



The Bay Area-Silicon Valley and Australia

An Expanding Trans-Pacific Partnership

December 2020

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A Message from Australia's Ambassador to the United States

The relationship of California and the San Francisco Bay Area with Australia is long standing and ever growing. It goes back one hundred and seventy years, shaped by strong people-to-people links and common values that we have not been afraid to fight for, together.

On 4 July 2018, Australia and the United States celebrated the first 100 Years of Mateship. The mateship forged in battle is the bedrock of a unique contemporary relationship that carries across government, business, and societies. San Francisco was once the staging area for many US soldiers, sailors and airmen who fought alongside their Australian counterparts during the 20th Century.

Today Australia and the United States are forging a new partnership that embraces science, technology, and innovation to build the industries of the future. The United States-Australian relationship in the San Francisco Bay Area is integral to that vision. California and the Bay Area are at the heart of American innovation and technological leadership. In 2018, we celebrated the 50th anniversary of the sister city relationship between Sydney and San Francisco.

Australians play a prominent role in the San Francisco Bay Area's celebrated research and innovation communities such as Prof. Sam Hawgood, Chancellor of UC San Francisco, and Prof. Akshay Venkatesh, winner of Mathematics' most distinguished award, the Fields Medal. Australia's influence spills over into the

Bay Area's commercial world through people like Robyn Denholm, Chair of Tesla, to name but one.

Australia even managed to penetrate the rarefied halls of American college sport through Saint Mary's College successful recruitment of Australian talent to lead its basketball program to several appearances in the NCAA tournament. Current NBA players Patty Mills and Matthew Dellavedova are Saint Mary's alumni.

Major Bay Area companies with operations in Australia that are headquartered in the region include Apple, Chevron, HP, and Alphabet (Google). There are over 100 Australian companies with operations in the Bay area including Telstra, Atlassian, and Culture Amp.

Today, San Francisco is the home of the Australian government's Landing Pad. It offers 90-day residencies (currently virtually) for Australian tech-enabled scale-ups to land and expand in the Bay Area and beyond.

Australia's connection to the Bay Area is multi-faceted and long standing, and I welcome this report and the insights it provides to creating a better future together.

The Hon. Arthur Sinodinos AO
Ambassador of Australia



Foreword

Australians have long enjoyed a mutually beneficial relationship with Californians. Beginning with the Gold Rush of 1848 and continuing to today, these two major Pacific powers have shared active two-way flows of trade, investment, research, innovation, education, culture, ideas, and people.

In October 2019, the American Chamber of Commerce in Australia (AmCham) visited the Bay Area to explore economic opportunities to create jobs and grow both economies. At a high-profile visit to the Bay Area Council Economic Institute headquarters, AmCham announced its support for a special research project to analyze the important economic connections that bind Australia and the Bay Area. This report is the product of that research, which was championed by Lendlease and also supported by Google, Salesforce, Telstra, University of Technology Sydney, Wipro, and Cisco.

Australia and the United States enjoy a US\$58.9 billion two-way trade relationship and have made over US\$1.3 trillion in reciprocal investments. The United States is both the leading foreign country investor in Australia and Australia's largest investment destination. US investment accounts for approximately seven percent of the Australian GDP, or A\$131 billion. American companies in Australia employ hundreds of thousands of people, and US companies spend over A\$1 billion annually on research and development. Australia is deeply invested in the United States as well: more than 10,000 Australian firms sell to or operate in the United States, and trade with Australia supports in total more than 300,000 US jobs.

Australian trade with California is especially noteworthy: California was the leading US exporting state to Australia, with nearly US\$4 billion in combined goods and services in 2019. Australia was the 14th largest importer of California goods and services. Key to the



investment is the potential for new technology solutions to allow areas such as mining, manufacturing, agriculture, banking, aerospace, and healthcare to improve productivity, upgrade workforce skills, and compete globally. Bay Area investment in Australia since 2015 has been, with a few significant exceptions, nearly all in the tech sector. Key verticals include ICT, cybersecurity, fintech, biotech, and renewable energy. US Investors see Australia as a market with considerable upside potential in terms of future population growth, a world-class education system, IP protections, and rule of law.

As the world economy emerges from a COVID-induced contraction, innovation is particularly vital to driving economic growth and development. US and Australian industries and investors need one another more than ever right now. This report is intended to inform and inspire public and private sector leaders to harness technology and leverage the bi-lateral relationship to help Australia and the Bay Area emerge stronger from the current crisis.

April Palmerlee
Chief Executive Officer
American Chamber of Commerce in Australia



Executive Summary

Australia enjoys close and longstanding economic, strategic and cultural ties to the United States. Its relationship with California and the San Francisco Bay Area dates back 170 years. These ties begin with a shared language but extend well beyond that to include a set of shared, deeply held values rooted in an appreciation for democracy, open markets, free trade, and the rule of law.

Australians have fought alongside Americans in every major US military engagement in the last 100 years, including World War I, World War II, Vietnam, the Persian Gulf, Afghanistan, and Iraq. The two countries have been formally linked since 1951 by the Australia-New Zealand-United States Defense Treaty (ANZUS) and share intelligence with each other and with Canada, New Zealand, and the United Kingdom under the “Five Eyes” framework. This in turn has translated into similar paths for industrial development, in areas such as defense, aerospace, and advanced manufacturing and materials.

More than A\$81 billion (US\$58.9 billion) in annual two-way trade¹ and A\$1.8 trillion (US\$1.3 trillion)² in reciprocal investment reflect the complementary nature of the two countries’ economies. The United States is Australia’s third largest trading partner, second largest import source, and fourth largest export destination.³ It is also the largest and most significant overseas investor in Australia, accounting for 25.6% of Australia’s inward foreign investment in 2019.⁴ In 2018 (the latest year of available US data), 1,101 majority-owned foreign

affiliates of US multinational enterprises employed a workforce of nearly 325,000 in Australia,⁵ compared to a reported 2,039 firms employing nearly 273,000 in FY2014–15, suggesting a shift toward larger investments by fewer companies.⁶ At the same time, the United States is Australia’s top investment destination, accounting for 28% of its global investment stock.⁷

The San Francisco-Silicon Valley region is an important contributor to the broader bilateral economic relationship. In particular, its role as the leading global platform for technology, venture investment, entrepreneurship, and innovation provides the basis for partnerships that support business growth and also enable Australian companies and organizations to leverage Silicon Valley assets to advance innovation at home. This report assesses the unique ties that connect Australia with the San Francisco Bay Area and the opportunities they present.

Converging Economic Interests

Crosscurrents at work in the global economy offer unique opportunities for closer US-Australia economic cooperation.

In the first quarter of 2020, Australia’s economy performed among the best in the world, with GDP having fallen just 0.3% in that quarter in the midst of the global coronavirus pandemic.⁸ Like other countries impacted by COVID-19 around the world, Australia saw

its economy contract severely in the second quarter, with GDP dropping 7%, the largest contraction on record. Still, Australia fared well in comparison to other developed countries, which saw second quarter GDP drops ranging from 7.8% in Japan,⁹ to roughly 9% in the United States, Germany, and the Netherlands, to 20.4% in the UK.¹⁰

Australia's domestic market of more than 25 million¹¹ has a structure dominated in key sectors by a handful of large, sophisticated companies and millions of small and mid-sized suppliers and independent niche players. Australia's abundant mining and energy natural resources along with agriculture account for a significant share of GDP and employment, although services—property, finance, healthcare, education, and public administration—have posted the strongest growth in recent years, absorbing workers as traditional manufacturing has declined.

Robust public investment has nurtured a world-class system of higher education and an institutional ecosystem for basic and applied research in fields ranging from aerospace to cybersecurity. International student enrollment has increased steadily in recent years to more than 758,000 in 2019, with more than two thirds of international students coming from Asia-Pacific countries, including China, India, South Korea, Malaysia, Japan, Thailand, Nepal, Indonesia, and Vietnam. The United States and Brazil are also among the top 10 source countries for international students.¹² Australia's education export income from international students more than doubled between 2014 and 2019, from A\$19.8 billion to A\$40.3 billion.¹³ A large number of total international higher education enrollments are in STEM studies, which have seen an average 17% annual growth rate since 2014.¹⁴ Commercialization remains a gap, however, as an underdeveloped focus on markets in guiding research has constrained private capital formation for investment. Australian STEM graduates and entrepreneurs have sometimes had to look abroad for funding, talent, and customers as they execute on their business strategies.

Australia, known for its stable economy, had not experienced a recession for almost three decades,¹⁵ although that impressive record ended in 2020, due to the COVID-led economic downturn. In addition,

the country has historically been subject to the cyclical whims of nature—storms, floods, droughts, and bushfires—which have increased in frequency and magnitude in recent years. While immediate emergency response solutions are needed, a longer-term discussion is now underway toward diversifying the economy, building on a robust resource sector while expanding sustainable, value-added growth through the application of new technologies. Key elements include

- digital transformation to help legacy industries modernize and compete globally;
- basic research in technologies of the future, such as artificial intelligence, quantum computing, robotics, data analytics, precision medicine, and the Internet of Things;
- skills upgrades to help workers keep jobs or switch careers in a new economy; and
- entrepreneurial incentives and financing to encourage new business formation and commercialization of research.

When it comes to innovation, the Silicon Valley/San Francisco Bay Area complements Australia well. Silicon Valley's organically developed, public-private ecosystem of federally-funded research institutions, state-funded and privately endowed universities, graduate-level researchers, entrepreneurs, venture and angel investors, and their deep web of connections is recognized worldwide for its ability to nurture talent and create wealth by bringing innovation to market. These patterns support new cross-border synergies on both sides of the Pacific, such as the following:

- Large Australian firms engage with Silicon Valley to plan and execute digital transformation strategies in mining and energy, manufacturing, finance, medicine, construction, and agriculture.
- Bay Area companies see Australia as a valuable test bed for cutting-edge technologies central to digital transformation and, increasingly, as a secure, affordable, politically stable base from which to serve the Asia-Pacific regional market.
- A growing Australian startup community relies on Silicon Valley for early- and later-stage venture capital, business expertise, M&A, and connections to leverage the US market and scale globally.

- Australia's regional governments hope to lure technology investment in R&D and in innovation hubs, data centers, and project partnerships.
- Australian and Bay Area universities and research labs are exploring collaborations that better leverage talent, reduce duplication of effort, and facilitate commercialization.

A Busy Two-Way Street

The first reported Australian emigrants to the United States were entrepreneurs, escaping an economic downturn (with falling wool prices depressing wages) and seeking a fresh start in the 1849 California Gold Rush.¹⁶ More than 30 ships¹⁷ carrying food, clothing, guns, building supplies, tools, and passengers sailed from Sydney Harbour to San Francisco Bay and up the delta toward the gold camps, in a race against settlers traveling by wagon from the eastern United States to stake claims and sell their goods. By May 1850, 11,000 Australians had made the more than three-month voyage.¹⁸ Two enterprising Australian prospectors noticed similarities in climate and terrain with their home districts in Victoria, decided to return home to hunt for gold, found it in the Bathurst and Clunes districts, and launched the Australia Gold Rush of 1851.¹⁹ The story is emblematic of a 170-year exchange that continues today.

More than 10,000 Australian firms sell to or operate in the United States.²⁰ Australian companies directly employed 83,700 American workers at the end of 2017, and trade with Australia supports in total about 300,000 jobs in the United States.²¹ Australian companies representing 83 different industries currently operate in California.²² The state boasts an Australian expatriate community estimated at about 60,000,²³ of which more than a third—around 25,000—are in the Bay Area. The preferential E-3 visa, reserved for Australians with special skills entering the United States to work, has been a draw for STEM researchers, startup founders, and advanced tech workers.

US National Trade and Tourism Office (NTTO) data compiled by Statista shows 1.32 million Australian visitors to the United States in 2019, down from a peak of 1.45 million in 2015 but otherwise consistent with levels seen since 2013.²⁴ In 2018–19, 812,000 US travelers visited

Australia, up 3.1% over the previous year's total.²⁵ The United States is the leading long-haul country destination for Australian tourists, and California is the leading US state destination.²⁶ Prior to the COVID-19 crisis, travelers from Australia had access to 87 weekly nonstop flights and 28,000 nonstop seats to and from Australia through San Francisco and Los Angeles International Airports.²⁷

Trade and Investment

Trade between the United States and Australia is underpinned by the Australia-United States Free Trade Agreement (AUSFTA). More than 97% of Australia's non-agricultural exports to the United States move duty-free, and three quarters of agricultural tariff lines have been eliminated.²⁸ Under AUSFTA, 99% of US manufactured industrial and consumer goods exports enter Australia duty-free, and there are no tariffs on 100% of US agricultural products.²⁹ Australian exporters have access to the US\$535 billion US federal government procurement market and the government procurement markets of 31 US states.³⁰ In 2018–19, the United States enjoyed a total goods and services trade surplus with Australia of A\$26.9 billion (US\$19.6 billion).³¹

Since AUSFTA was enacted, US exports to Australia have grown by 130%, and two-way investment between Australia and the United States has increased by more than 150%.³² Both countries have farming, energy, aerospace, and healthcare sectors that are highly compatible in terms of trade. Australian beef and wines are traded for US pork and dairy products. Australian component exports return as aircraft and satellites. Price controls in Australia's public healthcare system make it a net exporter of pharmaceuticals and protective equipment, but a net buyer of US medical equipment and instruments. Almonds and financial services enjoy healthy two-way trade flows.

On the investment side, Bay Area energy company Chevron Corporation has been prominent in the Australian market for more than six decades. San Jose-headquartered Cisco Systems arrived in the mid-1990s and today employs a workforce of 1,000 at its global technical assistance center outside Sydney, its innovation centers in Sydney and Perth, and its offices in nearly all regions of the country.

More-recently-arriving Bay Area tech companies have gravitated to Australia for its extensive pool of STEM talent, fed by world-class universities; its strength in sectors such as AI and quantum computing, advanced manufacturing, cybersecurity, biotech, fintech, and agritech; its shared language and business culture; its early consumer adoption of new technologies; and its proximity and ties to Asian markets.

Examples include the following:

- Enterprise software-as-a-service (SaaS) provider Salesforce sees particular opportunities among small and mid-sized businesses and within education and government to improve efficiency and deliver services. The company employs more than 2,000 people across Australia and plans to add another 1,000 when it moves into its 24 floors of headquarters space in a new \$1.9 billion, 53-story tower at Circular Quay overlooking Sydney Harbour, which is set to be called Salesforce Tower Sydney and scheduled for completion in 2022.³³
- Google opened a one-person office in 2002 to work with two brothers and their fledgling company, Where 2 Technologies, on the interactive mapping and navigation technology that would become Google Maps.³⁴ The company's 1,500 Australia employees work on products such as Google Maps, Google Photos, and mobile browser Chrome.³⁵
- As well-known in Australia for its solar energy and battery storage technology as for its cars, Tesla is working with the South Australian Government on developing a network of potentially 50,000 home solar PV and Powerwall battery systems across South Australia—all working together to form the world's largest virtual power plant (VPP). There are currently more than 1,000 homes involved in the VPP, which uses smart technology to lower consumer electricity prices and help stabilize the grid.

Other Bay Area firms with significant Australian presences include Oracle, Facebook, Square, Uber, Industrial Light & Magic, Slack, Stripe, and DoorDash. A US firm with a footprint in both the Bay Area and Australia is Boeing, whose \$A73 million investment in R&D in 2019 spanned modeling and simulation, autonomous systems, advanced composites, mission systems technology, and augmented/virtual reality.

Bay Area investment in Australia since 2015 has focused heavily on technology, with companies looking to explore opportunities in key regional markets, but also to develop R&D capability for local and regional markets. Typical investments have included Australia-New Zealand and Asia-Pacific headquarters, R&D centers, and data centers and other infrastructure supporting cloud computing and digital transformation. Key verticals include information and communications technology (ICT), cybersecurity, fintech, biotech, and renewable energy. Further inducements are IP and rule-of-law protections and pent up demand to modernize legacy industries and infrastructure.

As a startup culture has taken hold in recent years, Bay Area corporate and independent investors have also set up shop in Australia, competing with a fast-growing homegrown sector. Major players include Accel, Sequoia Capital, Khosla Ventures, and Salesforce's Trailblazer Fund.

In the reverse direction, more than 1,200 Australian firms have operations in the United States³⁶ in a wide range of industries, including manufacturing, wine production, retail, property development, finance, aerospace, and life sciences. The Australian Trade and Investment Commission (Austrade) estimates that between January 2003 and February 2017 Australian companies invested US\$20.9 billion on new capital projects in the United States. The industry sectors receiving the largest number of these new projects were software and IT services, business services, and natural gas, oil and natural gas liquids. The highest ranking industry activity receiving these projects was sales, marketing and support services, which had more than 150 new investment projects generating more than 6,500 new jobs.³⁷

Australian investment in the Bay Area since 2014 has come from a mix of established companies delivering innovative products and services at scale, alongside smaller growth-stage tech companies raising funds and entering the US market via Silicon Valley to achieve scale. Sectors range from telecommunications and renewable energy, to agritech and fintech, to healthcare and e-commerce. Investment projects have included agricultural seed producer Nuseed's R&D center in West Sacramento, telecom provider Megaport's dark fiber

facility in San Francisco, and automotive OEM supplier Futuris Automotive's Newark plant that builds seating and interior systems for Tesla.

Telstra, originally Australia's national telecom provider, today is a private carrier operating more than 400,000 km (249,000 miles) of subsea cable, 58 data centers, 2,000 points of presence in more than 200 countries, and access to 60 satellites globally.³⁸ Outside of Australia, Telstra's services are exclusively B2B, making it a critical technology partner for major Bay Area tech firms which rely heavily on high-capacity, resilient and secure cross-border regional and global services, particularly connecting the United States to Asia and Australia. Telstra in the Americas, which primarily handles sales, marketing, and customer/partner support in North America, is headquartered in San Francisco. Key technology partners include Cisco, Salesforce, Juniper Networks, Infinera, and Equinix. Telstra has been a customer of Sunnyvale cybersecurity firm CrowdStrike since 2013 and an investor since 2017 through its Telstra Ventures investment arm.³⁹

Team collaboration and productivity software company Atlassian is rooted in both Australia and Silicon Valley. The company raised US\$60 million from Accel in 2010 in a funding round that brought Accel's expertise onto its board, fueled acquisitions, and was also used to facilitate liquidity for employees.⁴⁰ Headquartered in Sydney, with 5,000 employees⁴¹ and US\$1.6 billion in revenue for the fiscal year ending in mid-2020,⁴² the company currently has 12 offices in seven countries, including two Bay Area offices (in San Francisco and Mountain View).⁴³

Starting in 2002, Australia's shopping center developer Westfield Group acquired and developed two major shopping complexes in Northern California (the downtown San Francisco Center and the Westfield Galleria at Roseville in the Sacramento metropolitan area) before being acquired itself in 2018 by the Paris-based Unibail-Rodamco commercial real estate group.⁴⁴

Coordinated Networks

The largest and most influential membership organization for companies operating between Australia and the United States is the American Chamber of Commerce

in Australia (AmCham). With offices across Australia and connections to Bay Area organizations, AmCham provides networking, advocacy, access, information, and visibility for those involved in two-way trade and investment.

Research and student exchange programs link universities such as Stanford, UC Berkeley, UC Davis, and UC San Francisco with Australian counterparts including Australian National University, University of Sydney, Curtin University (Perth), Monash University (Melbourne), University of Melbourne, University of Queensland, University of Adelaide, University of Western Australia, and others.

Another recently added link has been the creation of the Jeff Bleich Centre for the US Alliance in Digital Technology, Security and Governance at Flinders University in Adelaide. Named after former US Ambassador to Australia and Bay Area resident Jeff Bleich, the center focuses on educating the public and policymakers on the challenges posed to democratic societies by digital technologies and on promoting cooperative initiatives through research and support for policymakers.

Australia's government is represented in the Bay Area not only by the Australian Consulate General in San Francisco, but also by the national science organization, CSIRO, and by regional trade and investment specialists representing the states of Victoria, Queensland, and New South Wales. Landing Pad, an accelerator program run by Austrade, has hosted 94 startups to date, connecting them to resources and partners in the region. In the private sector, the Australian American Chamber of Commerce links many of the larger companies, while the Aussie Founders Network offers informal mentoring and network support to startups.

Innovation is an important theme linking the Bay Area with Australia which, as mentioned previously, has a strong university system and high research capacity but limited venture capital and a small domestic market.

■ Institutions like the University of Technology Sydney (UTS), a STEM and technology-oriented public university with a mission to transform the culture of business and academic engagement, see a natural synergy with Silicon Valley and are making deeper ties with the region a top priority.

- The Australian founder of San Francisco-based Planet Labs leveraged a stint at NASA Ames Research Center in Mountain View and venture funding from DCVC (Data Collective) to launch his company.
- Afterpay, a highly successful Australian fintech company launched in the United States with funding from Matrix Partners, is currently used by more than 15,000 brands and retailers and is serving five million active users in the United States.⁴⁵ With a Bay Area-based team of 120, the company was drawn to the region in a quest for talent and now plans to enter global markets from its San Francisco base.
- Sydney-headquartered unicorn graphic design platform Canva also turned to Silicon Valley for growth capital from Sequoia and other venture firms.

The innovation connection extends beyond core technology companies to include companies in traditional industries such as financial services, healthcare, agriculture, mining, and construction that are applying digital transformation methods to modernize their industries as they build new markets. A prominent example is Sydney-headquartered global property developer, builder, and investor Lendlease, known worldwide for projects such as the Sydney Opera House and the Petronas Towers in Kuala Lumpur, as well as the Grand Central Station renovation and the September 11 Memorial and Museum in New York. Lendlease has been active in San Francisco for more than a decade, with mainly high-rise multi-unit residential projects in the city's downtown core. Beyond individual structures, the company focuses on urbanization and the design and technology that can support livable workplace environments while using digital transformation to improve processes throughout the full life cycle of property development—investment, master planning, design, development planning, construction, and operation.

Lendlease's latest and most ambitious Bay Area project involves a 15-year, US\$15 billion partnership with Google to develop up to 15 million square feet of residential, retail, hospitality, and community uses in three Bay Area cities: San Jose, Sunnyvale, and Mountain View.⁴⁶ Behind the design is a data-driven approach that aims to revolutionize property development globally through digital processes that draw on domain knowledge of architecture and construction in Australia and the digital and software expertise of the Bay Area.

Conclusion

The complementary nature of the US and Australian economies provides significant opportunities for economic growth and development. As countries with deep cultural and geopolitical ties, Australia and the United States can capitalize on their shared values and democratic systems to collaborate more closely on issues ranging from defense and cybersecurity to the development of strategic and emerging technologies.

COVID-19 notwithstanding, it is becoming ever easier for Australians and Americans to live and work in each other's countries. Australians in tech and other high-demand industries enjoy streamlined visa availability due to the preferential E-3 visa program, and highly skilled professional Americans can now apply for expedited admission to Australia through the Global Talent Independent Program.

Australia's high-quality universities provide a further platform for cooperation in higher education but also in technology research and commercialization.

Complementary economies, strong trade and investment ties, and growing technology links, create a strong relationship between the Bay Area and Australia that is deepened by the connections of history, shared values, and mutual confidence.

Introduction

Australia and the United States enjoy close and longstanding economic, strategic, and cultural ties, allowing for important cooperation in the rapidly emerging hi-tech and innovation fields. In addition to shared values, language, history, and democratic systems, Americans and Australians have a shared love of freedom. Australians have fought alongside Americans in every major US military engagement over the last 100 years. The two countries have been formally linked since 1951 by the Australia-New Zealand-United States Defense Treaty (ANZUS), and share intelligence with each other and with Canada, New Zealand, and the United Kingdom under the “Five Eyes” framework. Since 2005, the US-Australia Free Trade Agreement has facilitated a huge increase in the two-way flow of trade and investment. This alignment has translated into close cooperation in areas such as defense, aerospace, and advanced manufacturing and materials.

While Australians were attracted to California in the 1800s to mine for gold, today Australian founders and entrepreneurs come to the Bay Area for a different kind of gold—innovation and access to global markets. The ties underlying these relationships begin with a common language but extend beyond that to include a set of shared, deeply held values rooted in an appreciation for democracy, open markets, open trade, the protection of intellectual property, and the rule of law.

Given current geopolitical challenges around the world, the Indo-Pacific region will continue to grow in importance for the United States, and so, too, will its relationship with Australia. This report assesses Australia’s economic ties to the Bay Area and outlines areas where capabilities, resources, and close alignment will offer stronger opportunities for business and other collaboration in the future.



Australia Performs in the Global Economy

In the first quarter of 2020, Australia's economy performed among the best in the world, with GDP having fallen just 0.3% in that quarter in the midst of the global coronavirus pandemic.¹ Like other countries impacted by COVID-19 around the world, Australia saw its economy contract severely in the second quarter, with GDP dropping 7%, the largest contraction on record. Still, Australia fared well in comparison to other developed countries, which saw second quarter GDP drops ranging from 7.8% in Japan,² to roughly 9% in the US, Germany, and the Netherlands, to 20.4% in the UK.³

Australia's domestic market of more than 25 million⁴ has a structure dominated in key sectors by a handful of large, sophisticated companies and millions of small and mid-sized suppliers and independent niche players. Australia's diversified economy is strongly based on services, which accounted for 88.4% of employment and 79.2% of real gross value added (GVA) in 2018–19.⁵ (GVA is a government measure which focuses on the structure and performance of the economy through value added by specific producers, industries, or sectors.) Between 1991 and 2019, Australian services sectors have grown strongly, with the information, media and telecommunications sector recording the highest compound annual growth rate (CAGR) at 5.1%, followed by professional, scientific and technical services with a 4.9% CAGR, and healthcare and social assistance at 4.5%. Among the three goods sectors, the country's

abundant natural resources contribute to mining leading with a 1991–2019 CAGR of 4.5%—that matches the growth rate of healthcare—while agriculture, forestry and fishing has had a growth rate of 1.6% and manufacturing has lagged with a 0.7% CAGR.⁶

Robust public investment has nurtured a world-class system of higher education and an institutional ecosystem for basic and applied research in fields ranging from aerospace to cybersecurity. International student enrollment, primarily from Asia-Pacific countries, has increased steadily in recent years, to more than 758,000 in 2019, with more than two thirds of international students coming from Asia-Pacific countries, including China, India, South Korea, Malaysia, Japan, Thailand, Nepal, Indonesia, and Vietnam. The US and Brazil are also among the top 10 source countries for international students.⁷ Australia's education export income from international students more than doubled between 2014 and 2019, from A\$19.8 billion to A\$40.3 billion.⁸ A large number of international higher education enrollments are in STEM studies, which have seen an average 17% annual demand growth rate since 2014.⁹ Commercialization remains a gap, however, as an underdeveloped focus on markets in guiding research has constrained private capital formation for investment. Australian STEM graduates and entrepreneurs have sometimes had to look abroad for funding, talent, and customers as they execute on their business strategies.

Slow but Steady

Australia, known for its stable economy, had not experienced a recession for almost three decades,¹⁰ although that impressive record ended in 2020, due to the COVID-led economic downturn. In addition, Australia's historically robust economy has been buffeted in recent years by forces outside its control, ranging from depressed commodity prices to natural disasters.

Severe drought and bushfires have taken an economic toll on agricultural, tourist, and residential areas in the eastern part of the country. Bushfires across New South Wales, Victoria, and South Australia since September 2019 have burned some 8.4 million hectares (nearly 21 million acres), killed 25, and caused more than \$600 million in damage based on claims filed as of January 2020. Moody Analytics estimates total fire damage exceeding the A\$4.4 billion of the 2009 Black Saturday fires, which destroyed a smaller but more densely populated area.¹¹ Estimates to date suggest a potential reduction in 2019–20 GDP of as much as 1%, due to the fires.¹² Annual GDP growth has moved in a 2–3% band since 2010, but dropped to 1.85% for 2019, according to IMF data compiled by Statista.¹³ IMF data also shows an annual GDP total of US\$1.36 trillion for Australia in 2019.¹⁴

Until COVID-19 hit, the governing Liberal-National Party (LNP) under Prime Minister Scott Morrison had continued a policy of fiscal austerity initiated by predecessor Malcolm Turnbull in 2015. While embracing increased spending on infrastructure, drought relief, and care for the aged, the LNP coalition had committed in 2019 to achieving a budget surplus in 2020. As in many other countries, however, those plans have been impacted by the COVID-19 crisis. Before the crisis struck, growth was forecast at 2.25% for 2019–20 and 2.75% for 2020–21.

Having suppressed the COVID-19 virus, Australia announced on May 8, 2020 a three-step plan to reopen its economy. The announcement was made jointly with the government of New Zealand, which had put strict lockdown measures in place early. As of mid-May, Australia had 6,900 reported cases and 97 reported deaths, with 855,000 people tested out of the population of 25.6 million.¹⁵

In mid-April, the Australian Bureau of Statistics reported that nearly 6% of workers had lost their jobs in the past month, primarily as a result of COVID-19 lockdown restrictions. The unemployment figures for the first two weeks of March had shown only a small increase from 5.1% to 5.2%, but the dramatic employment loss happened in late March and early April.¹⁶ The Treasury said in early May that it expected to see 10% unemployment for Q2, with a projected A\$50 billion (US\$32 billion) falloff in economic activity. Hardest hit sectors have been food and hospitality services and arts and recreation. Youth unemployment was estimated at more than 18%. Australia's low debt-to-GDP ratio enabled the government to commit A\$200 billion for direct support to businesses and workers, and another A\$120 billion in loans and guarantees for the financial system, effectively backstopping 16% of the economy.¹⁷

A Snapshot of the Economy

In recent years, Australia's economy has achieved significant global success¹⁸ in two key goods export sectors—mining (10.2% of GVA in 2018–19) and agriculture (2.2% of GVA)—while manufacturing (6% of GVA) and construction (8% of GVA)¹⁹ have struggled.

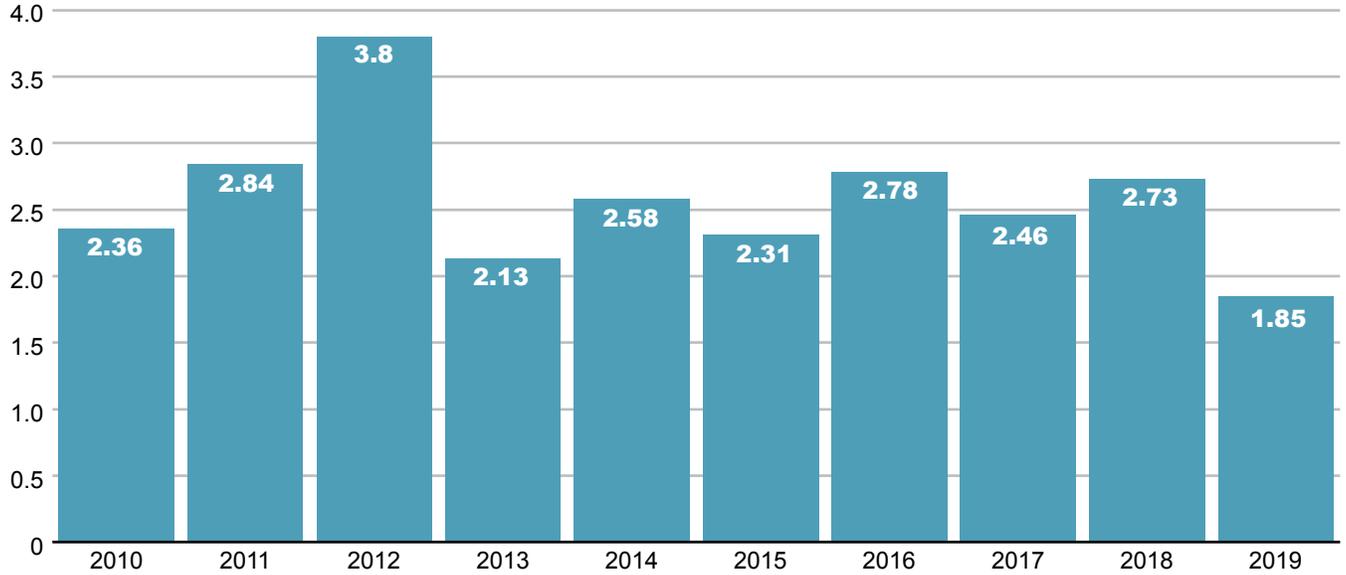
Service sectors—notably finance, tourism and hospitality, healthcare, and public administration—contributed nearly 67% of Australia's US\$1.36 trillion GDP in 2019, according to Statista,²⁰ and 72.9% of gross value added (GVA) in 2018–19. Financial and insurance (9.3% of GVA), construction (8% of GVA), and health care and social assistance (7.5% of GVA) contribute almost a quarter of total services GVA. Professional and technical services, transportation, retail and wholesale trade, hospitality, real estate services, and various public and cultural services make up the remainder.²¹

From 2016 to 2019, employment grew at a healthy pace and the share of the Australian population employed reached an all-time high, while the unemployment rate resumed its decline and then plateaued in mid 2019. Analysis by the Reserve Bank of Australia indicates that new jobs created in recent years have averaged fairly evenly across the spectrum of low wage and high wage jobs as well as the spectrum of lower skilled and higher skilled jobs. Two-thirds of the employment growth during 2018 and 2019 has been in full-time jobs.²²

EXHIBIT 1

Annual GDP growth has moved in a 2–3% band in recent years but dropped to 1.85% in 2019.

Australia Real GDP Growth Rate, 2010–2019, percent



Source: IMF data compiled by Statista

Visualization: Bay Area Council Economic Institute

EXHIBIT 2

From 2016 to 2019, employment grew at a healthy pace and the share of the Australian population employed reached an all-time high.

Australia Labor Force Participation Rate, 2015–19, percent



Australia Unemployment Rate, 2015–19, percent



Source: Australian Bureau of Statistics, Reference Period August 2020

Visualization: Bay Area Council Economic Institute

Coal: It's Complicated

Coal is a contentious commodity for Australia, given its importance to regional development and to the country's commitment to addressing global climate change. Australia produces more than 500 million metric tons of coal annually—both metallurgical coal for steel production and thermal coal for power generation—of which 75% is exported. Coal has been the second largest resource export after iron ore for nearly a decade, comprising 14% of Australia's total exports by value (A\$67 billion and more than 3% of GDP in 2018).¹ Much of the industry workforce of 38,000² is located in otherwise economically distressed areas of the country.

Australia supplied 30% of total worldwide coal exports in 2018, accounting for half of global metallurgical coal exports and 20% of thermal coal exports. India, China, and Japan are the top buyers, with growing markets across Southeast Asia. The Reserve Bank of Australia sees demand growth slowing in China, Japan, and South Korea, as cheap, plentiful, cleaner natural gas displaces coal in a transition to energy from renewables. Coal purchases by India and Southeast Asia may pick up some of the slack, however, for a possible modest net increase in exports through 2025.³

Australia, with its own domestic reliance on coal-fired generation, contributes 1.3% of global carbon emissions directly, as calculated by the Australian government. Its contribution rises to 3.3% if its exports are also counted⁴—a high per capita level for a population of 25.6 million. Worsening drought, fire, and storms have brought mounting public pressure to bear on industry and government. An annual Lowy Institute public opinion poll showed in 2019 that 61% of Australians view coal production as “a serious and pressing problem” which must be addressed now “even if this involves significant costs” —up from a 2012 low of 36%.⁵

Australia's coalition government stands by its commitment under the Paris Agreement to reduce greenhouse gas emissions by 26–28% from 2005 levels by 2030.⁶ Australia's initial National Climate Resilience and Adaptation Strategy released in 2015⁷ has been supplemented by the government's investment of a total of A\$4.5 billion in the Emissions Reduction Fund and the Climate Solutions Fund, both aimed at helping businesses and farmers lower emissions by 100 million tons by 2030.⁸ Amid continuing drought and fires, public sentiment that more needs to be done is on the rise.

- 1 Cunningham, Michelle, Luke Van Uffelen, and Mark Chambers, “The changing global market for Australian Coal,” Reserve Bank of Australia, September 19, 2019, <https://www.rba.gov.au/publications/bulletin/2019/sep/the-changing-global-market-for-australian-coal.html>.
- 2 “Are there really 54,000 people employed in thermal coal mining?” RMIT ABC Fact Check, July 10, 2019, <https://www.abc.net.au/news/2019-07-11/fact-check-are-there-54000-jobs-in-thermal-coal-mining/11198150>.
- 3 Cunningham, Michelle, Luke Van Uffelen, and Mark Chambers, “The changing global market for Australian Coal,” Reserve Bank of Australia, September 19, 2019, <https://www.rba.gov.au/publications/bulletin/2019/sep/the-changing-global-market-for-australian-coal.html>.
- 4 “Do Australia's greenhouse gas emissions account for more than 5% of the global total once exports are included, as Mike Cannon-Brookes says?” RMIT ABC Fact Check, November 19, 2019, <https://www.abc.net.au/news/2019-11-20/fact-check-australia-carbon-emissions-fossil-fuel-exports/11645670>.
- 5 “Lowy Institute Poll 2019: Climate change and energy,” Lowy Institute, <https://lowyinstitutepoll.lowyinstitute.org/themes/climate-change-and-energy/>.
- 6 Hanna, Emily, “Climate change—reducing Australia's emissions,” Parliament of Australia, Parliamentary Library Briefing Book, August 2016, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook45p/EmissionsReduction.
- 7 Hanna, Emily, “Climate change—a science overview,” Parliament of Australia, Parliamentary Library Briefing Book, August 2016, https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook45p/ClimateChange.
- 8 “About the Climate Solutions Fund – Emissions Reduction Fund,” Australian Government, Department of Industry, Science, Energy and Resources, accessed July 7, 2020, <https://publications.industry.gov.au/publications/climate-change/government/emissions-reduction-fund/about.html>.

Resources

Mineral and energy resources generate about 60% of Australia's exports,²³ with a combined value of A\$266.9 billion in 2018–19²⁴ and a workforce of nearly 256,000 in 2018.²⁵ Seven of the country's top 10 goods exports are mined or drilled: iron ore, coal, natural gas, gold, aluminum, crude petroleum, and copper ore.²⁶ A tripling of global commodity prices between 2004 and 2011²⁷ spurred a record A\$720 billion investment in the resources sector since 2005, in turn doubling employment in the sector between 2005 and 2018. By 2013, the sector had added an estimated 13% to household disposable income and 6% to real wages.²⁸

The sector has special geographic significance. More than half of its workforce is employed outside of major cities, in small communities and in remote rural and aboriginal regions, offering opportunities for training and highly-skilled, better-paying work. Surging investment in recent years has introduced advanced technology to production lines and supply chains and encouraged partnerships with government and university research centers.²⁹

Investment in the resource sector peaked in 2012 and has edged down since, but long-term prospects remain bright. In a June 2019 presentation to the Association of Mining and Exploration Companies, Reserve Bank of Australia head of economic analysis Alexandra Heath identified opportunities, stemming from Australia's efficient production and proximity to Asia, for long-term export growth in iron ore, coking coal, steel, and copper for construction; in thermal coal, oil, and gas for power generation; in gold; and in rare minerals, such as lithium and cobalt, that are essential for electronics and fuel cells.³⁰

Over the past decade, China has been an indispensable trading partner for Australia, in large part due to China's high demand for mineral resources (as well as agricultural products).³¹ Of Australia's total exports, the share going to China has hovered steadily around 30%

in recent years,³² amid China's financial deleveraging, slowing urbanization, and import substitution. More immediately, it had been feared that China's shutting down of businesses and industrial operations in response to the coronavirus would dampen imports of Australian coal, gas, and iron ore.³³ Recent reopening and signs of recovering demand in many areas of China suggest otherwise at the moment, but the possibility of a second wave remains. Over the longer term, Australia expects organic growth in the Indo-Pacific region—in particular India and Indonesia—to fill any gaps.³⁴

Agriculture

Australia's agricultural production is expected to reach \$60.6 billion for 2019–20, down 2.5% from A\$62.2 billion in 2018–19, according to Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) forecast data. That total breaks down into A\$28.3 billion for crops, and \$32.3 billion for livestock. The yearly decline represents a 6.7% drop in the gross value of crop production, in a third year of falling production amid drought conditions, against a 1.4% gain for livestock production as export demand rises.

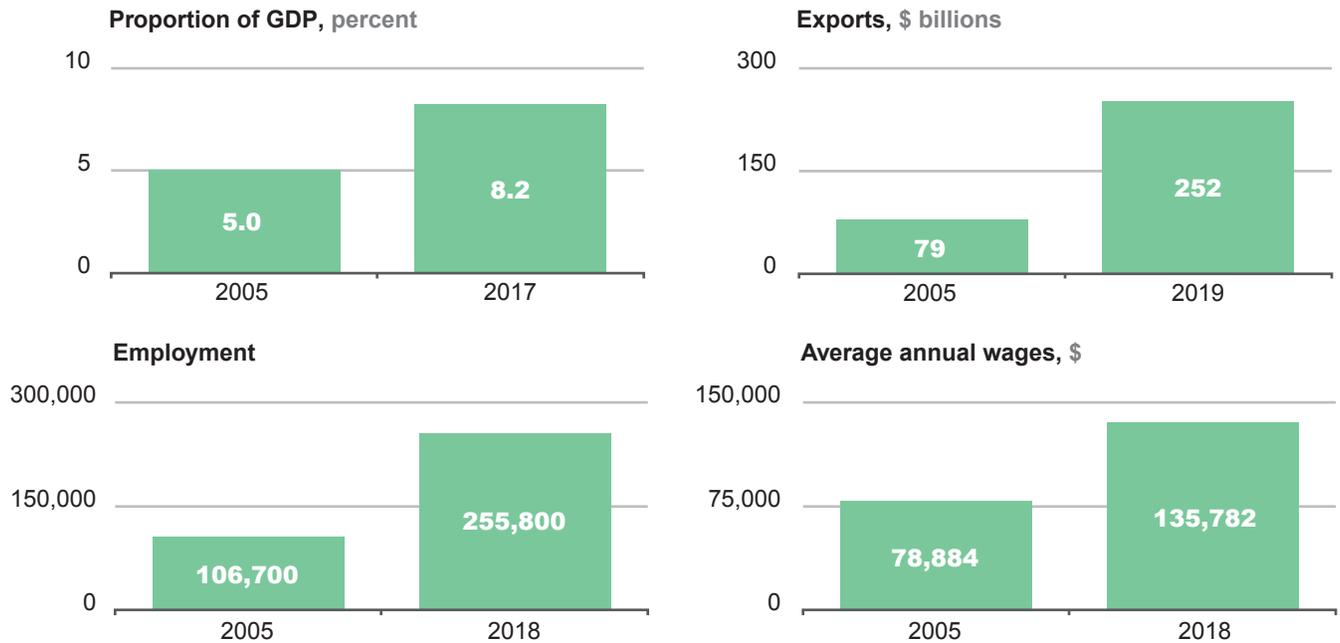
Export earnings are projected to total A\$44.7 billion, down 8.2% from \$48.7 billion in the previous year, with livestock product exports partly offsetting crop losses. Livestock is expected to account for 53% of total farm production for the first time in 30 years, as an outbreak of African swine fever across China and Southeast Asia has scaled back pork production and created protein shortages. A fall in national crop production has diverted grain from exports to meet domestic demand.³⁵

While Australia is historically prone to seasonal droughts, the current one is the most severe in more than a decade. Nationwide 2019–20 summer crop production and area planted are expected to fall by roughly half from a year earlier; winter crop production is expected to be flat with comparable area planted compared to 2018–19, but down by nearly half from the 2016–17 peak season.³⁶

EXHIBIT 3

A tripling of global commodity prices between 2004 and 2011 spurred a record A\$720 billion investment in the resources sector since 2005, in turn doubling employment in the sector between 2005 and 2018.

Australia's resources sector's contribution before and after the boom

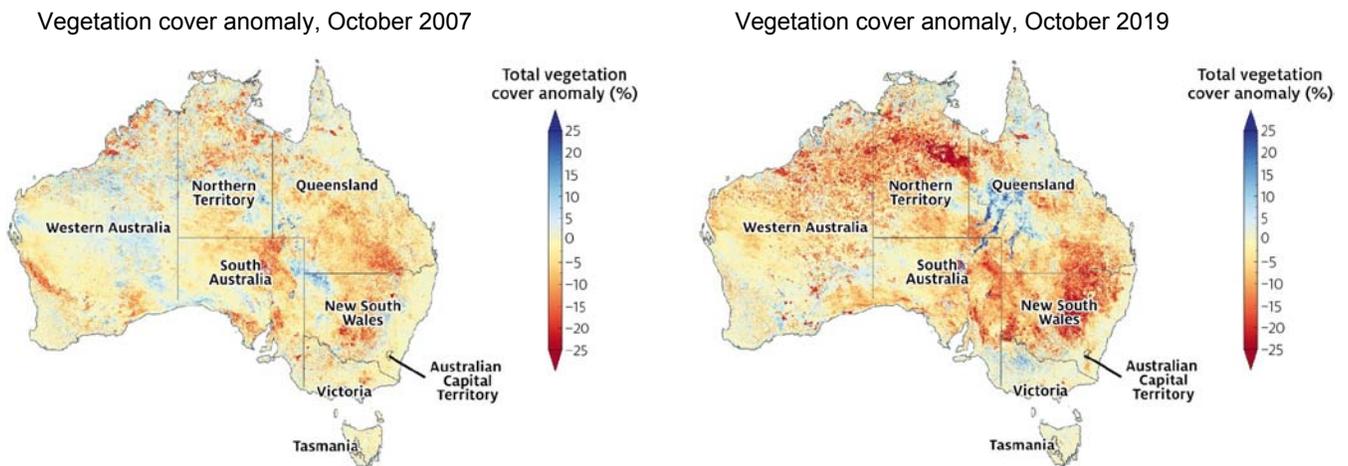


Source: Australia's Natural Resources Statement, February 2019

EXHIBIT 4

Australia's current seasonal drought is the most severe in more than a decade.

Relative level of vegetation cover over the Australian land mass, 2007 vs. 2019



Source: GEOGLAM RAPP

Source: GEOGLAM RAPP

Notes: Images reproduced as published by ABARES; zero on the scale signifies average vegetation cover.

Bushfires: The Heat is On

Australia is no stranger to bushfires; the country's annual fire season typically runs from December to March, Australian summer, usually peaking over January–February.

The first recorded bushfires in 1851, known as Black Thursday, burned more than 12 million acres and claimed the lives of 12 people and more than 1 million sheep. Later fires, the biggest in 1926, 1967, 1974–75, and 1983, have claimed hundreds of human lives, thousands of homes and structures, tens of thousands of livestock and wild animals, and tens of millions of acres, mostly in southeastern Australia.

Black Saturday, a series of 400 fires across Victoria in February 2009, the worst on record by death toll, killed 173 people and destroyed more than 2,000 homes, 11 million acres, and 12,000 head of livestock.¹

Australia has gotten progressively hotter and drier over the past two decades. Nine of the 10 hottest years on record have been posted since 2005; the tenth was in 1998. The mean temperature for the 10 years from 2010 to 2019 was the hottest on record, at 0.86°C above average, leading to the hottest day on record with a national area-averaged maximum temperature of 41.9°C (107.42°F) in December 2019.²

In 2019, Australia experienced its driest year on record, with rainfall 40% below normal.³ An unusually strong positive Indian Ocean Dipole (IOD), a meteorological imbalance of higher relative sea-surface temperatures in the western Indian Ocean, drew moisture from the east and brought deadly flooding to East Africa as it worsened Australia's persistent drought.⁴

Australia's fire season began earlier than usual, in September 2019. Conditions worsened by early November and only eased with a period of heavy rains in mid-January 2020.⁵ Fires spread quickly amid high temperatures and wind gusts, generating their own lightning and spreading embers to start new blazes.

As of March 2020, the death toll had reached an estimated 34, with 19 million hectares (46 million acres) burned and 2,779 homes destroyed.⁶ An estimated 820,000 hectares (2 million acres) of farmland were destroyed,⁷ affecting meat, dairy

and wool producers, fruit and sorghum crops, and wineries.⁸ It is estimated that more than 1 billion mammals, birds, and reptiles have been killed—including 800,000 in New South Wales alone—based on a previous study measuring animal populations affected by clearing of land for development.⁹

Insured losses from the fires total close to A\$1.9 billion (US\$1.3 billion), according to estimates from the Insurance Council of Australia.¹⁰ Australian fund manager AMP Capital estimates that the fires—and related health effects from smoke and ash—could subtract as much as 0.25% up to a worst case of 1% from GDP in 2020.¹¹

- 1 Stevens, Kylie, "A nation in flames: The shocking toll of summer brush fires in Australia," *Daily Mail*, December 30, 2019, <https://www.dailymail.co.uk/news/article-7838193/How-current-bushfire-crisis-compares-biggest-blazes-Australias-history.html>.
- 2 "Annual Climate Statement 2019," Australian Government, Bureau of Meteorology, January 9, 2020, <http://www.bom.gov.au/climate/current/annual/aus/>.
- 3 Klein, Alice, "2019 was Australia's hottest and driest year on record," *New Scientist*, January 8, 2020, <https://www.newscientist.com/article/2019-2019-was-australias-hottest-and-driest-year-on-record/>.
- 4 Uchoa, Pablo et al., "Indian Ocean Dipole: What is it and why is it linked to floods and bushfires?" *BBC News Science & Environment*, December 7, 2019, <https://www.bbc.com/news/science-environment-50602971>.
- 5 "2019–2020 Australian Bushfires," Center for Disaster Philanthropy, May 2020, <https://disasterphilanthropy.org/disaster/2019-australian-wildfires/>.
- 6 Bibby, Niel, "2019/20: Australia's worst fire season on record," *Asia Pacific Fire*, March 25, 2020, <https://apfmag.mdmublishing.com/2019-20-australias-worst-fire-season-on-record/>.
- 7 Kemp, Daniel, "Agricultural land comprises 14% of total area burned by Australian bushfires," *AgriInvestor*, January 17, 2020, <https://www.agriinvestor.com/agricultural-land-comprises-14-of-total-area-burned-by-australian-bushfires/>.
- 8 Lee, Heesu and Phoebe Sedgman, "Here's how wildfires will affect what Australians eat and wear," *Bloomberg*, January 11, 2020, <https://www.bloomberg.com/news/articles/2020-01-11/here-s-how-wildfires-will-impact-what-australians-eat-and-wear>.
- 9 "2019-20 Australian Bushfires," Center for Disaster Philanthropy, May 2020, <https://disasterphilanthropy.org/disaster/2019-australian-wildfires/>.
- 10 Sheehan, Matt, "Insured bushfire losses rise to AU \$1.9bn in latest estimates," *Reinsurance News*, February 14, 2020, <https://www.reinsurancene.ws/insured-bushfire-losses-rise-to-au-1-9bn-in-latest-estimates/>.
- 11 Oliver, Shane, "The Impact of the Australian Bushfires on Investors Worldwide," *AMP Capital*, February 2020, <https://www.ampcapital.com/americas/en/capital-edition/edition-5/the-impact-of-the-australian-bushfires-on-investors-worldwide>.

Drought has also had an indirect effect in the increase of input prices, such as for cereal and pasture hay, which reached a peak in August 2019, and for water.³⁷ Slowing global demand has contributed to a worldwide glut in dairy production and driven down wool and cotton prices. A December 2019 ABARES report estimates that climate change has reduced Australian cropping farms' revenue by A\$1.1 billion and eroded average annual profitability by 22% since 2000.³⁸

The 2019–20 federal budget includes a new A\$1 billion concessional loans package³⁹ and other assistance to drought-affected rural areas, including farm household allowances, financial counseling services, two-year interest-free loans for farmers and businesses, and funding for local capital projects.

Manufacturing

According to 2019 data compiled by The Australian Industry Group (Ai Group), a multi-industry trade association, manufacturing in Australia employs more than 900,000 people across 48,000 firms, produces A\$355.8 billion in revenue, 5.5% of the national GDP, and 25.8% of annual export earnings.⁴⁰ The manufacturing sector includes 9 principal industries:⁴¹

- food, beverage and tobacco;
- textiles, leather, clothing and footwear;
- wood products;
- pulp and paper;
- printing;
- chemicals (fertilizers, pesticides, pharmaceutical, cosmetics, photographic, etc.);
- metals and plastics;
- machinery and equipment; and
- furniture.

The sector has survived a number of direct challenges in the past decade, beginning with the 2008–09 global financial crisis and recession, including unfavorable exchange rates over 2010–2013; low-cost competition from Chinese exports; closure of Australia's entire domestic automotive sector in 2017, triggered by a 2014 General Motors-Holden decision to phase out

operations because of rising production and input costs;⁴² and, more recently, disruption to legacy industries from digitalization. Manufacturing rallied from 2016–2018,⁴³ but then edged downward in 2019, as reflected in the Australia purchasing managers' index, falling into contraction territory (below 50) in November and December.⁴⁴

Overall, manufacturing employment has fallen since the late 1980s, but the trend is believed to be finding a bottom with a change in Australia's mix of industries, products, and supply chains, plus long-term opportunities from Asia growth. In the near term, Ai Group sees the strongest growth concentrated in domestic consumer staples such as food, beverage, grocery and related processing and packaging businesses, as well as building materials, that are insulated from slower global demand. While exports have experienced volatility in the past five years, they have accounted for a growing share of manufacturers' sales.⁴⁵

Ai Group's annual business prospects survey, last conducted in October and November 2019, revealed that manufacturing CEOs were less optimistic heading into 2020 than in any year since 2015. With the two months of contraction in the sector in November and December, many manufacturers experienced a disappointing end to 2019. Their near-term concerns about growth inhibitors included "lack of customer demand," "competition from imports/internet sellers," and, to a lesser degree, skill shortages. In terms of business plans going forward, the most popular strategies indicated by manufacturing CEOs were focusing on improving sales of current products, introducing new products, and investing in both staff training and development and information and communication technologies (ICT).⁴⁶

Government research suggests that modernization is critical to Australian manufacturing competitiveness. Firms lack resilience to market volatility because they are not adequately investing in product improvement, diversifying product lines, or building flexibility into processes to adapt to changing conditions.⁴⁷ According to the Advanced Manufacturing Growth Centre, just 5% of companies account for 54% of the entire manufacturing sector's R&D spending, 94% of its capital spending, and

99% of its export value.⁴⁸ As a result, Australian firms can outperform the manufacturing industry average by as much as 20% during strong markets, but then underperform by 20% just as much during downturns.⁴⁹

Successive governments have put programs in place to help the sector modernize and innovate via financing, workforce skills development, small and mid-sized business (SME) assistance, startup funding, and more. At the core of these efforts are

- a A\$100 million Advanced Manufacturing Fund to invest in research, new technologies, emerging scientists and engineers, product testing, and business development;
- a A\$47.5 million Advanced Manufacturing Growth Fund focused on grants to help SMEs move up the value chain in manufacturing;⁵⁰
- a 3-year, A\$50 million Manufacturing Modernization Fund offering SMEs co-funding grants for capital investment in process and technology improvements, skills training, and job-creation;⁵¹ and

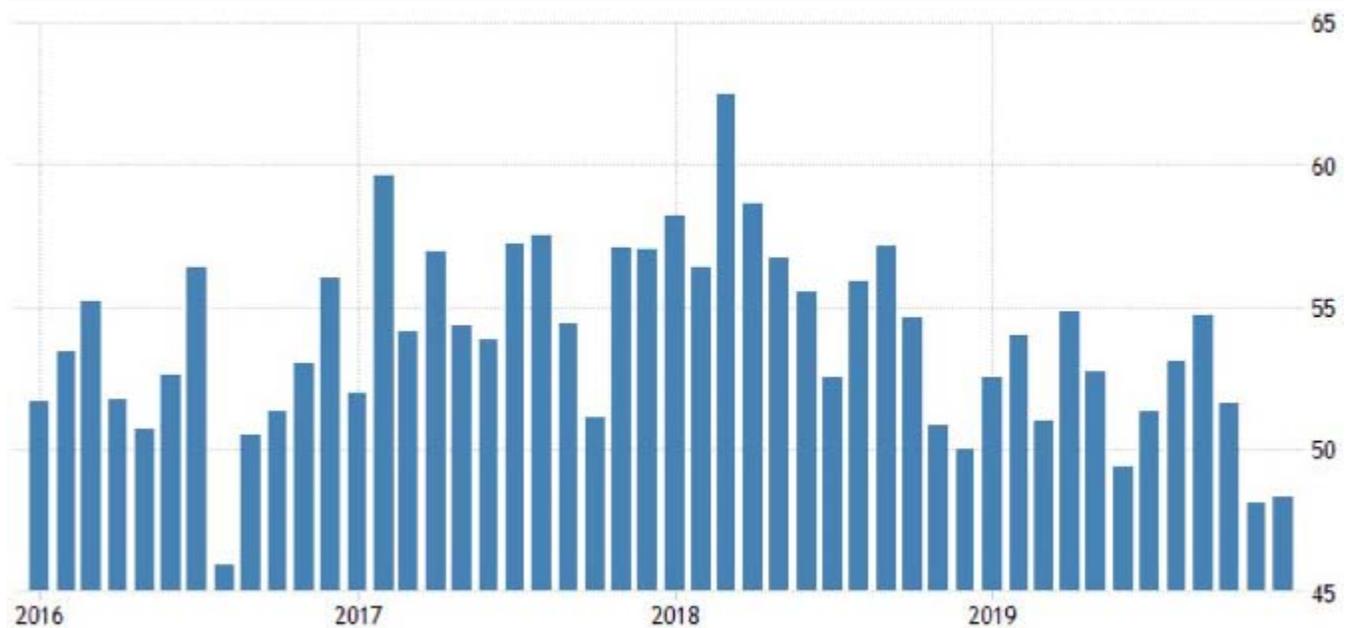
- the Sydney-based Advanced Manufacturing Growth Centre (AMGC), one of 6 sector-specific Industry Growth Centres across Australia focused on furthering collaboration and commercialization, international market access, management and workforce skills, and regulatory reform.⁵²

Small business owners, meanwhile, receive a A\$525 million package expanding instant asset write-offs and reallocating unused job training funds to employers and new workers, with a goal of creating 80,000 apprentice positions.⁵³ A A\$540 million Australian Business Growth Fund has been created to make equity investments in small and medium-sized businesses, filling a gap in the financing market alongside a A\$2 billion Australian Business Securitisation Fund through which the government helps to improve loan terms for SMEs by securitizing small business loans made by small and non-bank lenders.⁵⁴

EXHIBIT 5

Manufacturing rallied from 2016–2018 but then edged downward in 2019.

Australia Manufacturing Purchasing Managers Index 2016–2019, Composite Index Points (reading >50 signifies expansion)



Source: Trading Economics

EXHIBIT 6

Overall, manufacturing employment has fallen steadily since the late 1980s, but the trend may be finding a bottom with a change in Australia’s mix of industries, products, and supply chains, plus long-term opportunities from Asia growth.

Australia Manufacturing Employment and Projected Employment Trend, 1988–2023 (forecast)



Source: ABS, *Labour force Australia*, detailed quarterly, Feb. 2019; Department of Jobs and Small Business, *Employment Projections*, as published in *Australian Manufacturing in 2019*, p.7

Construction

The construction sector generates more than A\$360 billion in revenue and employs a workforce of more than 1.1 million which is projected to grow to 1.3 million by 2024. The sector is undergoing a transitional period as the workforce ages and retires, leaving a skills gap which traditional vocational education and training (VET) programs are scrambling to fill. That challenge comes amid a three-year job and housing market decline and a shift toward industrial and infrastructure projects which

require more advanced skills in areas like cloud-based management software, drones and robotics, building information modeling (BIM), prefabrication, and green construction.⁵⁵

The industry is bifurcated between a handful of large builders and the majority of firms, focused on the residential segment, with 20 or fewer employees. It can be difficult for these small-scale businesses to give their apprentices the full range of skilling opportunities needed to meet changing industry demand and regulatory requirements.⁵⁶

Australia's housing market, driven by Sydney and Melbourne, has been buffeted since 2014 as investor demand, cheap money, and easy credit caused overheating and drove up home prices.⁵⁷ Individual home buyers rushing to get in at the last minute often took on more debt than they could manage amid rising job insecurity and flat wage growth. Many owner-occupy buyers gave up looking amid mining and automotive layoffs and flat wages overall.

A 10% annual growth cap placed by Australian regulators on investor lending in 2014 was followed in 2017 by limits on the share of high-risk, interest-only loans a lender could hold in its mortgage portfolio. By then, such loans made up 40% of nationwide residential mortgage lending.⁵⁸ The growth cap was lifted in 2018, and bank lending standards relaxed in 2019. In addition, up to 10,000 first-time homebuyers annually became eligible for loan guarantees reducing their down payments to as little as 5%.⁵⁹ And a capital gains tax discount has been retained to protect owners of residential income properties in years when interest payments exceed rental income.⁶⁰ These steps, along with interest rate cuts by the Reserve Bank of Australia (RBA) in recent months, appear to be reviving the market.⁶¹

Middle-income tax cuts, implemented in July 2019, handed households earning A\$50,000–90,000 (US\$35,000–62,000) an extra A\$550–1,080 (US\$381–750) annually; adjustment of brackets and lower marginal rates for wealthier households are promised over 2022–24.⁶² The cuts are intended to boost consumer spending, but also to help ordinary Australians pay down mortgage and other debt. In Q3 2019, when the first refunds were paid out, they led to a near doubling of the household savings ratio to 4.8%, rather than an increase in discretionary spending.⁶³

On the engineering construction side, Canberra has pledged A\$100 billion in transportation infrastructure investment over 10 years⁶⁴ involving 130 major projects, half of them state or regional, to improve road safety, reduce urban congestion, and improve intercity connections, while generating an expected 85,000 jobs.⁶⁵ A newly-established National Water Grid Authority will administer A\$1.5 billion in water infrastructure grants and concessional loans to build and upgrade dams, improve regional water security,

build drought resilience, and meet growing population needs.⁶⁶ And a new A\$1 billion Grid Reliability Fund will provide a dedicated funding source for energy generation, storage, transmission, distribution, and grid stabilization projects,⁶⁷ including expansion of transmission capacity from hydroelectric generating stations as coal-fired plants are taken offline.

Banking and Finance

Australia's financial services sector contributes about A\$169 billion to its economy as measured by gross value added, which is equivalent to about 9.3% of the country's GDP in 2019.⁶⁸ The sector includes bank and non-bank lending, insurance, administration of employer-funded "superannuation" retirement accounts, investment brokerage, and wealth management. In 2019, it directly employed 439,700 people—up from 395,000 in 2015.⁶⁹ About half of these employees work in banking and funds management, roughly 20% work in insurance and superannuation, and the remaining 30% are in auxiliary services such as mortgage brokerage and trustee, investment management, or advisory services.⁷⁰

The Reserve Bank of Australia's semi-annual Financial Stability Review lays out several key trends affecting banking and financial services in 2019: stalled global demand; risks of political fallout from Hong Kong, Brexit, and US-China trade frictions; and monetary easing by central banks that has depressed bond yields, mispriced risk, and inflated asset prices. The result has been a drag on the domestic economy from job and economic insecurity, reflected in persistent weakness in consumer demand, household formation, business investment and, thus, borrowing. Among the hardest hit have been discretionary retailers, less diversified construction firms, and small businesses in areas affected by drought or fires.⁷¹

The "big four" banks (Commonwealth Bank of Australia, Westpac Banking Corporation, Australia and New Zealand Banking Group, and National Australia Bank)—which together hold a combined A\$1.4 trillion (US\$960 billion) in assets and a 75–80% market share,⁷² including more than 80% of nationwide residential mortgage business⁷³—are heavily invested in the domestic market, with international lending only 8% of total assets, down

from 10% in 2014. Their heaviest domestic exposure is in residential mortgages; personal debt, including credit cards, makes up only a small share of household credit in Australia relative to home lines of credit and no interest buy-now-pay-later arrangements for retail purchases. Non-bank lenders hold a relatively small market share, about 7% of total financial system assets, although their presence in mortgage and construction lending is growing.⁷⁴

Overall bank asset quality and profitability, while healthy, have softened in the past year from a rise in non-performing mortgages and small business loans. Reserve Bank of Australia (RBA) reports that while three quarters of mortgage debt is held by well-off households keeping up with payments, relaxed lending standards have left many owners “house-poor” with limited discretionary spending capacity, and in the Northern Territory and Western Australia, falling home prices are leaving owners with “underwater” mortgage debt that exceeds the sale value of their homes. Commercial property sector asset values and yields remain strong, although retail vacancy rates are high.⁷⁵ Business formation and investment have slowed.

Weak demand, falling interest rates, tightening regulation, and competition for market share have all cut into earnings,⁷⁶ at times incentivizing questionable practices. Findings from a two-year Royal Commission investigation of the banking and finance sector⁷⁷ have prompted calls for major regulatory reforms of banking practices, insurance and superannuation product offerings, fee structures, and incentive compensation. Over two years, the cost of customer remediation has reached nearly A\$8 billion, and the cost of restructuring has reached an estimated A\$587 million, as the major banks divest or demerge numerous businesses such as life and general insurance, financial advice, mortgage brokering, asset administration, and investment funds management.⁷⁸

Australia’s banking sector is also undergoing a transformation driven by changing demographics; new data analytics opportunities and cybersecurity risk from technology; a growing share of future business originating offshore, notably in Asia; and a

market environment of sustained slow growth.⁷⁹ Large incumbents will need to restore trust as they leverage natural advantages of scale, networks, and expertise to serve customers more efficiently in these new market realities.

Four large insurers hold a combined 70% share of the market for home, motor, travel, and mortgage insurance in Australia.⁸⁰ General insurers are well capitalized and profits so far remain healthy, but higher investment returns are under pressure from an increase in storm, flood, and fire claims, which the industry views as climate-change-related. Mortgage insurance for lenders has become a less profitable segment as tightened lending standards have cut into originations of high-risk mortgages requiring insurance, while claims for previously issued policies are on the rise. Intense market share competition has led to unsustainable long-term products and pricing for life insurance, especially involving disability income claims.

Superannuation, meanwhile, is undergoing major changes in regulation and supervision. A prohibition on borrowing by regulated funds reduces operating risk but that, plus planned fee limits and publicly posted performance measures, has prompted banks to begin exiting the segment.

Healthcare

Healthcare in Australia is provided under a single-payer Medicare system with care coordinated among federal, state/territory, and local governments and funded by a 2% levy on adjusted taxable income and a further 1–1.5% surcharge paid by wealthier households based on private insurance coverage.⁸¹ Medicare and the public hospital system provide free or low-cost access to most healthcare services, with private health insurance offering increased choice and elective procedures outside the public system.

Medicare has been Australia’s universal healthcare scheme since 1984, and is available to Australian and New Zealand citizens, permanent residents in Australia, and people from 10 other countries in Europe with reciprocal agreements. Medicare covers all of the

cost of public hospital services, plus some or all costs of services provided by GPs and medical specialists. A Pharmaceutical Benefits Scheme (PBS) negotiates lower-cost prescriptions on some 5,200 medicines and products; a Medicare Benefits Schedule (MBS) subsidizes services beyond a certain threshold of out-of-pocket costs. Private health insurance may cover either private hospital treatment; “extras” coverage for dental, vision, physical therapy or other such health services; or both. The government offers means-tested subsidies to cover a portion of private insurance in some cases.

Australia’s health system faces challenges similar to those found in other developed economies. Among them are increasing demand on services from an aging population;

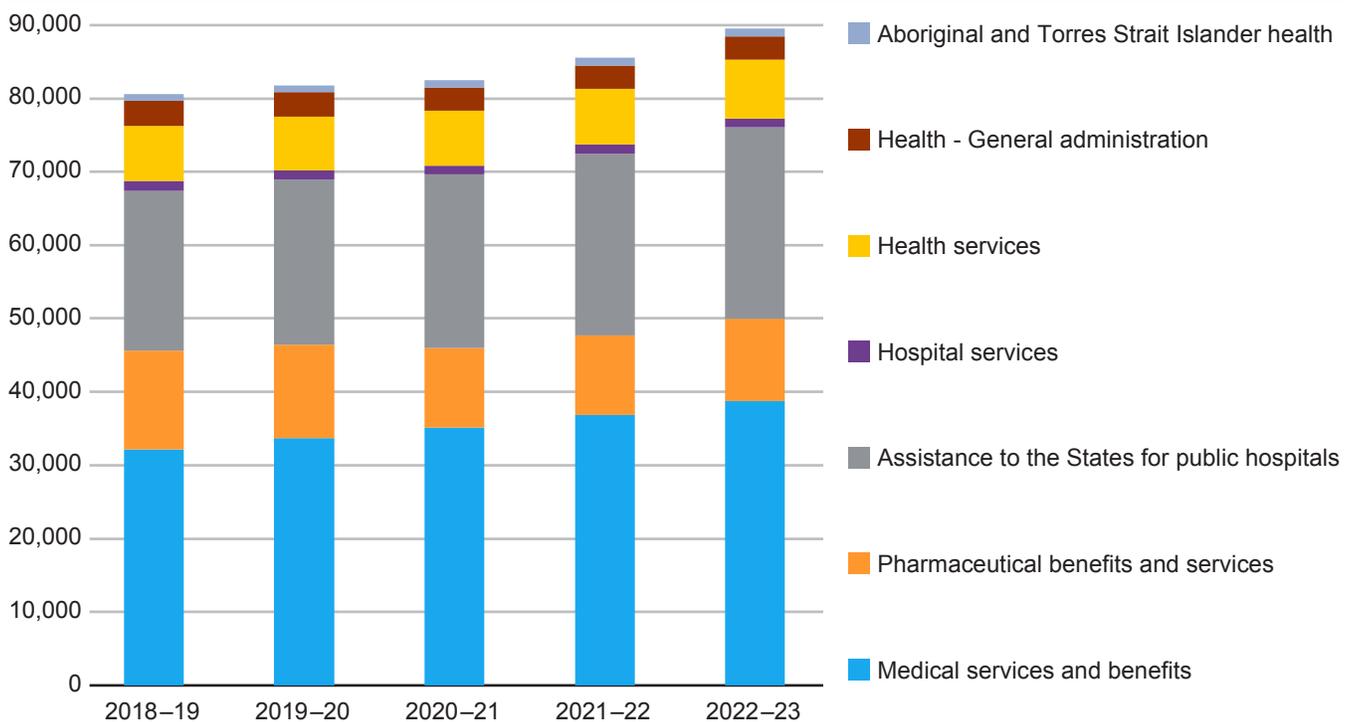
rising rates of chronic disease requiring more personalized services; and high R&D costs for new technologies, from genomic testing to robotic surgery to digital diagnostics, records management, and patient analytics.⁸²

In 2017–18, the most recent year for which full data are available, total public and private healthcare spending in Australia topped A\$185 billion, equivalent to nearly A\$7,500 per person and 10% of GDP. Adjusted for inflation, total health spending was up 1.2% from the previous year, less than the 3.9% average annual increase during the past decade. Two-thirds of the total was public spending—A\$77.1 billion from Canberra and A\$49.5 billion paid out by states and territories—with the remaining A\$58.8 billion spent by individuals and private insurance.⁸³

EXHIBIT 7

Federal healthcare spending for 2019–20 is estimated to be nearly \$82 billion, more than 16% of total federal government spending.

Estimated Australian Government Expenses for Health, A\$ millions, 2018–2023



Source: Australian Government, *Budget strategy and outlook: budget paper no. 1: 2019–20*, p. 5–19.

Source: Parliament of Australia, *Budget Review 2019–20*, April 2019

Federal healthcare spending for 2019–20 is estimated to be nearly A\$82 billion, more than 16% of total federal government spending. Health spending is expected to grow by 2% through fiscal 2022–23, led by increased assistance to states for public hospitals and medical services. On the plus side, changes to the Pharmaceutical Benefits Scheme (PBS) payment administration structure announced in the 2018–19 budget are expected to bring down spending on pharmaceutical benefits and services by nearly 19% from 2019–20 through 2022–23.⁸⁴ A funding package in the 2019–20 budget will increase funding for care of the elderly by A\$7 billion over five years to deliver home care services, develop a skilled aged-care

workforce, and improve the quality and safety of both home and residential care.⁸⁵

Healthcare and social assistance placed fourth among industry sectors in terms of job growth for 2019—behind professional and technical services, education and training, and administrative and support services—and included several of the leading job categories experiencing growth, among them pharmacists, clinical nurse educators, mental health technicians, midwives, and speech pathologists. The sector led in wage growth over 2019, at 3.2%, versus an average 2.2% for the overall economy.⁸⁶ That strength in part reflects a combination of pent-up demand and increased public spending on aged care.



2

Australia Strengthens Its Innovation System

Beginning in 2010, in the wake of the global financial crisis, Australia began a reassessment of its economy, aimed at diversifying GDP away from a heavy reliance on resources and agriculture by modernizing its manufacturing and services sectors and innovating in new technologies. This process has accelerated as slowing global demand, weaker commodity prices, trade uncertainty, and drought have brought added pressure to bear on traditional industries.

Australia has been both advantaged and disadvantaged by its wealth of natural resources. Among the 133 countries analyzed by the Atlas of Economic Complexity (AEC) developed by the Growth Lab at Harvard University, Australia ranks as the eighth richest economy per capita, with a 2018 per capita GDP of US\$57,395. The AEC analyzes countries' economic growth prospects by tracking global trade flows and measuring countries' industrial capabilities and knowhow along with their economic complexity in terms of the diversity of their export and import products. While Australia's national income nearly tripled between 1995 and 2018, its AEC Economic Complexity Index ranking during that same period fell from 55th to 87th.¹ Apart from education and tourism, the remaining eight of Australia's top ten exports are seven natural resources commodities (led by iron ore, coal, and natural gas) plus beef.²

The Growth Lab forecasts 2.5% annual growth in Australia's economy between 2018 and 2028 if current trends continue.³ Based on the understanding

that countries grow their economies by diversifying into new products of increasing complexity, it recommends both increasing the complexity of exports in established less-complex industries and building new markets in complex industries where a country's capabilities are already strong. In Australia, an example of the former is applying mine drilling and electrical power supply systems to other types of large infrastructure, and an example of the latter is building on the country's biotech strengths by creating new markets beyond the domestic healthcare system for innovative blood products, burn treatments, and digital health devices.⁴

An important catalyst for such a process is the commercialization of public and private research, often in collaboration. Faced with weakening commodity prices and declining resources investment in the past decade, successive governments in Australia have pledged to do more and are making gradual progress.

In a 2010–2017 series of Australian Innovation System (AIS) Report publications that culminated in the fully digital AIS Monitor (currently updated as of September 2020),⁵ Australia's Department of Industry, Science, Energy and Resources has monitored and evaluated innovation growth across the country's broad economy, based on uniform performance metrics. The AIS Monitor supports a broader work agenda on innovation measurement and policy development under the National Innovation and Science Agenda (NISA).

NISA was established in 2015 to foster a more entrepreneurial and innovative economy through strategic initiatives in four main areas—culture and capital, collaboration, talent and skills, and government. An independent advisory body, Innovation and Science Australia (ISA), coordinates science research and innovation policy across government and the economy.⁶ ISA issued a 2017 report on driving prosperity and innovation (Australia 2030: Prosperity through Innovation) and has followed up in 2020 with a Stimulating Business Investment in Innovation report outlining strategic recommendations for government and business.⁷

Australia takes a strongly business-focused policy approach to promoting innovation. The Department of Industry, Innovation and Science measures innovation through the activities of high-growth firms (HGFs), which are defined as businesses that experience rapid growth over a three-year period in terms of sales, hiring, and R&D.⁸ The levels of innovation activity by these firms, the extent of their public, private, and academic network collaborations, and the institutional and regulatory infrastructure for innovation and collaboration together define the innovation system.

A Snapshot of the Innovation System

Based on mainly on 2015–18 granular business data and survey findings, the Australian Innovation System Monitor has revealed the following.⁹

Innovation Activity

- Australia enjoys relatively high rates of innovation activity and entrepreneurship; nearly half of surveyed employers had introduced or were engaged in some innovation in 2018, with historically higher adoption rates in manufacturing, retail, and creative professions.
- Australian businesses typically modify innovations introduced by other domestic firms; roughly 75% of all innovation in goods and services introduced by Australian businesses is “new to the business only”; just 8.4% of innovation is “new to Australia or the world.” This type of innovation is appearing in the market from companies like Lendlease that have expanded recently into the Bay Area.
- Historically, more innovation activity has occurred in large businesses than in SMEs; in 2015–16, 77% of companies with 200+ employees self-identified as innovation-active.
- While access to business finance is not seen as a widespread problem in Australia, the most common barriers reported by firms undertaking innovation involved funding and a shortage of skilled workers. Government regulation, adherence to standards, and lack of access to knowledge or technology were not seen as significant problems.

Digital Innovation

- Nearly 90% of businesses use the internet for managing financial activities and working remotely; more than 40% use it for communicating, information-sharing, and training.
- Almost 82% of businesses use social media in their marketing, and nearly 72% use it to communicate with customers. More than a quarter use it for recruiting.
- Fewer than half of businesses rely on cloud computing, with software-as-a-service and storage the primary uses. The percentage of companies using cloud services increased with company size category, ranging from only 36% for microbusinesses (0–4 employees) to 76% for large businesses (200+ employees). Leading users by industry sector were information, media and telecommunications; professional, scientific and technical services; and finance and insurance services.
- Two-thirds of the surveyed companies reported no barriers to use of cloud computing; the remainder cited insufficient knowledge, cost, and security breach risk as limitations.
- Businesses rank mobile internet and high-speed broadband as the most important digital technologies they use, followed by cloud computing. Newer technologies such as intelligent software systems and data analytics still have single-digit penetration percentages.
- The surveyed businesses used information and communications technology (ICT) most extensively for accounting (67%), invoicing (61%), and human resources (48%); usage percentages increased with business size.

Entrepreneurship

- As of June 30, 2019, Australia’s construction industry had the highest number of businesses with almost 17% of total business operations. (The number of businesses in any industry indicates the market structure and level of competition, which in turn indicates how innovative businesses in that sector may be.) The transport, postal and warehousing industry had the highest growth rate, at nearly 8%. In terms of business exits and entries—which can be used as proxy indicators for the prevailing conditions for entrepreneurial activity, the industry sectors with the highest number of entries in 2018–19 were construction; transport, postal and warehousing; and professional, scientific and technical services. Between 2017–18 and 2019–20, the increase in business entries was only 0.3%, while the increase in business exits was 4.9%.
- In terms of entrepreneurial success, of the businesses entering the market in 2015–16, 78% were operating a year later, 63% were operating two years later, and 54% were operating after three years. Businesses in the financial services, healthcare and social assistance, and public administration and safety industries had the highest survival rates.

- On the metric indicating the extent to which new businesses are likely to create jobs, Australia performed well, with 28% of new Australian businesses expected to create at least six new jobs in the next five years, compared to the OECD average of 21%. Common barriers to entrepreneurship are a fear of failure and lack of access to capital.

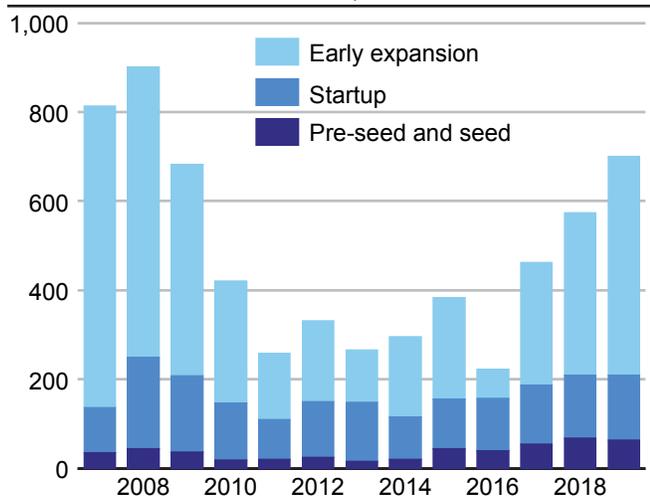
Startup Finance

- One in four young, innovative SMEs seek external finance, most commonly venture capital financing.
- The success rate of businesses applying for venture capital fell from 3% in 2005–06 to just above 1% in 2013–14. The principal driver was volatility in early expansion funding. Correspondingly, VC investment in Australia peaked in 2007–08 at A\$901 million, falling to A\$266 million in 2012–13. More recently, Australia’s venture capital investment has climbed back to A\$701 million in 2018–19, with 21% of funding going to startups.
- From a low point in 2012–13, pre-seed and seed funding deals more than tripled, from 49 to 166 in 2017–18, before falling to 125 deals in 2018–2019. Early expansion deals nearly tripled from 65 in 2012–13 to 172 in 2018–19, and start-up funding deals grew from 59 to 114 over the same period.

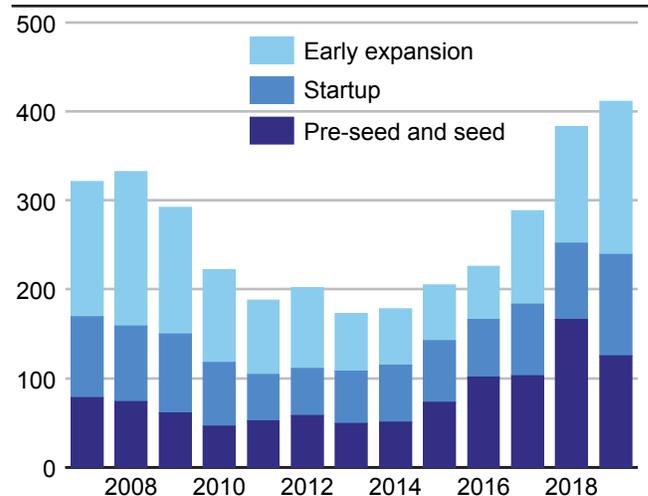
EXHIBIT 8

VC investment value and deal volume in Australia both reached low points in 2012–13, but have climbed back up since then.

Australia VC Investment Value, A\$ millions, 2007–2019



Australia VC Deal Volume, number of deals, 2007–2019



Source: Australian Bureau of Statistics, Venture Capital and Later Stage Private Equity, Australia, Cat. No. 5678.0

Visualization: Bay Area Council Economic Institute

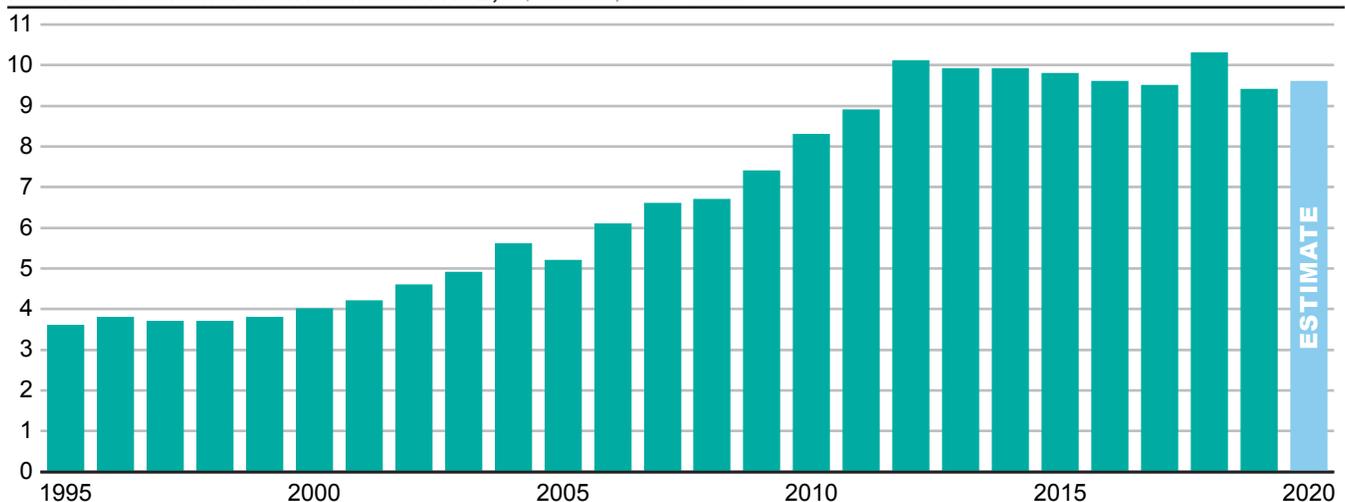
Research Spending and Output

- R&D-active Australian firms were three times more likely to introduce new-to-market goods and service innovations than non-R&D-active ones, according to the Australian Innovation System Report 2016.
- Business expenditure on research and development (BERD) currently accounts for nearly 53% of total R&D spending; manufacturing and professional, scientific and technical services are the largest contributing sectors.
- BERD peaked in 2014 at nearly A\$19 billion, then fell to under A\$17 billion in 2015–16 as mining and manufacturing stalled. Spending then rebounded to A\$17.4 billion in 2017–18, as FDI-related expenditure in information and computing sciences and engineering more than offset declines in resource-related R&D.
- Australian government spending on R&D increased steadily from the mid-1990s through 2012, nearly tripling from under A\$4 billion to more than A\$10 billion. It has held steady in the A\$9–10 billion range since 2012, peaking in 2017–18 at A\$10.3 billion and estimated to total A\$9.6 billion in 2019–20.
- According to September 2019 data, seven government programs account for more than 72% of total public R&D spending:
 1. Commonwealth Scientific and Industrial Research Organization (CSIRO) grants (7.7%),
 2. R&D tax measures that have displaced CSIRO funding over time (25.1%),
 3. Research block grants, largely to higher education institutions (18.9%),
 4. Australian Research Council grants (7.4%),
 5. Cooperative Research Centers (CRC) grants for industry-research community collaboration (1.56%),
 6. Funding support for rural R&D centers for agricultural research collaboration (3.05%), and
 7. National Health and Medical Research Council (NHMRC) funding (8.3%).
- Commonwealth R&D spending is typically accompanied by state and/or territory expenditures. The spending distribution has been roughly consistent for more than a decade, with Victoria, New South Wales, and Queensland the leading territories for government R&D spending.

EXHIBIT 9

Australian government R&D spending increased steadily from the mid-1990s through 2012, nearly tripling from under \$4 billion to more than \$10 billion.

Australian Government Investment in R&D, A\$ billions, 1995–2020

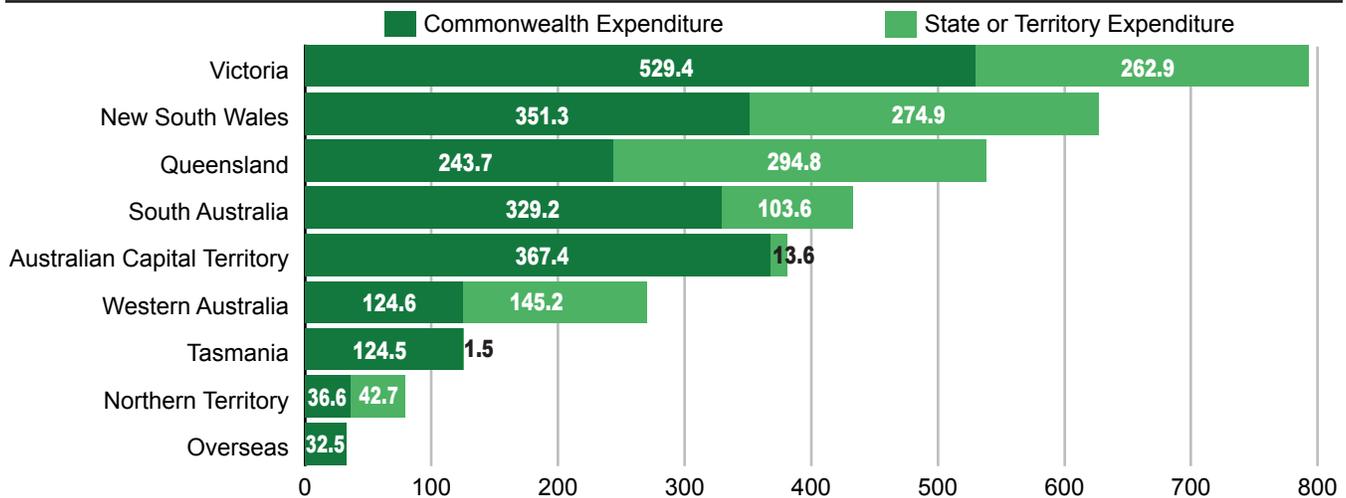


Source: Department of Industry Innovation and Science, Science Research and Innovation Budget Tables
 Visualization: Bay Area Council Economic Institute

EXHIBIT 10

Victoria, New South Wales, and Queensland have consistently been the leading territories for government R&D spending.

Australian Government R&D Spending by Source and Location, A\$ millions, 2016–17



Source: Australian Bureau of Statistics

Visualization: Bay Area Council Economic Institute

- Higher education R&D makes up more than 30% of Australia's total spending on R&D. Applied research to acquire new knowledge towards a specific aim or objective accounts for nearly half and has been rising in dollar value and share since 1994. Pure basic research, while increasing in dollar value, declined in share from 36% to 23% between 1994 and 2016.
- Nearly 60% of higher education R&D is concentrated in New South Wales and Victoria. Between the mid-1990s and 2016, the Queensland and Western Australia shares have been relatively consistent, with an average of 16.6% for Queensland and 9.2% for Western Australia. The Australian Capital Territory share has declined steadily from 14.7% in 1994 to 5.8% in 2016.

Innovation Connections

- The Australian Innovation System Monitor defines collaboration as "any arrangement where organizations work together for mutual benefit and share some of the technical and commercial risks." Its surveys suggest that one in five innovation-active businesses in Australia collaborates for purposes of innovation.
- The extent of collaboration varies by sector, with higher percentages found in information media and telecommunications, mining, administrative, arts, and financial sectors.
- Australian firms' collaboration on innovation is most commonly domestic—with customers or suppliers or among businesses owned by the same company. In 2016–17, fewer than 5% of innovation-active businesses collaborated with Australian universities; fewer than 2% collaborated with universities in other countries.
- Australian innovation-active businesses report relatively low rates of collaboration on R&D, with 9% of large innovation-active firms, 6% of mid-sized companies, and 3.5% of small businesses reporting joint R&D activity in 2017–18. Mining and professional, scientific and technical services had the highest rates of joint R&D activity.
- While data is inconclusive, co-patenting among Australian businesses and publicly-funded research organizations (PFROs) appears rare. Among patents that involved an Australian applicant in 2017, less than 2% involved collaboration, with the highest instances of business and PRFO collaboration occurring in the biotechnology, analysis of biological materials, and pharmaceuticals sectors.

- Licenses, options and assignments (LOAs) granted by Australian universities, medical research institutes and public research organizations to third parties, including businesses, grew by almost 13% between 2006 and 2016 (from 719 to 811), peaking in 2013 with 950 LOAs reported, according to data from the National Survey of Research Commercialization (NSRC).

Skills and Capability

- The educational attainment qualifications of Australian adults in 2019 were divided about equally among the University Degree, Certificate or Diploma, Year 12, and Year 11 or Below categories.
- In 2019, 82% of apprentices and trainees (non-academic qualifications) worked in just three fields: automotive and engineering (26.4%), construction (32.9%), and electrotechnology and telecommunications (22.7%). The number of apprentices working in three other occupations peaked in 2012 and then dropped to much lower levels in 2019, with sales assistants and salespersons falling from 39,747 to 11,735, specialist managers falling from 36,896 to 565, and office managers and program administrators falling from 31,936 to 3,089. Those drops were partly driven by changes to financial incentives under the Australian Apprenticeships Incentives Program, primarily affecting non-National Skills Need Lists apprenticeships and traineeships.

Innovation Capability

- Australia's number of private-sector R&D researchers, technicians, and support staff grew from 28,400 to 75,000 between 2000 and 2019, according to OECD data. From 2000 to 2016, higher education R&D personnel grew from 46,300 to 79,000. During the same period, government R&D personnel dropped from 18,200 to 14,800.
- Department of Industry, Innovation and Science data suggests that innovative companies are 4–8% more likely to export, while exporting companies are 7–10% more likely to be innovative. In 2016–17, 47.5% of Australian firms active in overseas markets were innovative, compared to the OECD average of 58.29%.

The Vision for Australia in 2030

In its Australia 2030: Prosperity through Innovation report,¹⁰ the Australian Government's Innovation and Science Australia (ISA) Board points to the country's aging population, the gradual decline in resources investment, and the need to "find new sources of growth and improve productivity to maintain our standard of living." It sees the strongest growth opportunities coming from "knowledge-intensive companies that innovate and export, as they are the most profitable, competitive and productive." As these companies pursue solutions to global problems at scale, ISA says, "they will make a substantial contribution to new jobs growth in Australia," through both direct employment and indirect job creation.

ISA cites McKinsey & Company data predicting that Australia will see a 6% shortfall in jobs by 2030 as generational retirement exceeds job displacement from automation. And while technology will create new jobs in STEM fields and in professional and technical services, an estimated 92% of new jobs will require digital skills; 45% will require an ability to configure and work confidently with digital systems. Beyond global competitiveness, technology innovation promises breakthroughs in areas such as precision medicine, energy, transportation, advanced materials, and disaster management, where Australia has both unique needs and capabilities.

Australia's 2030 Plan is a competitiveness strategy focused on developing digital technology skills and capabilities to drive productivity improvements in existing sectors, develop new global companies in innovative industries, and address key societal challenges such as improving health outcomes, increasing public safety, and decarbonizing the economy. Toward that end, it offers blueprints for accelerating Australia's performance in education, industry, government, research and development, and culture and ambition:

Education

- Upgrade the primary, secondary and vocational education systems to emphasize 21st century skills, strengthening teacher training and raising student ambition and achievement levels.

Industry

- Increase business R&D investment through better-targeted tax incentives and grants; increased export

promotion funding and taking full advantage of trade agreements; encouraging Industry 4.0 transformation to improve productivity and competitiveness; and expanded access to global talent pools.

Government

- Promote a more flexible, collaborative business regulatory framework across Commonwealth, state, territory, and local governments to foster innovation; encourage innovation investment that yields social as well as financial returns; make government data more open and accessible; leverage government procurement to spur innovation and raise SME participation in procurement to 33% by 2022; and digitalize government services to improve delivery and achieve cost savings.

Research and Development

- Build collaboration incentives into R&D tax credits; establish a stable long-term funding stream at the national level for R&D; prioritize commercialization capability in research; diversify the innovation R&D workforce by gender and across regions; and monitor and consult on availability of risk capital, mainly venture capital, to high-growth businesses.

Culture and Ambition

- Establish “National Missions,” large-scale public initiatives to address pressing societal challenges through innovation, beginning with a Genomics and Precision Medicine National Mission.

Government Support for Innovation

The 2015 National Innovation and Science Agenda committed A\$1.1 billion over four years for 24 measures in a national innovation strategy,¹¹ among them carry-forward tax offsets and 10-year capital gains tax exemptions on investments in early-stage innovation companies;¹² employee share schemes (ESS) offering up to 15 years of deferred taxes for startup employees paid in shares;¹³ tax offsets and relaxed rules for early-stage investors in innovative startups;¹⁴ “business innovation stream” and “investor stream” visas for entrepreneurs and investors;¹⁵ and the provision of A\$150 million per year (ongoing, indexed from July 1, 2017) to

support the operations of projects under the National Collaborative Research Infrastructure Strategy (NCRIS).

In 2016, the government announced a further commitment to NCRIS of A\$1.9 billion over 12 years, beginning in 2017, to develop and expand supercomputing capacity and other research infrastructure in nanofabrication, food production, health, environment, and sustainable cities.¹⁶ Under the Higher Education Support Act 2003 (HESA), the government has also committed nearly A\$1.2 billion in 2020 for higher education block grants for research support and training.¹⁷

Public-Private Collaboration

The Commonwealth has committed A\$250 million matched with A\$251.25 million in private sector capital for a total of A\$501.25 million in a Biomedical Translation Fund to commercialize biotech research,¹⁸ and its Business Research and Innovation Initiative (BRII) offers grants to SMEs that submit the best proposals for tech and process solutions for delivering government services in five selected challenge areas.¹⁹

In 2018, the CSIRO Innovation Fund that is managed by Main Sequence Ventures raised A\$232 million in investment in its first year. The CSIRO Innovation Fund was established as part of the National Innovation and Science Agenda to commercialize early-stage innovation.²⁰ Its portfolio of 20+ companies²¹ includes Internet-of-Things satellite low-cost connectivity company Myriota, telemedicine startup Coviui, precision agriculture analytics provider FluroSat, cybersecurity bot detection/defense firm Kasada, and San Francisco-based Clara Foods, a food technology company specializing in the manufacturing, engineering and formulation of real animal protein without the use of animals, starting with the world’s first chickenless egg proteins.²²

Through its network of six sector-specific centers—in advanced manufacturing; cybersecurity; food and agribusiness; medical technologies and pharmaceuticals; mining equipment, technology, and services; and energy resources—Australia’s Industry Growth Centres Initiative has been a catalyst for 150 public-private collaborative projects valued at a combined A\$135 million. Projects are focused on collaboration and commercialization, trade promotion, management and workforce skills development, and regulatory reform. The Centres

support and inform the design of multiple nationwide cluster programs, nodes, and hubs.²³

Cross-Border Opportunities

Two important incentives—the Research and Development Tax Incentive (R&DTI)²⁴ and the E-3 visa for specialty occupation professionals coming to the United States from Australia—a provision created by Congress in 2005 as an enhancement to the Australia-US Free Trade Agreement (AUSFTA)²⁵—offer unique opportunities for cross-border innovation and collaboration.

The R&DTI, targeted to SMEs, annually provides more than 13,000 companies refundable tax offsets ranging from 38.5%–43.5% for income years beginning July 1, 2016 or later and 40%–45% for income years beginning prior to July 1, 2016. The range of offsets depends on whether a company’s aggregated earnings exceed A\$20 million for a given year. Core R&D and supporting activities must aim to generate “new knowledge” toward developing or improving products, processes, or services.

Benefits extend to the first A\$100 million in R&D spending, with investment beyond that eligible for an offset at the company tax rate. To be eligible for the R&DTI, companies must be incorporated in Australia, incorporated abroad but residing in Australia for tax purposes, or incorporated in a country that has a double taxation agreement with Australia and maintains a permanent corporate presence in Australia.²⁶

The E-3 visa, which grew out of AUSFTA negotiations but was not included in the agreement itself, is a two-year residency visa for Australian professionals in specialty occupations.²⁷ The visa may be renewed every two years with no limit on the number of renewals in most cases. The visa is similar to the better-known H-1B visa for foreigners with special skills, but with several key advantages:²⁸

- The E-3 has a separate allocation of 10,500 visas, so applicants do not compete with workers from other countries in the H-1B pool.
- Spouses and children are eligible for visas which do not count toward the 10,500 cap, spouses are permitted to work in the US, and family members are not required to be Australian citizens.

- E-3 employers are not required to demonstrate either special needs or an inability to fill the position in question with a domestic worker, thus expediting the process.

The definition and related requirements for a “specialty occupation” are the same as for an H-1B visa, requiring a candidate to possess “highly specialized knowledge” in a particular field and, at minimum, a bachelor’s degree or equivalent experience in that area of expertise.

At present, about half of the E-3 visa quota goes unused. Efforts in 2018 and 2019 to pass legislation in Congress to enable 5,000 of the unused visas annually to be offered to Irish nationals have so far been blocked.²⁹ Australian officials have taken a dim view of the efforts to allocate the unused visas to Ireland and want to ensure that Australia retains access to the full quota of 10,500 visas.³⁰

Growing Innovation Through Immigration

Launched by the Australian government in late 2019, the Global Talent Independent (GTI) Program is an immigration strategy initiative designed to help grow Australia’s innovation and tech economies. The program provides an expedited visa pathway for highly skilled professionals in seven advanced industry sectors to work and live permanently in Australia and aims to create opportunities for Australians by transferring skills, promoting innovation, and creating jobs.³¹

To apply to the GTI Program, candidates must be highly skilled and internationally recognized in one of the following sectors: agtech, space and advanced manufacturing, fintech, energy and mining technology, medtech, cybersecurity, or quantum information, advanced digital, data science and ICT. In addition, a candidate must be able to command a salary that meets Australia’s Fair Work High Income Threshold (FWHIT) or be a highly-graded recent PhD or master’s degree graduate. A candidate who is accepted into the program is provided with a unique Global Talent identifier which enables that person to apply for a Distinguished Talent visa if he or she is nominated by an Australian citizen, an Australian permanent resident, an eligible New Zealand citizen, or an Australian organization with a national reputation in the candidate’s field.³²



3

Trade: An Evolving Value Proposition

Australia and the United States enjoyed more than A\$81 billion (US\$58.9 billion) in two-way annual trade in 2019,¹ and have made reciprocal investments totaling A\$1.8 trillion (US\$1.3 trillion).² The United States is Australia's third largest trading partner, second largest import source, and fourth largest export destination.³ The United States is Australia's largest foreign investor, accounting for 25.6% of Australia's inward foreign investment, almost A\$984 billion as of December 2019.⁴

More than 10,000 Australian firms sell to or operate in the United States.⁵ Australian companies directly employed 83,700 American workers at the end of 2017, and trade with Australia supports in total about 300,000 jobs in the United States.⁶ Australian companies representing 83 different industries currently operate in California.⁷ Some 1.3 million Australian tourists visited the United States in 2019, spending nearly US\$7.5 billion.⁸ Australia was the fourth largest origin country for visitors to California in 2018–19, with Australian visitors spending US\$952 million.⁹

Major US imports from Australia include beef, pharmaceuticals, optical and medical instruments, and machinery. Leading agricultural imports in 2018, in addition to beef, were wine and beer, tree nuts, essential oils, and beet and cane sugar. Top services imports were in the travel, transport, and financial services sectors.

Major US exports to Australia include machinery, passenger vehicles, optical and medical instruments, aircraft and parts, and electrical machinery. Major US agricultural exports include pork, dairy products, prepared foods, fresh fruit, and tree nuts. Leading service exports include tourism, financial services, and audio visual and other intellectual property-related services.

In 2019, the US goods trade surplus with Australia was US\$15.1 billion, up 4.14% from 2017, according to US Census Bureau foreign trade data.¹⁰ The Australian Government's Department of Foreign Affairs and Trade (DFAT) reports slightly different figures for Australia's merchandise trade with the United States, indicating a US goods trade surplus of A\$19.2 billion (US\$14.0 billion) for 2018–19. DFAT data also indicates a US services trade surplus with Australia of A\$7.6 billion (US\$5.6 billion) for 2018–2019. Total trade in goods and services for 2018–19 encompassed A\$24.7 billion in Australian exports to the US and A\$51.6 billion in imports from the US, for a A\$26.9 billion (US\$19.6 billion) US surplus.¹¹

The most recent US Commerce Department data available shows US exports of goods and services to Australia supporting an estimated 266,000 jobs in 2015—124,000 from goods exports and 142,000 supported by services exports.

US Trade Representative reporting of the most recent data available indicates sales of services in Australia by US majority-owned affiliates totaling more than US\$43 billion in 2016 and sales of services in the United States by Australia majority-owned firms amounting to nearly US\$15 billion.¹²

Trade between the United States and Australia is underpinned by the Australia-United States Free Trade Agreement (AUSFTA). More than 97% of Australia's non-agricultural exports to the United States are duty-free, and three quarters of agricultural tariff lines have been eliminated.¹³ Under AUSFTA, 99% of US manufactured industrial and consumer goods exports enter Australia duty-free, and there are no tariffs on 100% of US agricultural products.¹⁴ Australian companies also have access to the US\$535 billion US federal government procurement market and the government procurement markets of 31 US states.¹⁵ Since AUSFTA was enacted in 2005, US exports to Australia have grown by 130%.¹⁶ AUSFTA has not been without disputes during its 15 years in effect; a few notable examples include the following:

- Australian makers of generic drugs have complained that “patent linkage”—the AUSFTA regulatory process for introducing new generic substitutes for patented drug compounds—is unduly burdensome, with the practical effect of delaying for years and adding millions of dollars in legal costs to efforts to get new, less expensive pharmaceuticals to market.¹⁷
- A larger, related dispute involves drug “reference pricing,” the process by which a peer review panel had set “health innovation” price differentials between patented drugs and generic equivalents under Australia's Pharmaceutical Benefits Scheme (PBS). AUSFTA diluted reference pricing to the benefit of US drug makers—a sore point in domestic politics which spilled over into subsequent Trans-Pacific Partnership negotiations.¹⁸
- US firms, among them tobacco company Philip Morris and energy producers NuCoal and APR Energy, have complained about the lack of a formalized investor-state dispute settlement (ISDS) under AUSFTA to seek compensation from burdensome or costly regulations or rulings such as generic packaging requirements for tobacco, cancellation of licenses, or expropriation of assets.¹⁹

- Australian firms have complained that AUSFTA procurement rules strongly favor the United States by limiting their access to procurement markets in the United States reserved for US small businesses, while affording competitive advantages to US suppliers selling into the Australian market.²⁰

Australia found itself drawn into the recent US-China trade frictions in surprising ways—at times to its benefit. China, initiating public stimulus spending to dull the economic impacts of slowing trade, purchased roughly a third of Australia's exports in 2018–19, mainly iron ore and metallurgical coal, for heavy industry and construction. Supply cutbacks in iron ore from Brazil helped to create a 30% boost in overall Chinese purchases from Australia between early 2018 and mid-2019, and iron ore prices rose by 74% during the first half of 2019. At the same time, nervous Chinese investors also increased their asset allocations in gold, including Australian bullion, and Australian universities began to draw more Chinese students as an alternative to the United States. Opportunities for agricultural exports were limited by drought, however, while natural gas supplies were mostly locked into long-term supply contracts.²¹

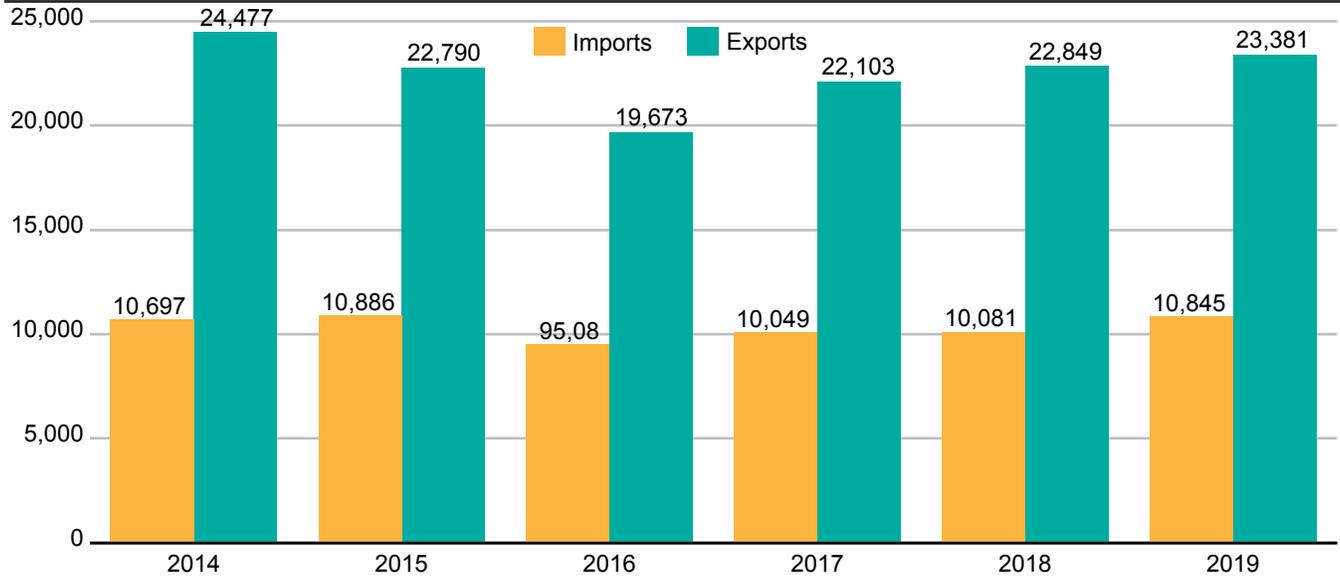
Australia was exempted in June 2018 from US 25% global tariffs on imported steel and 10% tariffs on aluminum.²² The United States is not a major buyer, however, accounting for only 0.8% of Australia's steel exports and 1.5% of its aluminum exports.²³

Tourism is an important services export to both the US and Australian economies. In 2018–19, 812,000 US travelers visited Australia, up 3.1% over the previous year's total, spending a combined A\$3.98 billion (US\$2.84 billion),²⁴ and staying an average 18 nights.²⁵ The United States is the leading long-haul country destination for Australian tourists, and California is the leading US state destination.²⁶ US National Trade and Tourism Office (NTTO) data compiled by Statista shows 1.32 million Australian visitors to the United States in 2019, down from a peak of 1.45 million in 2015 but otherwise consistent with levels seen since 2013.²⁷ The US International Trade Administration and NTTO pre-coronavirus forecast estimated that nearly 1.38 million Australian travelers would visit the United States in 2020.²⁸

EXHIBIT 11

The United States is Australia’s third largest trading partner, second largest import source and fourth largest export destination.

US–Australia Goods Trade, 2014–2019, US\$ millions



Source: US Census Bureau, US Trade Online

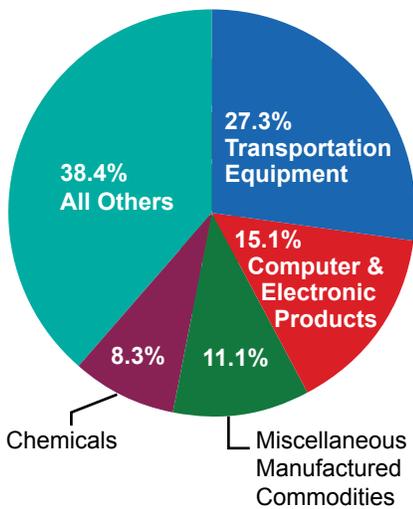
Compilation: Bay Area Council Economic Institute

Imports: Total value, all HS commodities; all districts. Exports: Total value, HS commodities; all districts.

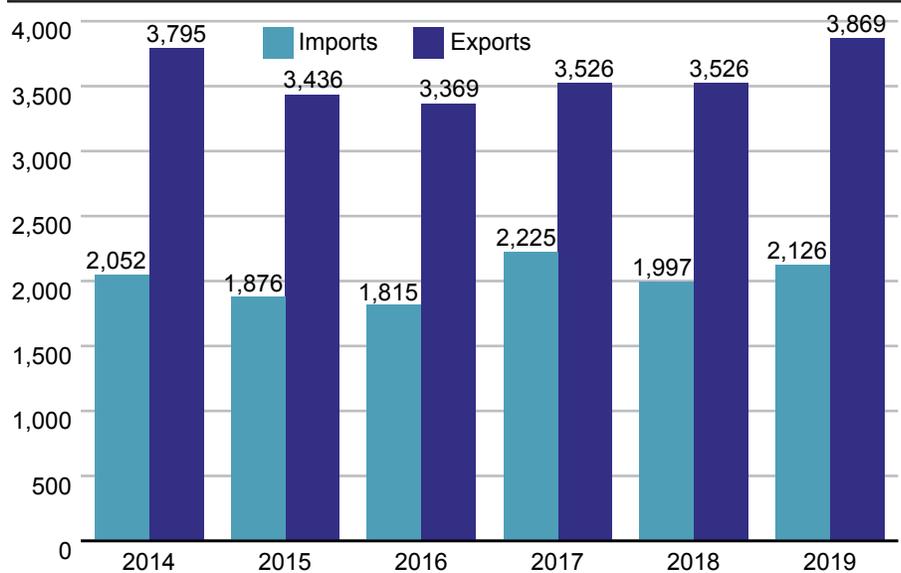
EXHIBIT 12

Australia was the 14th largest importer of California goods and services in 2019, while California was the leading US state exporting to Australia.

Exports from California to Australia 2019 NAICS Total All Merchandise



California–Australia Goods Trade, 2014–2019, US\$ millions



Source: CalChamber Advocacy for Exports graph; US Census Bureau, US Trade Online, compilation by Bay Area Council Economic Institute for Goods Trade graph. Imports: Total value, HS commodities; state of destination. Exports: Total value, HS commodities; state of origin.

California-Australia Trade

Australia was the 14th largest importer of California goods and services in 2019, while California was the leading US exporting state to Australia, with approximately US\$3.88 billion in combined goods and services. Transportation equipment accounted for the largest share of those exports at 27.3%, with computers and electronic products coming in second at 15.1%. Other top export categories include miscellaneous manufactured commodities at 11.1% and chemicals at 8.3% of the 2019 export total.

Top imports to California from Australia in 2019 were food manufactures at US\$814 million (38.3% of total imports from Australia), followed by primary metal manufactures at US\$292 million (13.7% of the total).²⁹

Retaliatory tariffs imposed by China on US\$110 billion of US goods in April 2018 resulted in an effective 93% tax on nearly \$1.4 billion worth of California wines, cutting exports by a third in the first half of 2019, with sales shifting to Australia and Chile under 26% tariffs.³⁰ Similarly, after China imposed a 50% retaliatory tariff on US almond exports,³¹ mainly from California, total US almond exports to China and Hong Kong declined by 33% year on year for the period from August 2018 to April 2019, according to the Almond Board of California.³² Australia, which grows almonds and enjoys zero tariffs under a free trade agreement with China, saw a 20-fold jump in almond exports to China from 2017–18 to 2018–19.³³

Australia ranked third among source countries for tourists to California in 2018,³⁴ with nearly US\$1.29 billion in visitor spending in 2019, projected (pre-coronavirus) to grow to more than US\$1.43 billion by 2023, according to Visit California, the state's public-private tourism promotion entity.³⁵ Average visitor spending by Australian travelers to California in 2018 was nearly 15% more than the average of all overseas visitors to the state, with average spending per trip at about US\$2,107 over an average nine-day stay visiting 3–4 destinations.³⁶ About 18% of travel groups from Australia include children; 73% of trips

are booked online, with strong growth in specialist travel agents offering niche experiences. Food and wine are key drivers of leisure travel; experiences are valued over shopping; "responsible" tourism and eco-tourism are growth trends. Before COVID-19 restrictions, travelers from Australia had access to 87 weekly nonstop flights and 28,000 nonstop seats to and from California through San Francisco and Los Angeles International Airports.

Visitor traffic from Australia slowed in 2019 as unemployment rose, wage growth and consumer spending softened, and the Australian dollar weakened against the US dollar. The United States remained the leading long-haul travel destination for Australians, but the Australian Bureau of Statistics reported that closer outbound tourism destinations including Japan, Indonesia, and India had gained in popularity.³⁷

Bay Area-Australia Trade

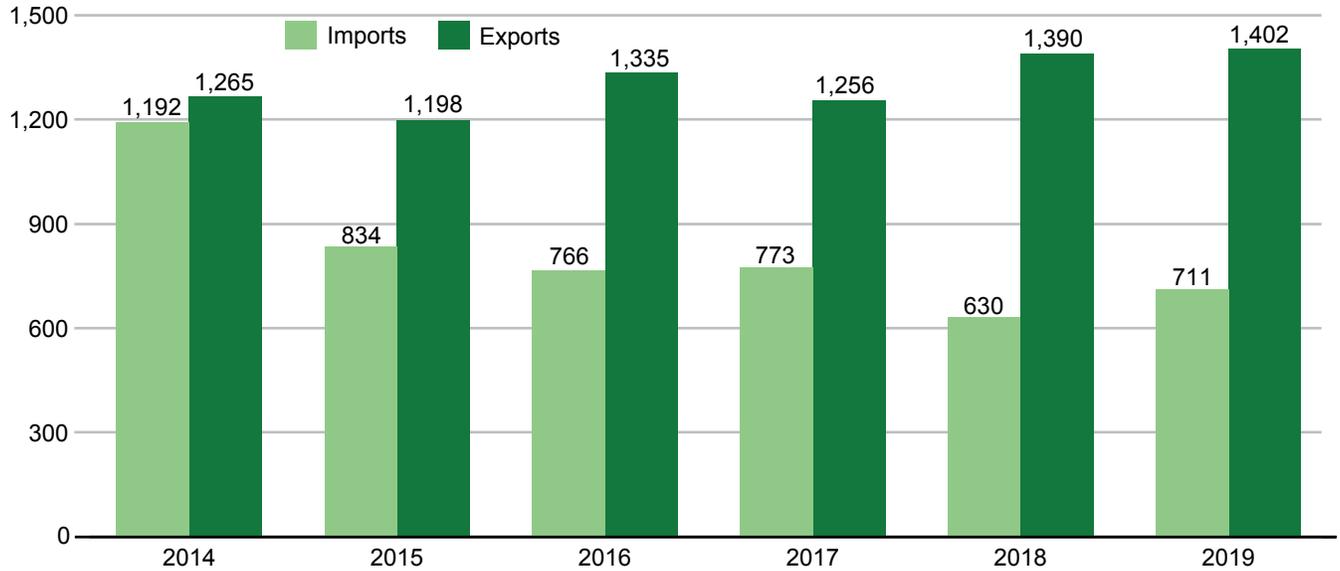
Bay Area trade is a measurement of the stated value on customs and export declaration forms filed by importers and exporters of record for goods entering and leaving the United States via harbors and airports in the San Francisco customs district, which extends from Monterey in the south to Eureka in the north and east to distribution centers in Reno, Nevada across the California state line.

While trade documents include fields requiring state of origin or destination information, it is impossible to determine whether an export shipment "originated"—was substantially manufactured—within the district, or whether an import shipment reached its final destination there. Totals may include, for example, transshipments to or from inland points by truck or rail, or shipments inspected and returned, or else packaged or assembled for re-export at foreign trade zones duty-free without ever officially entering the United States. Still, transshipment, storage, and handling adds value by generating longshore, trucking, and warehousing jobs in port districts, and the data is useful in highlighting relative growth trends in trade and business activity for a region.

EXHIBIT 13

Beginning in 2015, there has been a significant shift in the balance of trade from a Bay Area deficit to a surplus.

Bay Area–Australia Goods Trade, 2014–2019, US\$ millions



Source: US Census Bureau, US Trade Online

Compilation: Bay Area Council Economic Institute

Imports: All HS commodities, San Francisco district, country of origin/country of shipment. Exports: All HS commodities, San Francisco district, domestic origin/foreign transshipment.

EXHIBIT 14

The Bay Area’s major ports all run trade surpluses with Australia, while niche commodity ports emphasize bulk cargo imports and the smaller airports focus almost entirely on exports.

Australia Cargo Moving Into and Out of the Bay Area

Leading Imports

- Meat
- Fruits and nuts
- Sugar
- Beverages and spirits
- Mineral fuel oil
- Paper products
- Industrial machinery
- Computing, AV and electrical equipment
- Optical, scientific and medical instruments

Leading Exports

- Meat
- Dairy products
- Fruits and nuts
- Prepared foods
- Mineral fuel oil
- Aircraft/spacecraft
- Pharmaceuticals
- Vehicles
- Industrial machinery
- Computing, A/V and electrical equipment

Source: US Census Bureau, USA Trade Online

Compilation: Bay Area Council Economic Institute

Census data for the Bay Area suggests a relatively steady trend line for exports to Australia with a dip in 2017 and modest growth since. Imports, meanwhile, have steadily declined since 2011, except for a bump in 2017. The result has been a significant shift beginning in 2015 in the balance of trade from a Bay Area deficit to a surplus, with exports up 16% since 2011 and imports down 47%.

The broad decline in imports tracks flat overall US consumer and business demand, storm and drought impacts on Australian agriculture, and trade uncertainty around the imposition of blanket US tariffs on steel and aluminum in Australia (which was later exempted). Another factor depressing imports from Asia-Pacific ports through the Bay Area over 2015–16 was a West Coast longshore labor contract dispute,³⁸ which created short-term overflow congestion from Southern California ports, followed by longer-term diversion of cargo from Asia to other US coasts, Canada, and Mexico.

The dominant share of Australia cargo moving into and out of the San Francisco Customs District passed through the Port of Oakland (US\$1.1 billion total two-way trade in 2018), San Francisco International Airport (US\$866.1 million) and, to a lesser extent, the Port of San Francisco (US\$127.2 million) and Oakland International Airport (US\$70.1 million). Niche ports around San Francisco Bay handle specific commodity business such as sugar (Crockett); crude oil and petroleum products refined from coal (Richmond, Carquinez Strait); cement and grains (Stockton); aluminum ore and concentrates (Redwood City); and farm machinery (Fresno). San Jose and Sacramento International Airports move high-value shipments of agricultural commodities and food products, pharmaceuticals, and optical/medical instruments. The region's major ports all run trade surpluses with Australia, while niche commodity ports emphasize bulk cargo imports and the smaller airports focus almost entirely on exports.



4

Foreign Direct Investment: A Busy Two-Way Street

The United States is both the leading foreign country investor in Australia and Australia's largest investment destination, with the total value of two-way US-Australia investment reaching A\$1.8 trillion (US\$1.3 trillion) in 2019.¹ Since the Australia-United States Free Trade Agreement came into force in 2005, two-way investment has increased by more than 150%.²

US investment in Australia totaled almost A\$984 billion in 2019, of which more than A\$200 billion is foreign direct investment (FDI) in developed or acquired assets such as property and facilities. Australian investment in the United States totaled A\$837 billion, of which more than A\$300 billion is in the form of FDI. The most common type of investment in both directions has been portfolio investment in non-controlling shares in companies.

The US share of all foreign investment into Australia is 82% in the information sector, 50% in education, and 49% in the manufacturing sector. The United States accounts for more than 26% of total foreign investment in Australia, and is the destination for 28% of Australia's outward investment.³ In 2018 (the latest year of available US data), 1,101 majority-owned foreign affiliates of US multinational enterprises employed a workforce of nearly 325,000 in Australia,⁴ compared to a reported 2,039 firms employing nearly 273,000 in FY2014–15,⁵ suggesting

a shift toward larger investments by fewer companies. Around 1,200 Australian companies are active in the United States, 12% of them with assets or earnings exceeding US\$20 million.⁶

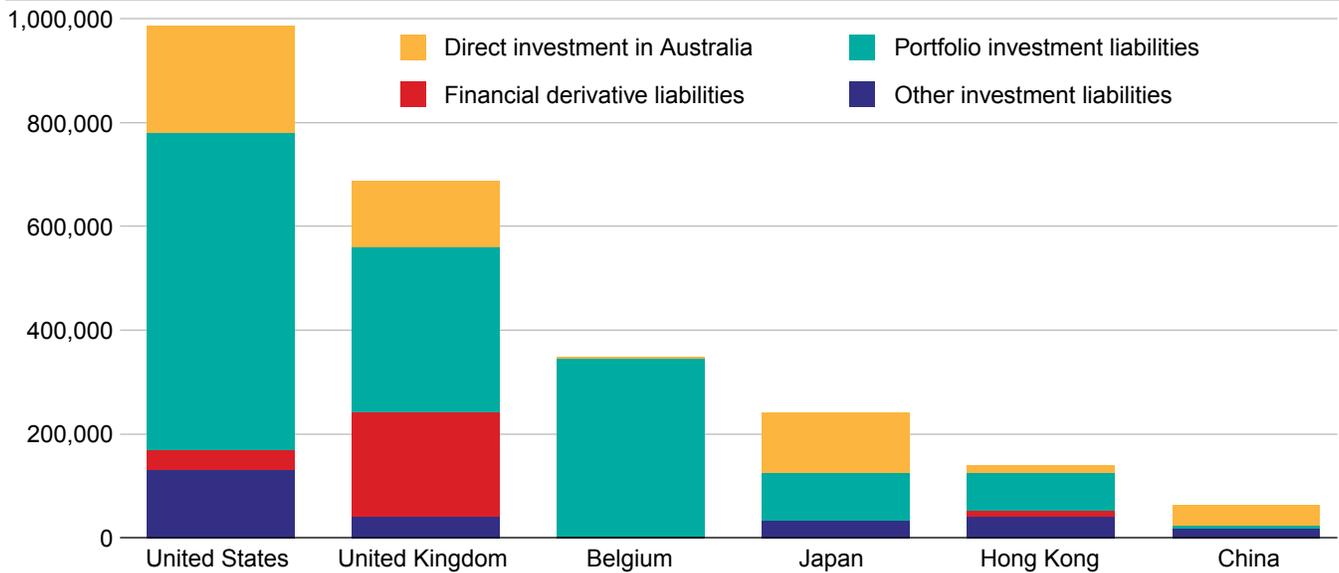
As of 2018, the majority of foreign direct investment into Australia has gone into three industry sectors: the mining industry received more than 37%, while manufacturing and the financial and insurance activities sector received about 11% each. The same three sectors were also the top destinations for Australia's direct investment abroad, but with a more even distribution: financial and insurance activities received slightly more than 24%, mining received more than 21%, and manufacturing received a little less than 21%.⁷

Despite Australia's relatively small market size of 25.6 million people,⁸ its broad natural resource base, high-performing services and technology sectors, higher education system, and proximity to Asia make it a draw for investors. Key to this investment is the potential for new technology solutions to help improve productivity, upgrade workforce skills, and increase global competitiveness in key industry verticals: mining, manufacturing, agriculture, banking, aerospace, and healthcare.

EXHIBIT 15

US investment in Australia totaled A\$984 billion in 2019, of which more than A\$200 billion is foreign direct investment (FDI).

Foreign Direct Investment in Australia, 2019, A\$ millions

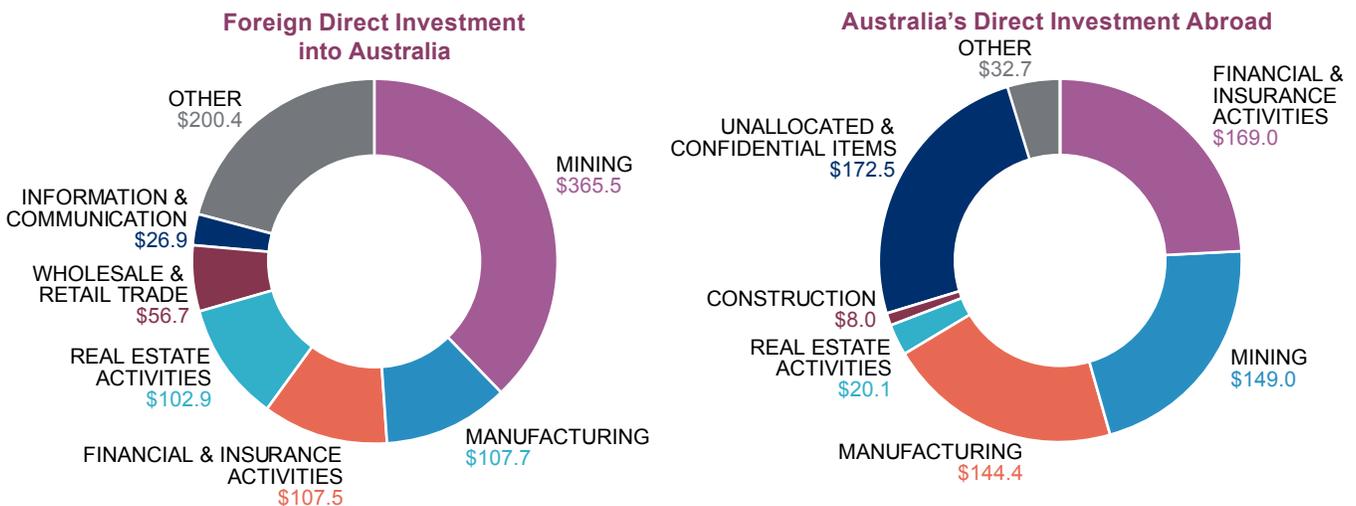


Source: United States Studies Centre, University of Sydney, using Australian Bureau of Statistics data Adaptation: Bay Area Economic Institute

EXHIBIT 16

The mining, manufacturing, and financial and insurance activities sectors have been the leading destinations for both total FDI into Australia and Australia’s outbound investment abroad.

Australia’s Inbound and Outbound Foreign Direct Investment by Industry Sector at Year End 2018, A\$ billions



Source: Australian Bureau of Statistics in "Trade and Investment at a Glance 2020"

In addition, the changing dynamics of US-China relations—and regional uncertainty following the 2017 US withdrawal from the Trans-Pacific Partnership—have focused new attention on Australia as a strategic innovation platform for serving Asia-Pacific markets. Bay Area companies see Australia, with its world-class higher education system, coupled with robust vocational training, as a valuable source of global talent in innovation industries such as AI and quantum computing, advanced manufacturing, cybersecurity, biotech, fintech, edtech, and agritech. Other assets include a common language and business culture, with full legal and intellectual property protections.⁹ The 18-hour time difference favors the US West Coast in permitting same-business-day communications.

“Investors will be looking for technology that improves productivity, has familiar non-Chinese supply chains, and solves for issues raised by COVID. AI, robotics, and financial facilitators that disrupt traditional financial services will be drivers. Healthcare and defense/aerospace technology should also see exceptional growth. Across industries, the focus on investment in productivity-enhancing technology and infrastructure is also growing. This is where Silicon Valley can play a big role.”

Joe Hockey

Founding Partner and President, Bondi Partners
Australian Ambassador to the US, 2016–2020

Navigating the Obstacles

Operating in the Australia market is not without challenges:¹⁰

- Labor costs are high, even for relatively low-skilled jobs, and worker protections regarding hiring, firing, hours, and leave limit flexibility and add to costs.
- Corporate tax rates of 26–30% depending on company size and how their income is derived, while lower than in the past, still exceed marginal rates in many developed countries.
- Housing prices in the most desirable corporate locations, Sydney and Melbourne, have risen sharply as a slowing economy has encouraged urbanization and concentrated population.

- Local government tax, zoning, and other regulatory policies, as in the United States and elsewhere, can be less business-friendly than national investment policies suggest.
- Replacement of the 457 temporary skilled worker visa with the Temporary Skills Shortage (TSS) 482 visa has eliminated some 200 eligible occupations, making it more difficult for foreign firms to relocate temporary managers and specialized workers. Reform measures have also attached conditions on more than 100 other occupations and have restricted movement between regions and tasks performed within a job category. And the Skilling Australians Fund (SAF) Bill for job training introduced a levy of A\$1,200–5,000 (depending on a firm’s annual revenues) on businesses wanting to sponsor overseas skilled workers.¹¹

US-Australia FDI

Boeing provides a good example of how leading US companies are partnering with and investing in Australia on R&D and technology innovation. With an active presence in Silicon Valley including the headquarters of its subsidiary Liquid Robotics, which makes the unmanned ocean robot Wave Glider, the company is also active in Australia, with approximately 4,000 employees focusing on a portfolio of defense systems, commercial aircraft components manufacturing, training and services, and unmanned systems. Its innovation infrastructure includes internal and external customers and suppliers, a commitment to research and development, and 13 university partnerships. Boeing invested \$A73 million in its Australian R&D activities in 2019 in fields ranging from modeling and simulation to autonomous systems, structures and advanced composites, mission systems technology, and augmented/virtual reality.

One outcome of its focus on autonomous innovation is the Loyal Wingman program for the Royal Australian Air Force, which will serve as a foundation for the Boeing Airpower Teaming System. Designed by Boeing Australia, it represents the company’s largest investment in a new unmanned aircraft program outside the United States. The aircraft will complement and extend airborne missions by smart teaming with existing military

aircraft, using artificial intelligence to fly independently or in support of manned aircraft.¹²

Bechtel Corp., until recently based in San Francisco, has had a footprint in Australia since 1954 and has been deeply involved in projects in mining, LNG (liquefied natural gas) production, power stations, and telecommunications infrastructure.¹³ Among these were the A\$11 billion Curtis Island LNG facility near Gladstone, off the coast of Queensland, a six-year global design and construction project completed in 2016 and Bechtel's largest since its founding in 1898. Curtis Island, in addition to delivering 25 million tons of LNG annually—about 8% of global production—in the course of development paid A\$1.5 billion in wages to Gladstone residents, hired and trained 436 apprentices, employed more than 500 Aboriginal and Torres Strait Islanders, and awarded more than 40 subcontracts totaling A\$350 million to local businesses.¹⁴

Bechtel was also selected by Chevron Corporation to provide the engineering, procurement and construction management (EPCM) services for the downstream facilities portion of its Wheatstone LNG project on the Pilbara coast of Western Australia.¹⁵ Other resource-related projects have included the Caval Ridge coal mine in central Queensland for BHP Billiton Mitsubishi Alliance (BMA), and A\$1.6 billion in expansion projects to double capacity at Port Waratah's Kooragang Island coal terminal in New South Wales.¹⁶

Bechtel is a partner in Australia's largest-ever public transportation project that is currently midway through construction of twin 15.5-kilometer (9.6-mile) tunnels at depths of up to 40 meters under Sydney harbor and the building of six city center stations for the Sydney Metro, which will comprise 66 km of railways and 31 metro stations by 2024. Excavated tunneling material will be used for runway development in another Bechtel project,¹⁷ the A\$5.3 billion Western Sydney Airport.¹⁸ In November 2019, Bechtel opened a Melbourne office to position itself as a bidder for some A\$100 billion in upcoming infrastructure projects throughout the Victoria region.¹⁹

A number of well-known Bay Area firms have also established presences in Australia.

San Ramon-based Chevron Corporation has also had a footprint in Australia for more than 60 years, having entered Western Australia through the purchase of Caltex in 1952.²⁰ The company has been a major contributor to Western Australia's emergence as a global leader in LNG.²¹ Chevron currently leads a combined investment of more than A\$80 billion in the Gorgon and Wheatstone natural gas projects, representing the largest single investment by a company in Australia's history.²² In addition to its operation of the Gorgon and Wheatstone projects, Chevron is an equal one-sixth foundation participant in the North West Shelf Project, which supplies domestic pipeline gas to customers in Western Australia and LNG cargoes to Japan;²³ operates Australia's largest onshore oilfield on Barrow Island; and is a major investor in exploration.²⁴

Capitalizing on Sydney's creative workforce, Industrial Light & Magic (ILM) opened its newest studio in the city in July 2019. Offering a complete slate of visual effects services, the studio works in conjunction with ILM's other global studios in San Francisco, Singapore, London, and Vancouver.²⁵ Growing Bay Area companies with a presence in the Australia market include Slack, which operates one of its 17 global offices in Sydney,²⁶ and Stripe, which established its first teams based in the Asia-Pacific region in Melbourne and Sydney in 2014.²⁷

Cisco Systems: Getting Research to Market

Data network and cloud computing services firm Cisco Systems entered the Australia market in the mid-1990s, with an initial focus on building data networking and IT capability within government at all levels and within large firms in mostly legacy industries.

The market has grown considerably since. "Australia is among the top ten revenue contributors for Cisco worldwide, which for a country of 25 million people says something important about the Australian people and the nation's economy," says Tim Fawcett, Director of Government Affairs for Cisco Australia-New Zealand. Of particular importance for Cisco in earlier years, he adds, were policy changes which furthered the heavily IT-dependent scaling and globalization of manufacturing and financial services.

Today, Cisco has an estimated 1,000 employees in Australia, including roughly 400 of its most experienced systems engineers in St Leonards (outside Sydney) at its Technical Assistance Center (TAC), one of three such centers worldwide, that covers the Asia-Pacific region in a 24-hour “follow the sun” customer support network.

Cisco has also invested A\$15 million (US\$9.5 million) in two innovation centers, in Sydney and Perth, that bring together startups, industry experts, developers, and researchers in an open collaboration environment. It also has presences in all regional capital cities except Darwin in the Northern Territory.

The innovation centers, like Cisco’s investments in education and vocational training partnerships with leading universities and private technical colleges, reflect a strategic priority of building a world-class Australian research base and tech workforce emphasizing commercialization of applied research.

“US institutions and companies are experts at commercialization of research,” Fawcett says. “It’s an area of constant frustration in Australia that we do a lot of research well, but there’s not a lot of commercialization of that research. The issue isn’t capital; it’s something deeper, something cultural.” The answer, he suggests, lies in more market-focused applied research and heightened public-private R&D collaboration.

The Sydney innovation center partners with the New South Wales Department of Primary Industries, agriculture trade group New South Wales Farmers, University of New South Wales, and the Commonwealth Scientific and Industrial Research Organization (CSIRO) Data61 data science research arm to promote IoT commercialization in agriculture, transportation, and smart cities.

The Perth center is a collaboration with Curtin University, natural gas producer Woodside Energy, and CSIRO Data61 to develop cloud computing, analytics, and IoT networking solutions for small and mid-sized businesses. In particular, Woodside has been a collaboration partner in developing IoT monitoring and predictive analytics for its plants and equipment in extreme environmental conditions. Mining firm BHP Billiton is also a partner,

with support from Cisco’s Country Digital Acceleration (CDA) fund.

Perth offers a new shared innovation center model for Cisco, in which Curtin provides facilities, Cisco provides equipment and technology, and they together share governance. Data61 shares research and input on projects. “Cisco has the envy of many in our industry for its partner and reseller relationships,” Fawcett explains, “but we lacked non-sale partners like universities and other research institutions. It’s an area where we came to realize we could get much more accomplished than if we were just doing everything by ourselves.”

A CDA investment of A\$500,000 established a Cyber Security skills program at Victoria University, with a 12-month certification program in network security that Fawcett says is in high demand and where “we’re seeing hairstylists become cybersecurity experts.” Cisco has relationships with 25 of Australia’s 36 leading universities and is in discussions with the remaining 11. Through its Cisco Networking Academy, the company has provided vocational training to 20,000 students annually since 2015, in partnership with various colleges and universities, but mainly with the 130-campus Technical and Further Education (TAFE) network of vocational schools. Graduates receive a Cisco data networking certification that has become standard within the industry; more than 80% of graduates go on to entry-level jobs in the field or further education.

A broader smart cities initiative launched in Adelaide in 2015 has seen its research focus narrowed in recent years to center on smart transportation—most notably autonomous public transit rideshare options, transit safety and, more generally, urban deployment of IoT. “The whole concept of smart cities is fading a bit,” Fawcett acknowledges. “It’s easy to say, but much harder to do. The economics and the day-to-day deployment have a lot longer timeline than you might expect.”

Cisco has invested, along with semiconductor maker NXP, in Adelaide-based Cohda Wireless, a developer of Wi-Fi car-to-car (C2C) and car-to-infrastructure (C2I) communications for safety systems, including its 360-degree V2X-Locate radar system that can sense other vehicles approaching around corners. Cadillac and Volkswagen are initial customers.²⁸

Cisco has also invested A\$1 million in an Adelaide connected roadways pilot project with partners Data#3, QuantumIT, SQLstream, Quanergy, Astrata, and Bartco Visual Information Systems,²⁹ and in C2C and C2I trials in Adelaide and Melbourne with Cohda. It partners with the University of Melbourne to conduct research utilizing the university's 5 km transport test bed street grid, one of the largest such facilities in Australia. Collaboration with wireless provider Telstra since 2008³⁰ on communications and network solutions for business and government includes work on the communications element of the Cohda trials.

In the healthcare field, Cisco has established digital health labs with Flinders University in South Australia and with RMIT (Royal Melbourne Institute of Technology) University to develop low-latency, always-on connectivity for monitoring devices, data collection, and telemedicine. And in the government sector, Cisco stood up a secure WebEx communications network linking 25 cabinet ministers in four days.

Fawcett says the COVID-19 crisis has provided important lessons for both the public and private sectors as they grapple with day-to-day regulatory, budgetary, and procurement obstacles. "It's shown us that where there's an urgent need, things can change; they can change quickly, and they can change for the better."³¹

Salesforce: Do-it-Yourself IP

Active in the Australia market since 2004, Salesforce.com has a workforce of more than 2,000 today at offices in Sydney, Melbourne, Brisbane, and Canberra. Continuing its expansion, the company plans to create 1,000 additional jobs in Sydney over the next five years and has signed the lease to occupy 24 floors of a 53-story A\$1.9 billion skyscraper, at Circular Quay overlooking Sydney Harbour, as its Australia-New Zealand headquarters. Set to be called Salesforce Tower Sydney and scheduled for completion in 2022, the tower will be Sydney's tallest office building.³² Facilities will include an innovation center and a top-floor flexible open space that will be available free of charge on nights and weekends to nonprofits for hosting their own events.³³



Salesforce Australia-New Zealand CEO Pip Marlow, brought on board in 2019 after a 20-year tenure at Microsoft that included six years as managing director, maintains that Australia is a natural fit for Salesforce and its software-as-a-service technology. "Australians have always had a history of creating and adopting innovation," she says. "Australia is an island, and a huge land mass with huge distances between people. When you're isolated you need to be innovative."

Marlow describes Australia as a "vibrant market" and a fast adopter of new technology. Legacy industries are increasingly turning to technology to optimize processes and achieve global scale. She cites use of IoT in agriculture for irrigation, fertilizing, smart gates for grazing cattle, and water quality monitoring for oyster beds, or in mining for mapping and ore analysis. In the education sector, technology and distance learning can bring the country's best teachers to students in remote rural areas.³⁴

For its large, established customers, Salesforce has deployed its platform to develop fast, scalable solutions to meet market challenges. It created a center of excellence within supermarket chain Woolworths in 2018 to better manage companywide operating expenditures by integrating the group's seven business lines that had been using the platform separately on a project-to-project basis.³⁵ More recently, it deployed a training platform to get new hires into stores quickly amid panic buying during the COVID-19 lockdown. SaaS solutions are also a force multiplier for Australia's critical mass of small and mid-sized businesses (SMBs). "When you think about our technology, we have a really vibrant SMB community that's the engine room of the economy," Marlow says. "The platform works well because it allows you to do everything with a click, not with coding."

Industry, universities, and the government are racing to promote STEM education throughout Australia for the long term, but also to provide vocational skills and encourage entrepreneurship immediately to fill the fast-growing demand for new hires today. Salesforce has partnered with Accenture and Melbourne's RMIT University, using its Trailhead for Students platform to deliver RMIT online courses in customer relations management (CRM) leading to an RMIT credential,

eligibility to take the Salesforce administrator exam, and a pathway to placement at Accenture.³⁶

A portion of the US\$2.7 million in grants handed out by Salesforce in Australia has gone to adopt high schools nationwide and offer programs to drive STEM engagement, with a particular focus on female students and schools in rural and indigenous areas. "We want to debunk the myths about certain students not being good enough or not being interested," Marlow says.

According to Matt Garratt, Managing Director of Salesforce Ventures, Australia is one of the firm's top investment markets, with startups attracting increased attention following the successful IPO of software company Atlassian in 2015.³⁷ Salesforce Ventures, ranked second among global corporate venture capital investors in 2018 by CB Insights, allocated US\$50 million in 2019 to an Australia Trailblazer Fund to empower Australian startups and invest in innovation to create next-generation technology, grow in the Salesforce ecosystem, and drive customer success. The program emphasizes diversity and products or services that solve a specific problem with a SaaS solution. The company sees a A\$524 billion addressable SaaS market by 2025.³⁸

Salesforce has already in previous years invested in a handful of Australian companies, among them marketing automation software developer Autopilot, crowdsourced cybersecurity platform Bugcrowd, and cloud/AI digital marketing and CRM systems integrator Square Peg.³⁹ The latter was acquired in 2018 by US-based quote-to-cash business process automation firm Simplus, in which Salesforce Ventures has also been an investor.⁴⁰

Trailblazer is part of a long-term strategy to grow the next generation of system integration in Australia, helping established companies to scale quickly through digital transformation. It complements Salesforce's development and 2016 launch of Einstein, a suite of cloud-based, AI-enabled CRM services involving machine learning and data analytics, and its 2017 deployment of Amazon Web Services (AWS) Cloud Infrastructure across the Australia-New Zealand and APAC (Asia-Pacific) markets. Among the enterprise and government customers using Einstein is telecom provider Telstra.⁴¹

Partnerships with universities and research labs have been slow to develop, Marlow acknowledges, in part because government funding and direction has tended to crowd out private collaboration and in part because the drive to commercialize research is weaker than in the United States. Salesforce was partnering with University of Technology Sydney (UTS) on hosting a global AI conference in 2020, which is now postponed due to COVID-19, and is talking with other institutions about ways they can work together. "Our connection to universities and research facilities is stronger in the US, but here it's not very strong," Marlow says. "It's a potential opportunity the universities are very aware of and are interested in exploring."

Google: Every Successful Journey Starts with a Map

Google's story as an Australian computer science company began in with a one-person office in 2002⁴² and the singular mission of two brothers, Lars and Jens Rasmussen, software developers working on an interactive mapping and navigation technology. Lars Rasmussen's Cuban girlfriend (now wife) couldn't live in the United States, so he moved to live with her in Sydney. There, the brothers and two partners, Noel Gordon and Stephen Ma, worked out of a apartment spare bedroom.⁴³ Through an angel investor, Frank Marshall, they caught the attention of Google co-founder Larry Page.⁴⁴

By 2003, they had created a software application for mapping and founded a company, Where 2 Technologies.⁴⁵ But Google wasn't interested in application software and wanted something that would work in a web browser instead. The four founders had a prototype by 2004, Where 2 was acquired by Google, and the former Where 2 inventors started working at the Google Australian headquarters. Their product was eventually developed into Google Maps.⁴⁶

Today, Google has an Australia workforce of 1,500, about half of whom are engineers working on products like Google Maps, Google Photos, and mobile browser Chrome. More than 1.1 million businesses, website publishers, and nonprofits advertise on Google's platforms, and there are more than 100 Australian YouTube channels with more than 1 million subscribers. Google supported nearly 118,000 jobs in Australia

in 2019; Australian content creators generated A\$95 million through YouTube and A\$160 million through AdSense.⁴⁷ "Australia is a high-income, English-speaking market with a relatively small population," says Alex Lynch, Google Australia Government Affairs and Public Policy Manager. "That combination makes it easier for companies like Google to localize our products developed for other markets, leading to a culture of early adoption."⁴⁸

This culture has given politicians and policymakers confidence to support STEM education and investment in research initiatives. As one of the largest digital businesses operating in Australia, Google has supported these efforts. Since 2014, Google has helped more than 500,000 online users⁴⁹ increase their digital skills through Grow with Google workshops, online tutorials, and materials including special training programs for app developers and for teachers to improve digital literacy in the classroom. The company has also partnered with FIRST Australia, a nonprofit established in 2006 at Macquarie University to promote primary and secondary student interest in STEM fields,⁵⁰ to bring a robotics competition called "Robots in the Outback" to students of schools from rural and remote communities.⁵¹

In all, Google has donated A\$20 million to nonprofits since 2014, and company employees have donated more than 18,000 volunteer hours. Since 2012, Google Crisis Response has provided an interactive map to track seasonal bushfires and storms across Australia and has donated A\$5 million to helping NGOs with digital solutions for connecting aid workers and victims' families in natural disasters.

Google and other large US tech firms have received mixed messages in recent years from successive governments on the value of investing in Australia. Concerns around issues including competition, taxation, harmful content, encryption, and privacy have led to a series of regulatory initiatives, while Australia continues to lack incentives for digital investment.

■ In October 2019, the Australian Competition and Consumer Commission (ACCC) filed suit against Google for failing to fully disclose the steps necessary for Android phone users to disable location data collection.⁵² Mediation was scheduled to begin in August 2020.⁵³

- In April 2019, following the mosque shootings in Christchurch, New Zealand, the Australian Government enacted the Criminal Code Amendment (Sharing of Abhorrent Violent Material) Act 2019, criminalizing the hosting and streaming of abhorrent violent content, in the space of two days with little debate and no meaningful feedback from industry. It passed the Senate with only a minute's consideration.⁵⁴ New Zealand, the nation subjected to the attack, did not follow.
- In December 2019, Google paid a settlement of A\$481.5 million (US\$326.75 million) to the Australian Taxation Office (ATO), ending the long-standing dispute between Google and the ATO. The settlement followed establishment of the Tax Avoidance Task Force in 2016 and the introduction of the Multinational Anti-Avoidance Law requiring detailed financial reporting of Australia-derived revenues versus offshore transfer payments. Google's tax practices between 2008 and 2018 were audited by the ATO.⁵⁵ Apple, Microsoft, Samsung, Facebook, Amazon Web Services, and Huawei have all similarly met the tax requirements and/or settled their tax affairs with the ATO.⁵⁶
- In April 2020, prior to the agreed upon first reporting threshold, the Australian Government curtailed an ongoing ACCC process of talks with Google and Facebook on a voluntary code for compensating local media companies.⁵⁷ The ACCC subsequently developed a News Media and Digital Platforms Mandatory Bargaining Code which was released on July 31 as a draft for public consultation for a period slated to end on August 28. Under the mandatory code, eligible news businesses and digital platforms would be required to agree on payments during a three-month negotiation process or be subject to an arbitrator-chosen payments deal if the negotiations fail.⁵⁸

At the local level, Google struggled for years to secure a centrally-located headquarters campus site of at least 100,000 square meters (1.07 million square feet) in Sydney.⁵⁹ Redevelopment of a White Bay power plant site fell through over the timing and construction effects of bringing public transit to the area,⁶⁰ and the New South Wales government rejected a subsequent

proposal for redevelopment of an unused rail yard in Eveleigh.⁶¹ Google currently occupies three buildings in Pymont's Darling Island district.⁶²

Alex Lynch notes that Australia's cross-economy investment in technology has fallen well behind the OECD average and is around half the rate seen in the United States in recent years. He cautions against complacency and a sense among some policymakers that "Australia's going to get that investment no matter what." On the tax and regulatory front, Google has advocated for better governance practices around the regulation of digital technology.

"You want to avoid an approach that over the long term leads to lower rates of investment, less competitive companies, slower economic growth, and unemployment," Lynch says. "Investment in Australia's digitalization relative to other nations is slowing. If it continues to fall behind, we're going to see digital competitors from nations like Singapore, India, and Indonesia entering the Australian market, rather than Australian companies successfully competing overseas."

Tesla: A Wall That Australians Will Pay For

Australia is a rare market in which Fremont-based Tesla Motors is better appreciated for its batteries than its electric vehicles. "Tesla has been in Australia since the roadster days," company global chair Robyn Denholm (an Australian) explains, "but essentially our growth started with the battery technology side and renewable energy in 2015."⁶³

Australia enjoys an abundance of clean energy resources; with a sunny climate for much of the year and an abundance of wind across the continent, there is a strong case to transition to renewables and storage. Presently the country boasts the highest penetration of residential photovoltaic solar in the world, with systems installed in 2.2 million Australian homes, some of which include the Tesla Powerwall battery to enable clean energy storage and address grid reliability concerns at the household level.⁶⁴ Tesla also offers utility-grade Megapack battery systems the size of shipping containers, a scalable solution for firming the output of renewables, providing a suite of grid and network services, and adding additional capacity at utility

substations.⁶⁵ Altogether, this makes Australia one of the few markets in the world for Tesla where the energy production market is larger than the market for vehicles.

Renewable energy is a contentious issue in a nation that is the world's largest coal exporter, where fossil fuel production makes a significant contribution to jobs and GDP, and where public sentiment and market forces are gradually leading to the replacement of centralized, coal-fired power plants in regional grids. In September 2016, a once-in-50-year storm damaged critical infrastructure in South Australia, causing a state-wide blackout. The 325 MW Hornsdale wind farm was among the generation sources that were impacted following a series of transmission line faults.⁶⁶ Tesla claimed it could stabilize the grid by providing 100 MW of backup storage for Hornsdale in 100 days. The regional government made such a project part of a A\$550 million energy plan and put it out to bid. Billionaire Atlassian co-founder and CEO Mike Cannon-Brookes publicly offered on Twitter to secure funding and approvals if Tesla's claim was serious. Tesla founder and CEO Elon Musk replied in writing, guaranteeing completion within 100 days or the project would be free of charge. Together with the South Australian Government and wind farm owner and operator Neoen, Tesla installed the 100 MW/129 MWh Hornsdale Power Reserve, completing the project in under 60 days.⁶⁷

In 2018, Tesla completed a second, 25 MW power reserve, paired with the Gannawarra solar installation in Victoria.⁶⁸ Initial construction of a 50% expansion of the Hornsdale Power Reserve was completed in April 2020 and began final testing in June.⁶⁹ To date, it remains the world's largest lithium ion battery and has brought down grid stabilization costs by A\$40 million in its first year of operation⁷⁰ and saved A\$116 million in its second year.⁷¹

"The bushfires have changed public sentiment to where climate change is now very much front and center," Denholm says. "Things are different in terms of public policy pressure since last summer, with people becoming very vocal about making the move to renewable energy." Efficiency improvements, lower material and component costs, and broader acceptance have helped the economics of rooftop solar, but small-scale storage remains a challenge. "We're at a point," Denholm adds, "where what makes it difficult is having the right battery at the right price point, not just that

it's the right thing to do." To that extent, widespread renewable energy deployment is still dependent on public policy incentives.

Australia's Federal government does not, on principle, currently offer federal tax or purchase incentives to encourage use of renewable energy or electric vehicles; however, state governments are taking the transition to renewables into their own hands. Take, for example, South Australia. Tesla is working with the South Australian Government on developing a network of potentially 50,000 home solar PV and Powerwall battery systems across South Australia—all working together to form the world's largest virtual power plant (VPP). There are currently more than 1,000 homes involved in the VPP, which uses smart technology to lower consumer electricity prices and help stabilize the grid.

Australia's electric vehicle market is in its early stages but is starting to catch on. Vehicles are currently shipped from the United States, with fleets supported by Supercharging networks on the Eastern Seaboard and the Melbourne-Adelaide corridor. Since the 2012 launch of the Model S, Tesla has made battery and software improvements that have extended vehicle range on a single charge—a concern in Australia, given the vast distances between cities and minimal charging infrastructure beyond the eastern coast.

Price is a trickier problem, given high shipping costs from the United States and Australia's limited market size. Beyond that, weakening of the Australian dollar against the US dollar has further pushed up the base cost of an imported Tesla vehicle. Canberra has so far not responded to calls for an electric vehicle exemption from the luxury car tax (LCT) which impacts all Tesla models except the entry level Model 3 Standard Range Plus.

Australia-US FDI

In the reverse direction, more than 1,200 Australian firms have operations in the United States⁷² in a wide range of industries, including manufacturing, wine production, retail, property development, finance, aerospace, and life sciences. The Australian Trade and Investment Commission estimates that Australian companies invested US\$20.9 billion on new capital projects in the US between January 2003 and February 2017. The industry sectors receiving the largest number of these

new projects were software and IT services, business services, and natural gas, oil and natural gas liquids. The leading activity was sales, marketing and support services, which had more than 150 new investment projects generating more than 6,500 new jobs.⁷³

Examples among traditional industry sectors include the following:

- Treasury Wine Estates (TWE) Americas, one of four regional divisions of a major global wine producer and marketer listed on the Australian Securities Exchange (ASX), owns and operates 3,728 planted hectares (9,212 vineyard acres), 44 vineyards and 7 wineries in California,⁷⁴ including the Acacia, Beringer, Beaulieu, Sterling, and Stag's Leap labels in the Napa and Sonoma regions of Northern California.⁷⁵ Treasury acquired most of its California assets in a 2015 purchase of global spirits firm Diageo's wine business.⁷⁶ TWE itself is a 2010 rebranding of the wine holdings of Foster's Group (best known for its beer), which included Beringer Vineyards.⁷⁷
- Pratt Industries, the US-based counterpart of Australia's Visy Industries (both chaired by Australian-born Anthony Pratt),⁷⁸ is the world's largest privately-held 100% recycled paper and packaging company and America's fifth largest corrugated packaging company.⁷⁹ Pratt first entered the US market in 1987⁸⁰ and has since invested some US\$2.5 billion in the United States.⁸¹ Pratt Industries now operates more than 100 facilities, with more than 10,000 employees across 27 US states.⁸² The company expanded into California in 2015, acquiring Salinas food and agricultural packaging firm Robert Mann Packaging. The acquisition included a 350,000-square-foot corrugated box manufacturing plant in Salinas.⁸³ Pratt also has an Oakland facility that designs and manufactures sustainably-sourced retail point-of-sale displays.⁸⁴
- Australia's shopping center developer Westfield Group acquired the downtown San Francisco Center shopping complex in 2002 and undertook a US\$440 million redevelopment that was completed in September 2006.⁸⁵ In November 2008, Westfield opened the Westfield Galleria at Roseville in the Sacramento metropolitan area, after completing the first phase of a US\$270 million expansion of a shopping center first opened by Urban Retail Properties in 2000.⁸⁶ Paris-based Unibail-Rodamco commercial real estate group acquired Westfield in 2018,⁸⁷ creating a new corporation, Unibail-Rodamco-Westfield, which also owns and operates the Westfield Valley Fair and the Westfield Oakridge malls in San Jose.⁸⁸ Valley Fair has undergone a US\$1.1 billion expansion and remodel since 2016, increasing its footprint by 500,000 square feet and adding about 100 stores and restaurants⁸⁹ plus theaters and open space to create a regional visitor destination.⁹⁰ All 32 Westfield centers in the United States were temporarily closed in March 2020 due to the COVID-19 pandemic.⁹¹
- Sydney-headquartered industrial property developer Goodman Group entered the US market in 2012, joining with Newport Beach, California-based Birtcher Development to form an investment partnership with an initial equity commitment of approximately US\$800 million. Three regional logistics and industrial development facilities in California were part of that market entry,⁹² beginning with the US\$45 million⁹³ 375,000-square-foot Goodman Logistics Center facility located within the Oakland Airport Business Park enterprise zone.⁹⁴ Goodman in North America maintains a headquarters office in California, with additional offices in Pennsylvania and New Jersey,⁹⁵ and has 19 properties under management across the US.⁹⁶
- Futuris Automotive, a Victoria automotive components supplier, opened a US\$107 million, 160,000-square-foot manufacturing and design center in Newark, California to supply seating and interior systems for Tesla Motors' Model S and Model X vehicles which are built in nearby Fremont. The vertically integrated facility includes a design and craftsmanship studio as well as testing, validation, and quality centers, with a workforce of 400 employees.⁹⁷

Investment Growth Trends

Bay Area investment in Australia since 2015 has been, with a small number of significant exceptions, nearly all in the technology sector, reflecting companies looking to

- open individual offices to explore opportunities in key regional markets;

- provide sales, marketing, technical and customer service support to an existing customer base;
- establish an Australia or Asia-Pacific headquarters presence;
- develop an R&D capability for local and regional markets, utilizing Australian engineering and software development talent; and
- build data centers that serve local and regional markets as part of global networks.

Key verticals include information and communications technology (ICT), cybersecurity, fintech, biotech, and renewable energy.

Broadly speaking, investors see Australia as a market with considerable upside potential in terms of future population growth, a world-class education system, IP and rule of law protections, and pent-up demand to modernize legacy industries and infrastructure. Some data center investments support compliance with federal government classified and sensitive data.

EXHIBIT 17

In recent years, the US sectors receiving the largest number of new Australian investment projects were software and IT services and business services.

Rank	Industry sector	Australian investment projects in US from 2003 to 2017
1.	Software and IT services*	129
2.	Business services	48
3.	Gas, oil and natural gas	26
4.	Real estate	25
5.	Communications	24

Note: This data is based on a total of 32 industry sectors.

* Software publishing, computer system and design, internet publishing, computer programming services, professional services, creative industries, financial services, ICT, and electronics.

Rank	Industry activity	Australian investment projects in US from 2003 to 2017
1.	Sales, marketing, and support services	154
2.	Manufacturing	81
3.	Business services	80
4.	Extraction	17
5.	Construction	10

Note: This data is based on a total of 16 industry activity categories.

Source: Australian Trade and Investment Commission in "Australia's Investment Footprint in the US" using Financial Times Ltd, fDi Markets database Australia FDI to US, accessed April 2017

EXHIBIT 18

Bay Area-Australia Foreign Direct Investment (FDI), 2015–2020

Firm	Type	Region	Project
DATA NETWORKS			
2020			
Google	Internet services	Victoria	Cloud data center
Oracle	Enterprise software	Victoria	Cloud data center
2019			
Oracle	Enterprise software	New South Wales	Cloud data center
Equinix	Data co-location	Victoria	Cloud data center
Equinix	Data co-location	New South Wales	IBE data center

2018

Digital Realty	Data co-location	New South Wales	2 data centers
InSpeed Networks	VOIP networks		VOIP data center
Docusign	Digital signatures	Victoria/Australian Capital Territory	2 data centers
Freshworks	Customer support	New South Wales	Data center

2017

Docusign	Digital signatures	New South Wales	Data center
Digital Realty	Data co-location	New South Wales	Data center
Zendesk	Cloud software	New South Wales	Data center

2016

Equinix	Data co-location	Victoria	Data center
Google	Internet services	New South Wales	Cloud data center
CloudFlare	Web security	Queensland	Two cloud data centers
Intermedia	Cloud IT services	New South Wales	Data center
Adaptive Insights	ERP analytics	New South Wales/Victoria	2 cloud data centers
Digital Realty	Data co-location	Victoria	Data center
Centrify	Identity-as-a-Service	New South Wales	Data center

2015

Sugar CRM	Open-source CRM	New South Wales	Data center
Equinix	Data co-location	Victoria	Data center/expansion
CloudFlare	Web security	Victoria	Data center
Skyhigh Networks	Fintech security	New South Wales	Data center

SALES / MARKETING / TECHNICAL SUPPORT**2020**

LaunchDarkly	Software testing	New South Wales	Sales office
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2019

Nutanix	Virtualization	New South Wales	Office expansion
Fanplayr	E-retail marketing	New South Wales	Sales/marketing office
Menlo Security	Security software	New South Wales/Victoria/ Australian Capital Territory	3 sales/marketing offices
Fieldwire	Construction software	(location details undisclosed)	Sales/marketing office
Pinterest	Social media	New South Wales	Sales/marketing office
Freshworks	Customer support	Victoria	Tech support office
Thousand Eyes	Network analytics	New South Wales	Sales/support office
Jacobi	Fintech	Queensland	Sales/marketing office

2018

Accelo	Cloud services	New South Wales	Office expansion
Asana	Collaboration SaaS		APAC sales/support
Ring Central	SaaS	Queensland	Sales/support office
Swrve	Mobile marketing	New South Wales	Sales/support office
Google	Internet services	Victoria	Sales/support office
Nozomi Networks	Cybersecurity	New South Wales	Sales/support office
Ring Central	SaaS	New South Wales	APAC sales/support
Uber	Mobility services	Western Australia	2 sales/support offices
StreamSets	Enterprise data	New South Wales	Australia/New Zealand hub
Twilio	API	Victoria/New South Wales	2 sales/support offices
WSO2	Middleware	New South Wales	Support/training office
Oracle	Enterprise software	Australian Capital Territory	Office expansion
Snowflake	Data warehousing	New South Wales/Victoria	Customer support

2017

Oracle	Enterprise software	New South Wales	Digital hub
MuleSoft	B2B integration	New South Wales	Flagship office
PagerDuty	Digital operations mgmt.	New South Wales	SE Asia office
Sojern	Travel data/media	New South Wales	Sales/support office
Bright Pattern	Cloud contact center	(location details undisclosed)	APAC cloud PoP
UpGuard	Cyber resilience	New South Wales	Sales/engineering office
Wizy	Mobile work solutions	Queensland	Sales/marketing office

2016

Hewlett Packard	Computers/Peripherals	New South Wales	Demonstration center
Tradeshift	Web-based invoicing	New South Wales	Trade/financial services
Juniper Networks	Network products	New South Wales	OpenLab center
Oracle	Enterprise software	New South Wales	Sales hub
MuleSoft	B2B integration	Victoria	APAC regional office
ShoreTel	Enterprise VOIP	Victoria	Sales/marketing office
ForgeRock	Open source software	New South Wales	Support office expansion

2015

Hewlett Packard	Computers/Peripherals	Victoria	Experience center
Ripple Labs	Distributed payment	New South Wales	APAC regional office
ZEDO	Adtech	(location details undisclosed)	Sales/support office
UserZoom	User Experience	New South Wales	Sales/support office
BrightEdge	Content marketing	New South Wales	Sales/marketing office
Click Labs	App development	Queensland	Sales/marketing office
Hortonworks	Hadoop solutions	New South Wales	Regional support center

HEADQUARTERS**2020**

DoorDash	Restaurant delivery	Victoria	Australia HQ/APAC HQ
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2019

Facebook	Social media	New South Wales	Australia HQ expansion
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2018

Wrike	Project mgmt. software	Victoria	APAC HQ
Google	Internet services	New South Wales	Australia HQ expansion
Square	Mobile payment	Victoria	Australia HQ expansion

2017

Optimizely	Web optimization	New South Wales	Regional HQ
Cisco Systems	Data networking	New South Wales	Australia HQ expansion

2016

Hired	Job marketplace	Victoria	Regional HQ
Expensify	Expensing software	Victoria	Australia HQ
On24	Webcasting solutions	New South Wales	APAC HQ
Slack Technologies	Business apps	Victoria	APAC HQ

2015

GoPro	Video capture	Victoria	Regional HQ
Square	Mobile payment	Victoria	Australia HQ

R&D CENTERS**2019**

Swift Navigation	GPS software	Victoria	Development center
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2015

Cisco Systems	Data networking	South Australia	IoT smart city studio
Cisco Systems	Data networking	New South Wales/ Western Australia	2 innovation centers

BUSINESS SERVICES**2020**

Rimon Law	Legal services	New South Wales	Law office
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2019

Align Technology	Dental technology	New South Wales	2 Invisalign clinics
Global Upside	Outsourcing	Victoria	APAC sales/support

2018

Tesla	Renewable energy	South Australia	Distributed solar power
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2017

Charles Schwab	Financial services	New South Wales	Self-managed superfund
Chevron	Energy	Western Australia	LNG production
500 Startups	VC investment	Victoria	Incubator/accelerator
RocketSpace	Incubator	Victoria/New South Wales/Queensland	3 incubator campuses

2016	Amyris	Health/personal care	Queensland	Biotech manufacturing
2015	Berkeley Research	Data analysis	New South Wales	Litigation/arbitration
	ADARA	Digital marketing	New South Wales	Travel marketing/PR

Source: fDi Markets database

Compilation: Bay Area Council Economic Institute

Australian investment in the Bay Area since 2014 has come from a mix of established companies delivering innovative products and services at scale, alongside smaller growth-stage tech companies raising funds and entering the US market via Silicon Valley to achieve scale. Sectors range from telecommunications

and renewable energy, to agritech and fintech, to healthcare and e-commerce. Southern California's profile as an FDI destination has an entirely different focus from that of the Bay Area, emphasizing aerospace and defense, automotive, apparel, and property development.

EXHIBIT 19

Australia-Bay Area Foreign Direct Investment (FDI), 2014–20

	Firm	Type	City	Project
2019	Nuseed	Ag seed producer	West Sacramento	R&D center
	Lendlease Energy Development	Energy infrastructure	Sacramento	Solar power plant
2018	Denomination	Beverage marketing	Napa Valley	Marketing/design
	Reveal Group	Robotic process automation	San Francisco	Intelligent automation
	Bryte Systems	Software vendor	San Francisco	AWS cloud services
2017	Kasada	Security software	San Francisco	Sales/support office
	Sinefa	Network management	San Francisco	Sales/support office
	Atlassian	Business software	Mountain View	Office/R&D expansion
	Verrency	Fintech	San Francisco	Sales/support office
	Upwire	Cloud CRM	San Francisco	Sales/support office
	Culture Amp	Survey platform	San Francisco	Sales/support expansion
	BOS Global	Productivity software	San Francisco	Sales/support office
	CSIRO	Government science agency	San Francisco	Research promotion
2016	SafetyCulture	Workplace software	San Francisco	Sales/support expansion
	Skedulo	Workforce software	San Francisco	Sales/marketing office
	Talent International	IT recruiter	San Francisco	Sales/marketing office
	Brandon Capital Partners	Venture capital	Palo Alto	Investment office

2015

Megaport	Telecommunication	San Francisco	HQ/dark fiber deployment
Seeing Machines	Mobility software	Mountain View	Sales/support office
Interspire	eCommerce	San Francisco	Sales/support expansion
Decimal Software	Fintech platform	San Francisco	Subsidiary office
DesignCrowd	Graphic design	San Francisco	US sales/marketing
Clinical Network Services	Biotech research	San Francisco	FDA clinical trials
Orora	Food packaging	Sacramento	Packing facility

2014

Futuris Automotive	Auto components	Newark	Auto seating/interiors
Maestrano	Cloud-based apps	San Francisco	Sales/marketing office
Interspire	eCommerce	San Francisco	Engineering office
OrionVM	Virtualization / IaaS	San Francisco	US HQ
Smart Sparrow	eLearning platform	San Francisco	US sales/marketing

Source: fDi Markets database

Compilation: Bay Area Council Economic Institute

Telstra: Balancing Global with Local

Melbourne-based Telstra's origins date back to Australia's federation in 1901. But it was in 1975 with the division of the Postmaster-General's Department (PMG) into separate government postal and telecommunications monopolies that Telecom Australia, as it was known then, came into its own. In 1993, it was merged with the Overseas Telecommunications Commission to provide both domestic and international telecom services. It has traded publicly as Telstra since 1995.

Over 1997–2011, the government has divested its Telstra ownership interest in a phased privatization. In 2011, the government established a National Broadband Network (NBN) with a planned A\$36 billion (US\$25.7 billion) high-speed broadband network build-out, the largest infrastructure project ever undertaken in Australia. At the network's core was A\$11 billion (US\$7.9 billion) in fixed-line telephone assets transferred and leased as dark fiber by Telstra beginning in 2014. NBN functions as an open-access public utility over which private providers, including Telstra, deliver services and content.⁹⁸

In Australia, Telstra serves the consumer, business, and government sectors. Its core services of fixed-line telephony, mobile, and broadband underpin its largest division supporting consumers, while its technology and managed services, including cloud, security, and IoT, underpin its offerings for business and government customers in Australia. Telstra competes primarily with Vodafone Hutchison Australia and Optus, a unit of Singapore Telecommunications. It offers satellite pay TV service in partnership with News Corp.'s Foxtel, and its 5G wireless service now covers 47 cities and almost 8 million Australians.

Telstra, now with about 26,000 employees and A\$25.3 billion (US\$16.3 billion) in revenues in 2019, has played to strengths beyond its traditional domestic regulated business segments—in particular, enterprise solutions, digital transformation, and global voice and data connectivity. "In Australia we're one of only a few fully integrated service providers," says Telstra (Americas) President Nicholas Collins. "Australia's a large country, although its population is relatively small, so the economics dictate there's only going to be a handful of players. As we look to growth opportunities, we are excited about the potential that exists across our international markets."⁹⁹

The company's Bay Area connection begins with its role as a global carrier connecting Australia, Asia, Europe, and the Americas via more than 400,000 km (249,000 miles) of subsea cable, 58 data centers, 2,000 points of presence in more than 200 countries,¹⁰⁰ and access to 60 satellites globally.¹⁰¹ In 2015, Telstra acquired Hong Kong and Singapore telecom services provider Pacnet Global from a private equity group.¹⁰² This broadly doubled the size of Telstra's business outside Australia and included a China joint venture, Pacnet Business Solutions, offering Internet protocol virtual private network services across 23 Chinese provinces.¹⁰³ Roughly a third of Asia internet traffic moves across Telstra's network, and the company is among the largest subsea trans-Pacific fiber optic cable operators.

Outside of Australia, Telstra's services are exclusively B2B, making it a critical technology partner for major Bay Area tech firms which rely heavily on high-capacity, resilient, and secure cross-border regional and global services, particularly connecting the United States to Asia and Australia. Some of Telstra's key technology partners are headquartered in the Bay Area, including Cisco, Infinera, Equinix, Juniper Networks, ServiceNow, and Salesforce. Telstra's Gurrowa Innovation Lab in Melbourne provides a co-creation space to explore solutions in geolocation, robotics and IoT, autonomous vehicles, and smart cities. The lab uses an open-source, cloud-based platform-as-a-service developed by San Francisco-based Pivotal Labs as part of the Cloud Foundry Foundation, which includes EMC, VMware, HP, IBM and SAP.¹⁰⁴

In Australia, Telstra sees opportunities in developing connectivity and digital transformation services in cybersecurity, healthcare, and education, mainly through partnerships. For example, Telstra has been a customer of Sunnyvale cybersecurity firm CrowdStrike since 2013 and an investor since 2017 through its Telstra Ventures investment arm, participating in a US\$100 million Series D round.¹⁰⁵ The relationship has been one of mutual benefit. Telstra has been a major customer for CrowdStrike's Falcon AI-driven endpoint security platform, not only for network protection but to deploy as a service for its smaller customers. That expands CrowdStrike's APAC footprint while supporting Telstra's

strategy to expand beyond network connectivity into software-driven managed client services.¹⁰⁶ In another partnership, Telstra Ventures, a collaboration of Telstra and Boston private equity fund of funds manager HarbourVest Partners, has invested more than US\$300 million in 60+ companies since 2011. Its current portfolio of nearly 50 companies focuses on security, data analytics, network infrastructure, and network software development.¹⁰⁷

"The Bay Area is an incredibly important region for our business. It is home to many of our technology partners who enable us to serve our customers in Australia and across the world, and it is also where many of our customers are based who rely on us to deliver global connectivity," Collins says.

Telstra in the Americas, which primarily handles sales, marketing and customer/partner support in North America, is headquartered in San Francisco.

Lendlease Embraces Building 4.0

Global property developer, builder, and investor Lendlease is known for landmark projects like the Sydney Opera House and the 88-story Petronas Towers in Kuala Lumpur, for which it was project manager, as well as the Grand Central Station renovation and the September 11 Memorial and Museum in New York. With headquarters in Sydney, Lendlease has over 60 years of applied experience and has been active in San Francisco for more than a decade, with

- One Rincon Hill, a 55-story downtown residential tower completed in 2008;
- the 193,000-square-foot LEED-NC Gold-certified City College of San Francisco North Beach-Chinatown campus opened in 2012;
- Lumina, a 656-unit four-tower LEED-NC Silver-certified residential-retail complex built in 2017; and
- 33 Tehama, a 35-story 403-unit apartment tower completed in 2018 as part of the planned Transbay Terminal regional transit center district.

Beyond individual structures, the company focuses on urbanization and on the design and technology processes that can support livable workplace

environments. In 2019, Lendlease announced a Bay Area initiative unique in its scope and ambition: a 15-year, US\$15 billion partnership with Google to develop up to 15 million square feet of residential, retail, hospitality, and community uses in three Bay Area cities—Mountain View, Sunnyvale, and San Jose. Residential development will include at least 15,000 units of housing.¹⁰⁸

The arrangement reflects a more than US\$1 billion commitment by Google comprising US\$750 million in South Bay land, a US\$250 million investment fund for affordable housing in the Bay Area,¹⁰⁹ and US\$50 million in Google.org grants to support nonprofits on the frontlines of helping to solve homelessness and displacement—all in one of the nation's most expensive markets for residential construction with a median home price of US\$928,000 in 2019.¹¹⁰ Google sees an opportunity to provide livable, affordable housing that addresses community needs close to its Bay Area campuses. Lendlease brings its expertise to advance a new, data-driven, integrated development model that creates and sustains community—whether at the building or neighborhood level—while tightly maintaining schedules and managing costs.

The two companies are already working together on Google's UK headquarters at King's Cross in London, initially scheduled for completion in 2021 but with construction halted for now due to COVID-19. In Silicon Valley, Lendlease is currently assisting with master planning efforts in all three cities and has quietly built a team of 80 people over more than two years to address development, entitlement, community engagement, sustainability, and infrastructure issues, according to Lendlease Google project managing director Claire Johnston.¹¹¹

"We worked with their team to start imagining development from the ground up, the types of communities they wish to create, the type of development that makes a place great," Johnston explains. "The fundamental agenda is around how we can deliver outstanding places that redefine how people choose to live, work, connect, and contribute to creating an active community."

Lendlease also sees its efforts in Silicon Valley in a larger context, as a model for reinventing the planning, engineering, and construction process, at a building or neighborhood level, through digital transformation. The higher vision is to deploy digital processes that build on the combined domain knowledge of architecture and construction in Sydney with digital processes in Silicon Valley, to deliver global projects. "The construction industry is ripe for disruption, not only in how we build, but in what we create," says company CEO-Digital William Ruh, who calls the Bay Area "a case study for disruption" with its labor-intensive processes, fragmented supply chains, and high regulatory costs. "The question is how we drive productivity gains with automation and analytics to take 20% of the cost out and then provide a better, purpose-driven building. We're not just creating a box; we're creating a place where people want to live, work, play, sleep, and eat."

Ruh is a veteran of Cisco Systems and GE Digital (also in the Bay Area) and oversaw development of GE Digital's predictive analytics software for industrial processes, Predix. He sees a natural fit between Australia's vibrant construction market, Lendlease's global domain knowledge in development and construction, and Silicon Valley's innovation in AI/machine learning, IoT, and data analytics.¹¹²

Based in the Bay Area, Lendlease Chief Technology Officer and Senior Vice President-Digital Technology Pankaj Srivastava, formerly with Cisco and specializing in geospatial applications and analytics central to IoT, agrees that a range of industries are taking a fresh look at digital transformation as cloud computing and equipment costs have come down. Applications for the property sector—known as proptech (or Building 4.0)—are in the nascent stages. "In technology, we're always looking for white space where there's opportunity," Srivastava says. "I've never seen such a hidden white space where technology has no presence. When you get into property management, buildings have tons of data and no one's taking advantage of it."

Building 4.0, which brings technology to design, begins with standardizing and automating all of the data—drawings, materials, parts, specifications, standards and certifications, performance milestones, bid and financial

documents, supplier data—in a single, integrated data cloud platform, accessible with specific permissions for specific parties based on their responsibilities. AI targets building performance, efficiency, and safety. Lendlease can then

- construct a “digital twin” for the project to run planning simulations to determine how various parts, materials, structures, and process controls will perform in specific situations;
- optimize land and space use, amenities, pedestrian and traffic flow, services, retail and community uses, and zoning compliance;
- standardize parts, materials, and specifications across projects, where possible, to reduce suppliers and control costs and use offsite modular construction to optimize site traffic and workflow;
- automate the procurement process, just-in-time logistics, and construction and installation schedules to minimize site inventory, delays, and change orders; and

- develop a data platform for the operation of a building—analyzing data from embedded sensors, patterns of temperature, humidity, electrical, plumbing, and lighting systems or equipment—which provides insight that will improve the performance and energy efficiency of the built asset.

As buildings are occupied, systems will adapt to meet shifting seasonal and time-of-day project demand and usage patterns while maintaining efficiency and cost control. “One of the attractive things,” Srivastava explains, “is that we’re looking at the full life cycle of property development—investment, master planning, design, development planning, construction, and operation.”¹¹³

Lendlease has begun building agile software teams of architecture, design, engineering logistics, manufacturing, technology, and other professionals in Sydney, Singapore, and Silicon Valley. From Silicon Valley, the company is developing designers and engineers who can drive the business globally. While not all the projects that result will be built in the Bay Area, the region will produce the critical design architecture and software.





5

The Australian Community in Northern California

A Colorful History

The colorful history of Australians in the United States began in December 1848 when the four-page *Sydney Morning Herald* published news brought by a schooner from Hawaii (then the Sandwich Islands) that gold had been discovered in California. Australia at the time was in the midst of an economic downturn with falling wool prices depressing wages and, in turn, dampening seasonal demand for Christmas merchandise.

The United States did not yet have a transcontinental railroad; it would take prospectors from the eastern seaboard just as long by land to reach the gold fields in northern California—at least three months—as it would take Australian gold seekers coming by sea. Nor was there a Panama Canal; it would take supplies even longer to reach California coming around Cape Horn in South America than coming from Australia.¹ The race was on. In 1849, more than 30 ships² carrying food, clothing, guns, building supplies, and tools, as well as passengers, sailed from Sydney Harbour to San Francisco Bay and up the delta as far as they could go toward the gold camps. By May 1850, 11,000 Australians had made the voyage.³

San Francisco during the period from 1847–50 grew in population from several hundred to 20,000, with the lure of gold and the transition from Mexican to

US rule. The city at the time was lawless, with a police force of 12. Robberies were common; at one point the murder rate averaged two per day.⁴ The first Australian migrants were notorious. After Britain closed down its Australian penal colonies in 1841, a number of emancipated prisoners had become successful in business. Many less fortunate were adrift and came to see the American frontier as a place with few rules and a chance for reinvention. Some never reached the gold fields, but instead stayed in San Francisco and became involved in the tavern trade and day labor. They joined Chinese laborers escaping the Taiping Rebellion, Chileans, and Peruvians in the northeast section of the city, concentrating in an area below Telegraph Hill that became known as Sydney Town.

A particularly infamous gang of mainly ex-felons from New South Wales and Tasmania, the Sydney Ducks, operated out of Sydney Town, specializing in extortion, arson, and robbery. In 1849, a narrow strip of wood-frame commercial buildings and tent encampments along the eastern waterfront constituted Gold Rush San Francisco. Six large fires in two years, attributed to the Ducks, burned down large sections of the area. The Ducks and rival gangs sparked a crime wave that ended in 1851 only after a citizens' Vigilance Committee conducted citizen's arrests, trials, and four public hangings. Nearly 50 Ducks were deported, expelled from California, or jailed.⁵

Sydney Town emptied out, with many of its residents headed north into the Sierra foothills and the Sacramento area. Two Australian prospectors, farmer Edmond Hammond Hargreaves and coach driver James Esmond, noticed similarities between the climate and terrain in the gold country and in Australia and returned home to hunt for gold. Their discoveries in the Bathurst and Clunes districts in Victoria set off Australia's own Gold Rush, expanding to Ballarat and Bendigo. Hargreaves was rewarded by the Victoria and New South Wales government for the initial May 1851 find; Esmond produced the first paying yield in July. The two men later teamed up at Clunes and found 50 troy pounds of gold in one day.⁶

Building Today's Community

Immigration to the United States from Australia and New Zealand fell sharply during the Civil War period, with only 36 immigrants recorded during 1861–70. In the following decade, the numbers grew again to nearly 10,000. To this day, the numbers have consistently held at a few thousand annually, with an ebb and flow related to economic conditions at home. After World War II, however, 15,000 Australian war brides married to US servicemen stationed in Australia and New Zealand immigrated to the United States with their husbands.⁷

According to US Department of Homeland Security data, the broader long-term immigration trend continues today, with 4,173 Australian nationals obtaining permanent resident status in 2016, declining to 3,818 in 2017 and 3,394 in 2018, the latest year for which data is available.⁸ Visas for special occupation Australians (E-3), their spouses and children (E-3D), and returning visa holders (E-3R) have also remained fairly constant over time, as illustrated in Exhibit 20.⁹

Precise numbers of Australian nationals in California and the Bay Area today are difficult to obtain because of the way data is collected. A 2020 fact sheet on Australia's relationship with California, published by the Australian Consulate General in San Francisco, puts the estimated statewide number at about 60,000, with around two-thirds of those in Southern California.¹⁰ The Los Angeles area, and particularly the west side beach communities, have been especially popular with Australian expats because of

the climate, the beach, opportunities in the entertainment, property, leisure, and aerospace industries, and large existing British and Australian communities.

Factoring in anecdotal expat growth in Silicon Valley and adjusting for expats living outside the state's two largest metro areas, a reasonable estimate for the Bay Area Australian community is around 25,000. A Facebook group for Bay Area Australian expats has 4,500 members.¹¹

The East-West Center's 2015 report on the Australia-US relationship reported that in addition to California's sister relationship with the state of New South Wales, Bay Area communities have sister city relationships in five distinct regions of Australia,¹² providing an ongoing bridge:¹³

■ Brisbane	↔	Brisbane, Queensland
■ Foster City	↔	Stonnington, Victoria
■ Fremont	↔	Elizabeth, South Australia
■ Los Altos	↔	Greater Bendigo, Victoria
■ Napa	↔	Launceston, Tasmania
■ Novato	↔	Shepparton, Victoria
■ San Carlos	↔	Maroondah, Victoria
■ San Francisco	↔	Sydney, New South Wales

From a business perspective, Australia and the Bay Area are a natural fit. Even apart from a shared language and similar legal systems and IP protection regimes, says Salesforce Australia-New Zealand CEO Pip Marlow, "a lot of cultural similarities make it easy to collaborate in terms of market dynamics. There's also a shared pioneer spirit in terms of how Australia was formed as a nation and how the Bay Area was formed." Marlow sees untapped potential in Australia for commercialization of R&D, which has been slow to develop as engineering graduates have typically chosen safer career paths in teaching or with large companies, versus launching their own companies. "What's not developed a lot is the kind of entrepreneurial spirit you see in the Bay Area, even though there's a lot of talent here. So a lot of 'R' happens here but not a lot of 'D', which makes it very natural for us to be collaborating."¹⁴

EXHIBIT 20

Visas for special occupation Australians (E-3), their spouses and children (E-3D), and returning visa holders (E-3R) have-3 remained fairly constant over time.

E-3 Visas for Special Occupation Australians, 2015–2019

	2015	2016	2017	2018	2019
E-3	5,527	5,609	5,657	5,394	5,807
E-3D	3,656	4,299	4,169	4,341	4,177
E-3R	1,324	2,026	2,306	2,941	3,167

Source: Table XVI(B), Travel.State.Gov, US Department of State–Bureau of Consular Affairs.

Academic Connections

International student exchanges between the United States and Australia follow a distinct pattern. The quality and range of Australia’s higher education system, most of which is publicly funded, make US universities less attractive to Australian students than to students from many countries, with the exception of advanced degrees and research. The high relative cost for education in the United States, and particularly in California, combined with a high cost of living, is a further discouraging factor.

Major Bay Area universities report relatively few Australian students overall, with Stanford reporting the most—61 in the 2018–19 academic year¹⁵—followed by UC Berkeley with 57,¹⁶ according to independent reporting service College Factual. Most others admit 10 or fewer in a given year. Graduate and post-doctoral researchers and scholars are present in greater numbers, pursuing specialized research and entrance to facilities which are harder to access back home.

Stanford University hosted 12 students from Curtin University in Perth, Western Australia for its eight-week International Honors Program in 2019. Six of the 12 Curtin students participated in Stanford’s Silicon Valley Innovation Academy, where students from various disciplines collaborate in teams on moonshot innovation projects.¹⁷ A previous 2018 project led by two Curtin students, which produced a biosensor capable of testing soldiers for PTSD-related stress through trace neurotransmitters in saliva, received a Stanford endorsement toward a US military grant.¹⁸

Stanford’s Bing Overseas Studies Program in Australian Coastal Studies, a collaboration with the University of Queensland Centre for Marine Studies, enables up to 48 Stanford undergraduates to study the marine biology and ecology of the Great Barrier Reef and the coastal rainforest while also learning about Australian culture.¹⁹ At the graduate level, four University of Technology Sydney (UTS) doctoral students were selected in 2019 as Stanford University Innovation Fellows at the Hasso Plattner Institute of Design (d. school). They will develop new ways to use design thinking to connect and integrate higher-degree research (HDR) students at UTS with cross-disciplinary content and learning opportunities across UTS faculties, schools, and industry partners.²⁰

Examples of various areas of research collaboration include the following:

- The Stanford Woods Institute for the Environment and the University of Western Australia (UWA) are jointly promoting the development of collaborative research projects focused on finding solutions to major freshwater and marine sustainability challenges. The three-year program funds joint PhD-level research, publications by Stanford and UWA researchers, and joint bids for competitive research.²¹
- UTS Business School and Stanford Australia Foundation (SAF), an Australian alumni scholarship initiative linked to Stanford’s Graduate School of Business, launched a five-year partnership in 2018 to help strengthen capacity in Australia’s nonprofit sector through a series of academic and leadership workshops in Australia and SAF scholarships for nonprofit leaders to attend Stanford.²²

- Stanford has joined with Southern Methodist University (SMU), Texas-based data analytics firm HMS, and Australia's Digital Health Cooperative Research Centre—a government-backed task force of more than 80 businesses, universities, and health technology providers—in a seven-year project to find ways to bring down healthcare costs by using large-scale data analysis to inform predictive models of risk factors, such as the odds of a patient returning to the hospital, or prescribing practices and patient traits that increase the likelihood of opioid addiction.²³

The Stanford Australia Association, an alumni group, has an estimated 600 members across Australia.²⁴ Among its initiatives is the Stanford Australia Foundation.²⁵

UC Berkeley's Education Abroad Program offers study programs in international security at Australian National University in Canberra; marine biology and terrestrial ecology at the University of Queensland (Brisbane); sustainability studies at the University of Tasmania (Hobart); and physics at the University of Sydney. UC Berkeley (UCB) also has affiliations with the University of New South Wales (Sydney) and the University of Melbourne.²⁶ UCB reports 478 alumni in Australia, with representative contacts in Adelaide, Canberra, and Melbourne.²⁷ The Berkeley-Haas School of Business has its own alumni group, with representatives in Sydney and Melbourne.²⁸

Joint research projects include the following:

- Since June 2019, Berkeley's Breakthrough Listen initiative has released three petabytes of radio and optical telescope data to the general public from the world's largest steerable radio dish at Green Bank Observatory in West Virginia, and from two telescopes—the Automated Planet Finder, built and operated by UC Berkeley at Lick Observatory near San Jose, and the Parkes radio telescope in New South Wales, owned and operated by CSIRO. The data is released to invite crowdsourced study as part of the Search for Extraterrestrial Intelligence (SETI) program.²⁹
- UC Berkeley and Lawrence Berkeley National Laboratory (Berkeley Lab) researchers, in collaboration with Monash University in Australia and the Institute for Basic Science (IBS) in South Korea, have developed a technique that produces atomic-scale 3D

images of nanoparticles tumbling in liquid between sheets of graphene, the thinnest material possible.³⁰

- In 2018, Monash University and Berkeley Lab researchers demonstrated electronic switching in an exotic, ultrathin nanomaterial grown at Berkeley Lab's Advanced Light Source facility. The material, sodium bismuthide (Na_3Bi), can carry a charge with nearly zero power loss at room temperature, making it a likely option for use in next-generation transistors.³¹

UC Davis (UCD) offers students a range of Australia study abroad options,³² including eight-week engineering and computer science internships with large and small companies in Sydney; a spring-semester viticulture and enology exchange with the University of Adelaide, where 70% of Australia's wine research is conducted; and four-week wildlife, conservation, and veterinary medicine internships at zoos and wildlife parks, offered in partnership with veterinarian-designed study program provider Loop Abroad. UCD also maintains important research connections to Australia rooted in agriculture, viticulture, veterinary medicine, and healthcare:

- The late UCD professor Harold Paul Olmo's clonal research at the university's 40-acre Oakville Station test vineyard in 1939 produced the Cabernet Sauvignon grape for which the Napa Valley would become famous. His subsequent work in Western Australia's Swan Valley in 1955 identified the potential of the Great Southern region for vineyard cultivation and today contributes to understanding of how growers and vintners might adjust practices to adapt to climate change.³³
- UCD enologist Anita Oberholster is collaborating with Australian researchers, grape growers, and vintners to address volatile phenols—residual “smoke taint”—in wine from areas prone to wildfires.³⁴
- In February 2020, UCD veterinarian and chief of integrative medicine Julie Peyton and her husband Eric Johnson, an associate professor of diagnostic imaging, were part of a visiting US team treating animals injured in the Australian bushfires. A collagen treatment Peyton developed using fish skin to treat animal burns was applied to aid kangaroos and wombats in healing and pain control.³⁵

- In 2018, UC Davis announced the first US university partnership with Australian scientific research organization CSIRO, a five-year agreement connecting UCD researchers and CSIRO's network of 4,500 scientists to collaborate on joint proposals and research, workshops, and student exchanges in areas such as agricultural and environmental sciences, engineering, and veterinary medicine.³⁶
- Also in 2018, UCD's College of Agricultural and Environmental Sciences signed a two-year research and information-sharing agreement with Hort Innovation, an Australian grower-funded horticultural research organization, to conduct joint research in smart farming, pollination, and food science and to establish a PhD exchange student program.³⁷

UC San Francisco (UCSF) chancellor Sam Hawgood joined the academic medical center in 1982 as a neonatal research fellow, with a medical degree from the University of Queensland, a pediatrics residency at Royal Children's Hospital in Brisbane and a neonatal research fellowship at Monash University in Melbourne. He served as an associate director of UCSF's Cardiovascular Research Institute, chair of the Department of Pediatrics, and dean of the School of Medicine before being named chancellor in 2015.³⁸ UCSF has managed to attract other Australian graduate and post-doctoral talent to its research facilities:

- The New South Wales Ministry of Health sponsors two postgraduate scholars to the UCSF Rosenman Institute scholar program for two years, with the goal of identifying needed treatments and facilitating medical device technology commercialization that could lead to new company formation. Current scholars Iman Manavitehrani, a biomaterials engineer who completed his PhD at the University of Sydney, and Maryam Parvis, a biomedical engineering entrepreneur with a PhD in chemistry from the Australian Centre for NanoMedicine at the University of New South Wales, co-founded SDIP Innovations in 2018. The company is intended to commercialize JAZBI, a regenerative medicine technology for bioresorbable orthopedic and cardiovascular implants.³⁹
- In 2019, researchers at UCSF and the University of Queensland announced their discovery of a scorpion toxin that targets the "wasabi receptor," a

chemical-sensing protein in nerve cells that causes the sinus sting from horseradish or wasabi and the tears associated with chopping onions. Scientists believe the toxin can be used as a tool for studying chronic pain and inflammation and may lead to development of new, non-opioid pain relievers.⁴⁰

UTS Seeks Industry Partners to Commercialize Research

The University of Technology Sydney (UTS) began in Sydney in 1878 as the Technical and Workingmen's College, an expansion of an earlier mechanic's institute created to preserve the initial mission of providing basic vocational education as the institute evolved as a technical school for the industrial age. The popular college opened branch campuses around the city and ultimately was taken over by the government and consolidated as the Sydney Technical College in 1882.⁴¹

UTS became a university in 1988 and today has 46,000 students, more than 15,000 of them international. It offers some 500 courses on 2,400 subjects and has more than 250 university exchange agreements spanning 43 countries. At UTS, Computer Science & Engineering is an exceptional area of strength, placing UTS first nationally and 13th in the world in the 2020 ARWU rankings for that field, along with Telecommunication Engineering, for which UTS also received 2020 ARWU rankings of first nationally and 19th in the world. UTS has consistently ranked among the top 20 and is currently ranked 15th worldwide in the Times Higher Education 2020 ranking of young universities (under 50 years old).⁴²

Associate Dean of Research for the Faculty of Engineering and Information Technology (FEIT) Professor Michael Blumenstein says UTS is strategically placed among Australia's public universities in that its primary focus is STEM and technology excellence. Its unique technical school roots foster a culture emphasizing private sector collaboration and commercialization of technology. That, he says, makes for a natural synergy with Silicon Valley. "We're a slight outlier, but in a good way," Blumenstein maintains. "The government has pushed universities to become more involved with industry as a source of new ideas in both directions. There's a perception that universities in their ivory towers are difficult to work with, but we're one of the universities that has actively reached out."⁴³

UTS initiated a world-first three-way industry technology partnership in 2018 with the launch of an Internet of Things (IoT) Innovation Lab in partnership with Cisco Systems and North Carolina software and analytics firm SAS. Among the first projects under this partnership was an energy conservation and cost-reduction initiative by the Faculty of Engineering and IT (FEIT) to process real-time data generated by the more than 3,000 IoT sensors throughout the faculty building and its electricity microgrid.⁴⁴ Next steps have involved engaging with industry partners to address their IoT-related challenges, processing and analyzing their data and testing solutions.⁴⁵

In other such partnerships,

- a Digital Transformation Centre, opened on campus at UTS in 2019 with Virginia-based IT services and solutions firm DXC Technology, serves as a focal point for industry collaboration, with engineering students embedding with companies as interns, and with UTS and DXC as technology solutions partners;⁴⁶
- OnePath, a specialist provider of wealth and insurance advice solutions—part of the Zurich Insurance Group—has rebuilt its underwriting system, using data science and artificial intelligence expertise from the Faculty of Engineering and IT, to construct policies in real time for OneCare insurance applicants;⁴⁷ and
- UTS is working with New South Wales public water system operator Sydney Water to develop innovative pipe linings and robotic tools for safer, more efficient inspection of pipes, determining areas of repair long prior to their failure.⁴⁸

UTS has recently been focused on expanding its university and company connections in the United States, particularly in the western states. While it has collaborative relationships with 18 universities and institutes worldwide through its Key Technology Partnership Program, only one, the University of Arizona, is in the United States.⁴⁹

Forging closer ties in Silicon Valley is a top UTS priority, Blumenstein says, in part to attract corporate investment and engagement but also to leverage capabilities for significant real-world impact. The university hosts Google research fellows and attracts Google Faculty Research Awards, and in early 2020 Professor Mary-Anne

Williams, director of the Magic Lab at UTS, won a Google TensorFlow Faculty Award that provides funds to develop new, or improve existing, machine learning courses.⁵⁰

An equally important priority is to transform business and academic culture. “We as a country have one of the best records for research in terms of the quality of output per capita among OECD countries,” Blumenstein argues. “We have a lot of talent, but often they pitch an idea too early and they fail. In the Research Triangle in North Carolina or in Silicon Valley, when startups fail the founders just go back to their companies, pick themselves up, and keep going. They have an ecosystem we don’t have.” The hope is to adopt and embed elements of this ecosystem and to transform the existing culture.

UTS has sweetened the deal further for business partners, announcing in January 2020 that the university’s default position was that it would not claim intellectual property rights on joint research with industry partners for work undertaken as fully-costed research. The policy targets small and medium-sized enterprises that are first constrained from innovating because they are undercapitalized and lack in-house research capability and are then burdened with a royalty structure. At the same time, universities often end up spending more to enforce IP than they recover. UTS has taken the new approach under a 2016 protocol as part of the Australian Technology Network of universities.⁵¹

Supporting Digital Democracy and Security

A different kind of partnership is being established at the newly created Jeff Bleich Centre for the US Alliance in Digital Technology, Security and Governance at Flinders University in Adelaide. Named for Jeff Bleich, a Bay Area resident and former United States Ambassador to Australia under Barack Obama, the Centre’s stated objectives are to educate the public and policymakers on the challenges posed to democratic societies by digital technologies and to promote cooperative initiatives through research and support for policymakers. The Centre also seeks to facilitate partnerships with academia, industry, and the defense community; become a research leader at the intersection of digital technology, security, and governance; and serve as a resource for allied democratic nations. Developing research links with institutions of higher education in California is a priority.⁵²

Coordinated Networks

Australian companies, entrepreneurs, and investors looking to tap Bay Area capital, talent, know-how, and market access benefit from a clearly-defined, mutually supportive professional network in which Australia's federal and regional governments, research institutions, companies, and entrepreneurs work in close communication and cooperation. An added benefit is that these entities typically have more to work with in their promotion efforts.

Startups and Venture Capital

First, Australia's R&D capacity and talent pool punch well above their weight in relation to the size of the domestic market, attracting VC and CVC interest for their quality and growth potential. Secondly, Australian startups are under less pressure from early-stage investors to come to market prematurely. As a result, most have established track records on both the engineering and the business side.

The rewards are evident in the list of unicorns (startups with valuations of US\$1 billion or more) coming out of Australia since 2011, including buy-now-pay-later (retail layaway) fintechs Afterpay and Zip Co, cross-border remittance payments platform Airwallex, enterprise collaboration software firm Atlassian, graphic design platform Canva, employee feedback and analytics provider Culture Amp,⁵³ small business lender Judo Capital, 3D aerial mapping firm Nearmap, and workplace safety/quality control analytics platform SafetyCulture.⁵⁴ Two additional tech unicorns are based in Silicon Valley but have Australian co-founders: autonomous vehicle rideshare company Zoox and gene sequencing technology firm 10X Genomics.⁵⁵ Another 50 Australian startups are each valued at \$100 million or more.⁵⁶

Sydney-headquartered Canva, which helps users create graphics and visual content for social media, is among the companies that have turned to Silicon Valley for growth capital. Founded in 2012, Canva raised US\$40 million from Sequoia Capital China, Blackbird Ventures, and Menlo Park's Felicis Ventures in a 2018 Series C round. Its May 2019 Series D round raised another US\$70 million from Boston-based General Catalyst and other investors and was followed in October by a

Series E round that raised another US\$85 million from its previous investors.⁵⁷ In June 2020, Canva announced that it had raised from the previous investor group another US\$60 million in new investment that values the company at US\$6 billion, nearly double the previous valuation of US\$3.2 billion set in October 2019.⁵⁸

Among Canva's earliest investors is San Francisco-headquartered global venture capital firm and accelerator 500 Startups.⁵⁹ An active investor in Australia, 500 Startups has made more than 20 investments⁶⁰ tied to the region since 2012, across the spectrum of its family of funds. Other examples of companies in its Australia portfolio include Queensland-based Gilmour Space Technologies, which is developing hybrid propulsion technologies for the launch of small satellites into space, and HappyCo, which enables the remote inspection, management, and monitoring of apartment buildings and other rental housing and hospitality real estate. One attraction found by 500 Startups is that Australia has an outward-looking orientation that encourages Australian startups not only to be creative but also to think globally.⁶¹

Venture capital continues to attract Australian startups to the Bay Area, due in part to the limited amount of venture funding available in Australia and the relatively conservative approach of investors. While Australia produces high quality research and innovative startups, it is less strong in technology commercialization and in scaling new businesses—an area where the Bay Area fills a gap. As a leader active in Australia's innovation ecosystem, Leigh Kelson explains, "Australians are fantastic at innovation. There are great minds who do great research, but there's not enough capital and the market is limited so commercialization is the challenge. You can come up with an idea, market test it, and get early customers. Australia is good from that perspective because it's a tight, high-end market. But we don't have paths to scale here, so Australia needs to partner with Silicon Valley and places like Europe in order to attract capital and scale globally."⁶²

The scale of support and capital available in Silicon Valley and San Francisco particularly draws companies that have achieved a level of local success and are reaching the growth stage that requires larger infusions of capital. Team collaboration and productivity software

company Atlassian, founded in 2002, after several years of bootstrapping raised US\$60 million from Accel in 2010 in a funding round that brought Accel's expertise onto its board, fueled acquisitions, and was also used to facilitate liquidity for employees.⁶³ Headquartered in Sydney, with 5,000 employees⁶⁴ and US\$1.6 billion in revenue for the fiscal year ending in mid-2020,⁶⁵ the company currently has 12 offices in seven countries, including two Bay Area offices (in San Francisco and Mountain View).⁶⁶ Kaggle, a data science, machine learning, and predictive modeling platform started by Australian entrepreneur Anthony Goldbloom in Melbourne in 2009, established its headquarters in San Francisco, received Series A investment led by Khosla Ventures in 2011,⁶⁷ and was acquired by Google in a multi-million dollar deal in 2017.⁶⁸

Government Trade Promotion and Investment

Within the Australian Consulate General offices in San Francisco, the Australian Trade and Investment Commission (Austrade), a government trade promotion and investment arm, works with regional trade and investment specialists for Victoria and Queensland, located in the same building, and with a New South Wales office across the street, to expand commercial relationships. Austrade administers one of five global Landing Pads in San Francisco to connect market-ready Australian startups with investors, advisors, and companies, to advance their strategic goals. The other four Landing Pads are in Tel Aviv, Berlin, Shanghai, and Singapore.⁶⁹

Victoria

"A good part of what we do is foreign direct investment supporting US companies to come to Melbourne, Victoria and establish a presence in our market," says Commissioner to the Americas for the Government of Victoria Michael Kapel, who has served since 2012 in the San Francisco office, which is the head office of six in the United States and one of 21 Victoria offices worldwide. "We look to bridge sector capability gaps in Australia, we look at skilled job creation, but more importantly we look for transformation capability through technology transfer."⁷⁰ A typical example is San Francisco fintech leader Square, which first established its Australian headquarters office in Melbourne and then expanded its

operations there with the establishment of its first-ever engineering hub outside of the United States.⁷¹ Uber Air also announced in 2019 that following a global search, it had selected Melbourne as the first city outside of the United States to trial their new aerial ridesharing service and technology.⁷² Kapel says that "Melbourne is a leading tech city in the region with a strong skills base and a vibrant tech ecosystem which is a major drawcard for international tech companies and investors."

Other Bay Area companies that have set up Australia or Asia-Pacific headquarters in Melbourne, Victoria are Slack, Zendesk, Splunk, Eventbrite, HighTail, Expensify, Stripe,⁷³ and DoorDash.⁷⁴ Company presence has also meant investment, such as Salesforce's CVC investment participation in Airwallex's massive A\$250 million Series D round, which closed in April 2020.⁷⁵ Kapel sees opportunities going forward to lure AI, data analytics, cybersecurity, and biotech business. He works with the University of Melbourne and Monash University, which have representatives in the Bay Area.

Queensland

Queensland has 16 global offices, with San Francisco serving as the state's North America office; it also has a representative office in New York. Trade and Investment Queensland Commissioner Viki Forrest estimates that 20% of her work in the Bay Area involves representing Queensland companies that have business interests in North America, while 80% is attracting FDI.⁷⁶

The region's distinct focus is in areas such as renewable energy and storage, synthetic biology relating to both food and materials, and robotics, in particular drones. Queensland, Forrest says, has made unmanned aircraft systems a priority sector after the rolling succession of natural disasters eastern Australia has experienced in recent years—to the point that the region has a dedicated RFQ specialist for unmanned aircraft systems deployed in medical emergency services.

In life sciences, Trade and Investment Queensland and Life Sciences Queensland, an industry group, partnered in the autumn of 2019 with the California Life Sciences Institute (CLSI) and its FAST accelerator advisory program to bring five Queensland biotech companies to the Bay Area for a 12-week program of networking, advisory sessions, and targeted introductions.

Companies included medicine delivery system developer De Motu Cordis, digital diagnostics company Ellume, medical device maker Field Orthopaedics, gut microbiome diagnostics and therapeutics firm Microba, and cancer treatment developer Zucero Therapeutics.⁷⁷

Forrest notes that among academic institutions, the University of Queensland and Queensland University of Technology maintain strong Bay Area presences through their alumni organizations.

New South Wales

New South Wales (NSW) has perhaps the most extensive Bay Area connections, including a state-to-state relationship with California and a San Francisco-Sydney sister city relationship dating back to 1968. NSW Trade and Investment Commissioner Joe Kaesshaefer says the city connection is largely cultural versus commercial, focused on event exchanges like museum exhibitions or comparing notes on urban planning issues.⁷⁸

State-level cooperation has focused primarily on shared issues such as drought. The same climate conditions and terrain that produced back-to-back discoveries of gold today produce similar conditions for drought and wildfires. The United States and Australia have had a bilateral wildfire resources exchange agreement in place since 2002; 130 Australian and New Zealand firefighters arrived in California in 2018 to fight wildfires, and 150 American firefighters⁷⁹—including a 20-person hand-picked team from California—repaid the favor during the 2019–20 bushfires.⁸⁰ Three firefighters from California died in a tanker plane crash in New South Wales in January 2020.⁸¹ The New South Wales Rural Fire Service and the California Department of Forestry and Fire Protection also cooperate on drought and fire control planning. Again in the summer of 2020, New South Wales rallied to meet California's request for specialized firefighters to assist by filling leadership roles for up to a month in the efforts to fight massive lightning-caused wildfires across California.⁸²

Among the Bay Area companies with significant presences in New South Wales are Facebook, Apple, Google, Salesforce, Uber, and Airbnb. University of Sydney, University of New South Wales, Macquarie University, and University of Wollongong all have Bay Area alumni chapters.

Strategic Connections

Synergies with California and the Bay Area can be found at several levels. Leigh Kelson is founder of the live streaming social video production company BeachCity Media,⁸³ Program Director for FireTech Connect, Entrepreneur in Residence for the Australian Federal Government and the State Government of Queensland, and adviser to the San Francisco-based accelerator US Market Access Center. He believes that instead of trying to replicate Silicon Valley or building more physical accelerators, Australia has an opportunity to create something unique. That can happen, he believes, by picking a limited number of specialties built around its market strengths and focusing on solving real problems.

One example is FireTech Connect, a collaboration program created to speed the adoption of advanced technologies that deal with wildfires—a growing problem for both Australia and California.⁸⁴ The idea is to build networks in both markets to de-risk new technologies for early adoption and build commercial capabilities within tech companies themselves. Approximately 80 individuals and companies including scientists, technologists, commercialization advisors, venture capitalists, government agencies, and emergency services experts—roughly 40% in California and 60% in Australia—are currently in the network. Designed in 2019 to develop procurement opportunities with governments and organize conferences on fire-related technologies in Australia and California, the program is currently virtual due to COVID-19 but is continuing to build. Australia's experience with bushfires has helped it to develop expertise.⁸⁵

Among FireTech Connect participating companies, Queensland-based Helitak designs and manufactures next-generation aerial fire suppression systems for helicopters, innovating new high-tech water tank designs for Blackhawk, Super Puma and other helicopters to enable them to deploy more water and target their drops more accurately.⁸⁶ Helitak announced in June 2020 that it had received a contract from the US Forest Service, in preparation for the 2020 North American fire season, and that its tank had been purchased by High Performance Helicopters in Redlands, California, for use in fighting California wildfires.⁸⁷ Fireball International, also headquartered in Queensland with offices in Nevada and British Columbia, uses satellites for early fire detection.

Its technology is currently being tested in two satellites deployed over California and in 90 cameras on fixed towers across the state. And the technology developed by FireTech Connect participant Atira Systems, a Santa Cruz company producing a biodegradable gel fire retardant that uses technology developed at UC Berkeley, is currently in trial use by Australia's McDermott Aviation, a well-known aerial fire attack company.⁸⁸

State offices from Australia share the goal of attracting companies that can support high-quality jobs, particularly in tech, and present Australia as a platform for doing business in the Asia-Pacific region, and as a place with strong legal protections for intellectual property that offers a high quality of life. Sydney is upping its game with a multi-billion dollar investment project to develop the area between Sydney's Central Station and Eveleigh as a tech hub dubbed the Tech Central Precinct.⁸⁹ Anchored by the corporate offices of Atlassian and located close to UTS, the development—on a scale comparable to New York's Hudson Yards⁹⁰—will include Sydney's new Quantum Academy⁹¹ and a National Space Industry Hub⁹² and is being marketed as a major Asia-Pacific startup center.

Kaesshaefer and Victoria's Kapel agree that Australia, Hong Kong, and Singapore are ambitious in their efforts to attract the APAC headquarters of foreign companies, and Kaesshaefer adds that "The competitive nature of FDI makes it essential that we identify unique selling propositions for investors." Each location has pluses—Hong Kong's world-class technical institutes, Singapore's generous incentives, and Australia's universities—along with talent and cost advantage in key technology segments.

Australian entrepreneurs, Kaesshaefer says, have a separate calculation. While Australia is the preferred location to launch a company out of university, and perhaps later to return and establish a national or regional headquarters, raising capital and scaling the business must be done overseas, typically in the United States or the United Kingdom. "It's much more common for founders to start businesses in Australia and then come here to search for funding," he explains, "and they come here much sooner because of the size of the addressable market."

Kaesshaefer believes a deeper pool of venture capital in Australia—helped by tax and investment incentives introduced in late 2015⁹³—will ease those pressures over time. For now, there is concern about educating tomorrow's business innovators only to lose them to foreign capital and markets. "Australia wants its founders back," he says.

Landing Pad

In the meantime, Australian founders continue to flow to the Bay Area. "Market-ready" is the operative term behind Austrade's Landing Pad. The program acts as an advisor and accelerator for Australian startups that are technically early stage—but not too early. The idea is to get the timing right to maximize the benefits of a move to Silicon Valley and then provide the right level of targeted support. Landing Pad San Francisco operates out of a cluster of WeWork spaces in San Francisco's financial district, providing work space, contacts with mentor networks, strategic partners, investors, and other Australian founders, as well as workshops in legal and accounting essentials, communications and marketing, and making investor pitches.⁹⁴

"A company must have gotten to a point where it's developed a product in Australia, tested it in the US market, and has some indication of early traction in the US," says San Francisco Landing Pad Market Entry Services Director David Brown.⁹⁵ Brown comes to the job as a former business owner, private equity/M&A lawyer, and employee #1 for an Australian tech startup, tasked with leading its expansion in the North American market.

General minimum eligibility requirements for Landing Pad companies are that they have 20+ employees, are at least "on the cusp of Series A" funding, have raised at least \$1 million, and are poised to expand in the US market. "We do take companies earlier if they meet certain criteria, such as having received early grants or been accepted by an incubator or accelerator," Brown adds, "but it's too early to come if you don't have a 12-month plan and the financial means to pay for living costs." In terms of companies he is seeing, the biggest share are in SaaS, followed by enterprise applications and cybersecurity. Landing Pad has hosted events in cybersecurity and agtech and has also worked with companies in the AI and space sectors.

Among the 94 companies San Francisco Landing Pad has hosted are conversational AI company Curious Thing, corporate rideshare solutions company Liftango, hospital management software company Butterfly Systems, agricultural analytics company FluroSat, AI-powered search company Sajari, gene therapy biotech company Indee Labs, and cloud-based live image data analytics platform Unleash Live.⁹⁶

The program has historically hosted three cohorts of 10 companies each over a year, or a total of 11 cohorts through the end of 2019. There have been two sector-specific cohorts: one in cybersecurity partnered with AustCyber,⁹⁷ and another focusing on defense dual-use technology partnered with CSIRO.⁹⁸ In 2020, the program moved to a rolling cohort framework, serving approximately 40 companies a year, but after accepting seven startups in February, the program was stalled by COVID-19.

CSIRO

CSIRO US, the North American innovation center for CSIRO (Commonwealth Scientific and Industrial Research Organization), is another active player in Australia's Bay Area support network. CSIRO is Australia's pre-eminent national science organization, functioning in much the same way as US national research laboratories do, both domestically and overseas. It is internationally recognized for inventing fast Wi-Fi as well as for a 50-year relationship with NASA, where its southern hemisphere tracking stations serve as a critical part of NASA's Deep Space Network.

Executive Vice President Susan Lucas-Conwell heads CSIRO's North American operations and established its Silicon Valley innovation center in 2017. She previously helped lead Berkeley cleantech incubator Siemens Technology-to-Business (TTB) Center and was a board director and CEO of the Silicon Valley Forum, a professional organization.

CSIRO's broad mission, Lucas-Conwell explains, is to "solve the greatest challenges through innovative science and technology" across all areas of science.⁹⁹ With a workforce of more than 5,000 scientists, it has generated 3,860 patents, 446 licenses,¹⁰⁰ and 450 spinoff companies.¹⁰¹ CSIRO's science areas are, to some extent, shaped by the significant natural resources

share of Australia's economy and the limited markets supporting the commercialization of needed research.

CSIRO partners with commercial, industry, and research organizations on a range of solutions from strategic advice and planning, research and development, IP licensing, and commercialization, to prototyping, testing and certification, SME funding, and scaling up. In this capacity, it participates in more than \$350 million in external research projects worldwide through its 55 research sites across Australia¹⁰² and international hubs in Silicon Valley, Chile, France, and Singapore and teams based in Vietnam and Indonesia. Major fields of research include energy, space, oceans and the environment, manufacturing, food and agriculture, and health and biosecurity. CSIRO US facilitates relationships with Global 1000 customers, US government agencies, universities, and research institutions. As to why CSIRO is in Silicon Valley, Lucas-Conwell notes that "all innovation doesn't come from Silicon Valley, but if you're not here, you'll be missing something important."

In North America, CSIRO partners with¹⁰³

- UC Davis, NASA, and Amazon Web Services on the development of the Data Cube California Centre of Excellence, building on a larger global CSIRO initiative: The Open Data Cube is a repository for global earth science observation data. Data Cube California will collect and analyze data for key projects targeting wildfire recovery and mitigation, forest health monitoring, agriculture, mining, and climate change adaptation.
- Silicon Valley Global (SVG) Ventures-THRIVE, a global food and agriculture innovation platform for advancing the future of food and agriculture by connecting corporate partners with entrepreneurs and investors that are developing new, value-adding technologies: CSIRO formed a three-year partnership with SVG Ventures-THRIVE to bring promising agritech Australian start-ups to Silicon Valley to showcase their projects to US investors and corporate partners for funding and commercialization.
- US Department of Energy National Laboratories through its Laboratory-Directed Research and Development (LDRD) program: The LDRD program enables overseas entities to collaborate on research

with DOE's 17 National Laboratories. CSIRO has worked in the Bay Area with Lawrence Livermore National Laboratory researchers on climate modeling and ocean salinity¹⁰⁴ and with Lawrence Berkeley National Laboratory on projects ranging from the analysis of radio telescope data from space to photovoltaics.¹⁰⁵

CSIRO, through its Innovation Fund, also facilitates investments in Australian innovation companies. An example was CSIRO's leading participation in the A\$15 million 2018 Series A investment round of Adelaide-based direct-to-orbit IoT satellite connectivity company Myriota. Boeing HorizonX Ventures¹⁰⁶ also invested in the Series A round along with Queensland-based venture capital firm Blue Sky Private Equity.¹⁰⁷ Myriota's A\$28 million Series B round in April 2020 has brought in additional partners.¹⁰⁸ "When we operate in Silicon Valley," Lucas-Conwell says, "our focus is not as much on the startup environment as on the innovation environment." Companies' research, she stresses, "must be at the readiness level."

Business and Professional Support

The largest and most influential membership organization for companies operating between Australia and the United States is the American Chamber of Commerce in Australia (AmCham). With offices across Australia and connections to Bay Area organizations, AmCham provides networking, advocacy, access, information, and visibility for those involved in two-way trade and investment.

Several business-focused organizations add to the professional network infrastructure for Australian nationals in the Bay Area, alongside government initiatives and alumni groups.

The Australian American Chamber of Commerce, San Francisco hosted its 40th annual Australian Gala on February 1, 2020. In addition to celebrating Australian-America businesses, the program recognized the contributions to innovation of individuals and companies such as Industrial Light & Magic.¹⁰⁹ Core sponsors and members of the chamber, which organizes events throughout the year, include Chevron, Telstra, Penfolds, HP, Bluestone Lane, and Qantas.

Advance.org, an online platform for connecting Australian expats worldwide, was launched in 2001 by Australian Consul-General Ken Allen in New York in the aftermath of the 9/11 attacks. Now headquartered in Sydney, Advance.org hosts a range of business events enabling expats to meet and share ideas, from digital roundtables to live town halls and conversations, to an annual Advance Global Summit and an Advance Awards dinner. The group also develops research and reports on the profile and activities of Australian expats. The underlying objective of Advance.org is to maintain contact and provide support for nationals abroad and inspire the next generation of Australian global leaders.¹¹⁰

The Aussie Founders Network (AFN) is a member-driven community of Australian founders, investors, and industry advisors that grew out of a series of regular Founder Lunches in Silicon Valley in 2015 and was formally established as a public benefit nonprofit in August 2016. Its stated mission is to support, build, and elevate the role and impact of the Australian tech community globally, with a vision of building a network of Australian-founded tech companies whose valuation is \$100 billion.¹¹¹

AFN's membership includes more than 300 founders representing businesses of all sizes, from one or two people to unicorns, and a database of about 2,000, with half of those in the Bay Area. Founding board member Geoff McQueen cites a couple of key motivations for setting up the organization. "In the beginning we were an information support group," he explains. "Running a company can be a lonely thing, even with a co-founder or two, and there are a lot of stressful things you can't share with everybody on the team when people are looking to you as the leader." Aussie Founders fills a key gap when members pay it forward by sharing their experience of coming to the United States: "Sharing history and experience creates a lot of shortcuts."¹¹²

McQueen knows from experience, having founded cloud-based professional services automation platform Accelo. His initial visit to Silicon Valley in 2005 was with file-sharing software company, Omni-Drive—"DropBox before there was DropBox." After some good publicity on TechCrunch, he recalls, "we were deluged with meetings and within a week Kleiner Perkins was

calling us; they didn't even know we were in Australia. We got on a flight; it didn't work out." Accelo began in the Bay Area in 2011. It was an uphill climb on the revenue side because the company's market was small- and mid-sized businesses, typically with small orders. "The first three years we were bootstrapping, it was a grind," McQueen recalls. "No heat, no air, homeless people in the doorway in SOMA."

The first employee was hired in 2012; by the end of 2014 the company had earned its first US\$1 million in revenue, which attracted initial seed funding. From there, a US\$9 million Series A round in 2017 put the company into overdrive; Accelo today has a marketing and customer support staff of 15 at its 4,000-square foot offices in San Francisco; an after-sales support staff of 30 in Denver; and an engineering and design team of 50 in Australia.

Those staff allocation choices, McQueen says, boil down to one overarching consideration in the Bay Area: cost. "If I had my way, we'd have all 50 of our US headcount in San Francisco, but we'd have to raise prices to a point where it would be a hard sell to a business on Main Street." Quality of life is also an issue for workers who are older and/or have families, or who prefer a bike commute in less traffic, with better schools and more house for the dollar. "If your key cost is HQ and your company has most of its center of gravity in the Bay Area, you should be there; make that your focus and hold your nose about the cost, because you can pass it on to your customers," he says. "We can't do that."

McQueen and other founders interviewed for this report agree that this cost/quality of life calculation is changing the competitive dynamic among states and localities hoping to lure tech business from Silicon Valley. Companies engaged in cloud-based software development and SaaS, where staff can work and the business can serve customers from anywhere with a reliable data center and broadband connection, are especially susceptible. Texas, Colorado, Utah and other mainly western states have set their business development sights on Silicon Valley, offering companies more affordable housing, less traffic, a friendly business environment, outdoor experiences, and lower taxes, all within a short physical flight time to and from the Bay Area, if necessary.

With this experience under their belts, McQueen and other founders see AFN as a venue not only to share information and commiserate, but as a first point of contact for new arrivals, "to pay it forward and help other people make different mistakes." AFN's hosted events these days are all online and mostly about coping in the COVID-19 environment, with titles like "Cashless after COVID-19: Rising payments technologies and trends in Australian fintech," and "Immersive innovation: The entertainment experience in a post-COVID world."¹¹³

While it has an office and a community manager, AFN maintains its largely volunteer-run structure and has no plans for formalized mentorship programs, large networking events, or consulting. McQueen says that as an organization of founders, set up by founders for founders, "we're all busy trying to get stuff done. We're working 80 to 100 hours a week—work that's tied to a visa that's tied to employment. No one has time."

Growing in the United States Space Entrepreneur

Australian Chris Boshuizen wasn't sure about next steps after receiving his PhD in theoretical physics from the University of Sydney in 2005. "I wanted to work in space, but the problem was that Australia doesn't have an equivalent to NASA," he recalls. "Engineering there was mostly aeronautical and I didn't want to build planes."¹¹⁴

Fortune smiled. His work organizing and reviewing papers for the Space Generation Congress, a conference series for university students and young professionals that is focused on the sustainable exploration of space, led to a surprise 2008 job offer from NASA's Ames Research Center in Mountain View to be a space mission architect—part of a study group of young technologists tasked with developing new mission concepts for the space agency. "The decision to go was very quick," he says. "I knew that if I'd applied, I probably wouldn't have gotten the job."

Boshuizen's signature project was an inexpensive, lightweight miniature satellite called PhoneSat, built around an off-the-shelf smartphone processor, which fit nicely into NASA's priority of doing more with less at lower cost. "Everything in the early days of satellites was a box inside a box inside a box—a camera, a computer,

a power source, and a propulsion system,” he explains. “That’s a lot of dead space if you pull it apart, whereas a smartphone has no boxes, no air, and the space carefully carved out.”

The low-cost, off-the-shelf commercial components strategy behind PhoneSat, in turn, became the basis for San Francisco-based Planet Labs, a nanosatellite manufacturer and operator formed in 2011 by Boshuizen and NASA Ames colleagues Will Marshall, who worked on PhoneSat and on lunar orbiters and landers, and Robbie Schingler, a former NASA Ames policy and management analyst and special assistant to the Center director.¹¹⁵

Planet Labs has launched nearly 300 of its shoebox-size Dove satellites since 2013 and keeps 150 in low-earth orbit, the number needed for continuous, daily-updated mapping of the Earth. Cheap to produce, with a useful life of up to three years, the Doves monitor natural and human activity on a planetary scale, from climate change, weather patterns, and natural disasters to deforestation, crop conditions, and urbanization. The company builds and operates the satellites, and the images and data they generate are used by partners in the defense, humanities, and agriculture sectors. Planet raised US\$183 million in equity and debt funding over 2015–18, and in 2018 the company opened a 27,000-square foot manufacturing facility in downtown San Francisco capable of producing 40 satellites per week.¹¹⁶

The lead investor in Planet Labs’ US\$70 million Series C round in 2015 was venture capital firm DCVC (Data Collective),¹¹⁷ where Boshuizen became an Entrepreneur in Residence in 2015 following the investment, eventually becoming an Operating Partner in 2017. DCVC’s portfolio of companies emphasizes “deep” technology based on significant new scientific and engineering innovation. Boshuizen’s focus with Data Collective is primarily investment in space, with companies such as synthetic aperture radar (SAR) satellite imaging company Capella Space and New Zealand-based satellite launch vehicle developer Rocket Lab.¹¹⁸

Boshuizen was also a founding executive director of Singularity University, helping to raise its initial US\$2.5 million in funding. He currently serves on the board of Advance.org.¹¹⁹

He acknowledges that the decision as a successful entrepreneur and investor to live overseas or return home is a complex one and different for each person. “I love Australia and always imagined I’d retire there when I got to be 90,” he says, “but there’s something about people who move overseas; it takes some level of sacrifice based on a drive to do something higher, which makes a lot of them tend to stay. I don’t have a strong urge to go back right now.”

Afterpay: A Retail Fintech Survives COVID-19

Buying retail merchandise on lay-away—when a customer made a big-ticket purchase in monthly installments, and the store delivered the merchandise after it was fully paid off—fell out of favor in the United States decades ago. In Australia, it never left. Now a new twist on the concept from an Australian company, made possible by technology, is bringing it back to the United States.

Melbourne fintech Afterpay has made a splash in the US market, catering to Millennial shoppers, a market segment spending US\$200 billion annually, nearly two-thirds of whom do not have credit cards.¹²⁰ The new twist is simple: purchases are limited to US\$1,500, split into four payments over eight weeks. The buyer provides basic personal and bank information in a point of sale application, and credit is approved or denied immediately based on a fintech risk model; the retailer is paid up front, so the buyer takes home the merchandise right away. No interest or fees are charged, other than an US\$8 per week fee for a late payment.¹²¹ New charges can’t be made until earlier charges are paid off. Afterpay earns revenue on a mix of merchant and late payment fees.

The company launched in Australia in 2015. A US\$19.4 million infusion from Matrix Partners in 2018 funded Afterpay’s expansion into the US market.¹²² First month US sales on the platform totaled US\$11 million.¹²³ At the end of its first year, Afterpay had 2 million users and 6,500 merchants signed up.¹²⁴ As of May 2020, it had 15,000 brands and 9 million users signed, with 5 million active users and 1 million having joined in the March–May COVID lockdown period.¹²⁵ Afterpay had 15 million app and site visits in April 2020¹²⁶ and approximately 15% of the online purchase market in Australia.¹²⁷ The company reported even faster growth in the UK, with the 2018 acquisition—90% in shares—of Clearpay,

a buy-now-pay-later subsidiary of digital payments platform ThinkSmart Ltd.¹²⁸

In some respects, Afterpay's US market debut was unusually well timed. Prior to COVID-19, brick-and-mortar retail was struggling, especially brand chains and mall-dependent stores selling clothing, footwear, and accessories like key Afterpay merchants Levi's, Adidas, Urban Outfitters, Forever 21, DSW, J Crew, Ray-Ban, Jimmy Choo, Lucky, and Steve Madden. Afterpay not only helped those brands in their transition to e-commerce, but offered a credit and payments solution tailored to their products within the average US\$100–US\$1,000 price point considered to be a sweet spot for Millennial and Gen Z shoppers. Merchants reported high customer conversion rates and loyalty, repeat purchases, and more incremental sales per transaction.

"There's been a general shift from traditional forms of credit," observes Afterpay Executive Vice President for Public Policy and Communications Damian Kassabgi.¹²⁹ "People don't trust traditional banks and credit card issuers." Anyone over the age of 18 with a debit card is eligible for Afterpay's short-term credit, Kassabgi says. The company's Touch System Platform collects point-of-sale and use data to build and maintain a credit profile over time and spot problems early. The US\$1,500 limit keeps consumer debt—and Afterpay's exposure to it—from piling up.

"We created a product with a six-week cycle," Kassabgi says. "Unlike other products, we weren't talking exposure over 18 or 36 months. With a credit card, you don't know how long someone will be paying back US\$10,000, but [with Afterpay] you know every two weeks whether they made a payment or not." Afterpay's default rate, he adds, is 1%, and the risk engine can be adjusted to be more or less conservative as needed.

When co-founders Nick Molnar and Anthony Eisen first joined forces to create Afterpay, Molnar had been selling jewelry online from home, Kassabgi says, and "found he got better engagement from allowing customers to purchase in installments." The key was to develop the right risk assessment technology for a vulnerable small retailer. As business grew in Australia, "retailers suggested that we come to the United States, where consumers were generally using debit cards. We

chose the United States as the first place outside of Australia-New Zealand to launch."

Afterpay's US operations include a staff of 120 in San Francisco, 10 in New York, and a call center in San Antonio. As to relative location, "the strategy from our perspective was more about talent and staffing," Kassabgi explains, "where to find the engineering, the data security, and the risk analytics. This is a place where you can start, find your talent, and build your leadership team. It was a no-brainer to think about the Valley." The company has attracted talent from companies like Uber, PayPal, Visa, and Airbnb over time. Kassabgi comes to his job from public policy positions, with Uber in San Francisco and Singapore, and with Google in Australia. Prior to that, he was a senior adviser to Prime Ministers Julia Gillard and Kevin Rudd.

It was also critical for the company to move closer to Matrix and other partners, benefitting from advice and networks as Afterpay entered the US market. The company's plan is for the team in San Francisco to take Afterpay global. In a year's time, Kassabgi expects the US presence will be the same or larger than the staff of 200–300 in Australia. Within two to three years, he expects most of the leadership team will be US-based. Cost will be a factor in where key US activities are located going forward. But ultimately it will be COVID-19 and evolving omni-channel retail trends that shape industry decision making in coming years.

ResMed: Respiratory Care and Digital Transformation in the COVID-19 Era

San Diego-based ResMed grew out of continuous positive airway pressure (CPAP) technology developed at the University of Sydney in 1981 to address sleep apnea. After publishing their research results in the medical journal *Lancet*, university researchers began the hunt for financing to prototype and commercialize a device.

Dr. Peter Farrell, head of Asia-Pacific activities for medical device firm Baxter International, green-lighted investment toward a prototype and clinical trials, but Baxter ultimately decided not to enter the sleep apnea market. Farrell bought the technology and launched ResMed—an abbreviation of Respiratory Medicine—in 1989.¹³⁰ ResMed is now a US\$27 billion (A\$40 billion) company with 7,500 employees and US\$2.8 billion in

annual sales in 140 countries.¹³¹ Farrell is now chairman of the company. His son Mick has been an employee for two decades and CEO since 2013.

Today, ResMed's focus remains on sleep and breathing with a strong concentration on digital health: it leads the world in cloud-connected CPAP devices, non-invasive ventilators, and digital inhalers and masks. Other products include sleep diagnostic devices; hospital-to-home invasive ventilators like those used to treat respiratory symptoms of COVID-19, as well as for patients with chronic obstructive pulmonary disease (COPD) and other lung diseases; oxygen concentrators and high-flow cannulas; and digital health solutions to treat and improve the treatment of sleep apnea, COPD, asthma, and other respiratory ailments. ResMed also offers SaaS solutions to support the operation and better integration of out-of-hospital care facilities across a broad spectrum, including home medical equipment, skilled nursing, life plan communities, senior living, home health, hospice, and private duty.

To deepen its knowledge base, expand its product and service offerings, and improve care at lower cost through digital technology, ResMed has integrated a series of recent key acquisitions:

- Curative Medical, a Santa Clara developer of non-invasive ventilators, sleep apnea treatment devices, and accessories with manufacturing operations in Suzhou, just outside Shanghai, China (2015);
- cloud-based business management, post-acute clinical care, and patient analytics software providers for skilled nursing facilities, hospices, and home care Brightree (2016), MatrixCare (2018), and HEALTHCAREfirst (2018);
- digital connectivity, analytics, and therapeutics technology provider Propeller Health, based in Madison, Wisconsin and San Francisco (2019); and
- Seoul, Korea manufacturer of home sleep apnea and respiratory care solutions HB Healthcare (2019).

ResMed CEO Mick Farrell says 80% of the company's revenues come from sleep apnea products, with the remaining 20% divided between COPD/asthma products and medical software and services. ResMed has roughly 15% of its workforce in California, including 100 software engineers in San Francisco with Propeller

Health, which makes a patient monitoring sensor that collects usage data from an asthma or COPD inhaler.

"Propeller is a cloud-native company founded by an epidemiologist and a software architect who have family members suffering with asthma and COPD treatments," Farrell says. "Usually you're just given a prescription for an inhaler and told 'good luck with everything.' The Propeller app monitors patients and engages them with their therapy, driving up adherence and driving down costs." Data is also shared with caregivers, and the app helps patients with setup and answers frequent questions. Simplifying use and reducing patient visits has increased adherence to treatment programs and lowered treatment costs by an average 25%, Farrell adds, leading to partnerships with AstraZeneca and Symbicort. A broader joint venture between ResMed and Alphabet life sciences/healthcare unit Verily is exploring software solutions that enable healthcare providers to more efficiently identify, diagnose, treat, and manage sleep apnea and other breathing-related sleep disorders.¹³²

COVID-19 has reinforced demand for respiratory medicine solutions. Compared to last year, ResMed tripled production during its January–March quarter, to 52,000 invasive and non-invasive ventilators, including its bi-level PAP devices and its hospital-to-home life-support ventilator, Astral. Commonly used to treat more complex forms of sleep apnea, bi-level devices have proved valuable in helping to treat thousands of non-ICU COVID patients, allowing treatment in lower-acuity hospital beds and at home with increasing survival rates when the virus was caught early. The digital health component enabled patient monitoring and contact tracing for patients either unable to get to the hospital or unwilling to go.

ResMed invests around 8% of its annual revenue in R&D. Innovation at ResMed is driven by distinct yet interoperating centers of excellence: medical equipment design and advance manufacturing in Sydney; post-acute care software solutions in Atlanta and Minneapolis; and digital health technology in San Diego, Singapore, San Francisco, Madison, Halifax, Dublin, and Lyon. The three largest employee concentrations are also in the company's three biggest tech hubs: Sydney, Singapore, and San Diego.

Conclusion

The complementary nature of the US and Australian economies is one aspect of a deeper cultural, historical, and geopolitical alignment—one that is likely to grow in importance as nations with shared democratic systems deepen their collaboration on issues ranging from defense and cybersecurity to the development of strategic and emerging technologies.

Australia participates in that dialogue through several important avenues that offer opportunities for future cooperation with Bay Area partners. As an advanced economy with sophisticated consumers, it offers an attractive test market for technology and other products. As supply chains in the Asia-Pacific region reconfigure, Australia also has the potential to serve as a stronger base for production, research, and Asia-Pacific headquarters. The Australia-US Free Trade Agreement stands in the background as a vehicle for even closer trade and investment relations.

The preferential E-3 visa simplifies the immigration process for Australians in tech and other industries coming to the United States, which opens the door to a strong flow of research and entrepreneurial talent to the Bay Area as Australian companies look to expand their global reach. That stronger global positioning can in turn strengthen Australian companies at home.

Australia's high-quality universities provide a further platform for cooperation in higher education but also in technology research as Australia works to accelerate the commercialization of its research.

Aligned economies, strong trade and investment ties, and growing technology links create a close relationship between the Bay Area and Australia that is deepened by the connections of history, shared values, and mutual confidence.

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CHAPTER 1

Australia Performs in the Global Economy

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CHAPTER 5

The Australian Community in Northern California

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