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SOVEREIGN WEALTH FUNDS
AND MACROECONOMIC STABILIZATION
IN THE HOME ECONOMY

Ibrahim El Badawi, Raimundo Soto
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Send correspondence to:

Hoda Youssef

The World Bank

[hyoussef@worldbank.org](mailto:hyousssef@worldbank.org)

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Abstract

The analysis of this paper suggests that SWFs have a robust stabilizing role against fiscal procyclicality and have also been a strong contributor to the sustainability of fiscal balance. Also, other fiscal institutions, such as revenue, expenditure and debt rules, were found to be associated with fiscal stabilization, though with a lesser degree of robustness. Our policy recommendation is, therefore, for emerging countries to consider the enactment of a SWF as an important institution that would bring both stabilization capabilities and an additional source of resources to improve the sustainability of fiscal policies. We also recommend to consider in the design of a SWF the reinforcing role of certain fiscal rules (either based on limiting the public debt or the expansion of expenditures). In this context, we highlight the case of the GCC countries, which despite their highly-endowed SWFs will likely need to consider adopting some fiscal rules in order to support the stabilizing role of the SWFs, especially under the new “normal” of expected relatively long-term low prices of oil and other commodities.

JEL Classifications: E00, E62, E42, E32

Keywords: sovereign wealth funds (SWFs), resource-dependence, cyclical fiscal policy, public expenditure, fiscal balance, emerging countries, GCC

ملخص

تشير هذه الورقة في تحليلها إلى أن صناديق الثروة السيادية تلعب دوراً قوياً في تحقيق الاستقرار ضد التقلبات المالية العامة، كما أنها تساهم مساهمة قوية في استدامة التوازن المالي. تبين الورقة أن المؤسسات المالية الأخرى، المعنية بالإيرادات والنفقات وقواعد الدين، هي أيضاً لها علاقة بالاستقرار المالي، ولكن بدرجة أقل من المتانة مقارنة بصناديق الثروة السيادية. ولذلك، فإن الورقة توصي، فيما يتعلق بالسياسة العامة، أن تنظر البلدان الناشئة في سن تشريعات لصندوق سيادي كمؤسسة مهمة لتحقيق إمكانات الاستقرار وكمصدر إضافي للموارد لتحسين استدامة السياسات المالية. وتوصي الورقة أيضاً أن يراعى في تصميم صندوق الثروة السيادية لدوره المعزز لبعض قواعد المالية العامة (إما استناداً إلى الحد من الدين العام أو توسيع النفقات). في هذا السياق، تلقي الورقة الضوء على حالة دول مجلس التعاون الخليجي، والتي تتمتع بوفرة في صناديق الثروة السيادية بها، إلا إنها ستحتاج على الأرجح إلى النظر في اعتماد بعض القواعد المالية من أجل دعم دور صناديق الثروة السيادية في الاستقرار، وخاصة في ظل "الوضع الطبيعي" الجديد الذي من المتوقع أن يشهد استمرار انخفاض أسعار النفط والسلع الأخرى على المدى الطويل نسبياً.

1. Introduction

While Sovereign Wealth Funds (SWFs) have existed since the middle of the twentieth century, their notoriety has increased substantially over the past 20 years as a result of their dramatic accumulation of assets. In 2000, SWFs held about US\$1 trillion, against a total estimated at over US\$7 trillion in 2015. More than 50 countries have now one or more of these funds, up from only 6 countries in 1990 (Amar, 2016).

Sovereign wealth funds are state-owned investment vehicles that invest globally in various types of assets.¹ Unlike central banks, which focus more on liquidity and safe-keeping of foreign reserves, most SWFs have the mandate to enhance returns and are allowed to invest in riskier asset classes, including equity and alternative assets, such as properties, hedge funds and commodities (Fernandez and Eschweiler, 2008). Unlike pension funds, SWFs are not financed with contributions from pensioners and do not have a stream of liabilities committed to individual citizens.

The inception of most SWFs, nevertheless, is not linked to financial or political motivations but the primary result of macroeconomic considerations: wealth funds might seem an excellent opportunity for nations with high variance in public revenues to ensure steady cash flow levels and provide resources for long-term investments (Bortolotti et al, 2014). For example, countries relying on commodity trade could avoid the pervasive effects of the fiscal procyclicality² induced by volatile commodity prices and of Dutch disease. Emerging countries without a fund to direct investments could squander short-lived windfalls from natural resources to the detriment of future generations. It is somewhat surprising, therefore, that the macroeconomic impact of SWFs in the home economy has not been studied in depth. In particular, in countries that were pioneers in implementing this type of foreign holdings and that currently hold the largest fraction of assets, such as the GCC economies (Bahrein, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates).

In this paper we focus on macroeconomic stabilization and assess whether SWFs have helped in improving the fiscal stance of the home economies. We use a large panel of around 120 countries in the period 1985-2015 to determine whether SWFs help improving the fiscal balance and reducing the procyclicality of government expenditures and of fiscal balances. Protracted fiscal imbalances and procyclicality have been often indicated as justifications for the setting up of SWFs, particularly stabilization funds. Sovereign funds can ameliorate these problems by acting as a shock absorber during episodes of commodity price shocks. This happened, for example, in the 2000s when high commodity prices –particularly oil prices— resulted in large current account surpluses for exporting countries and induced both the creation of several SWFs and an increase in the assets of the existing ones. In contrast, the recent drop in oil prices is likely to lead to a decline in the rate of asset accumulation by SWFs of oil-exporting countries, depending on their fiscal and external accounts.

Our methodological approach is based on the notion that the impact of fiscal institutions on different measures of the fiscal stance can be casted as the study of whether a treatment (in our case, implementing a SWF) has had any discernible effect on fiscal outcomes. We view the implementation of a SWF as a once-and-for-all event with the potential to cause permanent improvements in fiscal imbalances and/or a permanent reduction in fiscal procyclicality.

¹ According to Megginson and Fotak (2015), there is no consensus, in either the academic or practitioner literature, on exactly what constitutes a sovereign wealth fund. Funds in the SWF category, differ with respect to organizational structure (separately-incorporated holding companies versus pure state ministries), investment objectives (preservation of wealth versus wealth diversification and growth), compensation policies and status of fund managers (incentivized professionals versus fixed wage bureaucrats), and degree of financial transparency.

² A procyclical fiscal policy is defined as the case where governments increase spending (or cut taxes) during periods of expansion and cut spending (or raised taxes) during periods of recession.

Obtaining causal effects from observational data is, nevertheless, difficult as it depends crucially on the validity of the implicit or explicit identification assumptions particular to the empirical approach used. This would indicate the need of controlling for potential endogeneity of the treatment. Furthermore, modelling the treatment is not straightforward as it requires separating the determinants of fiscal outcomes from those that led to the enactment of the SWF, thus controlling from reverse causality and endogeneity issues. We use a two-step methodology. First, we deal with the endogeneity of SWF and other fiscal institutions –such as fiscal rules and fiscal councils—by creating a set of suitable instruments. Second, we use these instruments to estimate the average treatment effect of implementing a SWF on the fiscal stance, after controlling for a number of confounding factors, the embedded dynamics of the phenomenon, and the intrinsic characteristics of each country (individual effects).

The rest of the paper is organized as follows. Section 2 presents an overview of the literature on the potentially stabilizing role of SWFs, the determinants of the decision to set up a fund, especially in resource-rich countries, and the effectiveness of this fiscal institution in achieving fiscal stability. Section 3 briefly discusses the determinants and measurement issues regarding fiscal procyclicality: although there is consensus on the notion of fiscal procyclicality, its measurement remains controversial on two areas. One is the appropriate fiscal outcome to be included, whether it is government spending, government consumption, or the budget balance. The other is the scope of the public sector to be considered: consolidated public sector spending, general government, or central government. Section 4 presents the methodological framework which basically deals with the potential endogeneity of SWF and other fiscal institutions to the fiscal stance and quantifying the partial contribution of the SWFs effects on fiscal outcomes as measured by the difference between “treated” (countries with SWFs) and “control” group (countries that do not have SWFs). Section 5 discusses the estimation results for the two sets of econometric models we employ: panel probit models to generate the instruments of SWFs and other fiscal institutions and diff-in-diff dynamic, panel models to evaluate the role of SWF and other fiscal institutions on procyclicality of government expenditures and fiscal balances, as well as the fiscal stance. Section 6 draws some implications of the results on the Gulf Cooperation Council (GCC) countries, which have been among the leaders as owners of some of the largest SWFs. Section 7 collects the main conclusions and policy implications.

2. SWFs and Macroeconomic Stabilization

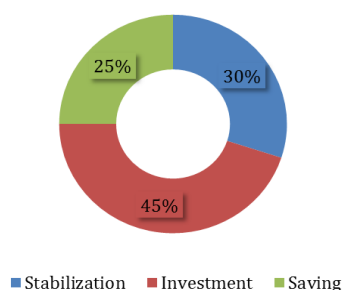
SWFs are a heterogeneous group and may serve various purposes (IMF, 2008). Five types of SWFs can be distinguished based on their main objective: (i) stabilization funds, where the primary objective is to insulate the budget and the economy against transient phenomena such as commodity price swings; (ii) savings funds for future generations, which aim to convert nonrenewable assets into a more diversified portfolio of assets; (iii) reserve investment corporations, which are established to increase the return on reserves; (iv) development funds, which typically help fund socio-economic projects or promote industrial policies that raise a country’s potential output growth; and (v) contingent pension reserve funds, which provide (from sources other than individual pension contributions) for contingent unspecified pension liabilities on the government’s balance sheet. While the analytical taxonomy is clear, in practice SWFs can have more than one mandate and, in certain occasions, resources can be used for purposes other than those expressed in their inception: when discussing Kuwait’s pioneering experience with SWFs, Shehabi (2015) notes that *“the law does not permit any governmental body to either reduce the investment rates or withdraw any amount from the Future Generations Fund except in extreme circumstances and with the approval of the National*

Assembly and the government. The Gulf War was the first of these extreme circumstances (page 25).’’³

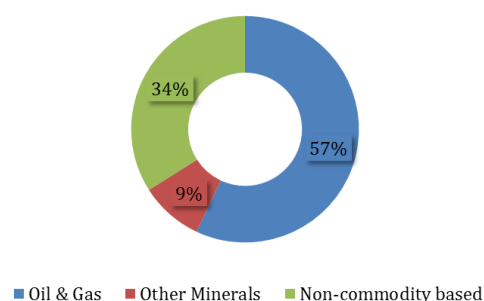
The vast majority of SWFs are commodity based (over 65%), in particular oil and gas. As shown in Figure 1, around one half of the SWFs are for saving purposes (those in categories ii, iii and v above) and one third are for stabilization. Certainly, one reason for the rapid growth in the number of SWFs was the commodity price boom of the 2000s which substantially increased the sovereign asset holdings of commodity-exporting countries. Another factor is the accumulation of large international reserves by many emerging countries as a result of persistent current account surpluses and the subsequent desire to diversify these reserves into higher-yielding assets. But despite the growing number, SWFs assets remain concentrated in only a few of them. In 2016, the top five funds were home to around 50% of all assets and the top ten held almost 75%.

Figure 1. SWFs by Type and Origin of Funds in 2015

Panel A: SWF by Type



Panel B: SWF by Origin of Funds



Source: own elaboration based on data from SWFI (2017)

According to the IMF (2008), SWF have potential effects on at least four areas of interest: fiscal policy, monetary policy, balance sheet implications, and external stability. First, SWFs can facilitate fiscal stabilization, and/or the saving of fiscal resources for long-term purposes. They can also introduce more professional and comprehensive investment and risk management frameworks, and enhance the transparency and accountability in the management of government financial assets.⁴ Second, SWFs can also affect monetary policy as, in some circumstances, the activities of SWFs could have a bearing on the exchange rate as investment abroad, followed by the repatriation of returns, involves currency transactions. If SWFs have discretion over whether they invest domestically or abroad, then decisions over investments will require careful coordination with the monetary authorities. Third, one of the motives for setting up an SWF is to enable better management of the public-sector balance sheet and to ensure that the asset management strategy of the SWF is consistent with an economy's underlying macro-fiscal objectives, while taking into account associated risks. The objectives of an SWF should have implications for its investment policy and asset management strategy.

³ As Mohaddes and Raissi (2017) explain, since 1976 the Kuwaiti government has by law transferred a minimum of 10 percent of all state revenues to the Future Generation Fund (FGF). However, with oil prices having been high for almost a decade it was announced in March 2013, following an Amir budgetary decree, that the minimum contribution is to be increased to 25 percent. But the following year oil prices fell sharply and remained low, and so the decision was reversed and the contribution to the FGF was cut back to 10 percent from fiscal year 2015/16 onwards. Note also that the government can dip into the General Reserves Fund (i.e. the component of the SWF which the fiscal authorities have control over) whenever they want.

⁴ SWFs may also pose fiscal risks when poorly managed. International experience has shown that oil funds with rigid operational rules and the authority to spend independently, or those that are involved in quasi-fiscal activities (including on-lending) have led to a fragmentation of the budget process. This has potential negative implications for the efficiency (and transparency) of resource allocation and cash management, in particular when control and monitoring mechanisms are weak (see Truman, 2010).

For instance, stabilization funds, which serve short- to medium-term objectives, are normally expected to be more conservative in their strategic asset allocation, using shorter investment horizons and low risk-return profiles. By contrast, SWFs with long-term objectives typically are expected to aim at generating higher returns over a long-time horizon, and effectively have higher risk profiles.⁵ SWFs with objectives to hedge against country-specific risks may hold assets with negative correlation to the country's major exports. Fourth, SWFs may also have important implications for the assessment of members' external stability both in the current and capital account. These are relevant for both the surveillance of countries with SWFs and for countries that receive large SWF inflows.

Some of these areas of SWF influence can also be potentially connected. It has become common wisdom that having a counter-cyclical fiscal policy and a credible exchange rate regime (especially if it is pegged) are interconnected objectives. On one hand, the choice of a fixed exchange rate regime may exert an alleviating effect on fiscal procyclicality. Countries under pegged regimes relinquish the use of monetary policy as a stabilization tool (particularly, when capital accounts are relatively open), which ought to put binding constraints on authorities when enacting fiscal policies; responsible authorities would eschew a pro-cyclical behavior during booms as a loose fiscal policy could threaten the peg. This is particularly true for resource-rich countries as they are exposed to large and volatile foreign exchange in flows. In countries with a managed float this incentive is notoriously absent. On the other hand, procyclicality of fiscal policy also affects the choice of exchange rate regime, as countries with pro-cyclical fiscal policies are less likely to adopt a fixed exchange rate regime due to the difficulty in this case of maintaining exchange rate stability.

The decision to set up a SWF⁶, especially in resource-rich countries, is also likely to be driven by similar common factors. First, there is the need to break the link between resources windfalls and government expenditures that exacerbates the boom and bust cycles. Theoretically, a smoother fiscal policy can be obtained by saving these windfalls in a fund. Additionally, the decision to establish a SWF may be due to excess reserves being accumulated during good times which make harder the management of inflexible exchange rate regimes. However, this may not be necessarily the case in practice, either due to the institutional set up of these funds, weak adherence to established rules, or for political economy considerations. For instance, the rapid accumulation of assets may lead to political pressures for increased government spending of the commodity revenues, which renders fiscal restraint more difficult. Moreover, even in cases where SWFs are associated with better fiscal outcomes, it is still unclear what the direction of causality is. In other words, do countries with prudent fiscal policies tend to establish SWFs, or is it rather the case that SWFs help in adopting a counter-cyclical fiscal policy? Last but not least, it has been frequently reminded that SWFs are not – and should not be treated as – a substitute for overall soundness of fiscal policy.

The effectiveness of sovereign funds in achieving fiscal stability has been assessed in the existing literature using both econometric evidence and country case studies. Fasano (2000) investigates whether stabilizations funds have contributed to enhance the effectiveness of fiscal policy in selected countries. He finds that, in Kuwait, Norway and the State of Alaska, funds succeeded in making the budget expenditures less driven by revenues availability. However, these funds have been less successful in other countries (Oman and Venezuela) because of frequent changes of funds rules and deviation from its intended purposes. He concludes that

⁵ Available data however seems to indicate that SWFs are made up by a large proportion of “risky investments” as on average 65% of the SWF assets are held in public and private equities (61% Norway; 72% SAMA; 65% Kuwait; 68% Qatar; 62% Abu Dhabi—figures based on 2014). See Mohaddes and Pesaran (2017) for more details.

⁶ See Bacon and Tordo (2006) for information on the early creation of 15 resource-based funds, the legislation used, the details of their organization and management, and their financial performance.

the success of these funds can be more attributed to the strong commitment to fiscal discipline and the sound macroeconomic management.

Other studies have tried to understand how SWFs may reduce expenditure volatility. Le Borgne and Medas (2007) investigate their role in protecting the budget from high revenue volatility and strengthening fiscal prospects in Pacific Island countries. They find that the funds do not seem to have had a clear impact on expenditure volatility, their effectiveness being hampered by lack of integration with the budget, institutional weaknesses, and inadequate controls. Their qualitative assessment indicates that countries that have successfully contained expenditure volatility have done so based on sound fiscal policies. More recently, Sugawara (2014) used a panel data set of 68 resource-rich countries to test whether SWFs help reducing expenditure volatility. His findings confirm lower volatility in countries that have stabilization funds, suggesting that the existence of funds contributes to smoothing government expenditure. Coutinho et al. (2013) study the experience of around 80 resource-rich economies and argue that SWF tend to dampen the pro-cyclicality of government consumption more than fiscal rules. Koh (2016) illustrates that fiscal policy becomes more counter-cyclical after the establishment of oil funds, and that these funds are typically associated with smoother government consumption. Finally, Mohaddes and Raissi (2017) inspect a sample of 69 commodity-dependent countries and show that having a SWF can mitigate the negative growth effects of commodity price volatility, especially in countries that enjoy higher-quality institutions (and hence less pro-cyclical fiscal policies). While they do not explicitly model the impact of fiscal pro-cyclicality, they argue that countries with weak political institutions are more prone to wasteful spending and pro-cyclical policies.

Still, the empirical evidence on the impact of SWFs on fiscal procyclicality is limited, in particular for oil and natural gas exporters which may behave differently than mineral exporters. Despite a growing literature showing a widespread procyclicality of fiscal policy, especially in developing countries⁷, we still don't know much on the potential role of stabilization and saving funds in overcoming it. Going beyond the identification of fiscal procyclicality, previous studies have attempted to investigate the issue of overcoming procyclicality. For example, Calderón et al. (2016) empirically evaluate whether the ability of countries to conduct countercyclical fiscal policy is affected by the quality of their institutions and/or by the availability of financial resources either in domestic or international capital markets. Their study confirms the role of these two factors in countries' inability to conduct countercyclical fiscal policies but suggest that institutional factors have a larger weight than financial variables in explaining the differences in cyclical behavior of fiscal policy between industrial and developing countries.

Along the same lines, Frankel et al (2013) investigate the determinants of graduation from procyclicality, and find that a key determinant in countries' ability to graduate lies in the quality of institutions. In their paper, they measure institutional quality by constructing an index comprising of four variables: investment profile, corruption, the strength and impartiality of the legal system and the bureaucratic quality.

The empirical literature has also given special attention to resource-rich economies. For instance, a case study by Bjørnland and Thorsrud (2015) on Norway explores if the adoption of a fiscal rule insulates the domestic economy from commodity price fluctuations. In this context, oil windfalls are first saved in a SWF for then to be spent following a fiscal rule. They find that fiscal policy has been more (not less) procyclical with commodity prices since the adoption of the rule in 2001, and that the stabilization fund has not led to a countercyclical behavior. They attribute this to the design of the fiscal rule and suggest that withdrawal of a

⁷ See Villafuerte et al. (2010); Ilzetzki and Vegh (2008); Alesina et al. (2008) and Kaminsky et al. (2004)

fixed percentage of a growing fund each year is not sufficiently countercyclical over the commodity price cycle.

To summarize, the literature seems to suggest that having a stabilization fund in itself does not guarantee a better management of fiscal policy, but rather that the rules on accumulation and withdrawal and the institutional arrangement play a major role. We build on the thin existing literature and extend the analysis to investigate the potential role of SWFs and their governance in promoting countercyclical fiscal policy, and in countries' graduation from procyclicality. We investigate whether there is a difference between resource-rich countries and non-resource-rich countries in the procyclicality of fiscal policy and whether the existence of a SWF helps overcoming it.

3. Fiscal procyclicality: determinants and measurement

In a pioneering paper, Gavin and Perotti (1997) provided evidence that fiscal policy in Latin American countries had been highly procyclical, i.e., that governments have typically cut taxes and increased spending during booms while they have retrenched outlays and implemented tax hikes during busts. This would imply that fiscal policy has a destabilizing effect over the business cycle. Fiscal procyclicality is not limited to Latin American economies: Frankel et al. (2013) found that more than 90% of developing countries show procyclical government spending during 1960–2009. They also found that, on the contrary, 80% of industrial countries exhibit countercyclical government spending.

A second defining characteristic of fiscal procyclicality is that it tends to occur more often and more forcefully in countries where natural resource rents are more important in government budgets, in particular in oil exporting countries. As shown in Figure 2, there is a positive yet noisy correlation between natural resource rents⁸ and procyclicality of government expenditures⁹. A number of hypotheses have been advanced to explain this dissimilar behavior, which we explore below.

Although there is consensus on the notion of fiscal procyclicality, its measurement remains more controversial. Most studies utilize government spending or government consumption as a proxy for fiscal policy (Talvi and Végh, 2005; Frankel et al., 2013), whereas others utilize budget balance (Gavin and Perotti, 1997; Aghion and Marinescu, 2007) or the cyclically-adjusted budget balance (Galí et al., 2003; Huart, 2011).

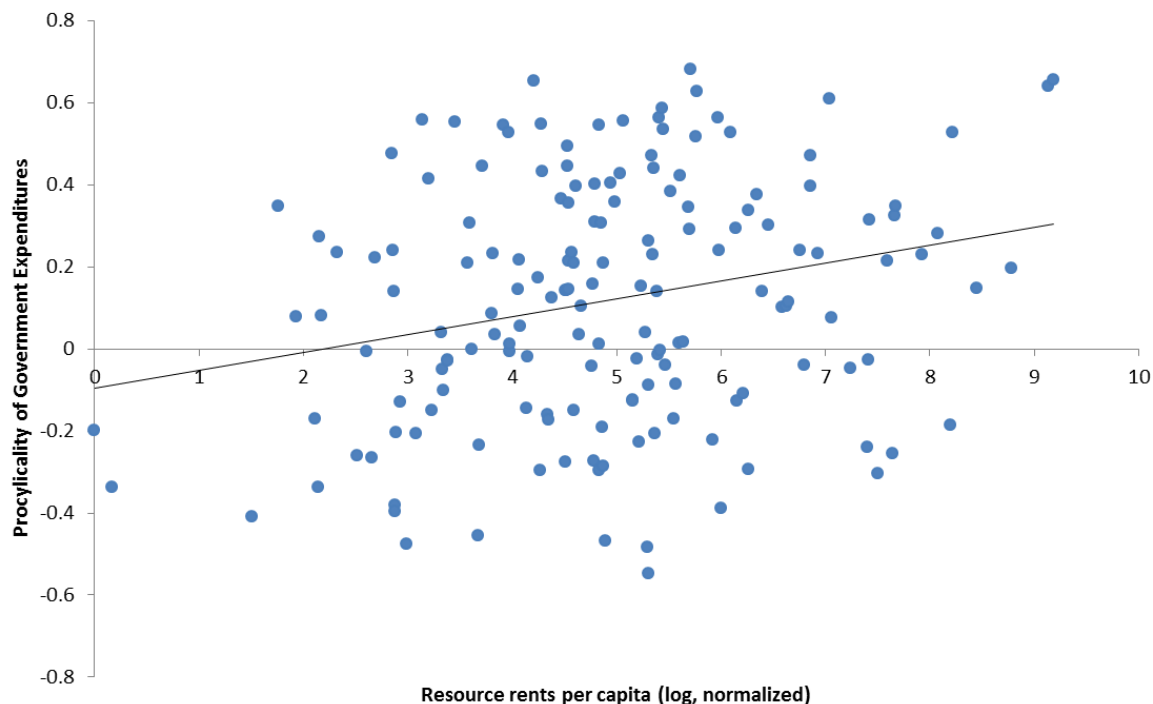
Clearly, the consolidated public sector spending ought to be the preferred measure of fiscal policy as it is comprehensive and largely under the control of the authorities. Unfortunately, time series data at the country level are mostly unavailable, in particular for emerging economies where procyclicality is pervasive. General government spending is a more limited but still representative measure of fiscal policy and systematic measurements tend to be more easily available on an annual basis. Government consumption is not a good proxy as it excludes capital outlays which are usually highly volatile. Tax revenue, which depends on both tax rates and the tax base, cannot be considered as an appropriate proxy for fiscal cyclicity because the tax base is positively associated with the business cycle (Kaminsky et al., 2004). The budget balance may indicate the effects of fiscal policy on savings and demand, but it reflects less appropriately the discretionary actions of policymakers. The cyclically-adjusted budget balance could be a possibly better proxy for fiscal policy in the sense that it excludes the cyclical component of the budget balance, but it is highly dependent on data availability and

⁸ Natural resource rents (as percent of GDP) are computed by the World Bank as extraction on natural resources times the spread between international prices and extraction costs.

⁹ Procyclicality is computed as the rolling correlation of the cycle in government expenditures and the cycle of GDP, and the cycle of the fiscal balance and the cycle of GDP.

the measurement methods used to estimate potential GDP (Mackiewicz, 2008). Therefore, in this paper we use both government spending and fiscal balances as a proxy for fiscal policy.

Figure 2. Procyclicality in Government Expenditures and Resource Rents, 1980-2015



We focus on two measures of the cyclicity of fiscal policy: (a) the correlation between the cyclical components of real government expenditure and real GDP and (b) the correlation between the cyclical components of real government balance and GDP. In the first case a positive (negative) correlation reflects pro-cyclical (counter-cyclical) fiscal policy; in the latter case, it is the opposite. We de-trend all variables using a bandpass filter (Hodrick and Prescott, 1997) and then compute ten-year rolling correlations of the cyclical components of government expenditure and GDP.¹⁰ We also study the role of SWFs on fiscal balance (as percent of GDP) to complement our analysis. Therefore, this study focuses on three fiscal policy performance measures as key endogenous variables. Our basic hypothesis is that having a sovereign wealth funds in place is likely to improve fiscal performance, reflected in lower fiscal policy procyclicality and improved fiscal balance.

The literature on the determinants of fiscal procyclicality is vast but it can be grouped in two main strands. One is related to the *borrowing constraints faced by governments* which arise from imperfection of capital markets (Gavin and Perotti, 1997; Riascos and Végh, 2003). Procyclicality would occur when governments cannot borrow in the international capital market in bad times to finance an expansionary fiscal policy. This would explain the situation of developing countries persuasively during downturns, but it has been criticized on the grounds that it cannot explain why these countries do not prepare by accumulating reserves in booms (Alesina et al., 2008; Ilzetzki, 2011). Econometric evidence supporting this view is also weak (Woo, 2009). The other strand of the literature focuses on *political economy determinants*. Tornell and Lane (1999) argue that spending could grow in excess of income if multiple power groups compete for fiscal revenues since the intensity of fiscal competition increases during times of bonanza (“the voracity effect”). Alesina et al. (2008) show that

¹⁰ Using five-year rolling regressions does not affect the qualitative results but lowers somewhat the statistical significance of our estimates.

corrupt governments could appropriate part of tax revenue for political rents. When voters face corrupt governments, they require more benefit from tax cuts or increases in spending when the economy is in good times, fearing that otherwise the government would appropriate more rents. Ilzetzki (2011) suggests an explanation based on political frictions between incumbent and successive governments, whereby the incumbent government wants to allocate more benefits to its own constituency when available. Woo (2009) shows that the social polarization of preferences over fiscal spending could make fiscal policy procyclical.

4. Methodology

From a methodological viewpoint, unveiling the impact of SWF on the fiscal stance can be casted as the study of whether a treatment (implementing a SWF) has had any discernible effect on fiscal outcomes, which we denote by P_{it} . A general model would be of the form:

$$(1) P_{it} = f(\alpha_i, x_{it}, D_{it}, P_{it-1})$$

where parameter α_i reflects cross sectional heterogeneity (i.e., individual effects), x_{it} is the set of fundamentals –other than SWF—that determine fiscal outcomes and D_{it} denotes the implementation of a SWF. The presence of P_{it-1} indicates the dynamic nature of our models which aimed to capture the inertia effect, deemed to be a significant characteristic of fiscal variables.

Obtaining causal effects from observational data is, nevertheless, difficult as it depends crucially on the validity of the implicit or explicit identification assumptions particular to the empirical approach used. As noted by Jordá and Taylor (2016), the divergence of results in fiscal policy analysis could be attributed to poor identification conditions and, indeed, much of the variation in results is the consequence of endogenous factors being either ignored or mishandled by the econometrician. In the context of panel data, this would indicate the need of controlling for potential endogeneity of the treatment. Furthermore, modelling the treatment is not as straightforward as it might seem as it requires separating the determinants of fiscal outcomes from those that led to the enactment of the SWF. In what follows we first address the issue of the modelling strategy for the treatment (i.e., the implementation of the SWF) and, then, the issue of the potential endogeneity of the controls being used to model fiscal outcomes.

4.1 Treatment Effects

In principle, the analysis of the effects of policy variables on variables of interest ought to consider the intensity of such policies by using continuous variables. The imposition of a SWF as well as any other fiscal rules, on the contrary, can be viewed as a once-and-for-all event (under the assumption that such rule does not change in time). In this context it seems appropriate to use a dummy variable (D_{it}) taking value 1 whenever the rule is in place and zero otherwise. We further assume that such policy is determined by $D_{it} = D(w_{it}, \psi_i, \varepsilon_{it})$ where w_{it} is the conditioning set (historical data) and ψ_i refers to the parameters of the implied policy function in country i and ε_t is an idiosyncratic source of random variation. Therefore, $D(w_{it}, \psi_i, \cdot)$ refers to the systematic component of policy determination.

Following Angrist et al. (2013) we define the potential outcomes of a policy as given by $P_{i,t+h}(D_{it}) - P_{i,t}$, i.e., where $P_{i,t}$ is the value that the observed outcome variable and $P_{i,t+h}$ is the value it would take when the rule is not enacted ($D_{it} = 0$) and when it is ($D_{it} = 1$). Therefore, the difference $P_{i,t+h} - P_{i,t}$ refers to the cumulative change in the outcome from t to $t+h$.

Consider now expressing equation (1) in linear form:

$$(2) P_{it} = \alpha_i + \beta_i x_{it} + \theta D_{it} + \gamma P_{it-1} + u_{it}$$

Standard panel data estimators, such as the pooled or fixed effects models, are inappropriate to parameterize equation (2) since there would be correlation between the individual effect and the error term. Nickell (1981) shows that this arises because the demeaning process which subtracts the individual's mean value of P_{it} and each x_{it} from the respective variable creates a correlation between regressor and error. The resulting correlation creates a bias in the estimate of the coefficient of the lagged dependent variable which is not mitigated by increasing the number of individual units.

One solution to this problem involves taking first differences (Δ) of the original model:

$$(3) \Delta P_{it} = \beta_i \Delta x_{it} + \theta \Delta D_{it} + \gamma \Delta P_{it-1} + \Delta u_{it}$$

The first difference transformation removes the individual effect (and any other constant) but it comes at the cost of inducing correlation between the differenced lagged dependent variable and the disturbance process (the former contains P_{it-1} and the error term contains u_{it-1}). But with the individual fixed effects swept out, instrumental variables (IV) estimators are available. As shown by Anderson and Hsiao (1981), we may construct instruments for the lagged dependent variable from the second and third lags of P_{it} , either in the form of differences or lagged levels. As argued by Arellano and Bond (1991) and others, the IV approach does not exploit all of the information available in the sample. By doing so in a Generalized Method of Moments (GMM) context, more efficient estimates of the dynamic panel data model can be constructed. Monte Carlo studies have shown that estimated asymptotic standard errors of the efficient two-step generalized method of moments (GMM) estimator can be severely downward biased in small samples. We use Windmeijer's (2005) finite-sample correction in order to have robust estimators.

Beyond the unbiased estimation of the parameters of the model, appropriate estimation of θ requires $P_{i,t+h}(D_{it}) - P_{i,t}$ to be orthogonal to $D_{it}|w_{it}$ (for all h). This conditional independence assumption plays an important role and allows us to identify the average causal effect of a policy intervention relative to a baseline on the outcome variable at time $t+h$ using local projections (LP):

$$\begin{aligned} E &= [E_t(P_{i,t+h}(D_{it} = 1) - P_{i,t}) - (P_{i,t+h}(D_{it} = 0) - P_{i,t})] \\ (4) &= [E_t(P_{i,t+h}(D_{it} = 1) - P_{i,t}) - E_t(P_{i,t+h}(D_{it} = 0) - P_{i,t})] \\ &= \theta^h [(D_{it} = 1 - D_{it} = 0)] \end{aligned}$$

If the conditional independence assumption fails, OLS applied to equation (4) will deliver a biased and inconsistent estimate of θ . This is most likely the case in the context of SWF since they may be implemented precisely as a result of the perceived need of enacting an additional mechanism to achieve or secure policy outcomes. Instrumental variables can be brought in to fix this inconsistency, but need to meet two well-known conditions. First, they need to be independent of the unobserved selection mechanism. Second, the instruments z_{it} need to be predictive for D_{it} . Assuming these two conditions are met, estimation of the response to policy interventions using local projections will deliver a consistent estimate of θ .

Estimation of these conditional expectations can be simplified considerably when a model for the policy variable D_{it} is available. Angrist and Kuersteiner (2011) refer to the predicted value from such a policy model the "policy propensity score". The policy propensity score acts as a dimension-reduction device and is meant to ensure the estimation of the policy response (the average treatment effect in the microeconomics parlance) is consistent under the main assumption.

It is, perhaps, important to note that the dynamic panel data models described above solve for the presence of individual effects and their potential correlation with residuals but they do not address the potential endogeneity of treatments, an issue we discuss in what follows.

4.2 Endogeneity of SWFs and other Fiscal Institutions

A legitimate concern is whether policy instruments –such as SWF or fiscal rules—are truly exogenous in models of fiscal performance. While one would expect that the adoption of new rules and institutions would induce better fiscal outcomes, it is nevertheless possible that the said policy instruments are adopted after an economy has already improved its fiscal indicators or is firmly on a path of consolidating them. If there is reverse causality, the estimation of the impact of SWFs on fiscal performance will be biased (the estimator is inconsistent).

This problem of reverse causality is an important issue that cannot be adequately addressed by the standard time-series practice of using lagged values and GMM conditions for the potentially endogenous regressor (such as Arellano and Bond, 1991). Furthermore, in our context, reverse causality of the SWF variable would lead to the classical endogenous dummy variable model (Heckman, 1978). We deal with the possible endogeneity of SWFs by means of IV methods. Assuming that we have a set of valid instruments z_{it} for adopting a SWF (not including the elements that determine fiscal performance in x_{it}), we can consistently estimate our models by the following three-stage procedure: (1) In the first stage, we estimate a probit model of the determinants of having a SWF_{it} in place and compute the predict probability \widehat{SWF}_{it} . (2) In the second stage, we regress SWF_{it} on \widehat{SWF}_{it} and z_{it} and compute the fitted values \overline{SWF}_{it} . (3) In the third stage, we regress y_{it} on x_{it} and the fitted values of the second stage. This procedure is different from the “pseudo-IV” procedure of running an OLS regression of y_{it} on \widehat{SWF}_{it} and x_{it} . In the latter case, consistency is not guaranteed unless the first stage is correctly specified, and the standard errors need to be adjusted (Adams, 2009).

There are many advantages to this approach. First, it takes the binary nature of the endogenous variable into account. Although the two-stage least squares consistency of the second stage does not hinge on getting the functional form right in the first stage (see Angrist and Krueger, 2001), two-stage least squares leads to biased estimates in finite samples and it is not known how misspecification in the first stage may affect this bias. Second, unlike some of the alternative procedures, it does not require the binary response model of the first stage to be correctly specified. Third, although some regressors are generated in the first stage, the standard IV standard errors are still asymptotically valid (see e.g. Wooldridge, 2002).

5. Empirical Analysis

In the first part of our empirical analysis we obtain an instrument for the SWF (as well as for other fiscal institutions) which we then use to estimate the effect of SWF on fiscal outcomes. We use annual data for the period 1985-2015 (see Appendix Table 1 for definitions and sources). Macroeconomic data tend to be very scarce and unreliable before 1985, especially for fiscal variables, as a result of both changes in definitions and measurement procedures as well as structural changes. Our sample is dictated by data availability; it contains 119 countries representing all major world regions (see Appendix Table 2 for a complete list). The regression analysis is conducted using averages of five-year periods. Each country has a minimum of three and a maximum of seven non-overlapping five-year observations (evidently, the panel is unbalanced). A minimum of three observations per country is required to run the IV methodology outlined below. The total number of observations is around 420 but varies with each model due to missing data.

5.1 Instrumenting SWFs

We use the abovementioned three-stage procedure to generate an instrument that is correlated with SWF and uncorrelated with fundamentals and omitted variables. As the first, we estimate a probit model for the incidence of SWFs, defined as a 0-1 dummy:

$$(5) \text{Prob}(SWF_{it} = 1 | x_{it}, z_{it}) = \phi(\theta_0 + \theta x_{it} + \delta z_{it})$$

where $\phi(\cdot)$ is the cumulative distribution function for a standardized normal random variable, z_{it} is the vector of instruments, and x_{it} is a vector of other control variables. It is important to highlight that our IV approach does not require this specification to be correct nor the estimation to be efficient. It only requires the instruments to be correlated with the probability of having a SWF in place.

With regards to independent variables, the literature identifies several potential determinants of the likelihood of accumulating net foreign assets in sovereign wealth funds (Beck and Fidora, 2008). The first group relates to trade openness, structure of exports and resource booms. Commodity price booms illustrate the adverse effect on competitiveness of large real appreciations induced by using these windfall gains for domestic expenditures, particularly when the gains are transitory (Céspedes and Velasco, 2012). Consequently, some countries have sought to deal with these concerns by saving a share of the gains in SWFs. We thus control for the *level of foreign trade* (as share of total GDP), *export concentration* (measured by Herfindhal indices, as computed by Soto 2016), and the size of *natural resource rents* (from the World Bank Database).

The second group relates to macroeconomic stance and general development level. More developed countries tend to have better macroeconomic management which, more often than not, includes policies of accumulating foreign reserves. Diversification of these reserves into potentially higher-yielding assets have usually entailed transferring them from the control of the central bank to the Treasury or to quasi-public entities, such as SWFs, with the mandate to pursue financial strategies aiming at higher long-run returns (Aizenman and Glick, 2009). We control for *development levels* using real per capita GDP in US\$. We also control more directly for macroeconomic mismanagement using the inflation rate as a measure of *price instability*.

A third group of factors behind the growth of SWFs relates to government revenue structures and, particularly, revenue instability. A large number of SWFs had been set up to insulate the budget and economy from commodity price volatility and external shocks. Their investment horizons and liquidity objectives resemble central banks reserve managers, in view of their role in countercyclical fiscal policies to smooth boom/bust cycles. We control for *government revenue instability* using the coefficient of variation of revenues computed as a rolling three-year (Elbadawi et al., 2015). We also control for the fact that countries with federal structures may find it more appealing –and perhaps more challenging—to set up a SWF as a way to increase independence of the federal government from the subnational units. A dummy variable for *federalism* is used in the empirical analysis.

Finally, we also control for idiosyncratic factors in the GCC economies. Gulf economies have not only allocated a significant fraction of their wealth in SWFs but have also been the pioneers in their implementation, following Kuwait’s initiative of 1953. These highly endowed resource-rich economies are subject to the highly volatile oil prices; SWFs partly serve the purpose of stabilizing government revenues which would otherwise mirror the volatility of oil and commodity prices (Barnett and Ossowski, 2002). We use a dummy to identify GCC countries.

Panel A in Table 1 reports the results of estimating probit regressions of the incidence of SWFs.¹¹ As reported, more open countries that enjoy higher levels of resource rents and have concentrated exports tend to have a higher probability of implementing SWFs. Likewise, more developed economies –which usually also have lower levels of price instability—are more likely to have established sovereign wealth funds. Finally, the evidence confirms that instability in revenues is an important reason for governments to implement SWFs and the preference of the oil-rich economies of the GCC for this type of fiscal institution. We use these results to generate a prediction of the likelihood of having a SWF in place for each year of the period 1984-2015, conditional on the observed values of fundamentals. This predicted variable is a consistent instrument for SWF but is not efficient. As mentioned, efficiency obtains when the SWF dummy is filtered against the fundamentals and the instrument obtained in the previous step. Results are contained in Panel B of Table 1.

We also use the same approach to generate instruments for two other potentially endogenous fiscal institutions. First, national fiscal rules. We follow Schmidt-Hebbel and Soto (2017a) to select the appropriate set of fundamentals and generate instruments for four national rules placing limits on government debt, government expenditure, revenues and fiscal balance. We exclude supranational (or multinational) fiscal rules that, by nature, cannot be endogenous to one country. Empirical estimates for both stages are in Appendix Table 3. Second, we also generate an instrument for the presence of fiscal councils. These are independent public institutions aimed at strengthening commitments to sustainable public finances through various functions, including public assessments of fiscal plans and performance, and the evaluation or provision of macroeconomic and budgetary forecasts (Debrun et al., 2013).

Table 1

Panel A: Random Effects Probit Estimation

Dependent Variable: SWF dummy

	Resource Rents	Foreign Trade	Export Concentration	Economic Develop.	Price Instability	Revenue Instability	Federal Country	GCC country	Constant
Est. Coefficient	2.183	1.707	0.926	2.827	-0.057	3.846	-3.855	5.510	-103.46
Std. Error	0.170	0.528	0.365	0.283	0.001	1.681	1.120	2.032	6.974
p-value	0.000	0.001	0.011	0.000	0.000	0.021	0.001	0.007	0.000

Panel B: Linear Filtering Model

Dependent Variable: SWF dummy

	Resource Rents	Foreign Trade	Export Concentration	Economic Develop.	Price Instability	Revenue Instability	Federal Country	GCC country	SWF first stage
Est. Coefficient	0.022	0.083	0.152	0.039	-0.037	0.096	-0.003	0.179	-103.46
Std. Error	0.002	0.010	0.009	0.004	0.035	0.059	0.135	0.038	6.974
p-value	0.000	0.001	0.011	0.000	0.283	0.105	0.814	0.007	0.000

Notes: Foreign trade is given by the share of total trade to GDP, Export concentration is measured by Herfindhal indices (as computed by Soto 2016); Resource Rents is calculated as net natural resource rents/GDP (from the World Bank Database); Economic Development is proxied by real per capita GDP in USD; Price Instability is measured by inflation rate; Revenue Instability is measured as the coefficient of variation of revenues computed as a rolling three-year (Elbadawi et al., 2015); Federal Country is dummy variable, equal to 1 for the case of federal system and 0 otherwise; and GCC is dummy variable, equal to 1 for the six GCC member countries and 0 otherwise.

Sources: World Development Indicators; World Economic Outlook.; ECLAC; the African Development Bank; and the Asian Development Bank.

5.2 Modeling Procyclicality

As customary, we measure fiscal procyclicality as the rolling correlation of the cycle in government expenditures and the cycle of GDP, both at constant prices (see Frenkel et al, 2011; Vegh and Vuletin, 2012). The data for real general government expenditures and real GDP were obtained from World Development Indicators and World Economic Outlook. In order to

¹¹ We also controlled for political factors and national governance using data from ICRG but the results proved to be statistically and economically insignificant.

get cycles, we first de-trend both variables in logs using a bandpass filter (Hodrick and Prescott, 1997) and then compute ten-year rolling correlations of the cyclical components of government consumption and GDP to avoid transitory phenomena. We also use a similar measure for the procyclicality of fiscal balances.¹² Measuring fiscal balances is difficult because some countries provide figures for the central government while others include subnational units and report data for the general government. We use the IMF Fiscal Database as the main source for our measure of the fiscal balance of the central government supplemented, when necessary, with data from ECLAC, the African Development Bank, and the Asian Development Bank.

In order to isolate the contribution of SWF, we identify other determinants of fiscal performance as suggested by theory and previous empirical research. We include access to borrowing by governments, political determinants of fiscal performance, macroeconomic regimes, fiscal institutions, level of development, and cyclical phenomena.

Access to borrowing by governments: Capital account openness and financial development largely determine the ability of governments to borrow money in domestic and external markets to fulfill their financial needs. Measuring access to foreign borrowing is not an easy task but common sense indicates that access should be easier in economies with more open capital accounts. We use the *de-jure measure of financial openness* developed by Chinn and Ito (2008 and extended by the authors to 2015). Likewise, borrowing from internal sources should be easier in countries with better developed financial markets. The latter is not observable. We therefore focus on financial outcomes as indicators of the ability of domestic financial firms to mobilize resources, mainly the level of *domestic credit to private sector*.

Political determinants of fiscal performance: In all countries in the world, fiscal performance is determined by political elements. We consider a proxy variable for *political representation*, namely the Polity2 measure of democracy as compiled by the Polity IV Project (2016) proxy variables for *political accountability*, such as measures of checks and balances (Cruz et al., 2016) and of political constraints (Henisz, 2015). In addition to political variables, we include measures of the perceived *political stability of government*, as measured by the ICRG stability index, and expect it to be positively correlated to fiscal outcomes. The International Country Risk Guide (ICRG) defines government stability as government's ability to carry out its declared program, and its ability to stay in office.

Macroeconomic regimes: Fiscal policy does not operate in isolation from monetary and exchange regimes: the stabilizing effectiveness of fiscal policy is higher the more inflexible is the exchange rate. We, therefore, use two proxy variables. First, we use a *de jure measure of exchange regime* in the form of a binary variable taking value 1 if the country has a fixed exchange system and zero otherwise. Fixed exchange systems include dollarization, currency boards, and monetary unions. Second, we also control for cases where countries do not have an independent monetary authority. Countries belonging to *monetary unions* tend to develop fiscal institutions that are often different from those with independent monetary policies. We build a binary variable taking value 1 if the country belongs formally to a monetary union and 0 otherwise.

Fiscal Institutions: There are several ways in which fiscal institutions might affect fiscal procyclicality. First, fiscal transparency could reduce corruption, lobbying, clientelism, and rent seeking behavior, and it in turn may help mitigate fiscal procyclicality. We use two variables to proxy for fiscal transparency: *fiscal rules* and *fiscal councils*. The former comprise of instrumental variables representing the existence of four types of rules: government debt,

¹² We tested alternative windows when computing the rolling correlations (5 years) without significant changes in our econometric results, as discussed below.

government expenditure, revenues and fiscal balance. The latter also comprises of an instrumental variable for the probability of observing a fiscal council in place on a given year in each country. Second, the lack of forecasting ability could be one of the reasons behind fiscal procyclicality. It is difficult for policymakers to predict the exact timing of the business cycle. Likewise, forecasting revenues is also complicated, particularly when they depend on the international price of commodities or when the tax base is volatile (Talvi and Végh, 2005). Frankel (2011) found evidence that official forecasts of the budget balance and GDP growth tend to be highly optimistic. We proxy the lack of forecast ability using a measure of *fiscal revenue instability*, namely the three-year rolling coefficient of variation of government revenues (as share of GDP). Finally, the fiscal structure of an economy also determines its fiscal outcomes. In particular, countries having federal systems tend to operate very differently than unitary countries. Therefore, we control for fiscal federalism using a dummy variable built on Feld and Schnellenbach (2011) and corresponding to a de-jure definition of a country as federal or unitary.

Overall development: Customarily measured by real GDP per capita.

Cyclical phenomena: We control also for transient phenomena that may have impact on fiscal outcomes. Business cycles and price instability (inflation) can influence fiscal outcomes by affecting the domestic tax base and thereby tax revenues. *Resource rent cycles*—arising primarily from commodity price movements—affect tax collection from international trade and royalties, as well as profits collected by resource-based state enterprises.

5.3 Main Results I: Procyclicality of Government Expenditures

Table 2, below, collects the main results for our estimated dynamic panel-data, instrumental variables estimation for the determinants of the procyclicality of government expenditures. The results for Model 1 indicate that indeed there is significant inertia in fiscal outcomes and, therefore, static models are inadequate. The first two lags of the dependent variable are significant and with opposing signs indicating that the dynamics are highly persistent and quite cyclical. Given the size of these coefficients, we expect a shock to dissipate in around four years. Our results also show that countries better integrated with the international financial market tend to have, somewhat surprisingly, higher levels of fiscal procyclicality, when measured by our de-jure indicator of capital openness. The magnitude of the effect is nevertheless rather small. On the contrary, we found no effects of different levels of domestic financial development on procyclicality, and we have dropped the variable from the analysis.

In agreement with previous literature, we found that countries belonging to monetary unions tend to have lower levels of procyclicality perhaps as a result of restrictions imposed on governments in order to reduce the stress on the monetary agreement arising from fiscal imbalances. We estimated this effect to be sizable, in the order of halving the procyclicality of the average economy. We also found, as expected, that price instability is positively correlated with procyclicality, although the coefficient is rather imprecisely estimated and the effect is mild. Somewhat surprisingly, we did not find significant effects on procyclicality arising from political instability, political regimes, or political accountability.

The most interesting results are those for cyclical phenomena and fiscal institutions. It can be seen that the business cycle is a key determinant of fiscal procyclicality: the estimated parameter is large and statistically very significant. Countries that manage to dampen significantly their business cycle are those where procyclicality is around one third lower than the average economy. Isolating an economy from these fluctuations could reduce fiscal procyclicality by around 20%. With regards to fiscal institutions, there is an important, positive correlation between our measure of fiscal revenue instability and fiscal procyclicality; again, the estimated parameter is large and statistically very significant. If fiscal revenue instability

in MENA economies is reduced to the level of emerging countries (by around one half), fiscal procyclicality would be dampened by one sixth.

These evidences would also suggest that in countries where natural resources are abundant and governments have less control over fiscal revenues, fiscal institutions could have an important role in reducing the inherent procyclicality of government expenditures. We test the role of fiscal institutions incrementally and present the results also in Table 2.

Table 2
Estimated Models for the 10-year Procyclicality of Government Expenditure

	Controls	Model 1	Model 2	Model 3	Model 4
First Lag Dependent Variable		0.751*** (7.88)	0.737*** (7.50)	0.721*** (7.42)	0.720*** (7.59)
Second Lag Dependent Variable		-0.221*** (-2.92)	-0.235*** (-3.40)	-0.230*** (-3.28)	-0.234*** (-3.23)
Financial Openness		0.512*** (-2.98)	0.579*** (-3.49)	0.679*** (-3.89)	0.631*** (-3.31)
Government Stability		-0.0276 (-1.47)	-0.0264 (-1.46)	-0.0298 (-1.62)	-0.0249 (-1.27)
Monetary Union		-0.257** (-2.45)	-0.202* (-1.81)	-0.085 (-0.65)	-0.130 (-0.94)
Business Cycle		7.496*** (2.77)	6.833** (2.42)	7.185*** (2.55)	6.992*** (2.46)
Resource Rent Cycle		0.337 (1.64)	0.457** (2.29)	0.432** (2.18)	0.411* (2.02)
Price Instability		0.766 (1.55)	0.869* (1.78)	0.855* (1.77)	0.850* (1.79)
Fiscal Revenue Instability		0.860** (2.26)	0.907** (2.35)	0.772* (1.91)	0.721* (2.73)
Sovereign Wealth Fund			-0.904** (-2.13)	-0.807* (-1.86)	-0.845* (-1.98)
Expenditure Fiscal Rule				-1.131* (-1.74)	-1.335* (-1.87)
Fiscal Council					0.491 (0.84)
Constant		-0.134 (-0.85)	-0.103 (-0.67)	-0.045 (-0.28)	-0.064 (-0.40)
Observations		419	419	419	419
Countries		112	112	112	112
Arellano Bond Test		-4.93*** 1.69	-5.03*** 1.52	-4.86*** -1.34	-4.69*** -1.27
Sargan Test		19.52	20.22	21.11	21.58

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Government Expenditure Procyclicality is computed as the rolling correlation of the cycle in government expenditures and the cycle of GDP; Business cycles, Resource Rents and Government Expenditures cycles obtained by de-trending real valued variables in logs using a Bandpass filter; Financial Openness is the de-jure measure of financial openness developed by Chinn and Ito (2008); Government Stability is measured by the ICRG stability index; Monetary Union is a binary variable taking value 1 if the country belongs formally to a monetary union and 0 otherwise; Price Instability and Revenue Instability: see notes to Table 1; Sovereign Wealth Fund instruments from Table 1; Fiscal Rules: instrumental variable representing the existence of rules on government debt, government expenditure, revenues and fiscal balance; Fiscal Councils: an instrumental variable for the probability of observing a fiscal council in place on a given year in each country.

Sources: World Development Indicators; World Economic Outlook.; ECLAC; the African Development Bank; and the Asian Development Bank.

Model 2 introduces our instrumental variable for the presence of a SWF. We found that there is a significant stabilizing effect of SWF on expenditure procyclicality as can be seen in the large, statistically significant estimated coefficient. Countries with a SWF in place are those where government expenditures are substantially countercyclical. Note also that the rest of the estimated coefficients do not change in a significant manner, suggesting that the stabilizing

effect of SWF does not act by affecting the role of other fundamentals, an issue we explore more formally below.

Model 3 test for the role of fiscal rules. We found that only expenditure rules have a stabilizing effect on expenditure procyclicality and act independently of the country having a SWF in place. Countries with this type of rule in place are those where procyclicality is negligible. This indicates that *both* fiscal institutions are important mechanisms to dampen the adverse effects of procyclicality and that they may reinforce each other.

Finally, in model 4 in Table 2 we provide the results for the estimated model that includes our measure for the probability of having a fiscal council in place. As is apparent, we found no significant effects. The loss of precision in estimating the coefficient for the fiscal rule may indicate that there may be joint determination.

5.4 Main Results II: Procyclicality of Fiscal Balances

Table 3, below, presents the results for our estimated panel-data, instrumental variables estimation for the determinants of the procyclicality of fiscal balances. Again, the results for the base model (Model 1) indicate that indeed there is significant inertia in fiscal outcomes and the dynamics are cyclical. The adjustment period is much longer than in the previous case and a shock would dissipate in around a decade. Our results also indicate that more developed economies tend to have less procyclicality in fiscal balances. A country that moves from the first quartile (25%) to the third quartile (75%) of the distribution of GDP per capita would see its fiscal balance procyclicality improve by around one half. Note that, in this case, a positive coefficient indicates less procyclicality since an increase in the variable of interest, in this case development level, would be associated with higher fiscal balances. We also found some impact of political variables (checks and balances) on the procyclicality of fiscal balances but it is quantitatively small.

Again, the most interesting results are those for fiscal institutions and SWFs. We found that there is a significant stabilizing effect of SWF on fiscal balance procyclicality as can be seen in the large, statistically significant estimated coefficient. Countries that have a SWF in place enjoy up to 50% higher procyclicality of the fiscal balance. Results for fiscal rules in Model 3 are somewhat paradoxical. On one hand, rules limiting the amount of government debt seem to play a stabilizing effect on the procyclicality of fiscal balances, perhaps because countries that have already reached the debt ceiling must act in a conservative manner vis-à-vis running uncontrolled deficits. On the other hand, balance budget rules seem to have a destabilizing effect, as implied by the negative estimated coefficient. Nevertheless, countries with both rules in place would enhance the countercyclical role of the fiscal stance by around one third. Fiscal councils, as shown in Model 4, play no significant role.

Table 3
Estimated Models for the 10-year Procyclicality of Fiscal Balance

Controls	Model 1	Model 2	Model 3	Model 4
First Lag Dependent Variable	0.523*** (5.88)	0.566*** (5.99)	0.542*** (5.41)	0.542*** (5.44)
Second Lag Dependent Variable	-0.190*** (-2.75)	-0.176** (-2.50)	-0.182*** (-2.73)	-0.183*** (-2.74)
Development Level	0.251** (2.02)	0.166 (1.47)	0.242** (2.27)	0.238** (2.20)
Financial Openness	0.271 (1.49)	0.205 (1.09)	0.279 (1.28)	0.260 (1.15)
Political Accountability	0.0211* (1.71)	0.0252* (1.94)	0.0281** (2.24)	0.0277** (2.21)
Business Cycle	3.060 (1.33)	3.466 (1.43)	3.604 (1.53)	3.583 (1.52)
Price Instability	0.0173*** (4.41)	0.0191*** (5.23)	0.0183*** (5.83)	0.0182*** (5.86)
Fiscal Revenue Instability	-0.598* (-1.72)	-0.662* (-1.76)	-0.670* (-1.89)	-0.686* (-1.93)
Sovereign Wealth Fund		0.872** (2.49)	0.707** (2.27)	0.687** (2.16)
Balance Budget Rule			-1.411* (-1.88)	-1.489* (-1.88)
Debt Rule			2.202** (2.29)	2.286** (2.27)
Fiscal Council				0.180 (0.34)
Constant	-2.072** (-2.05)	-1.443 (-1.58)	-2.093** (-2.41)	-2.058** (-2.33)
Observations	416	416	416	416
Countries	112	112	112	112
Arellano Bond Test	-4.40***	-4.51***	-4.35***	-4.37***
Sargan Test	0.17	0.06	0.22	0.25
	24.92*	22.88	19.89	19.70

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Fiscal Balance Procyclicality is measured as the rolling correlation of the cycle in budget balance and the cycle of GDP, both at constant prices. Cycles obtained by de-trending variables in logs using a bandpass filter; Political accountability: we use the Polity2 measure of democracy as compiled by the Polity IV Project (2016); Balanced Budget Rule: instrumental variable representing the existence of rules on balanced budget; Debt Rule: instrumental variable representing the existence of rules on public debt; for all other variables, see the notes to Tables 1 and 2.

Sources: World Development Indicators; World Economic Outlook.; ECLAC; the African Development Bank; and the Asian Development Bank.

5.5 Main Results III: Fiscal Balances

We now turn to our results for our models on the role of SWF in affecting fiscal balances and sustainability. As shown in Table 4, there is a high level of inertia in fiscal balances. As expected, adjusting fiscal imbalances—particularly, high deficits—requires a lot of effort on the part of authorities as well as political muscle and it usually takes time (around 10 years for a full adjustment after a shock). We also found the standard result in the literature that more stable countries in political terms as well as those with fixed exchange rates tend to have more conservative fiscal policies and, on average, higher fiscal balances (around one and two-percentage points, respectively). Business cycles and resource-rent cycles play a significant role in improving fiscal balances, even if in a transitory manner. We found no significant effects of development levels or fiscal revenue instability on fiscal balance: the latter result is an interesting finding.

Model 2 in Table 4 indicates that SWF have a stabilizing effect on fiscal balances: the estimated coefficient is large and quite significant. Contrary to the two models studied above, now there is evidence that the positive effect of SWFs on fiscal balances may filter through other

variables: development level and fiscal revenue instability change size and/or statistical significance. Note now that, as expected, fiscal balances are lower in more developed economies—an empirical regularity—and that fiscal revenue instability is associated with lower fiscal balances (although its statistical significance is low).

Table 4
Estimated Models for Fiscal Balance

Variable	Model 1	Model 2	Model 3	Model 4
First Lag Dependent Variable	0.437*** (5.22)	0.417*** (4.94)	0.442*** (5.02)	0.429*** (4.39)
Second Lag Dependent Variable	-0.175*** (-2.80)	-0.182*** (-3.45)	-0.173*** (-2.77)	-0.159*** (-2.45)
Development level	-0.879 (-0.92)	-2.022** (-2.24)	-2.297** (-2.16)	-2.395** (-1.86)
Government Stability	0.272** (2.53)	0.239** (2.38)	0.226** (2.34)	0.208* (1.95)
Fixed Exchange Regime	2.116*** (2.68)	1.589** (2.29)	2.262*** (3.08)	2.293** (3.00)
Fiscal Revenue Instability	0.067 (0.03)	-1.622 (-0.63)	-1.289 (-0.48)	-1.249 (-0.46)
Price Instability	-0.134 (-1.43)	-0.138** (-2.18)	-0.131* (-1.83)	-0.135* (1.94)
Business Cycle	56.21*** (3.93)	61.49*** (4.66)	62.40*** (4.77)	64.23*** (4.70)
Resource Rent Cycle	3.975** (2.46)	3.451*** (2.67)	3.894*** (2.64)	3.723*** (2.40)
Sovereign Wealth Fund		8.434*** (2.84)	7.439*** (2.42)	7.833*** (2.46)
Expenditure Fiscal Rule			14.20** (2.43)	15.35** (2.50)
Revenue Rule			-29.02*** (-2.72)	-25.13** (-1.99)
Fiscal Council				-5.210 (-1.03)
Constant	-2.413** (-2.28)	-2.022* (-1.91)	-1.976* (-1.89)	-1.958* (-1.88)
Observation	420	420	420	420
Countries	110	110	110	110
Arellano-Bond Tests	-4.38*** 0.54	-4.27*** 0.40	-4.39*** 0.53	-4.38*** 0.47
Sargan Tests	20.13	19.51	20.02	19.76

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Fiscal Balance is expressed as a ratio to GDP; Fixed Exchange Regime: de jure measure taking value 1 if the country has a fixed exchange system (dollarization, currency boards, and monetary unions) and zero otherwise; Revenue Rule: instrumental variable representing the existence of rules on government revenue; 4. For all other variables, see the notes to Tables 1 2, and 3

Sources: World Development Indicators; World Economic Outlook.; ECLAC; the African Development Bank; and the Asian Development Bank.

When studying the role of fiscal institutions, we found that having a SWF in place is associated with higher fiscal balances: the estimated coefficient indicates that countries with a SWF have, in probability, fiscal balances that are around 0.6 percentage points of GDP higher than countries without a SWF. This result is robust to having other fiscal institutions, such as fiscal rules or fiscal councils. We also found that two fiscal rules have an impact on fiscal balances. First, rules that limit the level of government expenditures tend to improve the fiscal stance. On the contrary, countries that have adopted a revenue rule seem to have worsened their fiscal balances, although we are unable to identify the reason for using the coarse measure of fiscal rules available.

5.6 Main Results IV: Robustness Checks

We undertake a series of robustness checks to verify that our results have general validity and do not stem from the sample of countries used in the estimations. One concern is that the results may largely reflect the role of developed economies which, on one hand, have historically had countercyclical fiscal policies and, on the other hand, have been among the first economies to implement sovereign wealth funds. If such were the case, our results would have no application to emerging market economies. We replicate our econometric models of subsections 5.2 to 5.5 excluding all advanced economies and report the results in Table 5 which is divided in three panels corresponding to the models for Procyclicality of Government Expenditures, Procyclicality of Fiscal Balances and Fiscal Balances, respectively.¹³ In order to save space, we focus only on fiscal variables and omit the results for the other control variables. In each panel we reproduce first the estimated coefficient of the Base Model. In Panel A it can be seen that omitting the advanced economies does not affect our initial conclusion that countries with a SWF in place are those where procyclicality of government expenditures is negligible or where government expenditures are mildly countercyclical: the estimated coefficient is roughly of the same size and statistically significant. In Panel B it can be seen that omitting the advanced economies yields exactly the same econometric results as when using the full sample and, therefore, our initial conclusion holds: there is a significant stabilizing effect of SWF on fiscal balance procyclicality since countries that have a SWF in place enjoy up to 50% higher procyclicality of the fiscal balance. Finally, from the estimates in Panel C we conclude, again, that having a SWF in place is associated with higher fiscal balances: on average, fiscal balances would be around 0.6 percentage points of GDP higher than countries without a SWF. The results for fiscal rules are also very similar. We therefore conclude that our main results are not driven by the presence of developed countries.

A second concern vis-à-vis our econometric work is whether our conclusions could be altered when considering that sovereign wealth funds may differ by the source of resources: oil and natural gas proceeds, exports of other commodities, proceeds from privatizations or allocations from the government budget. To test for such differences, we re-estimate our models focusing only on sovereign wealth funds from hydrocarbon exporters (oil and natural gas). The results reported in the three panels of Table 5 indicate that our conclusions remain unchanged in terms of the abilities of sovereign wealth funds to reduce fiscal procyclicality and improve fiscal sustainability. In the case of the procyclicality of government expenditure, our estimated models indicate that hydrocarbon exporters would benefit more than the rest of countries from having the sovereign wealth fund in operation (the estimated coefficient is one half larger than that of the Base Model). We therefore conclude that our main results are not driven by ignoring the source of resources used to set up the sovereign wealth fund. As a corollary, this would

¹³ We exclude advanced economies (basically the core OECD economies) and not high-income economies. Therefore, oil and gas exporters that are not in the OECD are not excluded,

indicate that MENA economies, where all sovereign wealth funds are based on hydrocarbon revenues, are inherently not different to the rest of the countries.

Finally, we check the robustness of our results vis-à-vis the measure of procyclicality. We re-estimate our econometric models using a five-year rolling windows to compute procyclicality and report the results in Table 5. As can be seen, results are very similar but the estimates are less precise (as shown in more insignificant estimated coefficients). We therefore conclude that our main results are not driven by the methodology used to compute the measure of procyclicality.

Table 5
Robustness Checks

	Estimated Coefficients:				
	Sovereign Wealth Funds	Fiscal Rules Budget Balance	Debt	Expenditures	Revenues
Panel A: Procyclicality of Government Expenditure					
Base Model (Model 3 in Table 2)	-0.814*	-	-1.100*	-	-
Base Model excluding advanced countries	-0.930*	-	-0.792	-	-
Base Model for only Oil and Gas based SWF	-1.331*	-	-0.245	-	-
Base Model with 5-year procyclicality	-1.161**		-1.854**		
Panel B: Procyclicality of Fiscal Balances					
Base Model (Model 3 in Table 3)	0.704**	-1.405*	2.204*	-	-
Base Model excluding advanced countries	0.712**	-1.769*	2.657*	-	-
Base Model for only Oil and Gas based SWF	0.648*	0.515	1.140	-	-
Base Model with 5-year procyclicality	0.236	-0.678	1.735	-	-
Panel C: Fiscal Balances					
Base Model (Model 3 in Table 4)	7.439***	-	-	14.20**	-29.02***
Base Model excluding advanced countries	7.273***	-	-	6.645	-31.82**
Base Model for only Oil and Gas based SWF	7.079***	-	-	21.15***	-27.51***

Notes: Symbols ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

6. A Focus on the GCC

The analysis of this paper suggests that SWFs have a robust stabilizing role against fiscal procyclicality and have also been strong contributor to the sustainability of fiscal balance. Also, other fiscal institutions, such as revenue, expenditure and debt rules, were found to be associated with fiscal stabilization, though with less degree of robustness. Nonetheless, other work in the literature find fiscal rules to be strongly associated with fiscal stabilization (e.g. Schmidt-Hebbel and Soto, 2017b).

Our empirical results lend strong support to the perceived role of SWFs in the GCC as a potent fiscal institution in economies that are highly susceptible to large fiscal shocks. Moreover, the deep fiscal pockets provided by the SWFs also support the credibility of the dollar-pegged regimes. However, the GCC economies are yet to consider fiscal rules, which have been an important component in the arsenal of fiscal institutions for many successful resource-rich developed and emerging market economies.

As early as the late sixties, countries started to adopt what was afterwards known as fiscal rules¹⁴. These include several types, namely different versions of expenditure rules, revenue rules, budget balance rules and debt rules. Norway, Chile and Australia (NCA) are classic examples of such countries. More recently, and partly in response to fiscal crises, several

¹⁴ In Germany, a "golden rule" for the central government was adopted in 1969), aimed at limiting net borrowing to the level of investment, except in times of a "disturbance of the overall economic equilibrium".

countries have established fiscal councils in charge of providing independent (albeit with different degrees of government independence) assessment and advice, and sometimes even entitled with the authority to propose sanctions in case of significant deviations in the execution of approved budgets (Figure 3).

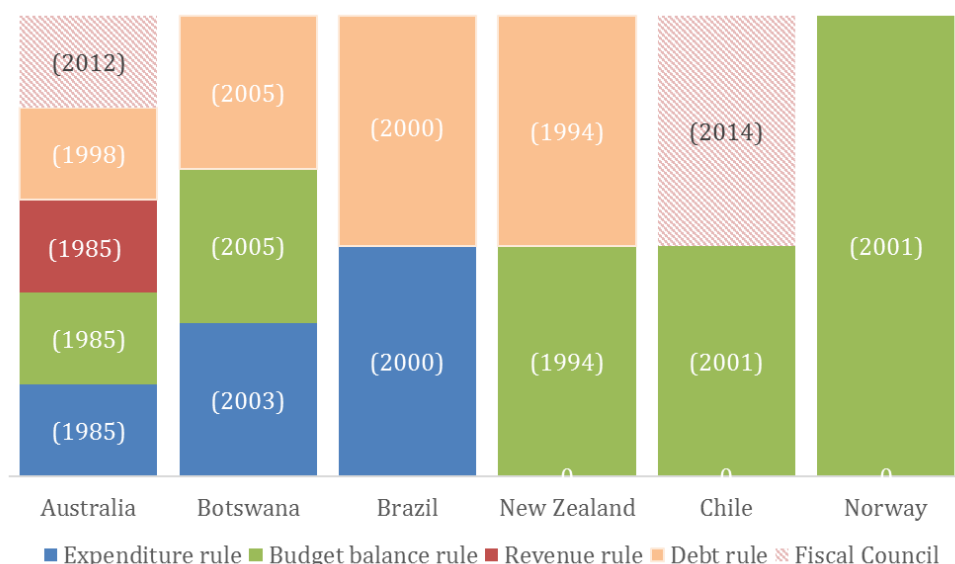
On the view of the relatively long-term secular decline in the prices of oil and other commodities associated with the post-2008 “new normal”¹⁵, smoothing current expenditure in the GCC with is not likely to be sustainable even for the highly resource endowed GCC economies. Moreover, divergent fundamentals with the economy of the anchor currency (the USA) remains a continues source of macro instability for these countries, causing inflationary spells under weak dollar and high oil prices; or currency appreciation under strong dollar and low oil prices.

We would argue, therefore, that, with their inflexible exchange rate regimes, the GCC exclusive reliance on SWFs will likely fall short in dealing with a relatively long-term secular decline in oil prices, which is widely predicted to be one of the central features of the “new normal”. The GCC countries should follow the lead of other advanced and emerging natural resource-rich economies, such as Norway, Chile and Australia, and consider fiscal rules, and at some point, they might need to switch to more flexible exchange rate regimes. While fiscal rules should reinforce the role of SWFs as fiscal stabilizing institutions, more flexible exchange regimes would act as shocks absorbers, reducing the burden of adjustment on the fiscal institutions¹⁶. Nevertheless, the design of the stabilization fund is of the outmost importance, including the mechanics of contributions to the fund as well as the rules for withdrawal. Bjørnland and Thorsrud (2015) find that fiscal policy in Norway has been more (not less) procyclical with commodity prices since the adoption of the rule in 2001, and that the stabilization fund has not led to a countercyclical behavior. This is the result of a withdrawal rule that is a fixed proportion of the expected real return of the fund (4%) which tends to grow whenever the global economy booms and oil prices go up. This, in turn, fuels procyclicality. In the case of Chile, the fiscal rule was built to be a-cyclical in the long run, thus being incapable of providing for countercyclical fiscal policy. On the other hand, Frankel (2011) claims that Chile has avoided pro-cyclicality due to the presence of an independent fiscal institution that provides “legally binding” independent forecasts of the general government budget balance. Not only the mechanics of the fund itself are important but also its impact on other macroeconomic variables. For example, in Australia, the medium-term budget balance anchor has led to a larger than expected upward drift in the net debt to GDP ratio since the end of the mining investment boom (Dizioli et al., 2017).

¹⁵ Since the 2008 global recession, advanced economies were claimed to have transited into a “*new normal*” of long term lower expected output and employment growth, as firms and consumers needed to *deleverage* extensively (M. El-Erian, 2009).

¹⁶ Several proposal for more flexible exchange rate regimes have been recently proposed for the GCC and other small economies with quasi-institutionally pegged regimes, ranging from commodity prices plus currency baskets (CPC) to more demanding regimes, such as product price targeting (see for example, Frankel, 2017a,b).

Figure 3.
Types of Established Fiscal Institutions, 2015. Selected resource-rich economies



Source: IMF, Fiscal Rules and Fiscal Councils Datasets

7. Conclusions

Several reasons justify the implementation of SWF. Some relate to the intended positive effects of SWFs on government policies, including public finances, monetary conditions, the balance of payments, and balance-sheet linkages. Other SWF are justified on the perceived need to transfer resources to future generations. Whatever the reasons, it is their effective impact on different economic variables what matters for policy purposes. In this paper we focus on the likely effects of SWFs on fiscal policy. A properly designed SWF can facilitate fiscal stabilization and/or enhance the saving of fiscal resources for long-term purposes—for example, preparing for population aging or facilitating intergenerational transfers. SWF can also introduce more professional and comprehensive investment and risk management frameworks, and enhance the transparency and accountability in the management of government financial assets.

The effectiveness of SWF is, nevertheless, essentially an empirical matter. We use econometric methods to test and quantify the role of SWF in reducing fiscal procyclicality and improving the sustainability of government finances. Our methodological approach deals with the following challenges: (a) that there exists significant intrinsic heterogeneity among countries, thus calling for a fixed effects approach; (b) that there is significant inertia in fiscal outcomes, thus calling for the use of a dynamic model, and (c) that SWF are potentially endogenous since countries enact SWFs precisely to improve their fiscal stance, thus requiring the use of instruments.

We use a two-step methodology. First, we deal with the endogeneity of SWF and other fiscal institutions—such as fiscal rules and fiscal councils—by creating a set of suitable instruments. Second, we use these instruments to estimate the effect of a SWF on the fiscal stance, after controlling for a number of confounding factors, the embedded dynamics of the phenomenon, and the intrinsic characteristics of each country (individual effects). Our models are estimated

for a period of 35 years so that we isolated from short-term fluctuations and transient phenomena.

We found that countries experience significantly less fiscal procyclicality when they have a SWF in place and that this effect acts independently of another important fiscal institution: fiscal rules harnessing the expansion of government expenditures. This indicates that *both* fiscal institutions are important mechanisms to dampen the procyclicality of government expenditures and their adverse effects. A third fiscal institution, namely the fiscal council, is found to have insignificant effects on this form of procyclicality.

We also found that there is a significant stabilizing effect of SWF on the procyclicality of fiscal balances. Countries experience significantly less balance procyclicality when they have a SWF in place, particularly in more developed countries, but the combined effects with other fiscal institutions is slightly more blurred than in the case of expenditures. The evidence indicates that SWF in conjunction with rules limiting the amount of government debt play the expected stabilizing effect on the procyclicality of fiscal balances, reflecting that once countries reach their debt ceiling, they are forced to act in a conservative manner. On the other hand, SWF in conjunction with budget-balance rules seem to have a puzzling destabilizing effect. Our data is too limited to provide an answer to this puzzle and calls for further analysis.

Turning now to fiscal sustainability, we found that that having a SWFs in place is associated with higher fiscal balances and that fiscal balances that are around one half of a percentage point of GDP higher than countries without a SWF. This result is robust to having other fiscal institutions, such as fiscal rules or fiscal councils, in place. We also found that this effect is reinforced when fiscal rules that limit the level of government expenditures are also in place. On the contrary, countries that have adopted both a SWF and a revenue rule seems to have worse fiscal balances, although we are unable to identify the reason due to the coarse measure of fiscal rules available.

Our policy recommendation is, therefore, for emerging countries to consider the enactment of a SWF as an important institution that would bring both stabilization capabilities and an additional source of resources to improve the sustainability of fiscal policies. We also recommend to consider in the design of a SWF the reinforcing role of certain fiscal rules (either based on limiting the public debt or the expansion of expenditures). In this context, we highlight the case of the GCC countries, which despite their highly endowed SWFs will likely need to consider adopting some fiscal rules in order to support the stabilizing role of the SWFs, especially under the new “normal” of expected relatively long-term low prices of oil and other commodities.

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Appendices

Appendix Table 1

Definitions and Sources of Variables used in Regression Analysis

Variable	Definition and construction	Source
Business Cycle	Cyclical component of the HP-filtered real GDP per capita	Own elaboration based on data from World Bank (2017)
Democracy	Democracy and Polity2 indices of the Polity IV database	Developed by Integrated Network for Societal Conflict Research (INSCR).
Dependency Ratio	Population between 15 and 64 years of age as share of total population	World Bank (2017)
Economic Development	Ratio of total GDP to total population. GDP is in 1985 PPP-adjusted US\$. Growth rates are obtained from constant 1995 US\$ per capita GDP series.	World Bank (2017)
Export Concentration	Herfindahl's index of 26 exported goods categories, measured annually in US dollars, using data from UN Comtrade database.	Soto (2016)
Exchange Rate Regime	Dummy variable taking value 1 if the country is dollarized, has a currency board, or belongs to a monetary union. Any other system is not considered as a fixed regime.	Reinhart and Rogoff (2004) de-jure classification, extended using IMF country reports.
Federalism	Dummy variable = 1 if the country defines itself formally as a federal entity.	Information from Forum of Federations web page.
Financial Development	Domestic credit to private sector (% of GDP)	World Bank (2017)
Financial Openness	Index based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions	Chinn and Ito database (2014).
Fiscal Balance	General Government primary balance	Databases of the IMF, World Bank, ECLAC, OECD, Asian Development Bank and African Development Bank
Fiscal Council	Dummy variable taking value 1 if the country has a fiscal council in place, and 0 otherwise	IMF Fiscal Council Dataset 2017
Fiscal Rules	A fiscal rule is defined as a permanent constraint on fiscal policy through simple numerical limits on budgetary aggregates.	IMF (2017) Fiscal Rules Dataset, 1985-2015.
Foreign Trade	Residual of a regression of the log of the ratio of merchandise trade (% of GDP), on the logs of area and population, as well as dummies for oil-exporting and landlocked countries.	World Bank (2017)
GCC country	Dummy variable taking value 1 if the country is Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, or United Arab Emirates and 0 otherwise.	Own elaboration
Government Gross Debt	All liabilities that require payments of interest and/or principal by the debtor to the creditor at a date or dates in the future.	World Bank (2017)
Revenue Instability	Three-year rolling coefficient of variation of real government revenue (including taxes, social contributions, grants receivable, and other revenue).	Own elaboration based on databases of the IMF, World Bank, ECLAC, OECD, Asian Development Bank and African Development Bank
Government Stability	Assessment of a government's ability to carry out its declared program and stay in office. The risk rating is the sum of three subcomponents (government unity, legislative strength and popular support).	International Country Risk Guide database, from PRS Group.
Inflation	Measured by the consumer price index: annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services.	World Bank (2017)
Inflation Targeting	Dummy variable: 1 if the central bank operates formally an inflation targeting scheme, and 0 otherwise.	Central Bank News webpage and database.
Monetary Union	Binary variable that takes value 1 if the country formally belongs to a monetary union and 0 otherwise.	Own elaboration.

Natural Resource Rents	Rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production.	World Bank (2017)
Political Accountability	Checks and balances indicator, defined as the number of veto players in a political system, adjusting for whether these veto players are independent of each other, as determined by the level of electoral competitiveness in a system, their respective party affiliations, and the electoral rules.	Cruz et al., (2016)
Political Participation	Democracy and Polity2 indices of the Polity IV database	Developed by Integrated Network for Societal Conflict Research (INSCR).
Procyclicality of Fiscal Balance	Ten-year rolling correlation of HP-filtered fiscal balance to HP-filtered GDP (both in constant 2000 US\$).	Own elaboration based on databases of the IMF, World Bank, ECLAC, OECD, Asian Development Bank and African Development Bank
Procyclicality of Government Expenditures	Ten-year rolling correlation of HP-filtered expenditures of general government to HP-filtered GDP (both in constant 2000 US\$). Expenditure consists of total expense and the net acquisition of nonfinancial assets.	Own elaboration based on IMF Government Finance Statistics and World Economic Outlook Databases.
Remittances	Workers' remittances and compensation of employees, received.	World Bank (2017)
Resource Rents Cycle	Cyclical component of the HP-filtered natural resource rents per capita	Own elaboration based on World Bank (2017)
Sovereign Wealth Funds	Dummy variable taking value 1 if the country has an international sovereign wealth fund, and 0 otherwise.	Own elaboration

Appendix Table 2

Countries used in Regression Analysis

<i>Albania</i>	<i>Dominican Republic</i>	<i>Kenya</i>	<i>Portugal</i>
<i>Algeria*</i>	<i>Ecuador</i>	<i>Korea, Rep.*</i>	<i>Qatar*</i>
<i>Argentina</i>	<i>Egypt</i>	<i>Kuwait*</i>	<i>Romania</i>
<i>Armenia</i>	<i>El Salvador</i>	<i>Latvia</i>	<i>Russian Federation*</i>
<i>Australia*</i>	<i>Estonia</i>	<i>Lebanon</i>	<i>Saudi Arabia*</i>
<i>Austria</i>	<i>Ethiopia</i>	<i>Lithuania</i>	<i>Senegal*</i>
<i>Azerbaijan*</i>	<i>Finland*</i>	<i>Libya*</i>	<i>Singapore*</i>
<i>Bahrain*</i>	<i>France*</i>	<i>Madagascar</i>	<i>Slovak Republic</i>
<i>Bangladesh</i>	<i>Gabon</i>	<i>Malaysia*</i>	<i>Slovenia</i>
<i>Belarus</i>	<i>Gambia, The</i>	<i>Mali</i>	<i>South Africa</i>
<i>Belgium</i>	<i>Germany</i>	<i>Mauritania*</i>	<i>Spain</i>
<i>Bolivia*</i>	<i>Ghana</i>	<i>Mexico</i>	<i>Sri Lanka</i>
<i>Botswana*</i>	<i>Greece</i>	<i>Moldova</i>	<i>Suriname</i>
<i>Brazil*</i>	<i>Guatemala</i>	<i>Morocco</i>	<i>Sweden</i>
<i>Brunei*</i>	<i>Guinea</i>	<i>Mozambique</i>	<i>Switzerland</i>
<i>Bulgaria</i>	<i>Guinea-Bissau</i>	<i>Namibia</i>	<i>Syria</i>
<i>Burkina Faso</i>	<i>Honduras</i>	<i>Netherlands</i>	<i>Tanzania</i>
<i>Cameroon</i>	<i>Hong Kong*</i>	<i>New Zealand</i>	<i>Thailand</i>
<i>Canada</i>	<i>Hungary</i>	<i>Nicaragua</i>	<i>Togo</i>
<i>Chile*</i>	<i>Iceland</i>	<i>Niger</i>	<i>Trinidad & Tobago*</i>
<i>China*</i>	<i>India</i>	<i>Nigeria</i>	<i>Tunisia</i>
<i>Colombia</i>	<i>Indonesia*</i>	<i>Norway*</i>	<i>Turkey</i>
<i>Congo, Dem. Rep.</i>	<i>Iran, Islamic Rep.*</i>	<i>Oman*</i>	<i>Uganda</i>
<i>Congo, Rep.</i>	<i>Ireland*</i>	<i>Pakistan</i>	<i>Ukraine</i>
<i>Costa Rica</i>	<i>Israel</i>	<i>Panama*</i>	<i>United Arab Emirates*</i>
<i>Cote d'Ivoire</i>	<i>Italy*</i>	<i>Papua New Guinea</i>	<i>United Kingdom</i>
<i>Croatia</i>	<i>Jamaica</i>	<i>Paraguay</i>	<i>United States</i>
<i>Cyprus</i>	<i>Japan</i>	<i>Peru*</i>	<i>Uruguay</i>
<i>Czech Republic</i>	<i>Jordan</i>	<i>Philippines</i>	<i>Venezuela, RB</i>
<i>Denmark</i>	<i>Kazakhstan*</i>	<i>Poland</i>	

Note: (*) country with one or more Sovereign Wealth Fund

Appendix Table 3

Instrumenting Fiscal Rules and Fiscal Councils

	Expenditure Rule		Budget Balance Rule		Debt Rule		Fiscal Council	
	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage
Democracy	0.310**	-0.0032*	0.0817	-0.0037*	-0.0008	0.0032*	0.845***	-0.0005
Federalism	-1.156	0.00201	2.777**	0.0748*	-0.212	0.121***	-1.797	0.044***
Checks and Balances	-0.136*	0.012***	0.154***	0.00143	-0.0137	-0.0029	0.0699	0.0017
Government Stability	0.0445	0.00182	0.0116	-0.0014	0.0617	0.00434*	-0.316***	-0.005**
Monetary Union	0.875*	0.112***	-2.967**	0.0748***	-1.355*	-0.0005	4.644**	0.034**
Fixed Exchange Regime	-0.462	0.0485***	-0.575	-0.139***	1.079***	0.0111	-0.625	-0.016
Inflation Targeting	0.557*	0.0709***	1.108***	0.126***	1.815***	0.132***	3.309	-0.036***
Financial Openness	2.637***	0.0989***	2.314***	0.223***	-0.370	0.0568***	5.761***	0.146***
Financial Development	0.0679	-0.020***	0.563**	0.020**	0.323	0.0299***	2.453***	-0.008
Economic Development	2.209***	0.0308***	1.375***	-0.014**	-0.551	-0.0498**	3.655**	0.029***
Dependency Ratio	13.73***	0.0276	30.82***	0.256***	28.26***	0.366***	-46.89***	-0.153**
Resource Rents	-	-0.019***	-1.545***	-0.0102**	-0.374	0.0179***	-3.192***	-0.033***
Remittances	1.271***						0.340*	0.0189
Constant	-	-0.660***	-172.2***	-1.027***	-124.7***	-0.882***	102.81***	-0.036
	103.7***							
First Stage Instrument		0.171***		0.0213		-0.257***		0.325***
Observations	3060	3060	3060	3060	3060	3060	2,744	2,744
Countries							118	118

Note: * p<0.1, ** p<0.05, *** p<0.01