Pursuing Innovation: Sovereign Wealth Funds and Technology Investment

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Introduction

The past three years have seen Sovereign Wealth Funds (SWF) capturing headlines for high-profile investments in innovative technology businesses. The Public Investment Fund of Saudi Arabia may have made the most noise in 2016 with its attention-grabbing $3.5 billion Uber stake and, more recently, a collaboration with Softbank on a "$100 billion" tech-focused venture capital fund. Yet such announcements are merely the tip of the iceberg.

The *Sovereign Wealth Center*, for instance, has recorded 47 direct TMT deals by SWFs in 2015 and 2016, in comparison with 93 for the entire decade 2003-2014. In addition, the data reveals a number of relevant investments classified under healthcare. While investments via external asset managers are not similarly tracked, their research alone would appear to indicate a sharp uptick in activity, focused largely on consumer technology and - to a somewhat lesser extent - alternative energy and biotechnology.

In this paper, we ask **whether this apparent increase is indicative of a genuine shift in SWF allocations**. We also explore **the strategies that they are currently pursuing in an opaque, hard-to-access and now increasingly frothy sector**.

> *"It's important to be sceptical. You get a lot of GPs looking for big pots of dumb money that will over-pay for something. Now that the mutual funds have pulled back from this space, some are looking at SWFs as the next cab off the rank. Be very wary. Ask: why has this deal come to me? Why am I special?"* Head of Private Equity, SWF

Part 1: Technology Investment Insights from Sovereign Wealth Funds (p.3) examines the different methods being employed by institutions around the world to break down doors in Silicon Valley, develop direct investment expertise and capitalise on their unique geographical or investment advantages. Data and front-line insights from more than a dozen senior SWF officials reveal how and why the vast majority have increased their allocations to technology investments during the past five years, ranging from early to growth stage and beyond, despite the endemic challenges of small scale and big complexity. Other examples from the world of pension funds and university endowments may also prove instructive.

> *"You can't just copy someone's strategy without understanding the ecosystem in which they invest."* Chief Investment Officer, SWF

In *Part 2: The Case for Innovation Investing - A Perspective from Oman (p.9)*, Hamid Hamirani sets out the economic case that can lead sovereign wealth funds to invest a greater portion of their assets in technology businesses. The sector has become particularly compelling, he argues, in a climate where economic growth remains weak despite loose monetary and fiscal policies. Hamirani's role in Oman's Ministry of Finance involves oversight of the State General Reserve Fund and the Oman Investment Fund, both of which have recently become more involved in this space. In August 2016, OIF participated in Cambridge Innovation Capital's latest £75 million fundraising round alongside the likes of Woodford Investment Management. In September and October, SGRF and OIF respectively announced the launch of their own venture capital funds with local development featuring as a key priority.

Finally, in *Part 3: "Innovation Investing" - A New User's Guide (p.13)*, Professor Jerome Engel of UC Berkeley urges SWF investors to prioritise education during their first decade in this sector, alongside the more traditional objectives of financial return and - in some cases - local strategic benefit. A leading academic figure long-recognised for his work on venture capital and the commercialisation of university research, Engel also draws comparisons between sovereign wealth funds and the world of corporate venture capital, highlighting the potential benefits of a more holistic approach.

> *"Most people who observe technology live in a fantasy and enjoy the fantasy. Self-driving cars will change the world, computers will cure cancer, that sort of thing."* Senior investment official, SWF

Part One
Technology Investment Insights from Sovereign Wealth Funds

Interviews with senior officials from thirteen SWFs revealed that more than 80% have increased allocations to technology investments during the past five years, whether through direct stakes or external asset managers.

These investors - predominantly large, globally oriented entities with an average AuM well over $100 billion - have adopted a range of strategies but a number of common attractions and priorities are evident:

- Perceived higher growth potential;
- Diversification from traditional investments towards idiosyncratic growth drivers;
- A window into how key technological developments will affect the wider portfolio.

"Why are we increasing technology sector investments? SWFs say:

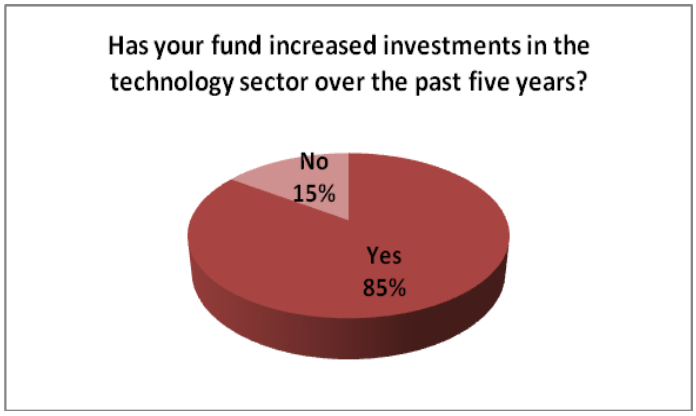
"We've been looking for idiosyncratic growth drivers - investments that are not correlated to GDP growth. We want to expose the fund to rapidly-growing small businesses, disruptive businesses, innovative businesses. We look at all sectors: consumer, internet, biotech, software, hardware, enterprise."

"There have been two main drivers. First, the return for traditional sectors and opportunities has become lower and lower. We've had to move towards earlier stage investing to seek higher returns. Secondly, there have simply been more opportunities available in technology, particularly in our region.

"This is about our worldview. Although traditional sectors continue to be important for us, technology is changing the world and we need to be benefiting from that growth."

Two roads converged

On a very broad level, the shift can be attributed to the confluence of two prevailing trends. The first is that many of these investors, like their large pension fund counterparts globally, have dedicated increasing proportions of their portfolios to unlisted assets including private equity since the global financial crisis. Much of this movement can be attributed to poor returns and weak expectations in public markets, as well as the desire for better diversification and risk management.



The second is that technology firms have themselves become increasingly reluctant to list on stock exchanges, preferring repeated rounds of private fundraising to the vagaries of an IPO and life as a listed company. Only 16 US-based venture-backed tech companies went public in 2015 and 14 have done so far this year, down from 30 in 2014 and far below the annual average of 49 since 1980.

These two developments are, of course, related. Companies have been able to pursue a private path in large part because of the increased willingness of investors to hold their shares privately rather than pushing towards listing. A secondary market has evolved and expanded to support this appetite.

Sovereign Wealth Fund: While definitions vary widely, these interviews focused exclusively on government-owned investment entities tasked with maximising long-term intergenerational savings. Stabilisation funds, development funds, central bank reserves and funds with explicit pension liabilities were **not** included. Technology investment *is* a highly relevant theme among development funds but strategies can be difficult to clarify and compare with global counterparts. Meanwhile, the theme is far less relevant among stabilisation funds due to the illiquid nature of preferred access points. All interviews were conducted anonymously in order to respect confidentiality requirements. Yet we hope that establishing restrictive criteria makes the findings easier to interpret. A list of relevant sovereign wealth funds is included in the Appendix.

For these private companies, a SWF may even be preferable to other types of investor, such as the private equity or venture capital vehicle in need of a three-, five- or seven-year exit or - still worse - the poorly aligned mutual fund.

This marriage of interests has not perhaps been tested fully since 2009, although there are some signs that private fundraising in the tech sector has slowed, with 355 late-stage deals in the third quarter according to the National Venture Capital Association. We have yet to see the end of an investment cycle which would hit valuations, despite some wavering in early 2016 when the likes of Jawbone took significant markdowns. The Kuwait Investment Authority, incidentally, stepped in to provide financing in that particular case, although only time will tell whether the acquired stake really did represent good value.

SWFs say:

"Being public can be a pain for companies. It shortens the management's horizon. If a firm can raise money privately and not have to go public, that would usually be preferable for them. There are long-horizon investors out there prepared to hold stakes for a long time if you reach the point where the company is generating cash - we're one of them."

"Eventually companies will have to IPO. We are seeing an increasing number of secondaries, where an early-stage investor wants to exit and a private buyer comes in.. There's a lot more of that than a few years ago."

Not all large institutional investors appreciate these synchronous trends among firms that wish to remain private and investors happy to hold private stakes. Earlier this year Oeyvind Schande, CIO of Norges Bank Investment Management (manager of the Government Pension Fund Global), a SWF prohibited from making direct or indirect private equity investments, expressed frustration that so few high-growth companies are now choosing to list on stock exchanges. In an interview with Reuters he cited Snapchat, Airbnb, Uber and Pinterest, saying: "those four alone have a combined market value of more than [$120 billion]. It's a market that we can't invest in." He called on governments in developed countries to do more to reverse the two-decade-long decline in listings.

SWFs say:

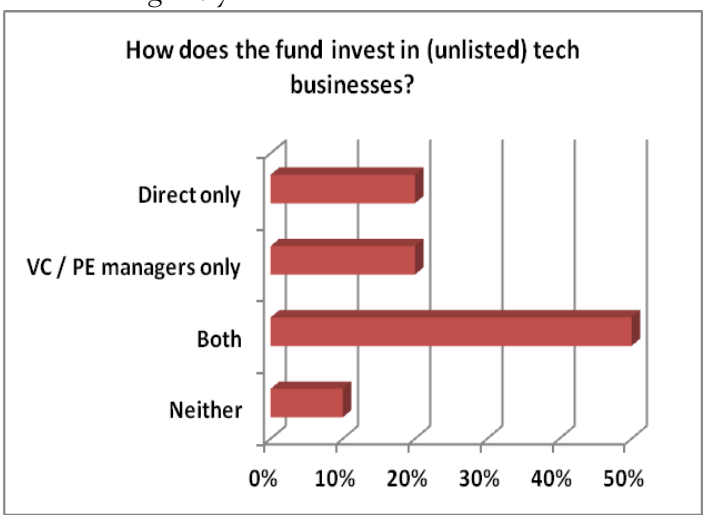
*" Many investors are now over-allocated to **bad** technology investments. Do you really want to be owning a piece of IBM nowadays? We shouldn't be thinking about the amount we invest in the technology sector. We should be thinking: what are we doing to allocate to the positive and negative sides of tech disruption? We do know that we're still grossly under-allocated to the positive side of disruption, although we do a lot more in technology than most... One of the most infuriating things I see is the mis-labelling. Everything gets aggregated as TMT. How would you classify a firm like Tesla? What about a firm like Solar City? In 2008, no analyst treated Apple or Samsung or Google as part of the' telecoms' population: their ability to foresee that shift in the industry was zero."*

Investment method

Half of the Sovereign Wealth Funds interviewed invest in technology businesses *both* through external asset managers (primarily venture capital funds) and via direct investments, with a minority doing either one or the other.

In a handful of cases the SWF has even founded or seeded its own VC entity, either through partnership with an external firm, as exemplified by the new PIF/Softbank initiative, or - in the style of OMERS Ventures - as a wholly owned subsidiary. New models have also emerged from the pension fund and endowment communities: PGGM, ATP and the University of California Board of Regents have all made widely-publicised developments in this sector.

To some extent, direct and indirect investments are treated as complementary strategies by the SWFs interviewed for this



SWFs say:

"Our direct investments are focused on growth capital, not early-stage. The early-stage investments are through funds. In the coming years we believe that growth capital - rather than early stage - will be our main focus. That part of the market is growing faster; we see more opportunities."

"Our bias as an institution is to invest directly where we can; we do more indirect investment in technology than we do in other sectors of our portfolio."

"With direct investing, 95% of the time the only thing that seems responsible and wise is growth. But there are very specific cases where we have done early-stage directly - where it's something right at the centre of an ecosystem, where we see everything developing around it and through it, we don't think we'd miss breakout success."

study. For instance, early-stage investments are almost entirely conducted through external venture capital managers while, for the most part, SWF direct investments focus on growth-stage. (*Note: a list of deals from the Sovereign Wealth Center can be found in the appendix.*) Conversely, direct early-stage financing is relatively rare and only two SWFs mentioned using specific technology-focused private equity managers for growth-stage investments, although others do have such exposure through broader multi-sector PE managers.

External approaches can complement internally managed strategies in a variety of other ways such as improving deal-flow; educating the internal team while building a direct investment capability and providing co-investments. Indeed, three officials expressed a clear preference for building up the direct investment strategy at the expense of fund investments over time.

For the majority of sovereign wealth funds, *both* direct and indirect investments were spread globally with a bias towards the United States in venture capital and, in the case of directs, an additional tendency to overweight the investor's local region. "In the U.S. we've worked more through the funds, whereas in Asia - China, India - we've worked more with the builders," explained one SWF. "We are willing to be as dynamic and creative in the U.S. as we have been in Asia but the market in the U.S. does savour the brand name funds. We plan to step out from behind the curtain a bit more."

Multiple institutions including GIC, Temasek and Khazanah Nasional have established their own offices on the West Coast in order to develop the relationships and resources that are vital to obtaining access in the most competitive tech hunting ground in the world.

The subject of gaining appropriate access to the U.S. tech market is a challenging and controversial one. New investors do not necessarily feel welcome in a hard-to-crack and potentially overheated cottage industry, where top quartile firms already have a queue of willing clients stretching out of the door. Even if the industry receives sovereign funds with open arms, how can large investors achieve appropriate scale? More critically, does VC performance net of fees really make sense on a risk-adjusted basis?

Not everyone thinks so, as is demonstrated by the case study below, featuring one SWF that is trying to leverage its own distinctive advantages in less oversubscribed parts of the market rather than playing on someone else's pitch.

One Sovereign Wealth Fund's Strategy: Avoiding the Classic VC Model

"We do direct investments in technology, mostly through minority stakes. We don't have any external venture managers. We have a view that the average VC investor doesn't get paid for the risks they take. You'll always hear the stellar anecdote but the average yield for the median fund doesn't generate sufficient returns for us, for the risks we'd take. The ability to select and access becomes vital and, because we haven't played in the venture space, we don't have those years of relationships. Our strategy has been focused on the intersection of what we see as two opportunities. One is alternative energy more broadly. The other is in expansion capital (growth capital) - the area between venture and more mature, where investments have gone beyond the initial tech risk but still require capital before they might go public. These deals are rather ***too large and late-stage for the venture capital funds but don't really suit buyout or listing****. That space is interesting for long-horizon investors who have the ability to provide that liquidity. Meanwhile, the alternative energy theme is driven by a view on the relative supply of capital to that space as well as long-running issues like carbon pricing, regulatory risk et cetera. A lot of these businesses are quite* ***capital-intensive. The VC funds prefer the capital-light businesses*** *where you can go from relatively small investments to public listing without needing the longer period of patient capital. We look for places where patient capital is required so we'll get paid for the risks we take."*

Accessing the U.S. market ... indirectly

"It's very difficult to get into the best West Coast VC funds. But some managers are looking at firms that may want access to our local market or connections, so having the sovereign fund as an investor can be helpful. We want to leverage this advantage."

"We were lucky in 2009: we wanted to enter VC just when endowments were running away. That enabled us to seed relationships with great managers. We've built up a reputation for our co-investments with those VCs and we've been approached by other managers who've heard how we operate."

"The really top guys are not taking money from any new investors. If you're not an LP you're not going to be an LP. But we believe we can find managers below top tier who will do well."

"We've been in top tier funds since '85. The industry has changed dramatically - half of the current top 10 weren't even on the list 10 years ago. There's a memory effect among the in the valley - what we did, who we stayed aligned with. We track the next generation at firms, spend time with them, not just the top guy."

...and directly:

"We're never going to be seen [by investee companies] in the same way that they'd look at entities like Sequoia, for instance. We will always be seen differently. One of our worries is that the companies would see us as dumb money. We opened an office on the West Coast and started getting more credibility, people saw what we were doing, we started getting more access."

"Next week[in the U.S.] we're hosting 22 brand-name company founders from China along with a group from the U.S. They'll sit down together, geek out and talk shop. There's a waiting list to get in: it's a who's who of the next generation of founders. This is about community building and putting yourself at the centre of that community."

"We have now established a large enough team in the U.S. not to have to rely on external firms - we're doing more direct over time. When we use external VC funds our approach is different to some other investors: for us, it's a route to partnering and to gaining knowledge most of all."

Indeed it was interesting to note the extent to which the mature West Coast industry does still dominate conversations, followed by the East Coast in the case of life sciences and - to an increasing extent - the UK.

Those that are taking on the challenge of U.S. venture capital report widely differing degrees of satisfaction with the access they've managed to gain so far. Interestingly, the very fact of being a sovereign wealth fund can prove a positive asset in this endeavour. More than a third of interviewees indicated - without being prompted - that their regional strategic position had assisted them in gaining entry to top tier managers, citing examples where the involvement of a state investor could prove strategically useful to GPs and their investee companies.

"Most of the help we provide [to investee firms] is related to cross-border value add," said one interviewee." We go to extreme lengths. But," he added," I am deeply concerned about how we can enhance this. There are far too many alternatives - others that can give that help now... We need to heighten our competitive advantages. In 2009 we had an immense competitive advantage." Cross-border value-add can work both ways: investee companies in the SWF's local region can benefit from the investor's U.S. network, just as U.S. investees can benefit from the SWF's regional relationships and influence.

Leveraging disruption: the wider portfolio

In describing their technology investment strategy and rationale, several SWFs mentioned that insights gleaned from private market technology investment benefit their wider portfolio. In theory, a window to innovative industry-changing technologies may allow investors to take advantage of instances when disruption should affect particular listed equities, infrastructure, real estate and more.

"We're using what we're seeing in the tech investing portfolio to make judgement calls on some of our more traditional investments," said one, who cited changes in the fund's power sector investments as a result of foreseen developments in energy generation, distribution and storage that they were poised to understand at an early stage thanks to the private equity team.

Yet when it comes to a holistic strategy there's a world of difference between talking the talk and walking the walk. "We have had trouble on the translation - translating insights into the public markets," said one private market-focused official. "I've gone to the public markets team and recommended stocks based on what I know about tech disruption and they haven't picked up on it, or haven't invested enough in it. In 2009 we should have

done a far bigger bet on Amazon - we had studied it extensively and had no doubt. It would have been one of the best investments the SWF had ever made." Major disruptions do not come up often, he explains, so it is important to be both able and willing to take concentrated bets. "I'm not finding ten amazing realities in a cycle. When they come up you need to take a big position to make it worthwhile."

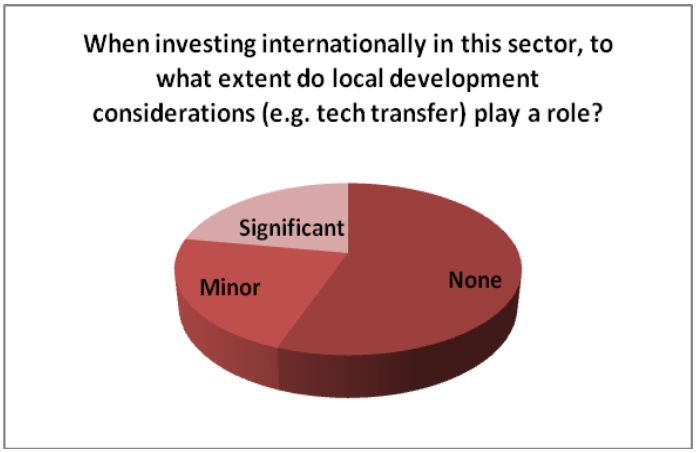
That investor is now introducing a new, confidential initiative that will essentially enable staff trained in the private markets team not just to recommend stocks but to invest in listed equities themselves as part of a new unit specifically incarnated for the purpose of exploiting disruption. For their colleagues in the public markets team, inaction will no longer be the career-risk-free strategy.

Local interests

Asked anonymously whether local developmental or strategic considerations influence their technology investments, nearly 20 percent of interviewees acknowledged that such factors play a "significant" role in their and a further quarter acknowledge "some/minor" relevance.

In part, this is because the old lines between globally-oriented "sovereign wealth funds," primarily established to avert the inflationary Dutch disease and provide important intergenerational savings, and domestically-oriented "sovereign development funds" concerned with a pure local agenda have become increasingly blurred.

Mumtalakat in Bahrain and Ireland's National Pension Reserve Fund (now the Irish Strategic Investment Fund) have morphed from international allocators to domestic strategic investors. The Oman State General Reserve Fund - a globally oriented SWF that now looks increasingly towards local development - provides another interesting example in this vein. From the other direction, Khazanah Nasional in Malaysia has evolved from a state holding company to a global investment force, retaining a strategic angle in cases where it is plausible. New entities such as the Nigeria Sovereign Investment Authority have been incarnated with separate sub-units that target different missions.



The twin driving forces of domestic pressure to enhance local growth in troubled economic times and increasingly meagre international investment prospects influence these shifts.

As a result, while this particular survey was aimed at internationally-oriented SWFs and excluded specific development funds, it is almost impossible to be entirely strict in this classification.

That being said, more than half of SWFs - 55% - said that local strategic or development considerations played "no role" at all. This includes the vast majority of the largest (>$100bn) entities. "To the outside world it

SWFs say:

"We do try to do this, although to be honest it can be a bit of a challenge to force the issue. We do always try to make investments that can benefit the country, whether there's some possible tech transfer or some manufacturing can be done in the country or something else, though it has to make sense for the underlying company. But in reality this is difficult for indirect investments: you're a step removed from the underlying companies. So we don't insist. For direct investments it's more realistic."

"We're a pure commercial entity and that is handled well. However, if you have an edge that no one else has, that can create opportunities. Sometimes firms want us as investors because of our local influence - we can open doors. We can also find prospective synergies that may exist between firms we invest in or may invest in. Of course we want investments to make sense on a standalone basis but our network effect can be very relevant to improving returns. To the outside world it may look as if some investments are being done for local interest, but in fact returns are the priority."

"We have been making investments in the local IT/tech sector but that's not been a top-down decision - there's been no influence - it's where we've been able to source good opportunities."

"Many large investors that I speak with want to increase exposure to technology and life-sciences. Temasek, Khazanah and CIC have staff in the Valley and are establishing centres in London and in China. Middle East sovereigns exploit their hub status to invest east and west with flying teams. Notwithstanding significant successes, many SWFs do acknowledge difficulty in achieving sufficient allocations to top managers or obtaining direct growth-stage deals at reasonable valuations. In addition, institutional-pace decision making and low risk tolerance does not always fit well with innovation investing. For many, the repeated process of small or lost allocations is driven by a framework of long, time-consuming due diligence and approval processes. For others, risk-aversion and the need to allocate from the PE "box", leads to the paradox of only buying known tech-brands, which produces concentrated portfolios of very expensive assets. Various institutional investors are also constrained by a range of double bottom-line considerations. ***Tech-transfer for Asian investors, domestic market development for Middle East and 'Impact' for Dutch pension funds all represent additional wants.*** *These are wants that fast-growing companies would often prefer to avoid by choosing conventional financial investors."*

Douglas Hansen Luke, Future Planet Capital

may look as if some of our investments are being done for local strategic interests but that is not the case," said one official, referencing examples where the SWF has invested in the regional market.

As Douglas Hansen-Luke, Chairman of Future Planet Capital, points out above, double bottom-line considerations are far from being a topic specific to sovereign funds, particularly given the rising importance of ESG and 'impact' considerations among the international pension fund community. His firm, which is focused on 'innovation investing,' has worked with Oxford, Cambridge, Edinburgh and Tsinghua to invest $100m on behalf of SWFs and venture funds.

Beware the bandwagon

Whilst the majority of SWFs have increased their investments in the technology sector, nearly half of the surveyed group expressed concerns about an overheating sphere inflated by excessive investor demand.

SWFs say:

"It's important to be sceptical. You get a lot of GPs looking for big pots of dumb money that will over-pay for something. Now that the likes of T. Rowe and Fidelity have pulled back from this space, some are looking at SWFs as the next cab off the rank. Be very wary. Ask: why has this deal come to me?"

"There is quite a bit of dumb money entering right now. It's ephemeral - they'll get scared off when things go sour. A lot of unicorns are going to be hurting badly soon - I've heard people estimate that half of the 300 or so unicorns will go out of business. From a self-interested perspective we don't mind if other investors come in and pay too much now - we hold a lot of shares in unicorns at big discounts. But when other investors put their money in bad funds, invest in bad structure - that's not healthy, not good for the industry."

Writing in 2015, Victoria Barbary - now Director at the International Forum of Sovereign Wealth Funds - expressed concerns that SWFs were helping to push prices in consumer technology and biotech to unsustainable levels. Her words are well worth revisiting:

"[There are] three potential bubbles into which state-owned investors have poured cash: consumer technology, healthcare/biotech and real estate/infrastructure. The level of dealmaking in the consumer technology sector - particularly in the U.S. and Asia - is flirting with dotcom-era levels and SWFs have been in the thick of it. Whether it is the QIA backing car-hailing app Uber Technologies at a $45 billion valuation, GIC supporting India's rival to Amazon.com (Flipkart) twice in 2014, at a valuation of 7bn in July and 11bn in December, or Temasek Holdings pouring money into Chinese firms like car-hailing app Didi Dache or online restaurant review service Dianping.com, SWFs now see consumer technology as a sector in which they want to play. But with technology companies seeking to avoid a replay of the 2000 dotcom bubble and shunning public listings, whether these investments will prove to have been unwisely overpriced won't be known for years. Some have already made a killing. ADIC invested in WhatsApp in 2013, reaping a mighty return when Facebook bought the company in 2014."

Whatever the precise approaches that sovereign wealth funds select in this space going forwards, institutional commitment to a very long-term strategy - rather than "jumping on the bandwagon" - will no doubt be key to eventual success.

Part Two
The Case for Innovation Investing by SWFs: A Perspective from Oman

Hamid H. Hamirani is Senior Advisor to the Minister of Finance of Oman, Member of the Investment Committee for the Oman Investment Fund, Visiting Scholar at Stanford University and an Advisory Committee Member for Future Planet Capital. He writes: "Investors today inhabit an asset bubble environment infected with excessive debt. It is incumbent upon us to seek innovative answers."

A world of low risk-adjusted returns

According to many leading investment management firms and analysts, none of the major listed asset classes are likely to generate anywhere near 6.5% - the long-term U.S. equity rate of return - over the next decade.

GMO, for instance, predicted in July 2016 that U.S. large cap equity returns over the next seven years - adjusted for inflation - will be *negative* 2.7% per annum, with international large cap expected to produce around 1.4%. Their forecast for non-U.S. fixed income, hedged back into the U.S. dollar, is even worse at -4%. If they are right, any kind of passive or semi-passive asset allocation strategy can expect real returns of approximately zero during this period.

Expansionary fiscal and loose monetary policies have not contributed to growth.

The current phase of GDP expansion is the fourth-longest such period since 1954. It is also the weakest. Since 1950, the average annual GDP growth rate during periods of economic recovery has been 4.3%. Since the Great Recession ending in the third quarter of 2009, that figure has averaged 2.1%. In other words, the economy has grown a mere 16% during seven years of so-called recovery (Crestmont Research, July 2016).

> *"Global policy makers gathered at the International Monetary Fund's meetings in Washington this week have been greeted with a message few like hearing: If they want faster economic growth, it's going to hurt. "...Monetary policy cannot deliver an improvement in potential growth and right now on the fiscal side a lot is going into just supporting short-term demand," said Janet Henry, global chief economist at HSBC Bank Plc, in an interview in Washington.*
> *"Governments know what to do, they just don't know how to get re-elected when they've done it."*
> Bloomberg, 8 October 2016

> *"If, in the long run, asset prices are a reflection of interest rates and economic growth, and both those are just slightly above or below zero, can we really expect stocks, commodities, and other assets to gain value?"*
> John Mauldlin, Thoughts from the Frontline

The IMF, World Bank, and BIS, have all recently revised their global forecasts downwards. Massive and unprecedented accumulation of debt in some of the large economic blocks, even at negative interest rates, has failed to generate the required results. Today, developed economies are in an interest rate trap. How can they raise rates when such rises would increase debt servicing costs, eating up a major part of government revenues and further hampering the economy?

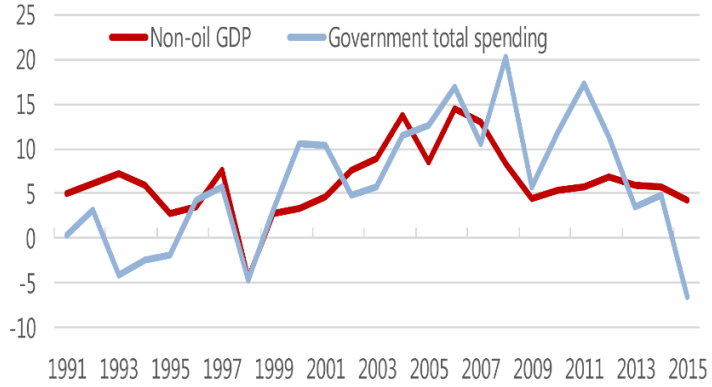
Japan has employed ZIRP (Zero Interest Rate Policy), QE (Quantitative Easing) and more recently NIRP (Negative Interest Rate Policy). Yet its growth rate has slipped to 0.6% since Shinzo Abe came to power in 2012, one third lower than the 0.9% average annual rate over the preceding 22 years, according to Stephen Roach of Project Syndicate (September 2016). This clearly suggests that extraordinary monetary stimulus has failed to generate get the economy moving.

As Roach observes, the same is true in the United States where growth since Q3 2009 has been 2.1%p.a., a far cry from the 4% average in comparable previous periods of economic recovery. The FED claims that monetary easing has been a clear success, citing a fall in unemployment from 10% to 4.9%. Yet the statistics suggest a major productivity slowdown that raises serious concerns about America's long term economic potential amid an eventual build-up of cost and inflationary pressures.

Acceptance is gradually emerging of the limits of monetary policy and, as a result, the emphasis has recently shifted towards the easing of fiscal policy. Yet fiscal policy can only go so far, especially under the weight of a record $152 trillion in global non-financial debt, as calculated by the International Monetary Fund.

There is now an increasing consensus that the only conceivable path to growth lies in increasing productivity, perhaps through technological innovation.

Figure 5. Government Spending and Non-oil GDP Growth in the GCC
(Percent, GCC simple average)



Source: World Economic Outlook.

GCC perspective

Fiscal policy may be a less effective tool to drive growth in emerging and low income countries than in advanced economies. A literature review by Batini et el. (2014) emphasised that fiscal multipliers are significantly lower in the former due to factors such as inefficiency in government spending and greater leakage through imports in smaller, more open economies. Short-term spending multipliers in emerging markets were found to be between 0.2 and 0.5; in advanced economies the figures ranged from 0.6 to 1.4.

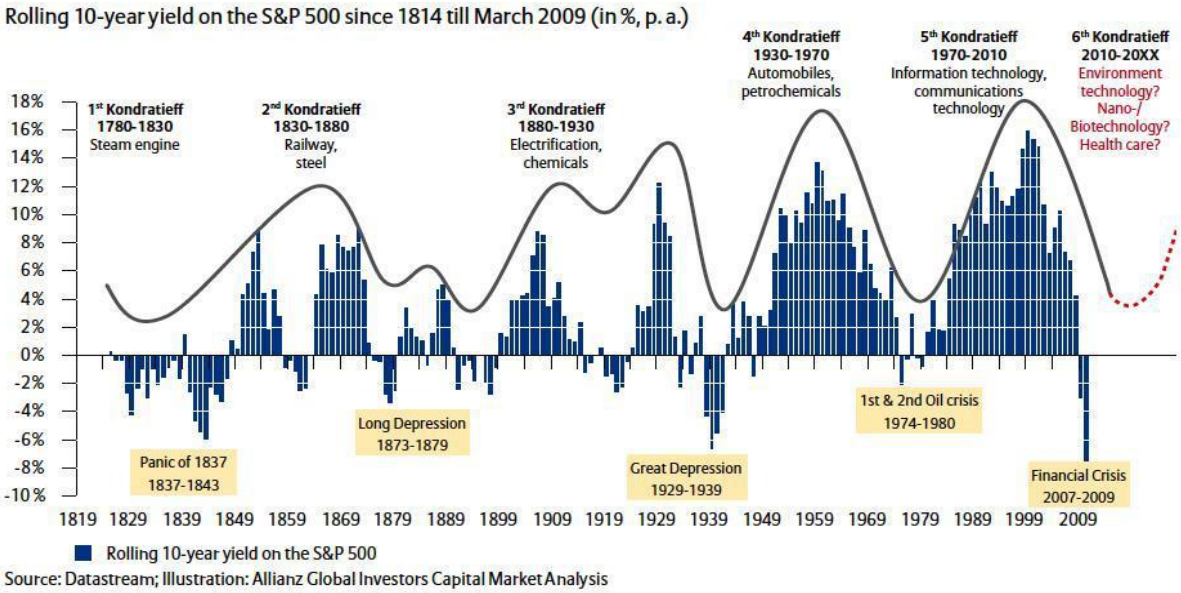
There are three components that contribute towards GDP in a classic framework: labour, capital and productivity. According to IMF, non-oil growth in the GCC countries has been mainly driven by capital and labour accumulation rather than productivity. This explains the falling GDP in GCC countries since the beginning of the oil price decline in mid-2014.

Indeed, one of the IMF's key recommendations for GCC countries is to introduce structural reforms fostering technological innovation as a means to enhance productivity.

A new wave of technology-driven growth?

In past decades, phases of economic expansion and investment returns have, it has been argued, been connected with productivity increases driven by major technological advancement, as illustrated in the chart below.

Technological innovation and equity markets



Source: Datastream; Illustration: Allianz Global Investors Capital Market Analysis

Today, the digital economy - with its smartphones and social media - is changing the way that economic activities are organised. In his book 'The Sharing Economy', Arun Sundararajan, writes that the merging of technologies:

- Is changing the distribution model, shifting from a single or few suppliers to crowd providers like Uber and AirBNB.
- Is enabling users to monetise their assets (cars, houses, household equipment) and increasing the capacity of utilisation. There are around 80 million power drills, each used on average for only 13 minutes over a lifetime. Cars spend most of time parked, doing nothing. Spare rooms stay empty.
- Is providing new sources of finance, with crowd funding turning individuals into tiny Venture Capitalists.

Yet the development of the digital economy is not necessarily captured by GDP statistics. Traditional employment figures, for instance, do not include the millions of micro entrepreneurs. The actual size of the digital sector in GDP figures has remained static, even while intangible assets on UK and US company balance sheets have increased by three times the rate of tangible assets, according to a study for SAS Institute in 2013. Information product, as American economist Paul Romer argues, is different from physical product: once the expense of creating a new set of instructions has been incurred, they can be used over and over again with zero marginal cost.

Mainstream economists assume that markets promote perfect competition and that imperfections such as monopolies, patents, trade unions, and price fixing cartels are always temporary. However once the economy is composed of shareable information goods, imperfect competition becomes the norm. There should be opportunities to arbitrage such inefficiencies for investment gains.

The case study of London, outlined above, represents a particularly useful model for the Arab world in an era of fiscal consolidation. While government spending on the digital economy in GCC countries is fairly low, the video consumption per capita on YouTube and Facebook is the highest in the world. The population is young, with 70% aged under 30. Smartphone penetration statistics are among the highest globally and there has been widespread adoption of social media platforms such as Twitter, Snapchat and Instagram.

Case study: London 2009-2014

In his 2015 book 'The Flat White Economy', Douglas McWilliams analysed how the UK had emerged in 2014 as one of the fastest-growing economies in the Western World. Approximately a third of this growth was, he concluded, down to the digital economy. Employment rates in London had skyrocketed with increases of 4.4% in 2014 and 5.7% in 2015, much of it thanks to jobs in the "professional, scientific and technical" sector. Growth has been particularly impressive in formerly deprived areas such as Camden, Hackney and Islington. Bicycles have replaced the Porsche, skinny jeans have replaced suits and coffee has replaced champagne.

This success has been achieved in the absence of dedicated government expenditure. In the U.S., the development of Silicon Valley had much to do with government defense spending; the Israeli technology sector is driven by military spending; China's technology giant 'Huawei' allegedly grew out of the communication arm of the People's Liberation Army; the Russian technology cluster also appears to have had historical links with military development.

The business model of the Flat White Economy operates via large numbers of relatively low-paid employees, so factors such as cheap accommodation, good transport links, nightlife and popular culture have been contributing factors for London's success, as has a highly diverse population. Indeed, empirical research by Chicago University Professor Ronald Burt demonstrates that diverse groups solve problems much more easily than less diverse ones.

Investing in innovation

According to Cambridge Associates, U.S. venture capital investments have performed better than private equity and listed equities, although such data is hard to rely on given factors such as survivor bias and capital weighting.

US Private Equity and Venture Capital Index Returns
Periods Ended September 30, 2015 • US$ Terms • Percent (%)

	Qtr	YTD	1 Yr	3 Yr	5 Yr	10 Yr	15 Yr	20 Yr	25 Yr
CA US Private Equity	-1.4	5.3	6.2	14.3	14.7	11.8	10.5	13.2	13.4
CA US Venture Capital	-0.4	11.3	22.8	20.8	17.7	11.0	2.9	33.7	24.4
Nasdaq Composite*	-7.4	-2.4	2.8	14.0	14.3	7.9	1.5	7.7	10.9
Russell 2000®	-11.9	-7.7	1.2	11.0	11.7	6.5	6.5	8.0	10.6
S&P 500	-6.4	-5.3	-0.6	12.4	13.3	6.8	4.0	8.1	9.9

Sources: Cambridge Associates LLC, Frank Russell Company, Standard & Poor's, and Thomson Reuters Datastream.
Note: Because the US Private Equity and Venture Capital indexes are capital weighted, the largest vintage years mainly drive the indexes' performance.
* Capital change only.

I believe that investing in technology in the private markets represents an opportunity to generate improved investment returns and, from an economist's perspective, to enhance economic productivity. I also believe that such investments are relatively more insulated from central bank policy decisions than, for example, listed equities.

Sovereign funds in the GCC can consider a two-pronged approach, making investments and assisting firms in working with Arab markets, such as acquiring rights to bring technical know-how or distribution to the region. Sovereign wealth funds in Asia have assisted companies with access to China, for instance, as part of their international technology investing strategy. We can look to such examples. In Oman we have already seen notable examples of investments blending international approach with domestic strategy, such as in the case of Glasspoint.

Technology investment in general, and venture capital in particular, certainly bring challenges. The rate of failure is high, later stage financing is still scarce and the ecosystem is developing. Conventional investment structures often do not provide appropriate alignment between investor and manager. However new modus operandi are evolving.

Oxford Science Innovation, for example, has a phenomenally interesting new model. Operating in partnership with Oxford University, this manager provides investment assessment and lifetime financing to research originating from the University in return for a certain percentage of free equity, *even where* OSI has chosen not to invest. Investors such as Google Ventures and Sequoia have already invested in their first $500m fund.

Both of Oman's sovereign wealth funds have become more heavily involved in this sector, internationally and at home, during the past few months. In August 2016, OIF participated in Cambridge Innovation Capital's latest £75 million fundraising round alongside the likes of Woodford Investment Management. The following month, the State General Reserve Fund announced plans to establish a domestic venture capital fund, in which it will hold a 60 percent stake. Most recently, in late October, OIF launched the $200m Oman Technology Fund in partnership with three international venture capital firms.

This theme is a key political and developmental priority for the sultanate, as well as an investment priority for its sovereign wealth funds. Speaking with the press, Minister of Commerce and Industry HE Dr. Ali Bin Masoud Al Sunaidy said of the OTF initiative: "This [the internet of things' is going to be a big challenge for us. Either we become part of that game and create jobs and profit out of it, or we become consumers and buyers. And I think this fund changes the equation by not restricting the country to the receiving side."

Part Three
"Innovation Investing" - A New User's Guide

Professor Jerome Engel is a Senior Fellow at University of California, Berkeley (Founding Executive Director Emeritus - Lester Center for Entrepreneurship and Innovation; Faculty Member - Center for Executive Education), Founding General Partner of Monitor Ventures, Advisory Committee Member of Future Planet Capital, to name but a few of his affiliations. He writes: Sovereign Wealth Funds should prioritise a steep learning curve when entering the "innovation" sector.

The marketplace for 'innovation' - the commercialisation of new research and technology - is complex, opaque and, by its very definition, risky and inefficient. This challenge is exacerbated when one seeks to take advantage of the phenomenal financial returns potentially available from investing in its' early adoption. Technology risk, market risk, business model validation and execution risk all await the early stage technology investor – and so does the commensurate outsized opportunity.

So how does the prudent sovereign wealth investor approach this opportunity? It is not for the faint of heart, but certainly prudent for those with sufficient resources and time horizons to weather it's cycles and surprizes. On close inspection one sees considerably more failures than successes, even if one simply confines the definition of success to the success of the technology or mass adoption of the business model innovation, let alone the return on investment. Yet success when it comes, is outsized, and as history has shown, for the consistent investor provides an appropriate risk adjusted return. Proximity and intimacy are key to understanding this market, making specialisation by geography and sector very important.

With relatively small deal sizes, ranging from approximately $1 to $50 million, it is difficult for large institutional investors to invest at scale on a direct basis, even if they have the expertise and resources to handle such investments in-house, which is generally not the case. Further amplifying this mismatch between size and opportunity is the recent emergence of university based technology commercialization funds.

Extending the long held relationship between venture capital investing and technology commercialization, leading research universities such as Oxford, UC Berkeley, and others are establishing their own in-house funds to sponsor the most promising opportunities emerging from their institutions. Managing these diverse and specialized opportunities requires more than special capabilities that go beyond disciplined financial acumen. Further, deals, which may have taken months or years to mature, move quickly once in play. Meanwhile, asset managers in this sector are expensive, with uneven track records. Given the relatively long time horizons, past track records may not be the best indicators of future performance. And access to those managers with the best historical records is limited.

Sovereign wealth funds also have a variety of models and structures to consider in addition to direct investment and primary venture capital funds. Options include: fund-of-funds, co-investment with managers, co-investment with fellow sovereign wealth funds or similar entities, or even co-investment with corporate venture capital. Access, alignment, cost, internal resources, scale and additional strategic benefit may all be relevant factors for selecting the appropriate method.

This, in short, it is an area which sovereign wealth funds should approach with a great deal of care and consideration.

Learning curve

To achieve the appropriate financial returns and, where appropriate, the relevant strategic benefits, I would advise sovereign wealth funds to add a third axis to their strategy in this space: the learning curve.

An investor embarking on a venture capital or innovation investing program for the first time should, I would suggest, be prepared to treat the first ten years as a learning phase to gain experience of this highly esoteric sector. In other words, this axis needs to balance the other two in importance. Rather than requiring or expecting ambitious financial outcomes from the start, the investor should lay the necessary foundations for success with a long time horizon. If the institution is not prepared to take a long view then, frankly, the world of early-stage investing is probably not a good fit.

If maximising the learning rate becomes a priority, the investment approach will naturally be rather different. Key considerations may include:

- Investing in every vintage year, rather than trying to pick and choose the best moments, even though vintage year is critical to investment outcome. It is important to gain a deeper understanding of how cycles really operate and how investee companies and managers handle the different phases.

- Making very long-term commitments to managers, not just for the fund they're raising now but for the funds they'll raise in future. This level of commitment, as well as willingness to enter at less popular points during the cycle, will also help investors gain access to the managers they want to work with.

- Actively squeezing knowledge out of those providers. Venture capital managers do not tend to devote much time or resource to educating their clients, unlike more traditional asset managers. Engagements are generally limited to standard LP meetings. Investors that arrive highly prepared and keen to dig into the details during those sessions can derive a great deal of insight; investors that don't will not.

- Seeking to add value to current portfolio companies or the deals that managers are looking at. Learning to look at a deal and work out where you might be able to provide help to that firm is a valuable skill for future direct investments as well as funds. Assets might include regional knowledge, political influence or relevant expertise, either in-house or among other companies in which the fund invests, to name but a few possibilities. Clear willingness and ability to leverage these advantages can also help investors gain access to hard-to-reach managers.

- Finding out how the managers bring value to their portfolio companies. While most venture capital managers claim to be adding value, some do a far better job than others. To gain better understanding, investors can engage with the CEOs of the firms in which the fund invests. Such insights can also help to inform a direct investment strategy.

Once the first phase - the learning phase - has concluded, the investment strategy for the second phase will be far more astute. Investors can select their second generation of managers and/or their direct investments, not only with a better understanding of the opportunities but of their ability to influence and drive success.

Learning from other sectors: corporate venture capital

The world of corporate venture capital can, I believe, provide several useful parallels for sovereign investment entities. Corporate VC funds are focused on financial returns, yet their investments target businesses which have some strategic connection with the corporation.

For example, when Intel launched the 86-series microprocessor, the VC fund invested in firms that would write software for that chip, helping to build an ecosystem around their new product and shortening the natural time-lag between the availability and usage of new technology. Similarly, Apple used this mechanism to support software developers that helped to build an ecosystem around the iPhone, usually through taking minority stakes.

While I would not expect firms to acknowledge that those broader corporate considerations can take priority over pure financial returns for individual VC

investments, my experience indicates that the reality is rather different. At the end of the day, the success of the chip brings more financial benefit to the company than the success of the individual software developer in the VC portfolio.

In the case of state development funds, national economic advancement or the development of strategically relevant industries at home might form the comparable dual objective. Those investors are not, of course, the primary focus of the study in Part 1 of this paper, although - as Part 2 illustrates - they can be highly relevant to the field of innovation investment, nurturing the technology sector in their own back yards. This extends from the development of in-country competencies to building entrepreneurial ecosystems and encouraging existing firms to facilitate scaling and globalisation.

In the case of return-focused sovereign wealth funds, the overall financial returns for the institution may be likened to a corporation's overall valuation. Considering how different investments may interact with each other in an ecosystem and benefit each other, rather than looking at each investment in isolation, may bring greater overall success. By treating direct or VC investments holistically, improved returns and new opportunities may be unlocked.

With more than forty or fifty years of history behind them, corporate VC funds also provide a deep well of potential insight for investors that are keen to learn from the mistakes and successes of others.

If pursued with a long-term perspective and a respect and strategy to accommodate the necessary learning curve, innovation investing presents a great opportunity for true diversification, strategic and financial returns for sovereign wealth funds.

Appendix

1: SWF direct deals

Direct deals by sovereign wealth funds in TMT and Healthcare

Year	Telecoms, Media & Technology (breakdown unspecified)	Healthcare (breakdown unspecified)
2016 YTD	21 (4 public equity, 17 private)	9 (4 public equity, 4 private, 1 other)
2015	26 (11 public equity, 15 private)	25 (18 public equity, 7 private)
2014	public equity, 14 private, 1 other)	21 (7 private, 14 public equity)
2004-2013	Average 9.3 per annum	undisclosed

Source: Sovereign Wealth Center

It may also be highly illustrative to examine the following (non-comprehensive) list of direct deals made by sovereign funds in technology businesses during the past eighteen months.

Direct deals by sovereign wealth funds (sample), 2015-16

Year	Investor	Firm	About
2016	KIA	Apttus	Cloud software, California
2016	Future Fund	MapR	Data processing, California
2016	Temasek	Sprinklr	Social technology startup, New York
2016	KIA	AET	Enzymes manufacturer, India, now public
2016	Temasek	pureLiFi	Wireless communication, Edinburgh
2016	CIC	Unity Technologies	Video game software, California
2016	RDIF	Hyperloop One	Experimental transport, California
2016	PIF	Uber	Taxi-hailing technology, California,
2016	Temasek	Beigene	Immunotherapy drugmaker, China, now public
2016	Temasek	FNIS	Payment service provider, Florida
2016	GIC	MultiPlan Inc.	Technology for healthcare company cost reduction, U.S.
2016	Temasek	Homology Medicines	Gene therapy, Massachusetts
2016	Temasek	Farfetch	e-commerce, UK
2016	Temasek	Huitong Tianxia IOT	Logistics hardware, China
2016	Khazanah	Garena	Online gaming/social networking, Singapore
2016	Temasek	BillDesk	Software for processing online payments, India
2016	Khazanah	Blippar	Computer-augmented reality, London
2016	Temasek	Team8	Cybersecurity, Israel
2016	Temasek	Illumina	Genetics analysis, California
2016	Temasek	Regneron	Biopharmaceuticals, New York
2016	KIA	Jawbone	Consumer technology, California
2016	Khazanah	WeLab	Mobile lending and credit analytics platforms, China
2016	Khazanah	Skyscanner	Flight cost comparison website valued $1.4bn, Scotland
2015	GIC	Shopclues	Online retailer valued at $1.1bn, India
2015	Temasek	CarTrade	Online car classifieds company, India
2015	Temasek	Flux Factory	Collaborative software for design&construction, California
2015	OMERS	Kaleo Software	Computer programs for information-sharing, California
2015	Temasek	Makesense	Software, India
2015	Temasek	EMC	Data storage, Massachusetts
2015	GIC	ANI Technologies	Includes taxi hailing (Ola), India
2015	KIA	Apttus	Cloud software, California, valued over $1bn
2015	GIC	1More	Audio devices, China
2015	Temasek	Jasper Infotech	Online marketplace snapdeal.com, India, value ~$4.7bn
2015	CIC	GrabTaxi (unconfirmed)	Taxi-hailing technology, Singapore
2015	GIC	Veritas	Data storage, California
2015	CIC	Didi Kuaidi	Taxi-hailing technology, China, valued at $15bn
2015	Temasek	Didi Kuaidi	Taxi-hailing technology, China, valued at $15bn
2015	GIC	Matterport	Imaging technology, California
2015	Temasek	Hello	Sleep sense monitor, California
2015	Future Fund	AST	Solar power, India
2015	ADIC	Spotify	Music streaming, UK/Sweden
2015	Khazanah	General Fusion	Fusion energy technology, British Columbia, Canada
2015	GIC	Sulekha	Online listings, India
2015	GIC	ANI Technologies	See above
2015	QIA	Flipkart	Online retailer, India
2015	SGRF	GlassPoint	Solar steam generators for oil & gas industry, California
2015	Temasek	Capillary Technologies	IT - customer engagement solutions, India

Source: Sovereign Wealth Center

2: Sovereign Wealth Funds

While SWF definitions vary widely, the interviews in Part 1 of this paper focus exclusively on government-owned investment entities tasked with maximising long-term intergenerational savings. *Stabilisation funds, development funds, central bank reserves and funds with explicit pension liabilities were not included* due to the difficulty of comparing the objectives and strategies of such different entities when reported in an anonymous context.

As such, officials from the following 22 Sovereign Wealth Funds - which we believe largely fulfil these criteria - were invited to participate:

List of invited institutions

Abu Dhabi Investment Authority
Abu Dhabi Investment Council
Alaska Permanent Fund
Alberta Heritage Savings Trust Fund
Brunei Investment Agency
China Investment Corporation
Future Fund, Australia
GIC
Government Pension Fund Global, Norway
Kazakhstan National Fund and National Investment Corp (could be considered Central Bank)
Korea Investment Corporation
Kuwait Investment Authority
Libyan Investment Authority (inactive)
New Mexico State Investment Council
New Zealand Superannuation Fund
Nigeria Sovereign Investment Authority (future generations fund component)
Public Investment Fund, Saudi Arabia (recent developments make status unclear)
Qatar Investment Authority
State General Reserve Fund, Oman
State Oil Fund of Azerbaijan
Temasek Holdings (could be considered a Development Fund)
Texas Permanent School Fund

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