



Australian Government
Department of Foreign Affairs and Trade



Australian Government
Australian Trade Commission

Innovation as driver of Trade and Investment

Submission by the Department of Foreign Affairs and Trade
and Austrade to the Parliamentary Joint Select Committee
on Trade and Investment Growth

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DEFINITIONS

An **innovation** is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisations or external relations. Innovation activities are all scientific, technological, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations (OECD and Eurostat 2005).

Knowledge based capital refers to a range of assets – typically intangible – that are based on investment in knowledge, including research and development, software and data, intellectual property, brand equity, firm specific skills, and organisational know-how” (OECD, 2015).

The **Fourth Industrial Revolution** is the quick economic change and transformation coming about from a rapid, powerful convergence of a number of big technology changes (autonomous vehicles, sensors, biotechnology, 3D printing, robotics, artificial intelligence).

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KEY POINTS

1. Innovation is a key driver of economic, trade and investment growth.
2. Australia has a mixed record on innovation, with a number of areas requiring improvement in order for Australia to take full advantage of the opportunities available.
3. Australia has a strong basis on which to improve its competitive standing
 - › Australia has a world-leading education system,
 - › is a world class provider of a range of services, and
 - › has an open approach to global engagement.
4. Openness to international flows of capital, goods, people and knowledge is essential for innovation. Increasing Australia's participation in global value chains is fundamental to Australia boosting our innovative capacity.
5. Innovation provides small and medium enterprises (SMEs) with tremendous opportunities for growth. Start-ups play a large role in generating new goods and services. With SMEs employing over 70 per cent of Australia's workforce and contributing over half of our GDP, it is important that SMEs are able to realise these opportunities, including by having access to finance.
6. Building on the electronic, information and automated production advances of the past few decades, global innovation is evolving exponentially. This is the fourth industrial revolution, where digital technologies are harnessed in new and unanticipated ways, provides significant opportunities.
7. All firms, including SMEs, can harness emergent big data and information flows to understand better their potential markets through analysis of demographics, consumption patterns and other market intelligence.
8. The policy sphere is an important component of enabling, encouraging and supporting innovation
 - › in order for this to occur, competitive tax policies, a sound intellectual property regime, and an open and encouraging approach towards goods and services trade and investment, among other supportive policies, need to be in place.

PREFACE

Innovation combines ideas and technology to enable companies to compete more effectively and realise productivity growth. The ability to innovate continuously lies at the heart of any country's international competitiveness. The OECD indicates that a successful environment for innovation features a skilled workforce, a strong and efficient system for knowledge creation and diffusion, policies that encourage innovation and entrepreneurial activity, a sound business environment, and a strong focus on governance and implementation.

The *National Innovation and Science Agenda* (NISA) is driving the Government's overall approach toward innovation. The NISA was released on 7 December 2015 and is part of the Government's commitment to establishing Australia as a leading innovation system. It puts forward a package of initiatives to provide incentives for innovation and entrepreneurship, reward risk taking, and promote science, maths and computing in schools. Recognising areas where improvement is required in order to take advantage of the opportunities available the focus will be on four priority areas:

- › **Culture and capital**, to help businesses embrace risk and incentivise early stage investment in startups;
- › **Collaboration**, to increase the level of engagement between businesses, universities and the research sector to commercialise ideas and solve problems;
- › **Talent and skills**, to train Australian students for the jobs of the future and attract the world's most innovative talent to Australia; and
- › **Government as an exemplar**, to lead by example in the way Government invests in and uses technology and data to deliver better quality services.

The Government announced a range of new initiatives under each of these priority areas, including changes to the tax system and business laws, providing support to start-ups, building world-class national research infrastructure and encouraging greater collaboration between universities and businesses. Further detail on the NISA and a full list of new initiatives can be found at www.innovation.gov.au.

This submission builds on the NISA and focusses on innovation as a driver of trade and investment growth, and the importance of a sound business environment for innovation. This is a joint submission by the Department of Foreign Affairs and Trade and Austrade.

INNOVATION AS A DRIVER OF TRADE AND INVESTMENT

"One of the symptoms of an absence of innovation is the fact that you lose your jobs. Everyone else catches up with you. They can do what you do better than you or cheaper than you." (Neil deGrasse Tyson, American astrophysicist)

In today's globally interconnected world, countries must innovate to boost economic growth. Innovation acts to lift the competitiveness of domestic producers of goods and services in international markets. Knowledge and ideas flow across borders and harnessing this allows Australian producers to be more productive — a primary driver of economic growth.

Innovation is a key driver of productivity growth. The OECD estimates that innovation through productivity improvements contributed at least half of economic growth in OECD countries from 1995 to 2013 (OECD 2015), and the importance of this contribution continues to grow. This is in line with the Australian experience. Between 2010 and 2014 productivity growth and population growth contributed equally to economic growth (Productivity Commission 2015).

Continuous innovation is fundamental to productivity growth and competitiveness in all areas of the economy. Resources, energy, agriculture and, to a lesser extent, manufacturing exports have long sustained the Australian economy. Indeed, the continued application of new ideas and technology to the production of these

commodities has enabled Australia to sustain strong export growth over the past two decades. In addition to Australia's natural resources endowment, innovation has enabled Australian resources and energy producers to remain competitive vis-à-vis companies in other countries, including those based in developing countries with access to highly competitive labour markets. This led to a sustained investment boom in resources and energy, and today's record high export volumes.

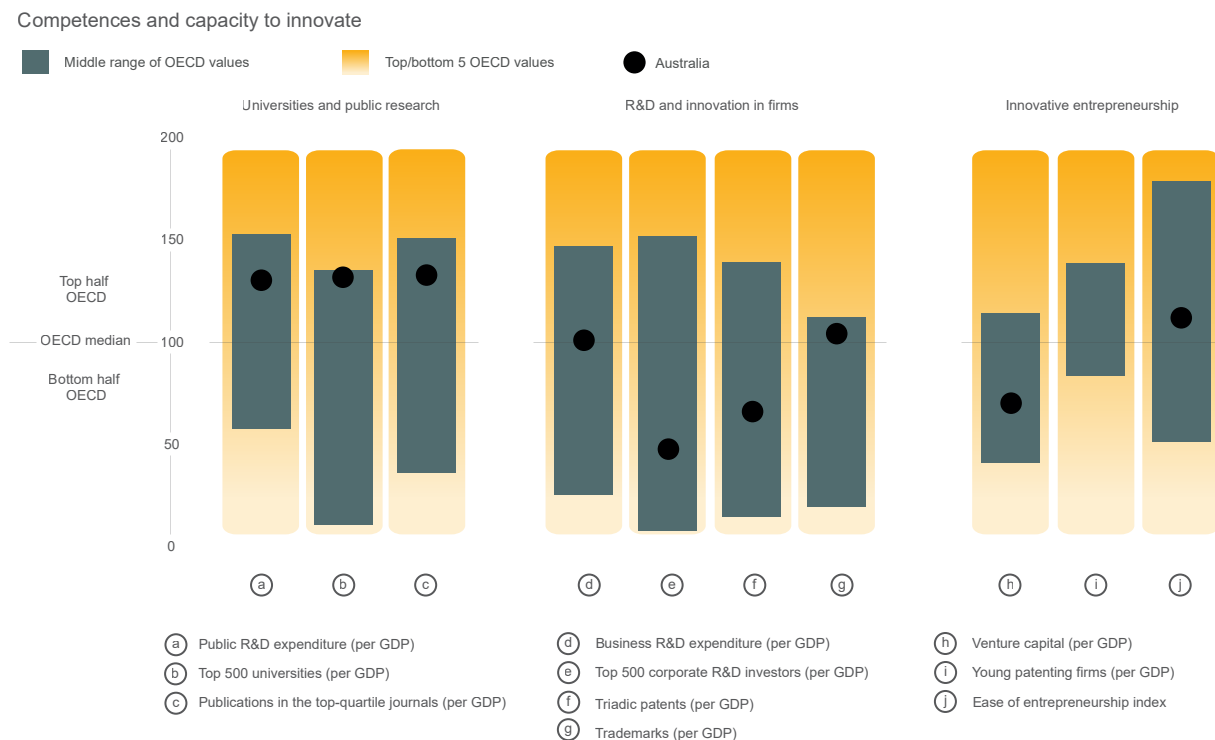
Innovation will continue to be central to Australia's continued competitiveness as a major exporter of commodities. Yet for Australia to continue to benefit from healthy economic growth, the next export boom will necessarily lie with services exports. Like other advanced economies, the share of services has steadily grown over time and now comprises about three-quarters of Australia's GDP and an even larger share of employment. On the other hand, productivity gains in the services sector have been outstripped by other sectors, particularly resources and energy.

Australia has a mixed record on innovation. Australia is only ranked 23rd out of 144 countries for the innovation pillar of the Global Competitive Index (World Economic Forum 2015). This places us in the middle of the pack of advanced economies and not far ahead of regional countries like China and Indonesia. Singapore, Taiwan, Malaysia and Korea all score better than Australia for innovation. According to the World Intellectual Property Organization's 2015 Global Innovation Index, Australia was ranked 17th out of 141 nations. Furthermore, Australia ranks amongst the top ten nations for innovation inputs, including human capital, research and infrastructure.

Australia has a strong basis on which to improve its competitive standing with a world-leading education system and universities. Australia is already a world-class provider of a range of services, such as telecommunications, travel, education, banking and insurance, and there is great potential to increase services exports further. And, crucially, Australia has an open approach to engaging globally. Innovation offers enormous potential for driving competition in sectors such as tourism and international education.

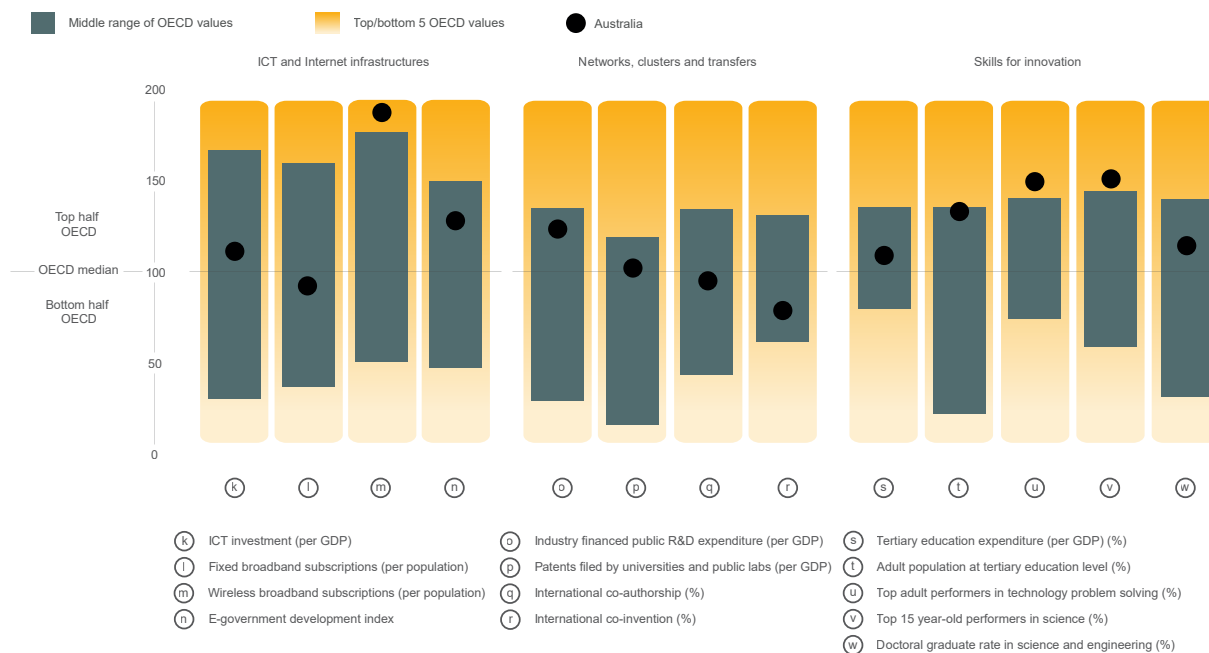
Innovation attracts investment. For Australia, with our thin capital markets and small population, investment is particularly important in helping new innovations secure seed funding and access larger offshore markets. Foreign investment is also an important source of innovation diffusion, allowing Australian firms to access insights and technologies from foreign affiliates and facilitating research collaborations.

Comparative performance of national science and innovation systems



Normalised index of performance (Index OECD median = 100), 2011 or latest year available

Interactions and skills innovation



Normalised index of performance (Index OECD median = 100), 2011 or latest year available

The Fourth Industrial Revolution and other drivers of change

“When you consider that the digital universe of data we create and duplicate is expanding by some 40 per cent a year, the potential benefits this digital new age presents for society are likely to be significant” (Joseph Jimenez, CEO Novartis, Davos 2016)

Building on the electronic, information and automated production advances of the past few decades, global innovation is evolving exponentially. This is known as the **fourth industrial revolution**, where digital technologies are harnessed in new and unanticipated ways. Technological breakthroughs, including artificial intelligence, robotics, biotechnology, quantum computing and 3D printing — all of which will (if they have not already) precipitate large-scale economic transformation. Behind the innovation frontier, the digital economy is helping make enterprises across the entire spectrum of economic activity more efficient and competitive as they harness the digital economy to reach out to new customers and access more competitive supply sources. The fourth industrial revolution has also seen the advent of new financial products, such as fintech and blockchain.

The convergence of robotics, “big data” and machine learning, combined with broadband networks and mobile access, means that distance from markets or low-cost labour do not need to disrupt job creation or the establishment or growth of an “advanced manufacturing” sector. To innovate, a country must have, at its core, a highly educated population, high levels of digital access and an economy driven by innovation and intellectual capital. While digital and robotic technologies will increasingly augment or replace workers, new technologies will also create opportunities to develop, service or operate the next generation of software or machines as well as completely new ways for businesses, industries and consumers to find and connect with each other.

E-commerce is the world's fastest growing retail channel. It represents significant opportunities to increase the number and value of Australia's exporters; allows exporters to sell into multiple markets; opens up opportunities for industries that have struggled using traditional channels, such as fashion or bespoke products; and allows even small or remotely located businesses to compete with large multinationals in emerging markets. The application of data innovation to logistics movements allows firms to reduce transport inefficiencies and costs of distributing goods by calculating congestion and choke points.

In addition to the fourth industrial revolution, other drivers of change are at play in the changing global business environment. World **population growth**, particularly in developing countries, creates rapidly increasing demand for energy, water and food as well as health and education services. Rapid urbanisation of populations and

the growth of major cities pose challenges to infrastructure and food supply and create new opportunities for suppliers. Ageing of the global population will see a decreasing rate of workforce participation and increasing demand for health and aged care services. The rapidly expanding middle-class population, especially in our region, is also driving growth in demand for consumer products and services. There are also **geopolitical shifts and new global trade routes**. Energy, water and food are becoming critical resources as populations grow and shift. Patterns in trade routes are also changing, as evidenced by the rise of China's new 'Silk Road' and maritime belt, the growing importance of air hubs in the Middle East, the route through Mexico into the USA and Canada, and a shift in manufacturing from northern Asia into ASEAN.

KEY DRIVERS OF INNOVATION

The OECD (2015b) outlines four key drivers of innovation:

- › **Knowledge-based capital** through investments in research and development (R&D), skills and organisational know-how that enable economies to absorb, adapt and reap the full benefits of new technologies.
- › Experimentation by firms — especially new entrants and **start-ups** — with new ideas, technologies and business models
- › **Global value chains** and connections, via trade, investment and international labour mobility
- › The **availability of finance** to underpin the growth of innovative firms.

Knowledge-based capital

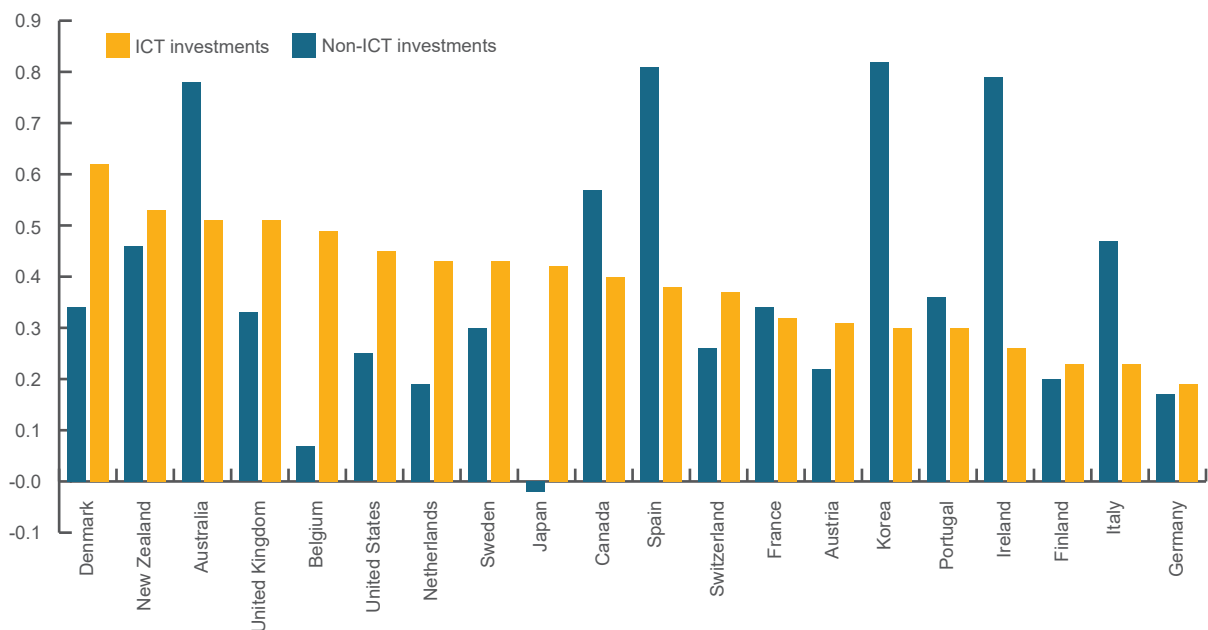
Australia has considerable strength in knowledge-based capital. For example, the Australian pool of science, technology engineering and mathematics (STEM) graduates is relatively high by OECD standards. Australia's broadband connectivity is among the highest in the OECD, and is continuing to be strengthened as the National Broadband Network rolls out. Australia is one of seven OECD countries with more mobile broadband subscriptions than people, and in 2014, 96.5 per cent of Australian businesses were connected to broadband. The four pillars of the NISA — culture and capital, collaboration, talent and skills, and the Government as an exemplar — will further strengthen Australia's standing in knowledge-based capital.

One way to stimulate investment in knowledge-based capital is through attracting global mobile talent, and, to a lesser extent, through Australian firms tapping into talent overseas. International competition for talent in science and technology, in particular, is strong. The ability of firms to attract global mobile talent is partly dependant on Government policies toward temporary employment visa and migration. Australia has long benefited from a strong net inflow of tertiary-educated migrants.

Data-driven innovation is another new phenomenon that can be of benefit to all firms. Australia is to date a relatively minor contributor toward big-data innovation and data-driven services. Nonetheless broader data-driven innovation continues to boost productivity across the economy as firms across the economy invest in ICT to boost productivity. In 2014, ICT specialists comprised 3.8 per cent of the Australian workforce, a similar magnitude to the United States (4.1 per cent) and Germany (3.5 per cent). Expenditure on software and data accounts for 0.74 per cent of Australian gross domestic product (ABS cat. no 5206.0)¹.

¹ The ABS notes that this figure is likely to be under-reported.

Contributions of ICT investment to GDP growth, 2000-09. Annual average growth (%)



Start-ups and small and medium enterprises

Innovation provides small and medium enterprises (SMEs) with tremendous opportunities for growth. SMEs employ over 70 per cent of Australia’s workforce and contribute over half of our GDP. SMEs are typically more specialised than larger firms, and range from the corner store operation to highly sophisticated technology firms. SMEs benefit greatly from the general productivity improvements that new ideas, especially innovations in information technology, bring. Many SMEs are also innovation leaders. Atlassian, Campaign Monitor and Menulog are some innovative Australian start-ups that have become global enterprises in the past decade.

New and young firms (*start-ups*), in particular, play a large role in generating new goods and services. Technology start-ups are responsible for an inordinately high number of patents, including more radical inventions. Although three out of four start-ups target information media and telecommunications, almost every sector has benefitted from highly innovative start-up activity. Start-ups typically use data-analysis and the internet to take advantage of global opportunities, both to access ideas and knowledge, but also to harness e-commerce to exploit global market opportunities. All firms can harness emergent big data and information flows to better understand their potential markets through analysis of demographics, consumption patterns and other market intelligence. The ability of all firms, large and small, to deliver products and services at a global level has removed the traditional tyranny of distance facing Australia. Australian exporters are able to exploit new international markets through new innovative distribution providers (such as Amazon, JD.com, and Alibaba) that achieve better market penetration than by solely relying on traditional distribution channels.

The current wave of innovation is enabling start-ups and other innovative enterprises to tap into the latest advances and reach new global markets. Start-ups are capable of achieving scale far more quickly than ever before. Google achieved a market capitalisation of one US billion dollars in just eight years, and more recently, Uber and Snapchat in under three years. Atlassian, founded in Sydney 15 years ago, currently has a market capitalisation of over five billion dollars, making the enterprise software company comparable in size to the Bank of Queensland. The fastest growing Australian enterprises are dominated by innovative start-ups, such as Online Education Services (385 per cent increase in revenue in 2015 over 2014), RXP Services (92 per cent growth), ISGM (72 per cent), Infotrack (50 per cent) and Kloud Solutions (111 per cent).

Entrepreneurial activity is spurred by ensuring new firms can enter the market as easily as possible. The regulatory environment for new firms should be as conducive as possible to reduce barriers to entry. This helps them focus their scarce human and capital resources on innovative activity rather than administrative procedures. Similarly, it is important to allow firms to exit the market as easily as possible. Only one per cent of Australian technology start-ups

reach \$200 million in revenue at the end of their eighth year of operation, and some three-quarters of start-ups fail (Price Waterhouse Coopers 2013). However, another characteristic of start-ups is the 'serial founder' aspect where 40 per cent of initially unsuccessful founders try again. Bankruptcy procedures for SMEs, in particular, should support rehabilitation and business rescue (rather than retribution) to foster a positive environment for risk and innovation.

Landing pads

Under the Government's National Innovation and Science Agenda (NISA), Austrade received \$11.2 million to deliver three elements of the agenda, including the establishment of five "landing pads" in global innovation hotspots.

The purpose of the landing pads is to provide Australian emerging companies with accelerated access to global opportunities and networks to assist them in their financing and commercialisation efforts.

Each landing pad will provide market-ready start-ups with a short-term operational base in global innovation hotspots from which to access entrepreneurial talent, mentors, investors and a wider connected network of innovation hubs.

Landing pads will be delivered by Austrade through partnerships with existing collaborative work spaces, located in global innovation hotspots. The first two will be in San Francisco and Tel Aviv.

Financing innovation

Access to finance is a key constraint to business-led innovation, particularly for SMEs, who tend to have more limited access to finance than larger firms. SMEs tend to be reliant on credit, yet have weak or no credit ratings. As SMEs tend to be highly specialised, they lack the resilience that diversification affords larger enterprises and also the depth of resources to withstand a downturn (and payment delays can trigger severe cash-flow problems). The global financial crisis, for example, saw a steep decline across the OECD in the number of start-ups due to a tightening of finance, and SME loan activity in Australia also dipped.

Traditional sources of finance (i.e. bank lending) will continue to make up the bulk of finance available to SMEs. In contrast to the downturn suffered by many other countries following the global financial crisis, this market remained fairly buoyant in Australia and continues to grow (SME loan growth was 3.1 per cent in 2014). In Australia, loans to SMEs represent a third of the total stock of business loans (32.2 per cent in 2014), which is higher than in the US (21.2 per cent) and the United Kingdom (22.5 per cent) but lower than the OECD median (44.1 per cent). Like all other OECD countries, Australian SMEs pay a significant interest premium over rates offered to larger enterprises (1.75 percentage points in 2014, compared to the OECD median of 1.52 percentage points).

While Australia has a well-functioning traditional financial market, there are also a number of non-traditional sources of finance available to SMEs and start-ups, notably alternative debt (corporate bonds), crowdfunding, hybrid finance instruments and equity finance (venture capital and business angels).

In contrast to traditional debt, the equity market in Australia suffered a severe decline with the GFC. Venture capital investments dropped from USD 680 million in 2007 to USD 266 million in 2014 (or less than 0.02 per cent of GDP). Venture capital is a far less developed source of finance in Australia than other OECD countries. The Department of Industry, Innovation and Science's Australian Innovation System Report 2015 noted that "[u]nlike in the United States, Israel and many other countries, Australian venture capital investment has not bounced back to levels reached before the global financial crisis. While Australia is performing slightly above the OECD median for later-stage investment, early-stage investments at 0.007 per cent of GDP are just half the OECD median"; and that "access to various forms of finance is a key issue for entrepreneurs. Innovation active start-ups are particularly reliant on equity finance. The limited scale and scope of venture capital, in particular, may be hindering these start-ups in reaching their full potential". The NISA includes policies to address this weakness, including changes to Early Stage Venture Capital Limited Partnerships and Significant Investor Visa (see below).

Foreign direct investment (FDI) in productive projects in Australia can also drive innovation, as FDI often brings new technologies, skills, management expertise and competition. Austrade actively attracts FDI to Australia, targeting foreign investors and decision-makers and matching them with investment-ready projects in Australia. This work focuses on five sectors, which make up the Government’s national investment priorities: agribusiness and food, resources and energy, major infrastructure, tourism infrastructure and advanced manufacturing, services and technology.

Canva: A model start-up

Canva is an Australian start-up founded in Sydney in July 2012. The company uses application technology to allow users to quickly create online professional publishing documents, such as posters, presentations, invitations. In March 2013, Canva raised \$3 million in seed capital from Australian and US venture capital investors, including Matrix Partners, InterWest Partners and 500 Startups. Accomplished angel investors Bill Tai, Lars Rasmussen (Director of Engineering at Facebook), Ken Goldman (Yahoo! CFO), and Paul Bassat (former Seek co-founder and partner at Square Peg Ventures), have also backed the company. Canva reached one million customers by October 2015, and currently has over eight million users all over the world. Canva has offices in Sydney, California and the Philippines. Canva’s potential market capitalization was recently estimated by Foundr magazine to be \$233 million.

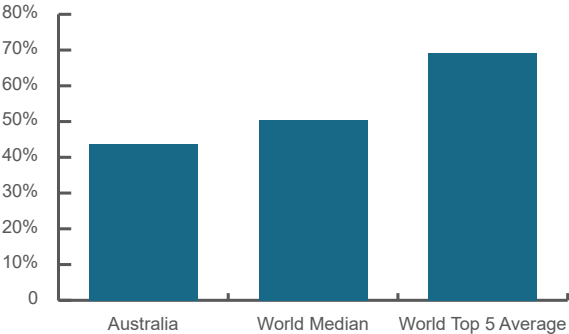
Openness and global value chains

Openness to international flows of capital, goods, people and knowledge is essential for innovation. Participation in global value chains (GVCs) increases the size of markets and facilitates specialisation, increases competition, and facilitates the spread of knowledge, technologies and new business practices. These dynamics positively affect innovation and long-term economic productivity (OECD 2015, Industry 2014).

Trade and investment also exposes businesses to a much wider range of ideas and solutions. By exposing themselves to the world market, innovative businesses learn from international competitors, suppliers and customers, and bring that knowledge back to Australia. This in turn generates more innovation. International research also shows that innovation is fundamental for establishing and maintaining export relationships, particularly where market churn and demand for large variations in product design is high. (Industry 2014)

Despite the many innovation gains to be made through participation in GVCs, Australian businesses have been relatively slow to take advantage of investment opportunities overseas. Australia’s participation in global value chains (43.8 per cent in 2009 according to the OECD’s global value chain participation index) is below the OECD median (50.5 per cent), and well behind global value chain hub countries (OECD 2013).

Australia’s participation in global value chains



Source: Industry 2014

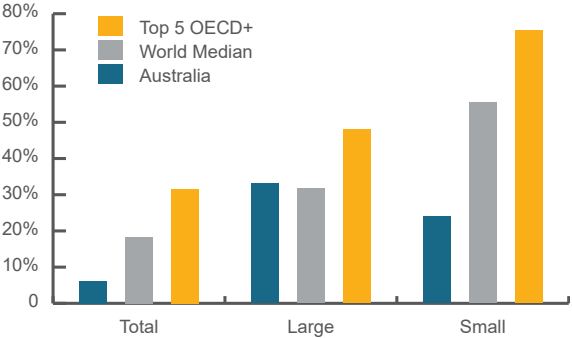
Australia’s participation in GVCs is above the world median in mining, business services, transport and manufacturing of food and basic metals. Participation through exports is mainly driven by downstream links as other countries intensively use Australian intermediates in their exports. This is closely linked to Australia’s large exports of natural resources (OECD 2013b).

Manufacturing exports include significant value added from service industries. Almost one third of the value of Australian manufacturing exports represents services value added; especially business services and to a lesser extent distribution services, transport and telecommunications and financial services.

The 2014 Australian Innovation System Report provides an analysis of Australia’s ongoing ability to participate in GVCs. It notes that compared with other OECD countries, Australia has low levels of trade, low participation in global value chains, low international collaboration on innovation, low proportions of researchers in business, and low collaboration on innovation between the research and industry sectors. This report found that Australia’s relatively low levels of new-to-market innovation² and low levels of collaboration on innovation has limited the capacity for Australian businesses to integrate into the higher value-added parts of global value chains compared to foreign rivals. Greater collaboration on innovation between sectors will help drive world-first innovation and global value chain participation (Industry 2014).

The unbundling of manufacturing provides real opportunities to capture market share in specialised manufacturing (rather than low value-add areas where Australia struggles to compete). However, accessing GVCs can be challenging – especially for Australian SMEs, remote from markets where GVC decision-making is often undertaken. Austrade’s trade services help Australian SMEs identify new GVC opportunities and works with them to influence GVC decision makers.

Australia’s business collaboration activity by innovation-active businesses



Source: Industry 2015

Open and non-discriminatory markets for services are also fundamental to creating opportunities and incentivising businesses to adopt innovative practices. Australia is relatively open toward investment and services trade. For example, Australia is more competitive than the average for 17 of the 18 categories in the OECD’s Services Trade Restrictiveness Index. Australia’s experience demonstrates that opening service sectors to competition provides a greater depth of knowledge inputs from at home and abroad, which catalyse business innovation in services. Freer trade also encourages local providers to be more innovative and efficient in delivering competitive services.

² The predominant innovation that occurs in Australian firms is the adoption and modification of innovations developed elsewhere, rather than delivering new-to-market (including new-to-world) innovations. Only 5.7 per cent of Australian businesses introduced new-to-market innovation in 2012 13 (Industry 2014).

Australian success in aerospace global value chains

Ferra Engineering specialises in the design, manufacture, assembly and testing of aerospace structures and subsystems. Through its commitment to advanced hi-tech facilities, and research and development, the Brisbane-based company has become a leading value chain partner to a large number of global aerospace original equipment manufacturers. Its customers include Airbus, Boeing, BAE Systems, GE Aviation, Goodrich, Lockheed Martin, Thales, Marvin Engineering, Northrop Grumman, Parker and Rolls Royce.

Ferra has signed a number of long-term agreements to supply components for a range of Boeing fixed-wing aircraft, both military and commercial, as well as securing contracts to supply components for the Lockheed Martin F-35 Joint Strike Fighter jet.

Ferra derives more than 70 per cent of its business from exports. Austrade has provided assistance through overseas market briefings, support at trade events like the Singapore Air Show, and introductions to potential Polish aviation customers at the 2013 Paris Air Show. Ferra has also received support from Austrade through the Export Market Development Grants scheme.

Ferra was named Boeing Supplier of the Year in 2011 in the International Category, out of a pool of more than 13,500 suppliers, and has earned a platinum supplier status award from Northrop Grumman, a US-based aerospace and defence technology company.

SUPPORTING INNOVATION

"Given the fourth industrial revolution's rapid pace of change and broad impacts, legislators and regulators are being challenged to an unprecedented degree and for the most part are proving unable to cope" (Klaus Schwab, Founder and Executive Chairman, World Economic Forum, Davos 2016)

The rapidity of change that the fourth industrial revolution brings is a great challenge for policy makers. Uber, for example, offers a revolutionary new way to provide cab services, yet also demands a fresh way of viewing regulatory policy. The creation of the right framework conditions to stimulate innovation covers a wide range of public policy, including general macroeconomic policy and an effective (but not burdensome) regulatory system.

A number of key policies are central to supporting the right conditions to foster innovation through trade and investment, including competitive tax policies, a sound intellectual property regime and open and encouraging settings for goods, services and investment.

Competitive Tax Policies

Tax policies can foster innovation through general tax policies that are internationally competitive, and targeted tax policies incentivising research and development.

The Government's tax incentives under the NISA provide appropriate incentives to encourage further innovation in Australia. These measures include:

- › new tax breaks for early stage investors in innovative startups. Investors will receive a 20 per cent non-refundable tax offset based on the amount of their investment, as well as a capital gains tax exemption;
- › introduction of a ten per cent non-refundable tax offset for capital invested in new Early Stage Venture Capital Limited Partnerships (ESVCLPs), and increasing the cap on committed capital from \$100 million to \$200 million for new ESVCLPs;
- › relaxing of the 'same business test' that denies tax losses if a company changes its business activities, and introducing a more flexible 'predominantly similar business test'. This will allow a startup to bring in an equity partner and secure new business opportunities without worrying about tax penalties; and

- › remove rules that limit depreciation deductions for some intangible assets (like patents) to a statutory life and instead allow them to be depreciated over their economic life as occurs for other assets.

While **general tax reform** issues are currently being canvassed in other fora including the Tax White Paper process, this submission a good opportunity to discuss some elements of Australia's tax system which relate to innovation.

Australia's **corporate tax rate** (30 per cent for companies, 28.5 per cent for small businesses with a turnover of less than \$2 million) is higher than the OECD average of 25.5 per cent (Treasury 2015). It is also higher than countries, like Hong Kong, Singapore and Ireland, which have used low tax rates to help attract international investment. A cut to the corporate tax rate cut has the potential to encourage growth and innovation and an attractive and stable investment environment.

OECD recommendations for a growth and innovation oriented tax system

OECD analysis indicates that some forms of taxation, including corporate taxes, are more harmful to growth and innovation than others, such as taxes on immovable property. Personal taxes and consumption taxes lie between these two, as a result of their respective impacts on the economic decisions of firms and individuals. In order to encourage growth and innovation the OECD suggest shifting the tax burden from incomes to consumption and/or residential property.

The OECD outlines other tax policies that are important for the business environment for innovation, including top marginal personal income tax rates, set to avoid undue damage to human capital formation and entrepreneurship, and taxes that correct for specific externalities, such as environmental taxes. To encourage growth and innovation, tax systems should not discourage risk-taking or discourage the possible inflow of skilled and other foreign workers. They should also stimulate the creation and adoption of domestic and foreign created intellectual property. The OECD notes that, as tax systems can contribute to the creation of an attractive business climate (including a favourable e-business and e-commerce climate), they should not discourage the restructuring of business activities for economic purposes.

Source: OECD 2015

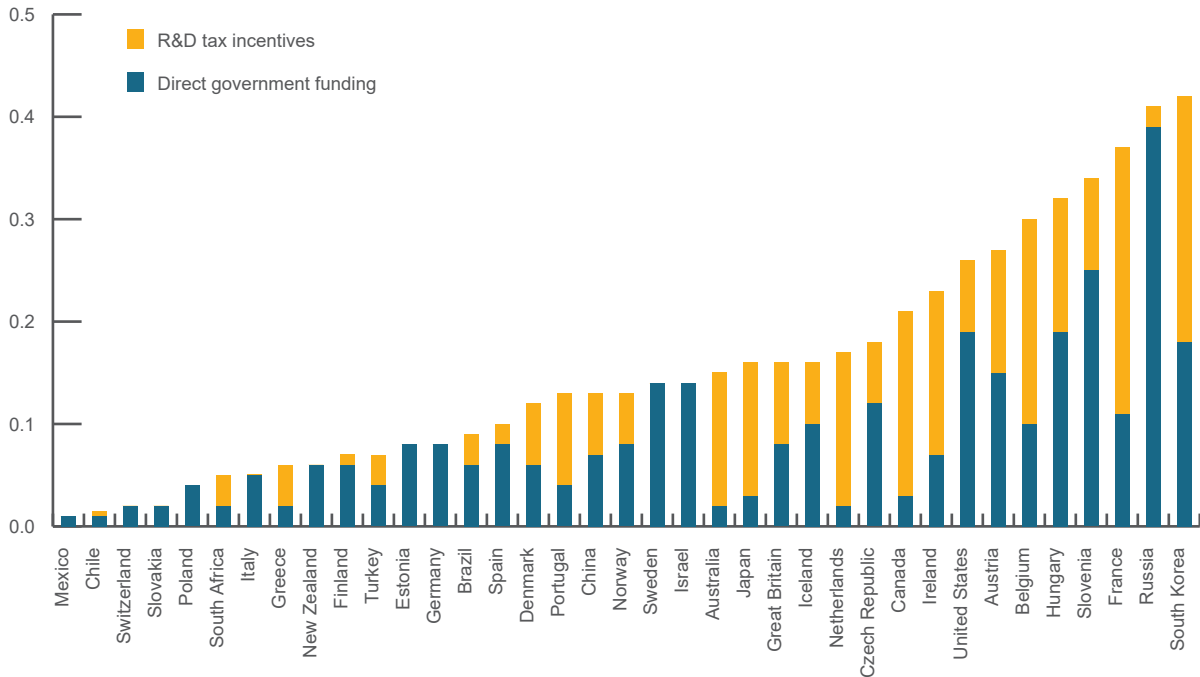
Targeted tax policies in support of research and development can spur innovation. A large part of the Federal Government's support for R&D is through indirect support in the form of the **R&D tax incentive**. This incentive provides a tax offset for eligible R&D activities, and targets R&D benefiting Australia. The incentive encourages companies to engage in R&D. It has two core components:

- › a 45 per cent refundable tax offset for eligible entities with an annual aggregated turnover of less than \$20 million, (not controlled by income-tax exempt entities) for expenditure on eligible R&D activities in Australia; and
- › a 40 per cent non-refundable tax offset for all other eligible entities for eligible R&D expenditure.

With effect from 1 July 2014, a \$100 million threshold applies to the R&D expenditure below which companies can claim a concessional tax offset under the R&D Tax Incentive. For any R&D expenditure amounts above \$100 million, companies will still be able to claim a tax offset at the company tax rate.

Data from the OECD shows that Australia's incentives for research are below the average of other developed economies. Australia ranks 18th in terms of government support for R&D expenditures. The Tax White Paper launched **a review of research and development tax incentives** as a means of better understanding the effectiveness of existing tax incentives for innovation, industry-funded research and collaboration with public research institutions. The outcome of this review should, where possible, inform the proposed Tax Options Paper.

Government investment in R&D (per cent of GDP)



Source: OECD 2015c

To lift investment and stimulate innovation, Australia could consider developing a **patent box initiative** to provide a concessional tax rate on profits related to patents that have been developed in Australia. Patent Boxes are increasingly being used internationally. This could provide the necessary incentive for Australian companies to commercialise their research and development. If introduced it should be consistent with the recently introduced G20-OECD guidelines in relation to Base Erosion and Profit Shifting.

Patent Boxes

A patent box is a policy tool that reduces the rate of corporation tax levied on the income generated from certain types of qualifying intellectual property (IP), particularly patents. In contrast with research and development (R&D) tax credits, which target the front end of the innovation lifecycle, a patent box regime targets the last stage of the innovation lifecycle, namely commercialisation. Tax relief can be given either as a reduced tax rate or a tax break for a portion of the patent box income.

The potential benefits from introducing a patent box include preventing tax avoidance, inducing innovation in activities and increased incentives to patent, as patent box regimes usually require IP to be registered for companies to be able to claim tax benefits.

In recent years a number of countries have introduced patent boxes, including 11 European countries (France, Hungary, the Netherlands, Belgium, Luxembourg, Spain, Malta, Liechtenstein, Cyprus and the United Kingdom) and China, while other countries are considering introducing patent boxes, including the United States. In countries such as Belgium, the Netherlands and the United Kingdom the objective of the patent box is to incentivise innovation, while in countries such as Cyprus, Hungary, and Malta the patent box is used to attract mobile IP income.

Source: de Rassenfosse 2015

The effectiveness of R&D tax incentives depends upon the broader regulatory environment and its stability over time. OECD analysis suggests that in countries that have experienced a large number of R&D tax policy reversals, the impact of R&D tax credits on private R&D expenditure is greatly diminished (Westmore 2013).

A sound intellectual property (IP) regime

Sound IP regimes are a key factor in establishing a wider environment that supports innovation, collaboration and commercialisation. Effective and balanced IP regimes encourage innovators, including small and medium sized enterprises (SMEs), to invest in the research, development and commercialisation of technologies and services.

IP settings and enforcement mechanisms are fundamental to positioning Australia globally as having a policy and economic environment that is conducive to innovation and open to trade, investment and capital movement. Effective IP regimes also support diffusion of technology. The requirement to disclose inventions under the patent system establishes a valuable and public source of knowledge, while IP licensing and other contractual arrangements can facilitate collaboration and increase efficiency in product development and commercialisation.

Protection and enforcement of IP rights is territorial, making international cooperation on IP an important factor in supporting commercialisation. Australian industry and exporters have real commercial interests in trading partners having accessible, transparent and effective IP standards that promote appropriate standards of IP protection and enforcement. For instance, international cooperation and minimum standards help protect Australian brands in overseas markets. Brand protection is essential to the effective marketing of products, and, as SME participation in the global economy increases through new trading channels (such as e-commerce), the importance of brand protection to Australian industry will only increase. In regard to patents, data shows Australian innovators file more patents overseas than they do domestically (three times as many in 2013), which, in turn, facilitates access to larger markets and attendant improvements in potential profitability.

In the World Economic Forum's Global Competitiveness Report 2015-16, Australia scores well for IP protection, ranking 13th out of 144 countries.

An open and encouraging approach towards goods and services trade and investment

Openness to foreign sources of knowledge is also important for innovation, as most innovation happens outside national borders. The freer movement of goods, services, people and capital achieved by Australia's Free Trade Agreements (FTAs) makes a key contribution to improving the business environment for innovation and research. Enhanced competitiveness through FTAs leads to new commercial opportunities for leading-edge goods and services, especially in the rapidly growing Asia Pacific region, and is an incentive for innovation.

The reduction of barriers to trade in goods, including the elimination and phased reduction of tariffs, enhances the competitiveness of Australian exporters in target markets, including for high value-added and premium products. For example, under the FTA with China, tariffs of between 3 and 10 per cent on Australian pharmaceutical products exported to China, including vitamins and health products, were either eliminated on 20 December 2015 or will be phased out by 1 January 2019. This will provide incentives for Australian producers to invest further in product and supply chain development, maximising benefits from a strong competitive position.

Australia's FTAs assist Australian businesses to benefit from global value chains, both through the lowering of tariffs as well as rules which contribute to their functioning. The TPP, for example, will establish a more seamless trade and investment environment across 12 countries.

In the environmental goods sector, a growing number of Australian firms are finding niche markets in several overseas markets, using cutting-edge technology and unique Australian innovation. Australia is working to reduce and remove tariffs through the Environmental Goods Agreement negotiations. A successful outcome would spur further Australian innovation and facilitate new investment in climate and clean energy technologies in Australia.

Australia secures commitments in our trade agreements to ensure Australian businesses can engage in open services markets; thereby increasing commercial opportunities and incentives to bring innovative solutions to market.

FTAs are a key vehicle for pursuing services trade reform, including in research and innovation-based services sectors. Australia's FTAs remove key barriers and provide Australian service suppliers with more transparent and predictable operating conditions.

Beneficiaries from Australia's FTAs include businesses that both enable and embody innovation. These include Australian banks, insurers, securities and futures companies, law firms and professional services suppliers, as well as education, health, aged care, education, construction, engineering, manufacturing, ICT, transport and logistics, tourism, telecommunications, consulting, research and development, environmental and mining services businesses.

With ongoing technological advancement and the evolution of consumer demand, new service sectors emerge over time. Australia's general negotiating approach of "negative listing" services obligations is designed to ensure the benefits of future market reforms in established services and the opening of markets to newly-emerging services are available to Australian services suppliers automatically. The agreements with the United States, New Zealand, Singapore, Chile, Korea, Japan and the TPP are structured in this way. This helps to ensure, for example, access for Australia's innovative financial sector to business opportunities in newly emerging financial services in these markets.

Australia's FTAs with North Asian countries include new commitments on education and research and development services that will underpin future innovation and collaboration. Under ChAFTA, Australia and China agreed to improve higher education qualifications recognition and to a process to enhance mobility of students, researchers and academics to increase opportunities for Australian companies seeking to invest in research and development in China, China committed to allowing such investment through wholly-owned subsidiaries. Agreements with Japan and Korea provide assurances with respect to access for Australia's innovative adult education and VET sectors.

Australia's FTAs support innovation and research by increasing business mobility through commitments on temporary entry, enabling business people to enhance their commercial relationships and pursue new opportunities. For example, under ChAFTA, China provides guaranteed access to Australian citizens and permanent residents for intra-corporate transferees for up to three years (including executives, managers and specialists); contractual service suppliers, in certain sectors, for one year, or longer if stipulated under the relevant contract; installers and maintainers for up to 180 days; and business visitors for up to 180 days. Australia's other FTAs include commitments across these categories, delivering a stable environment for business to determine the most agile human resource planning to support their business goals.

The inclusion of provisions on electronic commerce in FTAs assists Australian business in harnessing the efficiencies of the digital economy, while ensuring Australia can retain its robust regulatory and privacy frameworks, including protecting consumers online. Key commitments may include agreeing not to impose customs duties on electronic transmissions, undertaking to protect consumers, ensuring the protection of the personal data of users, and sharing information and experiences in relation to consumer confidence, cyber-security and measures used to regulate unsolicited spam and telemarketing.

Australia's FTAs support the growth of two-way investment, thus helping to drive competition, productivity and innovation in the economy. In addition to opening up new investment opportunities for Australian investors, FTAs raise Australia's profile as an investment destination and provide protections for investment both into and out of Australia. The liberalising of screening thresholds on private foreign investment applications in non-sensitive sectors further encourages investment into Australia from FTA partners.

FTAs contribute to creating an innovation-friendly business environment, through freer movement of goods, services, people and capital. There would be additional benefit from:

- › further advancing FTA negotiations, including on the Comprehensive Economic Cooperation Agreements with India and Indonesia, the Regional Comprehensive Economic Partnership, the Pacific Agreement on Closer Economic Relations Plus and through the Trade in Services Agreement;
- › pursuing the early entry into force of the Trans-Pacific Partnership Agreement;
- › making full use of the built-in agendas of existing FTAs to adapt these agreements to Australia's expanding/changing trade profile
- › continuing to pursue during FTA negotiations more favourable business conditions for technology-based goods and services, including through provisions on the trade in goods, trade in services, investment, intellectual property, electronic commerce, and the movement of natural persons; and
- › continuing to promote awareness of the opportunities provided by FTAs, including as they relate to innovation.

Attracting investors and entrepreneurs to Australia

The Significant Investor Visa (SIV) and the introduction of a Premium Investor Visa (PIV) are aimed at attracting applicants with business and entrepreneurial skills and capital to enhance investment into innovative Australian businesses and the commercialisation of Australian ideas, research and development. These visas offer accelerated pathways to Australian residency in return for significant investments in Australia.

Under new arrangements for the SIV, applicants will be required to invest at least \$5 million over four years in complying investments, which must now include at least \$500,000 in eligible Australian venture capital or private equity (VCPE) fund(s) investing in start-up and small private companies. The Government expects to increase this to \$1 million for new applications within two years as the market responds.

The PIV has been introduced to attract a small number of highly talented and entrepreneurial individuals who can translate those skills and talents into areas which deliver a long-term economic benefit to Australia. The PIV will be available at the invitation of the Australian Government only, with potential recipients to be nominated by Austrade. The programme will be developed in Australia's top two-way investment market, the United States, in the first instance and then gradually expanded to other top two-way investment markets.

To attract and retain talented entrepreneurs and highly educated individuals, the Innovation and Science Agenda also included a new Entrepreneur visa, as a stream of the existing Business Innovation and Investment Programme, for individuals who have obtained capital backing from a third party to develop and commercialise innovative and entrepreneurial ideas in Australia. To retain highly educated individuals, the current points test will be amended to award additional points for Australian doctorate-level and masters by research qualifications in science, technology, engineering and mathematics (STEM) and specified information and communication technology (ICT) fields.

Changes to the SIV scheme, which commenced in 2015, also aim to make a significant positive contribution to VCPE investment levels in Australia. The new investment framework for the SIV requires visa applicants to invest at least \$500,000 in AusIndustry registered fund(s) or an Australian venture capital fund of funds, rising to \$1 million as the market responds. Minister Robb noted at the time that investor visas offered a valuable prize which the Government believes warrants investment in more dynamic and productive areas of the economy which experience capital constraints. The changes aim to attract more investment into high-growth companies and to support the commercialisation of Australian research.

The further strengthening of the Early State Venture Capital Partnerships announced in the NISA should help to build momentum in venture capital investment in Australia. A number of other financing reforms announced in the NISA will also help improve the environment for non-traditional financing, notably the new tax breaks for early stage investors and the creation of a regulatory regime for crowd-sourced funding.

Single window

Another component of ensuring the right enabling environment for innovation is through trade facilitation. In Australia, there is increasing interest in the **adoption of a single window for trade in Australia** for Australian exporters and importers to cut red tape, facilitate trade and improve Australia's international competitiveness.

Under current arrangements, Australian businesses are required to navigate a range of Australian state and federal agencies and industry bodies to comply with export and import regulations. The regulatory and procedural requirements for businesses vary depending on the product to be exported, the state or territory of origin and the market destination.

A single window for trade would enable traders to submit standardised applications through a single gateway, eliminating duplicative processes, removing red tape and improving coordination and cooperation between authorities. Traders would spend less time and resources navigating the application and approval procedures of each government agency with responsibilities for cross-border trading. Small and medium sized businesses potentially have the most to gain from a single window which may assist them to access global value chains.

Other benefits for businesses and governments include:

- › more efficient and less resource-intensive application and approval procedures
- › minimising the risk of costly data entry errors by eliminating multiple data submissions
- › better categorisation of products to determine high-risk cargo for assessment and quarantine
- › faster approval times
- › faster and more accurate payment of duties, taxes and fees
- › higher transparency and public access to information.

The 2014 *Doing Business* report on single windows found the average time for the preparation and clearance of cross-border documents was 10 days in countries with single windows compared to 18 days for non-integrated systems. Single windows also contributed to greater access and clarity of the permits and approvals required for businesses to export.

Based on a range of international trade facilitation indices, Australia could improve its trade facilitation performance. For example:

- › Australia currently ranks 23rd for efficiency and transparency of border administration behind the UK (7th), Canada (20th) and the US (21st).³
- › In the World Bank's *Trading across borders index*, Australia's ranking dropped from 30th in 2012 to 49th in 2014.
- › In the World Economic Forum's *Global Competitiveness Report 2014-15*, Australia ranks 124th out of 144 countries for the burden of government regulation.
- › Out of 25 exporting countries assessed by the Boston Consulting Group, Australia ranked last in the *Global manufacturing cost competitiveness index* behind countries like the Republic of Korea, the US, Japan and Canada.

Single windows can also assist with the harmonisation of export and import data between countries. By better connecting import and export systems between countries, trade efficiency can be improved, leading to faster clearance of goods. Once trade data is standardised through a single window, data can be more easily shared with trading partners to speed up the documentation processes at trade destinations. Countries are increasingly adopting the World Customs Organization (WCO) Data Model to standardise information exchange between customs and border control agencies. As at February 2015, 71 countries had implemented systems that conformed to the WCO Data Model and 42 countries had completed pilots or projects that used the WCO Data Model. According to the WCO, Australia is 'partially aligned' to the Data Model.

There are a number of approaches to a single window for international trade. These approaches incorporate varying degrees of integration. The World Customs Organisation categorises single windows into three main approaches:

1. *Integrated single window*: clients submit data once through a single online gateway with standardized forms. Clients are able to fulfil all import, export and transit-related regulatory requirements in a single submission. The online service integrates the approval and reporting systems of each relevant agency. For example, Singapore's single window *TradeNet*.
2. *Interface single window*: as above but data is transmitted to relevant agencies, which maintain their own automated systems. For example, the New Zealand *Trade Single Window* enables clients to submit craft and cargo information and register for client codes required by relevant departments and agencies and receive responses from these agencies through a single gateway.
3. *Single agency*: A single authority is established to manage the export, import and transit-related regulatory requirements. The authority establishes a single window for clients to submit and exchange data and manages the interaction with all other relevant agencies. Clients only deal with the single authority. For example, Kenya's Trade Network Agency *KenTrade* within the National Treasury.

³ World Economic Forum's Efficiency and Transparency of Border Administration Index

A fourth approach is a single window-like arrangement in which traders can submit data for customs-only regulatory requirements but must separately deal with other government agencies. A number of countries, including Australia, have adopted this approach.

The overseas experience on single window

An increasing number of countries have, or are putting in place, single windows to facilitate trade:

- › Some 73 countries have now implemented a single window for traders in one form or another. Eighteen of these countries have a single window system that links relevant government agencies electronically while 55 countries have a partially integrated single window.
- › Eight out of Australia's top 10 trading partners have single windows.
- › All but two of Australia's bilateral FTA partners have single windows.
- › Thirteen APEC economies have adopted single window systems which integrate data across trade agencies.
- › Plans are under way for a whole-of-ASEAN single window.

The development of single windows was given a higher profile following the agreement by WTO Members to proceed to implement the WTO Agreement on Trade Facilitation (ATF). The ATF at Article 10.4 provides a lowest common denominator minimum standard obligation encouraging WTO Members to endeavour to establish a single window. Australia complies with this non-mandatory obligation by enabling the submission of customs documentation through a single entry point.

COUNTRY CASE STUDY: UNITED STATES

The US innovation system is unparalleled, characterised by scale, massive R&D spending, a highly competitive culture and appetite for risk. With continued large scale investment in research, and the recognition that innovation will be central to new growth opportunities, the US will continue to be a global leader. While the private sector is responsible for much of the success, the US government plays a strong role in establishing the right policy and funding settings. The US's position as arguably the world's leading location for innovation is often attributed to the success of Silicon Valley. But innovation activity is entrenched in US culture and is a feature of a range of innovation "hot spots" across the country. The US private sector and policy makers recognise innovation as a key driver of future economic growth, and leading firms and research institutes are keen to collaborate with the world's top researchers and businesses.

Total in-country R&D federal government spending reached US \$145 billion in 2015 (just under half relating to defence R&D) and US-headquartered companies exported US \$121 billion in R&D in the same year. The Global Innovation Index ranks the US among the top 3 countries globally in terms of domestic patent filings, scientific productivity and impact, ease of obtaining credit, and university-industry research collaboration. The Obama Administration's *Strategy for American Innovation* focusses on the goal of maintaining US global leadership in this area. It embraces the risk-taking and entrepreneurial vision the US innovation ecosystem requires, articulates the importance of innovation as a driver of US economic growth and prosperity, outlines the central importance of the private sector as the engine of innovation, and reinforces the critical role of government in supporting and investing in the US innovation system.

US Innovation Culture

Several key factors combine to make the US a leading location for innovation. First, R&D occurs on a huge scale. In 2014 the US's total gross R&D spend was just under half of the total spend by all OECD countries combined (US \$433 billion of \$1.07 trillion). The US is also home to more than 130 major research universities, six of which ranked in the top ten of the 2015-2016 Times Higher Education World University Rankings. An additional 57 US universities were among the top 200.

Second, there is a healthy access to capital in the US – both venture capital and firm finance. For example, a total of US \$50.75 billion in venture capital funds was invested in 2014 – only a portion of the total capital available across the US landscape. A wide array of funding sources is also available, much provided by the private sector.

Third, the US federal government is highly supportive of public-private partnerships and collaboration between industry and academia. Additionally, while competitive advantage is fundamental to business success, business recognises that collaboration is required to drive innovation. This is demonstrated through programs such as the federally-funded National Network for Manufacturing Innovation, which encourages companies in similar sectors (e.g. Rolls Royce, Boeing, Lockheed Martin and GE) to collaborate on joint projects for the overall competitiveness of the sector.

Fourth, the domestic IP system is strong, providing confidence that ideas will be protected. Also, while nearly every campus maintains tech transfer and commercialisation offices to support researchers, universities are increasingly establishing programs to support student innovators.

Fifth, anecdotally, Americans' desire to win and their strong appetite for risk drive a thriving entrepreneurial culture. There is a strong belief that anyone can rise up to become successful through risk-taking and endeavour, which drives individuals to strike out boldly. US bankruptcy laws also allow this to happen. This, combined with a mantra of "fail fast, fail often" (particularly in the tech sector) encourages entrepreneurship and reduces the stigma around professional failures in business. Of all the attributes, the eagerness to take risks is one of the distinguishing characteristics compared to Australia. In the same spirit, businesses and communities are also willing to give back to their respective sectors, often in the form of mentoring to new firms, students, and individuals.

Finally, Governments at the federal and state levels are heavily invested in providing the right enabling environment for innovation to occur. This approach was promoted in the recently updated *Strategy for American Innovation*.

Building Research-Industry Collaboration

Building a strong culture of research-industry collaboration is recognised as a key driver of future competitiveness and has been a central theme of the Obama Administration. The Open Innovation strategy supports companies connecting and collaborating with start-ups, university researchers, and users to generate new ideas and products instead of only relying on internal R&D as the source of innovation. For example, using the open innovation approach, the US Agency for International Development (USAID) has sourced over 10,000 ideas from "innovators, entrepreneurs, researchers, small and medium business owners and students". These ideas have led to more than 300 technologies. The Administration also supports an "all hands on deck" effort that includes business, non-profits, foundations, and others to improve science, technology, engineering and mathematics (STEM) education. Over the past six years, this effort has resulted in more than US \$1 billion in direct and in-kind support for STEM programs.

The Defence Advanced Research Projects Agency (DARPA) encourages industry to conduct DARPA-funded R&D to generate technologies and capabilities key for the US military and national security in projects usually lasting between three to five years. Creating urgency through this short timeframe, DARPA is able to create an environment to effectively advance high-risk technologies from the lab to the field. DARPA's FY2016 budget was US \$2.87 billion.

The National Network for Manufacturing Innovation (NNMI) aims to create a competitive research-to-manufacturing infrastructure for US industry and academia to solve industry problems. Within the Institutes, industry, academia, and government partners can collaborate and co-invest to nurture manufacturing innovation and accelerate commercialisation. To date, nine NNMI Institutes have been announced and received a total of US \$1 billion in public-private investment. The Lab-to-Market Initiative accelerates technology transfer for promising new innovations resulting from federally-funded research. The Initiative is the core of Administration efforts to promote R&D commercialisation, including a 2011 Presidential Memorandum directing all federal research agencies to speed-up R&D awards to small businesses, facilitate partnerships with industry, and track

concrete commercialisation goals. For example, the National Science Foundation (NSF) has established the Innovation Corps (I-Corps) Program which provides entrepreneurship training for Federally-funded scientists and engineers.

The Small Business Innovation Research (SBIR) is the US Government's largest innovation program (first established in 1982). Through SBIR, the government uses competitive grants to encourage domestic small businesses to engage in R&D that has the potential for commercialisation. Each year, Federal agencies with R&D budgets that exceed US \$100 million are required to allocate a portion of their R&D budget to SBIR. In 2015, this portion was 2.9 per cent, representing a total investment of about US \$2 billion. Currently there are 11 Federal agencies participating in this program, with just five responsible for 96 per cent of SBIR's investment (Defence, Energy, NASA, Health, NSF).

The Small Business Technology Transfer (STTR) program is similar to SBIR, but it requires participating small businesses to formally collaborate with a research institution in the earliest stages of project development. Each year federal agencies with R&D budgets that exceed US \$1 billion are required to reserve 0.3 per cent of their research budget for STTR awards to small businesses.

Innovation and Trade Policy

The US retains a pre-eminent position on IP-related trade. IP accounts for 70 per cent of the value of publicly traded companies, US \$5 trillion in value-add and 34 per cent of GDP in the US. Of the global total of receipts for royalties and licence fees for IP rights, 43 per cent went to the US in 2012. The US sees itself as the world leader in innovation and IP enforcement. It is a net exporter of IP and its protection in overseas markets through enforceable rules and standards is seen as a key driver of innovation. The US prioritises the protection of IP through trade agreement negotiations, which are seen as vehicles to promote value-added creative industries as well as the civil and criminal enforcement of American IP rights around the globe. The theft of US IP and trade secrets has been described by the Administration and Congress as the 'greatest transfer of wealth in history'.

US Innovation Hotspots

San Francisco and Silicon Valley, which includes Palo Alto, San Jose, Sunnyvale, and Santa Clara, California, are often considered the main innovation hubs in the US. But in reality, innovation is a widespread feature of US commerce, particularly in other so-called "hot spots" throughout the US. These include:

- › California: California (which includes San Francisco and Silicon Valley) remains one of the United States' largest innovation hotspots and leads the nation in venture capital investment. In 2014, the state attracted more venture funding (US \$26.2 billion) than all other 49 states combined (US \$20.46 billion).
- › Boston/Cambridge, Massachusetts: MIT and Harvard University have established a mature culture of university-industry collaboration in the life sciences, medical, and technology industries. In 2014, Massachusetts companies — most in Boston and Cambridge — took in more than US \$4.67 billion in investments. This area also ranks high on innovation measures, including patent filing with five patents/1000 residents between 2009 and 2013.
- › Research Triangle Park, North Carolina: North Carolina's Research Triangle Park, located between Raleigh and Durham, was created 60 years ago and is today the largest research park in the US, hosting 50,000 employees in 200 companies across 7,000 acres. Research strengths include micro-electronics, telecommunications, biotechnology, chemicals, pharmaceuticals, and environmental sciences. Industries annually invest nearly US \$300 million in R&D at nearby universities (including Duke University, the University of North Carolina-Chapel Hill, and North Carolina State University) — more than double the investment at similar innovation clusters elsewhere in the US.
- › Austin, Texas: Existing software and semiconductor industries in Austin have provided a solid foundation for e-commerce, life science and technology firms to launch in the region. Between 2009 and 2013, the city of Austin was granted 6.58 patents per 1,000 residents and attracted about US \$330 in venture funding per capita.
- › New York City: Venture capital invested in New York-based companies has grown rapidly since 2010, with more than US \$5.25 billion invested in 2014. Many recent investments have focused on

high-tech industries, earning the city the nickname “Silicon Alley”. The city government has also made significant investments to lure Cornell University and Technion-Israel Institute of Technology to launch a joint-technology and innovation centre, which will open on Roosevelt Island in 2017. CornellNYCTech will house graduate courses in innovation and entrepreneurship, multiple corporate offices, incubator/accelerator support, and the nation’s first university-based U.S. Patent & Trademark Office site

- › Midwest: Agricultural and food innovation, driven by significant production scale and intense internal and external competition, is endemic in the Midwest. Large, mostly Fortune 500 agricultural companies such as Monsanto, Dow AgriServices, Cargill, ADM, Dupont-Pioneer, and John Deere invest heavily in in-house R&D throughout the region. The “Animal Health Corridor”, a public-private initiative, runs from Kansas to Missouri to leverage the existing density of agricultural production and create world-leading innovation in the sector. In 2014, US \$2.15 billion in venture funding was invested in the mid-western states.

Other cities that rank high on innovation measures — including patent filings (per thousand residents), venture capital investment (per capita), and tech start-up density — include Boulder and Fort Collins, Colorado; Corvallis, Oregon; Seattle, Washington; and Provo, Utah. Notably, all of the top-performing US cities on innovation are home to at least one major research university.

COUNTRY CASE STUDY: ISRAEL

Taken from Keeping it Real, Official Blog of the Australian Ambassador to Israel, Dave Sharma, 15 November 2015

Innovation and Israel: Lessons for Australia

When Israel’s Chief Scientist, Avi Hasson, touches down in Australia tomorrow for a week of meetings and events, he will find a ready audience.

Avi, as well as his title as Chief Scientist, is also the head of Israel’s National Innovation Authority, and it is this title which more aptly describes his role in Israel. Avi is like the chief executive of Israel’s innovation system, an official appointed by statute but who enjoys powers more closely resembling those of a Minister. His job is to ensure the Israeli economy, the ‘Start Up Nation’, remains one of the most innovative in the world.

Avi will find an Australian economy at a turning point. Though still strong, our economy is coming off the highs of an historic mining and commodities boom. We are searching for the next engine of growth — one that makes use of our highly-educated workforce, is export-oriented, pays sufficiently well to maintain our living standards, and harnesses our natural advantages as a nation. For this, we need a more innovative, creative and entrepreneurial economy. Innovation has become the new buzzword in Australia, with the Prime Minister due to deliver a major Innovation Statement next month.

This is why the experience of Israel is so relevant to our current economic debate.

Israel is indeed an innovation powerhouse, on any metric. 50 per cent of Israel’s exports are in high-tech. Israel spends an OECD-high of 4.2 per cent of GDP on research and development (R&D). Last year Israel attracted almost \$2 billion in venture capital, more than any other country (including the US) on a per capita basis. Over 275 big multinationals have established R&D facilities in Israel, from Apple to Alcatel, Google to Philips. Israel has the highest density of start-ups in the world, with 1 for every 2000 people, and more NASDAQ listings than any country bar the US and China. For a small country, Israel punches way above its weight on innovation.

But — and this is where it gets interesting — Israel did not become like this overnight. Israel was not always destined to be an innovative, high-tech economy; quite the opposite, in fact. In the early 1990s, Israel’s economy was sclerotic, inefficient, and overly centralised.

Only as a result of conscious national decisions, taken from the early 1990s onwards, when staring down the barrel of a crisis, did Israel's economy begin to change. Today, Israel has one of the most competitive and productive innovation ecosystems in the world. But this system has been built and engineered every step of the way. A start-up scene did not just emerge organically. National policy and national leadership brought about this transformation, harnessing strengths but within a coherent and consistent framework, where the incentives were all aligned and the obstacles and disincentives removed.

What are the secrets to Israel's innovation system? It is a question I have spent the better part of two years in Israel thinking about. I think the answer can be broken down into four C's: culture, capital, coherence and clusters.

Firstly, culture. It is true that Israel has some unique national circumstances which – though we would not wish them upon any country – nonetheless have contributed to Israel's risk-taking culture. A small nation, lacking natural resources and surrounded by hostility, can only survive by dint of ingenuity, cleverness, and a degree of 'chutzpah'. In Israel, ideas are prized, experimentation and creativity are encouraged. Failure is seen as valuable experience, not a character blemish. Social hierarchy is almost non-existent, so good ideas can come from anywhere within an organisation. Compulsory military service in a high-technology army, and the large degree of autonomy given to young soldiers in the field, further contribute. The small size of the Israeli market gives rise to a 'global from day one' perspective.

Secondly, capital. The ready availability of early-stage, high-risk venture capital drives a vibrant and thriving innovation ecosystem – without this, risky but disruptive ideas (the possible 'unicorns') never emerge from someone's sketch on the back of a napkin. Israel is not naturally endowed with capital – it's a small economy in a geopolitically risky environment. But it has managed to create a thriving venture capital sector through two major government initiatives. The first was the Yozma program in the early 1990s, which created Israel's VC industry from scratch.

The second is the series of programs and funds now run by the Office of the Chief Scientist, which provides financial support to early stage start-ups without taking equity. This helps drive a sizeable pipeline of deals to feed the VC industry at the next stage of development. The Office of the Chief Scientist manages a budget in the order of \$450 million per year (this equates to about \$1.5 billion in Australian terms, given the relative size of our economy) to support industrial R&D and early-stage start-ups. This might look at first blush like generous corporate welfare. But in fact this spending delivers a very high return on investment when viewed across the economy. The Chief Scientist calculates that every dollar it spends to support R&D generates an additional \$1.50 in private sector R&D expenditure and translates into an additional \$5 – \$10 of GDP generated. It is seen as a good use of public money.

Competitive tax policies and settings, which encourage and privilege venture capital over other forms of investment – in recognition of the outsized multiplier effect such investment has on the rest of the economy – also play a part. Getting the optimal policy settings in areas such as crowd-sourced equity funding, tax treatment of angel investors, and employee share ownership (ESOP) schemes has been critical to Israel's success.

Thirdly, coherence. Creating an innovative ecosystem requires getting the incentives right and removing roadblocks across the policy sphere. Taxation, industry policy, science, education, financial regulation, immigration – all these policy areas need to be aligned. In Israel, Avi Hasson and his office provide the single point of accountability and responsibility within Israel for supporting innovation. He has a single mandate – to create the best environment for innovation in the world – and he has the authority to address the obstacles to making this a reality, and prevent new measures which would set it back. He is guardian and gatekeeper.

Fourthly, clusters. Israel is a small country, in size and population, with often no more than three degrees of separation. So clusters tend to form almost naturally. The military is a big part of life, and you often find people who served in the same military units then founding a start-up together. Beyond this, there is the connection between the academy and industry. Universities play a huge part in the innovation ecosystem, and do so enthusiastically. Researchers see potential commercial application as a vital partner in their work, not a distraction. Universities have in-house structures and specialists to help develop products and applications

from research breakthroughs: they seek to value-add to their research before selling the IP out the door. Taken together, the close interaction between the military and industry and between the universities and the commercial world, and the characteristics of a small society, make for a high degree of collision and interaction. This is how ideas are formed, refined, improved and eventually commercialised. It's like the whole country is a version of Silicon Valley. The government has taken steps to promote this — building a cyber hub in Beersheva, for instance.

What does all this mean for Australia? For me, the take-out is positive. Israel created a more innovative economy, and so can we.

Our baseline strengths to be a more innovative nation are good. We have strong research credentials and a highly-educated workforce. We have a sizeable and sophisticated capital market, supported by our large super funds. We embrace technology. Our population is still small enough to be manageable. We run a big migration program, meaning our country is also importing new talent and ideas. We too are a nation known for innovation and a healthy disregard for the usual way of doing things — disruption comes naturally to us. We are plugged into the growth markets of Asia, including through our network of recently-concluded FTAs and regional trade agreements.

Importantly, we have a high degree of political commitment and buy-in to now take the policy steps needed to realise our potential. Innovation has become a national priority, which means resources and political will can be mobilised behind it.

As we go about building a more innovative Australian economy, we need to ensure it remains uniquely Australian, and plays to our own natural strengths and advantages. We should not be seeking to replicate Israel or Silicon Valley or, indeed, anywhere else. 'Cut and paste' will not work. We will need to come up with our own policies and initiatives to foster more innovation.

But we can and should learn from the experiences of countries such as Israel, and adapt them to our own national circumstances.

COUNTRY CASE STUDY: SINGAPORE

Singapore provides a useful example of how government, industry and the tertiary research sector can effectively work together to achieve common aims; and of how well-calibrated cabinet-level policies can be delivered across implementing agencies without too much duplication. With its small landmass, few natural resources and geostrategic vulnerabilities, Singapore has consistently applied policies supportive of research and innovation to increase its competitiveness and improve its terms of trade; enhance its security; and — through attracting global talent — grow its population.

Government initiatives

Driving Singapore's research and innovation success has been well-crafted public policy, directed from the highest level of government and with generous fiscal support. This policy is regularly reviewed in line with national requirements in annual budgets. Every five years, the Research, Innovation and Enterprise (RIE) Council, which comprises cabinet ministers and eminent international leaders in science and technology, releases a five-year plan.

The latest plan, "RIE 2020," was announced by PM Lee on 8 January 2016. Under the plan, SG \$19 billion (A\$18.84 billion) has been set aside for 2016-2020 to ensure high impact in scientific research, value from commercial R&D investments and a robust research base and innovation workforce. Key "technology domains," or industries of focus, will include advanced manufacturing and engineering; health and biomedical sciences; services and the digital economy; and urban solutions and sustainability.

For advanced manufacturing, SG \$3.3 billion has been allocated to develop cutting-edge manufacturing technology. This will focus on eight key industries including aerospace, marine and medical technology. For health and biomedical sciences, SG \$4 billion has been allocated. Services and digital economy will receive SG \$400 million in funding. Urban solutions and sustainability will get SG \$900 million. Notably, SG \$2.5 billion has been earmarked for so-called “white space” research (or in PM Lee’s words, “curiosity-driven research”) into promising new areas of enquiry. This is up from SG \$1.6 billion under the previous RIE 2015 plan.

The RIE 2020 budget, an increase of 18 per cent on the RIE 2015 budget, will represent approximately 1 per cent of GDP, comparable to the United States. In his announcement, PM Lee added that the state also wants the private sector to raise its R&D spending to 1.8 times what the government is spending under RIE 2020.

The RIE 2020’s stated focus is to break down silos by getting interdisciplinary groups to collaborate under broad groupings; increase competition for funding to get the best research; train people; and improve return on investment.

The World Intellectual Property Organization’s 2015 Global Innovation Index ranked Singapore at 7th overall, but for its “innovation efficiency ratio” Singapore only ranked 100th in the world. Whereas Singapore was rated highly on enabling input factors (tax, money, institutions and infrastructure) it fared poorly on output factors (creativity, knowledge outcomes, and inventiveness). This can be attributed to poor targeting of grants and tax incentives (“Productivity and Innovation” or PIC tax credits are typically taken up by small businesses to buy equipment, but this doesn’t always translate into increased output).

International Enterprise Singapore (similar to Austrade) and the InfoComm Development Authority (which coordinates services from broadband to start-up acceleration spaces to the government’s in-house policy ‘lab’) run specialised innovation-related programs. Cross-government initiatives, particularly ‘SmartNation’, which aims to deliver on big data and build a national ‘internet of things’ (ranging from hospital safety sensors to autonomous public transport vehicles), have a wider mandate.

Taxation incentives

Singapore offers a wide range of innovation-friendly tax breaks and financial incentives, in addition to the PIC tax credits. The general corporate tax rate is 17 per cent with partial tax exemption granted for the first SG \$300,000 of otherwise taxable income. Section 14D of Singapore’s tax code provides a complex multi-tiered system of tax deductions related to research and development expenditure. Where expenses exceed trade income, the excess may be carried forward and set off against future taxable profits. Capital expenditure is excluded, but at the same time there is no capital gains tax and Singapore offers generous incentives for R&D capital expenses, such as free land for offices and factories, or preferred terms in the use of public sector research goods (such as researchers at universities).

Other initiatives

Singapore draws on organisations such as its national universities and government-linked companies (Singtel, Singapore Airlines, Keppel Corporation, SingPost, etc.) to further these policies. RIE 2015 focusses on bridging the gap between academic and commercial research, as well as foster synergies in public-private partnership. Beyond government-industry and government-university collaboration, uniform messaging on innovation is now embedded in public sector institutions.

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