Sovereign Wealth Funds and the COVID-19 shock: Economic and Financial Resilience in Resource-Rich Countries*

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Abstract

Commodity (primarily oil) funds are facing today the most severe adverse shock of their history. The COVID-19 pandemic has accelerated the crisis in oil-rich nations, already hit by low oil prices and declining hydrocarbon revenues. Governments of all stripes are tapping sovereign wealth and foreign exchange reserves to stabilize their budgets and mitigate the effects of the ensuing recession. The future of SWFs is at risk. In this article, we provide anecdotal evidence about SWFs' behavior during the COVID-19 crisis. We subsequently quantify, using updated national official statistics, the economic and financial resilience of the main resource-producing nations and link it to possible future trends in sovereign investment. We conclude that the COVID-19 crisis may induce profound changes in the industry. In the future, we expect SWFs to become more leveraged, to favor domestic over overseas investment, and to focus on broader economic and social impact than purely financial returns.

Keywords: Sovereign wealth fund, state ownership

(JEL G32, G15, G38)

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1. Introduction

Sovereign Wealth Funds (SWFs) are widely recognized as emerging key players in global finance. Boasting assets worth $6trn and an impressive concentration of wealth, these new financial powerhouses can foster long-term investment and stabilize markets thanks to their limited, or non-existent, liabilities.

The COVID-19 shock has shaken this conventional wisdom. With a handful of exceptions, including pension reserve funds and leveraged funds, many SWFs abruptly realized that, while lacking explicit liabilities, they are required to meet *implicit* liabilities: contingent obligations to their sponsoring governments when their economies are hit by severe, unexpected shocks. In the new scenario triggered by the outbreak of COVID-19, SWFs are being called on to both fill gaps in the public budget outright and to support their ailing domestic economies via corporate bailouts.

The current crisis sounds a wake-up call to the SWF community, taking some by surprise and finding others in a more proactive position. Indeed, some more farsighted governments charged their SWF with an explicit stabilization mandate and adopted risk management strategies, including asset/liabilities management tools and suitable governance solutions. However, most funds were conceived in the prevailing mindset of the "age of the great accumulation," where fiscal and trade surpluses were mounting under the push of the commodity super-cycle and the deepening of globalization.

SWF mandates have been already tested in the past, including during the severe commodity price shock in 2014-2015 and throughout the deceleration of global trade for Asian funds. The outbreak of the COVID-19 crisis, due to its black-swan features, intensity, and disruptive potential, may represent a deterministic pivot in the identity and strength/success of all SWFs alike.

SWFs are today hit by an asymmetric, double whammy. Commodity (mostly oil) funds are struck by an unprecedented price shock combined with a global demand slowdown induced by the spreading of the virus. Trade surplus (mainly Asian) funds, battered by the trade war-induced deceleration of global trade, have to grapple with new challenges in transports and logistics, potentially disrupting the global value chains that underpinned their growth during the golden age of globalization.

Against this backdrop, in this article we pose three, related questions: firstly, how are SWFs currently reacting to the COVID-19 crisis? More precisely, are they divesting part of their holdings to support the strained budgets of their sponsors, or are they buying the dip, opportunistically acquiring stakes at discounted prices in developed markets? Interestingly, this contrarian, countercyclical strategy would be consistent with the view of SWFs as a stabilizing force, in line with the role they played during the global financial crisis, whereas the former would corroborate the opinion that SWFs assets are callable at will, in spite of mandates, rules, and governance arrangements. Secondly, how resilient will resource-rich countries be in the face of the COVID-19 crisis? More specifically, how strong are oil producing nations' buffers in terms of pledgeable sovereign assets, resource diversification, and institutional capital at the outbreak of the crisis? And finally, will SWFs remain relevant players in a new scenario accelerated by COVID-19 and characterized by declining hydrocarbon revenues?

In this article, we try to provide some tentative answers to these questions, by reporting the updated albeit incomplete information about SWFs' immediate reaction to COVID-19, and by developing a new indicator of economic and financial resilience allowing a meaningful comparison across resource-rich

nations. We then conclude that the documented resilience will allow the identification of possible trajectories in the future evolution of the major oil-producing countries' SWFs.

2. Weathering the storm: SWF behavior during the COVID-19 shock

Estimating the losses on SWF portfolios of invested assets during the crisis is challenging. Firstly, SWFs are notoriously opaque. Secondly, the extreme volatility of worldwide financial markets makes estimates obsolete before the ink dries up. With this in mind, we attempt, in this section, to offer some up-to-date figures.

We should also note that US equity markets touched a bottom in late March, but have since recovered to the valuation levels of January 2020, shrugging off the crisis almost entirely. European and Asian markets have followed similar patterns, albeit with less pronounced recoveries—with the obvious exception of Chinese equities, that are hitting new record heights at the time of writing. Keeping this in mind, at the start of April, JP Morgan estimated aggregate losses for SWFs of over $1 trillion, on a basis of $8.4 trillion, or approximately a 12% loss.[1] These figures were consistent with our own back-of-the envelope estimates, based on the SIL SWF dataset: we estimated that the average allocation to liquid assets in SWF portfolios is about 60%, for a total of $5 trillion as of the end of 2019;[2] with our estimates of losses of 16%, we concluded that SWFs faced paper losses of $800 billion. This is also consistent with estimates by the Institute for International Finance, which reported losses of $296 billion for the Gulf SWFs, and of $114 billion for Norway.[3] Bloomberg reported similar estimates for Norway's losses, at $113 billion. No SWF was spared: media reports estimated (very conservatively) losses for Temasek at $23.5 billion,[4] For New Zealand's SWF at $2.5 billion, and for Australia's future fund at $3.5 billion.[5]

Stock market losses are certainly important, but even more relevant for the future of SWFs are estimates of the actual drawdowns by cashed-stripped governments—firstly, because drawdowns reduce assets under management, but also because they led to realized losses before the markets' (partial) recovery. The above-mentioned JPMorgan study claims that MENA SWFs are on course to sell up to $225 billion in equities. The Institute for International Finance estimates $80 billion in drawdowns from Gulf funds.[6]

The selloffs are largely motivated by the need to support the domestic economy during this crisis—and are often part of a plan of domestic retrenchment. The best example of a SWF fulfilling an implicit "rainy day" mandate is perhaps Singapore's Temasek. In June, Temasek recapitalized Sembcorp Marine, a domestic shipbuilding and repair conglomerate, for $1.5 billion. This follows a $13 billion injection into

[1] https://www.reuters.com/article/us-health-coronavirus-swf-analysis/oil-rich-wealth-funds-seen-shedding-upto-225-billion-in-stocks-idUSKBN21G05K

[2] This figure is consistent with the data reported in 2020 Invesco Global Sovereign Asset Management survey (https://www.invesco.com/igsams/en/country-splash.html).

[3] https://www.reuters.com/article/us-health-coronavirus-norway-swf/norways-wealth-fund-lost-114-billion-in-first-quarter-as-stocks-crash-idUSKBN21K1GZ

[4] https://www.scmp.com/news/asia/southeast-asia/article/3076678/singapore-temaseks-biggest-shareholdings-drop-nearly-us24

[5] https://www.pionline.com/sovereign-wealth-funds/australias-future-fund-reports-34-drop-quarter

[6] State street and IFSWF provided a recent account on the institutional investor behavior during the COVID-19 and an (anonymous) survey about SWF asset allocation changes. https://www.ifswf.org/publication/pandemic-no-panic-evidence-institutional-investor-flows

Singapore Airlines.[7] Another airline bailout, rumored by not yet finalized, seems to be taking place in Malaysia, where Khazanah Nasional is expected to bail out Malaysia Airlines. The Turkey Wealth Fund, in the meantime, has injected $3.1 billion into three state banks and purchased all public national insurance shares.[8,9] Overall, while the primary focus of SWFs remains overseas investment, domestic deals are increasing in size and frequency. According to the International Forum of Sovereign Wealth Funds, domestic deals accounted for 21% of total SWF investments (by value) in 2019—and that trend has only accelerated during the recent pandemic.

Other funds, like those based in Norway, Iran, Kuwait, and Nigeria, are facing withdrawals or increased dividend distributions to fund their respective governments. Norway, for example, has announced plans to withdraw a record $13 billion from its SWF in the spring; at the time of writing, media reports indicate that the planned withdrawal has since grown to $37 billion, far surpassing its fiscal rule of not spending more than the expected real return rate of 3% of petroleum revenue.[10] Kuwait Investment Authority, the world's oldest sovereign fund, after almost depleting is liquid General Reserve Fund, is grappling with the constitutional rule that prevents it from tapping the Future Generations Fund, and considering either a loan extension to the government or buying treasury-owned assets in order to boost liquidity.[11] Bahrain's Cabinet approved a memorandum recommending a one-off withdrawal of $450 million from the Future Generations Fund.[12] Abu Dhabi's Mubadala, in the meantime, is propping up assets in its neighborhood by coming to the aid of Dubai. It should be noted that this coincides with Mubadala issuing $4 billion in bonds.[13] Meanwhile, Ireland is using its SWF to fund a rescue package for small and medium-size enterprises.

Nor is all the domestic support purely financial. Temasek and Australia's Future Fund are among many funding scientific research with the aim of accelerating the development of a COVID-19 vaccine. In a similar vein, Russia's SWF is financing the production of the anti-rival drug Avifavir, which has been granted preliminary approval for the treatment of COVID-19 in Russia.[14]

Yet, amid the domestic retreat of most funds, others are seeing attractive buying opportunities at depressed asset prices—at least, relative to recent valuation peaks. In reality, compared to historical valuations, asset prices have remained high, with record-breaking price-to-earnings ratios even during the March low—and that is without accounting for the full drop in earnings that is likely to be revealed as second-quarter figures are reported. Current market valuations are a lot higher than in the aftermath of the global financial crisis of 2008-2010, when Qatar acquired stakes in Credit Suisse, Barclays, and

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[7] https://www.reuters.com/article/us-sovereign-wealthfund-economy-breaking/breakingviews-sovereign-funds-are-having-their-rainy-day-moment-idUSKBN23U0DN

[8] https://www.kitco.com/news/2020-06-26/Rainy-day-hastens-sovereign-wealth-funds-refocus-to-home.html

[9] https://www.reuters.com/article/turkey-insurance/turkish-insurance-shares-jump-after-wealth-fund-takeover-idUSL5N2CC2X4

[10] https://finance.yahoo.com/news/temasek-biggest-shareholdings-fall-23-074002271.html; https://www.ipe.com/home/swfs-never-waste-a-good-crisis/10046453.article

[11] See *infra*, p.5.

[12] http://tradearabia.com/touch/article/BANK/370290

[13] https://uk.reuters.com/article/uk-health-coronavirus-swf-idUKKBN23W2MP; https://uk.reuters.com/article/uk-health-coronavirus-swf-idUKKBN23W2MP

[14] https://www.reuters.com/article/us-health-coronavirus-russia-flights/russian-fund-steps-up-production-of-anti-viral-drug-approved-by-moscow-for-covid-19-idUSKBN2431RW

Volkswagen at bargain valuations. But that has not stopped Saudi Arabia's Public Investment Fund (PIF) from engaging in a buying spree exceeding $2 billion, in an amalgamation of new acquisitions. One sector that PIF has focused on is energy, somewhat counterintuitive to observers, given the previously stated goal of diversifying the country's dependence on oil-based assets—and the strategy of the fund appears constantly evolving, as PIF claims to be aiming for allocating 75% of its assets to the domestic market, but is currently acquiring assets abroad.[15] These acquisitions, totaling approximately $1.2 billion, include a $200 million stake in the Norwegian oil company Equinor, as well as undisclosed shares in Royal Dutch Shell, Eni, and Total, for an aggregate total of $1 billion stakes in those three firms.[16] While those acquisitions appear to have been driven by an information advantage in the face of volatile oil prices (a volatility which was induced by the KSA's own manipulation of oil production levels within OPEC), other acquisitions span a diverse set of sectors, and appear to be driven by a highly opportunistic strategy. Those include an 8.2% stake in cruise-ship operator Carnival, acquired for $369 million, a $300 million investment in the soccer club Newcastle United, as well as a $250 million stake in HDFC and $500 million in Live Nation.[17] Media reports have emerged of a large cash injection into the real estate developer Related, and new stakes in Boeing, Citigroup, Facebook, Walt Disney, and Marriott, but details are scant.[18] Nor are the investments limited to Western, developed, markets: June saw PIF investing in Jio Platforms, an upcoming Indian internet giant owned by oil-retail conglomerate, Reliance.[19]

While Saudi Arabia, via PIF, has certainly proven to be the most enthusiastic sovereign investor over recent months, it is far from alone. In an attempt to find attractive investment opportunities, SWFs are boosting their allocations to alternative asset classes. By June, SWFs had poured over $17 billion into venture capital funds, which exceeds their total allocation for the full-year 2019, according to PitchBook data. Among the big beneficiaries we find China's tech companies, including game developer and distributor Tencent, and video-streaming firm Kuaishou, both of which received funding from Singapore's Temasek via the Tencent Industry Win-Win Funds. In the meantime, Abu Dhabi's Mubadala took part in a $3 billion investment in Waymo, Alphabet's self-driving technology wing, and has invested in many health technology startup companies.[20]

The preliminary evidence of SWFs' immediate reaction to the COVID shock is therefore mixed. Some funds entered the crisis with abundant liquidity and acquired stakes in battered listed firms at discounted prices; others served as rainy days funds and stabilized their economies by filling domestic budget gaps. At any rate, SWFs of all stripes are reassessing their investment strategies in light of the new challenges posed by the COVID-19 crisis.

A fundamental aspect of this strategic review will be the consideration of the overall state of the economy, the public finance conditions in the new oil price scenario, and how the SWF can better serve the interest of their sponsoring governments to tackle the COVID-19 crisis and its long-lasting consequences. Despite their mandates and governance arrangements, SWF are not stand-alone institutions. Rather, they are

[15] https://uk.reuters.com/article/uk-health-coronavirus-swf-idUKKBN23W2MP
[16] https://www.wsj.com/articles/saudis-take-big-stakes-european-oil-companies-11586382353
[17] https://www.ft.com/content/ad8ea498-6982-478d-a16e-3948b8963076
[18] https://uk.reuters.com/article/uk-health-coronavirus-swf-idUKKBN23W2MP
[19] https://telecom.economictimes.indiatimes.com/news/public-investment-fund-to-buy-2-32-stake-in-jio-platforms-for-rs-11367-cr/76444076
[20] https://news.cgtn.com/news/2020-06-30/Sovereign-funds-pile-into-venture-capital-investments-in-2020-RKvUa5UAQ8/index.html

fiscal policy tools, fully integrated in the macroeconomic management of the country. The future role of SWFs in the domestic and global economy will thus be shaped by each country's present and future conditions, and by the economic and financial resilience achieved so far through the accumulation of oil wealth, effective resource diversification, and investment in institutional capital.

3. Measuring economic and financial resilience in resource-rich countries

Commodity funds in particular are currently facing the most severe adverse shock of their recent history. Even before the outbreak of the COVID-19 pandemic, prices of all major commodities (with the only exception of gold) were falling, suggesting the definitive end of a 20+ years super-cycle. The shale revolution and other technological developments in the conventional oil industry have significantly augmented both current and future potential global oil supply, obviating fears of oil depletion that simmered in earlier decades. According to the IMF (2020), declining population growth and slowing economic growth combined has led to a 2.5% decrease in annual global oil demand, with a cumulative impact of 100 million barrels per day from 1971 to 2016. The growth of global demand for oil (and gas) will most likely slow down in the next decades. Furthermore, the recent OPEC coordination challenges have shown that the organization's market power is progressively declining, with prices less sensitive to production cuts (see Garavini, 2020). The combination of the above-mentioned supply and demand effects suggest a significant future decline of oil prices and consequently hydrocarbon revenues. Due to drawdowns in foreign exchange reserves and SWF assets, the IMF forecasts that financial wealth in the GCC could be depleted by 2035, with significant differences across the six nations.[21]

The Economist predicts that Gulf energy exporters will earn in 2020 approximately half their oil revenues of 2019, which is expected to shrink the regional GDP by 7.3%.[22] Yet, COVID-19 is simply accelerating a trend that was present far before the current crisis. Oil revenues for the Middle East and North Africa fell from $1 trillion in 2012 to $575 billion in 2019; most forecasts for 2020 are at around $300 billion.[23]

The clearest example of this accelerating trend is Kuwait. The country is running a deficit estimated at 40% GDP.[24] A current political impasse between the government and parliament is leaving it unable to borrow. As a result, the government has drawn significant quantities from the General Reserve Fund, which is moving toward depletion.[25] There have been recent considerations of the country tapping the Future Generations Fund (FGF), negating its stated objective of accumulating wealth fund future generations.[26] Even before withdrawing capital from the SWF, the government had frozen its contributions to it. Three different plans, not necessarily mutually exclusive, are being discussed. Firstly, halting the pre-pandemic mandatory annual transfer of 10% of total revenue to the FGF. Secondly, amending an existing law that allows for up to 25% transfers in years of surplus. Thirdly, using FGF's assets

[21] https://www.reuters.com/article/us-gulf-economy-imf/gulfs-financial-wealth-could-be-over-in-15-years-imf-idUSKBN2002HZ
[22] https://www.economist.com/leaders/2020/07/18/with-oil-cheap-arab-states-cannot-balance-their-books
[23] https://www.economist.com/middle-east-and-africa/2020/07/18/the-end-of-the-arab-worlds-oil-age-is-nigh
[24] https://www.bloomberg.com/news/articles/2020-07-06/kuwait-s-savings-for-life-after-oil-may-be-needed-a-lot-sooner
[25] https://www.fitchratings.com/research/sovereigns/kuwait-15-04-2020
[26] https://gulfnews.com/world/gulf/kuwait/one-third-of-kuwaits-general-reserve-fund-is-gone-1.72427610

as collateral for a $7.2 billion loan that would be used to buy assets owned by the Treasury. In addition, in June, Parliament decided to transfer all of FGF's profits into general reserves.

In this rather bleak scenario, commodity SWFs are doomed. Transient, cyclical institutions rapidly rising in the surplus years, SWFs are rapidly falling subject to the tight budget constraints of low and declining oil prices. The COVID-19 shock and the ensuing global recession may only accelerate their long-term demise.

Indeed, the Gulf SWFs have effectively showing sign of change. Rather than tools for the accumulation of wealth and projection of soft power via trophy assets, they are embracing a new role as financers of economic diversification as their economies transition towards a future without a hydrocarbon-based revenue. Yet, generalizations are limited, given that commodity SWFs are heterogeneous, ranging from emerging to established funds and operating with diverse mandates, governance arrangements, and investment strategies. Importantly, the survival and future relevance of SWFs in their domestic economies will depend upon their countries' resilience in the face of the COVID-19 shock and the extent to which their sovereign assets are used as buffers.

In this section, we attempt to quantitively assess the economic and financial resilience of the largest commodity-rich countries. Due to data limitation, we restrict the analysis to the top 20 oil-producing, resource-rich nations, excluding Venezuela and Libya, countries for which recent, reliable, official statistical data are not available.[27]

Our definition of national economic and financial resilience aims to be comprehensive, tractable, and consistent. We use a holistic approach by combining fiscal accounts and balance of payments data for government marketable assets and liabilities, with overall indicators of effective resource diversification and institutional governance. We also include simple measures for various facets of resilience that we ultimately combine into a single indicator. We use official data from a main centralized source, the Institute of International Finance, ensuring consistent comparison across countries and over time. Variables and sources are described in Table 1. Given that our focus is on the most recent outlook of oil-producing nations, we use data from 2017-2019, leaving more historical analysis to further research.

Our final resilience indicator, that we label the Economic and Financial Resilience Index (EFRI), is based on the four pillars described below.

3.1 Pillar 1. *Adjusted Sovereign Wealth*

This pillar provides an estimate of each country's sovereign wealth relative to its borrowing requirements net of oil revenues. It broadly captures the number of years a government would take to exhaust its assets if maintaining a constant level of expenditure while facing an absence of oil revenues.

We calculate the *Adjusted Sovereign Wealth* as the ratio between a country's total sovereign (marketable) assets net of government short-term liabilities and the non-oil fiscal deficit. Sovereign assets include the central bank foreign exchange reserves (excluding gold); we employ this figure as an estimate of the country's SWF assets under management. While international financial institutions regularly report foreign exchange reserves, the level of disclosure regarding SWFs' asset size varies considerably across

[27] The United States, Canada, and China are also listed among the top oil producing nations but given the limited contribution of the hydrocarbon sector to the economy they are also excluded from the analysis.

countries. The data used in this article will refer to the consensus estimates collected by the Sovereign Investment Lab.

We assume financial resilience to be positively associated with the total amount of disposable sovereign assets available to the government in times of financial distress. Foreign exchange reserves are usually invested in ultra-liquid, safe assets: primarily highly rated government bonds that can rapidly be liquidated at low-cost to support either the exchange rate or the budget (or both). With the exception of countries with a full-fledged rainy-day fund (such as Algeria's Fonds de Regulation des Recettes) or SWFs with an explicit stabilization mandate (such as Kuwait's Reserve Fund or Nigeria's NSIA stabilization fund), most SWFs manage a multi-asset class portfolio with significant exposure to illiquid assets, including private equity, infrastructure, and real estate. The liquid share of SWF portfolios including cash, fixed income, and public equity tends to be around 60% and the recent trends have shown a stark decline, as most SWFs have shifted their asset allocation away from fixed income in favor of private markets (Bortolotti, Massi and Scortecci, 2019).[28] Evidently, vast portions of SWF portfolios are not callable at will by sponsoring governments, given statutory restrictions and liquidity constraints. Yet, the availability of abundant wealth stored in one or more SWFs contributes to a country's overall resilience both directly and indirectly, as the government can pledge SWF assets as collateral when issuing debt, improving ratings and thus reducing the cost of capital.

We partly consider net sovereign wealth by including short-term government debt in the numerator of *Pillar 1.* We assume that countries potentially vulnerable to a sudden shock are more resilient if they hold financial assets sufficient to cover all debt obligations falling due within the coming year.[29] This benchmark relates to the Greenspan-Guidotti rule, the most widely preferred benchmark for measuring vulnerability to capital account crises.[30]

In order to compute the *Adjusted Sovereign Wealth*, total net sovereign assets are scaled by the non-oil fiscal balance, a widely used measure of fiscal sustainability for resource-based economies, providing a perspective on the portion of the domestic budget insulated from cyclical fluctuations in commodity prices (Zakharova and Medas, 2009). A large non-oil deficit renders a country's economy less resilient to economic shocks, forcing painful adjustments in the form of government expenditure cuts and tax increases.

Table 2 reports the individual components of *Pillar 1*. On average, oil-producing countries own $113bn of foreign exchange reserves and have $230bn invested in their SWFs. SWFs' portfolios are thus, on average, twice as large as central banks' portfolios, suggesting that the creation of a SWF to manage oil wealth has been the policy of choice of most oil-producing countries. The most recent data suggest a growing gap, with an average growth in reserves of 2.7% over the 2017 to 2019 period as opposed to a 13% increase in SWF assets. As shown in Figure 1, Norway has allocated almost its entire oil rent to its SWF, the Government Pension Fund Global; the UAE followed the same route by creating several funds in the oil-

[28] *Sovereign-wealth funds face lean years*, The Economist, May 31, 2020. https://www.economist.com/finance-and-economics/2020/05/21/sovereign-wealth-funds-face-lean-years

[29] A strict definition of net sovereign wealth would obviously consider the entire government debt, and not only short-term liabilities. However, general debt tends to have a long maturity and this should not affect the short-term financial resilience, which is the main object of the analysis.

[30] An alternate measure of reserve adequacy is the value of three months of imports, broadly equivalent to short-term debt.

richest emirate of the federation, Abu Dhabi. The most notable exceptions are Russia, a country where, after colossal liquidations, the central bank vastly outsizes the SWF by assets, and Saudi Arabia, where SAMA is still the larger sovereign investor, even after accounting for the significant recent increase in PIF's allocations.[31]

The average non-oil fiscal deficit of our sample hovers at 16% of GDP and has shrunk by approximately 2% over the last three years, reflecting the significant consolidation efforts displayed by main oil-producing countries after the 2014-2015 price shock. Since 2017, on average government expenditure has been cut by 3% and non-oil revenues increased by 5.9%. As Figure 2 shows, with non-oil deficits larger than one quarter of their economies, the fiscal position of countries like Oman, Iraq, Kuwait, and notably Saudi Arabia is unsustainable in face of at-risk oil revenues. On the contrary, a fiscally prudent country such as Norway runs a 6.5% deficit covered by the annual returns of its behemoth SWF, the Government Pension Fund Global (GPFG), safeguarding a structural balanced budget.

Figure 3 ranks oil-producing nations according to the first pillar of resilience, *Adjusted Sovereign Wealth*. On average, without oil revenues, the accumulated financial assets allow for 7 years of funding budget deficits, at current levels, before being completely exhausted. Unsurprisingly, major differences surface in cross-country comparisons. Vast financial wealth combined with low-range non-oil balances boosts the value of the indicator in Norway and the UAE to 42 and 20, respectively. The median *Adjusted Sovereign Wealth* is only 2.6, indicating that financial resilience is a major issue for most countries in our sample. The asset side of government balance sheets of Angola, Oman, and Iraq appear especially fragile and worth less than the annual non-oil deficit.

3.2 Pillar 2. *Debt Ratio*

Debt issuance is one policy alternative that allows governments to avoid painful fiscal adjustments in the face of economic distress. Yet, this option is only viable for "unconstrained" issuers, countries with sound credit ratings, strong market access, and sustainable borrowing costs. Indeed, low levels of government debt can either reflect a government's inability to attract investors or sound fiscal policies adopted by governments able to balance their budgets. A very low debt ratio thus lumps together the most and the least appealing targets for investors in sovereign bonds.

The relation between a country's government debt and its economic resilience is therefore non-linear, but extant research reveals that, above a given threshold, public debt can jeopardize the growth prospects of the economy as excessive leverage can push a country to the verge of default.

The recent evolution of sovereign credit ratings and debt issuance in the GCC is an interesting case in point. Before the 2014-2015 oil shock, all countries in the region were rated "investment grade" by the three leading rating agencies. Then, in 2016-17, the first set of downgrades took place: Bahrain quickly dropped to non-investment grade, followed by Oman, while Saudi Arabia lost two notches on its rating. Countries with weaker financial reserves and limited appetite for fiscal reform were downgraded early as agencies took note of the risk, while more resilient countries such as Kuwait and the UAE maintained the same rating throughout. Qatar was downgraded by one notch only in 2018. Interestingly, the COVID-19

[31] https://www.arabnews.com/node/1681876/saudi-arabia

crisis did not trigger any further downgrades, with the exception of Oman, whose rating was reviewed down twice in 2020 to one notch away from a junk status.[32]

Increases in debt and foreign exchange reserve draw-downs are often quoted motivations in credit agencies' reviews of sovereign risk. As shown in Figure 4, since the oil downturn, the resource-rich nations in our sample experienced a marked increase in their debt as a share of GDP (i.e. the "debt ratios"). Most countries in our sample started with low initial debt levels and consequently display high growth rates. In the 2014-2019 period, the average government debt as percentage of GDP rose from 25.5 to 44.6%. Indeed, several GCC countries re-entered the international debt markets after long absences. Starting from a debt ratio lower than 5%, Oman and Saudi Arabia ended both the period with a ratio of 63% and 23%, respectively, a spectacular tenfold increase. Saudi Arabia alone issued $60bn of debt, making it the largest issuer in the region. In 2019 Oman made its foray into the international bond market, issuing a $3 billion sovereign bond.[33] Algeria and Kuwait similarly experienced very significant increases in their debt ratios. A few countries such as Angola and Bahrein were instead heavily indebted at the time of the oil crisis and added 70 and 53 percentage points, respectively, to their debt ratios, reaching critical levels of sustainability. On the other side, the emerging countries of our sample, together with UAE, Qatar, and Norway, did not increase significantly their exposure to debt.

The outbreak of the COVID-19 shock triggered a broad and marked rise in the rates of oil producing countries' credit default swaps (CDS), which are typically used to hedge against default. As shown in Figure 6, heavily indebted GCCs such as Oman and Bahrain experienced the largest increase. Within the UAE, Dubai's default risk also surged considerably, along with Saudi Arabia's. The impact of COVID-19 of has been to same extent more muted in Abu Dhabi, Qatar, and Kuwait. Interestingly, while for the latter group CDS premia quickly stabilized in the second quarter of 2020, default risk has reached a new, higher plateau in Oman, Bahrain, 6 Dubai, increasing the likelihood of a bailout from their less fragile neighbors. Among the non-GCC oil-producing countries, the crisis has brought Angola, an already heavily indebted country, to the verge of default. CDS premia skyrocketed in March and are still twice larger than the pre-crisis level as we write. Iraq, Nigeria, and Egypt all mark significant upticks, while the other oil producing countries' CDS premia remained under control, due to lower initial levels of debt.

3.3 Pillar 3. Resource diversification

Resource-rich nations are increasingly aware of the finite nature of their wealth and concerned about their economic sustainability in the post-oil era. With hydrocarbon sectors accounting for a very large share of GDP, exports, and government revenues, efforts have been made in order to diversify their economy away from oil to avoid the many issues related to resource dependency, including Dutch disease, procyclicality of fiscal policy, and other problems broadly related to the so called "resource curse" (Frankel, 2010).

The extent of resource diversification is a key dimension of a country's economic and financial resilience and it can be quantitatively assessed by different indicators. A widely used measure is the non-oil GDP. However, this variable may yield a misleading representation of resource diversification. Indeed, as we saw in the GCC, the non-oil economy has grown, as has the scale and diversity of goods and services

[32] https://www.fitchratings.com/research/sovereigns/oman-24-03-2020
[33] https://internationalfinance.com/oman-raises-3-billion-through-international-bonds/

provided. But most countries remain dependent on the flow of oil revenue that comes in through public spending. Consequently, the centrality of oil has in no way diminished. As forcefully stated by Banafe and McLeod (2016), the government injects demand paying with oil money, and the Keynesian multiplier generates additional demand at each round of spending. Demand then leaks away into savings and imports of goods or into remittances by expatriate workers. If oil revenues stopped flowing into the budgets, governments would have nothing to spend unless it raised money from local taxes, something that would decimate the economy.

More reliable measures of effective resource diversification are the share of non-hydrocarbon exports or the Hirshmann-Herfindal (*HH*) index, a normalized measure of one country's degree of export product concentration computed with the following formula:

$$HH_j = \frac{\sqrt{\sum_{i=1}^{n}\left(\frac{x_{ij}}{X_j}\right)^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}}$$

where

HH_j = Hirshmann-Herfindal index for country *j*

$x_{i,j}$ = value of export for country *j* and sector *i*

X_j = total value of export for country *j*

n = the number of sectors

An index value closer to one indicates that the country's exports or imports are highly concentrated on a few sectors—in the case of our sample countries, usually hydrocarbon-related. On the contrary, values closer to zero reflect exports or imports being more homogeneously distributed among sectors. In our sample, the correlation coefficient between the *HH* index and the non-fuel export share is -0.88, so we choose to stick to the former in the construction of EFRI, given that it is a more precise and more widely used metric (Imbs and Wacziarg, 2003) and available for all countries from a single centralized source (UNCTAD).

Figure 8 shows the ranking of the countries in our sample based on the most recently available HH index of export concentration. The sample average is 0.49 as opposed to the global average 0.35, suggesting a high level of concentration among oil-producing nations. It is worth noting that the average masks some successful diversification trajectories. In Figure 9, countries are ranked in terms of their export products diversification efforts observed over that last two decades, considering the long-term nature of economic transformation. Countries are ranked according to the difference in their latest (2018) and 2000 *HH* index. Oman and Iran exhibit the largest decrease in the index, immediately followed by the UAE. The resource diversification efforts put in place by the UAE paid off, and the country is the fourth more diversified economy in our sample, despite its substantial oil wealth. Evidently, the extent of diversification and economic transformation depends upon how much time has lapsed since the first major oil discoveries. The limited change observed in countries such as Angola and Kazakhstan are therefore unsurprising. Yet, Iraq, one of the historical oil producing nations, is caught with oil as its only viable resource in the

economy. Limited diversification has been achieved over the last two decades in Algeria and, importantly, in Saudi Arabia.

3.4 Pillar 4. Truman score of SWF governance

Finally, we complement the economic and financial dimension of resilience with a measure of a country's institutional quality in the management of sovereign assets. Truman (2009) developed a scoreboard to examine and promote the transparency and accountability of SWFs within and outside their countries. The scoreboard contains 33 elements (questions) grouped into four categories: i) structure of the fund, including its objectives, fiscal treatment, and whether it is separate from the country's international reserves; ii) governance of the fund, including the roles of the government and the managers, and whether the fund follows guidelines for corporate responsibility and ethical investment behavior; iii) accountability and transparency of the fund in its investment strategy, investment activities, reporting and audits; iv) and behavior of the fund in managing its portfolio and in the use of leverage and derivatives. The score ranges from 0 to 100. A higher Truman score tentatively indicates more clarity in the definition of mandates, consistency in the stated objectives of the investment strategy, comprehensive reporting, and overall efficient organization. Ceteris paribus, a country with a higher score is more likely to have the suitable stabilization tools to face a liquidity crisis stemming from an oil price shock, or to ring-fence the long-term savings tranche of the portfolio against the short-term needs of the government. More generally, the Truman score is strongly correlated with a country's institutional endowment in terms of democracy, rule of law, and corruption. As such, it can be interpreted as a proxy of the overall "quality" of government and fiscal policies, a fundamental ingredient of resilience in times of distress.

Figure 10 shows the last reported values of *Pillar 4* for year 2015. The average Truman score in our sample is of 58.85, against a global average of 62.1 (for 60 SWFs examined), suggesting a slightly lower institutional quality in oil producing countries. Stone and Truman (2016) document that the overall transparency and accountability in SWFs has improved over time, from an average score of 51 in the first survey carried out in 2007.

The almost-perfect score obtained by Norway, one of the most established democracies around the world is not unsurprising. The efficient governance structure of the GPGF, the world's largest SWF, has certainly contributed to the impressive growth of the fund's assets. Yet, we also find very large SWFs with average or below average Truman scores, such as UAE and Qatar. The above average value of emerging countries such as Nigeria and Azerbaijan are also noteworthy.

3.5 The Economic and Financial Resilience Index (EFRI)

Our aggregate measure of resilience is the mean of the standardized values (each with mean zero and standard deviation of one) of the four pillars for each year. Evidently, Pillar 2 (the debt ratio) and Pillar 4 (the HH export concentration index) enter the index with negative sign.[34] Table 2 presents the country ranking by the 2017-2019 average of EFRI. In figure 11, we plot the index over time.

[34] We had to deal with a few missing data for the Truman score. In this case, we replaced the missing data with the (standardized) mean (zero).

Table 3 shows the pair-wise correlation between our main variables of interests and the individual pillars. Overall, the individual components of the EFRI do not appear strongly correlated, partially supporting the view that they capture different aspects of a country's resilience. However, we observe a strong correlation between the size of the SWF and the *Adjusted Sovereign Wealth*, corroborating the idea that countries with a larger SWF are more effective in managing fiscal policies and controlling the budget. Across pillars, the only noticeable and statistically significant correlation (-0.41) is found between the *Adjusted Sovereign Wealth* and the debt ratio. Accumulated past savings providing strong returns, combined with more conservative fiscal policies, reduce the government's need to resort to debt. Yet, a large endowment of sovereign wealth represents also an invaluable collateral for successful debt issuance in terms of borrowing conditions and costs. It is for this reason that we claim that outstanding debt provides useful additional information about a country's financial resilience.

Due to data availability, we restrict the calculation of the EFRI to the 2017-2019 period. The analysis is mainly aimed at providing a snapshot of resilience just before the outbreak of the COVID-19 pandemic and not of its evolution over time. Even within a short time span, we document some visible strengthening in resilience in Norway, Kuwait, Azerbaijan, Russia, Qatar, and Egypt. The rebound in oil prices in 2018 and the stock market rally in 2019 may have pushed *Pillar 1* (*Adjusted Sovereign Wealth*) upward for countries with stronger exposure to public equity. Algeria, Bahrain, and notably, Angola, instead weakened considerably.

Angola is probably the most emblematic example of a country that was on a deteriorating trend before the current crisis—and whose economic situation was made even worse by the current shock. Angola's economy has been moving from crisis to crisis since the 2014 drop in oil prices, which reduced oil revenues from approximately 35% of GDP to below 18%. Facing the disappearance of its current account surplus and the risk of a shock to the exchange rate in the face of raising inflation, the government has introduced a policy of austerity coupled with raising taxes. Worryingly, while publicizing a policy of diversification of the economy, the government has been enhancing investment in energy with the hope of stimulating growth. A new privatization program has been interrupted by the COVID crisis—and, in preparation for private ownership, firms have seen reduced subsidies for water, petrol, and electricity. As a result, even before the current COVID-19 crisis, unemployment reached almost 30% and real GDP per capita growth was projected to be negative for the next years.

In contrast, Iraq was on a positive, albeit weak, trend, prior to 2020—a trend that was derailed by the current crisis. After years of contraction, GDP per capita had grown at a healthy pace in 2017-2019, due in part to a rapid increase in exports. At the same time, inflation had remained low, even stirring a deflationary warning in 2019, while the unemployment rate had stabilized at around 13%. Yet, the country remains highly dependent on oil revenue. Before the crisis, the sector accounted for 85% of government revenue, in an economy largely dominated by state-run firms. This left it too vulnerable to a drop in energy prices. External critics point to over-regulation, a lack of skilled human capital, an outdated infrastructure, and rampant corruption for the country's failure to diversify its economy.

The EFRI provides a neat illustration of (relative) resilience within our sample of oil producing nations. The ranking confirms a well-established fact: Norway is the most resilient resource-rich country in our sample, boasting a level of economic and financial resilience 7.4 standard deviations above the mean. This extraordinary result is driven by the immense wealth stored in its SWF, the strength of its fiscal position, and the almost perfect score achieved in SWF governance. While Norway can reasonably be considered

an outlier in our sample, two GCC countries, the UAE and Kuwait, make it to the podium in second and third position in the EFRI ranking. The UAE, particularly, combines the largest sovereign wealth (that would allow to finance up to 20 years of current expenditure even absent any oil revenue) with an advanced stage of resource diversification. Kuwait has not found its way out of oil, but gains prominence thanks to the assets of its long-standing sovereign fund and to effective institutional governance in the management of SWF assets. EFRI allows also to identify the least resilient countries of our sample. Two above-mentioned nations, Iraq and particularly Angola, entered the COVID-19 crisis in extremely fragile conditions. The macroeconomic outlook of Angola recently deteriorated, reflected in an EFRI 3.3 standard deviations below the sample mean. For these two countries, the pandemic could be the last straw for debt sustainability, and the question of painful adjustment will loom large in their policy agendas. Below average EFRIs are also reported for a group of MENA economies including Bahrain, Oman, and Algeria. For these countries, the scenario is bleak and it will be difficult for them to recover a sustainable fiscal path without a lifeline from abroad. Within the region, Qatar, a country surviving a 5-year blockade, improved its economic and financial resilience throughout, giving it an EFRI score very close to the mean. Further down the league table, we find Saudi Arabia in a middle-rank (7), above the mean, due in part to the sizable reserves of the central bank and a low level of government debt.

The EFRI comprises the Truman Score, an institutional pillar measuring the transparency and accountability of one country's SWF. While we believe that the soundness of the institutional framework surrounding SWF asset management is a critical element for resilience against shocks, we also notice that this score is missing for SWFs that were not mapped by Truman (2016), including the PIF of Saudi Arabia and the recently launched Misr Fund in Egypt, as well as countries without a SWF (Iraq). While the replacement of the missing value with the standardized mean (zero) allows to maintain all countries in the analysis, we also realize that it can confound our final results. We thus present in Table 2 and Figure 12 an additional reduced version of EFRI based on Pillar I, II, and III, focusing on the economic dimension of resilience.

The reduced EFRI reshuffles considerably the final ranking, even if the groups of best and worst performers previously identified remain almost unscathed. The biggest improvements in ranking are observed for Algeria (+5), Qatar (+3), and notably Russia (+3), jumping to third position. The new EFRI scales back in the ranking a few countries who have been as successful in improving their SWF governance, such as Azerbaijan and Nigeria, losing 8 and 5 positions respectively.

4. Conclusions. The SWF is dead: long live the SWF!

Our review leads us to project that the golden age of SWFs is over. Declining oil prices, mounting protectionism, and increasing barriers to international capital flows have halted the spectacular rise of SWF of the last two decades. The double whammy of the COVID-19 shock and of the new macroeconomic reality represents a quintessential challenge for an industry. Yet, with $6trn under management, SWFs remain major players in global finance and have the potential to mitigate some of the worst financial consequences of the current crisis.

Over and above the immediate, short-term reaction, we claim that the future of SWFs will be primarily shaped by the overall domestic macroeconomic context, and more specifically by the degree of economic and financial resilience achieved before the outbreak of the pandemic. In oil-rich nations, which this article focuses upon, SWFs themselves are part and parcel of their countries' resilience, as sovereign assets can

provide a buffer in the crisis and past sovereign investment contributed directly to diversify the economy away from the natural resource.

The disruptive potential of the crises is such that no country, nor SWF, will be spared. Sovereign investors of all stripes will be called to reassess their investment strategies, as new public-sector liabilities will have to be accounted for. Nevertheless, SWFs' future behavior will differ according to the degree of resilience against adverse shocks achieved so far, which this article has tried to quantify.

A handful of leading countries have shown that the resource curse can be broken. Despite profound cultural and institutional differences, Norway and the UAE enter the crisis with a remarkable store of wealth, low levels of debt, and diversified economies. Interestingly, SWFs greatly contributed to their countries' resilience, and are now ready to readjust their strategies to cope effectively with the crisis. Liquid assets and cash can be partly tapped to support the budget without causing a pro-cyclical oil austerity and to bailout firms caught in temporary financial distress, while illiquid assets are maintained to preserve the long-term consistency of diversification policies. Asset allocations will likely shift in favor of domestic assets, but portfolio rebalancing will also entail that investment opportunities will be seized in global equity markets, especially in those battered economies where assets can be bought cheapest.

Our analysis identifies also the most fragile, least resilient oil-producing economies. Angola, Iraq, Bahrein, Oman, and Algeria entered the COVID-19 crisis in precarious economic conditions, with depleted reserves, high indebtedness, and overreliance on oil revenues, and are now in freefall. In those countries, the COVID-19 shock is accelerating a crisis that may end in a default or a painful debt restructuring. What does the future of SWF will look like in those failing economies? Liquid assets and cash should be exploited to the maximum possible extent (considering short term liabilities and import needs) and this may imply that stabilization funds will be completely exhausted. As far the illiquid tranche of the portfolio, however, the government even if pressed by budgetary considerations should deleverage (amortizing public debt) by divesting assets whose expected returns fall short the cost of government debt, and hold the rest. It would be difficult to justify the existence (and costs) of a SWF in a bankrupt country managing assets against this simple rule. In the design of future policies, these countries should ponder over the causes of failure in the management of their oil wealth.

Between the "drowned" and the "saved", we find a group of countries with different characteristics. Some have a sizable amount of sovereign wealth in store, but have been able only partly to diversify their economies away from oil. Russia and Saudi Arabia, together with Qatar, Kazakhstan, and Azerbaijan, belong to this group. Most of these countries have entered the COVID-19 crisis with a very low level of government debt. Some others, symmetrically, have made significant progress in resource diversification (or were already well diversified at the time of the oil discovery) but do not have sizable sovereign assets. In this bucket, we find Mexico, Egypt, and Brazil (a country that liquidated its SWF in 2017).

The different initial conditions in terms of documented resilience allow to draw some possible future trajectories for sovereign wealth management in these two groups of countries. We expect the SWFs of the first group will be engaged in significant debt issuance in the foreseeable future. Thanks to their strong balance sheets and high credit ratings of the sponsoring country, these SWFs will enjoy low borrowing costs in international capital markets. Their experience as asset managers will in most cases reassure investors about deal execution and boost returns, generating a positive carry. In order to mitigate the COVID-19 crisis, this new breed of leveraged SWFs will prioritize domestic investment to meet their

development and diversification objectives, reverting back to overseas investment once their economy is stabilized.

With limited sovereign assets to pledge and a large outstanding debt to service, governments of the second group have much less room for maneuver. Still, SWFs may have an important role to play in the reorganization of the state-owned enterprise sector, by collating stakes within a single, unified umbrella, with the aim to optimize national strategic assets, battered by the COVID-19 crisis. Importantly, countries on this list are also less reliant on oil revenues to square their budgets, and thus more resilient against future oil price decline. Still, repositioning (or launching anew) their SWFs as strategic investment funds with a strong developmental mandate may contribute address the daunting economic and social challenges they will face during and after the pandemic.

In our analysis, we have avoided normative statements—yet, a discussion about the future of SWFs would be incomplete without any policy recommendations. Accordingly, we make the following five recommendations. These are rooted in our analysis of the data, but tinged by our own interpretations and, hence, necessarily reflecting of our own, subjective, views.

First, governments should more clearly define the primary objective of SWFs. In truth, SWFs fulfill different roles across countries—and, often, they attempt to fulfill multiple roles simultaneously, which leads to inefficiencies in implementation. At the core, SWFs aim at intergenerational wealth preservation, sponsor domestic industrial development, fund economic diversification, and offer a buffer against shocks. In specific instances, they might fulfill other, idiosyncratic, roles. The current debate about whether to use SWF assets to absorb shocks stems, largely, from poorly defined goals. The crisis reveals, in this sense, the need for clear, explicit, prioritized, mandates.

Second, governments should tap into sovereign assets to soften the blow of the current crisis. The COVID shock, while dramatic, is temporary. Even if "temporary" proves a long time-horizon than hoped for, or longer than forecasted by experts at the beginning of the crisis, it is a crisis with an end date. The light might be far, but it shines at the end of the tunnel. The goal of government assistance programs is to provide support to businesses that are suffering through this temporary ordeal, but are otherwise in good economic health. Sovereign wealth is well positioned to act as a "bridge," so that economies can quickly and fully ramp-up once the pandemic is under control.

In general, while grappling with one of most severe downturns in history, sponsoring governments should broadly consider the long-term, intergenerational savings aim embedded in the mandates of many of the largest SWFs. Throughout human history, we have seen technological advances and scientific discovery raise life standards across generations in ways that are difficult to foresee, but that, ultimately, have consistently improved life standards across generations, whether measured in terms of life expectancy, food intake, or other criteria. We are cautiously optimistic about the prospects of future generations—their world will face its own set of challenges (some of which we cannot foresee), but they will enjoy, most likely, greater wealth and prosperity than our generation—not to mention, a vaccine for COVID. SWFs were not conceived as a permanent solution—at their incipit, they were designed to be a temporary buffer for the accumulation of foreign reserves, with the goal of mitigating Dutch disease, sparking domestic development, and absorb fiscal shocks due to commodity price shocks. This is the right moment for governments to reassert the temporary nature of SWFs, to become more explicit about their mandates, as discussed above, and to re-focus on domestic development and stabilization.

Third, domestic support should be financed by borrowing, not by asset sales. Selling assets in the middle of this crisis would mean selling at depressed valuations, and, most importantly, adding to downward pressures on already stressed markets. A much better option is to use sovereign assets as collateral for loans. Debt has the additional benefit of acting as a discipline mechanism. The maturing of debt becomes a deadline for divestment—and prevents the "mission creep" typically associated with government bailouts, who often become permanent sources of finance, rather than temporary crutches towards profitability.

Fourth, whenever possible, the support offered by SWFs should come in the form of equity contribution to dedicated funds and platforms, rather than direct investments in domestic firms. Simply put, SWFs do not have the sizeable staff and granular, local knowledge to screen local firms, identify the best candidates, and monitor the process to avoid fraud. Traditionally, SWFs have focused their investment on large, publicly traded firms, generally abroad. In a few cases, SWFs have taken a role in financing local start-ups or joint ventures—but, again, the focus is generally on large stakes, in a few, large champions. In contrast, the crisis is mostly affecting small businesses, who do not have the buffers and access to capital necessary to weather the crisis. These are better served by local banks and private equity funds, who have the infrastructure in place to access the necessary information, and monitor compliance with award programs going forward.

Fifth, governments should use the crisis as a chance to rebuild and reorient their economies away from hydrocarbons—or, at the very least, to reduce their dependency on oil and natural gas-based revenue streams. The priority, right now, should be economic survival—and the main criteria for action should be the preservation of jobs. Nevertheless, whenever compatible with these priorities, government should focus on diversification. With and without the current pandemic, the world has been moving away from hydrocarbons, for a variety of reasons, with environmental concerns first and foremost. Using sovereign assets to create, or preserve, jobs that will disappear over the next decade seems futile.

More generally, in the design of future investment strategies, SWF should relax the strict interpretation of fiduciary duty and fully embrace ESG standards, fostering the transition to a more equitable, socially resilient, economic paradigm. This would probably the best way not to let a good crisis go to waste.

References

Banafe, A. and Macleod, R. (2016), The Saudi Arabian Monetary Agency, 1952–2016, Berlin, Springer.

Frankel, J. (2010), The natural resource curse: a survey, NBER Working Paper n. 15836.

Imbs, J. and Wacziarg, R., (2003), Stages of Diversification, American Economic Review 93(1): 63-86.

International Monetary Fund (2020), The Future of Oil and Fiscal Sustainability in the GCC Region, Middle East and Central Asia Department Research Department, Working Paper 01.

Garavini, G. (2020), This Time is Different. The "COVID-Shock" and Future of the Global Oil Market, IAI Commentaries, n. 18.

Stone, S. and Truman, E.M. (2016), Uneven Progress on Sovereign Wealth Fund Transparency and Accountability, Peterson Institute for International Economics, Policy Brief n. 18.

Truman, E.M. (2009), A Blueprint for Sovereign Wealth Fund Best Practices, Revue d'économie financière, (Special Issue), 429-451

Zakharova, D. and Medas, P. A. (2009), A Primer on Fiscal Analysis in Oil-Producing Countries, IMF Working Papers, Vol., pp. 1-39.

Table 1. Definition and sources

Variable	Definition	Source
FX Exchange Reserves (a)	Balance of Payments & External Debt: External Assets: Reserves Excluding Gold (USD million)	International Monetary Fund, Institute of International Finance
SWF Assets (b)	Total Asset under Management by national SWFs	Sovereign Investment Lab, Bocconi University
Short-term liabilities (c)	Balance of Payments & External Debt: External Assets: Short-term Debt (USD million)	Institute of International Finance
Non-oil Fiscal Balance (d)	Fiscal Accounts & Public Debt: Central Government Accounts: Total Expenditure minus Total Revenues plus hydrocarbon revenues	Institute of International Finance
Adjusted Sovereign Wealth	[(a) + (b) – (c)]/(d)	Institute of International Finance; Sovereign Investment Lab, Bocconi University
Debt ratio	Fiscal Accounts & Public Debt: Central Government Accounts: Total Central Government Debt to GDP	Institute of International Finance
HH Index	Herfindal-Hirschman Index of Export Concentration	UNCTAD
Truman Score	Average of one country's SWF Transparency Scoreboard value	Stone and Truman (2016)
EFRI	Sum of standardized means of Adjusted Sovereign Wealth, Debt Ratio (with minus sign), HH Index (with minus sign), and Truman Score	Authors' calculations

Table 2. The constituents of the Economic and Financial Resilience Index (EFRI)

This table lists the main variables used in the calculation of the Economic and Financial Resilience Index (EFRI) by country, including central banks' foreign exchange reserves, the US dollar value of SWF assets under management, the primary fiscal balance net of hydrocarbon revenues as a percentage of GDP. Pillar I (Adjusted Sovereign Wealth) is the ratio between the sum of foreign exchange reserves and SWF assets net of short-term debt and the non-oil fiscal deficit. Pillar II is the debt-to-GDP ratio, Pillar III is the Herfindal-Hirschman Index of export concentration, Pillar IV is the Truman Score of SWF transparency, governance and accountability (ranging from 0 to 100). EFRI is computed as the mean of the standardized values (*z*-scores) of Pillar I, II, III, and IV. All data are 2017-2019 averages. Countries are listed using EFRI as ranking variable.

Country	#	FX ($bln)	SWF ($bln)	Non-oil fiscal deficit (% of GDP)	Pillar I (Adjusted Sovereign Wealth)	Pillar II (Debt ratio)	Pillar III (HH Index)	Pillar IV (Truman score)	EFRI	EFRI (excluding Truman Score)
Norway	1	66,00	1091,48	6,54%	42,50	15,04%	0,34	98,49	7,31	5,27
UAE	2	100,50	1210,47	15,22%	19,83	22,40%	0,23	53,28	2,79	3,11
Kuwait	3	37,31	549,88	32,2%	13,43	14,90%	0,56	68,18	1,84	1,47
Mexico	4	172,43	1,00	5,66%	1,66	41,58%	0,13	58,33	0,97	0,99
Azerbaijan	5	6,80	38,63	18,17%	5,36	19,52%	0,82	92,42	0,88	-0,68
Russia	6	385,20	114,13	6,29%	4,51	10,67%	0,31	42,42	0,63	1,55
Saudi Arabia	7	497,10	310,00	26,07%	3,84	19,65%	0,56	N/A	0,09	0,23
Brazil	8	374,59	6,10	7,01%	2,39	76,33%	0,16	59,85	-0,08	-0,14
Nigeria	9	42,60	1,20	3,89%	2,62	19,89%	0,78	75,76	-0,11	-0,80
Kazakhstan	10	14,96	62,07	7,32%	6,15	15,35%	0,56	47,73	-0,20	0,54
Qatar	11	26,83	311,73	17,42%	10,22	42,79%	0,48	40,15	-0,62	0,48
Iran	12	97,17	69,00	5,87%	6,24	39,85%	0,51	48,49	-0,66	0,01
Iraq	13	57,44	0,30	32,61%	0,69	53,48%	0,94	N/A	-0,90	-2,74
Egypt	14	36,09	3,99	9,71%	1,12	99,97%	0,15	N/A	-0,99	-0,99
Oman	15	16,45	16,00	35,57%	0,71	51,71%	0,42	51,52	-1,72	-1,24
Algeria	16	79,93	42,00	20,76%	2,70	33,99%	0,48	25,76	-1,93	-0,05
Bahrain	17	2,56	14,12	22,01%	2,05	92,43%	0,36	52,27	-1,96	-1,53
Angola	18	16,24	3,82	24,84%	0,77	86,18%	0,93	66,67	-3,58	-3,73
Average		112,79	213,66	16,51%	7,04	41,98%	0,49	58,75	0,10	0.10

Table 3. The correlation matrix

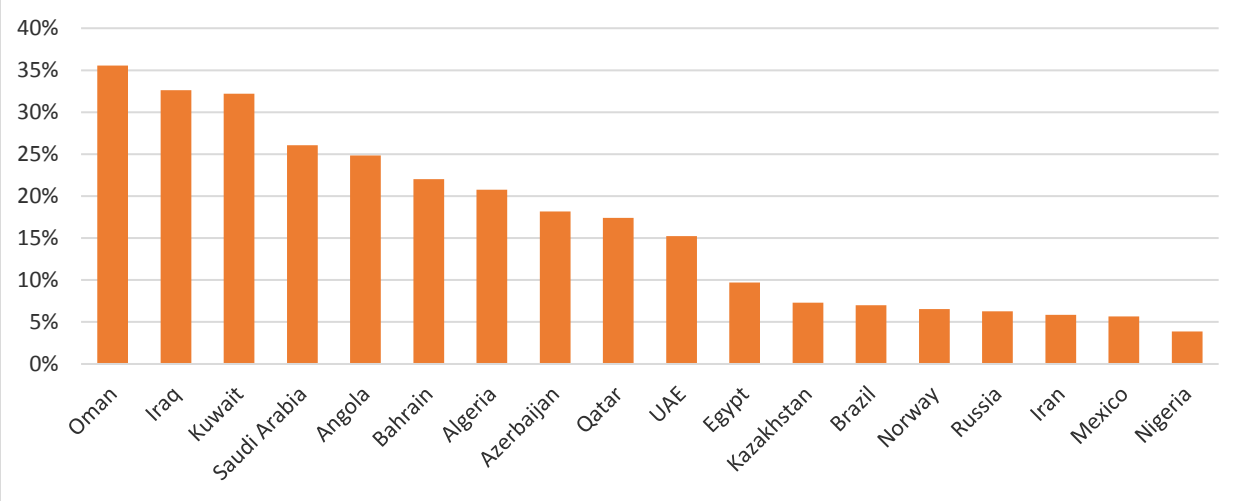
This table presents the pair-wise correlation coefficients between the variables listed in Table 1. *p*-values of statistical significance are reported in brackets (5% significance is reported in boldface).

	Reserves	**SWF assets**	**Non-oil fiscal deficit**	**Pillar I. Adjusted sovereign wealth**	**Pillar II. Debt ratio**	**Pillar III. HH index**	**Pillar IV. Truman score**	**EFRI**
Reserves	1							
SWF assets	0.0410 (0.7772)	1						
Non-oil fiscal deficit	0.1396 (0.4239)	0.1809 (0.3137)	1					
Pillar I. Adjusted sovereign wealth	0.2984 (0.0917)	**0.8743 (0.0000)**	-0.1666 (0.3542)	1				
Pillar II. Debt ratio	-0.1851 (0.1803)	**-0.4169 (0.0026)**	-0.0938 (0.5921)	**-0.4164 (0.0159)**	1			
Pillar III. HHI export	-0.3119 (0.0726)	-0.2357 (0.1940)	0.2074 (0.3543)	-0.2986 (0.1886)	-0.2590 (0.1391)	1		
Pillar IV. Truman score	-0.2049 (0.1768)	0.2840 (0.0720)	-0.0624 (0.7619)	-0.2781 (0.1882)	-0.1724 (0.2575)	0.3022 (0.1045)	1	
EFRI	0.1098 (0.4294)	**0.7928 (0.0000)**	0.0070 (0.9681)	**0.6826 (0.0000)**	**-0.5766 (0.0000)**	-0.2810 (0.1074)	**0.5674 (0.0000)**	1

Figure 1. Foreign Exchange Reserves and SWF Assets

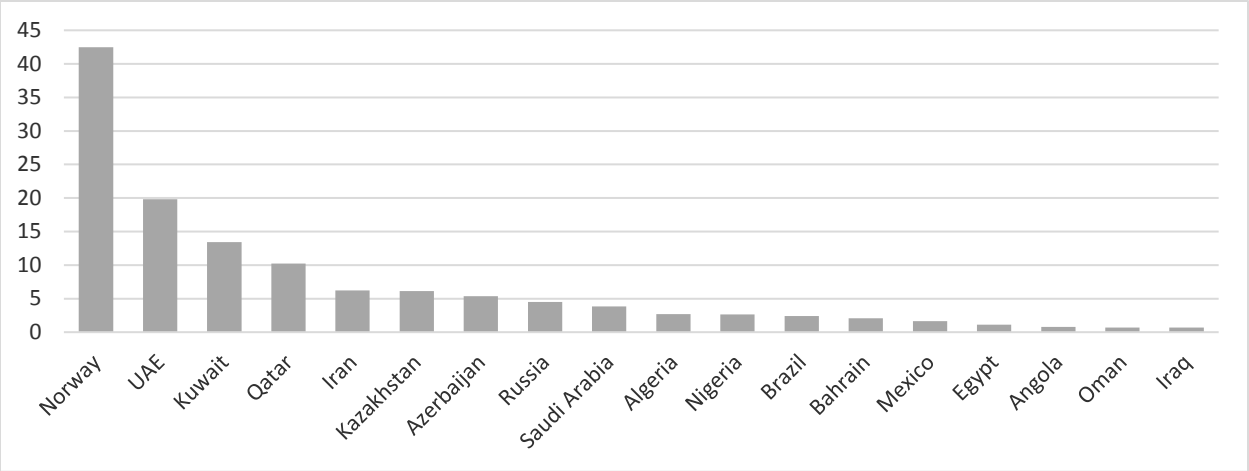
Source: International Monetary Fund and SIL, Bocconi. Averages 2017-2019

Figure 2. The Non-oil Fiscal Balance



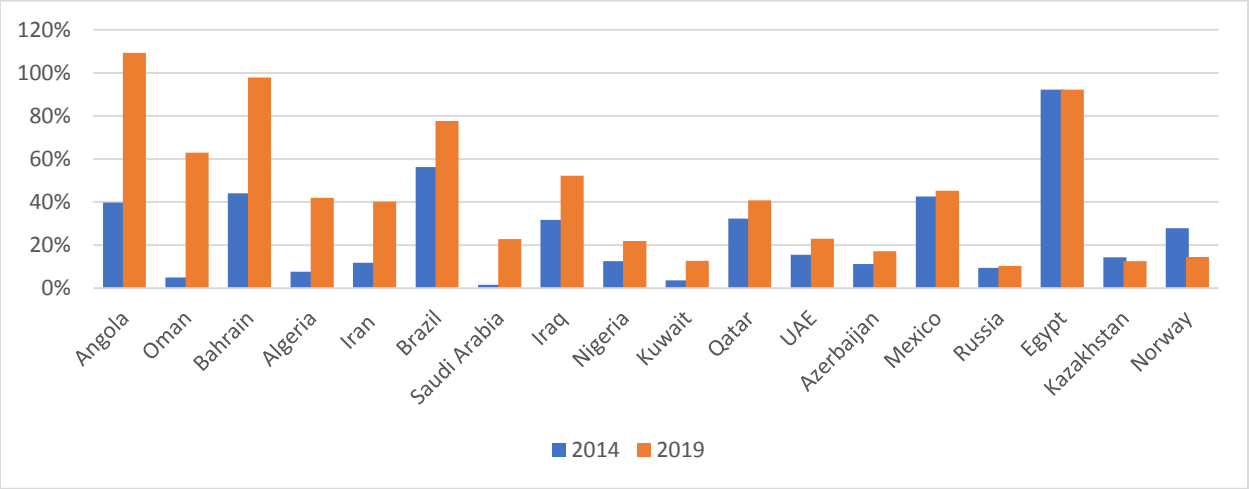
Source: Institute of International Finance. Average primary fiscal deficit net of hydrocarbon revenues as a percentage of GDP, 2017-2019

Figure 3. Pillar I. The Adjusted Sovereign Wealth



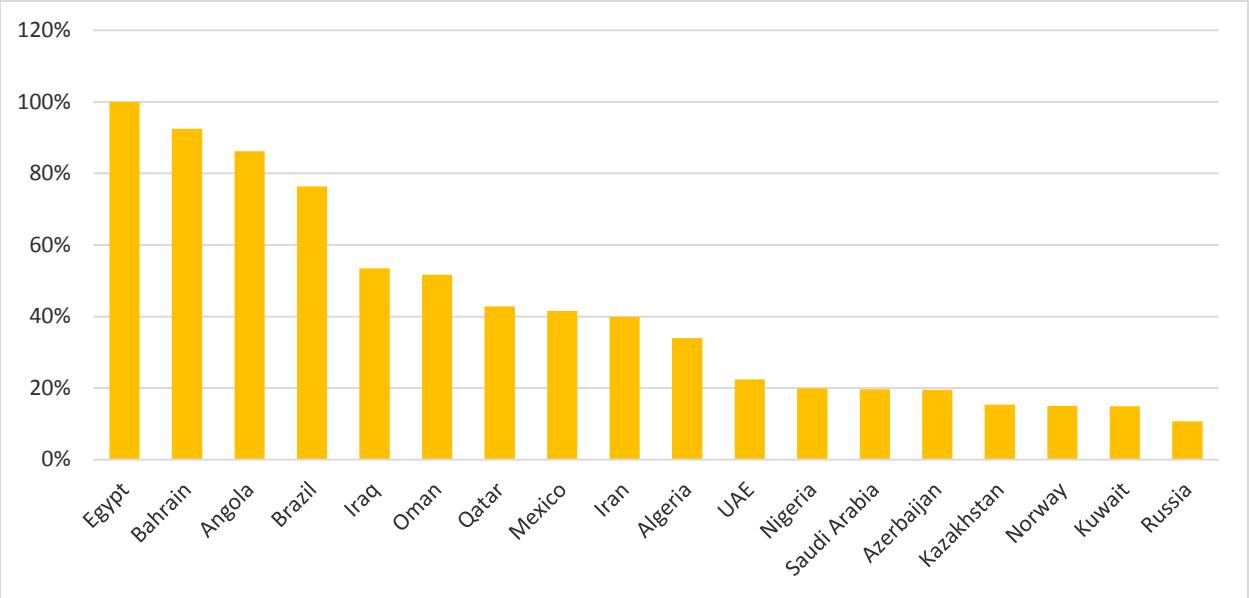
Source: International Monetary Fund, Institute of International Finance and SIL, Bocconi. Average ratio between the sum of foreign exchange reserves and SWF assets net of short-term debt and the non-oil fiscal deficit, 2017-2019

Figure 4. The Recent Evolution of Government Debt



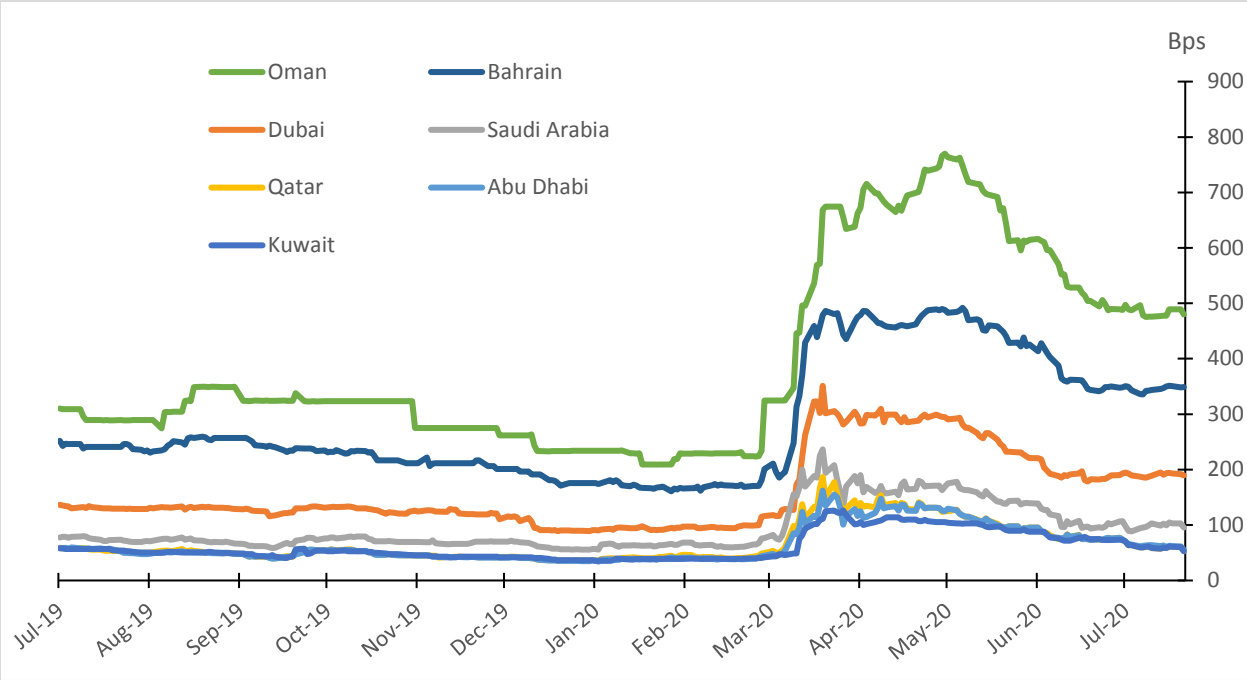
Source: Institute of International Finance. Average general government debt as a percentage of GDP, 2017-2019

Figure 5. Pillar 2. The Debt Ratio



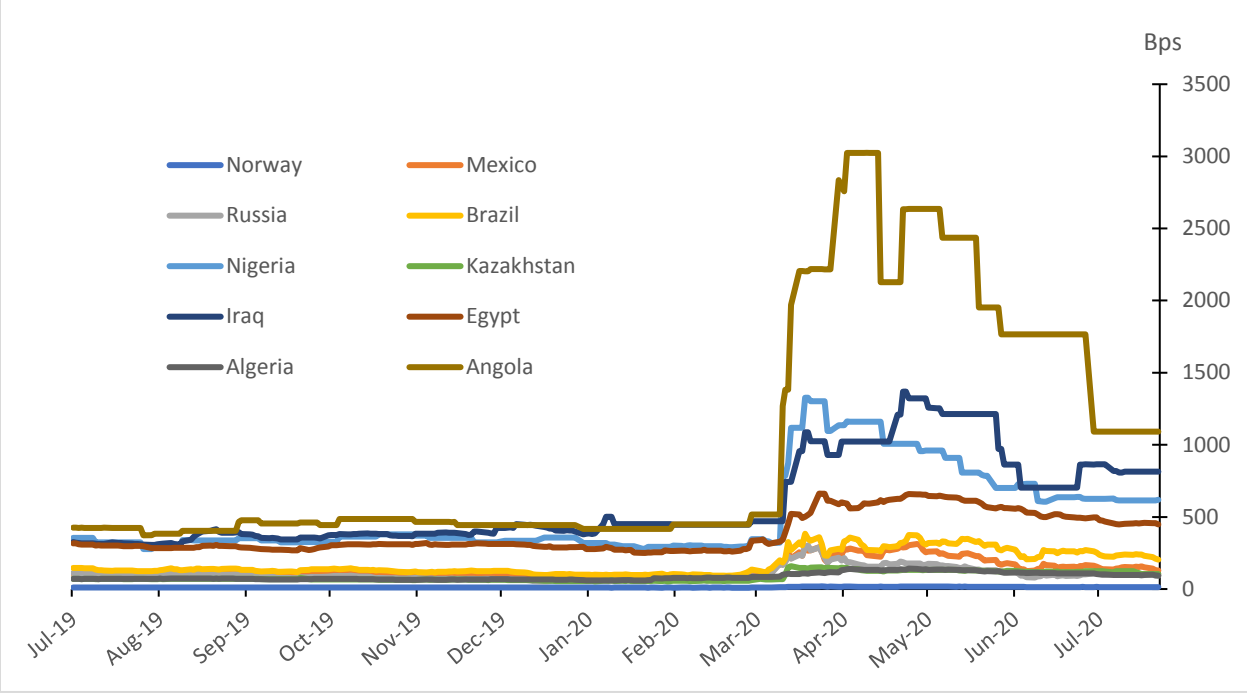
Source: Institute of International Finance. Average general government debt as a percentage of GDP, 2017-2019

Figure 6. CDS on sovereign bonds in main GCC countries



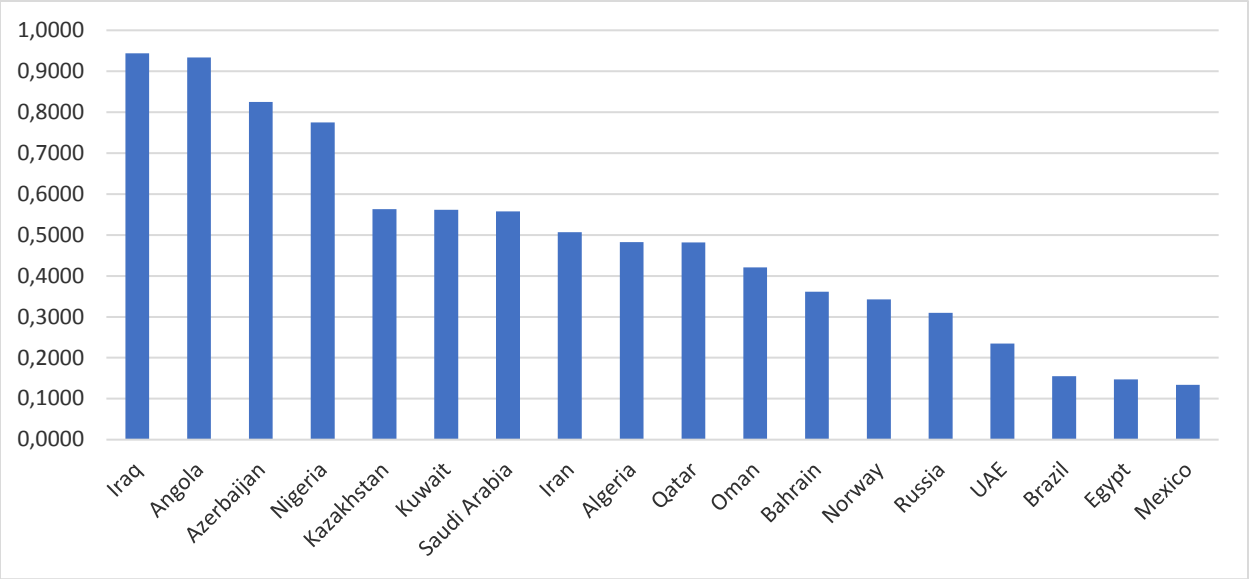
Source: Bloomberg. 5-years tenor, weekly data

Figure 7. CDS on sovereign bonds in other oil-producing nations



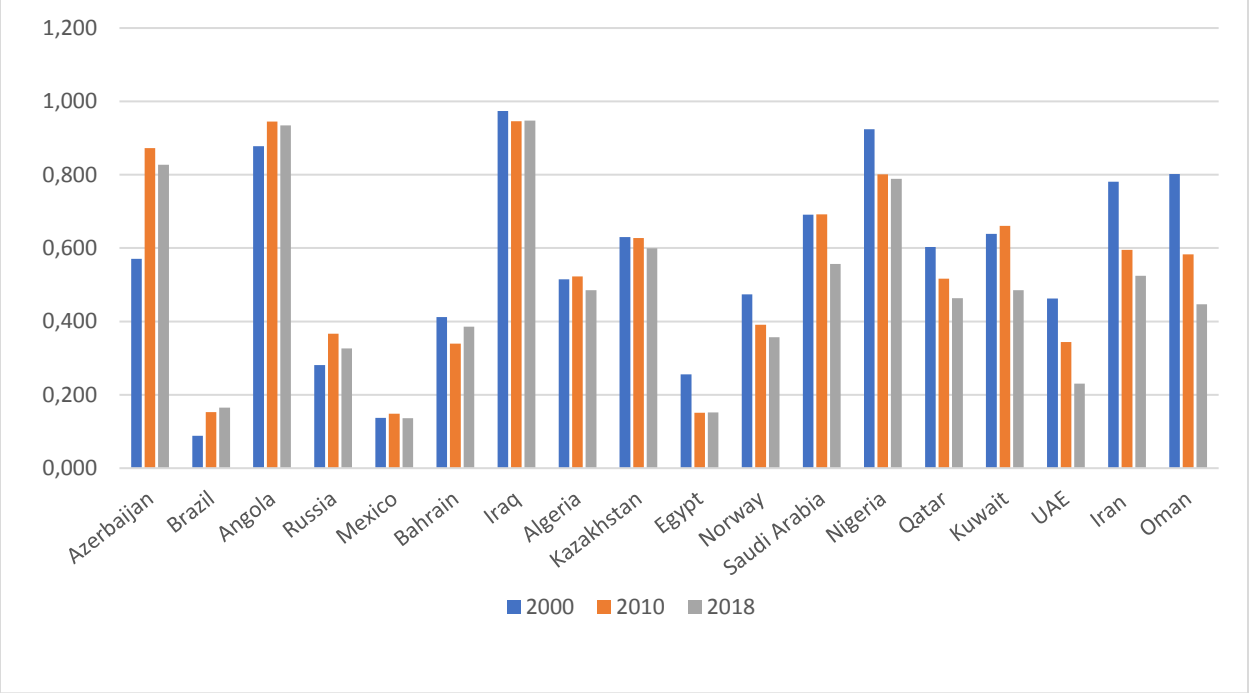
Source: Bloomberg. 5-years tenor, weekly data

Figure 8. Pillar 3. Resource Diversification



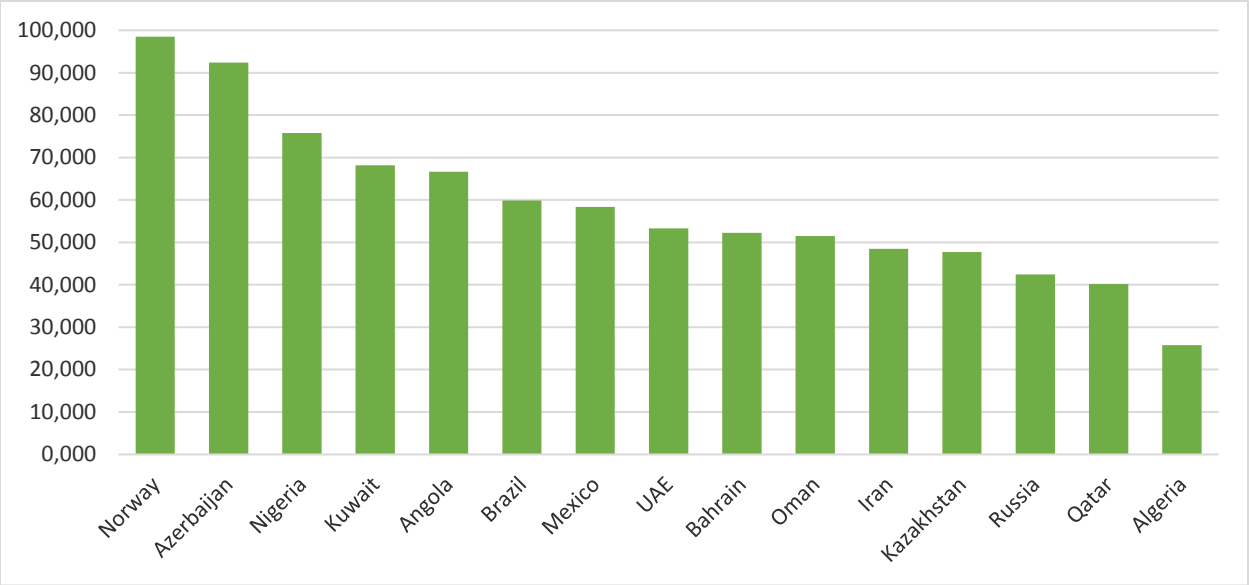
Source: UNCTAD. Herfindhal-Hirschman index of export concentration, 2018. It Ranges from 0 (total export diversification) to 1 (total export concentration)

Figure 9. Resource Diversification Since 2000



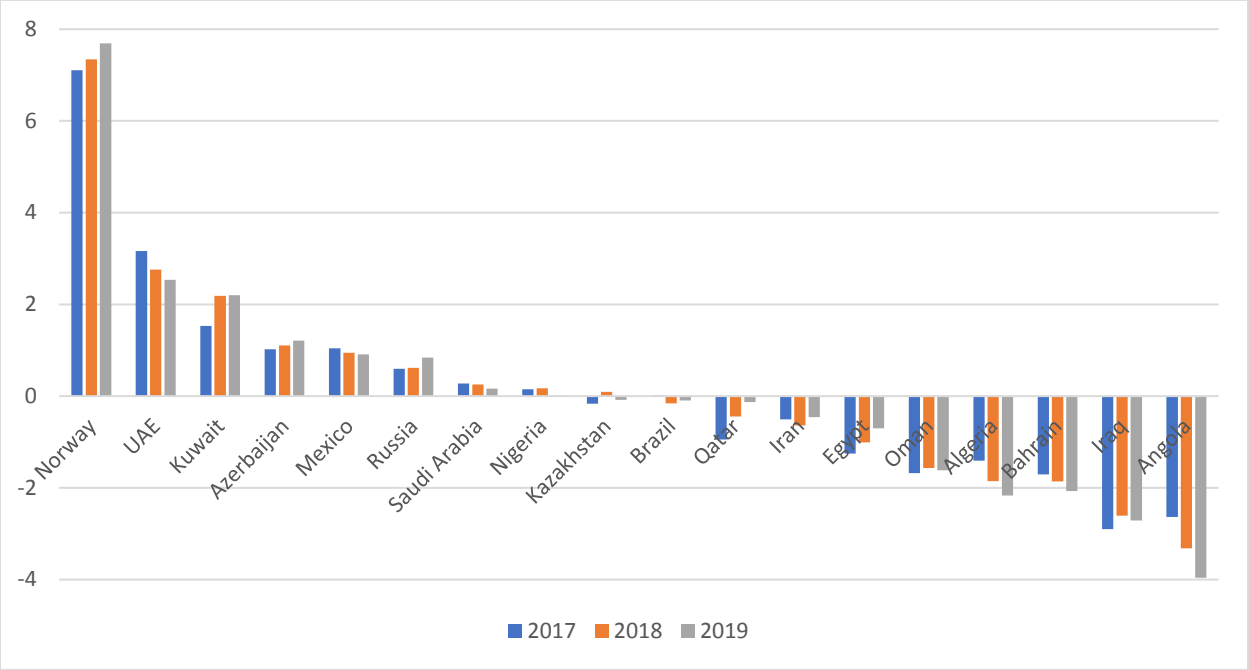
Source: UNCTAD. Herfindhal-Hirschman index of export concentration. It Ranges from 0 (total export diversification) to 1 (total export concentration.

Figure 10. Pillar 4. Sovereign Wealth Funds Governance



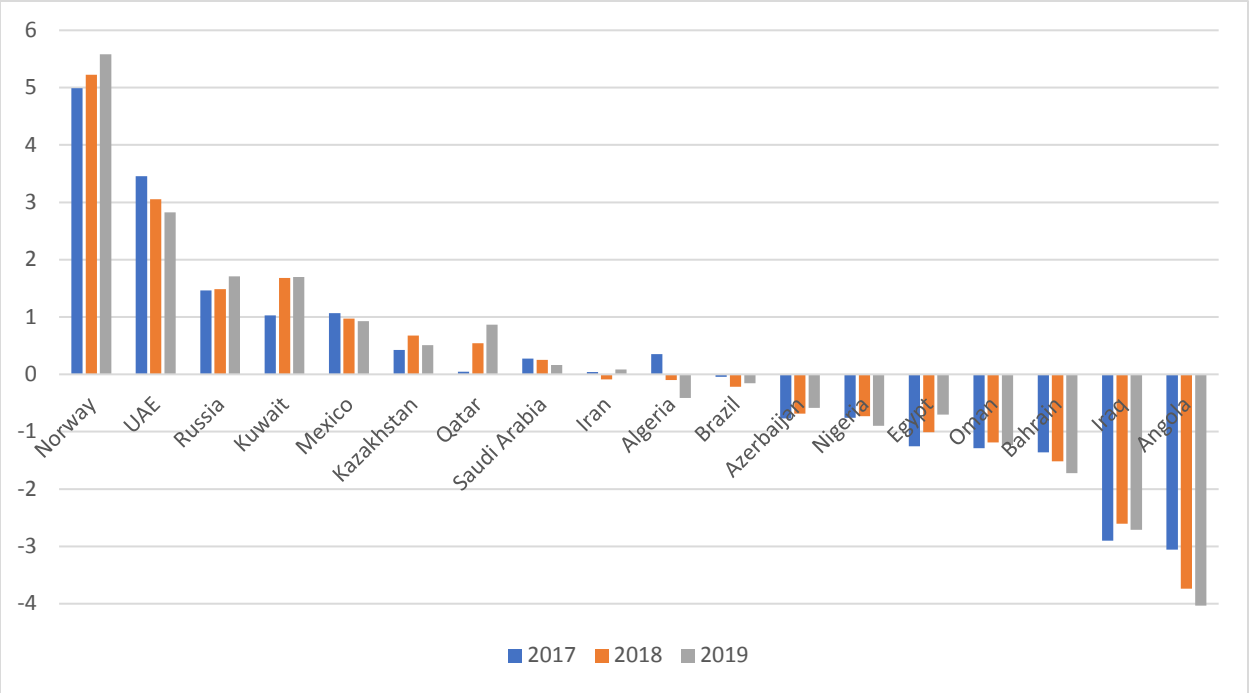
Source: Stone and Truman (2016). Average of one country's SWF Transparency Scoreboard value

Figure 11. The Economic and Financial Resilience Index



Source: Authors' elaborations. Simple means of standardized values (z-scores) of Adjusted Sovereign Wealth, Debt Ratio (with minus sign), HH Index (with minus sign), and Truman Score

Figure 12. The Economic and Financial Resilience Index (excluding Truman Score)



Source: Authors' elaborations. Simple means of standardized values (z-scores) of Adjusted Sovereign Wealth, Debt Ratio (with minus sign), HH Index (with minus sign)