SUCCESS AND FAILURES OF SWFS ON THE MACROECONOMIC PERFORMANCE, TIME-VARYING OBJECTIVES AND FIRST LIQUIDATIONS OF SOVEREIGN WEALTH FUNDS

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Success and failures of SWFs

On the macroeconomic performance, time-varying objectives and first liquidations of Sovereign Wealth Funds

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Abstract

There are now more than 100 Sovereign Wealth Funds around the world and some exist for more than 50 years. Currently, they face headwinds due to the end of the commodity super-cycle and to gradual reduction of the global imbalances. We review what remains from their original definitions and discuss the SWFs' alternative institutional design for reaching their objectives (saving, stabilization and development). We find that SWFs are more heterogenous than ever. We then review the available literature on the assessment of their effectiveness in stabilizing the economy, economic development and long-term savings. We find that this is a severely understudied area. By extension, not all SWF have had a successful track-record and the world has moved into a period with regular SWF liquidations, which may be a new area research.

Keywords: Sovereign Wealth Funds; Resources management; Natural resource course; intergeneration equity

1. Introduction

Sovereign Wealth Funds (SWFs) exist for more than 50 years. According to the Sovereign Wealth Fund Institute, around 100 SWFs have been established during the last decades across the world, from high-income to low income, and from those rich in natural resources or export surpluses to those without, and from democracies to autocracies (Carpantier and Vermeulen,

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2018). However, SWFs, especially those funded by commodity exports, face headwinds, due to the ending of the commodity super-cycle and to the progressive reduction of global imbalances. In this context, we propose to offer a new perspective by focusing on four specific topics, all figuring future challenges for their home countries.

We first take a new look on the defining criteria and discuss the growing difficulty to get a general definition applicable to all SWFs. Heterogeneity is here more than ever. We then come back to the theoretical grounds wherein SWF draw their existence and various objectives (saving, stabilization, development) and discuss some key institutional specificities. As a third topic, we review the recent empirical assessments of the SWFs' macroeconomic performance. Such studies mainly focus on the effectiveness of stabilization, but only few addressed their effectiveness in terms of net savings or economic development. We finally shed some light on illustrative failures, by summarizing the recent SWF liquidations and by discussing the overvalued resilience of current institutions. Concluding, we identify what are in our view the most promising research questions that remain unsettled. This review is, by design, limited to four topics and can be read as a complement to recent overviews (Bernstein et al, 2013; Bortolotti et alii, 2015; Fotak et alii, 2017; Megginson and Gao, 2019).

2.SWF Heterogeneity

There is no SWF definition strictly applicable to all SWFs. Various authors have defined SWF differently, perhaps depending on their research objectives, and even a research institute dedicated to the topic has changed its definition over time.[3] Nevertheless, a general consensus emerges on some criteria that are relevant to understand the emergence and behaviour of sovereign wealth funds. We describe the main defining aspects of SWF through (1) the ownership of the assets, (2) their operational management and (3) their liabilities (Amar et alii, 2018; Megginson and Gao, 2019). The objectives, and resulting investment strategies, are presented separately in Section 3.

[3] Various articles refer to the description given by the Sovereign Wealth Fund Institute, http://www.swfinstitute.org, an industry body and consultancy. Its description and criteria has also expanded over time (e.g. compare the current description with those of an early version available at https://web.archive.org/web/20080213123234/https://www.swfinstitute.org/swf.php also see Ang (2012, p.97).

2.1. Ownership

Most analysts agree that SWFs are state owned. This is the sole part of the definition that has no exception so far. The origin of this ownership is due to the funding source. First, several SWFs started out as an organisational vehicle to manage state owned enterprises at an arms-length from daily government business, for instance, Singapore's Temasek (Adeakin, 2018).

The second source of funding is linked to the accumulation of foreign exchange reserves due to current account surpluses. Korea and later China are the exemplary cases of sovereign wealth funds funded by the desire to optimise the benefits from their central banks' accumulation of foreign exchange reserves. However, not all foreign exchange reserves are equal. Current account surpluses are not always due to general trade surpluses, but to specific exports or to capital inflows.

When the excess reserves are primarily due to the export of extracted mineral commodities, such as fossil fuels or valuable metals and minerals, we sometimes speak of commodity sovereign wealth funds. Oil and gas rich countries in the Middle East are specifically associated to such funds, and the first sovereign wealth fund established is the one of Kuwait in 1951, when it was still under control of the British empire. Several commodity SWFs have been established in recent times, specifically in low income countries in Africa and south-east Asia, following high oil prices in the early 2000 and new large discoveries, which were combined to large rents that had to be managed appropriately.

When excess reserves are due to capital inflows, the rationale for establishing a SWF is weaker. While India has large foreign exchange reserves, it has not established a SWF to date. Rather than goods exports, for India these reserves are due to portfolio investments and other international investment flows, which have proven prone to rapid capital flights under adverse circumstances. This gives an argument that India should not transfer its reserves to a sovereign wealth fund for long-term, potentially illiquid, investments for fear of a balance of payments crisis later (Sarkar, 2010).

2.2. Operational management

The way SWFs are integrated in the state institutional framework is another key characteristic. The difficulty lies in the need of giving the SWF some autonomy, but not at the cost of losing sight of the general welfare objective. Independently of the source of funding, and despite state

ownership, SWFs typically benefit from a relative independence from fiscal and monetary authorities. For instance, a fund within the Central Bank that manages foreign exchange reserves through buying and holding a portfolio of save international bonds is not considered to be an SWF. Neither would be a similar fund managed by the ministry of finance. However, when a portion of such funds is transferred to distinct organisation entity and given a set of criteria for managing the funds for financial and social objectives, we usually would define it as a sovereign wealth fund.

This autonomy can sometimes raise some concerns; typically for SWFs that have the explicit mandate to contribute to the development of the domestic economy through the financing of public infrastructure, such as roads, railways, electricity and internet networks. The issue here is that such developmental projects would typically be the responsibility of the finance and relevant infrastructure ministries. If such SWFs can decide independently from government development plans on what to invest, there is clear potential for mismatch with wider government policy and potential for wasteful spending.

SWFs also have nominal duty to make profitable investment, which should at least partly be to the benefit of the government budget. In some exemplary cases this is designated in a law, for instance the Chile Structural Balance Rule (where the fiscal revenue derived from copper price is based on forward-looking 10 year average price), or the Norwegian so-called spending rule (non-oil budget deficit should be on average 3 percent of the Norwegian SWF over time). Building on this, the IMF has developed an analytical framework designed to manage inflows and outflows under an authority with clear rules and objectives (Al-Hassan et alii, 2013).

2.3. Liabilities

SWFs tend to have very limited or no liabilities. Funds are granted by the government and, until recently, would not be used to attract additional funding for leveraging investments. True to the idea that a SWF is a savings funds, it consists only of assets fully owned by the government.

The criterion of liabilities is often used to differentiate SWFs from pension funds. Similar to the source of funding coming from individual contributors, a pension fund also has the nominal obligation to pay its contributors their pension benefits. A SWFs does not have such obligation.

More recently, some SWFs have experimented with opening the funding bases to outside investors (Lugo and Bortoni, 2017). This may be an effective way for funds targeting domestic investments, such that the government invests alongside multilateral and private investors to increase the size and number of projects. SWFs that invest alongside other investors or take on additional debt finance are said to be leveraged, since the invested capital is a multiple of the publicly owned capital. While the social benefits of such investments will be larger than if the fund would not be leveraged, the financial returns are split between all investors. We discuss this issue further below (section 3.5).

3.How and where to invest: the objectives of commodity SWFs

The economic theory of saving natural resource revenues is now well established in the literature (e.g. Hartwick, 1977; van der Ploeg and Venables, 2011; Cherif and Hasanoc, 2013; van der Bremer and van der Ploeg, 2013; Wills, 2018). In what follows we draw on these to provide a basic sense of the objectives underlying the creation of commodity SWFs. We concentrate on these since such funds tend to have the largest potential to be used beneficially for economic development and are the most numerous among SWFs. Nonetheless, while most theory on national saving funds focuses on the rationale of commodity exporters, their implications can be generalized to general surplus exporters. As non-renewable natural resources tend to be physically finite, current account surpluses may be finite in terms of time duration.

A country, through a sovereign wealth fund, can transform a finite stream of income into a potentially infinite stream of income through a well-diversified portfolio of international investments. The interest and dividends that this portfolio generates can be added to a government budget or reinvested. This common-sense rationale is formalized in economics under the ‘permanent income hypothesis’. This hypothesis can be derived with three pieces of information. Firstly, we have a finite stream of income, such as exhaustible natural resources. Secondly, we observe that people care a little more about today than tomorrow, i.e. the rate of discounting future values. Thirdly, something invested today will, on average, give a positive return tomorrow. Using this, it is said to be optimal to consume only a portion of the income

while investing the remainder, such that the investment returns in the future allow to remain at a higher level of consumption indefinitely. This result is not affected much by reasonable changes in the rate or return of investments or different preferences on future consumption that affect the discount rate.

However, the trade-off between consumption today or tomorrow is changed when reconsidering some crucially important underlying assumptions that are especially relevant for developing economies. Firstly, what if a country's income is expected to grow significantly over time, for instance when low income and emerging economies catch up over coming decades? Secondly, what is the consequence if world capital markets are not fully open, such that the rate of expected return in the domestic country may be different from the world average? And thirdly, what is the optimal strategy if the commodity returns are volatile and uncertain, for instance due to world commodity price fluctuation or uncertain volume of resource recovery, thereby transmitting revenue volatility into the government budget or the overall economy? We address these questions in the next three subsections and then summarise what these three aspects imply for the character and functioning of SWFs.

3.1. SWFs in low income countries

Rather than a 'permanent level of income', we may believe that low income countries will demonstrate convergence in their income levels, independent of their resource wealth. This implies that future generations will be better off than current generations due to relatively faster economic growth. Under this hopeful setting, the argument can be made that current consumption of commodity revenues can be higher, benefiting current generations, and tapered off towards the future, where future generations will be at least as well off due to general economic progress (van der Ploeg and Venables, 2011). This argument is especially appropriate when some of the countries with the lowest average income and highest poverty rates would otherwise be advised to keep billions US dollars' worth of savings from natural resource exports in foreign investments.

The counter argument, touching on political economy, is that distributing money to the poorest in society may not be straightforward if not everyone is fully identified with a known bank account, or if increased income just raises prices of all goods to the same amount, or replaces incentives for education and work, or is captured by government institutions through graft and

corruption. Therefore, the successful implementation of a policy to distribute revenues more towards current low-income generations relies on socio-economic and political factors that are often confounded with other institutional causes of low incomes.

For SWFs, the consequence of early consumption of resource revenue is that there is relatively little saving in early stages of resource exploitation, as the wealth of natural resources will be mostly consumed, e.g. through imports of consumption goods, or invested in the domestic economy, which we describe next. In summary, there is some economic rationale for a resource rich low-income country to not establish a SWF or to keep it relatively small.

3.2. Domestic vs international returns

The second question asks what the consequence is if the country that earns the revenues is not fully integrated with the world economy through fully open capital markets. Generally, it can be assumed that when an economy does not allow international capital flows to enter its economy, a divergence emerges between the average rate of return of investments domestically relative to the rest of the world. Moreover, if capital is scarce domestically, rates of returns on capital would on average be higher relative to the rest of the world and specifically relative to developed economies such as the US and Western Europe (in open capital markets, such divergence would disappear).

Hence, savings from export earnings, such as from natural resources, could potentially be more profitably invested in domestic investment projects than in internationally low yielding debt. This argument could be used against policy proposals to establish a sovereign wealth fund, proposing instead that the national government can use the funds beneficially through investment projects in the domestic economy. Alternatively, this argument can be used to allow a SWF to invest in domestic projects, not just internationally.

Again, some considerations on the political economy side are appropriate. The choice of investable projects in the domestic economy may give rise to opportunities for corruption or political issues on regional or demographic distribution of the funds (e.g. by religion, ethnicity, or any other political grouping).

3.3. Volatility of revenue and economy

The question of how to manage volatility of the revenue is especially relevant for governments budgets that rely strongly on the revenue. Revenue volatility can affect an economy in multiple ways. Firstly, the government may create annual budgets using a specific level of the resource price with a projected volume of extraction. Unexpected drops in the price or extraction volumes can potentially lead to large budget deficits that need to be covered by foreign borrowing. Alternatively, to avoid the deficit the government may cut on spending, which will directly affect the rest of the economy.

Secondly, boom and bust cycles of the resource sector can also spill-over to the wider economy through backward and forward linkages with other industries. Over the longer-term, a resource sector may become a dominant sector in a economy, which could become problematic once resource run out (Corden and Neary, 1982; Krugman 1987). Therefore, a SWFs can be a useful policy option to mitigate against the so-called `Dutch Disease' phenomenon.

In the short to medium term, people and businesses generally prefer a less cyclical and more balanced economy over time, which creates a level of predictability that allows for planning and facilitate savings and investment decisions. Theory on savings suggests to increasing the level of savings in presence of unpredictable variability relative to the case where future revenue is perfectly known and certain. This additional 'pre-cautionary savings', allows to top-up future income in case of severe unexpected shortfalls of revenue.

A major statistical issue is that many commodities, and in particular the oil prices, have close to unpredictable price movements, implying that the price level is hard to predict, and periods of stable prices may be followed by periods of high volatility. Therefore, there is some difficulty in deciding on the level of precautionary savings, as well as the right moment when governments should draw on these savings, especially since calls from the public are likely to encourage a earlier drawing than might be prudent.

3.4. Three objectives of sovereign wealth funds

The main savings argument combined with these three economic contexts (income level of an economy, domestic investments, and revenue volatility) give rise to three distinct objectives

for a potential sovereign wealth fund (Venables and Wills, 2016). Firstly, a savings fund for future generations with a diversified portfolio mostly in foreign assets. These investments could very well be in riskier and less liquid asset classes such as equities and direct stakes in companies not listed on a stock exchange, since at the long-term horizon these are likely to offer a higher rate of return. Such a fund could easily be run at arm's length of a national government, since its day-to-day operations does not interact with that of the government. Some broad guidance on the style of investment and appropriate companies could be set, but a finance ministry would not be expected to actively manage and approve each investment.

Secondly, a fund dedicated to domestic investments to spur domestic economic growth. Investments are likely to be focused on infrastructure, education and health care provision, which will all carry strong social-economic returns and facilitate future economic growth (Amoako-Tuffour, 2016). Such public goods tend not to be supplied through private parties, but public investment will be beneficial to the economy in the long run. For such investment, coordination with the national government would be more critical, and the role of finance ministry and other political bodies would be much larger. A SWF can hardly decide its own infrastructure projects without eyeing other infrastructure projects planned by the government. On the other hand, if the finance ministry uses the sovereign wealth fund as a piggy bank for its favoured projects, then it is unclear why the funds should be held in an organization that is nominally separate from the government budget.

Thirdly, the volatility of revenue could be addressed to a so-called volatility, stabilization or liquidity fund. This fund could be used to compensate for shortfalls in the government budget or wider cyclical effects due to commodity price movements that are exogenous to domestic reasons. In this case, the point to use its fund is a political decision, although some metrics may be used. Wills (2018) argues that a volatility fund must be left alone and only its returns used, but this does not seem how the concept of a stabilisation fund is implemented in reality. For instance, in Chile the finance minister, while prudent in its timing, drew on the stabilisation fund to finance additional public spending during a recession.

In practice various countries or regions apply different combinations of these three functions. For instance, Bassey et al. (2014) and Oshionebo (2017), discuss the case of Nigeria's Excess Crude Account (for short term gains and shortfalls, and Sovereign Wealth Fund for longer term investments. Van de Bremer and van der Ploeg (2016) present the case for the oil rich Canadian province Alberta. In a speech the central bank governor of Trinidad and Tobago lucidly sets

out the same case for a stabilisation function of the economy in case of long depression in oil revenues, and a heritage function for the benefit of future generations (Williams, 2007).

3.5. Discussion

From a politician's point of view, a fund for domestic strategic or structural investments for long term economic development is thought to be the most attractive of the three functions. Tangible investment may have immediate political pay-off, in contrast to funds for the benefit of future generations. Perhaps unsurprisingly, recently, a substantial number of proposals have been made by international organisations and national governments to set up strategic development funds with the purpose to invest in infrastructure or 'critical' industries (where 'critical' is up to the government's determination).[4]

The key difference between strategic development funds and sovereign wealth funds, apart from exclusive focus on domestic investment, is their funding. These funds are (often) not financed by resource revenue or profits from state own enterprises, but with taxes, and leveraged with funds from outside investors, often institutional investors looking for long-term investments. The basic premise can be sound, and successful (Clark & Monk, 2015), perhaps especially if capital constraints of states can be circumvented with the inclusion of outside investors (Schena, 2017; Schena et alii, 2018; Arezki and Sy, 2016). Halland et alii (2006) and Gelb et alii (2014) emphasise that unless the institutional structure, accountability and objectives are well clarified, such funds run the risk of crossing with usual state activities of public goods provision.

As was hinted above, all of the above may sound quite reasonably, but also relies heavily on an often-implicit assumption: good quality of government, rule-based public management and absence of special interest or divided constituencies (van der Ploeg, 2011; Amaoko-Tuffour, 2016). In short, the underlying assumption is that a country is not subject to the (political) resource curse, which finds that resource rents undermines the rule of law, democracy, and responsible government (Robinson et alii, 2006; Ross, 2015; Venables, 2016). One implicit reason for the advocacy of sovereign wealth funds in the past may have been that saving funds

[4] Some examples include, The Netherlands (https://www.nrc.nl/nieuws/2019/09/20/ineens-strooit-mister-nein-met-miljarden-a3974163), South Africa (https://uk.reuters.com/article/uk-safrica-swf-idUKKBN1KZ17E), Germany (Gross and Mayer 2012), Europe (https://www.ft.com/content/033057a2-c504-11e9-a8e9-296ca66511c9) also EIB/EIF.

with investments held in foreign assets could improve transparency on the use of resource revenues, in contrast to the disappearance of funds through graft and wasteful spending by governments or state-owned resources companies. Now the attention of policy discussions is shifting again to domestic investment funds, but it is not immediately clear that the underlying issues have been resolved. Cases of political interference, or outright malpractice, fraud, and stealing from such funds abound, including from Nigeria (Dixon & Monk, 2011; Adeakin 2018), Malaysia (Lai, 2012; Gabriel, 2018, Hope and Wright, 2018), or unwise investment choices for political reasons (e.g. the Alberta Heritage Fund as argued by Morton and McDonald, 2015).

4.Macroeconomic performance

Recent surveys on SWFs typically cover topics such as the SWF definitions, their institutional arrangements, especially the influence of politicians in the decision making process, but also their investment strategies (portfolio diversification, interdependence with national macroeconomic profile, level of ownership) and their impact on the targets including on the valuation and corporate governance of the targets (Bernstein et alii, 2013; Fotak and Megginson, 2015; Fotak et alii, 2017; Megginson and Gao, 2019). There is, however, a critical topic that so far has been surprisingly underweighted in most surveys: are SWFs successful in fulfilling their objectives of long-term development, macroeconomic stabilization and intergenerational wealth sharing?

A first wave of pioneering global empirical studies has been carried out. Time has come to take a first critical view on the genuine SWF benefits but also on their defects/deficiencies. We find so far two categories of empirical papers. The first category covers those papers focusing on the impact of SWFs on the public expenditures (level, volatility, procyclicality). The second category includes papers designed to measure the impact of SWFs on the real exchange rate (size of misalignments or degree of isolation from terms of trade shocks). The papers discussed below are synthetized and reported in Table 1.

4.1. Public expenditures

The research papers that aim to assess quantitatively the role of SWFs on economic volatility, that is, their ability to smooth the public expenditures by attenuating the effects of revenue fluctuations, rely on different set of countries (natural resource countries, oil exporting countries, regional subsets) on different time windows and on different methodologies (see Table 1).

The simplest approach consists of comparing the volatility of fiscal revenues with the one of fiscal expenditures. Medas and Le Borgne (2007) focused on a homogeneous sub-group, the Pacific Island countries (Kiribati, Timor-Leste, Papua New Guinea, Nauru, Tonga, Tuvalu, Marshall Islands, Micronesia, and Palau) and concluded, based on comparative statistics, that accumulating revenues in a fund (so removing it from the budget) does not necessarily decrease the size or volatility of public spending.

The issue with these results is that is hard to disentangle the effect of the SWF with other characteristics of these economies. Another approach was then considered based on comparing the level of the public expenditures before and after the establishment of a SWF, in view of controlling for country specific factors (fixed effects). Bagattini (2011) implemented this empirical analysis on a set on 12 countries with SWFs over the period 1992-2007 and came to the conclusion that the existence of stabilization funds is correlated with a lower level of public spending and with high fiscal sustainability (as measured by an original indicator variable summarizing stabilization and saving virtues).

Other variables, potentially correlated with the existence of the SWF, could have an effect on the volatility of public spending. To account for potential omitted variables bias, a more formal econometric setup has been considered in other studies such as Sugawara (2014), Koh (2017) and Mohaddes and Raissi (2017). Sugawara (2014) considered, for a panel of 68 resource-rich countries over 1988-2012, a fixed-effect estimation setup incorporating political, financial and economic control variables, while Koh (2017) focused on a panel of 42 oil-exporting countries over 1960-2014 by using vector autoregression techniques. Both found that the volatility of public spending is smaller in countries that establish a SWF (13 percent lower according to Sugawara, 2014) and particularly in countries with high institutional quality (Koh, 2017).

Instead of focusing on public spending, we can also assess the stabilization effect of SWFs by considering alternative macroeconomic variables such as the level of investment, GDP growth

or the real exchange rate. Contrary to the above discussed papers, Mohaddes and Raissi (2017) interacted an SWF dummy with the commodity terms of trade volatility. Based on a panel of 69 commodity dependent countries over 1980-2014 and using a cross-section augmented autoregressive distributive lag model, they found that the negative impact of commodity terms of trade is lower in countries with an SWF, the dampening effect operating through lower accumulation of physical capital and lower TFP. Their results supported the effectiveness of SWF in smoothing the effects of commodity price volatility.

In brief, most of these studies correlate the establishment of SWF and more stable macroeconomic indicators. Importantly, this correlation was documented to be stronger in contexts of high institutional quality (Koh, 2017; Mohaddes and Raissi, 2017).

4.2. Real exchange rates

The real (effective) exchange rate (REER) of commodity exporting countries is often found to be influenced by the commodity terms of trade (see the commodity currency literature, such as in Cashin et alii, 2004, and Bodart et alii, 2012). Different empirical approaches can be considered for assessing the role of SWFs. We can, firstly, study the impact of SWFs on the volatility of the REER, or secondly, the impact of SWFs on the transmission of commodity terms of trade shocks to the real exchange rate, or thirdly, assess the role of SWFs on the degree of misalignment of the real exchange rate.

For the first approach, focusing on the volatility of the real exchange rate, we find conflicting results in Shabsigh and Ilahi (2007) and Koh (2017). The latter used, as discussed above, panel vector autoregression techniques on a sample 42 oil-exporting countries from 1960 to 2014, and found that oil funds are associated with reduced volatility of the real exchange rate in countries with low institutional quality, while the former examined whether “oil funds bring macroeconomic stability” from a 30-year panel data set of 15 countries and found that the negative association between the presence of an oil fund and volatility of the real exchange rate is only “statistically weak”.

More in line with the commodity currency literature perspective, Aizenman et alii (2012) studied the buffer role of international reserves in the transmission of shocks from terms of trade to real exchange rates in Latin American countries over the period 1970-2007. They found that active reserve management not only lowers the short run impact of commodity terms of

trade shocks significantly, but also affects the long run adjustment of REER, effectively lowering its volatility. Since international reserves traditionally do not include assets held by (semi-) independent sovereign wealth funds, they looked more closely to the specific case of Chile where a copper fund was established in 1985. They showed a break in the transmission mechanism between commodity terms of trade shocks and real effective exchange rate starting in 1985. Looking more closely to SWFs in the same sample, Aizenman and Riera-Crichton (2014) documented "a substitution between reserves and SWFs, where SWFs take over the buffering role of the REER and the real GDP during the Great Recession and the post-Great Recession period."

INSERT TABLE 1 HERE

Finally, and originally, a third approach assesses whether energy funds help in reducing the volatility of real exchange rate misalignments, by dampening the domestic transmission of international energy prices. Raymond et alii (2017) focused on 24 energy-exporting countries over the period 1980-2010. Relying on panel cointegration tools, they determined a measure for REER misalignment and found evidence that establishing a SWF is associated with a reduction in the volatility of REER misalignments. Unfortunately, estimation of misalignments relies on strong assumptions on what the fundamental real exchange rate should be. Raymond et alii (2017) based their fundamental values on a long run proxy of the commodity terms of trade, a choice that can be questioned.

5.SWF failures

Although nothing is definitive, some SWFs are clear successes. The Norwegian Government Pension Fund Global is the largest in the world in absolute value, the Timor-Leste Petroleum Fund is the largest in terms of domestic GDP. Both clearly contribute to a smoother government consumption and to intergenerational equity. The Chile's SWF, together with strict fiscal rules, has been documented to act countercyclically and contribute to macroeconomic stabilization. Singapore, Malaysian and Chinese SWFs have aimed to reduce the social cost of excess foreign reserves by opening the doors to higher yield investments.

Still, these nice-to-share-experiences should not hide the less convincing ones. SWFs are not all successful stories. They were sometimes not justified economically or not supported by an appropriate institutional setting (governance, fiscal rules).

We document in this section some anecdotal developments that illustrate that SWFs are not all here to last. These examples give also the opportunities to shed an original light on issues that might become more common in the future. Indeed, SWF countries might well have to face headwinds in the coming decade. Firstly, the commodity super-cycle has ended, and secondly, global imbalances, which were the main factor behind the establishment of SWFs, are expected to decline in a context of trade war and potentially rising protectionism. If SWFs incomes decline, we might see progressive transfers of their assets to government budget and progressive depletion of their balance sheets.

We list in Table 2 the sources of SWFs difficulties. For some of them, these difficulties even resulted in the liquidation of the SWF. We can identify problems related to two sources: mismanagement, adverse economic circumstances.

5.1. Mismanagement

Mismanagement is ultimately rooted in corporate governance problems. Rules on deposits and withdrawals are changed over time due to budgetary pressures. As a first example, the Papua New Guinea's former Mineral Resource Stabilization Fund (MRSF) was established in 1974. Poor integration with budget and fiscal policy led to large fiscal deficits and public debt. Rules on deposits and withdrawals were changed over time in the face of budgetary pressures. Moreover, the assets were used as collateral for new borrowing and to repay debt. The MRSF subsequently closed in 2001 (IMF, 2010; Medas and Le Borgne, 2007). Similarly, in Ecuador, the Stabilization Fund for Investment and Debt Reduction was founded in 2002. Several sub-funds with extremely complex revenue earmarking rules limited the margin for budget flexibility and led to fragmented cash management. The fund was abolished in 2005. In Chad, the Fund for Future Generations, established in 1999 was abolished in 2006 to streamline the fiscal policy framework and to increase flexibility in the government's liquidity management.

Mismanagement also affected some Pacific island funds. As noted by Medas and Le Borge (2007), "the Nauru and Tonga funds have been almost depleted due to risky investment decisions and mismanagement, as well as the financing needs of the budget." The portfolio of

the Tonga Trust Fund, which was established in 1988, consisted mainly of investments in three US companies active in the life insurance, energy and internet businesses. As for Nauru, after its independence in 1968, a sovereign wealth fund, the Nauru Phosphate Royalties Trust, was established to manage the revenues from the phosphate industry. The size of the SWF, at its peak of USD1billion in 1991, was modest as for international comparison, but huge in relative terms given its 14.000 inhabitants. Once the phosphate mines were depleted, the SWF progressively shrinked. Because of mismanagement and depredation of capital (high government expenses, bad investments in real estate, shipping and air services), the island finally went bankrupt. The country, which was once nicknamed the Kuwait of Pacific, has now a GDP per capita of around USD 8500 only (Cox, 2009; Ang, 2012).

Nigeria has established in 2011 a set of three new SWFs with stabilization, future generation and infrastructure objectives, respectively. These funds were designed to increase transparency and make sure that the nation's resource wealth would not be misappropriated (Bortolotti et alii, 2015). Despite, the new institutional setting, in 2014 the fund was found to be depleted by USD 700 million, and remains subject to heavy controversies on its compatibility with the national Fiscal Responsibility Act guaranteeing a balance between federal and regional interests (Venables, 2016). We finally note that Cameroon decided, at the start of oil production in 1977, to create an extra-budgetary account ("Compte Hors-Budget") to manage oil revenues. The objectives of this structure were in line with those of SWFs but were also associated to lack of transparency and corruption (Gauthier and Zeufack, 2010).

If the good management of resource windfalls sometimes go through the set-up of a SWF, SWF themselves are only effective if an appropriate corporate governance offers the right framework for good management. As was documented above, the macroeconomic performance of sovereign wealth funds depends on institutional quality and corporate governance.

5.2. Adverse economic circumstances

Mismanagement is not the only difficulty of SWFs. We note that some SWFs were depleted or substantially affected by factors leading to a change of objectives. As a first example, the National Pensions Reserve Fund was created in Ireland in 2001 and lost its mandate of investment in 2014. Initially designed to support the funding of pension liabilities, which are expected to increase substantially from 2025 onwards, the fund ultimately mainly served to bail out the Irish banks during the 2008-2010 banking crisis. Of the 23 USD billion, 20 were

transferred for recapitalizing Allied Irish Banks and Bank of Ireland. The remains of the fund were transferred in 2014 to the newly established Ireland Strategic Investment Fund.[5]

Brazil set up an SWF, Fundo Soberano do Brasil, in 2008, initially infused with USD 6 billion. At the end of 2017, it only marginally increased, reaching USD 7 billion. Given the large public foreign debt, close to USD 1 trillion, the government decided to shut it down in 2018 and transferred the money toward repayment of foreign debt. Assets of SWFs were also partially diverted from their initial objective in emergency situations related to international sanctions, for instance in the case of Iran and Russia.

As a third category, we illustrate this source of difficulty with the specific case of Alberta where the investment strategy raises questions. The Alberta Heritage Savings Trust Fund was established in 1976 and designed to receive 30 per cent of the province's non-renewable

resource revenues. Of the total assets, 65 per cent, was designated for its Alberta Investment Division, whose mandate was to "strengthen and diversify the economy of Alberta." This SWF still exists, with USD17 billion in March 2019, but also illustrates the difficulties faced by SWFs with domestic development mandate. Morton and McDonald (2015) show that diversification attempts globally failed, noting that the government had lost an estimated USD 2.3 billion on various initiatives and list what they call the "dirty dozen" of most costly diversification projects. This experience reminds that few research sheds light on the diversification effectiveness of SWF development strategies (see Fortescue, 2010, on Russia).

INSERT TABLE 2 HERE

Finally, we consider the case where liquidation results from a countercyclical spending policy. The Russian Reserve Fund was created in 2008 when the Russian Stabilization Fund was split into a Reserve Fund, designed to smooth government energy revenues, and a National Wealth Fund, mainly designed to support the pension system. This fund was closed on 1st January 2018. This closure might be seen as the natural consequence of a long-standing countercyclical stance in a context of depressed commodity prices. Determining whether the speed of depletion is appropriate is a complex issue far from settled.

5 "Ireland's sovereign wealth fund relaunches with €1bn investment", Financial Times, 4 May 2015.

The various examples discussed so far show that sovereign wealth funds are not exempt from difficulties and not immune to liquidation, without exception. Indeed, the largest sovereign wealth fund of the world has not failed at the time we write this article (and hopefully at the time you read it). Still, is the size of the sovereign wealth fund a guarantee that Norway will be economically safe for decades? We probably overvalue the resilience of the fund. So far, SWF have not been publicly submitted to stress tests as banks are now used to have. In case of market crash, it is difficult to know what losses such funds would suffer. The Norway SWF did the exercise in 2018 and "said that it could lose more than 40 per cent of its value in a single year because of a combination of a plunge in stock markets as well as a potential strengthening in the Norwegian krone."[6] In addition, the share of the government budget funded by SWF proceeds was around 18% in 2018. Assuming standard countercyclical government spending and a loss of competitiveness due to strengthening of the krone, it would not be irrational to consider that the fund would be absorbed within a decade.

Similarly, the Petroleum Fund of Timor-Leste stood at end-2018 at USD 15.8 billion (506 percent of total GDP and 848 percent of total non-oil GDP), covering more than 166 months of goods and services imports. Although the perspectives look sound and promising, as stated in the IMF Article IV 2019, active oil/gas fields are expected to be depleted in 2022. The sad story of Nauru should remind that success ultimately relies on good institutions and governance.

6. Research perspectives

The success of SWFs in fulfilling their objectives has been so far under-investigated. A few studies, mainly related to the macroeconomic stabilization objective, have assessed the impact of SWFs on the country real exchange rates, on the smoothing of public expenses, but a lot remains to be done. We especially need to further investigate the contribution of SWFs to macroeconomic stabilization and intergenerational wealth transfers. First, in terms of macroeconomic stabilization, we still need to better know their contribution in tackling Dutch disease, in other words in supporting the non-commodity related exporting industries. As was

[6] "Fears over future market crash stalk Norway's $1tn oil fund", Financial Times, 11 March 2018.

illustrated by Morton and McDonald (2015) for Alberta, their contribution to domestic development through diversification efforts still need to be assessed as well on a wider basis. Second, in terms of intergenerational transfers, looking at the size of SWF balance sheet is not enough. Foreign exchange reserves should also be considered, the level of private and public indebtedness, and more globally the evolution of the international net financial position of SWFs countries. Finally, SWFs are accessorily expected to contribute to a better governance in managing trade surpluses. For instance, Gabriel (2018) noted a poorer level of governance standards for the Malaysian 1MDB fund compared to the previously established national SWF Khazanah. Few papers address the potentially positive effects of SWFs on corruption/governance in their home country (Tsanis, 2013, concluded that SWFs have a positive effect, while Ayadi et alii, 2018 found no effect in Nigeria). We might wonder whether the paucity of papers evaluating the macroeconomic success of SWFs is due to insufficient data, to the lack of a satisfactory counterfactual scenario or to failure of finding any effect of SWFs.

Research efforts in this context are critical, as SWF countries might well have to face headwinds in the coming decade. Indeed, we are in the down phase of the commodity super-cycle and global imbalances, which were the main factor behind the establishment of SWFs, are expected to decline in a context of trade war and rising protectionism. If SWF incomes decline, we might expect to see progressive transfer of their assets to government budget, as was illustrated above for Russia and announced by Norway. As noted by Fotak et alii (2017), "it is also important to look at the channels that parent-country governments use to explicitly/implicitly force SWFs to support their domestic financial budgets, and to study how political pressure from domestic governments will affect SWF investment strategies."

Medas and Le Borgne (2007) noted 12 years ago that "from a domestic policymaker's viewpoint, a [...] fundamental question is whether SWFs can be a useful instrument to achieve domestic policy goals." Despite some successes documented to Chile, more than a decade later, the question remains a valid one that still needs to be convincingly and globally addressed.

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Table 1 Macroeconomic effectiveness of sovereign wealth funds

Authors	Comment	Sample	Time	Focus
Aizenman, Edwards and Riera-Crichton (2012)	They found that active reserve management not only lowers the short run impact of commodity terms of trade shocks significantly, but also affects the long run adjustment of REER, effectively lowering its volatility. They also look more closely to the specific case of Chile where a copper fund was established in 1985 and showed a clear break in the transmission mechanism between commodity terms of trade shocks and real effective exchange rate starting in 1985.	Latin America	1970-2007	Volatility of RER
Aizenman and Riera-Crichton (2014)	Looking more closely to SWFs in the same sample, they documented a "substitution between reserves and SWFs, where SWFs take over the buffering role of the REER and the real GDP during the Great Recession and the post-Great Recession period."	Latin America	1980-2007	Volatility of RER
Bagattini (2011)	The adoption of a stabilization fund is associated with improved fiscal performance	12 countries with stabilization funds	1992-2007	Fiscal sustainability indicator
Koh (2017)	Using panel vector autoregression techniques, they showed that oil funds are effective in reducing fiscal procyclicality in countries with high institutional quality. Nevertheless, oil funds are associated with reduced volatility of government consumption and the real exchange rate in countries with low institutional quality.	42 oil exporting countries	1960-2014	Volatility of public spending and of RER
Medas and Le Borgne (2007)	Based on comparative statistics they found that that accumulating revenues in a fund (removing it from the budget) does not necessarily constrain the size or volatility of spending.	9 Pacific Island countries	1990-2005	Volatility of public spending
Mohaddes and Raisi (2017)	Based on a CS-ARDL approach to account for endogeneity, they found was that CToT volatility exerts a negative impact on economic growth operating through lower accumulation of physical capital and lower TFP. On average, having a SWF can mitigate such negative growth effects, especially in countries that enjoy higher-quality institutions.	69 commodity-dependent countries	1981-2014	Real GDP per capita growth
Raymond, Coulibaly, Omgba (2017)	Relying on panel cointegration tools, they determine a measure for RER misalignment and find evidence that establishing a SWF is associated with a reduction in the volatility of RER misalignments.	24 Energy exporting countries	1980-2010	RER misalignments
Shabsigh and Ilahi (2007)	The results indicated a robust negative relationship between the presence of an oil fund and inflation and the volatility of broad money and prices in oil exporting countries but a weaker relationship with the volatility of the real exchange rate.	15 oil exporting countries	1973-2003	Volatility of RER
Sugawara (2014)	Spending volatility in countries that have established stabilization funds is found to be 13 percent lower in the main estimation. They showed that political institutions and fiscal rules are significant factors in reducing the expenditure volatility.	68 resource rich countries	1988-2012	Volatility of public spending
Tsani (2013)	The estimation results provided an initial assessment of the relationship between resource funds, governance and institutional quality by indicating that resource funds may positively affect the latter.	27 resource rich countries	1996-2007	Governance and institutional quality

Table 2 SWF illustrative problems

Country	SWF	Start	End	Problems	References
Alberta (CA)	Alberta Heritage Savings Trust Fun	1976	-	Bad performance of investments aimed at economic diversification	Morton and McDonald (2015)
Brazil	Fundo Soberano do Brasil	2008	2018	Transfers toward repayment of foreign debt.	SWFI, 23 May 2018
Cameroon	Compte Hors-Budget	1977	-	Governance failures	Gauthier and Zeufack (2009)
Chad	Fund for Future Generations	1999	2006	Governance failures	IMF (2010)
Ecuador	Stabilization Fund for Investment and Debt Reductio	2002	2005	Governance failures	IMF (2010)
Ireland	National Pensions Reserve Fund	2001	2014	Emergency (banking sector recapitalization)	Financial Times, 4 May 2015
Nauru	Nauru Phosphate Royalties Trust	1968	2005	Governance failures	IMF (2010), Cox (2009), Medas and Le Borgne (2007)
Nigeria	Nigerian Sovereign Wealth Fund	2011	-	Governance failures	Venables (2016)
Papua New Guinea	Mineral Resource Stabilization Fund	1974	2001	Governance failures	IMF (2010), Medas and Le Borgne (2007)
Russia	Russian Reserve Fund	2008	2018	Transfers to cover budget deficit (countercyclical); emergency (international sanctions)	Reuters, 10 January 2018
Tonga	Tonga Trust Fund	1988	-	Governance failures	IMF (2010), Medas and Le Borgne (2007)

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