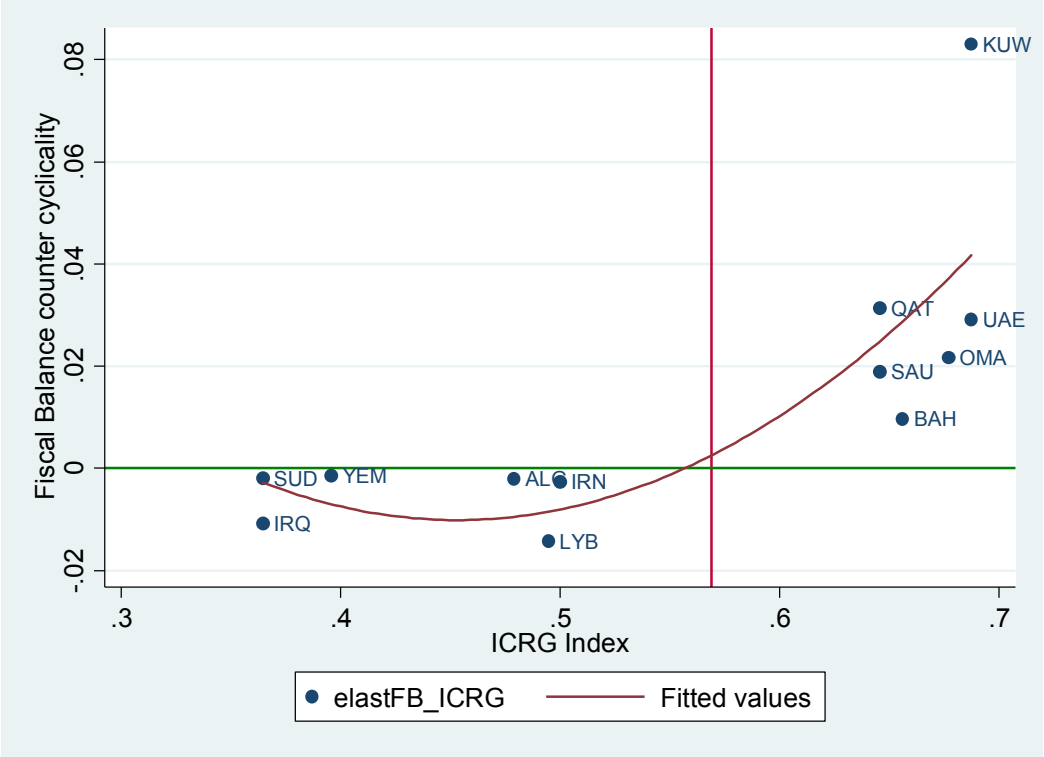


Figure 9B: Impact of Institutional Quality on Expenditure Counter-Cyclicality: (Model 3)

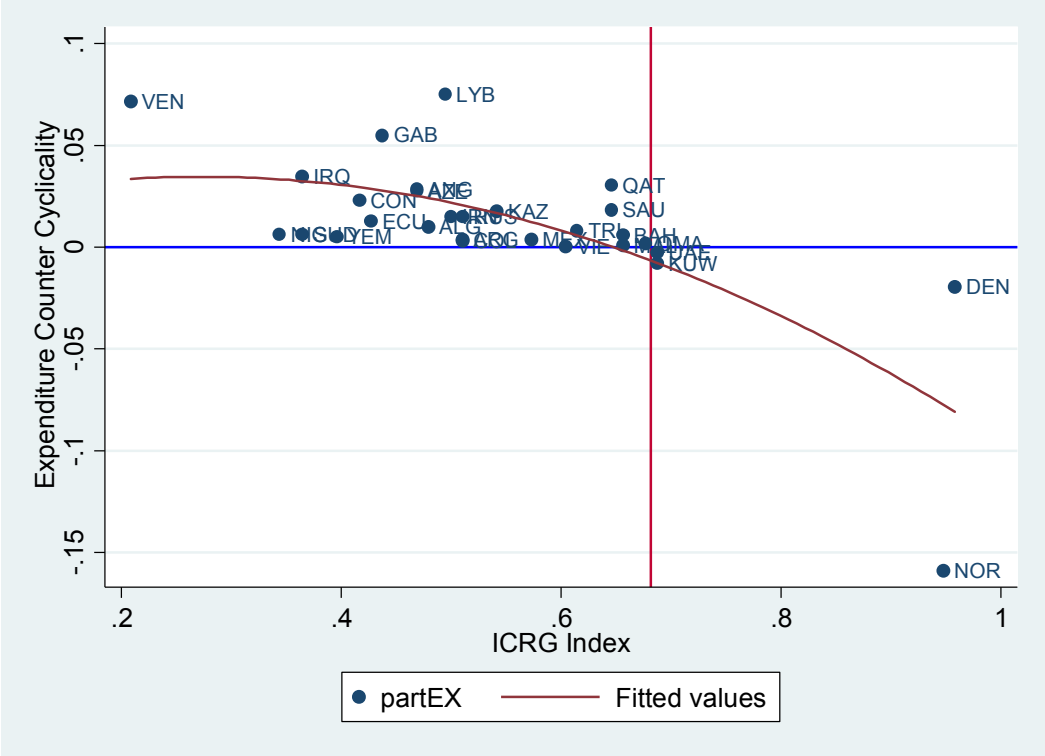


Table 1: Population, Level of Development and Economic Structure: Arab Oil Economies and Comparator Countries

	Population, millions	Nominal GDP, billions current USD	Per Capita GDP-PPP, constant (2011) International dollar	Natural resources rents per capita (current US$)	Non-resource GDP (% of GDP - constant 2005 US$)
	2014	2014	2014	2012	
Populous Oil Arab Group					
Algeria	39.5	213.5	13,888	1,245	82.7
Sudan	37.3	74.8	4,296	140	84.7
Yemen	27.5	43.2	3,788	244	72.6
GCC Economies					
Oman	3.7	77.8	43,847	12,352	61.3
KSA	30.8	746.2	52,311	17,125	64.4
UAE	9.3	399.5	66,347	52,297	85.1
Comparator Economies					
Chile	17.8	258.0	23,057	2,677	90.4
Norway	5.2	499.8	67,166	11,909	90.7

Notes: 1. Data sources: Authors' own elaboration, based on data from the International Monetary Fund, World Economic Outlook Database, April 2014; and the World Bank: World Development Indicators database, July 2014. 2. Natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents (WDI, World Bank). 3. Natural resources rents per capita are reported as natural resources rents per national capita for the GCC, where the national population size is obtained by multiplying the published total (national and resident) population size by a factor of 0.80 for Oman; 0.73 for Saudi Arabia; and 0.19 for the UAE. 4. Non-resource GDP is calculated as GDP (2005 constant US$) less real values of Natural Resource Depletion taking into consideration the World Bank's Adjusted Savings of Total Natural Resources (see WDI data base):

- Algeria's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2009
- Sudan's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2007
- Yemen's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2005
- Oman's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2005
- KSA's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2005
- UAE's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2012
- Chile's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2009
- Norway's Non-resource GDP (% of GDP - constant 2005 US$) latest available data is in 2009

Table 2: Private Sector Access to Domestic Credit, Tax and Seigniorage Revenue in Arab Oil and Comparator Economies

	Domestic Credit to the private sector (% of GDP)			Average Seigniorage Revenue (% of GDP)			Average Tax Revenue (% of GDP)		
	1990-99	2000-09	2012-14	1990-99	2000-09	2010-12	1990-99	2000-09	2011-13
Populous Group									
Algeria	14.7	11.6	16.6	3.5	4.9	4.7	11.2	9.3	12.4
Sudan	2.9	8.5	10.3	3.4	2.3	3.1	6.3	6.5	6.2
Yemen	4.6	6.4	5.7	4.4	1.8	1.7	9.8	7.2	6.5
GCC									
Oman	29.2	36.6	44	0.3	1.5	1.6	7.4	2.2	2.5
KSA	21.1	33.1	40.5	1.2	3.0	5.4	..	0.5	1.0
UAE	29.9	47.4	61.4	0.8	2.7	1.9	..	..	0.4
Comparator Group									
Chile	53.9	80.2	106.7	1.4	1.6	2.2	17.8	17.2	19.1
Norway	60.2	76.0	..	3.2	3.6	..	..	27.8	27.1

Notes: 1. Data sources: Authors' own elaboration, using data from International Monetary Fund's World Economic Outlook Database, April 2014 and Article IV Country Reports; and, World Bank's World Development Indicators, July 2014. 2. Average Seigniorage Revenua (% of GDP) is calculated as (M1t-M1t-1)/GDPt. 3. Algeria, Sudan, Yemen, Norway, and Chile Average Tax Revenue data are taken from the IMF's Article IV Country Reports; and for Chile the data excludes Copper income tax (Codelco).

Table 3: Debt and Foreign Assets in Arab Oil and Comparator Economies

	Government Domestic Debt (% of GDP) 2012	External Debt (% GDP) 2013-14	Net Foreign Asset (billion current US$) 2006-2012
Populous Oil Arab Group			
Algeria	8.2	1.75	191.0
Sudan	13.4	78.85	(0.1)
Yemen	28.4	14.45	6.9
GCC Economies			
Oman	2.0	4.6	15.7
KSA	3.7	11.95	684.7
UAE	17.1	46.75	773.0*
Comparator Economies			
Chile	34.2	58.3	28.9
Norway	29.4	-	465.0

Notes: 1. Data source: Authors' own elaboration, based on data from the International Monetary Fund's World Economic Outlook Database, April 2014 and various Article IV Country Reports; World Bank's World Development Indicators database, July 2014; Business Monitor International database, July 2014; and Statistics Norway: (http://www.ssb.no/en/utenriksokonomi/statistikker/intinvpos/aar/2013-10-02). 2.** According to informal estimates, the SWF of the Emirate of Abu Dhabi (of the UAE) is the second largest in the World with foreign assets totaling US $ 773 in 2012 (http://www.aawsat.net/2014/01/article55328255). 3. Norway's Net Foreign Assets (million current US$) and public debt (% of GDP) refer to 2012, obtained from Statistics Norway.

Table 4: Exchange Rate Regimes in Arab Oil and Comparator Economies

	Exchange rate-based Stabilization Episodes	Exchange Rate Regime
Populous Oil Arab Group		
Algeria		1988–1994 Managed floating/Parallel Market 1994–1995 Freely falling/Managed floating 1995–1999 De facto crawling band around French franc 1999–2004 De facto crawling band around euro 2005—2010 De facto crawling band around US dollar 2014 Composite Exchange rate anchor (flexibility is limited vis-à-vis another basket of currencies)
Sudan		1979-1985 Dual Market 1985-1986 Parallel market January 30, 1986 Bankers' Committee to determine official rate 1990—2010 De facto crawling peg to US dollar 2014 Conventional peg to US dollar
Yemen		2002-2004 De facto peg to the US dollar 2005-2007 Pre-announced horizontal band that is narrower than or equal to +/- 2% 2007-2010 Managed floating with no pre-determined path for the exchange rate 2014 Stabilized arrangement (flexibility is limited vis-à-vis the U.S. dollar)
GCC Economies		
Oman		2002—2014 Official peg to the US dollar
KSA		1975–2014 De facto US dollar peg
UAE		1990—2014 Peg to US dollar
Comparator Economies		
Chile		1979Q2-1982Q2 Pegged to the US dollar 1984–1988 Managed floating/Dual Market 1988–1989 De facto crawling band around US dollar/Dual Market 1989–1992 Pre announced crawling band around US dollar/Dual Market 1992– 1997 De facto crawling band around US dollar/Dual Market January 20, 1997–June 25, 1998 De facto crawling band to US dollar/Dual Market September 16, 1998–December 22, 1998 Pre announced crawling band to US dollar/Dual Market 1999–2010 De facto band around US dollar 2014 Free Floating
Norway	- 1987-1992 -	1973–1982 Moving band around DM 1982–1987 Managed floating 1987–1992 Moving band around DM 1992–2010 Managed floating/de facto band around euro 2014 Free Floating

Data sources: Authors' own elaboration, using International Monetary Fund, De Facto Classification of Exchange Rate Regimes and Monetary Policy Framework July 31st, 2006-2008; and Ilzetzki et al (2011).

Table 5A: Pegged Exchange Rates Regime and Inflation Inertia in the Populous Oil Arab Economies and Comparators

	Sudan	Yemen	Chile	Norway
Inflation lagged once	1.01*** (0.084)	0.94* (0.6249)	0.72*** (0.043)	0.29*** (0.1087)
Change in inflation foreign in period t	0.480 (3.106)	-0.1191 (0.5125)	0.215 (0.605)	0.2679* (0.1550)
Inflation foreign in period t-1	-0.082 (0.520)	0.7828 (3.7075)	1.48*** (0.224)	-0.0197 (0.2278)
Dummy1	-0.089 (0.292)	3.1914 (3.0355)	0.195 (0.160)	2.76*** (1.0250)
Dummy2	..	0.3557 (2.8258)	..	0.1153 (0.5506)
Dummy3	..	..	..	..
Dummy1 inflation lagged once	-0.174* (0.116)	-1.3388* (0.7012)	0.33*** (0.107)	-0.677** (0.2810)
Dummy2 inflation lagged once	..	-0.7705 (0.6863)	..	0.1939 (0.2665)
Dummy3 inflation lagged once	..	..	..	..
Dummy1 inflation foreign lagged once	4.427 (3.683)	-3.8234 (4.0305)	-2.37*** (0.629)	0.3988 (0.3617)
Dummy2 inflation foreign lagged once	..	-0.8546 (3.7378)	..	-0.0985 (0.4722)
Dummy3 inflation foreign lagged once	..	..	..	..
Money Growth	0.919* (0.568)	9.2048 (8.4936)	0.87*** (0.281)	0.0594 (3.0543)
Constant	-0.030 (0.108)	1.6686 (2.7114)	-0.07*** (0.018)	0.55*** (0.1998)
Number of obs	*103*	*42*	*103*	*113*
F	*106.9*	*1.68*	*275.9*	*8.73*
R-squared	*0.89*	*0.3508*	*0.95*	*0.4612*
Adj R-squared	--	*0.1414*	--	*0.4084*

Notes: 1. Source: Authors' elaboration, using IMF data. 2. For Chile and Sudan, regressions results taken from Elbadawi and Kamar (2005). 3. *; **; ***, respectively, refer to statistical significance levels at 10, 5 and 1%. 4. Due to the large gaps in the Algerian CPI data, the inflation equation for Algeria could not be estimated.

Table 5B: Pegged Exchange Rates Regime and Inflation Inertia in the GCC

	Oman	Saudi Arabia	United Arab Emirates
Inflation lagged once	0.0944 (0.0953)	0.1493 (0.0990)	0.1966** (0.0938)
Change in inflation foreign	-0.3528 (0.4377)	-0.0735 (0.1339)	0.0381 (0.1044)
Foreign inflation lagged once	0.3597 (0.4486)	0.1043 (0.1724)	0.3445*** (0.1122)
Money Growth (M1)	1.2529 (4.5763)	5.5485** (2.2597)	2.2193** (1.1293)
Period Dummy (2007q1-2008q3)	1.0558 (2.7839)	..	..
Period Dummy (2004q1-2010q4)	..	0.0436 (0.3302)	..
Period Dummy (2006q1-2008q3)	..	..	2.5581*** (0.9416)
Period Dummy (2007q1-2008q3) * Inflation L1	0.6220 (1.0437)	..	..
Period Dummy (2007q1-2008q3) * Foreign Inflation L1	-0.1738 (1.2026)	..	..
Period Dummy (2004q1-2010q4) * Inflation L1	..	0.5583*** (0.2019)	..
Period Dummy (2004q1-2010q4) * Foreign Inflation L1	..	0.1985 (0.2520)	..
Period Dummy (2006q1-2008q3) * Inflation L1	..	..	-0.2432 (0.3426)
Period Dummy (2006q1-2008q3) * Foreign Inflation L1	..	..	-0.4957* (0.2741)
Constant	-0.3348 (0.4661)	-0.0909 (0.1754)	0.3676*** (0.1230)
Number of obs	*116*	*117*	*120*
F	*1.41*	*8.00*	*16.16*
R-squared	*0.0837*	*0.3394*	*0.5024*
Adj R-squared	*0.0244*	*0.2969*	*0.4713*

Notes: 1. Source: Authors' elaboration, using IMF data. 2. *; **; ***, respectively, refer to statistical significance levels at 10, 5 and 1%.

Table 6: Cyclicality of fiscal Policy in Arab Oil Economies and Comparators (1990-2012)

	Revenue	Expenditure	Fiscal Balance
Populous Oil Arab Economies:			
Algeria	0.40**	-0.18**	0.14**
Sudan	0.30**	NS	0.08**
Yemen	0.50**	NS	0.08**
GCC Economies:			
Oman	0.34**	-0.30**	0.18**
Saudi Arabia	0.75**	-0.34**	0.18**
UAE	0.32**	-0.49**	0.16**
Comparator Economies:			
Chile	0.17**	NS	NS
Norway	0.09**	-0.20**	0.16**

Notes: 1. Source: Appendix Table 6.A. 2. (**): significance levels at 5%. 3. NS stands for not significant.

Table 7A: Determinants of fiscal balance Countercyclicality

	Model 1		Model 2		Model 3		Model 4	
	Coef	t-Statistic	Coef	t-statistic	Coef	t-statistic	Coef	t-statistic
1. Oil rent per capita ($x10^3$)	0.0034*	(1.92)	0.0146**	(3.6)	0.014**	(4.46)	-0.012**	(-2.1)
2. Oil rent per capita^2 ($x10^6$)			-0.000342**	(-3.0)	-0.00033**	(-3.7)	-	-
3. Reserve								
4. ICRG	0.0033**	(4.9)	0.00198**	(2.07)	0.00197**	(2.92)	0.0398**	(4.9)
5. SFI	0.032	(0.4)	-0.024	(-0.23)	-	-	-	-
6. Exchange rate dummies	0.01	(0.32)	0.009	(0.21)	-	-	-	-
Intermediary	-0.015	(-0.64)	0.0013	(0.07)	0.0013	(0.07)	-0.03	(-1.28)
Float	0.013	(0.56)	0.0353	(1.63)	0.034*	(1.88)	-0.0086	(-0.5)
7. Cross Effects								
ICRG* Oil Rentpc ($x10^3$)							0.0211**	(2.3)
Constant	0.028	(0.55)	0.034	(0.6)	0.027	(1.47)	0.062**	(3.3)
R^2	0.46		0.57		0.57		0.51	
Observations	24		24		24		24	

Notes: Flexible exchange rate regime (reference).**, * 5% and 10% significance level.

Table 7B: Determinants of Expenditure Cyclicality

	Model 1		Model 2		Model 3	
	Coef	t-statistic	Coef	t-statistic	Coef	t-Statistic
1. Oil rent per capita ($x10^3$)	-0.00418*	(1.76)	-0.0137**	(-2.12)	0.0298**	(2.21)
2. Oil rent per capita^2 ($x10^6$)	-	-	0.000351*	(1.86)	-	-
3. Reserve						
4. ICRG	-0.00477**	(-2.45)	-0.00418**	(-2.11)	-0.0072**	(-3.2)
	-	-	-	-	-	-
5. SFI	-	-	-	-	0.0167	(0.39)
6. Exchange rate dummies						
Intermediary	-	-	0.033	(0.7)	0.083	(1.61)
Float	-	-	0.044	(1.23)	0.107**	(2.81)
Cross Effects						
ICRG* Oil Rentpc ($x10^3$)					-0.0437**	(-2.34)
Constant	-0.07**	(-2.20)	-0.15484		-0.131**	(-3.2)
R^2	0.34		0.33		0.37	
Observations	24		24		24	

Notes: Flexible exchange rate regime (reference). **, * 5% and 10% significance level.

Appendix

Table 6A: Cyclicality of Fiscal Variable to Oil Price Index (Model of equation 6)

Country	Revenue	Expenditure	Fiscal Balance
Algeria	0,397**	-0,183**	0,140**
Angola	0,704**	0,239*	0,119**
Azerbaijan	0,307**	-0,153	0,087*
Argentina	0,027	-0,095	0,016
Australia	-0,031	-0,086**	0,0115
Bahrain	0,39**	-0,061	0,097**
Belgium	0,017	-0,339**	0,0512
Belorussia	-0,01	-0,033	0,0117
Brazil	-0,028	-0,124**	0,0187
Canada	-0,018	-0,107**	0,0765**
Chile	0,17**	-0,084	0,0337
Colombia	-0,01	-0,103**	-0,0051
Congo republic	0,468**	-0,275**	0,167**
Denmark	-0,002	-0,094**	0,0639**
Ecuador	0,392**	0,11	0,0328*
Equatorial Guinea	-0,109	-0,315**	0,148**
France	0,0198	-0,044**	0,0263*
Gabon	-0,05	-0,496**	0,154**
Germany	-0,012	-0,126**	0,027
India	0,0435	-0,0713	0,0014
Indonesia	0,113	-0,047	0,0162
Iran	0,289**	-0,081	0,104**
Iraq	0,401**	-0,177	0,058
Italy	-0,021	-0,053**	0,053**
Japan	0,07**	-0,048	-0,029
Kazakhstan	0,109	0,073	0,084**
Kuwait	0,072	-0,166	0,138**
Libya	0,296**	-0,196*	0,2**
Malaysia	-0,031	-0,041	-0,031
Mexico	0,185**	0,0283	0,005
Netherlands	0,0445**	-0,096**	0,045*
Nigeria	0,599**	-0,178	0,165**
Norway	0,0875**	-0,198**	0,159**
Oman	0,343**	-0,295**	0,178**
Qatar	-0,03	-0,2**	0,102**
Russia	0,167**	-0,324**	0,106**
Saudia Arabia	0,752**	-0,339**	0,179**
Singapore	0,258**	-0,132	0,053
South Korea	0,075*	-0,096**	0,02*
Spain	0,024	-0,076**	0,052
Sudan	0,297**	0,121	0,084**
Sweden	0,024	-0,066*	0,069**
Syria	-0,14	-0,162**	0,0152
Thailand	0,092*	-0,263**	0,036
Trinidad & Tobago	0,396**	-0,24**	0,091**
UAE	0,324**	-0,489**	0,163**
United Kingdom	0,053**	-0,079**	0,0465
USA	0,0396	-0,058*	0,0331
Venezuela	0,466**	0,001	0,081**
Vietnam	0,075	-0,153**	0,0317*
Yemen	0,498**	-0,069	0,0835**
Mean	**0,397****	**-0,127****	**0,07****
Test of Parameter homogeneity	$\chi^2(102) = 412.4$ P=0.00	$\chi^2(102) = 156.61$ P=0.00	$\chi^2(102) = 1514.3$ P=0.00

Notes: Model I corresponds to the value β of the regression d(ln(Fiscal variable))=α+β*d(ln(Oil price index)), where Fiscal variable corresponds to government revenues or government expenditures. For fiscal balance, the model is Fiscal variable=α+β*d(ln(Oil price index)). The estimation procedure is the GLS Random Coefficients Models. The Oil Price Index is for the Crude Oil Brendt. (**);(*), significance levels at 5% and 10% respectively.

Table 6B: Cyclicality of Fiscal Variable to Oil Price Index (1990-2012: model of equation 8)

	Revenue		Fiscal Balance	
Country	**Elasticity**	**Output Gap**	**Elasticity**	**Output Gap**
Algeria	0,432**	-0,82	0,206**	0,426**
Angola	0,35**		0,174**	ns
Azerbaijan	0,233**		0,0727	ns
Argentina	-0,01		0,017	0,417**
Australia	-0,006		0,007	0,58**
Bahrain	0,39**	-0,713	0,111**	0,489**
Belgium	0,163**		-0,037	0,85**
Belorussia	0,025	-0,6	0,012	ns
Brazil	-0,026		0,049**	ns
Canada	0,0085		-0,023	0,86**
Chile	0,138*		0,105**	0,44**
Colombia	0,328		0,048**	ns
Congo republic	0,329**		0,170**	ns
Denmark	0,008	-0,463	0,0167	1,01**
Ecuador	0,363**		0,08**	ns
Equatorial Guinea	0,03	0,45**	0,171**	0,269**
France	0,0545		-0,01	0,847**
Gabon	0,129		0,160**	ns
Germany	-0,001		0,032	0,426**
India	0,096		0,031*	0,326**
Indonesia	0,149		0,02*	0,105**
Iran	0,167		0,108**	ns
Iraq	0,198*		0,138**	0,44*
Italy	0,061		-0,005	0,655**
Japan	0,08**		0,06	0,519**
Kazakhstan	0,07		0,0914*	ns
Kuwait	-0,019	0,6**	0,235**	ns
Libya	0,3**		0,416**	0,437*
Malaysia	0,13		-0,042	0,52**
Mexico	0,223**		0,05**	ns
Netherlands	0,0486**		0,041	0,795**
Nigeria	0,227**		0,237**	0,317**
Norway	0,074**		0,158**	0,590**
Oman	0,214**		0,255**	ns
Qatar	0,071		0,062	ns
Russia	0,316**	-0,524	0,153**	0,306**
Saudia Arabia	0,364**		0,38**	0,958**
Singapore	0,221**	1,27**	0,086**	0,42**
South Korea	0,123*		0,0174	ns
Spain	0,02		0,008	0,85**
Sudan	0,18		-0,058	0,062
Sweden	0,01		-0,009	1,02**
Syria	-0,069		-0,005	-0,104
Thailand	0,094		0,056*	0,393**
Trinidad & Tobago	0,312**		0,188**	0,235**
UAE	0,358**		0,294**	0,51**
United Kingdom	-0,0135	0,6**	-0,01	0,82**
USA	0,0124		-0,041	1,21**
Venezuela	0,358**	-1,02	0,117**	ns
Vietnam	0,09		0,031	0,71**
Yemen	0,36**		0,103**	ns
Mean	**0,146****		**0,088****	
Test of Parameter homogeneity	$\chi^2(102) = 246.85$ P=0.00		$\chi^2(102) = 2311.6$ P=0.00	

Notes: Model II corresponds to the value β of the regression d(ln(Fiscal variable))=α+β*(Cyclical Oil price index)+ γ (output Gap), where Fiscal variable corresponds to the levels of government revenues or government expenditures,expressed as a share of GDP. Cyclical Oil Price is the cyclical component of Oil Price and Output gap is the cyclical component of ln(GDP). For fiscal Balance, the model II is Fiscal variable=α+β*(Cyclical Oil price index)+ γ (output Gap).The estimation procedure is the GLS Random Coefficients Models for all the sample based on an unbalanced panel data of 52 countries covering the period 1990-2012. The Oil Price Index is for the Crude Oil Brendt. (**);(*), significance levels at 5% and 10% respectively.