



Chapter 7

Sovereign funds' technology investments

'Public-private partnerships to overcome start-up obstacles'



Sovereign funds and French public authorities are working together to boost investments in the country's promising tech sector, writes Alexandre Gazaniol, economist, impact assessment unit at Bpifrance.

THE French technology sector has grown significantly over recent years. In 2019, local start-ups raised around €5bn, almost tripling investments in four years. Between 2015-19, the number of venture capital deals increased by half and the average deal size nearly doubled. All industries have benefited from this trend, from software and internet services to life sciences. The venture capital industry is upscaling, as general partners boost funds under management, develop new business lines, set up offices abroad and invest in their ability to provide operational support to their portfolio. France has a growing network of incubators and accelerators, including 'Station F' in Paris.

This trend is partly the result of a long-time effort led by French public authorities to overcome the many obstacles – financial and non-financial – that start-ups face. Public-private partnerships are needed to develop a viable venture capital sector. Venture capital is associated with high financial risks and all actors within the industry, from entrepreneurs to investors, must follow a learning curve so that the asset class becomes profitable.

Venture capital's positive impact goes beyond the benefits of private investors and is not fully accounted for in investment decisions. These 'externalities' include the dissemination of knowledge and innovation, as well as environmental and health benefits. To ensure society reaps the full benefits of venture capital, public authorities must share financial risks with private investors.

Bpifrance, the French public development bank, was designed precisely for this purpose. Its objective is to promote high-growth companies by investing with the private sector, covering all segments of the venture capital market from seed to growth. Operationally,

Bpifrance acts both as a direct investor and a 'fund of funds'. In 2019, direct investments into start-ups represented around €320m, while commitments into venture capital funds amounted to nearly €600m. The increase of these investments in recent years was in line with market movements, and Bpifrance's weight in total venture capital funding remained constant.

Bpifrance has partnered with sovereign funds, which are attracted by the French tech sector's potential and willing to adopt a more flexible and long-term approach than traditional investors.

For example, Bpifrance has a co-investment agreement with the UAE's Mubadala, which targets fast-growing companies through direct investments and a fund of funds programme. This type of agreement allows the sovereign fund to meet its return expectations, while channelling patient funds into the French ecosystem.

Pandemic-induced lockdown measures have hurt start-ups' revenues and fund-raising, but the impact varies across industries. Bpifrance has enacted a wide support programme to provide bridge finance for start-ups with little cash runway.

Lockdowns have also accelerated the digitalisation of the economy and will induce structural changes in consumer habits and production processes. Tech sector equity values have outperformed the rest of the economy over the past months.

Bpifrance is committed to help start-ups seize these opportunities and foster the emergence of new actors and industries.

This will ensure the French tech scene remains buoyant over the long run, in an efficient, innovative, competitive and resilient French economy. •

'In 2019, local start-ups raised around €5bn, almost tripling investments in four years.'



Funds seek economic reward, geopolitical clout

Low returns on traditional assets have driven many sovereign funds to invest in technology firms. Yield is not the only motivation, however. Concerns about deglobalisation and disruption are crucial, write Pierre Ortlieb and Brandon Chye.

THE volume of sovereign fund deals in private market technologies fell in 2019, after years of growth. Since the 2008 financial crisis, returns on listed assets have waned. Geopolitical tensions have risen and public listings by major technology companies have declined. As a result, sovereign funds looked for profit and power in direct and indirect private market technology investments. Yet the private market technology rush appears to have cooled significantly even before the onset of the Covid-19 pandemic.

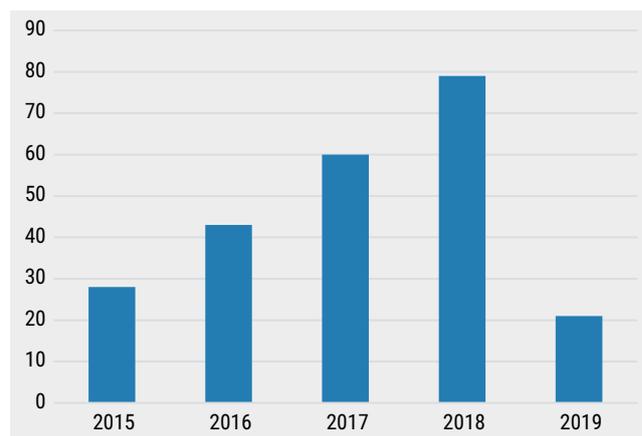
Nonetheless, technology remains of strategic importance for sovereign funds across geographies and sectors. This chapter lays out sovereign funds' existing holdings, strategies and rationales for investment in private market technology, seeking to disentangle the roles of geopolitics, internal investment capacity and governance. As the immediate shock

of the pandemic subsides and its longer-term implications unfold, this sector will take on even greater importance.

Quantifying sovereign funds' technology exposure

Many of the major sovereign fund players in technology come from

emerging market backgrounds and are highly concentrated on specific institutions. In particular, Singapore's Temasek and GIC are prolific investors across this landscape. Together, they were involved in nearly 61% of total technology deals between 2015-19 (Figure 2). The high involvement by Singaporean



1. Momentum slows after years of growth

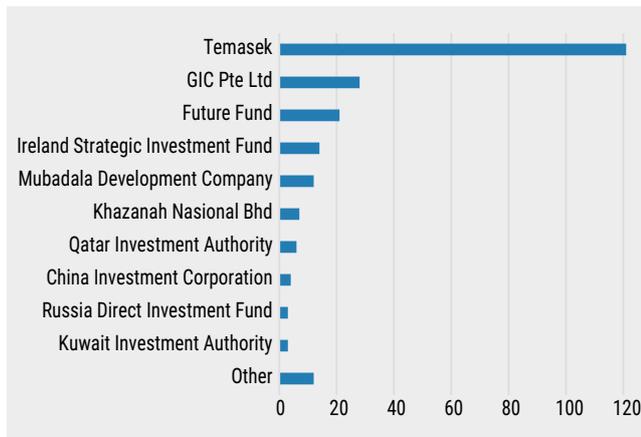
Number of technology investment deals by sovereign funds by year, 2015-19

Source: Tufts University SovereignNet, OMFIF analysis

2. Tech investments highly concentrated among emerging market sovereign funds

Top 10 sovereign funds by number of technology investment deals, 2015-2019

Source: Tufts University SovereignNet, OMFIF analysis



sovereign funds is linked to long-term capacity building within their divisions. Temasek and GIC were some of the first investors to explore early-stage technology investments and venture capital efforts, as early as the 1980s. Other sovereign funds are increasingly engaged in this area. Malaysia's Khazanah Nasional Berhad is a notable sovereign technology investor. A trio of Gulf state sovereign funds, the Qatar Investment Authority, the Kuwait Investment Authority and Mubadala, were involved in around 9% of deals between 2015-19. The profile of these major sovereign technology investors suggests that countries lacking natural technology bases have tried to acquire, import and reverse-engineer expertise from abroad via strategic sovereign investments. These funds' activities underline financial and political competitive pressures across the sovereign investment sector.

Examining the major target countries for technology deals highlights that techno-nationalist motives are often combined with more return-driven priorities. Even though major technology-focused sovereign funds typically originate from developing countries in Asia and the Middle East, the target countries receiving private market technology investment from sovereign funds are slightly more diverse. The lion's share of sovereign fund technology investment (51%) is spent on companies in the US (Figure 3). This is in line with America's highly

developed ecosystem. Other major recipients of sovereign fund deals are from emerging markets in Asia Pacific. China has attracted about 15% of deals, reflecting China's push towards indigenous technological innovation. Singapore and India are major target countries for deals, reflecting bullish sovereign investor sentiment attributed to an expanding young, tech-savvy middle class.

Sovereign investors have prioritised investment into core infrastructure for the digital economy (Figure 4). These areas include companies dealing with business processing software, cloud computing, data centre services, information technology management, security and storage. These investment areas are likely to grow as businesses digitise and accelerate their efforts to adapt to the post-Covid-19 economy. In a demanding balancing act, they involve both investing in new technologies

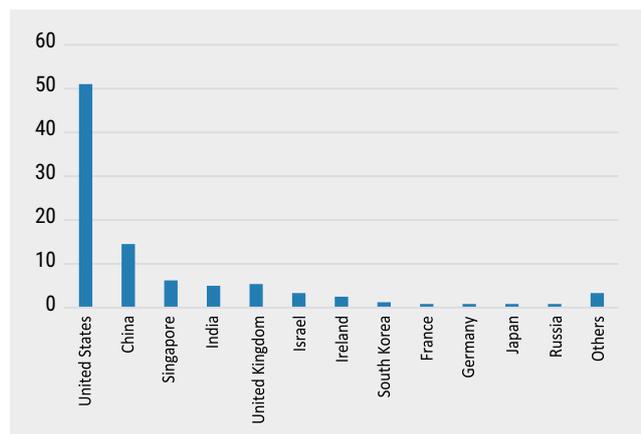
and upgrading existing assets.

Another field that stands out is biotechnology, which has taken on increasing importance as a result of the pandemic. The interplay between biopolitics and cross-border sovereign investment is an area of increasing tension. The Russia Direct Investment Fund is backing the tentatively useful Covid-19 treatment drug Avifavir. In a failed attempt at biopolitical mercantilism, the US administration was rebuffed in its attempt to take over unlisted German vaccine maker CureVac, leading to the German government to acquire a stake itself ahead of a planned US stock market flotation. Beyond the pandemic, however, as advanced economies grapple with ageing populations, investments in life sciences, healthcare and wellness will also be shaped by changing consumption patterns.

Early-stage technology investments may be complex activities for institutional investors to evaluate. But it is clear that investment risk is often tempered with a clear awareness of demographic trends and structural economic transformation that will affect different countries and sectors. The focus areas of sovereign investment are aligned with these trends to maximise the likelihood of long term profitability.

Models and strategies

Sovereign funds have traditionally relied on indirect means of accessing technology investments, including



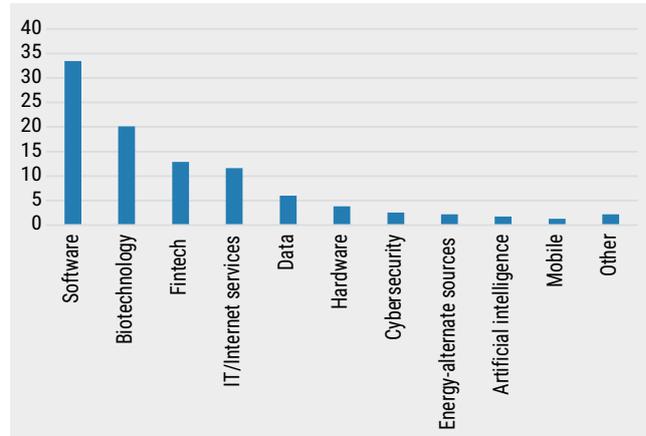
3. US is the most popular destination for inbound sovereign fund tech investments

Top 10 destination countries by % of technology investment deals, 2015-19

Source: Tufts University SovereignNet, OMFIF analysis

listed equities and investment through external venture capital funds. Many funds still maintain the former approach, such as those passive stabilisation funds that are sector-neutral vis-à-vis an index such as the MSCI All Country World Index. Yet the growing clout and scale of some large sovereign funds on the global investment stage has transformed their role and shifted their focus towards direct access.

Since the 2008 financial crisis, sovereign funds have increasingly



4. Tech investments aligned with strategic trends in the digitalised, post-pandemic economy

Top 10 technology sub-sectors by % of sovereign fund investment deals, 2015-2019

Source: Tufts University SovereignNet, OMFIF analysis

Central banks' technology stakes

CENTRAL bank reserves generally do not include investments in private markets, although some central bank-affiliated sovereign funds – such as the Hong Kong Monetary Authority’s Exchange Fund and Norges Bank Investment Management – invest in private markets in some capacity.

A growing share of reserves managers, including at the People’s Bank of China, the Swiss National Bank and the Reserve Bank of Australia, have allocated some of their holdings towards listed equities. These holdings often include significant shares of listed technology companies,

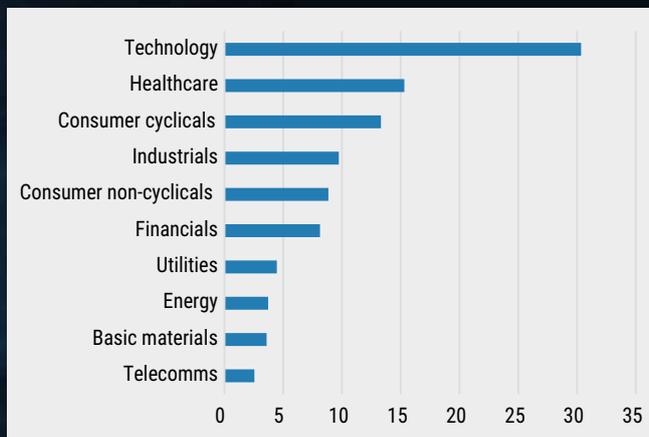
especially as central banks are generally barred from holding bank equities.

This gives equity-holding central banks a stake in innovative, disruptive processes and a way to reap the benefits of technological advances achieved in other economies. It also raises questions on shareholder activity – how active can central banks be as shareholders, especially on key issues such as assuring adequate corporate governance or promoting sustainability?

These considerations place them at the centre of difficult geopolitical quandaries.

5. Central banks tied up in booming tech sector

SNB listed equity portfolio, May 2020, % by sector
Source: Thomson Reuters, OMFIF analysis



looked to private markets as an entrance point to technology investment. First, the appeal of listed assets has declined across developed markets, forcing significant reconsideration of investment strategies among this group of investors. Second, high-profile and attractive technology firms have become increasingly reluctant to list on public markets. New listings fell 20% between 2018-19. Many of the firms that have gone public, such as Uber, have experienced significant share price drops in the aftermath.

Tepid initial public offering figures are mirrored by a boom for venture capital among sovereign funds. Sovereign funds have contributed vast amounts of funding to so-called external investment 'platforms', including investments by Saudi Arabia's Public Investment Fund in Japanese conglomerate Softbank's Vision Fund I. Typically, external funds are used to access deals at earlier stages, drawing on the expertise and local knowledge of the venture fund manager. For later stages in a company's cycle, sovereign funds will typically draw on their own capacity or establish specialised internal funds, a strategy which will be explored later in this chapter.

These models of delegation have proven popular among sovereign funds given the broader financial market environment and their desire to participate in the immense growth of the technology sector. These modes of access tend to provide a highly diversified, high-quality deal flow. They allow sovereign funds to capitalise on the know-how of venture funds at key points in deal origination and due diligence.

Yet reliance on external, indirect strategies to access private technology markets can prove challenging, especially for smaller funds with less clout and experience. For one, exorbitant fee structures, particularly among the most highly rated venture fund managers, can act as a disincentive for even the most risk-hungry sovereign funds. At the same time, it can be difficult for smaller

sovereign funds to gain access to those sought-after venture investors, reducing potential rewards and their appetite for specialised investments. Finally, sovereign funds may find that indirect participation results in a lack of control and strategic benefit from their technology investments, countermending a key strategic reason guiding these transactions. Therefore, many funds have turned towards direct market access, often using co-investment or a build-up of internal capacity through in-house venture funds.

The alternative to a delegation-based model of passive participation is direct equity investing, which has risen in popularity among sovereign funds. The least innovative of these, solo direct investment, is the most common. It involves a sovereign fund simply taking an equity stake in a private technology company. Lower

51%

US-based companies received 51% of sovereign fund technology investments between 2015-19

fee structures and greater control are two advantages of this model.

Direct equity investment in private markets has brought about more engaging forms of innovation, institutional development and co-operation among sovereign funds.

Most importantly, sovereign funds have risen to the task of developing the internal capacity required to execute complex direct investments. This practice raises questions about their institutional capacity and the adequacy of their governance structures. This is reflected in the number of sovereign fund offices that have opened the globe.

The most notable city which has a clear ecosystem built around various

aspects of the technology investment lifecycle is San Francisco. One of the salient challenges for early-stage technology investing is that many companies have no tangible assets and are unlisted, lacking an assessment of their potential financial value. Some of the human capital advantages from setting up a regional office in San Francisco are clear; global public investors are closely situated to key companies and technology innovation hubs in Silicon Valley, as well as universities such as Stanford. Global public investors can benefit from access to a pipeline of professionals with the expertise to integrate opaque and complex technology investments into their portfolios.

In addition to maintaining offices in tech hubs such as San Francisco, direct investments in the technology sector require the build-up of internal expertise and often significant changes to governance models. Innovation can be challenging to understand, requiring deep internal specialisation and more careful due diligence. Measuring performance and developing the right risk management models to understand both macro and micro risks involved requires effort and patience. The largest sovereign funds have dealt with this by establishing in-house, specialised venture capital institutions. Temasek established Vertex Holdings in 1988 for precisely this reason – to provide operational support to its network of funds and harness local knowledge in each of its six target regions. Serving as an anchor investor through Vertex allows Temasek to delegate internally, thereby balancing control and strategic benefits with the specialised know-how of indirect or platform investment. A host of other large sovereign funds have emulated this strategy, developing their capacity through establishing in-house, technology-focused investment units.

The appeal of co-investment

In parallel to the establishment of internal venture capital platforms,

sovereign funds have turned to co-operative co-investment strategies among themselves, allowing them to leverage each other's knowledge, networks and expertise. Co-investment implies a 'more dynamic engagement with partner companies' and 'demands a stronger analytical framework and a long-term engagement mindset,' as noted by Javier Capapé, professor at IE Business School. It is a far more hands-on strategy than simple delegation models. Some forms of co-investment, such as two sovereign funds investing with the same venture capital manager, represent more co-incidental forms of co-operation. Those forms of co-investment that involve a sovereign fund as the anchor or lead, and involve more deliberate co-operation, represent an important growing trend. While they are costly and labour intensive, they represent a great opportunity for sovereign funds to further entrench themselves as powerful global investment players and further develop their institutional capacity, gaining expertise and market access from collaboration with their peers.

These strategies have risen in prominence in recent years. According to the direct investment data by Tufts University's SovereignNet, there were 97 unique co-investment deals by sovereign funds between 2015-19. Co-investment transactions make up roughly 14% of the dataset. Bpifrance, one of the world's most active tech investors, is a case in point, having established co-investment opportunities with a number of other leading sovereign funds. Bpifrance and CIC Capital established the Sino-French Third-Countries Investment Fund in late 2016, boosting third-party market access for French and Chinese companies. Bpifrance established similar projects with the Korea Investment Corporation, Bahrain's Mubadala, and the Russia Direct Investment Fund, all seeking to bolster the development plans and economic interests of companies located in France.

Bpifrance's experience underlines

the features and benefits of co-investments for sovereign funds. Typically, these are designed to enhance access to a particular region or investment theme. Bpifrance's agreement with Mubadala sought to enhance access to French tech companies, for example. At the same time, through its partnership with CIC Capital, it has been able to leverage the know-how, network and expertise of Chinese firms and the sovereign fund to access both the Chinese market and third markets.

Clearly defined rules and procedures are required to ensure the fullest possible success for the co-investment. Defining a clear mandate for the group ensures a high-quality and thematically relevant deal pipeline. Ensuring commitment to the co-investment by participating funds is equally important. Preventing the rise of unwanted competition effects between the participating institutions is another key step in helping the success of the endeavour.

In all these cases of direct equity investment, governance concerns are crucial. Some of these can be addressed through more thorough risk management frameworks and internal specialisation. Others are more strategic and geopolitical in nature, alluding to the inevitably political nature of these institutions. For example, political tension may inhibit a successful partnership in cases where there is distrust between the partners or between the partners

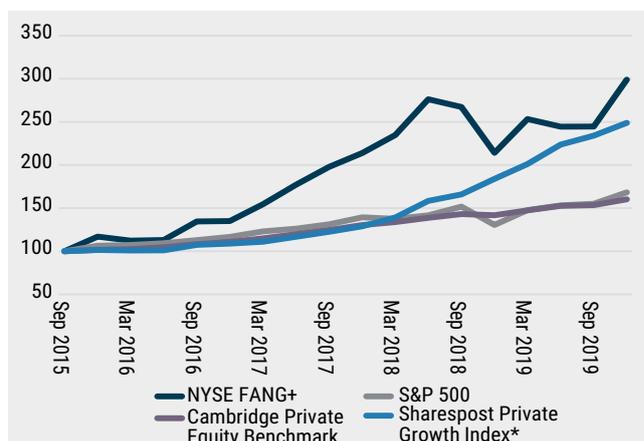
and a target's parent country. This has been a recurring theme over the past decade. Many developed economies have taken an increasingly hard-line stance against Chinese investment, which in some cases may be linked to, say, French investment through Bpifrance. A Sino-French co-investment in the US, for example, might lead to French exclusion under new investment screening rules. Similarly, the distinct fiduciary responsibilities of sovereign funds require them to take a more active stance as shareholders on certain issues, which might breed conflict between partners where there is poor alignment on strategic aims. This makes defining them at the outset all the more important.

Rationales for technology investment

Over the past decade, technology stocks have vastly outperformed the broader market. Returns from private investments in technology companies have been eye-popping (Figure 8).

This is a powerful rationale for seeking out technology investments, especially through direct investments where fee structures are lower. For funds that have long been active in this sector, the appeal is even larger. Temasek, for instance, has leveraged its internal capacity and geographic reach to 'amplify net returns and drive additional exposure to direct investing'.

Proactive investment in technology



8. Burst in tech outperformance drives GPI interest

Quarterly returns on NYSE FANG+ index, S&P 500, Cambridge Associates Private Equity benchmark, and SharesPost Private Growth Index benchmark, Q3 2015 = 100

Source: Refinitiv, OMFIF analysis

*The SharesPost Private Growth Index measures the performance of VC backed, US based, private growth companies across technology driven sectors.

will help sovereign funds stay ahead for the future, enabling them to secure growth for their constituents by anticipating trends. The Abu Dhabi Investment Council's investment in WhatsApp, which allowed it to reap significant returns when the latter was bought by Facebook in 2014, is a notable case. In a similar vein, investing in productivity-enhancing technologies will ensure higher growth and, by extension, higher asset prices in the future.

At the same time, peer pressure can be a powerful force; the vast majority of private market deals are conducted by large, internationally active sovereign funds. The rise of co-investment as a strategy for technology access makes this particularly easy. It allows more inexperienced funds to deploy capital accompanied by a more skilled partner, leveraging the expertise of their peer group. According to the OMFIF GPI Survey 2020, high returns were the main driver behind technology investment for 46% of sovereign and public pension funds, followed by 'preparing for disruption risks' at 29%.

Yet as inherently political institutions, many sovereign funds are driven by instincts that force them into competition with other funds. Innovative investments and high-impact technologies are scarce commodities. Their limited supply will spur sovereign funds on the outside to seek greater access; their appealing returns add to these competitive dynamics. 'Following leaders' has been an important generator of sovereign fund technology investment, fuelled by both collaborative and competitive forces.

Supporting local innovation is a key motivation in sovereign fund technology investments, a feature which is more common among traditional 'development' funds rather than among 'stabilisation' or 'savings' funds. However, even the latter group have become more involved in bolstering domestic tech companies as the sovereign fund

community has developed.

Fulfilment of this mandate can take several forms. Typically, sovereign funds have preferred direct investments to indirect ones; the latter necessarily removes the investor from direct control and may limit the benefits of the investment. On the other hand, sovereign funds have pursued indirect investment as a means for supporting domestic tech firms – for instance, the Ireland Strategic Investment Fund has committed a significant amount of capital to venture capital platforms such as Silicon Valley Bank's Strategic Investors Fund X to develop, scale and lend to small-scale, innovative Irish firms. Similarly, its \$100m commitment to Insight Venture Partners' Fund X seeks to bolster established and growing Irish software businesses.

Direct investments are regarded as a more effective way to lift domestic innovators. They provide a greater degree of control over the investment, developing and maintaining the local technology base. For investments abroad, direct access allows the sovereign fund to ensure that processes such as technology transfers and knowledge-sharing take place. ISIF provides further examples for how direct equity investment can be used to leverage technology, creating employment and productivity gains. In 2017, it invested €19m in Kaseya, a provider of IT solutions for managed service providers and mid-sized enterprises, adding 130 jobs to the company's already-existing 30 Dublin-based employees.

While Kaseya is an Irish company, supporting domestic innovation is by no means limited to investment in local firms. Sovereign funds can invest in foreign firms, encouraging them to expand their operations in the home country. ISIF's investment in Nautilus Data Technologies is a case in point. The California-based pioneer in sustainable data centres will expand its operations in Ireland following ISIF's backing, 'with the aim of constructing a new generation

of leading-edge data centres in Ireland for use in the Irish and global markets'. Here, technology transfer from abroad bolsters domestic innovation and creating employment. While some might argue that this transfer prevents domestic companies from flourishing, the specificity of the technology in question and the aggregate benefit provided to the Irish economy mean that concerns about a form of 'technological mercantilism' should not apply here.

The rise of co-investment strategies has facilitated the use of sovereign funds as a means of nurturing domestic innovation. Many of these co-investments allow technology to flow between jurisdictions, resulting in a mutually beneficial exchange of knowledge and capacity – provided clear rules of engagement are spelled out. Bpifrance's partnership with Korea Investment Corporation, for example, allows French investee firms to gain easy access to Korean capital and know-how, placing them in a stronger position to innovate while remaining intrinsically 'French'. KIC's involvement can facilitate technology transfer to Korea, taking steps towards the fulfilment of their own domestic development needs.

Hedging against disruption

The notion of 'hedging against disruption' might best encapsulate sovereign funds' technology investment strategies. It captures the dual passive and active approach they have taken to innovative forces. Disruption is diffused in two ways: by producing new technologies and altering old ones.

The direct investments described in the preceding sections are generally a good example of an 'offensive' or 'attacking' strategy. By building up internal capacity, seeking access to cutting-edge investments and gaining a stake in the underlying technology, sovereign funds are able to position themselves at the forefront of innovation, ensuring that they reap the benefits of nascent disruptive phenomena. This explains

both the size and scale of sovereign funds' investments in technology. Finding the next unicorn is no easy task and doing so, for both financial and geostrategic reasons, requires an aggressive, all-encompassing and proactive approach.

Sovereign funds also engage in defensive strategies, which involve using direct investments to shield investments in other sectors. This entails taking riskier bets in more conventional sectors, such as real estate or infrastructure, and using those to safeguard against future paradigm shifts. At the same time, it requires applying knowledge gained through technology investments to existing holdings to 'futureproof' them.

GIC's approach to the real estate industry has been an apt example of the former. As Lee Kok Sun, chief executive officer of GIC Real Estate, says, the fund has taken significant forward-looking gambles in property, such as a sizeable bet on the future importance of co-working. This allowed the fund to better understand nascent development in the sector and to profit financially if the trend should become a widespread new reality. This is one way of ensuring that sovereign funds are insured against disruption in traditional sectors.

The other side of this coin is upgrading existing assets and ensuring that they are not left behind by technological advances. Insights gained through investments in the technology sector can lead to change throughout the entire investment strategy, from the application of new data analytics tools to refurbishment of existing building space. Lee Kok Sun describes how GIC had 'decided to convert the banking hall' in one of their portfolio office buildings 'into a hub in which tenants could hold events and showcase their latest products or technology'. In 2018, Australian Future Fund's Chief Investment Officer Raphael Arndt described how the fund had used the knowledge acquired through e-commerce investments, and

61%

Between 2015-19, 61% of global tech deals involved GIC and Temasek

their staff with a background in ecommerce, to upgrade 'a traditional brick and mortar luxury goods retailer that had a pretty basic web offering'.

These two approaches allow sovereign funds to leverage their patient capital and growing internal capacity to take advantage of overarching, non-market risks, such as demographic change. Hedging against disruption in this way is a complex task, but one from which prepared and well-governed sovereign funds can reap substantial benefits.

The development of comprehensive private capital programmes is key for sovereign funds seeking to prepare for, hedge against and reap returns from disruptive technological processes. Several funds, including Singapore's GIC and Temasek, have taken a significant head start in their private market access.

Other funds are catching up, as they shift from indirect platform investments, such as external venture capital funds, to some degree of self-reliance in their private technology investments. This has involved the development of considerable new internal capacity, a process which is changing the way sovereign funds see themselves and operate. The perception that disruption will influence every sector of the global economy has driven many sovereign funds to take a two-pronged approach. They are engaging in a delicate game of 'attack' and 'defence' wherein they aggressively pursue unicorns and upgrade existing assets in more conventional sectors.

The field of agritech highlights the distinctly geopolitical nature of these investments. Both the target and origin country in a deal must weigh important strategic considerations against the prospect of returns. Wide dispersion in returns on investments together with the possible reversal of globalisation in many fields and the broader pandemic fall-out will maintain sovereign funds' technology pursuits in the vanguard of international investment for years to come. •



'Digital economy could be relabelled Covid economy'



The pandemic provides opportunities for investors, consumers and governments to target capital towards building a sustainable future, writes Tibor Schwartz, senior adviser, asset management, QIC Global Infrastructure.

As a result of the new socially-distanced reality, the digital economy could be relabelled the Covid economy. Investors are seeing an increasing pace of technological change, alongside a growing need to adopt and integrate innovation along all stages of the investment spectrum.

Early-stage technology opportunities are becoming more appealing, despite their high-risk, high-reward profile. Today, institutional and sovereign investors should view the digital economy and technological innovation as a vanguard against disruption and a champion for sustainability.

Before the pandemic, the pace of technological change had begun to restructure the foundations of the global economy. New technologies – such as data and energy storage, and renewable hydrogen infrastructure – are emerging to become tomorrow's utilities and infrastructure. Institutional investors kept abreast of these technological, regulatory and consumer driven changes by adapting asset classifications. The virus outbreak has highlighted the role of technological innovation as an essential connector as international borders are shuttered and commercial activity disturbed at an unprecedented scale.

Even as the full impact of Covid-19 is still being mapped out, investors, consumers and governments have an opportunity to target capital towards building a sustainable future. Technological innovation is powering climate resilience, decarbonisation and decentralisation. Sustainability drives investment performance through enhanced growth, as well as lower

operational costs and reduced regulatory and legal intervention risks, among others.

The scope of an investor's support should expand to a 'technology ecosystem' rather than individual technology enablers. For instance, the South Korean approach to prioritising investment in the 'hydrogen ecosystem' is inclusive of the production, storage and dispensation of renewable hydrogen. South Korea's plans for a hydrogen ecosystem could transform the domestic economy, and has strong export potential for hydrogen technology such as fuel cells.

To succeed and manage risk, institutional and sovereign investors must understand the level of

continual process improvements that must occur to ensure the resilience of their investments in a constantly changing environment. To build a sustainable business, technological innovation must be embedded across all 'life stages' of a company: maintenance, expansion and re-creation. As such, innovation doesn't just play a role in existing operations; it can

play a positive, disruptive role in the latter stages as well.

Governments, through their fiscal stimulus post-Covid can support the shifting technological landscape to ensure long-term benefits. They can do this by providing regulatory certainty and early-stage funding to help business grow.

At QIC, we seek out innovations and innovators contributing to an investment environment to make the operations of a business fit for the future. All these ingredients can be combined to create growth and relevance for a reimagined, more sustainable future.

'Technological innovation is powering climate resilience, decarbonisation and decentralisation.'



Navigating pathway through politics of agribusiness

Sovereign funds are exploring more complex and sophisticated investment strategies in an era of heightened scrutiny over their cross-border operations.

STRATEGIC objectives have often dictated sovereign funds' investment approaches. As long-term providers of capital, these financial institutions can dedicate investments to specific industries and sectors seen as contributing to the investing countries' social and economic security. Sovereign funds are adapting their investment approaches as the long-term systemic risks of climate change, overpopulation and food shortages shape public consciousness and the policy-making agenda.

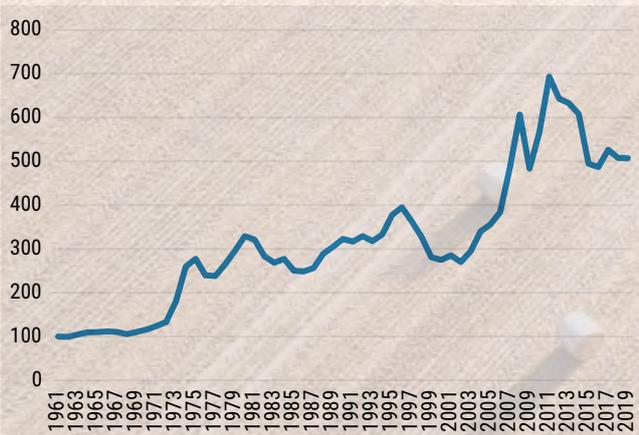
Even as international initiatives try to blunt climate change, mitigation actions could have thorny trade-offs and exacerbate Malthusian pressures on global food adequacy (Figure 6). For instance, a 2019 report from the United Nations Intergovernmental Panel on Climate Change estimates that by 2050, afforestation on a massive scale could create pressures on arable land and increase food prices by as much as 80%. Covid-19 has further underscored potential food supply vulnerabilities. Fragmentation in international supply chains and movement restrictions have jeopardised the production and distribution of food across the world.

Sovereign funds place considerable importance on consolidating and strengthening their states' supply chains of food and similar essential natural resources. Many sovereign funds originate from small, open and resource dependent economies that will be heavily affected by any disruptions and structural scarcity in international food supplies. Emerging market sovereign funds are thus particularly influential players in redefining the landscape of global food security. For instance, the Middle East has been a prolific region for outbound agro-food investments linked to the reorientation of national food security policies since 2007. As water-stressed countries with low arable land levels, they are exposed to supply and price risks for food imports. Private market technology allocations are flourishing amid reductions in traditional investments in public equities and fixed income in an era of anaemic

returns. One intersection between these two strategic trends is highlighted via sovereign fund investment into agricultural technology and agribusiness.

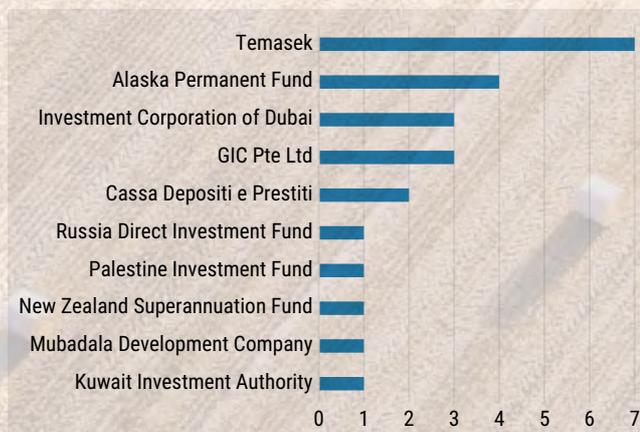
Major investors in agritech and agribusiness include sovereign funds such as Temasek and GIC, China Investment Corporation and Arab Gulf state funds Mubadala, the Investment Corporation of Dubai, the QIA and the KIA (Figure 7). With the exception of NBIM, the largest sovereign

funds have dedicated agricultural investment vehicles, having made direct investments through subsidiary agricultural investment companies. In other cases, agribusiness and food security have been a basis for institutionalised collaboration among emerging market sovereign investors. CIC has collaborated with the RDIF to establish a joint Russia-China Investment Fund, with food and agriculture as a priority investment area. The RDIF has announced similar co-investment plans with



6. Volatility and increase in food prices influence strategic investment policies

FAO Food Price Index, base year = 1961
Source: FAO, OMFIF analysis



7. Sovereign funds from small or resource-dependent economies seek agro-security

Number of sovereign fund agribusiness investment deals by institution, 2015-2019
Source: Tufts University SovereignNet, OMFIF analysis

Mubadala to channel capital to Russian agriculture and food production.

Agriculture and food production are areas of great political and economic sensitivity. Sovereign funds are exploring more complex and sophisticated investment strategies in an era of heightened scrutiny over their cross-border operations. Direct acquisition of land, natural resource supplies and physical assets in foreign countries can be a thorny issue for government-linked financial actors. Amid an upsurge in protectionist sentiment, seen especially in the US-China trade dispute, foreign investment in strategic areas such as digital infrastructure, food, medicine, and energy will become subject to greater scrutiny and regulatory restrictions. Sovereign fund investments in these fields have often elicited considerable backlash. For instance, a QIA-owned subsidiary, Hassad Foods, has been compelled to redefine its investment activities in Australia to lower emphasis on strategic food security. It will instead emphasise commercial objectives perceived as more legitimate by foreign investment regulators.

Investments and projects contingent on market access to agricultural markets or land purchases to repatriate food supplies have often produced disappointing returns. Some funds have experienced success. Bahrain, for instance, was able to achieve a significant degree of agricultural self-sufficiency thanks to the activities of Mumtalakat's portfolio companies, which sparked a rise in domestically produced red meat and poultry. Yet in many cases, sovereign funds have had to take a more hands-off approach, acting as ancillary institutions supporting the agribusiness acquisitions of state-owned enterprise subsidiaries. CIC has opted for a networked investment strategy through co-investments and partnerships with

state-owned enterprises and major domestic agri-businesses to facilitate investment across the entire agricultural value chain.

In a broader sense, sovereign funds' emphasis has shifted to capture investment opportunities further up the global value chain in food production, in a process sometimes dubbed 'strategic financialisation'. In this process, sovereign funds make use of financial vehicles and investment strategies to fulfil state-driven food policies.

This has resulted in largely indirect investment in yield-boosting technologies and new sustainable food alternatives. Frontier areas that have attracted sovereign fund investment range from plant-based meat alternatives, food waste management systems, microbial fertiliser catalysts and digital agricultural business platforms. These projects are less geopolitically contentious than direct investments in offshore land.

This portfolio expansion from strategic agritech investments motivated by food and security considerations to those more centred on technological innovation has important implications for sovereign funds' organisational structures.

Strategic investments into frontier asset classes via unorthodox joint ventures and co-investment arrangements require considerable expertise and dedicated teams to evaluate and structure deals. The strategic imperative of food security continues to be a prime objective of many sovereign fund investments. Yet this overriding goal has to be combined with more financially motivated, return-seeking objectives.

Navigating a pathway amid the often conflicting influences of politics and economics remains, in the agrifood sector as in other fields, an abiding challenge.



'Geopolitical importance of bond market digitalisation cannot be understated'



Unlike payments or foreign exchange markets, bond markets still rely on arcane financial infrastructure. The industry must rectify this as soon as possible, writes Frank Scheidig, global head of senior executive banking, DZ BANK.

THROUGHOUT the virus-induced lockdowns, even with manufacturing and supply chains at a standstill, the financial infrastructure has kept going. People were able to send and receive money, if not in real-time then usually on a next day basis. The last big step in payments and foreign exchange markets – the switch to real-time – is being implemented across several jurisdictions. Without this connectivity and uptime of payment services, the effects of the Covid-19 crisis could have been much worse.

Yet this efficiency has not spread to all corners of finance. The bond market is as vital to our economies as payments and foreign exchange, but lacks automatisations, digitalisation and real-time availability. The pandemic has shown how deeply and quickly bond markets can be disrupted. This is in part due to investors' risk aversion, as well as the fact that bond markets are not used to the level of digitalisation found in payments.

Bond markets would benefit greatly from the next step in the natural evolution of financial markets. The move to straight-through processing with unlimited access points as well as the real-time revolution are ripe for implementation. Solutions to implement all of these already exist. Blockchain is one way, but would require a change in almost all existing systems and the signing-up of all market participants. Leaving aside issues like speed and capacity, blockchain seems highly unlikely to be a real candidate, especially after such a devastating and costly pandemic.

Fortunately, there are other alternatives. The European primary placement facility (eppf) works with existing infrastructure to provide straight-through processing and real-time issuance, as well as standardised issuance documentation. DZ BANK, one of eppf's founding

partners, is supporting the roll-out of this innovative platform, finding more and more use cases for itself and with other banks, issuers and investors. eppf offers the tools to keep primary bond markets open, no matter what. Like payment markets, it collates all information into a golden copy so that it even goes a step further than payments – no reconciliation is needed and errors are almost impossible since everyone works collaboratively on and with the same data. This financial infrastructure platform is cloud native, which means it can be accessed from any existing system. The benefits of implementing such a system for bond markets are clear. It prevents market disruption.

It allows for a more efficient use of markets, as well as a combination of primary and secondary markets. It offers significant cost savings for banks, issuers and investors, as it reduces the use of own capital, leaves no room for errors, requires no reconciliation and frees up time for staff to do more important

things than administer bond settlements. The system provides a much larger selection of issuers to investors and a larger pool of capital to issuers, benefiting banks though higher fees for intermediating between the two ends of the investment spectrum.

The geopolitical importance of digitalisation of bond markets cannot be understated. It will be one of the most critical pieces of future capital markets' infrastructure (and can be easily extended to loan and other markets) by providing the portal through which banks – and above all, issuers and investors – will connect. Such plumbing needs to be neutral and fully performing. The financial industry needs to implement it as soon as possible to improve the efficiency and performance of international bond markets. •

'The pandemic has shown how deeply and quickly bond markets can be disrupted.'