



# Australian IP Report

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**2023**

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# Welcome to the Australian IP Report 2023

I am pleased to introduce the 2023 Australian IP Report, “IP for a skilled, diverse and productive economy.”

Innovation is a powerful tool for raising living standards over the long term. Intellectual property rights are a key driver of productivity and support Australian businesses and economy through their effect on innovation and the diffusion of ideas. The importance of these rights is evident when you consider that Australian businesses with IP rights account for;

- Around 35% of Australia’s Gross Domestic Product (GDP),
- Jobs for 2.6 million Australian workers,
- More than \$6.4 billion in research and development (R&D) investment annually, and
- Around 51% of Australia’s total exports.

The report shows that innovation investments remained resilient during the Covid-19 crisis, but there will be challenges ahead with rising living costs impacting risk capital reserves. Patent applications in 2022 were near their record 2021 level, and applications for plant breeder’s rights have grown. However, trade mark applications fell by 11.2% and design applications fell by 3.6%.

There are great opportunities to build on recent labour market gains and grow a more robust economy. Capturing these opportunities requires different sectors of our society working together to address key challenges.

Harnessing diversity and participation, addressing skills shortages and maximising opportunities in the digital technology sector can help increase economic productivity and support sustainable wage growth. Australia’s IP system has a crucial role to play in achieving these outcomes. For Australian businesses, IP rights drive productivity growth by encouraging innovation and the spread of new technologies and ideas.

For Australian workers, innovation with patents is linked to higher wages and retention, which increases businesses’ incentives to invest in skills and training.

As this report shows, Australian businesses rely on a diverse workforce to innovate, encompassing young people, skilled migrants and tech workers, as well as strong representation of women in leadership roles. In turn, Australia’s IP-holding businesses create vital opportunities for talented people across occupations at all levels.

Australians should value our know-how – it’s the platform that supports the creation and growth of businesses and jobs. It can also play a critical part in addressing Australia’s key economic challenges.

Hon Ed Husic MP  
Minister for Industry and Science



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# Overview

## IP for a skilled, diverse and productive economy

Innovation is the engine of sustainable growth in living standards. Through technological breakthroughs, and diffusion of new ideas, we learn to produce goods and services with fewer resources, reducing our footprint. We develop new solutions to meet our needs. We free time and can better use our society's human capital.

The IP system aids this process in three fundamental ways — it encourages innovation, facilitates diffusion and enables more transparent and efficient trade.

**Encourages innovation** — Without IP rights, it can be difficult to exclude others from reproducing an innovation once it is made public. When an innovation is copied, its original producer may not financially benefit from their work as much as they would have otherwise. Patent, design and plant breeder's rights (PBRs) provide temporary exclusive rights for innovators to exploit their inventions in the market, creating an incentive for innovation.

**Facilitates diffusion** — In return for limited exclusive rights, innovators are required to disclose new technical knowledge in their inventions. The effect is to coax inventive solutions to practical problems out of secrecy and into public view so that others can rework inventions.

**Enables efficient trade** — Intangible assets, such as data, software, inventions and brands, are an increasingly important source of business value. When protected as IP, they become tradeable assets — able to be licensed and sold to others. Trade marks also increase transparency between producers and consumers, increasing the likelihood that consumers will reward producers for quality.

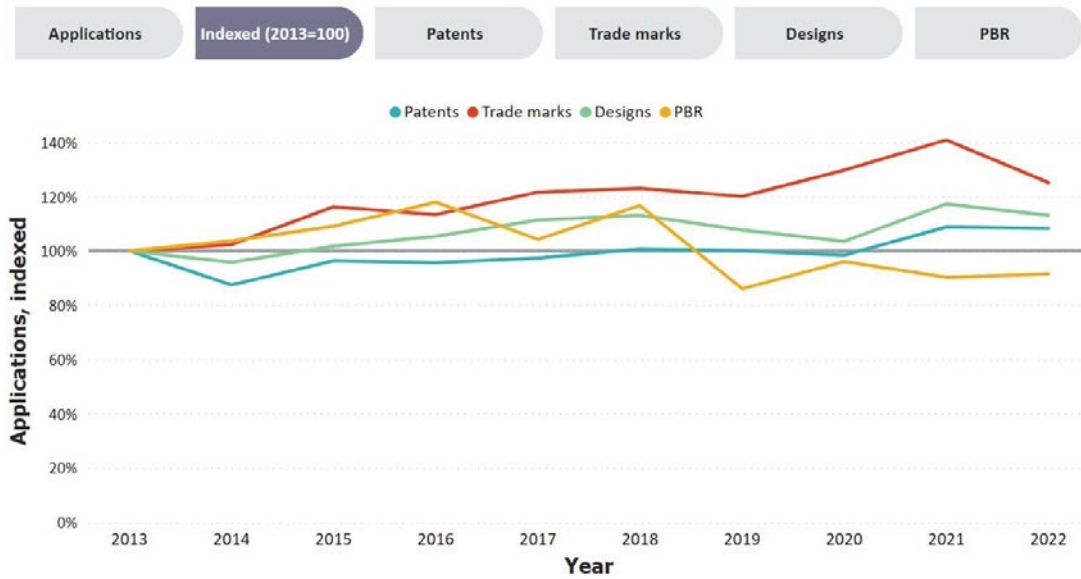
The Australian IP Report analyses current trends in technology, commercialisation and trade through the latest IP statistics. The 2023 report considers the IP system's role in harnessing skills, diversity and innovation to create a more productive economy, drawing upon new research by IP Australia and other contributors.

# Outlook

Patent applications reached the highest level on record in 2021 and they neared that record level in 2022. This result reflects the resilience of global innovation investments during the first two years of the COVID-19 crisis<sup>1</sup>. In 2022, applications for PBRs also grew by 1.3% on their 2021 level.

## At a glance: IP rights statistics

		All applicants 			Australian applicants 			Overseas applicants		
		Number	Growth	Number	Growth	Share	Number	Growth	Share	
	Filed	32,264	-0.4%	2,494	-16.8%	7.7%	29,770	+1.2%	92.3%	
	Granted	16,407	-4.4%	1,064	-2.6%	6.5%	15,343	-4.5%	93.5%	
	Filed	78,832	-11.2%	44,646	-16.3%	56.6%	34,186	-3.4%	43.4%	
	Registered	69,712	-1.3%	38,149	-5.3%	54.7%	31,563	+4.2%	45.3%	
	Filed	7,836	-3.6%	2,133	-18.1%	27.2%	5,703	+3.3%	72.8%	
	Certified	1,242	-9.8%	416	-12.8%	33.5%	826	-8.2%	66.5%	
	Filed	301	+1.3%	118	-8.5%	39.2%	183	+8.9%	60.8%	
	Registered	175	+50.9%	66	+32.0%	37.7%	109	+65.2%	62.3%	



However, from their peak levels in 2021, trade mark applications fell by 11.2%, and design applications fell by 3.6%. Some of this involves a correction from significant growth in IP filings over the pandemic period. At the same time, rapidly increasing costs of living, rising interest rates and declining real wealth are also expected to affect applications by weighing on demand. In Australia, consumption growth moderated late in the year. Consumer sentiment fell to levels not observed since the onset of the pandemic and the 2008 Global Financial Crisis<sup>2</sup>. Trade mark filings indicate the introduction of new products and services. Trends in trade mark filings react quickly to changes in expected demand and can anticipate the business cycle<sup>3</sup>.

The first two years of the pandemic saw growth in patenting related to digital and health technologies<sup>4</sup>. Patenting in health technologies continued to grow in 2022 — by 12.2% for pharmaceuticals. The evidence for digital innovation is mixed. In 2022, patent applications fell by 4.4% for computer technology and 26.6% for digital communications. However, trade mark applications grew for services related to computer security, medical research and other science and technology fields. Financial services also saw strong growth in trade mark filings, as digital technology has widened the scope for new products, payment systems and platforms.

## Insights

### IP in a slowing economy

Australia's economy expanded strongly over 2022. However, as inflation peaked around the end of the year, rising living costs weighed on demand, and consumption growth moderated. In this year's report, we preview new research by economists at the Reserve Bank of Australia (RBA). Using Australian microdata, they examine how a slowing rate of economic activity and weakening demand affects innovation in Australia. They consider outcomes across a range of innovation measures, from research and development (R&D) and patenting to technology adoption and commercialisation.

### IP, productivity and wages

This year's report presents new research considering the IP system's role in developing a more productive economy. In Australia, and across developed economies, a decline in economic dynamism has contributed to slow productivity growth over recent decades<sup>5</sup>. Reduced dynamism is reflected in low rates of business formation, technology adoption and job switching<sup>6</sup>.

Recent research suggests that, for businesses with valuable inventions, being granted a patent can cause substantial increases in productivity which flow through into higher wages for workers<sup>7</sup>. Using Australian microdata, Chapter 8 explores the relationship between business patenting and employee outcomes, including retention, higher wages, and job switching by employees with different backgrounds. The findings suggest that patent-holding businesses play a significant role in attracting workers away from less productive businesses, consistent with prior evidence.

### IP, diversity and innovation

At the end of 2022, Australia's unemployment rate was at its lowest level in about 50 years. Australia's labour participation rate was at a record high, driven largely by women and young people entering the workforce. Net arrivals from overseas increased, helping meet the strong demand for labour and skills<sup>8</sup>. Maintaining these labour market gains is important for long-run productivity because diversity underpins innovation. Chapter 8 examines women and migrant participation in Australia's IP-active businesses, and its importance to innovation. Chapter 7 also looks at how the returns to innovation in businesses that patent are shared among workers of diverse occupations and backgrounds. It highlights how having quality people across many roles — from inventors and product assemblers to sales workers — is crucial to innovation.

## IP data for policy and decision making

The IP analytics in this report are derived from IP Australia’s open data product, IPGOD. This publicly accessible data provides information on over 100 years of IP applications in Australia — a rich history of innovation in Australia since Federation. IP Australia periodically revises its data and annual time series as more up-to-date or better-quality source data becomes available.

The research in this report is enabled by access to a unique dataset from the Australian Bureau of Statistics (ABS). The Multi-Agency Data Integration Project (MADIP) combines administrative data from across government agencies at the person-level. It combines information on individuals’ demographics, education, income and taxation, occupation and employment in a highly confidential, anonymised and secure data environment. The data provides information on around 14.5 million Australian workers observed over 2011 to 2019. As there were around 13 million employed persons in Australia at year-end 2019, this provides substantial coverage of Australia’s total workforce. This person-level data is linked to comprehensive data on individuals’ employers, contained in the ABS’s Business Longitudinal Analysis Data Environment (BLADE). IP Australia has worked with the ABS to integrate information on the IP activity of Australian businesses into this linked employer-employee data.

Now in its 11th year, the Australian IP Report offers a rich account of IP activity in Australia to inform engagement between government, industry, academia and our wider community.

We welcome you to join the conversation.

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### Overview endnotes

<sup>1</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). *Resilience and ingenuity: Global innovation responses to Covid-19* (eBook). Centre for Economic Policy Research (CEPR) Press.

<sup>2</sup> Reserve Bank of Australia (2023). *Statement on Monetary Policy: February 2023*.

<sup>3</sup> De Grazia, C. A. W., Myers, A. & Toole, A. (2013). *Innovation activities and business cycles: Are trade marks a leading indicator?* [USPTO Economic Working Paper No. 2019-04].

<sup>4</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). *Resilience and ingenuity: Global innovation responses to Covid-19* (eBook). Centre for Economic Policy Research (CEPR) Press.

<sup>5</sup> Hambur, J. (2022). Product market competition and its implications for the economy. *Economic Record*. Advance online publication.

<sup>6</sup> Quinn, M. (2019). *Keeping pace with technological change: The role of capabilities and dynamism* (Speech at OECD Global Forum on Productivity, Sydney, 20 June 2019). Andrews, D. & Hansell, D. (2019). *Productivity-enhancing labour reallocation in Australia* [Treasury Working Paper 2019-06]. Commonwealth of Australia.

<sup>7</sup> Kline, P., Petkova, N., Williams, H. & Zidar, O. (2019). *Who profits from patents? Rent-sharing at innovative firms*. *The Quarterly Journal of Economics*, 134(3), 1343–1404.

<sup>8</sup> Reserve Bank of Australia (2023). *Statement on Monetary Policy: February 2023*.





# Patents

A patent is an exclusive right granted for an invention that allows the owner to exclude others from commercially exploiting the invention. Standard patents are granted for inventions that are new, useful and involve an inventive step beyond the normal progress of technology.

Without patent rights, innovators may be unable to recoup investments made to develop new technologies and bring them to market. Patents provide their owners with temporary rights to exclude others from exploiting their inventions<sup>1</sup>. In return, patent owners must disclose new technical knowledge in their inventions.

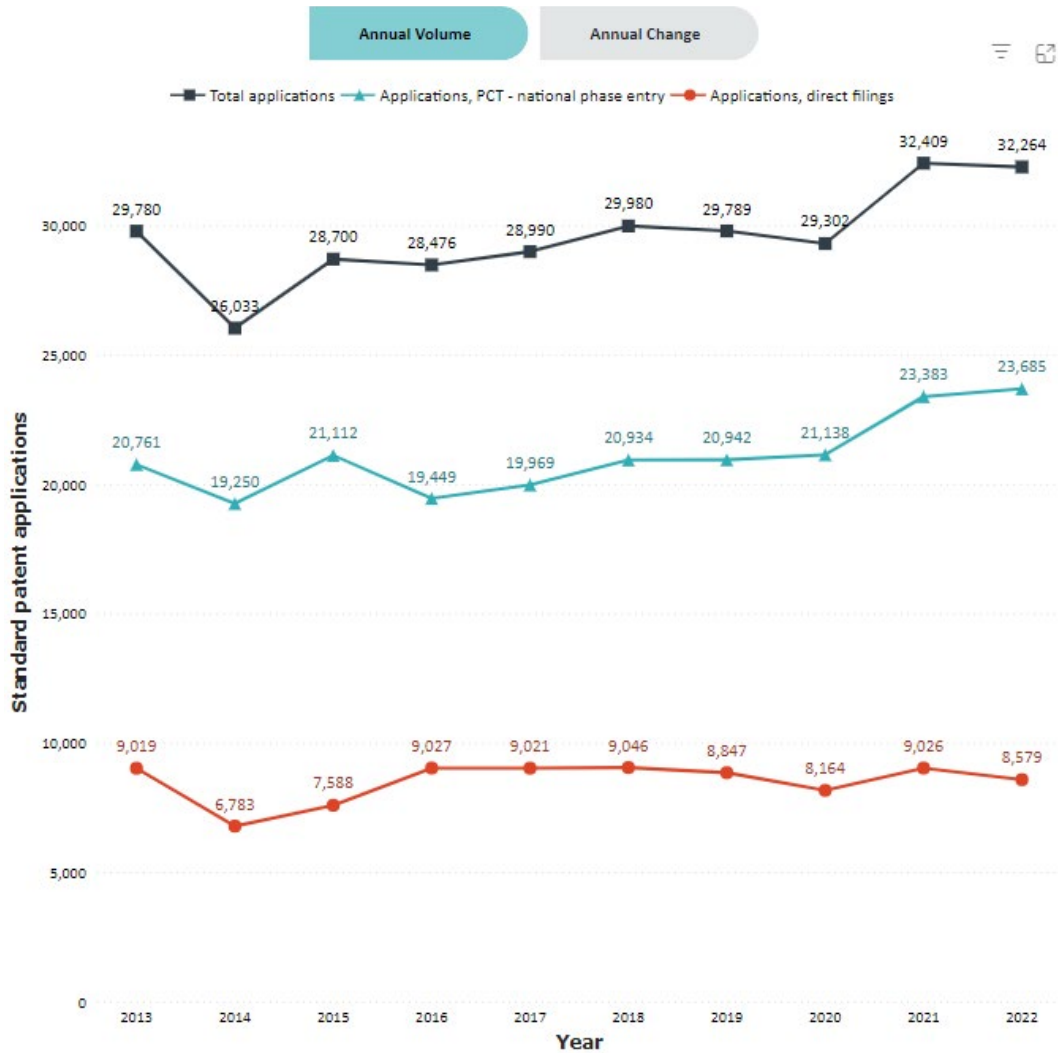
Therefore, patents are a valuable source of information about inventive capacity and the rate of invention in different technological fields.

## Standard patent applications and grants

In 2022, standard patent applications in Australia neared the 2021 record level: overall applications fell by just 0.5%, from 32,409 in 2021 to 32,264 in 2022 (see Figure 1.1). In Australia, 92.3% of standard patent applications are filed from abroad, that is, by entities outside Australia. In 2022, non-resident applications increased by 1.2% on the 2021 level to 29,770. Applications from residents fell by 16.8% to 2,494.

The continued strength in patent applications reflects the resilience of global innovation investments during the first two years of the COVID-19 crisis. The pandemic created a massive demand for innovations (e.g., in healthcare and ecommerce) to help mitigate its impacts. Fiscal support cushioned the demand shock from periodic lockdowns. Many companies maintained or resumed their innovation investments, given the continued availability of financing. Across major jurisdictions, patent filings were negatively impacted, but the impact was shallow and short-lived<sup>2</sup>. International patent filings grew by 3.6% in 2021 and a further 0.3% in 2022<sup>3</sup>.

**Figure 1.1 Standard patent applications in Australia by filing route, 2013 to 2022**



A patent is enforceable in Australia only after it has been granted. Overall, grants of standard patents fell by 4.4%, to 16,407, in 2022. Grants fell for both residents (-2.6% to 1,064) and non-residents (-4.5% to 15,343).

## International patenting in Australia

Effective patent laws encourage businesses to transfer technology into a country and encourage inward foreign direct investment (FDI)<sup>4</sup>. For example, a recent study found that patents significantly contributed to Australia’s economic expansion between 1947 and 2010. A primary mechanism was the causal effect of patents on inward FDI<sup>5</sup>. This study used over 150 years of data on patenting activity in Australia, taken from Australia’s open data product, IPGOD.

### Taking IP global: the Patent Cooperation Treaty (PCT)

The PCT system provides an alternative route to filing applications in Australia. An applicant can file a single ‘international’ patent application through the PCT instead of filing several national or regional applications. The approach provides applicants more time to assess the value of an invention and its most profitable markets while they build their patent strategy.

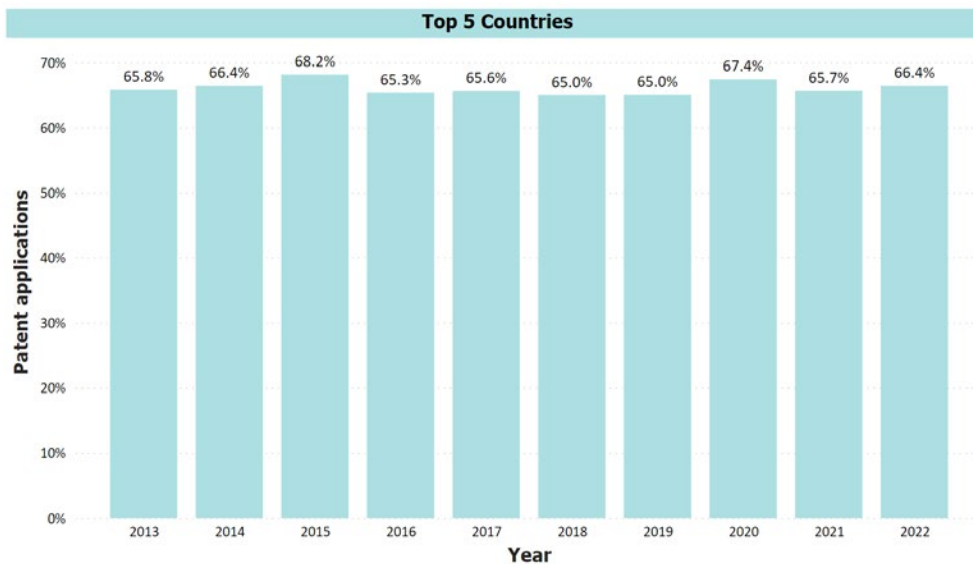
## Use of the PCT

Most (73.4%) standard patent applications in Australia are filed internationally through the PCT. In particular, this is the preferred route for applications by non-residents. In 2022, 23,685 PCT applications were lodged in Australia, up 1.3% from their 2021 level. PCT applicants are given 31 months to file an Australian ‘national phase’ for their application from its ‘priority date’. The priority date is that used to identify prior art relevant to assessing the invention’s novelty and non-obviousness. As such, application growth in 2022 largely reflects inventive activity that occurred in 2020 or earlier.

## Countries of origin

United States (US) applicants are named on 45.7% of standard patent applications filed in Australia (see Figure 1.2). A country’s count of applications includes applications filed by residents of that country with co-applicants from other countries. For example, of the 14,735 applications filed by US applicants in 2022, 452 were filed with partners from outside the US. Applications from the US increased by 1.0% in 2022, lifting the year’s overall filing volume.

**Figure 1.2 Leading countries of origin for standard patent applications, 2022**



China is Australia's second major source of technology imports protected by patents. In China, corporate R&D investment was maintained through the initial COVID-19 shock: national R&D spending grew 10.3% in 2020, slightly below China's previous 5-year growth trend. The country saw steady growth in its worldwide patent applications, even in 2020<sup>6</sup>. A substantial 5.9% rise in China's worldwide filings followed in 2021. These applications contributed strongly to global patent growth that year<sup>7</sup>.

In Australia, patent applications from China grew at an average annual rate of 28.9% between 2015 and 2020. However, this growth run essentially halted in 2021. Chinese-origin patents declined by 8.2% in 2022. The reduction in China's filings most likely reflects non-market factors. In recent decades, China's government provided direct financial subsidies, tax breaks and other social benefits to encourage patenting. Amid a larger shift in China's IP policy, on 27 January 2021, the government announced the phase-out of all government funding for patent applications, including patents filed abroad.

Looking more broadly at countries with lower overall application volumes (though still focusing on the top quartile of countries), hot spots for growth in patent applications in Australia include the Republic of Korea and Singapore. Applications from the Republic of Korea have increased 1.6 times above their 2013 level, including a 17.1% increase in 2022, to 902. The past decade has seen applications from Singapore rise to 1.4 times their level from 2013. However, they fell 28.1% in 2022, to 210.

## **Domestic patenting in Australia**

### **Economic characteristics of patent-holding businesses**

Domestic patenting is relatively concentrated in Australia. Around 3,100 businesses with active operations in Australia hold a domestic patent annually. Patent-owning businesses skew larger than the average business: the median patent-owning business employs more than 10 times the number of workers as the median business without patents (see Figure 1.3). Still, in 2022, small and medium enterprise (SMEs) accounted for 69.6% of all standard patent applications filed from within Australia and 94.4% of their applications were filed by single parties.

Patent-holding businesses account for around 10% of Australia's GDP and 7% of Australia's total workforce. Labour productivity in Australia is around 30% higher in the median patent-holding business than in the median business without patents.

These aggregates are based on data which covers only entities that hold an Australian Business Number (ABN) so excludes the contributions of individual applicants. In 2022, 55.6% of resident applications were filed by individuals rather than organisations.

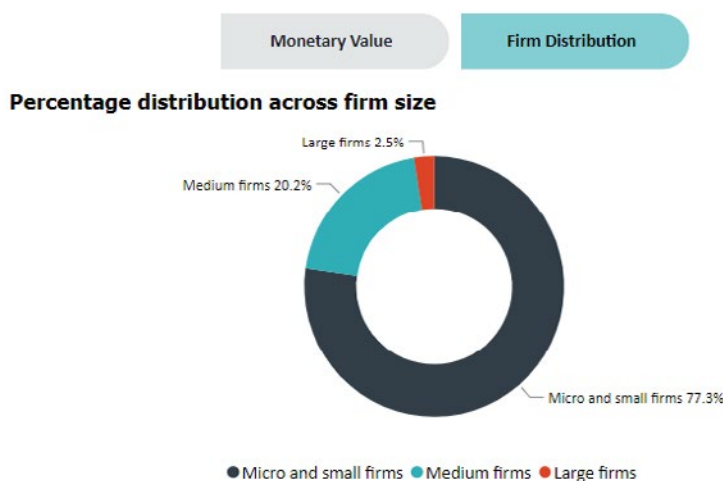
**Figure 1.3 Economic characteristics of Australian patent-holding businesses, annual averages, 2010-11 to 2019-20**

**Economic aggregates**

<b>Number of holding firms</b>	<b>3,350</b>	<b>Employees (FTE)</b>	<b>527,000</b>
Micro and small firms	77.30%	Gross value add	\$184.10bn
Medium firms	20.20%	R&D spend	\$2.00bn
Large firms	2.50%	Exports	\$81.30bn

**Median comparisons of IP holders and non holders**

	<b>Employees (FTE)</b>	<b>Gross value add</b>	<b>Labour productivity</b>
<b>Patent holders</b>	<b>21</b>	<b>\$258,252</b>	<b>\$109,506</b>
<b>Non-holders</b>	<b>2</b>	<b>\$109,506</b>	<b>\$84,653</b>



**Environmental and policy factors**

Resident applications fell by 16.8% in 2022. However, this follows a 24.8% growth in resident filings in 2021 (see Figure 1.4). A key driver of that growth was a change to the Australian patent law – the phase-out of the ‘second-tier’ innovation patent. Applicants who filed for new standard patents before 25 August 2021, the final date to file an innovation patent in Australia, retained the option to obtain an innovation patent by converting or dividing their standard patent application. As a result, this policy change likely encouraged applicants to bring forward standard patent applications in 2021. The fall in resident applications in 2022 comprises a correction from the marked growth in 2021. Data over coming years will show whether resident applications have reverted to the negative growth trend observed over 2018 to 2020.

**Figure 1.4 Annual change in standard patent applications in Australia by residency, 2013 to 2022**



Amidst tightening economic and financial conditions, a key question is how an economic downturn may affect innovation and patenting in Australia. Chapter 6 of this report previews new research by economists from the RBA on this topic. Using Australian microdata they examine the impact on innovation of contractionary monetary policy shocks as a way of exploring the effect of changing economic conditions.









- Read this report’s feature chapter on monetary policy, investment and innovation.

## States and territories

New South Wales (NSW), followed by Victoria and Queensland, are the leading sources of standard patent applications in Australia (see Figure 1.5). Application volumes fell across all states and territories in 2022, including an 18% decline in NSW, Victoria and Queensland.

The Australian Capital Territory (ACT) was the most patent-intensive state or territory in 2022, with 2.8 applications for every 1,000 businesses in the territory. The ACT was twice as patent-intensive as Western Australia. It followed the ACT with 1.4 applications for every 1,000 businesses (Figure 1.5).

**Figure 1.5 Patent applications by Australian states and territories, 2022**

	New South Wales	Victoria	Queensland
			
Applications	919	629	435
Change in applications, 2021 to 2022	-18.0%	-18.2%	-17.5%
Applications per thousand businesses	1.20	1.00	1.00
	Western Australia	South Australia	Australian Capital Territory
			
Applications	302	118	80
Change in applications, 2021 to 2022	-9.0%	-23.4%	-5.9%
Applications per thousand businesses	1.40	0.80	2.80
	Tasmania	Northern Territory	
			
Applications	20	4	
Change in applications, 2021 to 2022	-42.9%	-50.0%	
Applications per thousand businesses	0.50	0.30	

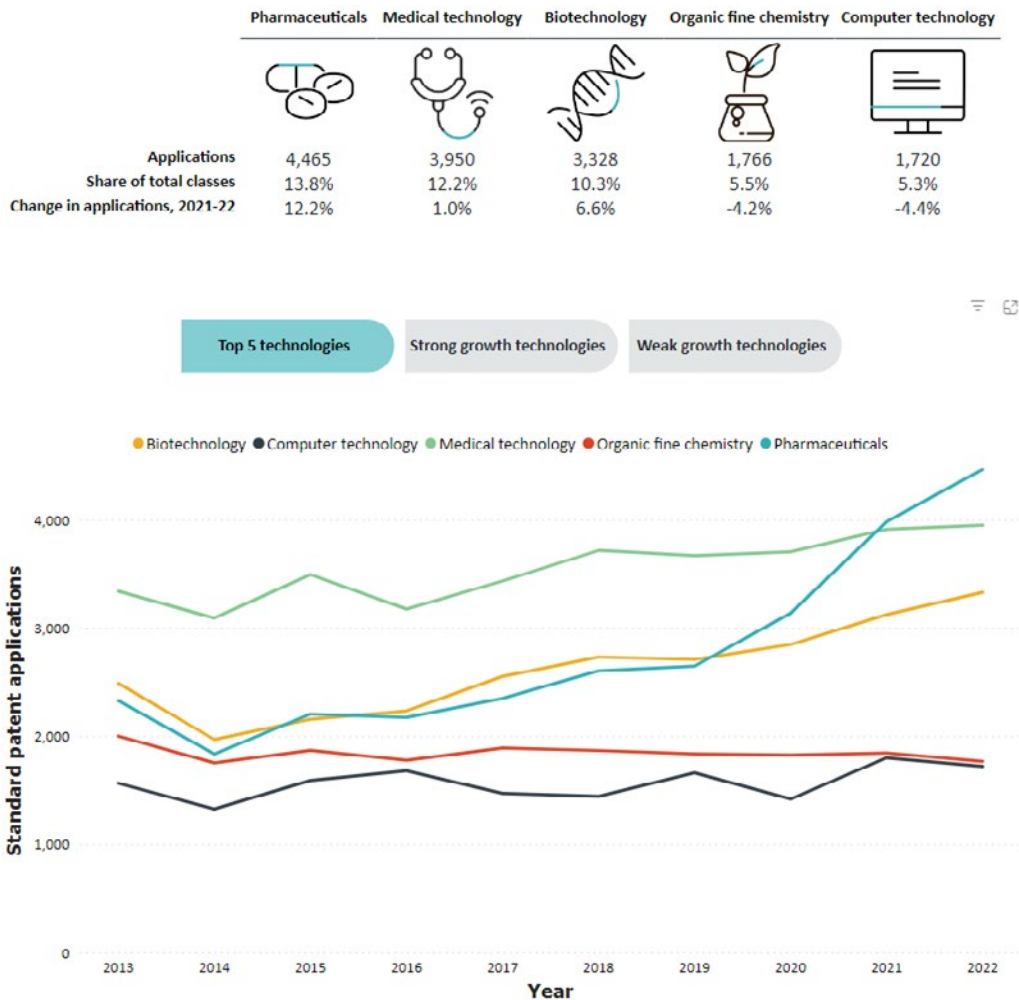
## Technology fields

Patents are assigned to technology fields, so provide a useful indicator of the rate of inventive activity across fields<sup>8</sup>. Internationally, in 2020 and 2021, urgent needs created by the COVID-19 pandemic led to elevated patenting related to digital and health technologies<sup>9</sup>. In 2022, these trends continued at the international level. Digital communication and computer technology saw the fastest rate of growth in PCT applications filed worldwide, ahead of growth for health-related technologies<sup>10</sup>.

### Technological trajectories in patenting

In Australia, healthcare dominates other fields for the volume of standard patent applications received each year (see Figure 1.6). Applications for pharmaceutical patents have been on a growth trajectory since 2016. However, their climb accelerated the first two years of the COVID-19 crisis, with 18.5% growth in 2020 then a further 27.0% in 2021. That growth was sustained in 2022, when pharmaceutical patent filings increased by 12.2%. Medical technology and Biotechnology also increased their share of overall filings.

**Figure 1.6 Leading technology fields for volume of standard patent applications, relative growth in applications and relative decline in 2022**



Evidence is more mixed for digital technology. In 2021, Computer technology became the fifth top field for new patent filings, ahead of Civil engineering. International evidence suggests that COVID-19 aggravated a decline in patenting within more traditional technology fields<sup>11</sup>. In the same year, applications for Audiovisual technology increased by 83.7%.

Significant corrections from this growth occurred in 2022.

- Standard patent applications for Computer technologies declined by 4.4%.
- Applications for Audiovisual technology fell by 26.2%.
- The largest relative decline was in applications for Digital communications; these fell by 26.6% from their peak level in 2021 (see Figure 1.6).

At the same time, major technology companies, IBM and Australian ‘unicorn’ start-up Canva, entered the ranks of lead patent filers. Trade mark and design applications have increased in technology sectors and financial services, where digital technology has created scope for new products, payment systems and platforms.



## Examination request rates across fields

Examination request rates provide further insight into trends across technology fields. Under Australian legislation, a patent is examined only once the applicant has requested examination. The request can be voluntary or result from the Commissioner of Patents directing an applicant to request examination. A longer wait period can benefit applicants, for example by allowing them time to find a commercialisation partner. This may also, however, create market uncertainty and curtail follow-on innovation<sup>12</sup>.

In Australia, applicants must request examination within 5 years of an application's filing date or the application will lapse. For around a quarter of original applications filed in Australia via the PCT, applicants make voluntary and more timely examination requests within one month of the application entering Australian national phase (quarterly average, 2021 data). The rate is higher in information technology fields such as Semiconductors (51%), Digital communication (51%), Audiovisual technology (44%) and Computer technology (39%). This likely reflects the pace of technological progress and catch-up in these fields. It may also reflect the value of experimentation in complex technology markets, where revealing IP can help broadcast common problems<sup>13</sup>.

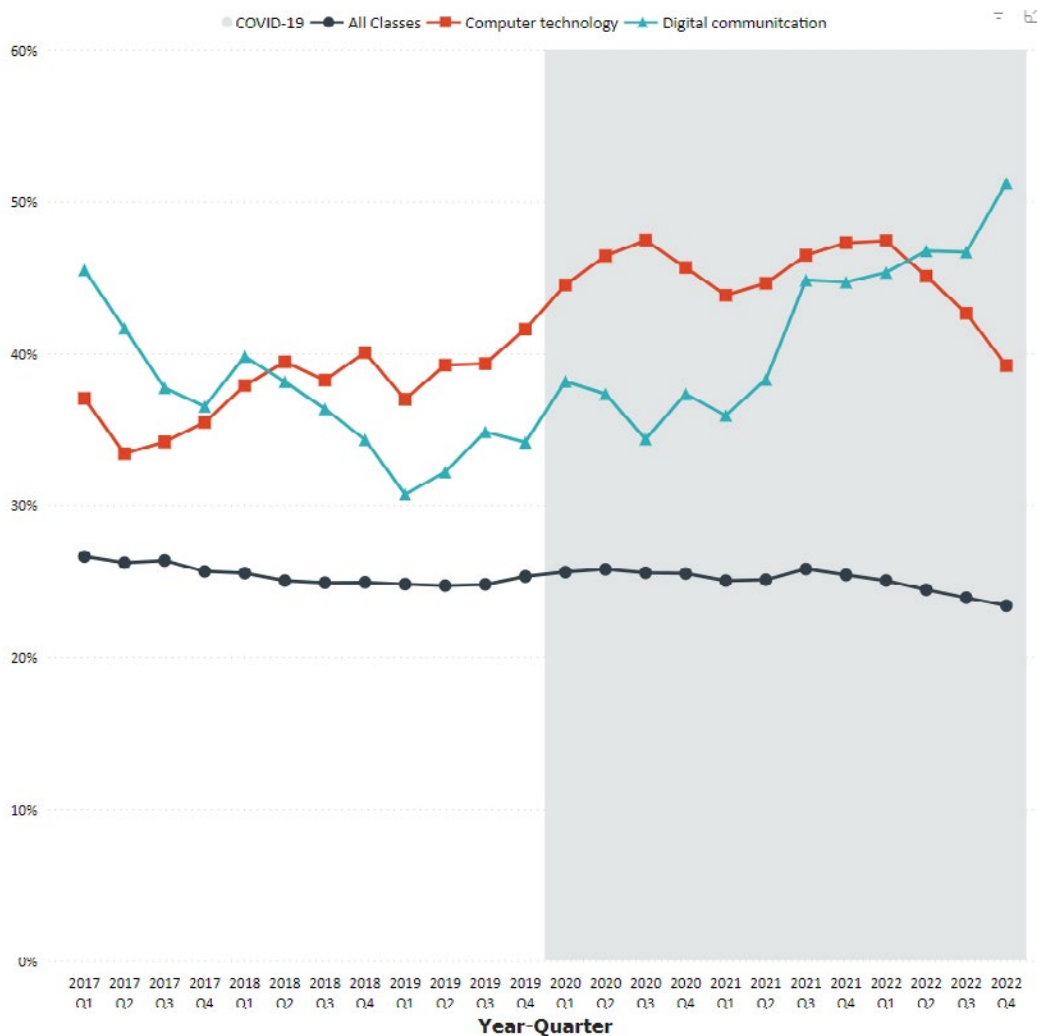
As the global economy moved to a virtual model in response to COVID-19, demand for innovation in digital technology accelerated. The rate at which applicants voluntarily requested more timely examination (within one month) for original applications rose within information technology fields (Figure 1.7).

- In Digital communications, the rate increased from 34% for applications filed between 2017 and 2019 to 44% for applications filed between 2020 and 2022.
- In Computer technologies, the rate increased from 39% for applications filed between 2017 and 2019 to 44% for applications filed between 2020 and 2022.

In contrast, the overall rate at which PCT applicants voluntarily requested more timely examination remained largely stable from the pre-pandemic period to the end of 2022 (Figure 1.7).

In the computer technology field, the rate at which applicants voluntarily request more timely examination has declined in 2022, from a peak of 47% in the January quarter to 39% in the December quarter. Increased conservatism by investors has led to valuation contraction in many major technology companies. Many companies have adapted to worsening market conditions by closing down marginal projects and cutting jobs, and fewer start-ups are going public<sup>14</sup>.

**Figure 1.7 Rate at which PCT applicants request voluntary examination (within one month of national phase entry date), quarterly averages over 2013 to 2021, based on application dates**



## Leading applicants

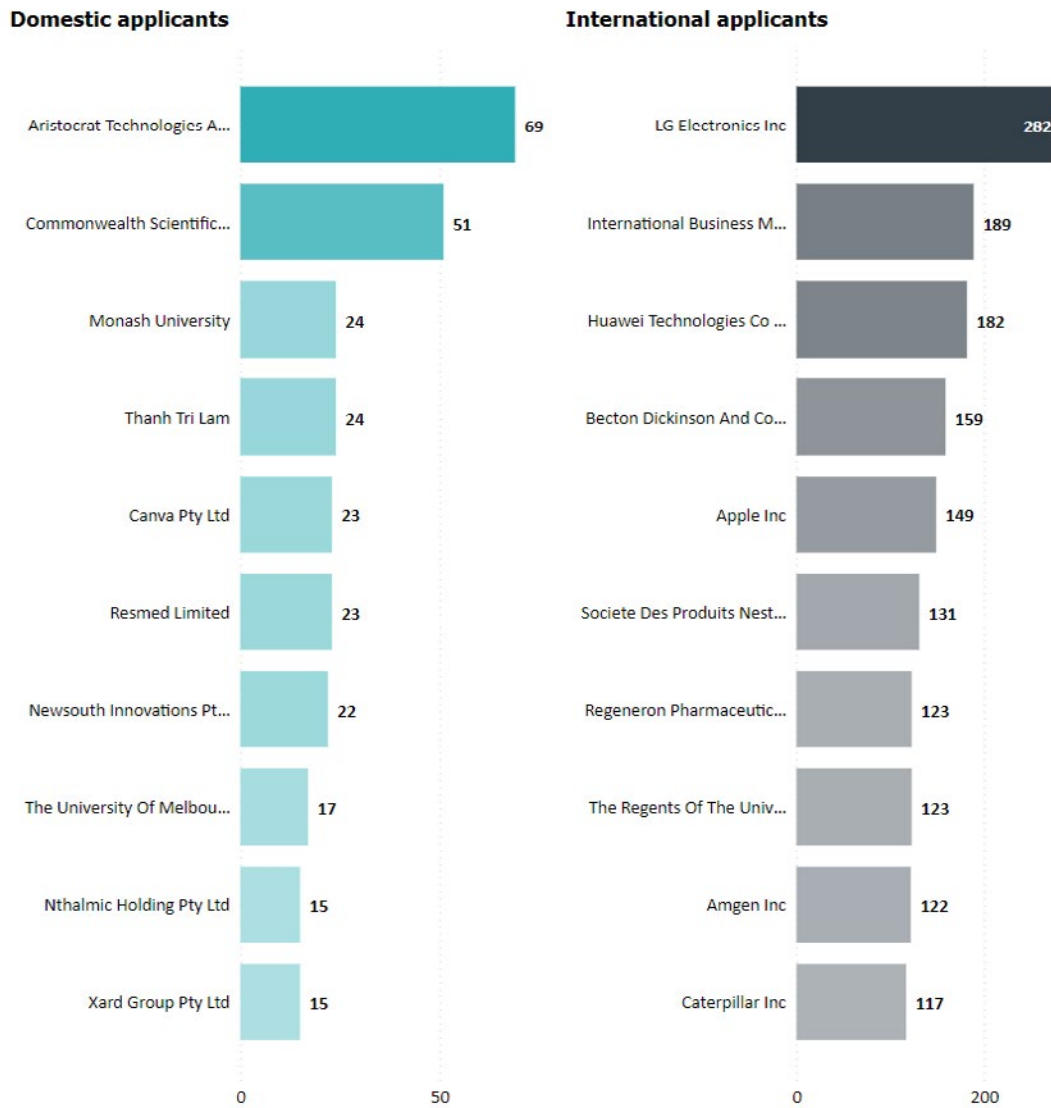
In recent years, patenting in Australia has been dominated by major global information technology and media device providers. These include Chinese telecommunication giants Huawei Technologies and Guangdong OPPO Mobile Telecommunications, and South Korean technology powerhouse, LG Electronics.

In 2022, LG Electronics was the leading filer of standard patents in Australia, with 282 applications. Huawei came in at third place, with 182 applications, while also leading globally for international patent filings<sup>15</sup>.

Two surprises include the exit of Guangdong Oppo Mobile Telecommunications from the list of lead filers and the entry of IBM Corporation, which ranked second with 189 applications (see Figure 1.8). In the US, IBM led in patent acquisition for 29 years, from 1993 to 2021. In a recent editorial, the company’s Senior Vice President and Director of Research, Dario Gil, explained that IBM’s innovation strategy has shifted<sup>16</sup>. He notes that advances in complex technologies (e.g., AI and quantum computing) rely on open innovation, open source and knowledge sharing to create new markets. The company has sought to embed these principles while maintaining a proactive IP strategy that appears to involve an increase

in patenting activity outside the US market<sup>17</sup>. IBM first filed patents in Australia in 1939 but has remained relatively inactive in Australia’s patent system over several decades. The company’s previous highest ranking was 6th in 1965. Since the turn of the millennium, IBM has ranked in Australia’s top 100 patent filers only 6 times before, and in the top 50 only once before, ranked 40th in 2021.

**Figure 1.8 Top domestic and international applicants for standard patents in Australia, 2022**



Among domestic applicants, gaming technology producer Aristocrat Technologies led with 69 applications (two fewer than 2021). The Commonwealth Scientific and Industrial Research Organisation (CSIRO) followed with 51 applications (one fewer than 2021). Monash University filed 24 applications. A new entrant to the list was NSW-based inventor Thanh Tri Lam, with 24 applications related to renewable energy technology<sup>18</sup>.

New to the list of top resident filers was Australian start-up ‘unicorn’ Canva, with 23 applications. Canva is an online design software company founded in Perth in 2013. By September 2021, Canva had become one of the world’s most valuable start ups, valued at around \$40 billion. Even as investment in the technology sector has slowed, Canva has continued to develop new technology, launching a new visual worksuite in 2022<sup>19</sup>.

ResMed, an Australian-born leader in respiratory and sleep technology, was fifth in the list of top domestic filers in 2022, with 23 applications, after entering the list in 2021.

The above rankings are based on the number of standard patent applications filed by applicants (including original and divisional applications). Applicants vary in the rate at which they succeed in converting applications into grants and examination request rates vary across technology fields.

## Provisional applications

A provisional application is one of several options available to businesses to establish a foothold in the patent system in Australia and key export markets.

Filing a provisional patent gives applicants 12 months to decide whether to file a complete patent application while establishing a priority date. A key benefit of obtaining provisional patent protection is that applicants can disclose, make, use and sell their invention while maintaining the option to seek continued protection.

The number of provisional applications filed in Australia fell in 2022 by 6% on the 2021 level to 4,037. Most provisional patent applicants are filed by Australian residents. The decline in provisional applications was driven by a 6.8% fall in applications by residents to 3,755. Applications from non-residents increased by 5.6% to 282.

The number of provisional patent applications filed annually has increased steadily over the past decade. However, provisional patent activity has decreased relative to the number of standard patent applications by residents. On average, 1.8 provisional patents were filed for every standard application by residents in 2013. That rate fell to 1.6 by 2022. It has been observed that while the number of provisional applications has declined, those that are filed tend to be of higher quality on average than those that were filed in the past: they are more likely to be filed with professional assistance and provide bases for further patenting activity<sup>20</sup>.

## Australian filings overseas

Patents play a central role in international trade. For firms looking to export, securing foreign patent protection provides legal security by giving patent holders the right to exclude others from exploiting their invention in markets where the patent can be enforced.

Patents are associated with a significant export premium – according to one recent study, the value of exports increases by an estimated 6%<sup>21</sup>. Patenting also tends to precede exporting, since inventions disclosed to the public when offered for sale cannot be patented. As a result, patent filings are a useful indicator of export expansion<sup>22</sup>.

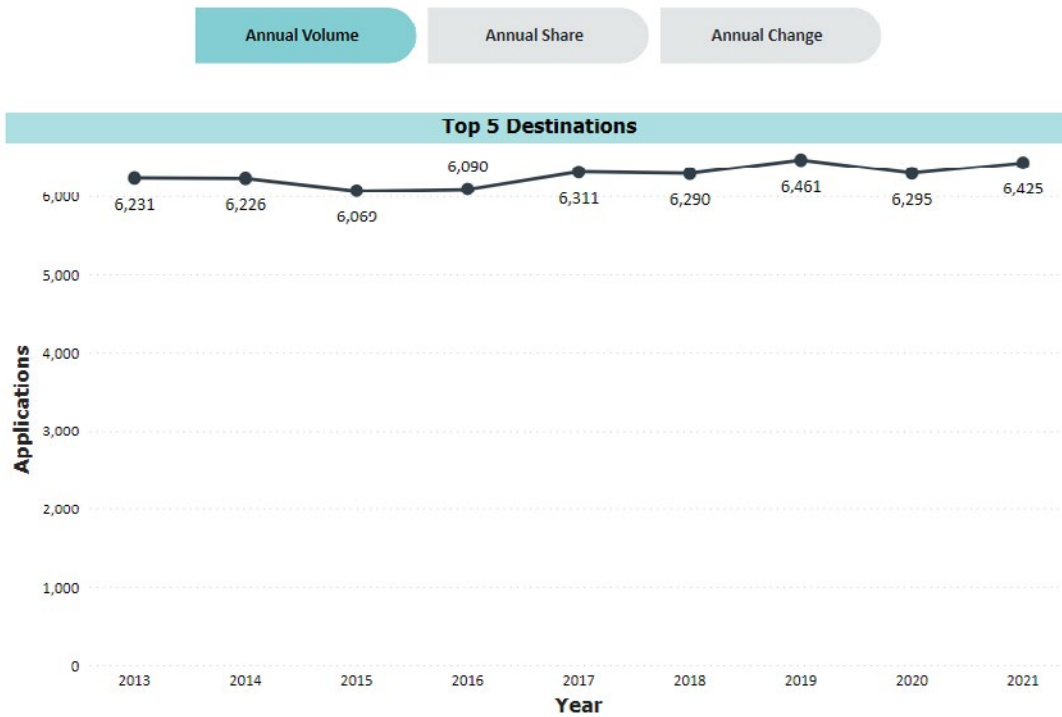
In 2021, the number of patents filed overseas by Australians increased by 2.4%, to 9,328, based on the latest available data from the World Intellectual Property Organization (WIPO). The leading destination markets for Australian patents are the US, European Patent Office (EPO), China, New Zealand and Canada (see Figure 1.9).

The destination markets for Australian patents abroad have remained relatively stable since at least 2005. In 2021, applications to the EPO grew by 6.3%, and those to New Zealand grew by 13.1%. In contrast, applications to the US were stable at the 2020 level.

Australians can seek patent protection in other countries by filing through the PCT or with IP offices in destination markets. In the five years to 2021, Australian PCT filings abroad have grown by an average of 3.1% per annum. This includes 2.8% growth from 2020 to 2021. Australians increasingly prefer the PCT route when taking their ideas global. The PCT share of Australian filings abroad has increased to 72.8%, up by around six percentage points since 2013.

**Figure 1.9 Leading destinations for Australian patent filings abroad, 2021**

	United States of America	European Patent Office	China	New Zealand	Canada
					
	<i>Select one of the country flags above to filter the visuals below</i>				
Applications in 2021	3,468	1,026	740	675	516
Share of total applications	37.2%	11.0%	7.9%	7.2%	5.5%
Change in applications, 2020-21	0.0%	↑6.3%	↑1.5%	↑13.1%	3.6%



## Patents endnotes

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- <sup>1</sup> The maximum term of a patent is 20 years, though pharmaceutical substances that experience a delay in market approval can receive an extension, providing up to 25 years of protection.
- <sup>2</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). [Resilience and ingenuity: Global innovation responses to Covid-19](#) (eBook). Centre for Economic Policy Research (CEPR) Press.
- <sup>3</sup> World Intellectual Property Organization (2023). [International intellectual property filings in 2022](#); World Intellectual Property Organization (2022). WIPO IP facts and figures 2022.
- <sup>4</sup> Lee, J. Y. & Mansfield, E. (1996). *The Review of Economics and Statistics*; Intellectual property protection and U.S. foreign direct investment.78(2), 181–186.
- <sup>5</sup> Fleming, G., Liu, F., Merrett, D. & Ville, S. (2022). [Patents, foreign direct investment and economic growth in Australia, 1860–2010](#) (Discussion Paper 2022-08). Centre for Economic History, The Australian National University.
- <sup>6</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). [Resilience and ingenuity: Global innovation responses to Covid-19](#) (eBook). Centre for Economic Policy Research (CEPR) Press.
- <sup>7</sup> [WIPO IP facts and figures 2022](#). World Intellectual Property Organization (2022)
- <sup>8</sup> [Application trends across classes are analysed using a scheme maintained by the World Intellectual Property Organization \(WIPO\)](#). The WIPO technology concordance groups various International Patent Classification classes and subclasses into 35 technology fields.
- <sup>9</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). [Resilience and ingenuity: Global innovation responses to Covid-19](#) (eBook). Centre for Economic Policy Research (CEPR) Press. .
- <sup>10</sup> World Intellectual Property Organization (2023). [International intellectual property filings in 2022](#); World Intellectual Property Organization (2022). WIPO IP facts and figures (2022).
- <sup>11</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). [Resilience and ingenuity: Global innovation responses to Covid-19](#) (eBook). Centre for Economic Policy Research (CEPR) Press.
- <sup>12</sup> de Rassenfosse, G., & Zaby, A. K. (2016). [The economics of patent backlog](#).
- <sup>13</sup> Bremner, R. P. & Eisenhardt, K. M. (2021). *Organizing form, experimentation, and performance: Innovation in the nascent civilian drone industry*. *Organization Science*, 33(4), 1251–1699.
- <sup>14</sup> Waters, R. (2022, 11 November). [Big tech job cull may be the start of things to come](#). Inside Business: Financial Times.
- <sup>15</sup> [International intellectual property filings in 2022](#). World Intellectual Property Organization (2023).
- <sup>16</sup> Gil, D. (2023, 7 January). [Why IBM is no longer interested in breaking patent records – and how it plans to measure innovation in the age of open source and quantum computing](#). Fortune.
- <sup>17</sup> For more analysis, see Summerfield, M. (2023). [Korea's LG tops Australian patent filing table, while IBM surprises in second place](#). Patentology.
- <sup>18</sup> Most (21) of these applications were divisional applications, dividing out the subject-matter contained in other patent applications.
- <sup>19</sup> Silberling, A. (2022, 14 September). [Canva moves beyond graphic design to launch a visual worksuite](#). TechCrunch.
- <sup>20</sup> Summerfield, M. (2023, 27 January). [Australian patent filings declined slightly in 2022, but held at historic highs by strong international interest](#). Patentology.
- <sup>21</sup> de Rassenfosse, G., Grazi, M., Moschella, D. & Pellegrino, G. (2022). *International patent protection and trade: Transaction-level evidence*. *European Economic Review*, 147, Article 104160.
- <sup>22</sup> de Rassenfosse, G., Grazi, M., Moschella, D. & Pellegrino, G. (2022). *International patent protection and trade: Transaction-level evidence*. *European Economic Review*, 147, Article 104160.



# Trade marks

Trade marks are signs used to distinguish goods or services in the market. Registering a trade mark provides an owner with the exclusive right to use the mark – or authorise others to use it – and seek relief for trade mark infringement<sup>1</sup>. A trade mark must be distinctive and not confusingly similar to an existing mark to be registered.

Trade marks serve as badges of commercial origin. They increase transparency between producers and consumers and can help create expectations of quality. When consumers can more easily identify high-quality goods, they are more likely to reward quality in the market<sup>2</sup>.

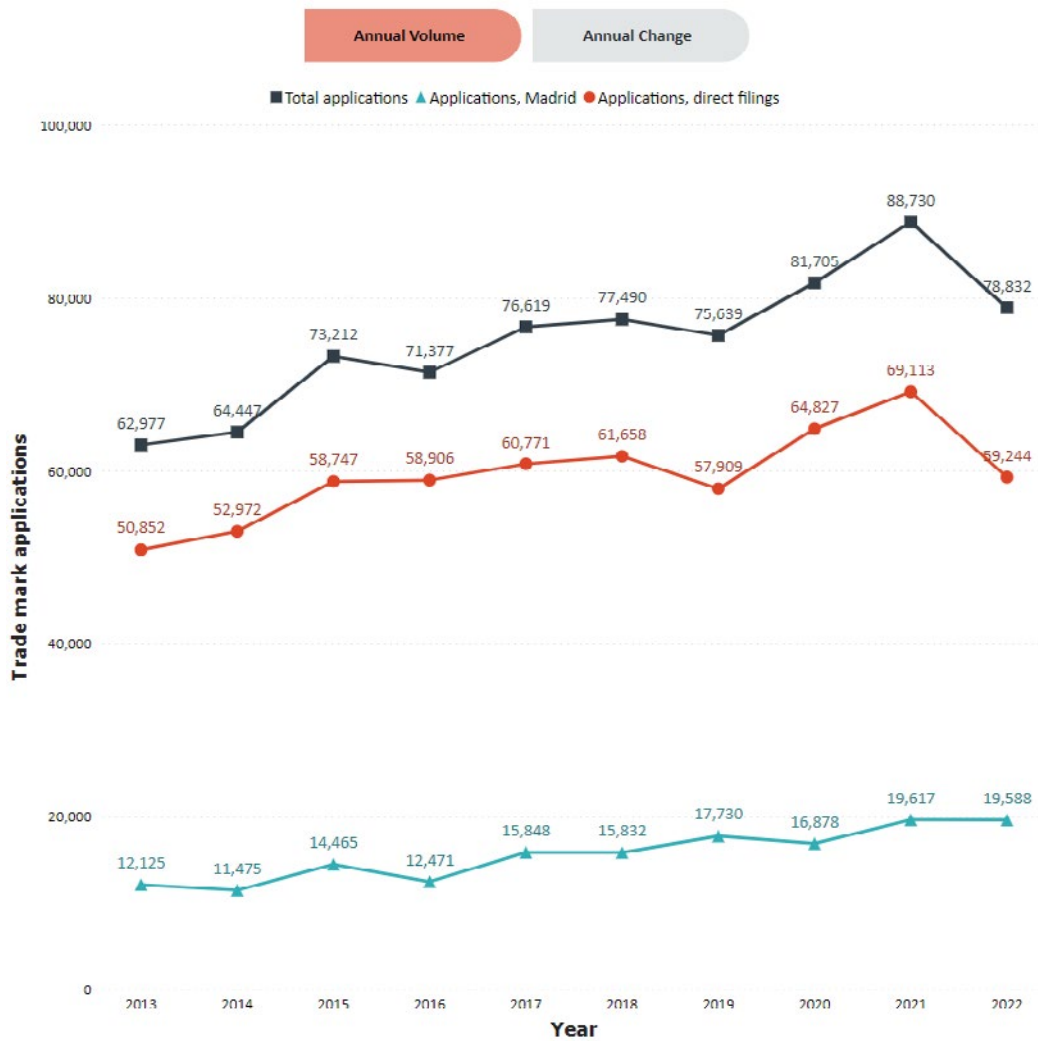
Businesses often file trade marks to announce new products or services, when there is demand for new and higher quality offerings<sup>3</sup>. As such, trade marks are a leading indicator of entrepreneurial activity, the commercialisation of innovations and international expansion<sup>4</sup>.

## Trade mark applications and registrations

In 2022, total applications in Australia fell 11.2% from their record level in 2021, to 78,832. This follows two years of strong consecutive growth, by 8.0% in 2020 and 8.6% in 2021 (see Figure 2.1).

In Australia, trade mark applications made by Australian residents comprise 56.6% of all trade mark filings. In 2022, applications by residents fell by 16.3% below their level in 2021, to 44,646. Trade mark applications by non-residents fell 3.4%, down to 34,186. The decline in resident applications accounted for 88% of the overall decline in applications.

**Figure 2.1 Trade mark applications in Australia by filing route**



Trade mark registrations also fell by 1.3% in 2022 from their record 2021 level. The decline was fully attributed to reduced registrations by Australian residents. These fell by 5.3% (to 38,149), while non-resident registrations increased by 4.2% (to 31,563).

Trends in trade mark filing activity tend to be procyclical: they exhibit positive growth during periods of economic expansion and are negative when the economy contracts. Recent economic shocks, though, have elicited countercyclical responses. Global economic growth fell by 20% before Easter in 2020, at the onset of the COVID-19 pandemic. However, in Australia and internationally, trade mark application volumes boomed over 2020 and 2021<sup>5</sup>.

The strong growth in trade marks during the first year of the pandemic reflected the massive demand for goods and services to mitigate the pandemic’s impact. In Australia, Canada, Brazil and Singapore, among other countries, residents took risks amidst immense economic uncertainty to introduce new products and services<sup>6</sup>.

Additional filing activity in 2021 was underpinned by growth in demand and household income. In 2022, real consumption growth moderated and consumer sentiment declined<sup>7</sup>. Trade marks react quickly to changes in expected demand and tend to anticipate the business cycle<sup>8</sup>.



## International trade mark activity in Australia

For businesses, trade mark registrations are an important ‘entry ticket’ into markets abroad. They help exporters differentiate their goods and services from competitors’ and overcome the liability of being foreign and unfamiliar<sup>9</sup>. Research shows that customers are more likely to try unfamiliar products marketed under a familiar brand . Trade marks provide the basis for firms to build strong brand associations in customers’ minds and extend into new markets<sup>11</sup>. Research by IP Australia shows that for Australian businesses, filing trade marks in overseas markets is a significant forward indicator of export entry and performance<sup>12</sup>.

### Taking IP global: the Madrid system

Brand owners can directly file for trade marks with IP offices in the countries and regions where they seek protection or file an international application through the Madrid system. The Madrid route provides a streamlined way for applicants to file an international trade mark application, providing protection in multiple jurisdictions.

### Use of the Madrid system

Australia’s 2022 decline in new trade marks aligns with international experience. In 2022, international trade mark applications filed worldwide fell by 6.1% year-on-year. This was the largest drop in Madrid filings since 2009<sup>13</sup>.

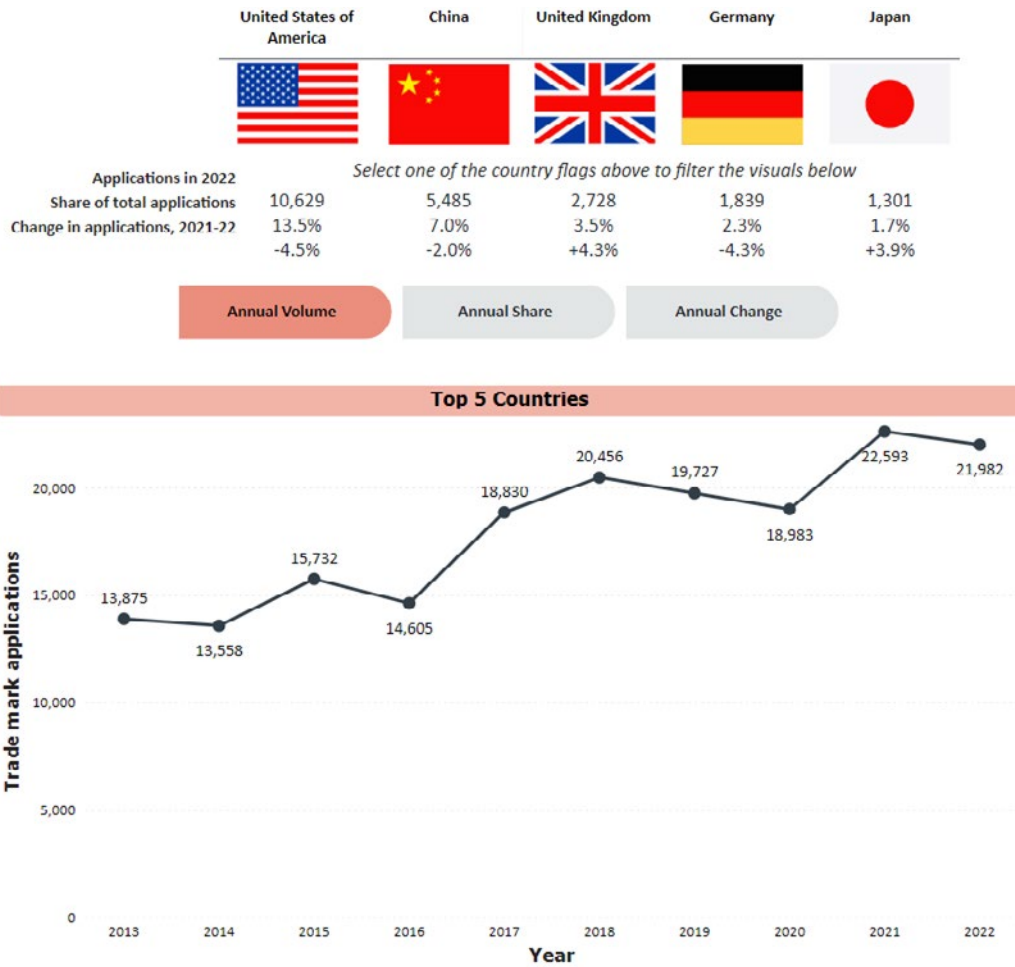
However, this followed an extraordinary boom in trade mark applications around one year into the COVID-19 crisis. International trade mark filings worldwide grew by 15% in 2021<sup>14</sup>.

A growing share of new trade marks in Australia are filed as international applications via the Madrid system. These comprised 24.8% of applications in Australia in 2022. Madrid filings increased 0.1% above their level in 2021. As such, the overall decline in Australian applications was entirely due to a reduced number of direct applications (14.3% in 2022).

### Countries of origin

Australia is the leading country of origin for new trade marks in Australia, followed by the US, China, the United Kingdom (UK), Germany and Japan (see Figure 2.2). US applicants were named on 13.5% of trade mark applications in Australia in 2022. A country’s count of applications include those filed by residents of that country with co-applicants from other countries<sup>15</sup>. Applications from US applicants were down 4.5% from their 2021 level.

**Figure 2.2 Leading countries of origin for trade mark applications, 2022**



Trade mark applications submitted by Chinese applicants fell by 2.0% from 2021. However, China’s share of total applications increased over 2020 to 2022, from 5.9% to 7.0%. This follows a period of exponential growth between 2014 and 2017. Since 2018, trade mark applications from China have sat close to their peak level from that year (see Figure 2.2).

A hot spot for growth in Australian trade marks is the United Arab Emirates (UAE). Applications naming residents from the UAE have grown over the past five years at an annual average rate of 20.3%. From 2021 to 2022, they grew by 58.4%, from 101 to 160. This follows the UAE government agreeing to join the Madrid system from 28 December 2021, and revamping its trade mark laws in March 2022 to provide for more effective brand enforcement.

# Domestic trade mark activity in Australia

## Economic characteristics of trade mark-holding businesses

The use of trade marks is more diffuse than the use of patents throughout the economy. Around 53,900 businesses operating in Australia each year hold a trade mark (based on 2019-20 data), around 1.7% of all businesses in the economy.

On average, from 2010-11 to 2019-20, these businesses accounted for around 34% of Australia’s GDP, 32% of Australia’s workforce, 42% of national R&D spend and 49% of total exports (see Figure 2.3).

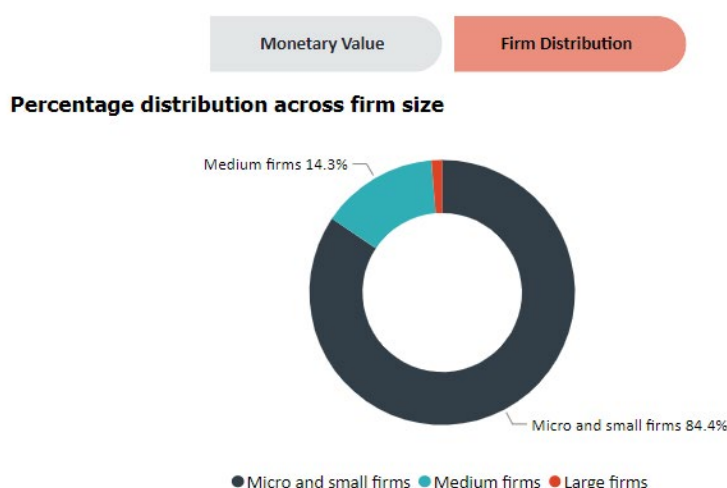
**Figure 2.3 Economic characteristics of Australian trade mark-holding businesses, annual averages, 2010-11 to 2019-20**

### Economic aggregates

<b>Number of holding firms</b>	<b>69,000</b>	<b>Employees (FTE)</b>	<b>2,450,000</b>
Micro and small firms	84.40%	Gross value add	\$601.00bn
Medium firms	14.30%	R&D spend	\$5.80bn
Large firms	1.30%	Exports	\$184.50bn

### Median comparisons of IP holders and non holders

	Employees (FTE)	Gross value add	Labour productivity
Trade mark holders	8	\$159,364	\$73,401
Non-holders	2	\$23,022	\$68,353



Source: BLADE, Australian Bureau of Statistics (ABS), 2022. Notes: All monetary values are reported in real 2020–21 dollars (price index from ABS 5206.0)

Given their role in innovation, trade marks are a leading indicator of growth in revenue productivity for businesses. For example, a recent study estimated that each additional trade mark is linked to an 8% increase in revenue per worker, above that generated by product launches<sup>16</sup>.

In Australia, the median business with a trade mark employs around four times the number of workers as the median business without a trade mark. Labour productivity is 7% higher on average in businesses that hold domestic trade marks (see Figure 2.3).

## Environmental and policy factors

In 2022, trade mark applications by Australian residents fell by 16.3% to 44,646. Some of this involves a correction from disproportionate growth in resident applications in recent years. These recent increases include 16.7% in 2020 and 3.2% in 2021 (see Figure 2.4).

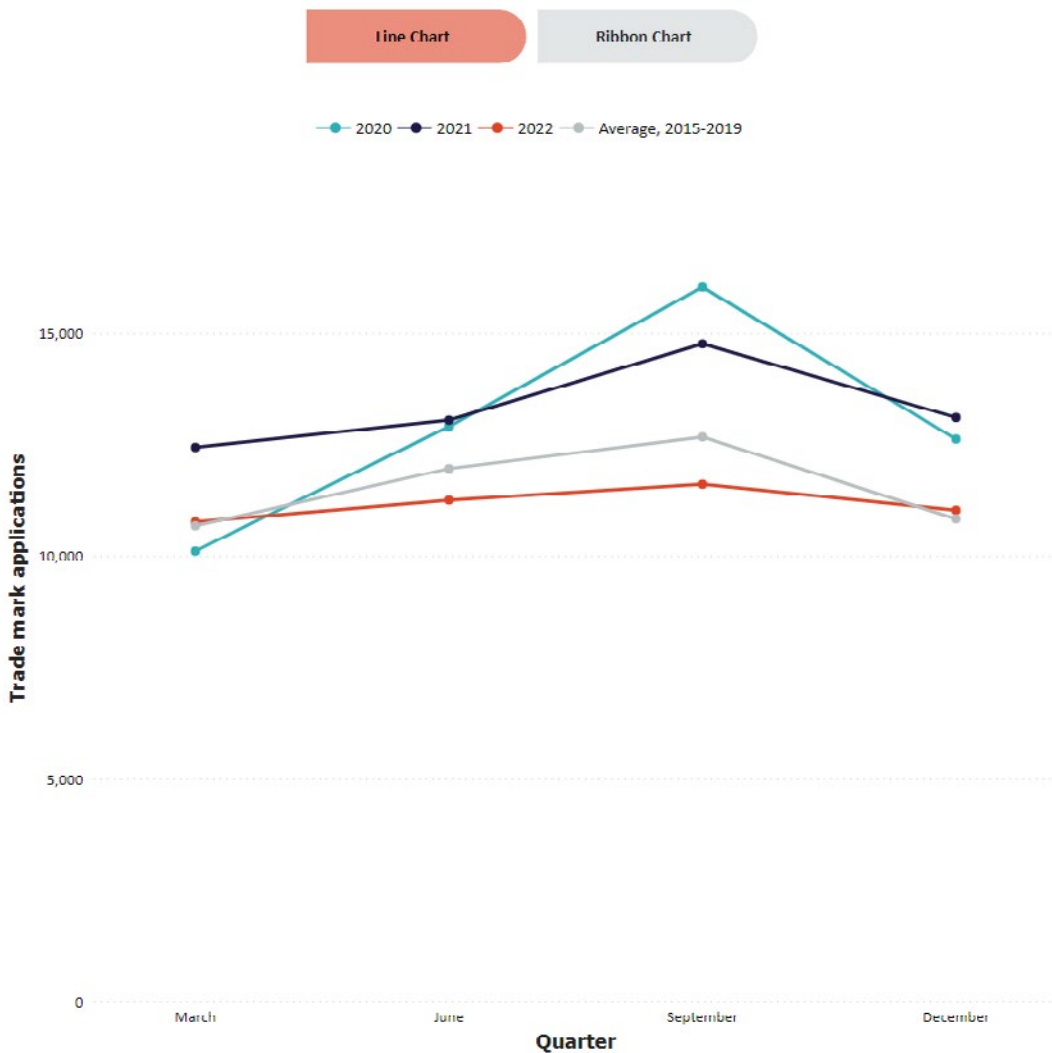
**Figure 2.4 Annual change in trade mark applications (%) in Australia by domicile, 2013 to 2022**



Studies show that trade mark filing activity is positively linked to changes in average real household income<sup>17</sup>. Australia’s economy displayed a strong expansion over 2022. However, rising living costs weighed on demand and consumption growth moderated in late 2022<sup>18</sup>. Survey research indicates that, once adjusted for inflation, average household income in Australia declined by 3.1% from April to October 2022<sup>19</sup>. This placed it significantly lower than at its highest level during the pandemic (November 2020). Rising interest rates have added to the effect by reducing real spending power.

Trade marks react quickly to changes in expected demand and can anticipate the business cycle. Resident applications fell most notably below trend in the September quarter of 2022, as shown in Figure 2.5. In that quarter, applications in 2022 (in red) fell below the average quarterly level observed pre-pandemic (in grey) and in the pandemic’s first two years (in purple and blue).

**Figure 2.5 Resident trade mark applications per quarter, 2015 to 2022**



Consistent with these observations, Chapter 6 of this report previews new research by RBA economists, who find that domestic trade mark filings in Australia are sensitive to changes in macroeconomic conditions and monetary policy.

- Read this report's feature chapter on [monetary policy, investment and innovation](#).









Trade mark activity is also linked to the level of opportunistic entrepreneurship in a country — start-up activity directed at creating high-growth businesses<sup>20</sup>. Australia’s business entry rate declined 16.6% between the 2022 June and September quarters in seasonally adjusted terms<sup>21</sup>. Fewer product and service introductions by new businesses may help explain the below-trend level of resident applications in the late half of 2022.

## States and territories

All states and territories experienced a decline in applications from their 2021 levels. These declines ranged from a 7.4% drop in the Northern Territory to a nearly 20% decline in Western Australia (see Figure 2.6). New South Wales (NSW) was the leading source of trade mark applications in 2022 (with 15,730), followed by Victoria (12,892).

The most trade mark-intensive state or territory in 2022 was the Australian Capital Territory (ACT) with 22.6 applications per every 1,000 businesses in the territory, followed by Victoria, Queensland and NSW.

**Figure 2.6 Trade mark applications by Australian states and territories, 2022**

	New South Wales	Victoria	Queensland
			
Applications	15,730	12,892	8,943
Change in applications, 2021 to 2022	-12.2%	-19.0%	-8.4%
Applications per thousand businesses	20.40	21.10	20.50
	Western Australia	South Australia	Australian Capital Territory
			
Applications	3,163	2,694	656
Change in applications, 2021 to 2022	-19.9%	-11.7%	-12.2%
Applications per thousand businesses	14.30	18.80	22.60
	Tasmania	Northern Territory	
			
Applications	462	138	
Change in applications, 2021 to 2022	-15.8%	-7.4%	
Applications per thousand businesses	12.20	9.70	

## Trade mark classes

Trade mark activity is concentrated in a variety of goods and service categories. High-tech manufacturing industries are heavy users of trade marks, as are information-intensive services such as advertising and education.

Trade mark applications are assigned to product and service categories using the Nice Classification, an international system of 45 product and service classes<sup>22</sup>. On average, applicants file around 1.9 classes for each application; in 2022, class filings reached 153,054 in total.

Internationally, trade mark applications have grown strongly across goods and service classes over recent years. However, a year into the pandemic, growth in trade marks for new services outpaced those for new goods<sup>23</sup>. In 2022, services inflation remained high, driven by resilient demand, even as goods inflation started to decline<sup>24</sup>. In Australia, consumption growth slowed in late 2022, concentrated in discretionary goods categories<sup>25</sup>.

Consistent with these trends, growth in trade marks continued for new services, even as it moderated in goods classes. In 2022, the only top class for trade mark applications that received an increase in filings was Scientific and technological services, up 1.7% on their 2021 level (see Figure 2.7). This class includes services related to computer security, medical research and other science and technological fields.

Financial services saw the greatest increase in its share of total filings in 2022. The accelerated adoption of digital technology has widened the scope for new financial products, payment systems and mobile and web applications. The number of enterprises in the sector is increasing through entry by foreign banks, neobanks and financial technology providers<sup>26</sup>.

**Figure 2.7 Top five trade mark classes and high-volume classes with the greatest relative growth and decline**



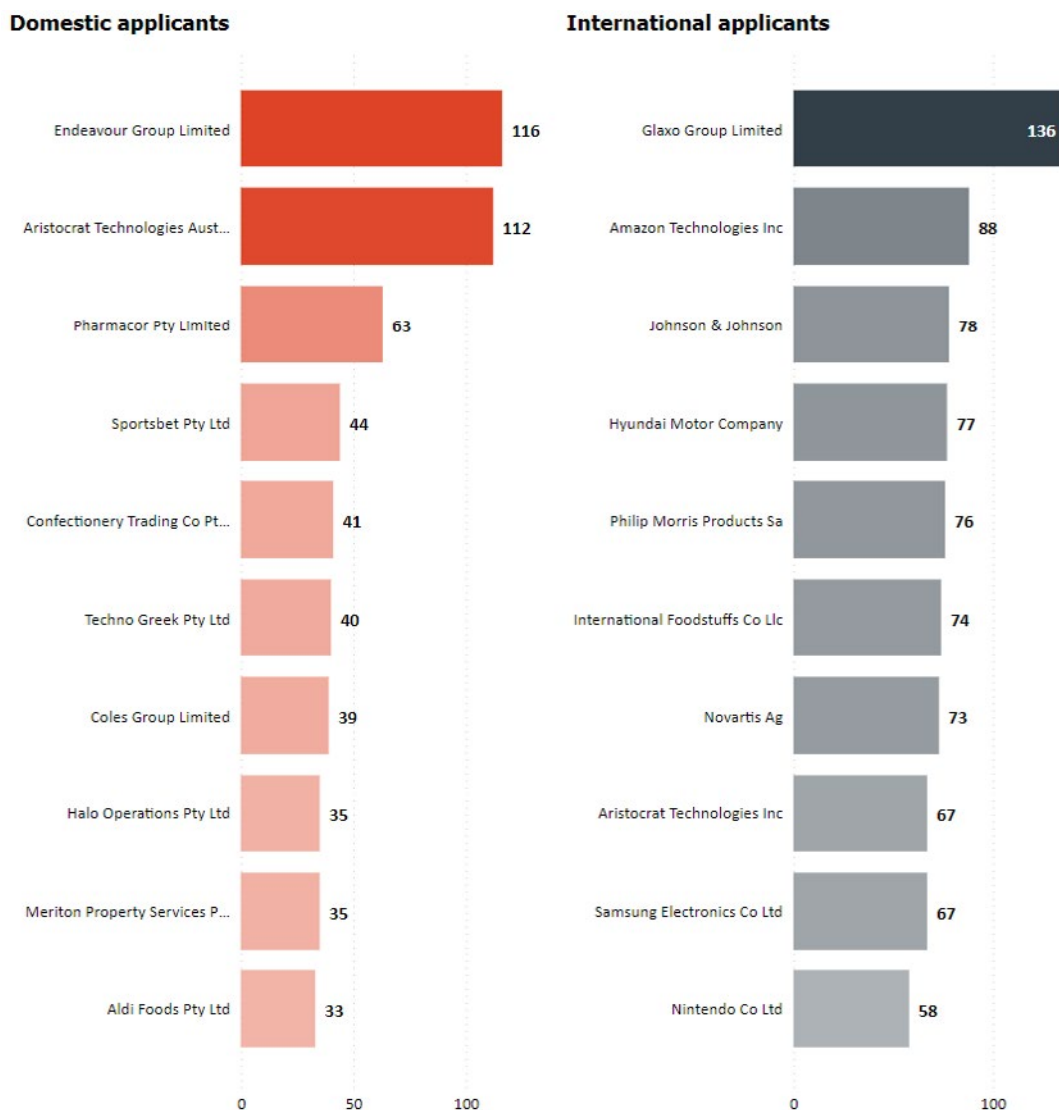
A decline in trade mark filings was observed across key discretionary goods classes. These included Clothing, footwear and headgear; and Printed paper, cardboard and stationery. Growth in trade marks for new pharmaceutical and personal care products has also tapered after spiking in 2020.

## Leading applicants

Global pharmaceutical manufacturer Glaxo Group retains its position as the lead international trade mark filer in 2022, with 136 applications (see Figure 2.8). Ranked second, with 88 applications, was Amazon Technologies. In Australia, the company doubled its production capacity and expanded its product range by 60% in 2022<sup>27</sup>.

Healthcare and consumer packaged goods company Johnson and Johnson returned to the list of top filers, with 78 applications in 2022, having last exited in 2020. The Hyundai Motor Company is a new entrant, with 77 applications, as global automotive markets recover after the pandemic.

**Figure 2.8 Top domestic and international applicants for trade marks in Australia, 2022**



Source: IP Australia; ABS. Australian Demographic Statistics, June 2021. Retrieved 27 January 2022.



The leading domestic trade mark filer in Australia (with 116 applications) was Endeavour Group, the retail drinks and hotels business formed by Woolworths Group in 2019. Gaming machine manufacturer Aristocrat Technologies ranked second (112 applications).

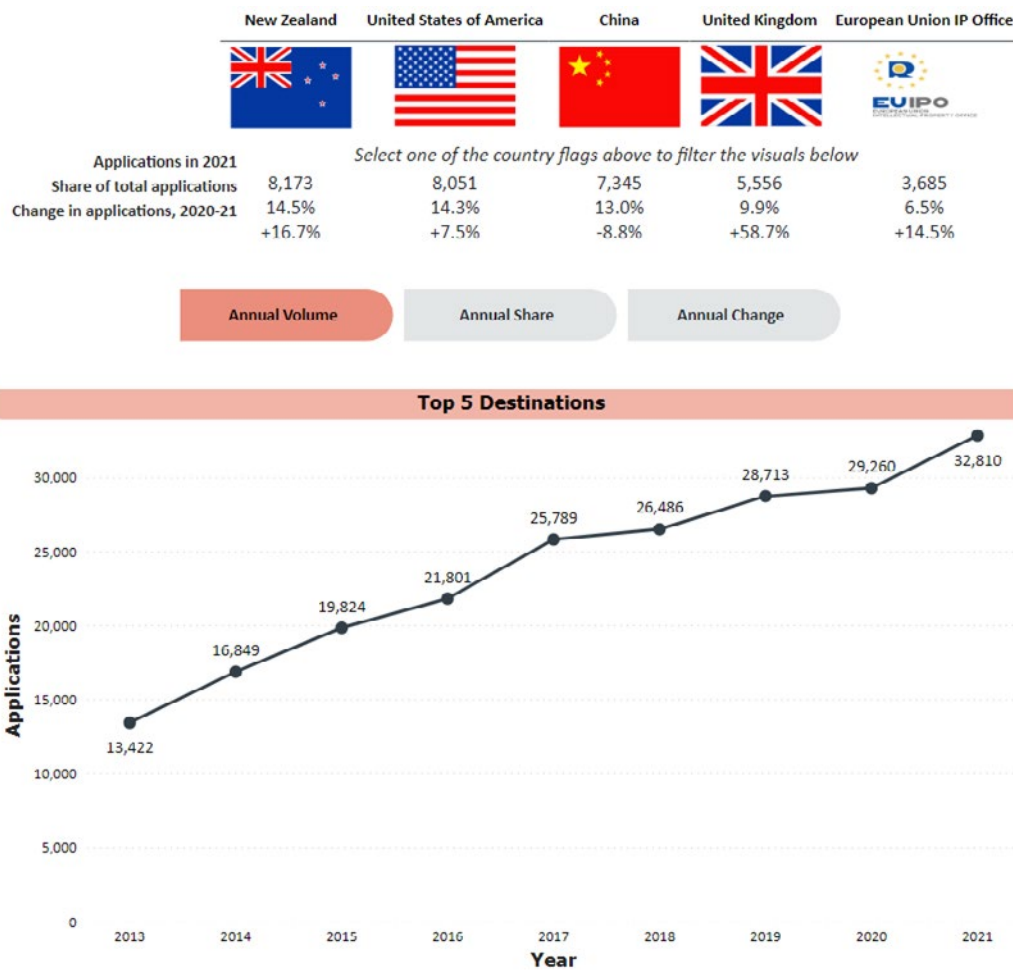
A new entrant into the ranks of top filers was Pharmacor (63 applications), an Australian-operated company focused on generic medicines.

## Australian filings overseas

In 2021, Australians filed 22,893 trade mark applications abroad, up 11.9% from the 2020 level, based on the latest available data from WIPO<sup>28</sup>. Total trade mark classes filed by Australians abroad increased by 18.6% to 56,289.

The leading destination markets for Australian trade mark filings were New Zealand, the US, China, the UK and the European Union Intellectual Property Office (EUIPO; see Figure 2.9). From 2015 to 2020, China was the lead destination for Australian class filings abroad. However, class filings in China fell 8.8% in 2021. In contrast, Australian filings abroad rose by 16.7% in New Zealand and 7.5% in the US in 2021.

**Figure 2.9 Leading destinations for Australian trade mark applications (class count), 2022**



Source: WIPO IP Statistics Database

Trade mark applicants can obtain protection for their marks in multiple countries by filing a single international registration via the Madrid system. There are now over 138 member countries of the Madrid system, more than 64% of all countries worldwide. As the system

has expanded to cover more countries over the past decade, its use by Australians has intensified. In the five years to 2021, Australian class filings via Madrid abroad have grown an average of 49.6% per annum. The Madrid share of class filings has climbed from 52.0% in 2020 to 60.0% in 2021.

### Trade mark endnotes

- <sup>1</sup> Trade marks can be renewed every 10 years in perpetuity so long as they are in use, on the basis that the need to prevent consumer confusion does not lessen over time.
- <sup>2</sup> Akerlof, G. (1970). *The market for 'lemons': quality uncertainty and the market mechanism*. The Quarterly Journal of Economics, 84(3), 488–500; Shapiro, C. (1982). *Consumer information, product quality, and seller reputation*. The Bell Journal of Economics, 13(1), 20–35.
- <sup>3</sup> Castaldi, C., Block, J. & Flikkema, M. J. (2020). *Editorial: why and when do firms trademark? Bridging perspectives from industrial organisation, innovation and entrepreneurship*. Industry and Innovation, 27(1–2), 1–10.
- <sup>4</sup> Mendonça, S., Pereira, T. & Godinho, M. (2004). *Trade marks as an indicator of innovation and industrial change*. Research Policy, 33, 1385–404. Nathan, M. & Russo, A. (2022). *On the timing of trade mark filing vis-à-vis entrepreneurial events*. Innovative events: Product launches, innovation and firm performance. Research Policy, 51(1), Article 104373. On the relationship between trade marks and exports, see Falk, M. (2021). *Exporter resilience to shocks: The role of trade marks* (IP Australia Economic Research Paper Series 11). Commonwealth of Australia.
- <sup>5</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). *Resilience and ingenuity: Global innovation responses to Covid-19* (eBook). Centre for Economic Policy Research (CEPR) Press.
- <sup>6</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). *Resilience and ingenuity: Global innovation responses to Covid-19* (eBook). Centre for Economic Policy Research (CEPR) Press. .
- <sup>7</sup> *Statement on Monetary Policy: February 2023*. Reserve Bank of Australia (2023).
- <sup>8</sup> De Grazia, C. A. W., Myers, A. & Toole, A. (2013). *Innovation activities and business cycles: Are trade marks a leading indicator?* [USPTO Economic Working Paper No. 2019-04].
- <sup>9</sup> Barroso, A., Giarratana, M. S. & Pasquini, M. (2019). *Product portfolio performance in new foreign markets: The EU trademark dual system*. Research Policy, 48, 11–21.
- <sup>10</sup> Claycamp, H. & Liddy, L. (1969). *Prediction of new product performance: An analytical approach*. Journal of Marketing Research, 6(4), 414–420; Hoyer, W. & Brown, S. (1990). *Effects of brand awareness on choice for a common, repeat-purchase product*. Journal of Consumer Research, 17(2), 141–148.
- <sup>11</sup> Krasnikov, A., Mishra, S. & Orozco, D. (2009). *Evaluating the financial impact of branding using trademarks: A framework and empirical evidence*. Journal of Marketing, 73, 154–166.
- <sup>12</sup> Falk, M. (2021). *Exporter resilience to shocks: The role of trade marks* (IP Australia Economic Research Paper Series 11). Commonwealth of Australia.
- <sup>13</sup> *International intellectual property filings in 2022*. World Intellectual Property Organization (2023).
- <sup>14</sup> *International intellectual property filings in 2022*. World Intellectual Property Organization (2023).
- <sup>15</sup> We count an application as originating from a country if at least one applicant on the application is a resident of that country, as indicated by the applicant's address.
- <sup>16</sup> Nathan, M. & Russo, A. (2022). *Innovative events: Product launches, innovation and firm performance*. Research Policy, 51(1), Article 104373.
- <sup>17</sup> For example, see Jensen, P. H. & Webster, E. (2011). *Patterns of trademarking activity in Australia* [Melbourne Institute Working Paper No. 2/04]. Australian Intellectual Property Journal, 15.
- <sup>18</sup> Reserve Bank of Australia. (2023). *Statement on Monetary Policy: February 2023*.
- <sup>19</sup> Biddle, N. & Gray, M. (2022). *Economic and other wellbeing in Australia – October 2022*. ANU Centre for Social Research and Methods. Further, according to data from the Australian Bureau of Statistics, the December 2022 quarter saw living costs for employee households rise 3.2%, the largest quarterly rise in two decades. *Employee households living costs highest in two decades* [Media release]. Australian Bureau of Statistics (2023)
- <sup>20</sup> See Lyalkov, S., Carmona, M., Congregado, E., Millán, E. & Millán, J. M. (2019). *Trademarks and their association with Kirznerian entrepreneurs*. Industry and Innovation, 27(1–2), 1–10.
- <sup>21</sup> *Counts of Australian businesses, including entries and exits*. Australian Bureau of Statistics (2022, 25 August).

<sup>22</sup> For more information, see <https://www.wipo.int/classifications/nice/en/>.

<sup>23</sup> Fink, C., Toole, A. A. & Veugelers, R. (2022). *Resilience and ingenuity: Global innovation responses to Covid-19* (eBook). Centre for Economic Policy Research Press. *IP Australia. (2022). The Australian Intellectual Property Report 2022*. Commonwealth of Australia.

<sup>24</sup> *Statement on Monetary Policy: February 2023*. Reserve Bank of Australia (2023).

<sup>25</sup> *Statement on Monetary Policy: February 2023*. Reserve Bank of Australia (2023).

<sup>26</sup> *Finance in Australia – Market research report* [Industry Report K6200: March 2022]. IbisWorld (2023). Viewed 15 January 2023. .

<sup>27</sup> Mitchell, S. (2022, 24 November). *Online battle gets serious as Amazon shifts gear*. AFR.

<sup>28</sup> WIPO IP Statistics Database.



3

# Designs



Design rights protect the visual features of a product that give it a unique appearance, such as its shape, pattern, configuration or ornamentation. In Australia, designs are registered without substantive examination. A design must be examined and certified by IP Australia for rights to be enforced. Additionally, the design must be new and distinctive to be eligible for protection – that is, it must be dissimilar in overall impression to designs that constitute prior art.

When design concepts are made public, they may be easily copied by imitators, in which case the original producers may not financially benefit from their design as much as they would otherwise. The owner of a certified design has exclusive rights to use, license and commercialise the design for up to 10 years, incentivising design innovation.

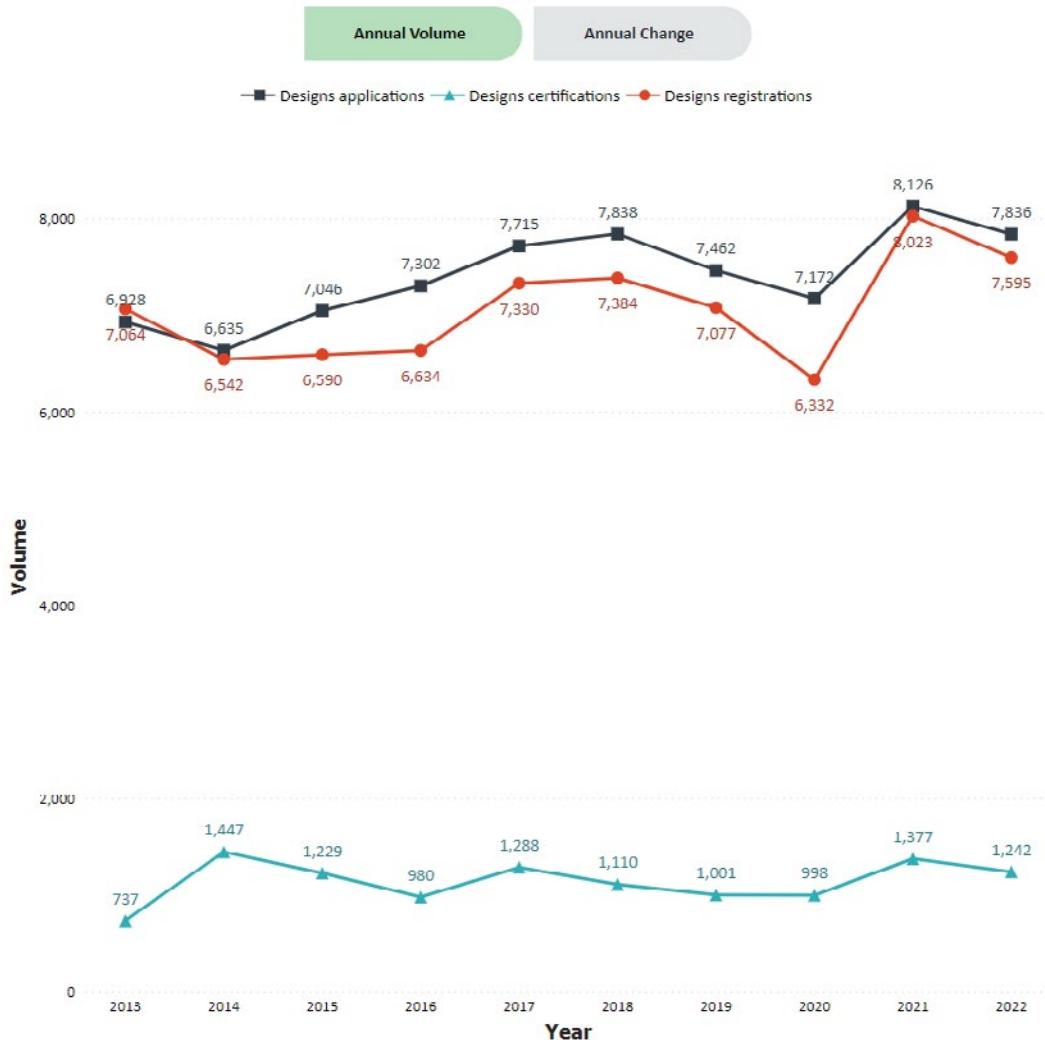
Design applications contain information about the form of products. As such, they provide valuable data on changes in design styles and their role in new product development<sup>1</sup>.

## Design applications, registrations and certifications

Applications for design rights in Australia fell by 3.6% to 7,836 in 2022. However, this follows a sharp 13.3% rise in applications in 2021, when they reached a record level (see Figure 3.1). The total for 2022 was 4.5% higher than the five-year annual average observed from 2016 to 2020.

Non-resident applications increased by 3.3% on their record 2021 level, to 5,703. In contrast, design applications by Australian residents fell by 18.1%.

**Figure 3.1 Design applications, registrations, and certifications in Australia, 2013 to 2022**



Design registrations totalled 7,595 in 2022, a reduction of 5.3% from the record level they reached in 2021. IP Australia certified 1,242 design registrations, 9.8% fewer than in 2021. This follows a 38.0% increase in certifications in 2021. Certifications by non-residents fell 12.8% in 2022, and those by residents fell by 8.2%.

## International design activity in Australia

A study commissioned by IP Australia in 2019 found that Australian design innovators tend to have a global focus. They compete at the cutting edge of industry through innovation, collaboration, responsiveness to customers and combining multiple types of IP protection. Design rights are used by businesses competing globally, often as part of global value chains; that is, they are used in commercialising components that form part of complex products sold by other companies in final markets<sup>2</sup>.

### Recovery in international filings

Non-residents account for 72.8% of all design applications in Australia. This proportion has increased by nearly 16 percentage points over the past decade, including a five percentage point increase in 2022. Globally, the number of designs included in international applications under WIPO’s Hague System increased by 11.2% in 2022 and reached a new record. In Australia, continued growth in non-resident applications partially offset a decline in resident applications in 2022 (see Figure 3.2).

**Figure 3.2 Annual change in design applications (%) in Australia by domicile, 2013 to 2022**

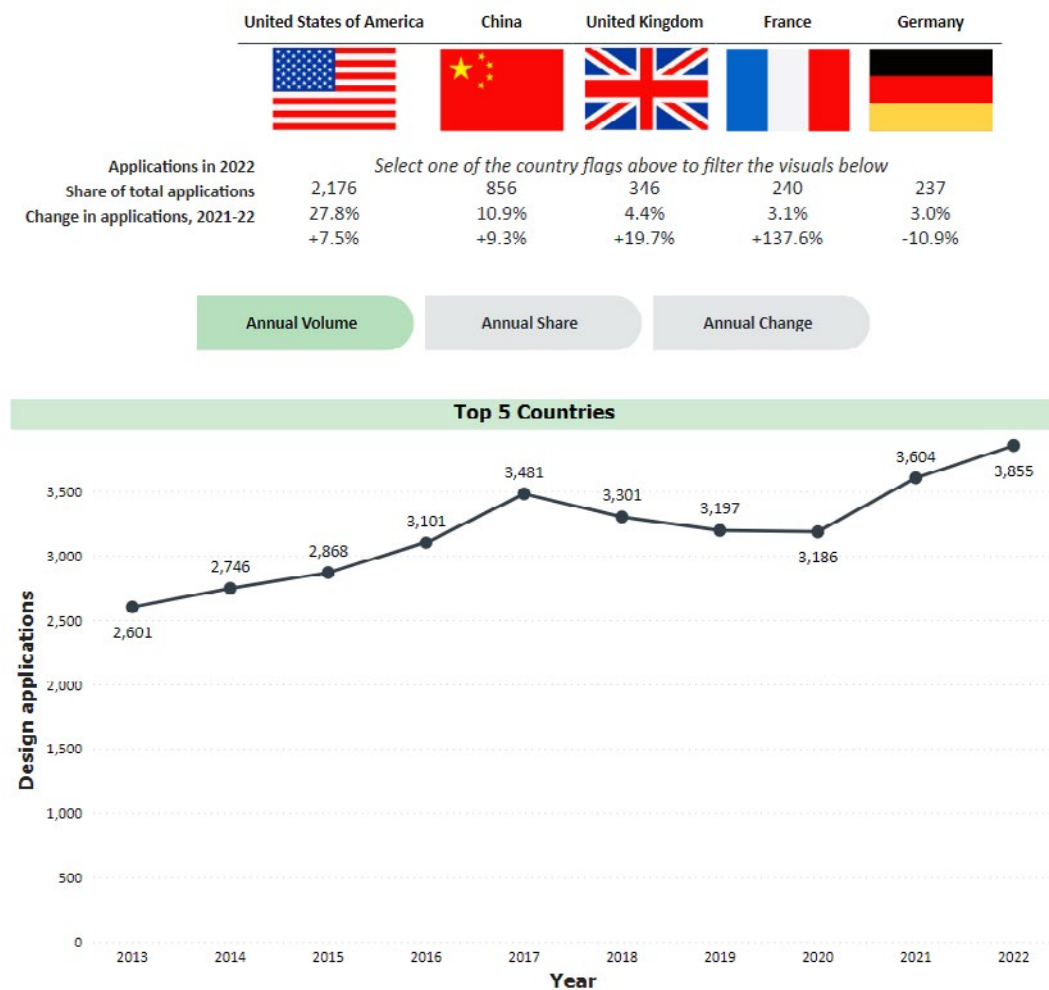


## Countries of origin

The leading overseas countries of origin for design right applications in Australia are the US (US applicants were named on 2,176 applications), China (856), the UK (346), France (240) and Germany (237)<sup>3</sup>. Apart from Germany, applications from each country increased from their 2021 levels, with a 7.5% increase for the US.

Over the past decade, applications naming residents from China have grown at an annual average rate of 32.1%. This includes a growth of 9.3% in 2022. China’s share of total applications has grown by a factor of six, from 1.8% in 2013 to 10.9% in 2022 (see Figure 3.3).

**Figure 3.3 Leading countries of origin for design applications, 2022**



Hot spots for growth in Australian design applications have included France and the Republic of Korea. Applications from French residents increased by 137.6% in 2022. The Republic of Korea has experienced an average annual growth rate above 27.0% in the three years to 2021 and increased its share of total applications in 2022.

# Domestic design activity in Australia

## Economic characteristics of design-holding businesses

In Australia, around 590 active businesses held a domestic design right in 2020. Design right holders comprise less than one-fifth of the business population with patents. However, the use of design rights has become more extensive over time: as a proportion of all active Australian businesses, design rights holders have increased by around a third, from 0.011% in 2010–11 to 0.016% in 2019–20.

Previous research commissioned by Australia found that for Australian businesses in certain design-intensive industries (mostly concentrated in manufacturing), holding registered or certified designs is linked to higher productivity. Designs are also associated with higher R&D spend and exports. The findings suggest that the value of design rights stems from their use as part of a broad competitive strategy to manage the intangible aspects of products<sup>4</sup>.

On average, labour productivity was around 30% higher in median design-holding businesses than in median businesses without registered designs between 2010–11 and 2019–20 (see Figure 3.4). Further, over the half-decade to 2019–20, design rights holders improved their productivity at six times the rate of businesses without registered designs.

**Figure 3.4 Economic characteristics of Australian design-holding businesses, annual averages, 2010-11 to 2019-20**

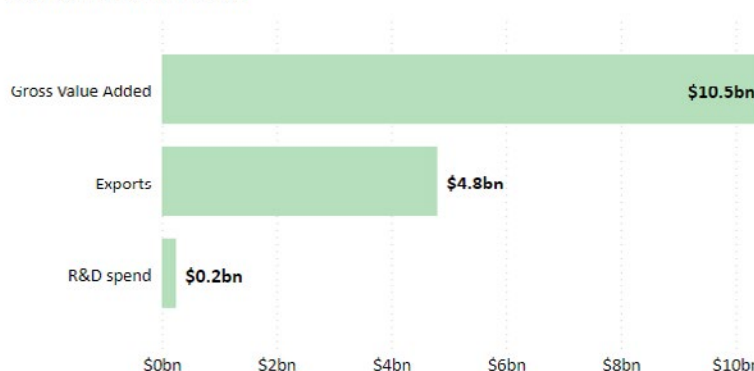
### Economic aggregates

<b>Number of holding firms</b>	<b>590</b>	<b>Employees (FTE)</b>	<b>83,800</b>
		<b>Gross value add</b>	<b>\$10.50bn</b>
		<b>R&amp;D spend</b>	<b>\$0.25bn</b>
		<b>Exports</b>	<b>\$4.80bn</b>

### Median comparisons of IP holders and non holders

	<b>Employees (FTE)</b>	<b>Gross value add</b>	<b>Labour productivity</b>
<b>Design holders</b>	<b>30</b>	<b>\$876,117</b>	<b>\$99,558</b>
<b>Non-holders</b>	<b>2</b>	<b>\$26,224</b>	<b>\$76,123</b>

### Economic contribution



Source: BLADE, Australian Bureau of Statistics, 2022. Notes: Monetary values are reported in AUD (current prices).



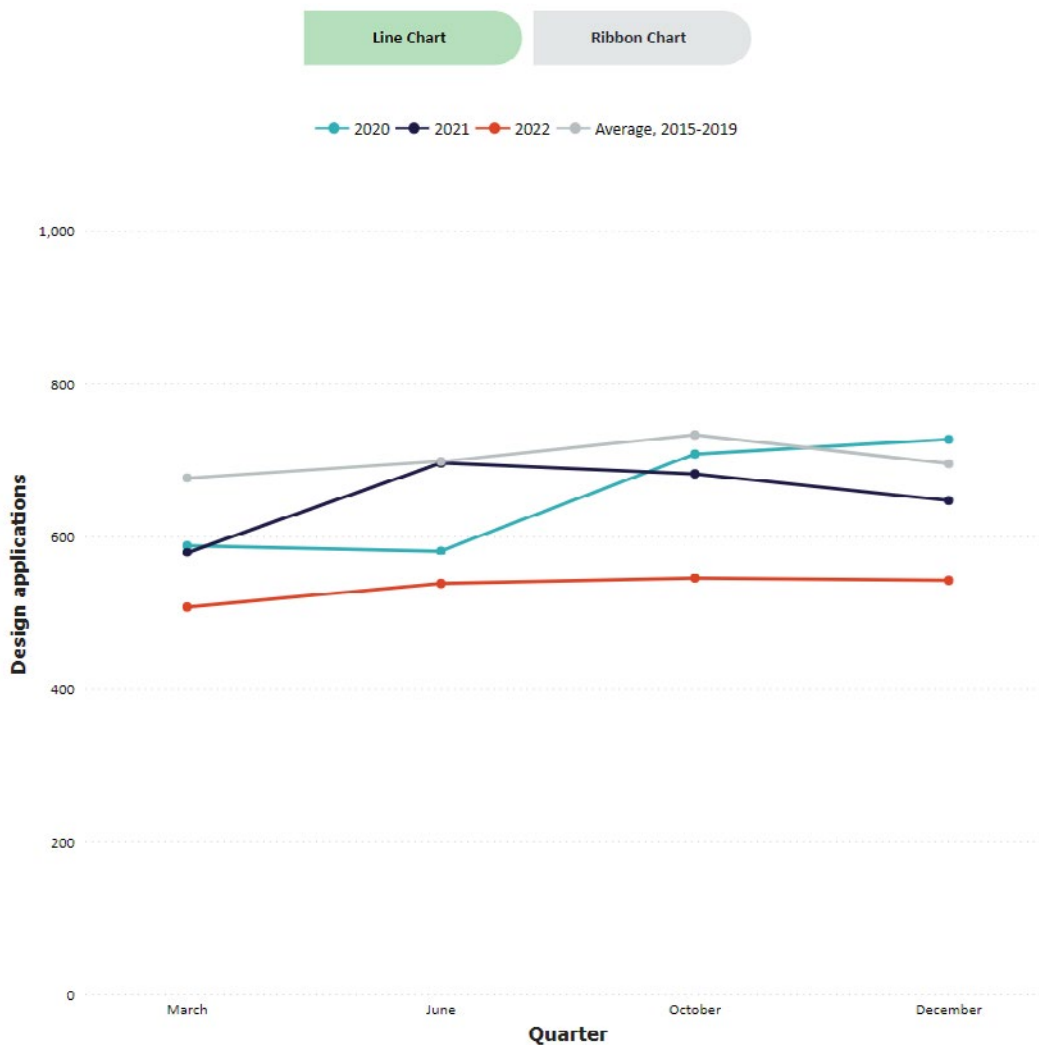
## Environmental and policy factors

Changes in product form often follow changes in function or provide the framework for technological advancement. An example is Apple’s iPad, which helped define the form in which tablets have developed. Design also has a role in technology adoption and commercialisation. Clever designs can create differences between products, shape their experience for people and convey information about the lifestyle of their users.

Previous studies have used design applications to measure the rate of change in design styles. They have shown that design activity varies across different stages of an industry’s development. In emerging industries, design innovation is intense because it can help build market acceptance for new technologies. In late-stage industries, design changes can help create differences between functionally mature products.

Given design’s role in adoption, it is likely that design filings react quickly to changes in expected demand as economic activity shows, similar to trade marks. Looking at quarterly trends in resident design filings (see Figure 3.5), application levels in 2022 (in black) settled lower than during the COVID-19 shock and the pre-pandemic period.

**Figure 3.5 Resident design applications per quarter, 2015 to 2022**



The 2022 decline in resident applications is most apparent relative to the pre-pandemic period: 2022 applications were fewer than in the pre-pandemic period but followed a similar over-the-year trend. COVID-19 may have accelerated preexisting trends, including a shift in the industries that rely most heavily on the designs system.

## Improving IP protections for Australian designers

In March 2022, several improvements to the design rights system came into effect.

Most significantly, a 12-month grace period has been introduced to ensure designers can register their designs after inadvertently disclosing them. Designs law in many other jurisdictions, such as the US, Japan and Europe, provide a 12-month grace period. This change will make it easier to coordinate IP protection across jurisdictions.

The changes also streamline and improve the design registration system, giving designers more flexibility in protecting their products.

IP Australia is exploring a program of further reforms to ensure the Australian design rights system is fit for purpose and supports the Australian economy now and in the future. We are considering how the design rights system could accommodate non-physical or 'virtual' products and parts of products; and how to give designers more flexibility in adapting their protection as their products change during development.

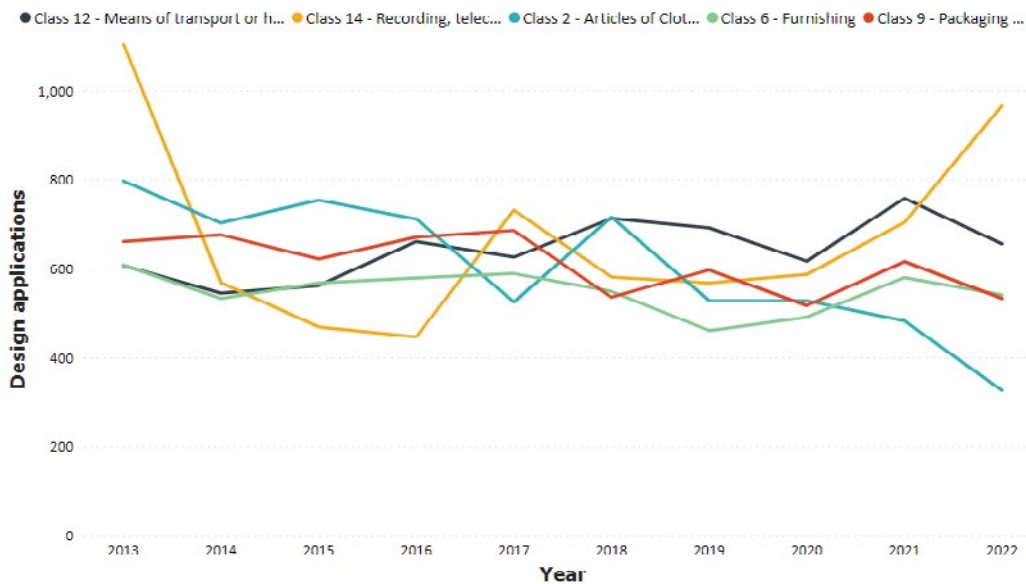
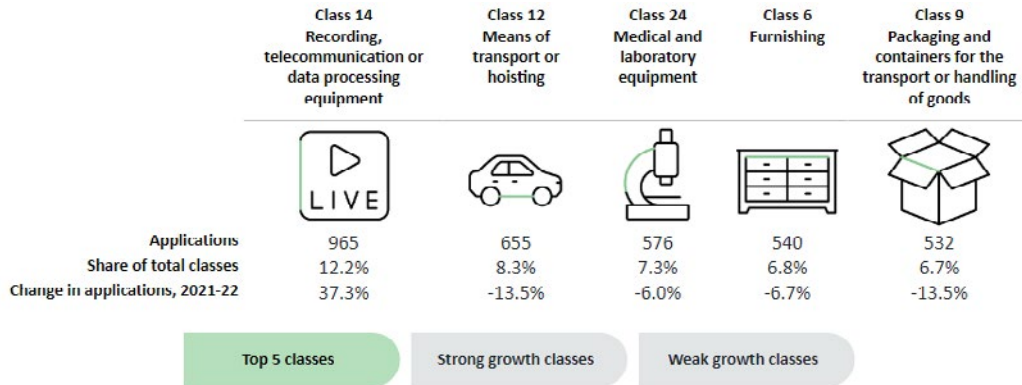
The ongoing reforms build on a 12-month review that involved [extensive research into Australia's design economy](#), the drivers of design innovation and the impact of design rights.

## Design classes

In Australia, designs are classified using the Locarno Classification, comprised of 32 product categories<sup>5</sup>. Traditionally, residents' design filings have concentrated in several key classes: clothing, furniture and building materials. These are product sectors where proximity to the market can confer an advantage to local businesses. Non-residents have focused more strongly on technology-intensive sectors such as recording, telecommunications and data processing equipment. This pattern holds in design filings across jurisdictions<sup>6</sup>.

Recording, telecommunications or data processing equipment is a broad class that includes tablet computers, point-of-sale terminals, and screen displays and icons. In 2022, applications in this class grew by more than a third from their 2021 level (+37.3%, to 965), while applications fell across all other leading design classes (Figure 3.6). Likely contributing to this rise in applications was strong growth in IT and telecommunications adoption, up 2.8% in 2022<sup>7</sup>.

**Figure 3.6 Top five design classes and high volume classes with the greatest growth and decline in 2022**



A substantial increase in the share of applications also occurred in Equipment for production, distribution or transformation of electricity. Over the first half of 2022, wholesale electricity prices in Australia’s National Electricity Market spiked as gas and coal prices rose due to the Russia-Ukraine conflict. Innovation in solar, electric vehicle and storage technologies is driving distributors to change the way they deliver electricity to end users<sup>8</sup>.

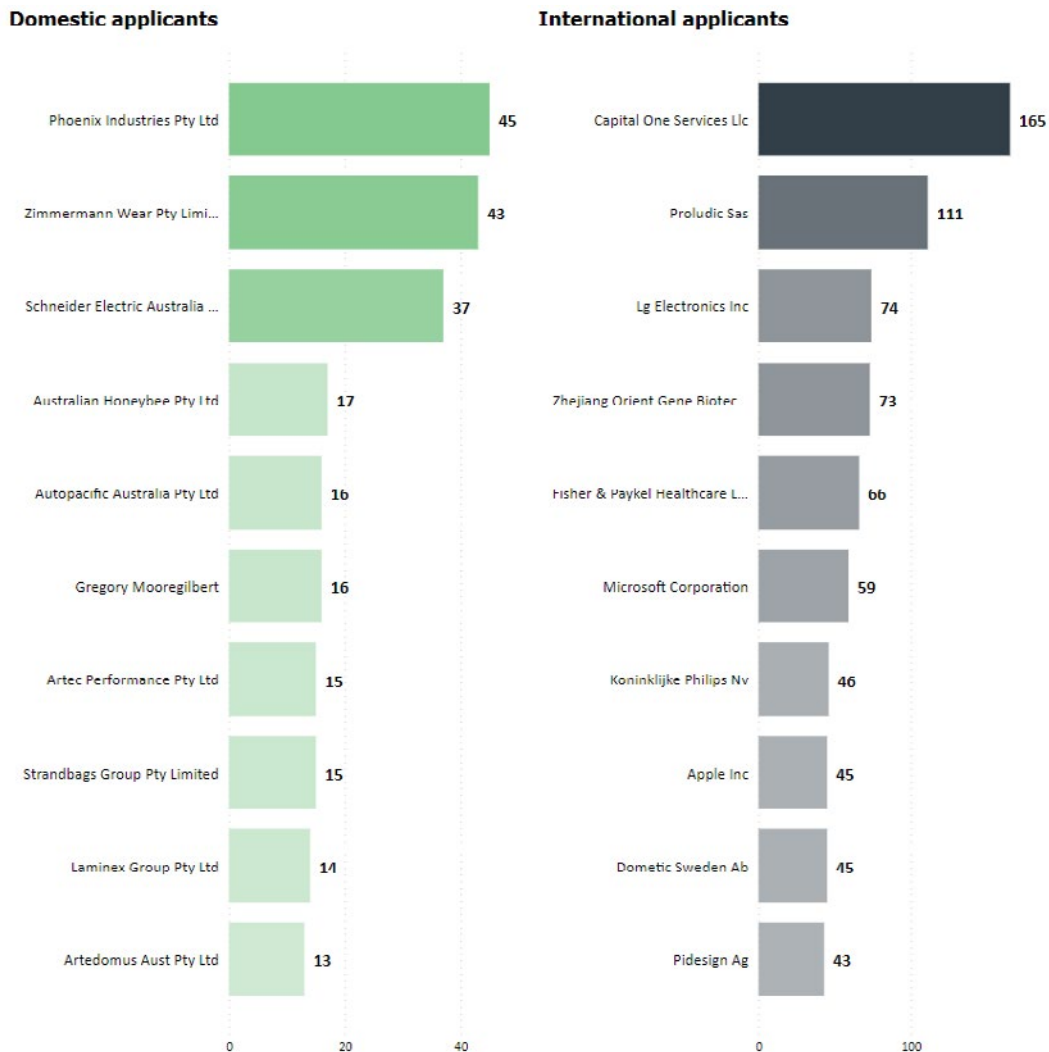
The strongest relative decline was in design applications for Clothing and haberdashery. Historically, Clothing manufacturing was the second most design rights-intensive industry in Australia<sup>9</sup>. However, over time, clothing has halved its share of total design filings, accounting for 9.7% of applications in 2013 and just 4.1% in 2022. Applications in this class fell by 32.6% to 325 in 2022.

## Leading applicants

In 2022 the leading international applicant was Capital One Services (see Figure 3.7). This major US bank specialises in credit cards, auto finance and consumer and commercial banking. It has filed to register a portfolio of designs related to an electronic device and graphical user interface for card communication (165 applications). Second-ranked was Proludic, a French designer and manufacturer of sports, playground and fitness equipment (111 applications).

South Korean technology company LG Electronics was the lead patent filer in 2022 and ranked third for design applications (74 applications). A China-based company focusing on in-vitro diagnostic products, Zhejiang Orient Gene Biotech Co., followed with 73 applications. Fisher and Paykel Healthcare, a producer of respiratory care products, rounded out the ranks with 66 applications.

**Figure 3.7 Top domestic and international applicants for design rights in Australia**



Phoenix Industries, a producer of tapware, showers and bathroom accessories, led domestic design filers in 2022 (45 applications). The company entered the ranks of top filers in 2021 (see Figure 3.7).

Australian-based fashion house Zimmermann Wear moved from first to second position with 43 applications. Zimmermann filed 29.5% fewer design applications in 2022 than in 2021.

Schneider Electric, which specialises in energy management products, systems, and solutions, is new to the list of lead filers. Their 37 applications in 2022 include filings for the design of electric vehicle charging stations.

Australian Honeybee (now named HiveIQ) was ranked fifth with 17 design applications for its Australian-manufactured beehive system. The company has protected its product system and brand through a combination of patents, trade marks and design rights.

## Australian filings overseas

According to the latest available WIPO data, in 2021, Australian applicants filed 2,989 classes in design applications abroad – a record number and 34.3% more than in 2020<sup>10</sup>. On average, in the five years to 2021, Australian design class filings abroad have grown by 17.1% each year.

The leading destination markets for Australian designs were the UK, US, EUIPO, New Zealand and China (see Figure 3.8).

**Figure 3.8 Leading destinations for Australian design applications (class count), 2022**



Source: WIPO IP Statistics Database

Hot spots for growth include the UK, where Australian residents tripled their design count between 2020 and 2021, from 164 to 705, and the Republic of Korea, which saw 152.6% growth in 2021.

## Taking IP global: The Hague Agreement

The Hague Agreement on Industrial Designs allows design applicants to seek registration in multiple countries through a single international application. First adopted in 1925, the Agreement covers 94 countries. The European Union became a member in 2006, the US in 2015 and China in 2022. In principle, Australia has agreed to make all reasonable efforts to join the Hague Agreement as part of a free trade agreement (FTA) between Australia and the UK. The agreement allows time to consider legislative and system changes after entry into force of the FTA.

### Design endnotes

<sup>1</sup> Chan, T. H., Mihm, J. & Sosa, M. E. (2017). *On styles in product design: An analysis of U.S. design patents*. Management Science, 64(3).

<sup>2</sup> Kollmann, T., Koswatta, A., Palangkaraya, A. & Webster, E. (2020). *The impact of design rights on Australian firms* [IP Australia Economic Research Paper 09]. Commonwealth of Australia.

<sup>3</sup> We count an application as originating from a country if at least one applicant on the application is a resident of that country, as indicated by the applicant's address.

<sup>4</sup> Kollmann, T., Koswatta, A., Palangkaraya, A. & Webster, E. (2020). *The impact of design rights on Australian firms* [IP Australia Economic Research Paper 09]. Commonwealth of Australia.

<sup>5</sup> For details about the Locarno System, see <https://www.wipo.int/classifications/locarno/en/>.

<sup>6</sup> Falk, M., Zhang, H., Drake, P., Lim, K., Massey, B., Mitra-Kahn, B. & Richardson, M. (2019). *Designs law and practice: Design within Australia and how Australia compares to its international peers* [IP Australia Economic Research Paper Series 08]. Commonwealth of Australia.

<sup>7</sup> *Finance in Australia – Market research report* [Industry Report K6200: March 2022]. Viewed 15 January 2023. IbisWorld (2023).

<sup>8</sup> *Computer and software retailing in Australia - market research report* [Australia Industry (ANSIC) Report G422]. IbisWorld (2022).

<sup>9</sup> Falk, M., Zhang, H., Drake, P., Lim, K., Massey, B., Mitra-Kahn, B. & Richardson, M. (2019). *Designs law and practice: Design within Australia and how Australia compares to its international peers* [IP Australia Economic Research Paper Series 08]. Commonwealth of Australia.

<sup>10</sup> WIPO statistics database.



4

# Plant breeder's rights



Plant breeder's rights (PBRs) provide legal protection for new plant varieties to encourage private investment in plant breeding and commercialisation. A plant variety must be clearly identifiable and distinguishable from other varieties to be eligible for protection. It must be uniform and stable upon propagation.

PBRs grant their owners an exclusive right to exclude others from commercially exploiting their new varieties for up to 25 years. PBRs enhance their owners' ability to collect royalties while directing the production, sale and distribution of varieties.

Without IP protection, new varieties may be propagated or distributed without the breeder receiving remuneration, resulting in underinvestment. PBRs allow breeders to recoup their investments in cultivating new varieties.

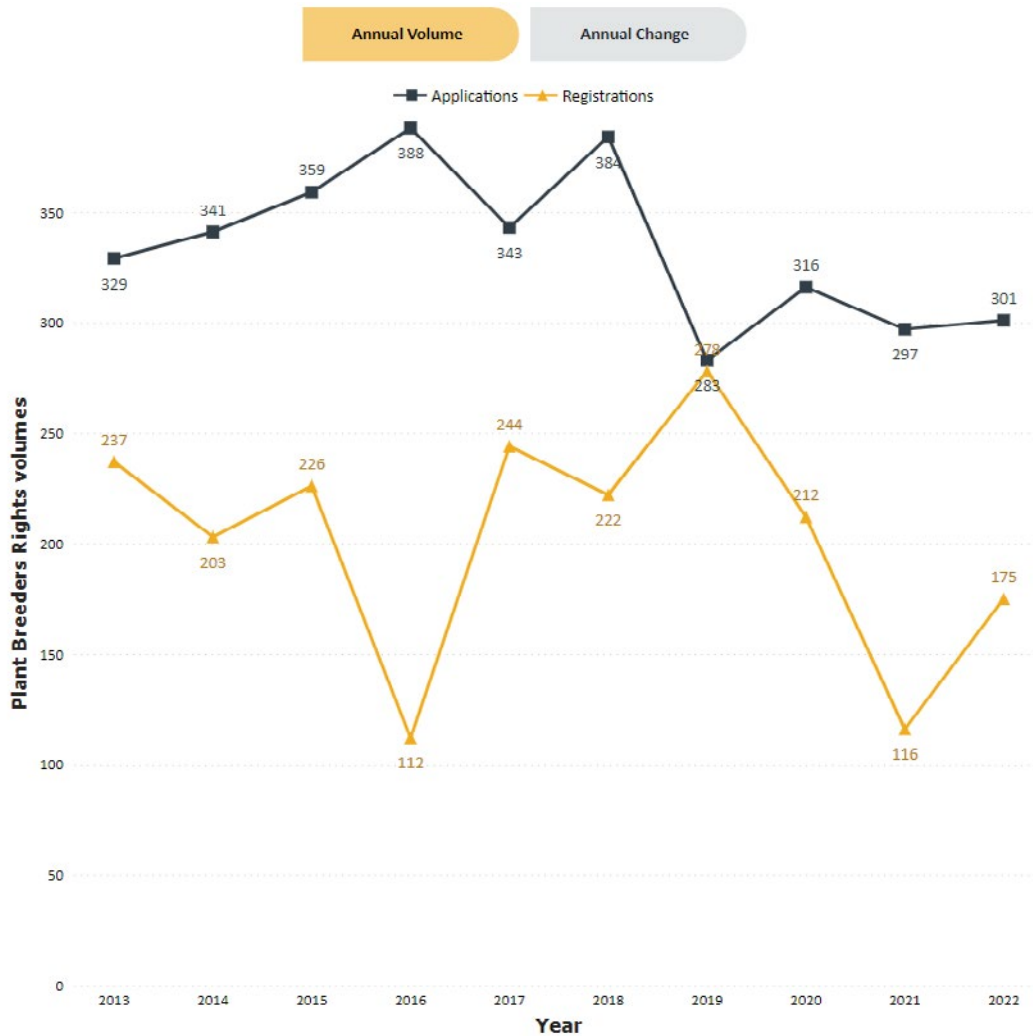
## PBR applications and registrations

In 2022, PBR applications in Australia rose by 1.3%, to 301, from their 2021 level. Resident applications fell by 8.5% to 118. Applications by non-residents increased by 8.9% to 183.

Australia's devastating bushfires in 2019–20 caused economic losses equivalent to 6–8% of Australia's national agricultural output. The devastation included the loss of crops, impacting breeders and downstream users<sup>1</sup>. The bushfires were preceded by severe drought over Eastern Australia from 2017 to 2019. A structural break is observed in the PBR application series in 2019 (see Figure 4.1). On average, between 2015 and 2018, 369 PBR applications were filed annually; from 2019 to 2022, the annual average dropped by 19.0% to 299.

While the average level of PBR applications dropped, their rate of growth remained fairly consistent between the pre- and post- bushfires periods: over 2016 to 2018, PBR applications grew by an annual average rate of 2.8%, which was only slightly above the 2.3% annual rate observed from 2020 to 2022.

**Figure 4.1 PBR applications and registrations in Australia, 2013 to 2022**



A PBR application must pass a substantive examination process and a comparative growing trial to be registered. In 2022, PBR registrations increased by 50.9% on their 2021 level, rising to 175.

Registrations have partially recovered from their significant decline following the 2019–20 bushfires. They fell 23.7% in 2020 and a further 45.3% in 2021. In addition to the reduced application volumes in that period, COVID-19 travel restrictions affected the ability of examiners and plant group experts to attend growing trials.

In 2022, an increase in registrations was observed for resident and non-resident applicants. Australian residents registered 66 PBRs, up 32.0% on their level in 2021. Non-residents registered 109 PBRs, up 65.2% on 2021 levels.

## International PBR activity in Australia

Many industries rely on foreign-sourced germplasm (living genetic material such as seeds, plants or plant parts) brought into Australia to improve plant varieties. PBRs facilitate the international transfer of varieties into Australia and the local investments needed to adapt varieties for Australia’s environment<sup>2</sup>.



## Recovery in international filings

Non-residents account for 60.8% of all PBR applications in Australia. As overall PBR application volumes in Australia are relatively small, they are volatile and strongly influenced by the behaviour of individual applicants.

The trajectory of annual change in non-resident applications suggests a gradual recovery path for PBR filings since 2019 (see Figure 4.2). Non-resident filings fell by 36.8% that year. In 2020, non-resident applications rebounded with a growth of 38.8%. As of 2022, non-resident applications appear to follow an inclining growth trend, albeit at a lower absolute level than before 2019.

**Figure 4.2 Annual change in PBR applications (%) in Australia by domicile, 2013 to 2022**

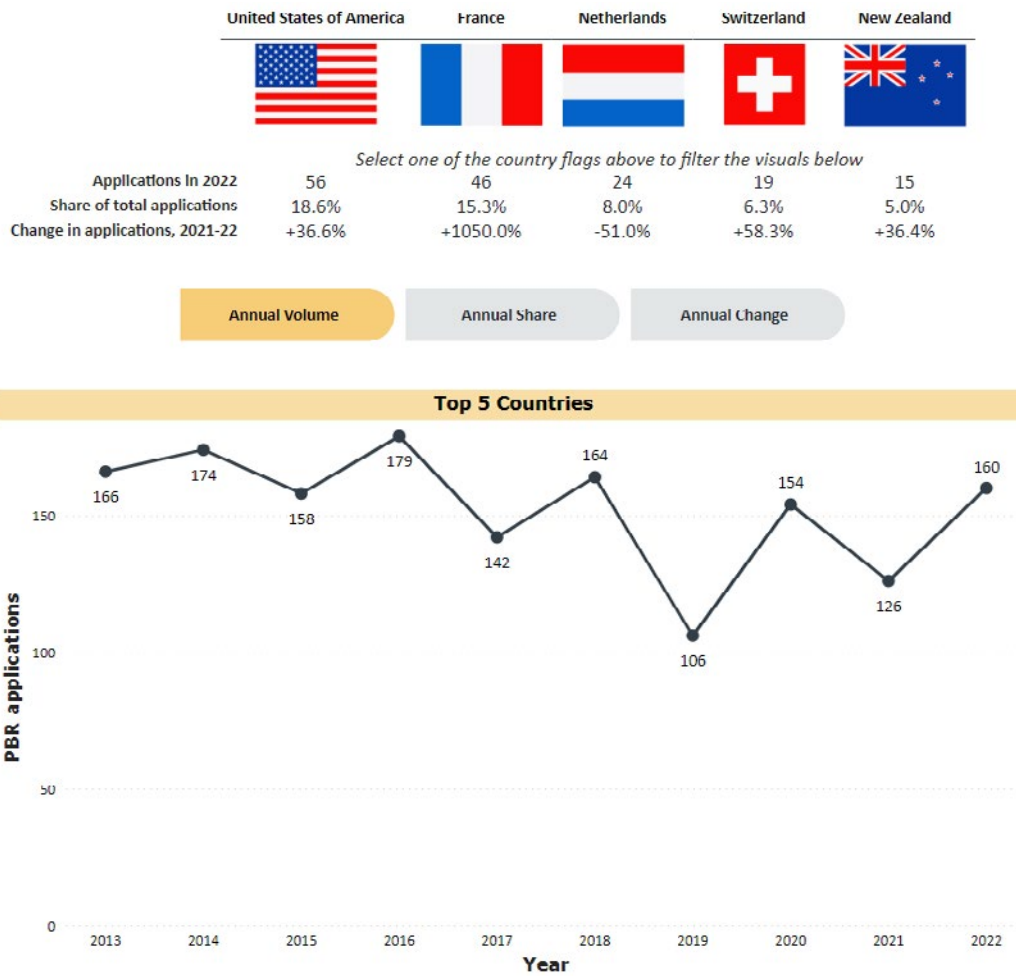


## Countries of origin

The US and the Netherlands have been the leading countries of origin for PBR applications in Australia since 2013. However, in 2022, applications from the Netherlands were exceeded by applications from France, which had more than 10 times the applications than in 2021, from 4 to 46 in total. Applications from the Netherlands fell by 51% to 24 (see Figure 4.3).

Significant growth was also observed in applications from Switzerland, up 58.3% to 19. Applications from New Zealand rose by 36.4% to 15 in total.

**Figure 4.3 Leading countries of origin for PBR applications, 2022**



## Domestic PBR activity in Australia

### Economic characteristics of PBR-holding businesses

New plant varieties contribute to productivity growth in many Australian agricultural industries, partly by expanding agricultural production. Research commissioned by IP Australia estimates the net present value of added economic output linked to new cultivars at around \$1.5 billion each year<sup>4</sup>.

The same study found that between 2016 and 2020, an average of 235 Australian firms held PBRs each year. In aggregate, these firms generated around \$12.8 billion in turnover each year and employed approximately 78,000 full-time equivalent workers<sup>5</sup>.

The impact of PBRs includes the added value generated for breeders and economic output in end-use sectors. For example, through their use in pastures, improved forage crops support Australia’s dairy, meat, livestock and wool industries<sup>6</sup>.

## Environmental and policy factors

Australian domestic PBR filings also exhibit a clear structural break around 2019. In the five years to 2019, resident applications grew by an average annual rate of 6.7%. However, from 2018 to 2019, resident applications fell by 13.4%. In contrast to applications by non-residents, domestic filings have followed a declining trend since 2019, suggesting ongoing impacts from the severe drought, bushfires and their associated economic losses.

In 2022, resident applications fell by 8.5% to 118. The decline in resident applications follows three years of negative growth, tapering from -13.4% (2019) to -0.8% (2021).

In contrast, in the five years prior to the devastating bushfires in 2019, resident applications had grown at an annual average rate of 6.7% – more than four times the growth rate in non-resident filings.

### Investigating the PBR economic and policy landscape

IP Australia has set up a dedicated program to explore Australia's plant breeding ecosystem and the role of PBR. In 2022 we published the findings from an initial research program, now available on our website.

[Read the reports and what we learnt from the research.](#)

We have continued researching the landscape, challenges and opportunities associated with PBR and are proceeding with initiatives we expect to result in changes that benefit the system overall.

These initiatives include reviewing the Qualified Person model, timeframes in the PBR process, public education and awareness, and a scan of issues within the legislation. We also commissioned the University of Queensland to undertake a deep dive into six key policy issues identified for review and possible change. [Read the policy reports.](#)

The findings feed directly into IP Australia's explorations of policy reform and ongoing work to improve IT systems, administrative processes, information and education materials, and forms/paperwork.

Economic research is a cornerstone of this program's work to ensure that PBRs are fit-for-purpose, support plant breeding industries and connect with the government's priorities for agriculture and growth.

Our partnership with the Centre for Transformative Innovation (CTI) at Swinburne University of Technology for PBRs economic research continues. In 2022, we published a report and visual summary, providing estimates of PBRs' economic impact on a national scale. We also published the results and a visual summary of a qualitative research study that interviewed a wide range of people with different roles across PBRs and the plant breeding ecosystem. [Read the economic impact report.](#)

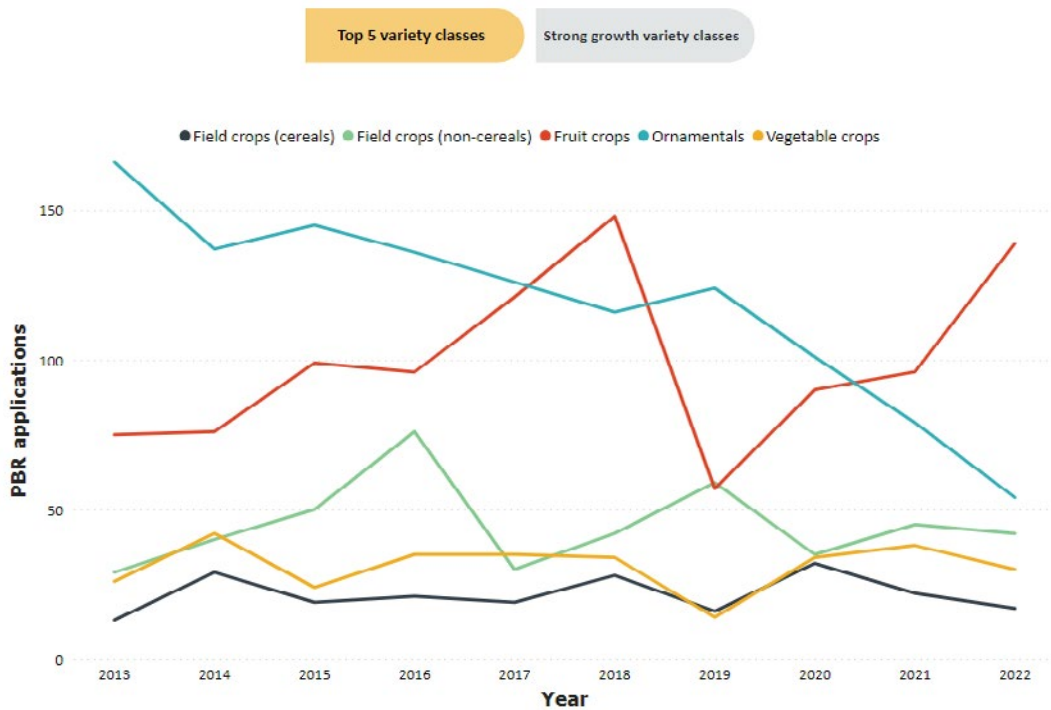
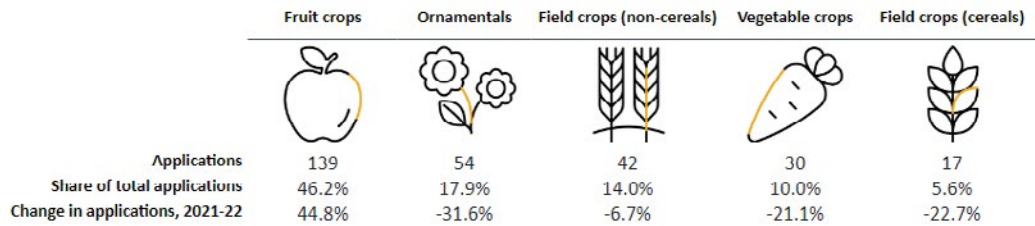
Further research is needed to understand the costs and benefits of PBRs, their impact on investment and the incentive to innovate, and the importance of PBRs in commercialising new plant varieties.

We have again partnered with CTI to explore these important questions and the economic impact of PBR at the user level. CTI is undertaking the most comprehensive research survey conducted with Australian organisations using the PBR system to date. The survey is actively pursuing responses from over 450 survey-eligible Australian organisations who have applied for a PBR in the past. We look forward to publishing these findings later in 2023.

## Plant varieties

The two major plant varieties for which PBR applications are sought are Fruit crops and Ornamentals, followed by non-cereal Field Crops (see Figure 4.4). The increase in PBRs from 2021 to 2022 was largely driven by a 44.8% increase in applications for Fruit crops – applications fell across each of the other lead plant groups.

**Figure 4.4 Top five plant variety classes**



Key end-use sectors for plant varieties protected by PBRs in Australia include nurseries, cut flowers or cultivated turf, fruit and nuts, broadacre crops and vegetables. Historically, PBR filing activity has been heavily concentrated in varieties sold through nurseries and, to a lesser extent, fruits and nuts.

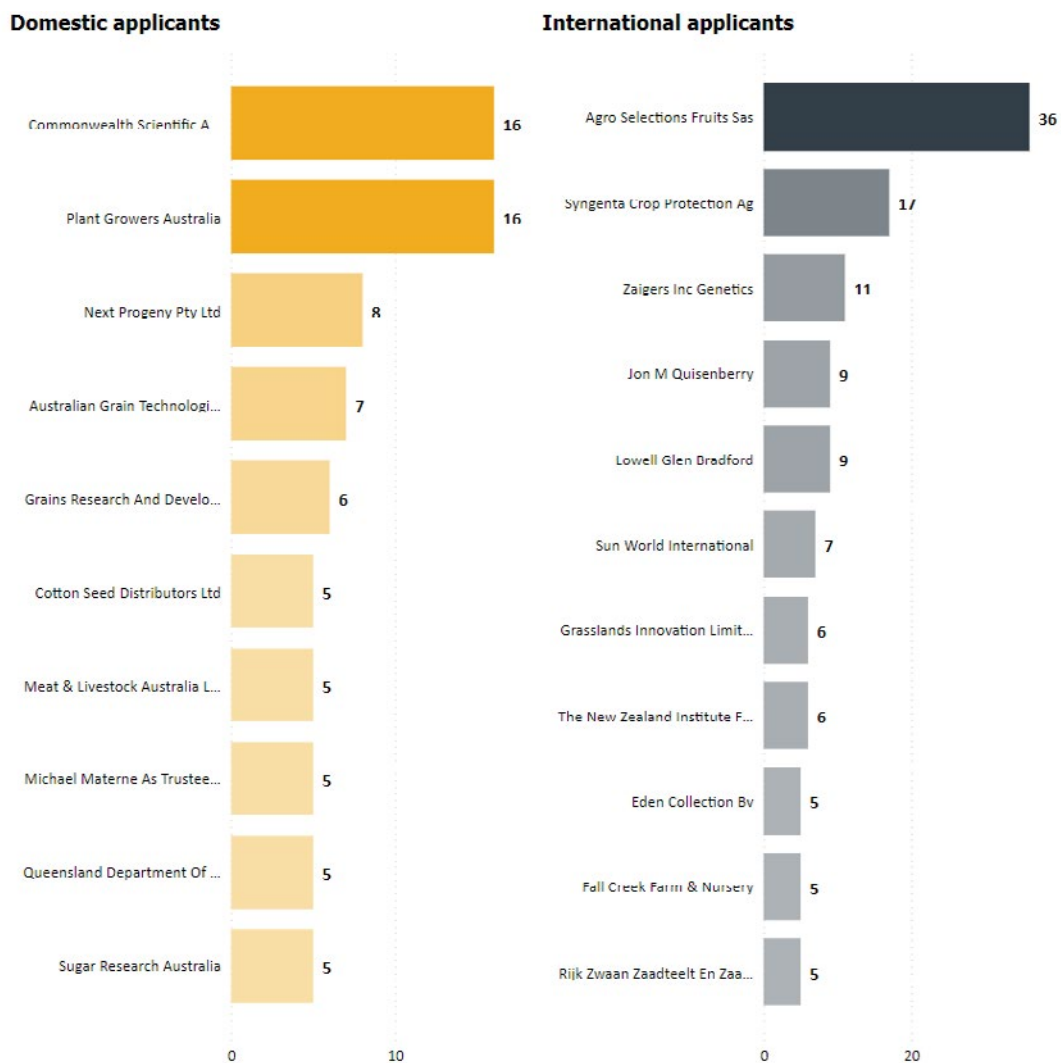
Ornamentals comprised half of all protected varieties in 2013. However, applications for fruit crops have shown an overall increasing trend since before 2013, while ornamentals have steadily declined. Fruit crops were disproportionately impacted by the events in 2019 (see Figure 4.3) but have since recovered at an average annual growth rate double its rate before that year – 35.7% over 2020 to 2022 compared to 15.1% over 2016 to 2018.

## Leading applicants

In 2022, the lead domestic filer was Plant Growers Australia (16 applications), a wholesale production nursery based in Victoria. Australia’s national science agency, CSIRO, filed the same number of applications (see Figure 4.5).

Other domestic lead filers included Next Progeny (8 applications), an Australian private company that has developed new blueberry varieties; Australian Grain Technologies (7 applications), a market leader in wheat genetics; and the Grains Research and Development Corporation (GRDC; 6 applications). The Australian Government established the GRDC to fund projects and partnerships that improve productivity in Australia’s grains industry.

**Figure 4.5 Top domestic and international applicants for PBRs in Australia, 2022**



The lead PBR filer among international applicants was Agro Selections Fruits (36 applications), a French company specialising in varietal creation, renowned for its doughnut peaches.

Agro Selections was followed by Syngenta Crop Protection (17 applications), an agricultural science and technology provider based in Basel, Switzerland.

Third was Zaigers Genetics (11 applications), a family-owned fruit-breeding business founded in Modesto, California. Zaigers is an active user of plant variety protection in Australia and the US, as are inventors Lowell Glen Bradford and Jon M. Quisenberry, whom each filed nine applications in Australia last year.

### Plant breeder's rights endnotes

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<sup>1</sup> Bishop, J., Bell, T., Huang, C. & Ward, M. (2021). *Fire on the farm: Assessing the impacts of the 2019–2020 bushfires on food and agriculture in Australia*. WWF Australia.

<sup>2</sup> Hegarty, S., Thomson, R. & Webster, E. (2022). *The economic impact of plant breeder's rights in Australia*. IP Australia, Commonwealth of Australia.

<sup>3</sup> A country's count of applications includes applications filed by residents of the country in partnership with co-applicants from other countries.

<sup>4</sup> Hegarty, S., Thomson, R. & Webster, E. (2022). *The economic impact of plant breeder's rights in Australia*. IP Australia, Commonwealth of Australia.

<sup>5</sup> Turnover is reported in real 2020 dollars, based on price index from ABS 6427.0 division A.

<sup>6</sup> Hegarty, S., Thomson, R. & Webster, E. (2022). *The economic impact of plant breeder's rights in Australia*. IP Australia, Commonwealth of Australia.



# Copyright

Copyright is an unregistered form of IP founded on a person's creative skill and labour. It protects the original expression of an idea or information. Copyright material generally includes items such as books, artwork, software, film and sound recordings.

Copyright provides exclusive economic rights that allow the copyright owner to do certain acts with their copyright material. These acts may include copying, publishing, publicly performing or otherwise communicating the copyright material (e.g., broadcasting it or making it available online). Copyright owners may also licence another person to do some or all of those acts.

In addition, copyright law also provides non-economic rights, known as moral rights. These are designed to protect the creative integrity of copyright creators.

In Australia, copyright is granted automatically from the time an original work is created and does not need to be registered. With no formalities and low barriers to protection, copyright is easily accessible to different sectors, including SMEs.

The Attorney-General's Department is responsible for managing the *Copyright Act 1968*. The Department develops Australian copyright policy and represents Australia's interests in relation to international copyright issues.

## **The contribution of copyright to Australia**

Copyright has a central role in content-based industries as a driver of economic value. Collectively, these industries are sometimes referred to as the 'creative economy' – a way of recognising the economic value of creativity and innovation underpinned by IP rights<sup>1</sup>.

Measuring the contribution of content-based industries is one way to gauge the value of economic activity enabled by copyright. A study commissioned by the Australian Copyright Council and conducted by PricewaterhouseCoopers (PwC) found that Australian industries that rely on copyright protection contributed \$124.1 billion to the Australian economy in 2018<sup>2</sup>. This estimate included the contribution of 'core' copyright industries and \$7.5 billion contributed by nondedicated industries that support core copyright industries<sup>3</sup>. The study used a methodology developed by the WIPO.

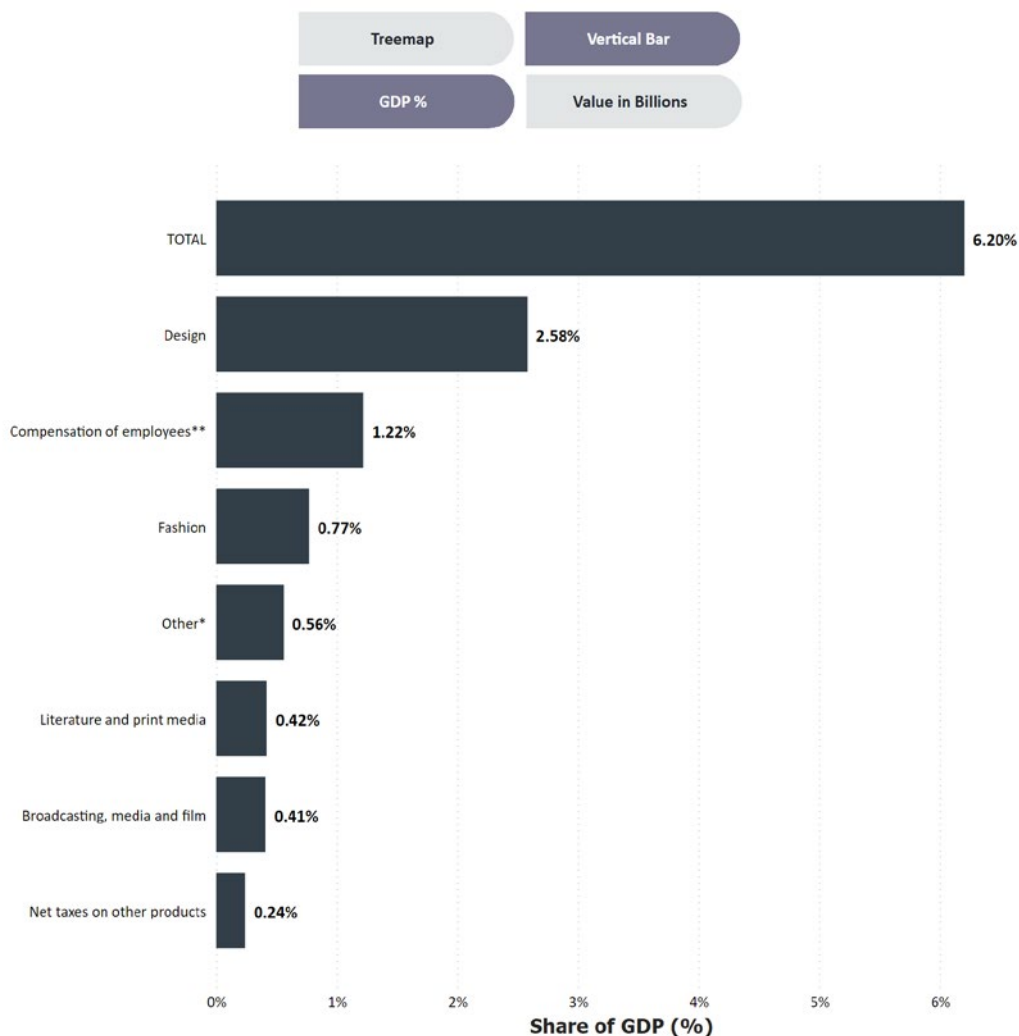
A more recent publication by the Department of Infrastructure, Transport, Regional Development Communication and the Arts estimated that ‘cultural and creative activity’ contributed \$122.3 billion to the Australian economy in 2019–20 (see Figure 5.1)<sup>4</sup>. This economic contribution was 27.1% higher than in 2010–11, and was equivalent to 6.2% of Australia’s GDP. The analysis captured smaller sectors (such as zoological and botanical garden operations) not directly underpinned by copyright; however, it also excluded some non-dedicated industries<sup>5</sup>.

The publication found that industries with the greatest contribution to cultural and creative activity included:

- design at \$50.9 billion
- fashion (\$15.1 billion)
- literature and print media (\$8.3 billion)
- broadcasting, electronic or digital media and film (\$8.1 billion).

Findings from the PwC study demonstrated that these industries were supported by copyright to some degree.

**Figure 5.1 Cultural and creative activity (value, 2019–20)**



\* ‘Other’ includes museums, libraries and archives, performing arts, environmental heritage, music composition and publishing, visual arts and crafts, cultural goods manufacturing and sales and supporting activities.

\*\* ‘Compensation of employees’ is income received by individuals working in cultural and creative occupations outside industries identified as cultural and creative.



## Use of copyright content

Copyright law provides mechanisms by which creators and other copyright owners can maintain control over their work. The system is designed to provide creators with adequate incentives to create and disseminate new content. It also facilitates various uses of copyright material. These include collective licensing arrangements that are voluntary or, in some public interest circumstances, mandatory. In addition, public interest exceptions enable some uses of copyright material without the copyright owner's permission.

### The value of licensing through collecting societies

A significant portion of the economic contribution attributable to copyright takes the form of direct licensing arrangements between copyright owners and users.

Australia's copyright arrangements also include collecting societies. These bodies collect fees from licensing arrangements that allow large volumes of copyright material to be put to various uses and distribute the fees to the owners of the creative works.

For users and owners of creative content, negotiating individual licences can be a burdensome and costly process that diminishes their value. Educational institutions, governments and businesses commonly rely on collective licensing to access copyright material and reduce licensing costs.

The annual reports of collecting societies provide insight into the scale at which copyright material is used. In 2021–22:

- \$434.2 million in Australian royalties were paid to music industry rights-holders by the Australasian Performing Right Association and Australasian Mechanical Copyright Owners Society, together known as APRA AMCOS<sup>6</sup>;
- \$95 million was allocated to more than 22,000 rights-holders, including writers, artists, publishers and agents by Copyright Agency Limited (CAL). Collective licensing by CAL also indirectly benefits other creative industries workers – writers and illustrators working in-house or with contractual entitlements to a share of Copyright Agency payments<sup>7</sup>;
- \$39.6 million was distributed to registered artists and licensors by the Phonographic Performance Company of Australia (PPCA)<sup>8</sup>;
- \$45.9 million was distributed to 4,900 copyright owners in the audio-visual sector — such as producers, directors, broadcasters and agents — by Screenrights<sup>9</sup>.

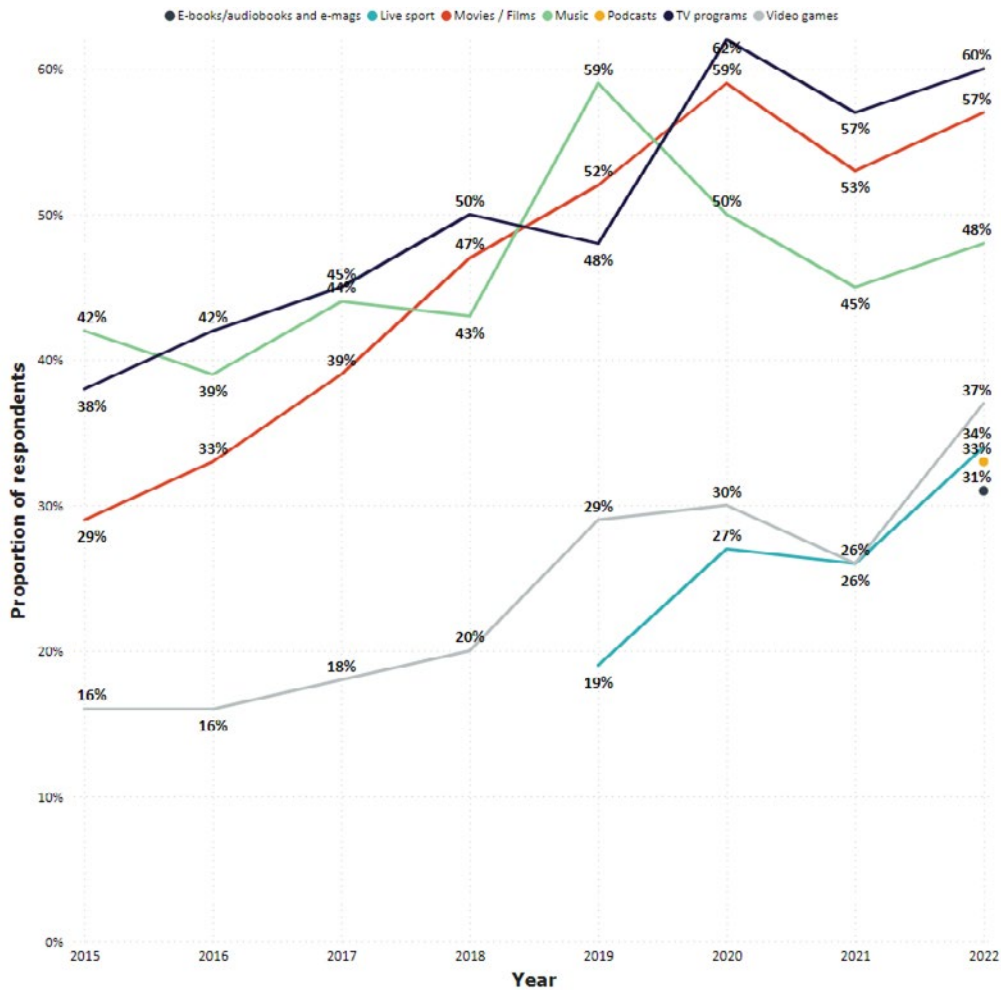
### Consumption of online copyright content

A large number of Australians consume copyright content online. The Consumer Survey on Online Copyright Infringement (the 'Consumer Survey') provides insight into consumption. This is an annual publication commissioned by the Attorney-General's Department. The survey analyses current trends in online copyright content consumption and copyright infringement (discussed below)<sup>10</sup>.

According to the 2022 Consumer Survey, almost three-quarters (72%) of respondents surveyed had consumed some form of online content (music, movies/films, TV programs, video games or live sport) in the past three months.

Broadly, the proportion of respondents consuming each content type has increased over time (see Figure 5.2).

**Figure 5.2 Proportion of respondents who consumed each content type (either lawfully or unlawfully) 2015 to 2022**



## Copyright infringement (unlawful access to copyright content)

The Consumer Survey indicates that the overall proportion of respondents who had consumed some online copyright content unlawfully has increased (39% in 2022, compared to 30% in 2021). However, for each content type, the rates of unlawful consumption increased only marginally (and declined for video games).

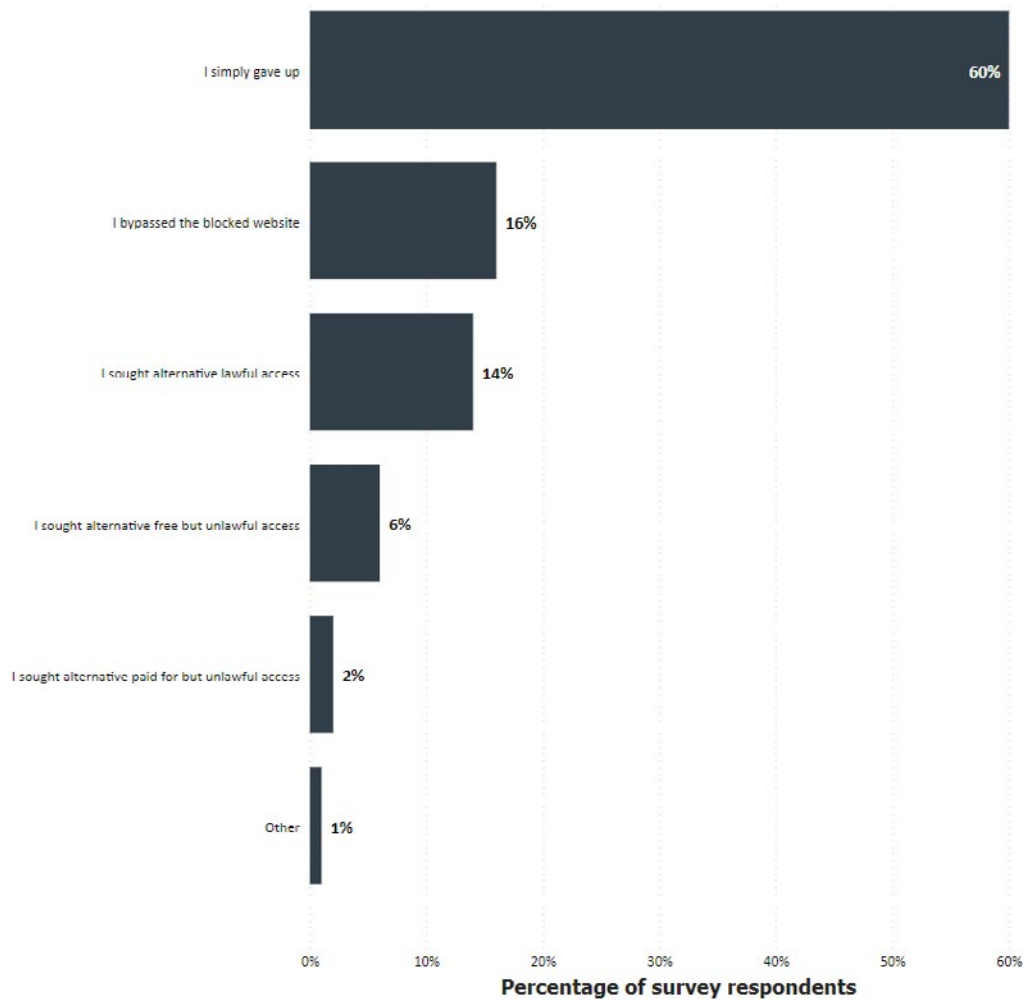
Adjustments to the 2022 Consumer Survey have made it more sensitive to emerging methods of unlawful consumption. As such, an increase in overall infringement is likely partly due to the survey’s increased ability to detect infringing behaviours<sup>11</sup>.

## Australia’s website blocking scheme is achieving its purpose

Australia’s website blocking scheme allows copyright owners to apply to the Federal Court of Australia to block an online site that operates outside Australia and infringes copyright material.

To December 2022, almost 2,000 websites have been blocked since the scheme commenced in 2015. The 2022 Consumer Survey indicates that the scheme has reduced the extent to which consumers access content through websites that infringe copyright. Around three-quarters of respondents who encountered a website blocked by the scheme reported that they either ‘gave up’ or sought lawful access (see Figure 5.4).

**Figure 5.3 Actions taken when encountering a blocked website**



## Copyright endnotes

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- <sup>1</sup> [Guide on surveying the economic contribution of the copyright-based industries](#). World Intellectual Property Organization (2015).
- <sup>2</sup> *The economic contribution of Australia's copyright industries – 2006-2018*. PricewaterhouseCoopers (2020).
- <sup>3</sup> 'Non-dedicated' includes industries in which a portion of the activities are related to facilitating broadcast, communication, distribution or sales of works and other protected subject matter, and whose activities have not been included in the core copyright industries (e.g., wholesale, retail, transport, and information and communication industries).
- <sup>4</sup> [BCARR—Visual summary: Cultural and creative activity in Australia 2010-11 to 2019-20](#), Bureau of Communications, Arts and Regional Research. (2022). Department of Infrastructure, Transport, Regional Development, Communication and the Arts.
- <sup>5</sup> The analysis uses the same approach taken by the Australian Bureau of Statistics in their Cultural and Creative Activity Satellite Account and includes a broad range of industries where cultural and creative activity occurs.
- <sup>6</sup> Figure provided by APRA AMCOS based on royalties paid for the year ended 30 June 2022.
- <sup>7</sup> *Copyright Agency annual report 2021-22*. Copyright Agency Limited (2022).
- <sup>8</sup> *Phonographic Performance Company of Australia*. (2022). PPCA annual report 2022.
- <sup>9</sup> *Year in review 2021-2022*. Screenrights (2022).
- <sup>10</sup> [Consumer survey on online copyright infringement 2022: Survey findings report](#) [commissioned by the Australian Attorney-General's Department]. ORIMA Research (2023).
- <sup>11</sup> In addition, due to changes to the survey's methodology, comparisons between 2022 and earlier survey results should be made with caution.



# Monetary policy, investment and innovation

The 2008 Global Financial Crisis was followed by a period of persistently low innovation around many advanced economies, potentially contributing to slower productivity growth and economic recovery alongside other structural factors. While innovation investments were resilient during the COVID-19 shock, the overall impacts on innovation and IP are difficult to predict.

In this insights chapter, IP Australia previews forthcoming research conducted by economists from the RBA, Jonathan Hambur and Omer Majeed, and Robert Breunig of the Australian National University. The research offers new evidence for how macroeconomic conditions and monetary policy shape IP and innovation in Australia.

## Key findings

- Economic downturns have the potential to limit innovation and thereby impact productivity growth over the long-run. Forthcoming work examines these issues using monetary policy ‘shocks’ as an externally caused change in economic conditions.
- Monetary policy shocks have a limited effect on domestic patenting by Australians.
- However, contractionary monetary policy shocks are associated with a decline in national R&D spending and domestic trade mark filings one to two years after the shock.
- The share of firms that undertake innovative activity also falls following a contractionary monetary policy shock, driven by small and medium enterprise.
- Overall, the results suggest that economic conditions and monetary policy can have medium-run effects on innovative activity and potentially productivity.

## How do macroeconomic conditions and monetary policy affect innovation in Australia?

Macroeconomic and financial conditions can shape businesses' incentives to invest, adopt technology and innovate. When demand is strong, firms may have more cash to spend on innovation and could expect to earn larger profits from new products. Conversely, when demand is weak firms may have incentive to implement cost-saving innovations.

To the extent that economic downturns affect innovative activity they could have sustained effects on the economy's productive capacity and output. For example, the Global Financial Crisis was followed by persistent below-trend business R&D spending, patenting activity and trade mark registrations in many countries<sup>1</sup>. Several papers have argued that this contributed to a slower economic recovery by weighing on productivity growth<sup>2</sup>.

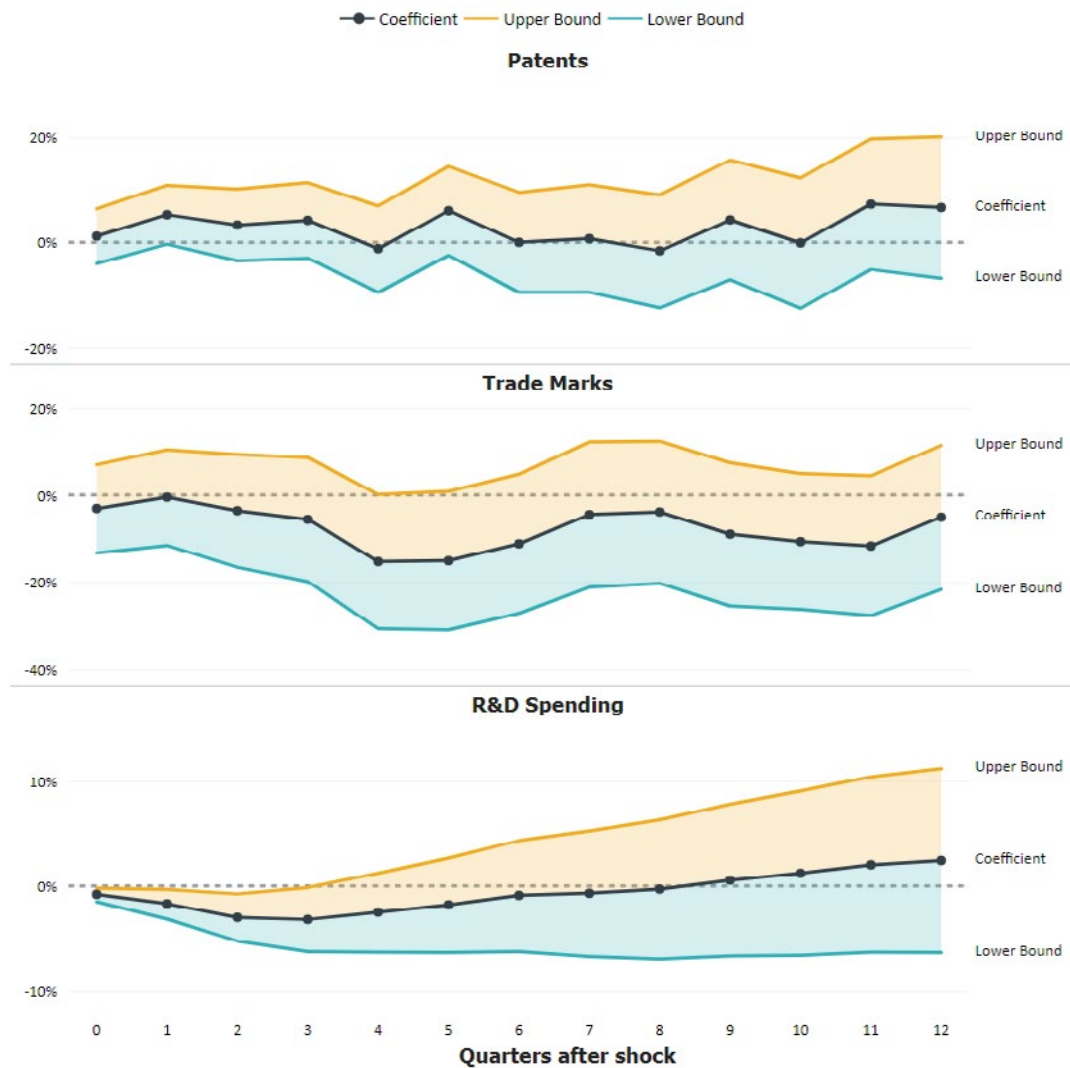
Unfortunately, it can be difficult to assess how macroeconomic conditions affect innovation and adoption. While macroeconomic conditions can affect innovation, the effects can also run the other way. For example, innovation in computers and their diffusion throughout the economy have contributed to economic growth in recent decades.

One way to get around these issues is to look for 'exogenous' shocks that affect demand. Majeed, Hambur and Breunig (forthcoming) investigate the effects of surprise changes, or shocks, in monetary policy and interest rates that lead to tighter economic and financial conditions. This helps isolate the effect of macroeconomic conditions on innovation, adoption and potentially productivity over the medium term, while exploring the effects of monetary policy on these outcomes.

The study uses aggregate data on patents and trade marks filed in Australia by Australian residents from IP Australia's IP Longitudinal Research Dataset (IPLORD) and aggregate R&D spending data from the ABS National Accounts. Both are used at a quarterly frequency over a sample from early 1994 to 2019 to align with the shock variable. The study also uses annual firm-level data on innovation from the ABS Business Characteristics Survey in BLADE. This captures around 8,000 firms each year from 2006 to 2018.

Preliminary analysis suggests that monetary policy has limited effects on the number of domestic patents filed by Australians (see Figure 6.1), which contrasts with findings in the US. For example, Ma (2023) found that expansionary monetary policy leads US firms to develop new patents several years after a shock. This lack of response in Australian domestic patenting is consistent with Australia tending to be more an importer of new technologies than a producer.

**Figure 6.1 Effect of monetary policy shock on aggregate innovation metrics (quarterly response after 100 basis point shock)**



Sources: ABS; IP Australia; RBA. Notes: Trade mark samples exclude 1994 to 1995 due to apparent break in series. Patents and trade marks include only those with only Australian filers. Dashed lines show 90% confidence interval.

However, when focusing on broader measures of innovation, commercialisation and adoption, there is evidence that monetary policy can have a significant influence. In the year following a 100-basis point contractionary monetary policy shock, national R&D spending declines by a little under 5%. The number of trade marks filed by Australians also falls by around 15% one to two years after the shock, although the latter finding is only marginally significant in a statistical sense.

Similarly, firm-level data suggests that the number of firms reporting that they adopted new (to business or to world) products or processes also declines following a contractionary monetary policy shock. This is particularly evident for SMEs, which see around a 5 percentage point decline for one to two years after a 100-basis point shock, while larger businesses appear to increase their adoption.

Together, these results suggest that strong economic and financial conditions tend to contribute to increased innovation and adoption, though much of the impact appears to be on the adoption and commercialisation of existing technology rather than development of new technologies. This suggests that downturns have the potential to have long-lasting economic impacts by limiting innovation, particularly for SMEs. While these findings may have implications for the recovery from COVID-19 the unique nature of the downturn means that the overall impacts on innovation and IP are difficult to predict.

#### Monetary policy, investment and innovation endnotes

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<sup>1</sup> *Innovation in the crisis and beyond*, OECD Science, Technology and Industry Outlook 2012. Organisation for Economic Co-operation and Development (2012).

<sup>2</sup> Anzoategui, D., Comin, D., Gertler, M. & Martinez, J. (2019). *Endogenous technology adoption and R&D as sources of business cycle persistence*. *American Economic Journal: Macroeconomics*, 11(3), 67–100; Moran, P. & Queraltó, A. (2018). Innovation, productivity, and monetary policy. *Journal of Monetary Economics*, 93, 24–41.

<sup>3</sup> They use the monetary policy shock measures constructed in Beckers (2020). See Beckers, B. (2020). *Credit spreads, monetary policy and the price puzzle* [RBA Research Discussion Paper – RDP 2020-01].

<sup>4</sup> Ma, C. (2023). *Firm liquidity and the innovation channel of monetary policy*. Viewed 3 March 2023.





# Diversity and innovation in Australia

At the end of 2022, Australia's unemployment rate was at its lowest level in about 50 years. Australia's labour participation rate was at a record high, driven largely by women and young people entering the workforce. Net arrivals from overseas increased, helping meet the strong demand for labour and skills<sup>1</sup>. New research by IP Australia highlights that maintaining these labour market gains is important for long-run productivity because diversity underpins innovation in Australian businesses.

The research uses linked employer-employee data from the ABS. The data provides information on nearly 14.5 million individuals over 2010 to 2019, linked to employer data<sup>2</sup>, providing a unique insight into the demographic make-up of Australia's innovation sector and the role of diversity in innovation. We focus on the top management teams of businesses, including start-ups, and their STEM workforce.

## Key findings

- International patent data shows Australia has a relatively high rate of migrant inventors. However, the representation of women inventors on patents is below the world average.
- Compared to businesses without IP, those with registered IP have a notably larger share of women and migrants in their STEM workforce.
- A migration background increases the likelihood that when a person transitions jobs, they will transition into a patent-holding business.
- Among firms with a STEM workforce, the representation of women in leadership is associated with lower research intensity but greater efficiency in converting R&D investment into IP.
- Cultural and ethnic diversity in leadership is associated with increased research intensity.

## Diversity in the Australian inventor pool

Diversity spurs innovation: it increases the breadth and depth of innovative activity in the economy. When organisations embrace cultural and gender diversity, they tend to enjoy numerous benefits. For example, a business can gain greater marketplace understanding and diversity can enhance creativity and problem-solving ability. Despite these benefits, there remain persistent and well-documented diversity and gender gaps in science output, including patents<sup>5</sup>.

### Australia is traditionally a large receiving country for migrating inventors

According to one recent study, a new high-growth start-up is born for every 29–55 inventors that migrate into a region<sup>6</sup>. At a regional level, medium and high skilled migration is positively linked to patent, trade mark and design production<sup>7</sup>. Greater ethnic diversity within the inventor community, in particular, tends to raise its patenting rates<sup>8</sup>.

Several factors help explain the link between inward migration and IP output. Migration facilitates greater cultural diversity, which enables new perspectives and hybrid practices to emerge. Foreign-born inventors who remain connected with their countries of origin may have more extensive networks to draw on for information, resources and investments<sup>9</sup>. Through Australia's skilled migration program, migrants are targeted based on their education and skill level and may bring competencies especially suited to innovation<sup>10</sup>. Indeed, Australia's Temporary Graduate Visa program, targeted at skilled talent, has been linked to patent activity<sup>11</sup>.

International patent data shows Australia has traditionally been a major receiving country for migrant inventors<sup>12</sup>. Using more recent data, IP Australia's study found that when a person transitions jobs in Australia, a migrant background increases the likelihood that they will transition into a patent-holding business. This result highlights the reliance of Australia's innovation sector on people of diverse backgrounds and its role in attracting talent into Australia.

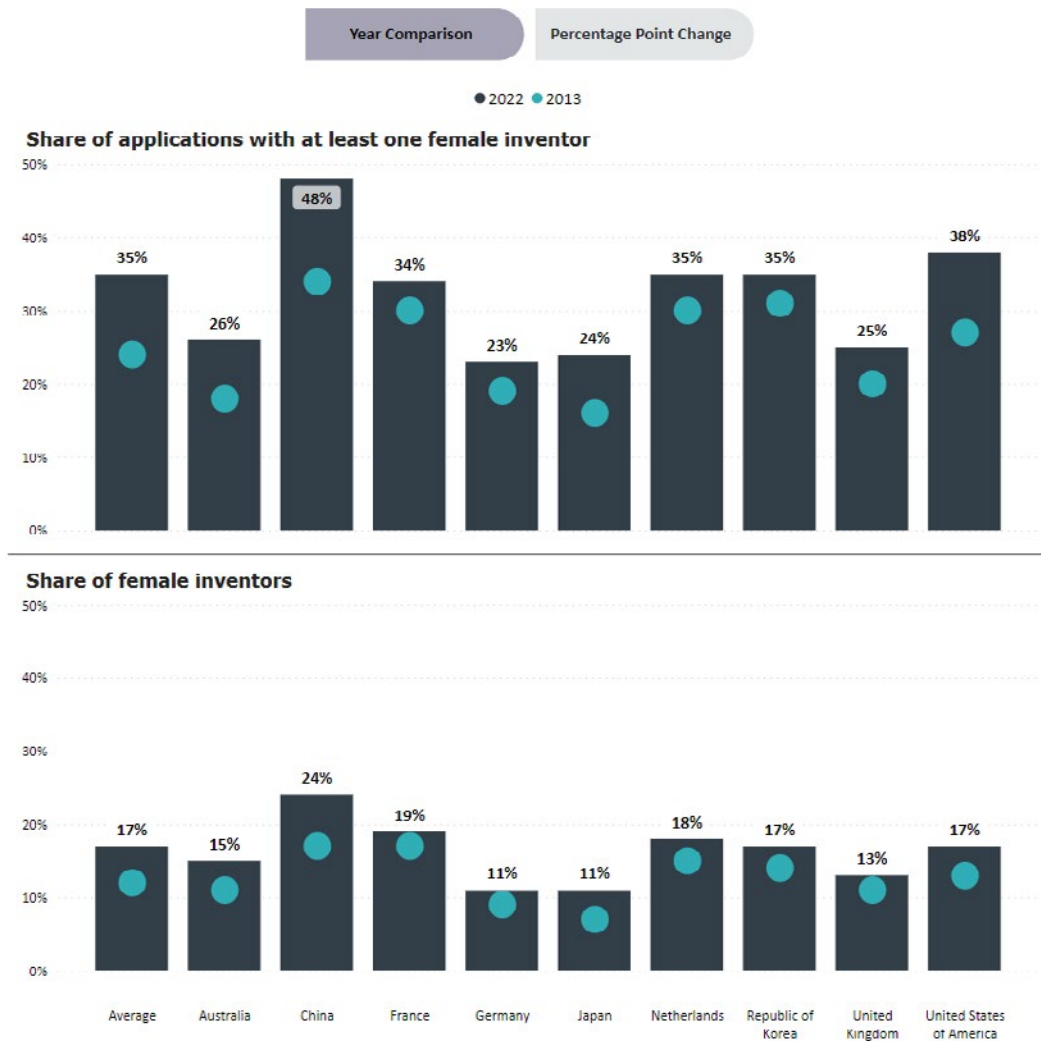
- Read more about labour mobility and matching in Australia's innovation sector in [Chapter 8](#) of this report.

### Australia has a low rate of women inventorship compared to the international average

Most patent applications filed globally by Australian residents are filed via the PCT. Based on data from WIPO, 26% of PCT applications filed by Australians worldwide name at least one woman inventor. Women account for 15% of unique inventors named on PCT applications from Australia. This represents a participation rate 2 percentage points lower than the international average (see Figure 7.1).

Under-representation of women on patents can be attributed to a variety of factors. Representation of women on patents varies across technology fields. In 2022, women inventors were named on around half of PCT applications in Biotechnology (61%), Organic fine chemistry (59%), Pharmaceuticals (59%), Analysis of biological materials (56%) and Food chemistry (56%). Consistent with this, women are more highly represented in the STEM workforce of life science businesses than in the broader STEM workforce.

**Figure 7.1 Representation of global patents filed by women inventors via the PCT in 2022**



Source: WIPO IP Statistics Database (2023).

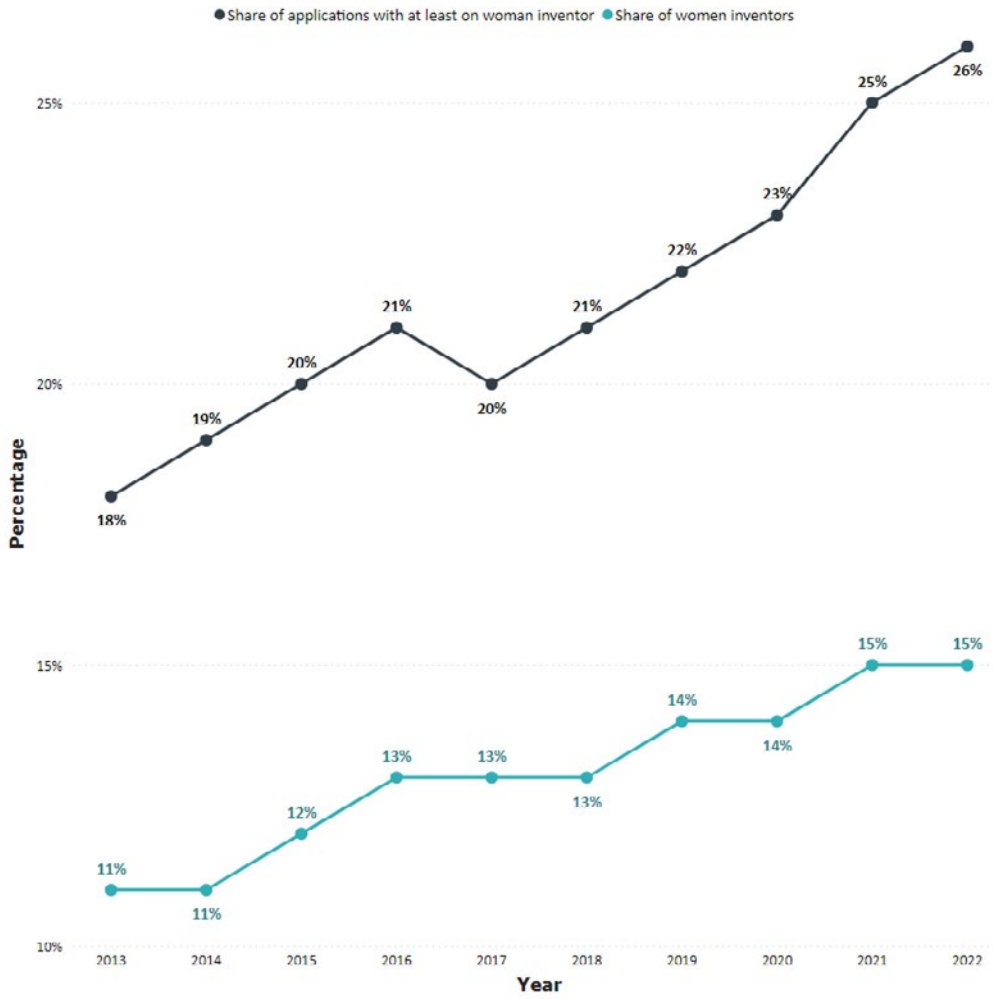
Other factors that may contribute to the gender patent gap include the nature of women’s research<sup>13</sup>, under-crediting of women in science output<sup>14</sup>, and disparity in research funding<sup>15</sup>. Women entrepreneurs, for example, reportedly receive less funding and on less favourable terms than men when it comes to follow-on R&D investment<sup>16</sup>.

### Entry by women into the Australian inventor pool

Evidence shows there are no systematic productivity differences between women and men in creative and innovative endeavours<sup>17</sup>. However, gender diverse teams tend to produce more radical innovations and higher-impact scientific ideas<sup>18</sup>. Data on Australians’ patenting activity suggests that growth in women’s participation is occurring in mixed-gender teams. For example, in the three years to 2022, the share of PCT applications from Australia with at least one woman inventor increased by three percentage points to 26% (see Figure 7.2).

At the same time, the share of unique women inventors on Australian PCT applications remained relatively constant. In 2022, women constituted 14.6% of Australian inventors, the same level as in 2021.

**Figure 7.2 Rate of women’s participation in patents over time**



Source: WIPO IP Statistics Database (2023).

An alternative reading of these trends is that women inventors are filing patents more intensively without significant growth in the women inventor pool. This theory could at least partly explain the persistent gender patent gap. Research from the US shows that the gender gap is greatest in the first contact of inventors with the patent system. Among previous patent inventors, there is only a 6% gap in the number of women and men inventors who patent again within five years<sup>19</sup>.

# Demographics of Australia's IP sector

## Representation in top management and STEM roles

A key driver of firm innovation is the composition of a firm's leadership and R&D team. Based on this study's analysis, on average, 37% of leaders in the top management teams and 18% of STEM workers in Australian businesses were women in 2019.

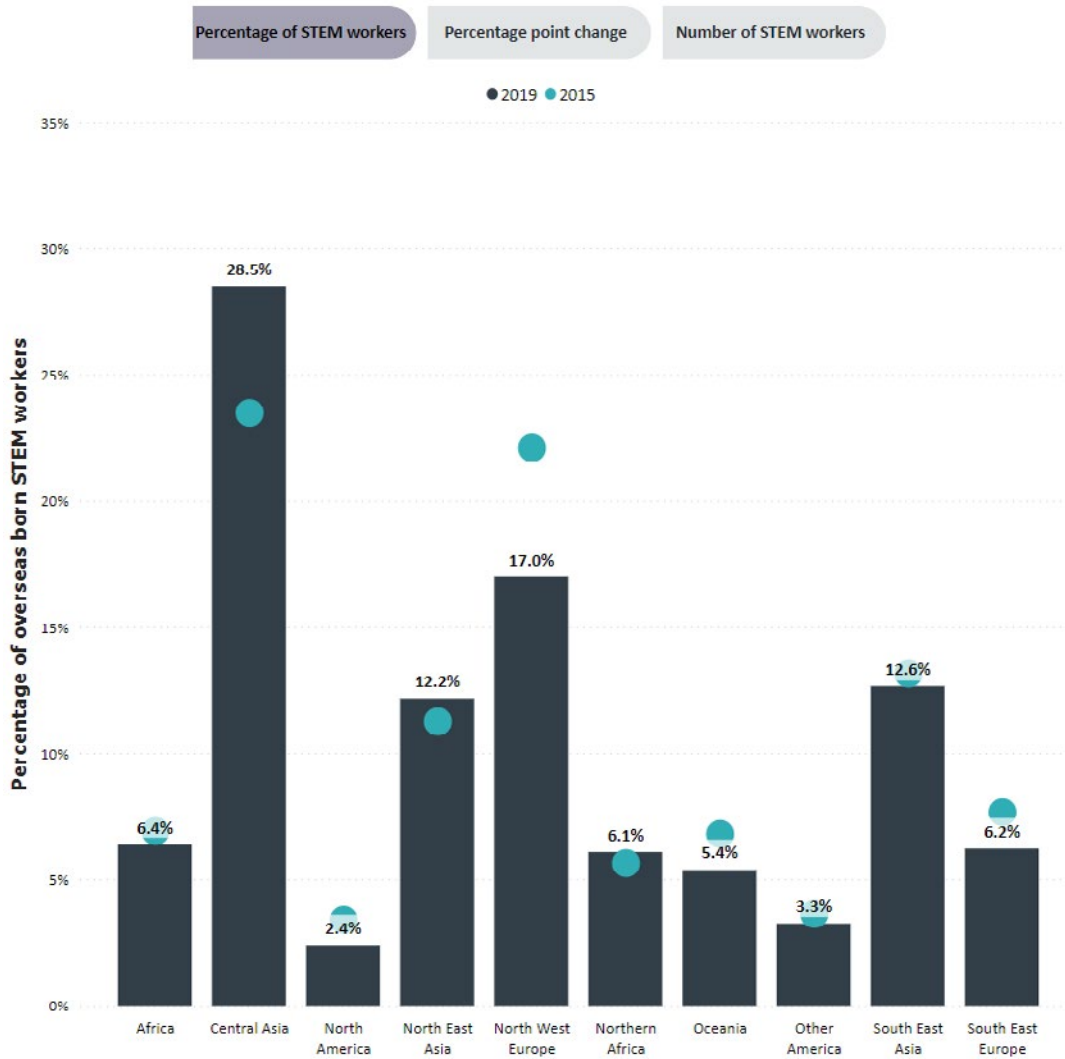
In contrast, individuals with a migrant background (born overseas) are more strongly represented in STEM (41.4% of the STEM workers in Australian businesses) than in their top management teams (33.8% of leadership roles). These figures illustrate a strong reliance of Australian innovators on skilled migrant labour.

Australia's below-average participation of women in patents reflects the low representation of women in the STEM workforce. Australia has been more successful in increasing the participation of women in leadership. Australia is one of only three countries worldwide to have achieved more than 30% women board membership in its top listed companies without legislated quotas<sup>20</sup>.

There is a fair mix of international representation in the migrant STEM workforce (see Figure 7.3). No single region accounts for more than 25% of STEM workers, and most regions have at least 5% representation. This mix expands Australia's networks for knowledge exchange, which is vital for technological innovation.

Workers of Central Asian origin accounted for the largest share of Australia's overseas-born STEM employees in 2019. Central Asian STEM workers also saw the greatest growth since 2015. In comparison, the greatest decline in representation has been in migrants from North West Europe.

**Figure 7.3 Source of Australian STEM workers born overseas**

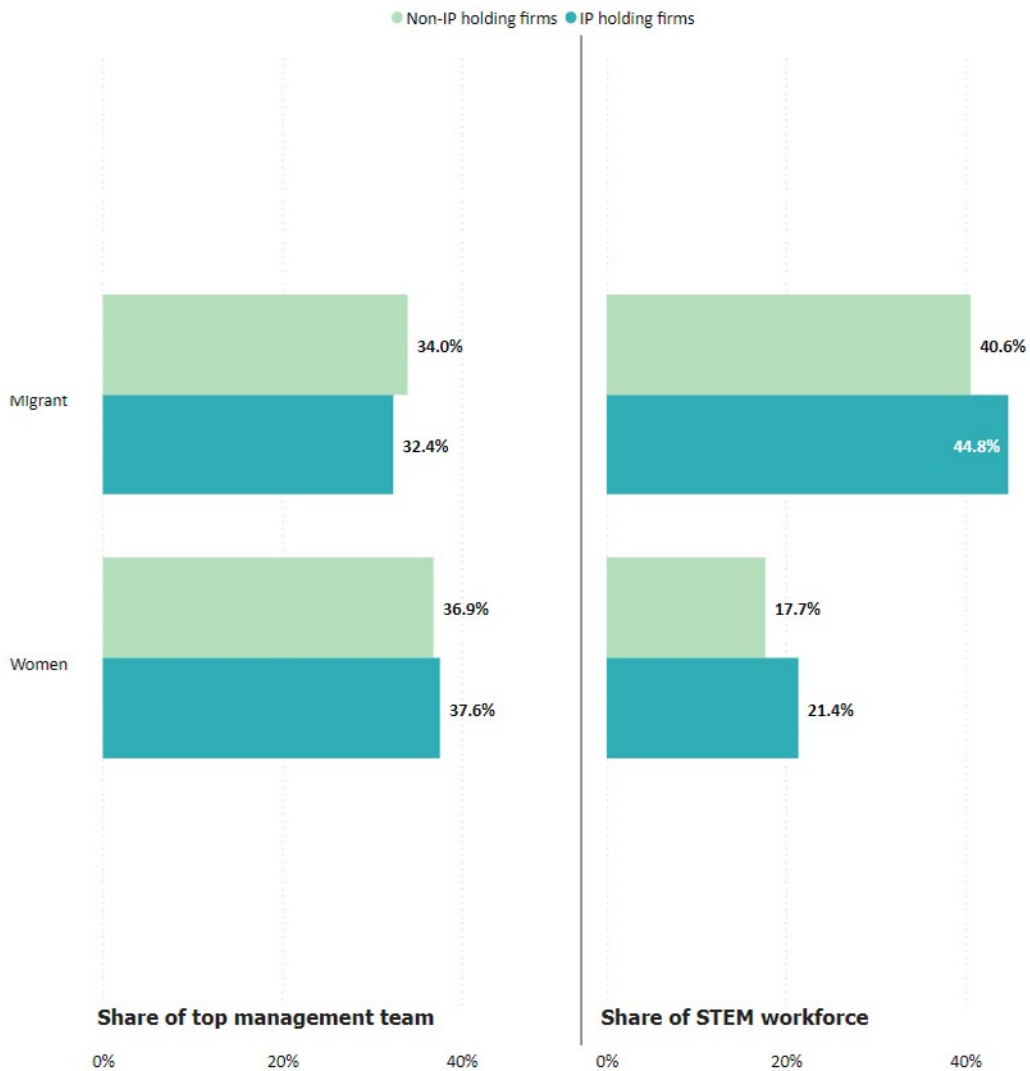


Source: MADIP, ABS, 2022; BLADE, ABS, 2022.

### **Gender diversity and migrant participation are greater in businesses that hold registered IP**

Comparing businesses with registered IP rights (patents, trade marks, designs or PBRs) to those without IP, diversity in top management teams is consistent. However, in their STEM workforce, IP-holding businesses have a notably greater share of women and a greater share of migrants (see Figure 7.4).

**Figure 7.4 Diversity in the workforce of Australian firms with and without IP rights**

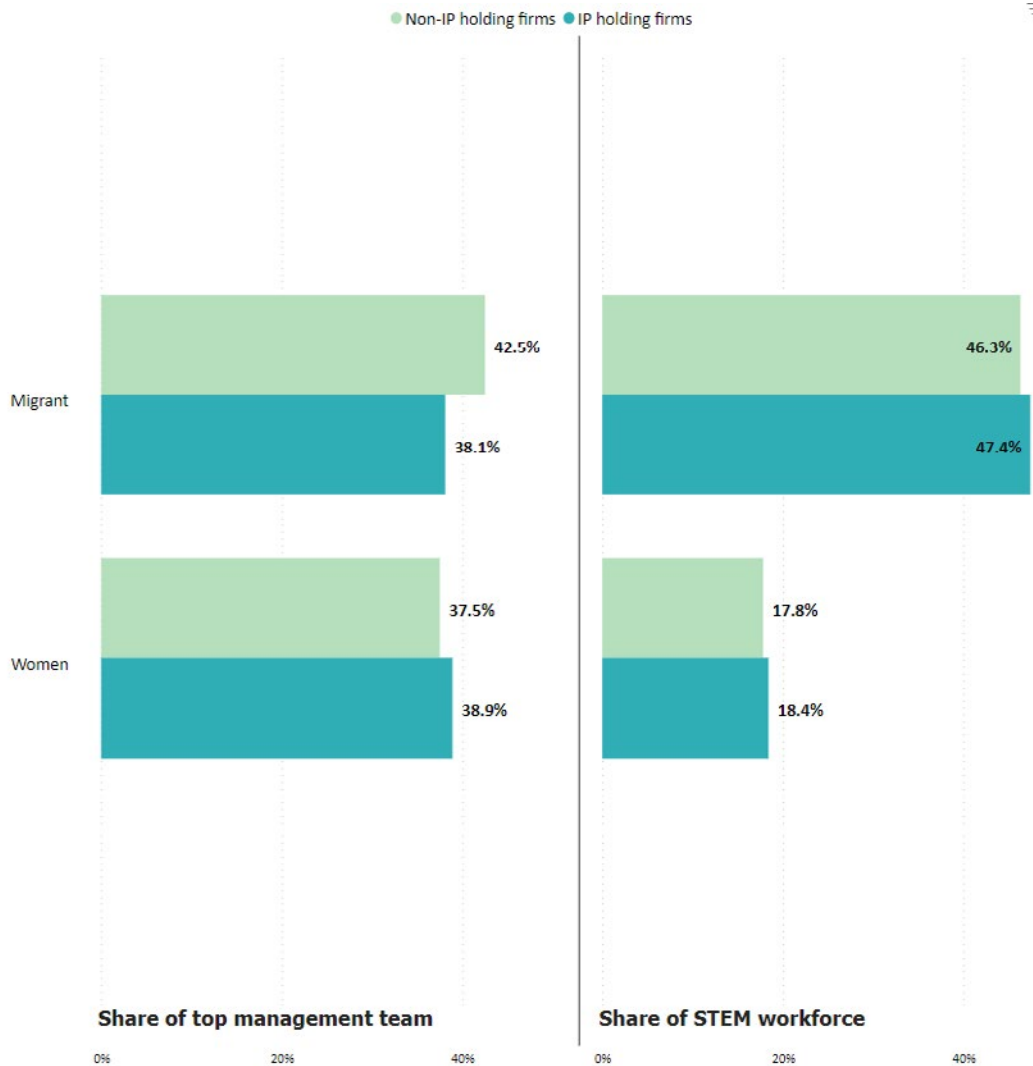


Source: MADIP, ABS, 2022; BLADE, ABS, 2022.

### **Start-ups that hold IP benefit from greater migrant participation in STEM**

Entrepreneurs take new ideas or innovations and convert them into business opportunities, often resulting in the creation of new companies. Studies have found that migrants engage in more entrepreneurship than the average citizen<sup>21</sup>. This may reflect a higher risk tolerance, which is crucial in starting up a new endeavour, as the decision to emigrate itself is risky. Focusing on Australian start-ups (businesses less than seven years old), migrant representation in management is greater in start-ups than in the larger business population. However, migrants appear to be less well-represented in the management of IP holding start-ups. This may reflect large concentrations of migrant entrepreneurship outside research-intensive sectors. Compared to the larger business population, those start-ups that do hold IP have a marginally more diverse STEM workforce (see Figure 7.5).

**Figure 7.5 Diversity in the workforce of start-up businesses with and without IP**



## Diversity and firm innovation

### Women’s participation is linked to greater productivity in innovation — especially for R&D businesses and start-ups

Greater gender diversity in leadership has been associated with higher rates of patenting and greater R&D productivity (future sales from R&D)<sup>22</sup>. Gender diversity within the R&D team is also positively associated with more radical (new to market) innovation<sup>23</sup>.

IP Australia’s study modelled the relationship between women’s representation in Australian businesses and their innovation investments and performance. The analysis compared businesses of similar size operating within the same industry.

Women’s representation in leadership and STEM was associated with lower R&D intensity. These results differ from previous studies that used data from other countries<sup>24</sup>. Nevertheless, among R&D businesses, those with a greater share of women in leadership were more efficient in converting R&D investment into patents<sup>25</sup>. For every 10 percentage point increase in the women’s share of leadership, efficiency in converting R&D expenditure into patents increased by 0.1%. This result is consistent with international research on corporate innovation and female board representation<sup>26</sup>.



In addition, among R&D businesses, those with stronger women representation in leadership held more IP on average, controlling for other factors<sup>27</sup>. The representation of women in STEM roles also predicted incrementally higher IP output by the business.

Women's participation in the management team of start-ups was associated with increased overall IP holdings. Separately, it predicted increased holdings of trade marks, designs and PBRs. The effect was incremental, at around 1% or less for every 10 percentage point increase in women participation .

## **Improving the flow of capital to female-led start-ups**

### **Anne-Marie Birkill**

#### **Co-founder, Venture Partner and Director, One Ventures**

In 2022, 23% of Australian venture capital deals included at least one female founder, a record for the sector. However, only 10% of total capital was committed to these deals<sup>28</sup>, which is significantly below the US (16.3%)<sup>29</sup> and Europe (11.8%)<sup>30</sup>. Worryingly, globally less than 3% of all venture capital is committed to female-lead ventures and this metric has remained relatively static for decades, according to a variety of sources<sup>31</sup>.

Given WIPO data confirms that on average 17% of global PCT applications are made by female inventors, it is possible that there is a disconnect between female inventorship and translation of those research outcomes, to the extent that venture capital is required to facilitate that translation.

More work needs to be done to determine whether the perceived difficulty of obtaining funding to commercialise IP contributes to the gender gap in patenting, but there is no doubt that we must do more to improve the flow of capital to female-led start-ups. The Australian venture capital community is working collaboratively to facilitate change with a focus on ensuring equitable access to capital for female founders and increasing the number of female decision makers in venture capital firms<sup>32</sup>.

Year-on-year, diversity is improving in the ecosystem and more females are building successful careers as investors and founders.

## **Participation of migrants in leadership is linked to greater research intensity**

Ethnic and cultural diversity has been associated with more radical innovation that can translate to superior returns for companies<sup>33</sup>. Studies show that ideas produced by ethnically diverse groups tend to be considered higher quality than those produced by homogenous groups<sup>34</sup>.

IP Australia's study found that migrant participation in leadership predicts an incremental increase in research intensity. In addition, businesses with strong migrant participation perform on par with other businesses in generating IP from R&D and income from IP. The study found that migrant participation in STEM is associated with an incrementally lower level of patent output. The result could be an artefact of migrant leaders concentrating in less research intensive industries or point to access barriers.

## Diversity underpins innovation in Australia

Overall, the study suggests that gender and cultural diversity underpins innovation in Australia. Foreign-born workers comprise a significant component of Australia's STEM workforce, and their participation in leadership increases the research intensity of Australian businesses. While research investment is lower in businesses with higher women participation, they are more productive in converting R&D into patents.

### Diversity and innovation in Australia

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- <sup>1</sup> [Statement on Monetary Policy: February 2023](#). Reserve Bank of Australia (2023).
- <sup>2</sup> While many people may hold multiple jobs over a year, this research focuses on the outcomes and transitions in their primary job, defined as a job in which they earn at least half of their total annual earnings.
- <sup>3</sup> Slater, S., Weigand, R. & Zvirlein, T. (2008). *The business case for commitment to diversity*. Business Horizons, 51(3), 201–209.
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- <sup>8</sup> Nathan, M. (2015). *Same difference? Minority ethnic inventors, diversity and innovation in the UK*. Journal of Economic Geography, 15, 129–168.
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- <sup>10</sup> Borjas, G. (1987). *Self-selection and the earnings of immigrants*. The American Economic Review, 77, 531–553.
- <sup>11</sup> Crown, D., Faggian, A. & Corcoran, J. (2020). *Foreign-born graduates and innovation: Evidence from an Australian skilled visa program*. Research Policy, 49, 103945.
- <sup>12</sup> Miguelez, E. & Fink, C. (2013). [Inventor migration files](#) [WIPO Economics & Statistics Related Resources 6].
- <sup>13</sup> Whittington, K. & Smith-Doerr, L. (2005). *Gender and Commercial Science: women's patenting in the life sciences*. Journal of Technology Transfer, 30, 355–370.
- <sup>14</sup> Ross, M., Glennon, B., Murciano-Goroff, R., Berkes, E., Weinberg, B. & Lane, J. (2022). *Women are credited less in science than men*. Nature, 608, 135-14
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- <sup>16</sup> Whittington, K. & Smith-Doerr, L. (2005). *Gender and Commercial Science: women's patenting in the life sciences*. Journal of Technology Transfer, 30, 355–370.
- <sup>17</sup> Astegiano, J., Esther, S. G. & de Toledo, C. C. (2019). *Unravelling the gender productivity gap in science: a meta-analytical review*. Royal Society Open Science, 6(6).
- <sup>18</sup> Yang, Y., Tian, T. Y. & Woodruff, T. K. (2022). *Gender-diverse teams produce more novel and higher-impact scientific ideas*. The Proceedings of the National Academy of Sciences (PNAS), 119(36).
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- <sup>25</sup> R&D businesses are identified as those that employ at least one worker in a STEM role.
- <sup>26</sup> Chen, J., Leung, W. & Evans, K. (2018). *Female board representation, corporate innovation and firm performance*. *Journal of Empirical Finance*, 48, 236–254.
- <sup>27</sup> We estimate that with every 10 percentage point increase in the women share of managers, total IP holdings increase by an estimated 0.3%. This effect is largely driven by an increase in trade mark holdings.
- <sup>28</sup> [2022 The State of Australian Startup Funding](#). Cut Through Venture and Folklore Venture (2022).
- <sup>29</sup> [US Female Founders Dashboard](#). PitchBook (2023).
- <sup>30</sup> [European Female Founders Dashboard](#). PitchBook (2023).
- <sup>31</sup> [US Female Founders Dashboard](#). Reported for the US at 2.1% in PitchBook (2023).  
[Funding to the Female Founders](#). Reported at 3% in Crunchbase (2020).
- <sup>32</sup> For example, supporting community driven initiatives such as [Heads Over Heels](#); [Springboard Enterprises](#); grassroots efforts like [VC Women Down Under](#); [Startmate's Women Fellowship](#); Scale Investors [EducatED](#); [WinVC](#), the [AIC](#) diversity suite [not an exhaustive list].
- <sup>33</sup> Mohammadi, A., Brostrom, A. & Franzoni, C. (2017). *Workforce composition and innovation: How diversity in employees' ethnic and educational backgrounds facilitates firm-level innovativeness*. *Journal of Product Innovation Management*, 34(4), 406–426.
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# The innovation wage premium and labour mobility



Wages help shape the incentives for individuals to engage in the innovation process. Prior research has shown that within businesses, patent grants can cause substantial increases in firm productivity that are passed through into higher wages<sup>1</sup>.

IP Australia is investigating the relationship between firm patenting and employee outcomes, such as retention, pay, job mobility and matching. A dynamic labour market, which efficiently matches people with jobs, gives businesses access to the right skills for innovation<sup>2</sup>. A dynamic labour market also has broader benefits for workers. When more firms compete for productive workers, more people can find work, move jobs, upskill and receive better pay and conditions.

This research uses linked employer-employee data from the ABS, which provides information on around 14.5 million individuals employed between 2010 and 2019<sup>3</sup>.

The research identifies a significant wage premium for working in an innovative business that holds patents. The wage response is greatest for workers in lower-skill-level occupations (e.g., technicians, sales assistants and product assemblers). The results remind us how diversity in skills and backgrounds is needed for businesses to implement innovations in the market.

Over recent decades, a decline in economic dynamism has contributed to slow productivity growth<sup>4</sup>. In Australia, this includes a decline in job switching rates. IP Australia found evidence for this broadly and within Australia's patent sector. However, the evidence also suggests that resources flow from less productive businesses to innovative patent-holders, a process that could enhance aggregate productivity.

## Key findings

- Working in an innovative business that patents is associated with an 11% wage premium in Australian SMEs.
- Patenting is associated with higher wages and a higher likelihood of retention, especially for workers in medium- and low-skill-level occupations.
- Patent-holding businesses rely on and create employment for a diverse workforce, including younger workers, migrants and those with digital technology skills, with benefits from innovation shared across occupations at all levels.

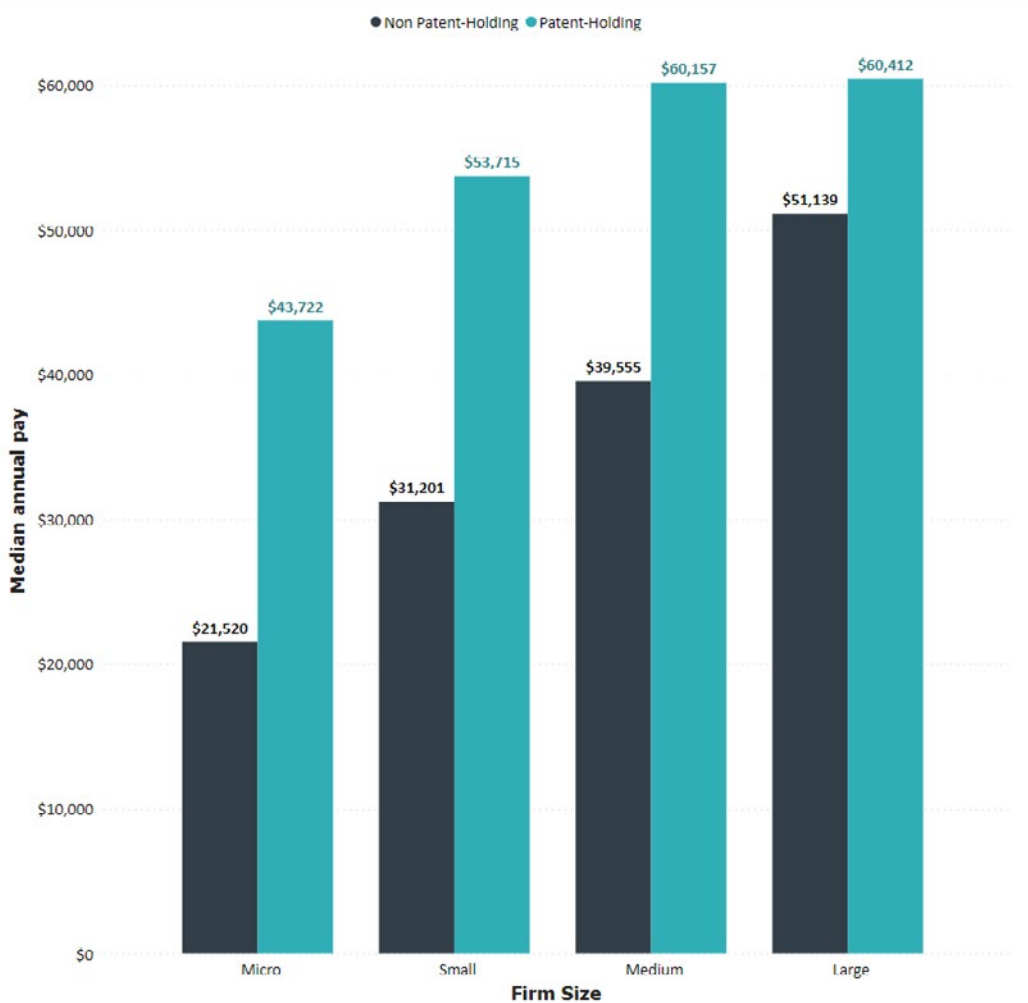
## The innovation wage premium

Several studies have shown that, for workers, there is a significant wage premium associated with working in more innovative businesses. This wage response has been found for businesses that invest more in R&D, are more technologically innovative, and engage in patent activity<sup>5</sup>.

The wage premium is generally two-fold. On the one hand, workers may extract a share of the direct revenue from innovation. Additionally, workers may benefit from the increased business performance generally associated with innovation.

IP Australia used Australian microdata to investigate the wage premium from working in a patent-holding business. At a simple level, the median annual pay of workers in patent holding businesses is much larger than the median annual pay of workers in businesses without patents. This is the case across businesses of all sizes (micro, small, medium and large), as shown in Figure 8.1.

**Figure 8.1 Comparison of the median wage for staff of different-sized businesses with and without patents**

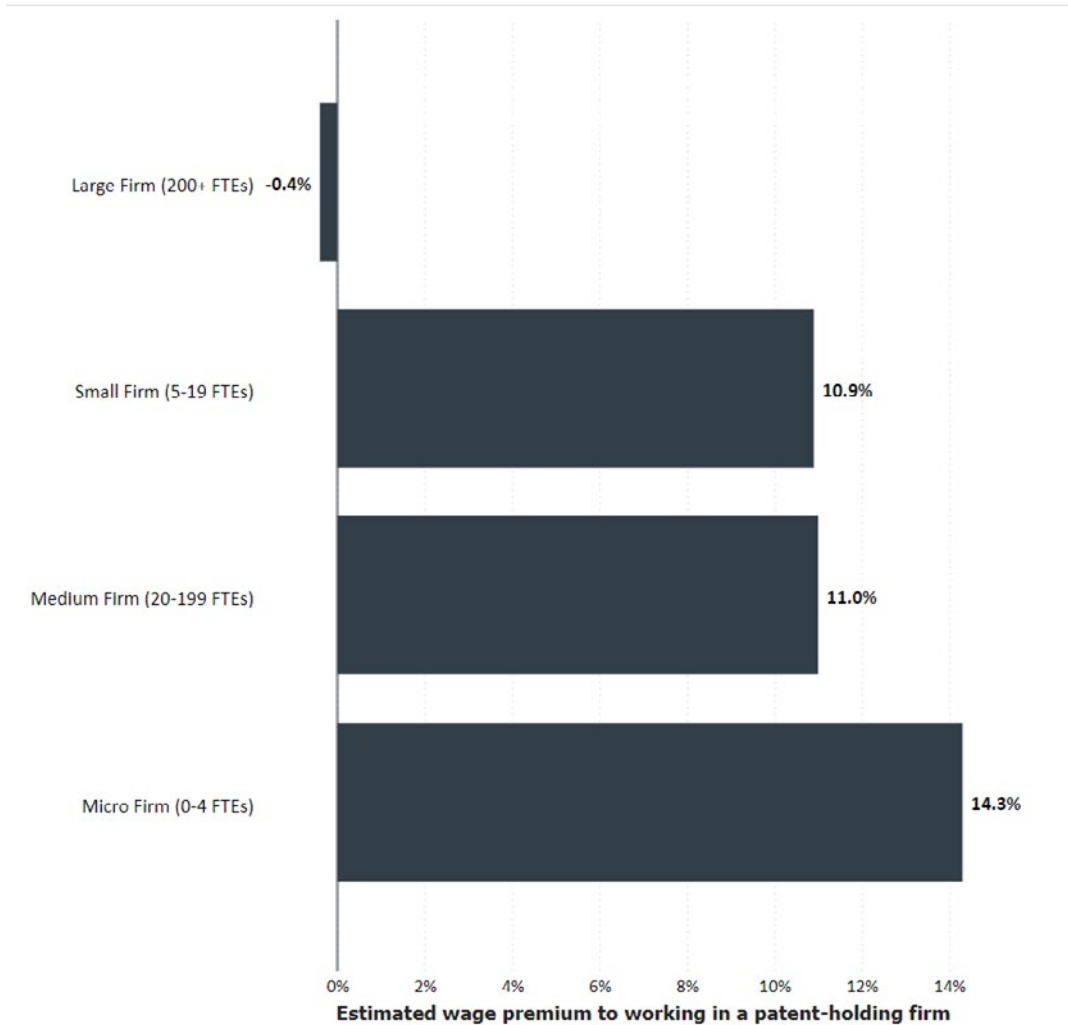


Source: MADIP, ABS, 2022; BLADE, ABS, 2022. Note: Firm size is identified based on a firm’s number of full-time equivalent (FTE) employees, consistent with ABS definitions: micro, 0–4 employees; small, 5–19 employees; medium, 20–199 employees; large, 200+ employees.

The study estimated outcomes associated with patenting, controlling for worker and business characteristics. For example, it controlled for the worker’s age, gender, occupation, years of tenure with the employer and outside wages (if they hold multiple jobs). It controlled also for unobserved personal attributes (such as natural ability) that do not vary significantly over time and which influence a person’s selection into working in an innovative business. The study also accounted for the age and productivity of the person’s employer, aspects of their regional labour market and macro conditions.

Figure 8.2 illustrates the estimated wage premium associated with patents for workers in businesses of different sizes. For workers in SMEs, employment by a patent-holding business is linked to an 11% wage premium. Patents indicate a business’s inventive capacity and can contribute to growth in business productivity, passed through into wages<sup>6</sup>. High-quality workers may also be selected for employment by patent-holding businesses, affecting their wages.

**Figure 8.2 Estimated wage premiums for workers employed by patent-holding SMEs**



Source: MADIP, ABS, 2022; BLADE, ABS, 2022. Notes: Wage premium refers to the relative increase (decrease) in annual primary job salary for workers in patent-holding firms compared to workers in non-patent-holding firms of the same size.

For workers in large businesses, employment by a patent-holding business is associated with slightly lower-than-average pay levels. This may be an artefact of the data: in larger businesses, returns on innovation may be shared through non-wage benefits, including profit-sharing arrangements.

The result may also reflect high labour market concentration around these businesses<sup>7</sup>. That is, relatively few large patent-holding businesses may compete in a market for skilled labour. Patent-holding businesses tend to be larger and more productive than businesses without patents. These attributes tend to increase a business’s bargaining power over wages<sup>8</sup>.

Across businesses of all sizes, working in a business that has held patents for three or more years is associated with higher levels of pay. This finding makes sense, as innovation may take time to improve business productivity and performance. The returns on patenting may take time to flow through as higher wages.

In addition, employees' wages increase on average with their employer's total number of patents. Research shows complementary patents – those covering technical components that combine to make a complex product – tend to increase a patent portfolio's total value<sup>9</sup>. Larger and more diverse portfolios are more likely to yield commercially successful patents.

## Combining diverse skills for innovation

Innovation relies on collaboration between people with diverse skills and backgrounds. The study investigated how the returns to innovation in businesses that hold patents affect earnings for workers in occupations at different skill levels.

The ABS classifies occupations into different skill levels based on the level of formal education workers require to perform the occupation competently (see Table 8.1).

**Table 8.1** *ABS skill levels and usual education requirements*

Skill level	Occupations have a level of skill commensurate with...	Example occupations
1	Bachelor degree or higher qualification	Engineer, Accountant, Pharmacist
2	Associate Degree, Advanced Diploma or Diploma	Science Technician, Office Manager
3	Certificate IV or Certificate III and work experience	Electrician, Mechanic, Secretary
4	Certificate II or III	Logistics Clerk, Machine Operators
5	Certificate I or compulsory secondary education	Sales Assistant, Product Assemblers

'Lower skill' occupations can require substantial experience and know-how – including soft skills and skills acquired on the job or through apprenticeships or training. Indeed, the results of this study (discussed below) highlight how having quality people across all roles – from engineers to product assemblers and sales assistants – is crucial to innovation.

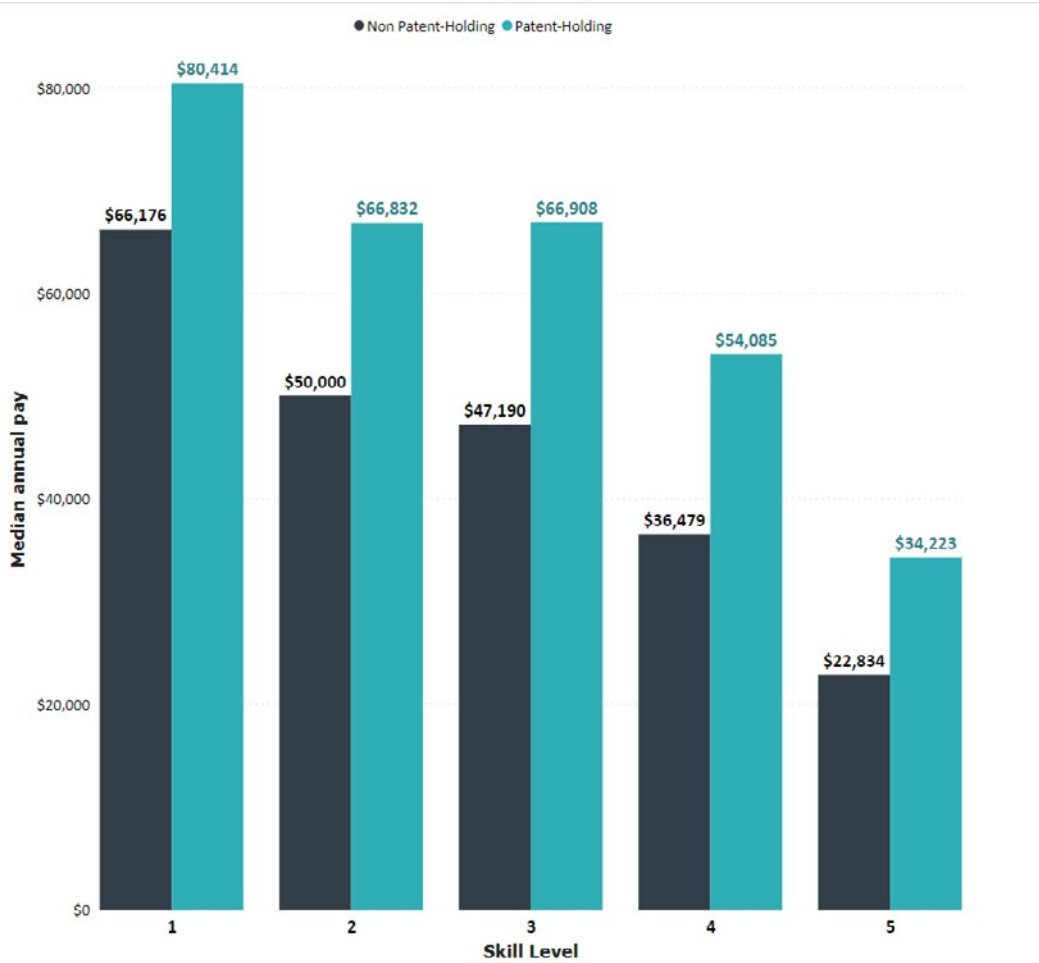
Prior evidence is mixed on how the returns to innovation vary across occupations:

- Evidence from the US suggests inventors and top-earning employees receive larger wage increases from patent grants<sup>10</sup>.
- Research on UK businesses suggests that the innovation wage premium is higher for workers in lower-skilled occupations<sup>11</sup>.
- Additional evidence indicates that highly skilled workers place a high value on non-wage-related job characteristics (e.g., physical working conditions, training and promotion opportunities and the opportunity to publish scientific outputs) for which they may be willing to sacrifice higher earnings<sup>12</sup>.

In Australia, the median annual pay of workers in patent-holding businesses is much larger than the median annual pay of workers in businesses without patents across all skill levels (see Figure 8.3).



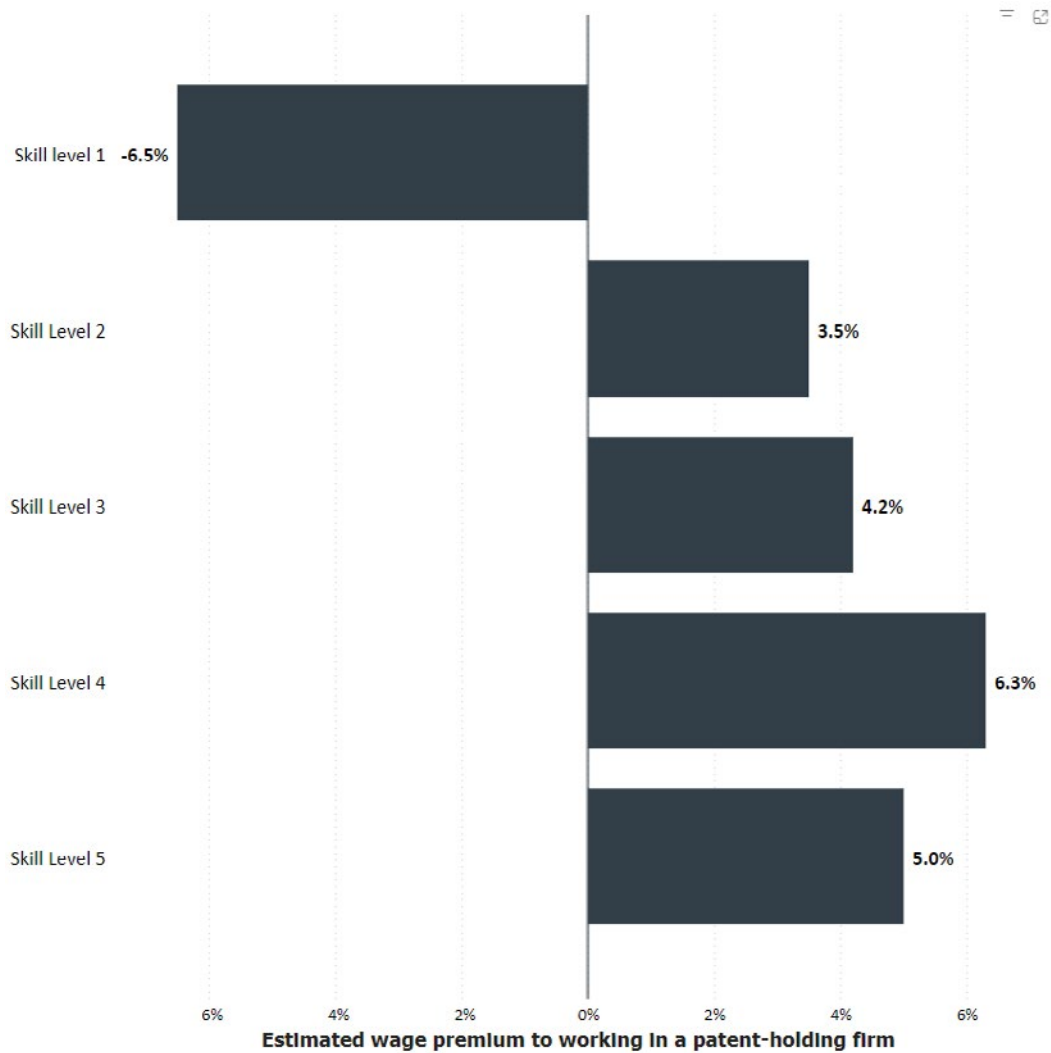
**Figure 8.3 Median annual pay in patent-holding firms and non-patent-holding firms across all occupation skill levels**



Source: MADIP, ABS, 2022; BLADE, ABS, 2022. Notes: Wage premium refers to the relative increase (decrease) in annual primary job salary for workers in patent-holding firms compared to workers in non-patent-holding firms of the same size.

Figure 8.4 shows the estimated wage premium associated with patents for workers of different skill levels based on economic modelling. For workers at the highest skill level, working in a patent-holding business is linked to lower pay levels. This likely reflects implementation of non-wage financial incentives and benefits to remunerate highly skilled workers. In addition, as inventors value patents as signals of their productivity to the labour market, some inventors may be willing to sacrifice higher wages to work in businesses with a strong innovation capability<sup>13</sup>. Further analysis reveals that workers at the high skill level in micro, small and medium enterprise enjoy a positive wage premium, akin to workers at lower skill levels.

**Figure 8.4 Estimated wage premiums for workers employed by patent-holding firms based on employee skill level**



Source: MADIP, ABS, 2022; BLADE, ABS, 2022. Notes: Wage premium refers to the relative increase (decrease) in annual primary job salary for workers in patent-holding firms compared to workers in non-patent-holding firms of the same size.

On average, employment in a patent-holding business was associated with a 3.5–4.5% wage premium for workers in medium-skill-level occupations. The innovation wage premium was 5.0–6.5% for workers in low-skill-level occupations. These results highlight how diverse skills are needed for businesses to implement innovations in the market. High-quality medium- and low-skill level workers may be deemed hard to replace and can command a wage premium for their contributions.

## Retaining quality workers

While a degree of job churn and labour market dynamism is important for wage and productivity growth, retention offers many benefits to employees and employers. For businesses, retaining workers with relevant skills and know-how is a critical challenge – especially in a tight labour market. For workers, higher retention equates to greater job stability, which is often important for lower-income workers. Retention can also increase employers’ incentives to invest in training their employees<sup>14</sup>.

Based on economic modelling, the study found that working in a patent-holding business is associated with higher retention:

- Workers employed by a business in 2018 were 3% more likely to retain primary employment with that business in 2019 if the business held patents.
- The added likelihood was around 9% for workers in the lowest skill level occupations and 2% in medium skill occupations.

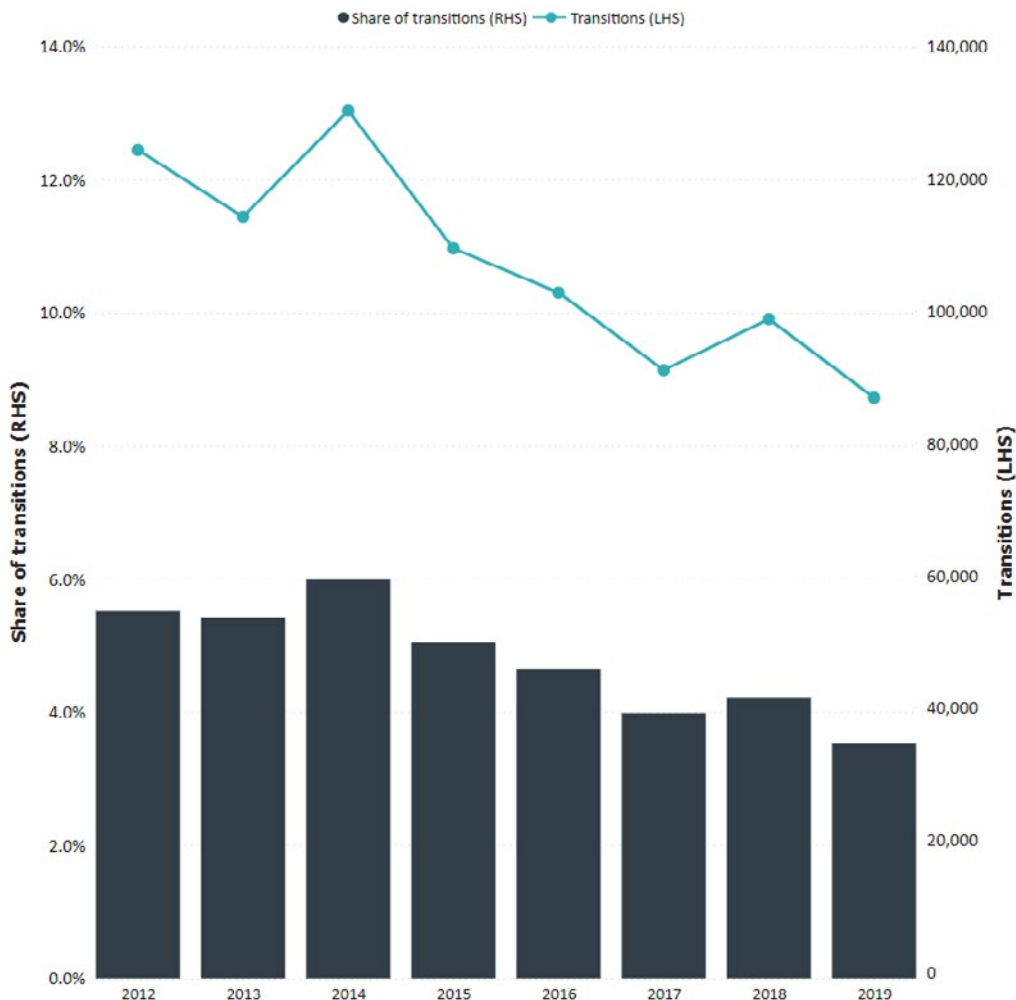
Managers can often easily observe the quality of inventors and scientists – it is reflected in their education and their patents and publications. The qualities of workers in lower-skill-level occupations may be harder to observe, making it difficult to replace quality workers in these roles<sup>15</sup>.

## Moving between employers

The microdata provided insight into employment transitions across the economy – that is, where workers have changed employers in moving jobs. In Australia, the overall job switching rate fell between 2012 and 2019 (see Figure 8.5), consistent with prior research.

Over the same period, around one in five transitions were movements into a patent-holding business. Not accounting for personal attributes, a worker’s likelihood of joining a patent holding business stands at around 4.8%.

**Figure 8.5 The share of job transitions into patent-holding firms and overall employment transitions from 2012 to 2019**



Source: MADIP, ABS, 2022; BLADE, ABS, 2022.

When looking at transitions, it is possible to identify factors that make it more likely a worker will transition to a business with patents:

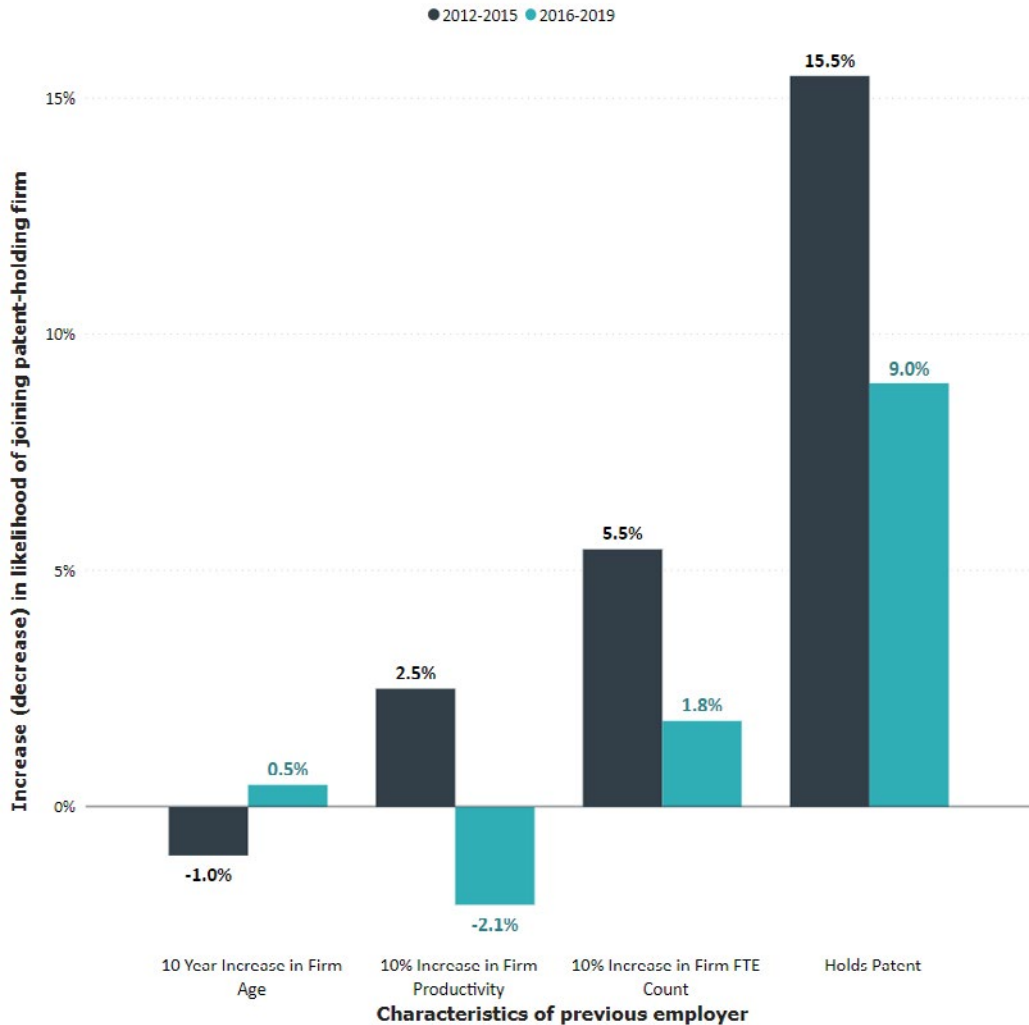
- Patent-holding businesses create employment for workers with previous experience working in digital technology (in ‘tech jobs’). Having digital technology skills increases the likelihood that an individual will join a patent-holding business by 41.7% (an increase of two percentage point above the 4.8% base rate at which workers join patent-holding businesses).
- Younger workers are marginally more likely to transition to a patent-holding business: every decade of age is associated with a 2.1% decrease in this likelihood (a 0.1 percentage point increase above the base rate).
- Men are around 10.4% more likely than women to transition to a patent-holding business (a 0.5) percentage point increase above the base rate).

These hiring patterns remained fairly constant over the study period. In addition, migrants are around 10.4% more likely to join a patent-holding business than workers born in Australia, highlighting the importance of migrants to innovation. This complements findings from the previous chapter that diversity underpins innovation in Australia.

## Reallocating labour

Looking at who joins patent-holding businesses, the most dramatic shifts over the last decade have occurred in the characteristics of their previous employers (see Figure 8.6).

**Figure 8.6 The characteristics of previous employers of workers who transition into patent-holding firms over time**



In 2012 to 2015, people with experience working in larger and more productive businesses, especially those with patents, were more likely to be hired into businesses with patents. The likelihood of being hired into a patent-holding business was around 15.5% higher for people previously employed by a business with patents. By the second half of the decade (2016 to 2019), this relationship had weakened; in fact, the effect almost halved between the two periods.

Perhaps most strikingly, patent-holding businesses are increasingly likely to hire from less productive businesses and older businesses, whereas they used to hire from more productive businesses and younger businesses. This may reflect a rising prevalence in the economy of unproductive businesses that would typically contract or exit in more competitive markets. Recent research links this to declining levels of labour market dynamism generally<sup>16</sup>. Together, this study’s findings suggest that resources in the economy are flowing to more innovative businesses, a process which may be productivity enhancing. However, further research is needed to understand the impact of reduced dynamism on the productivity of patenting businesses.

## **Patent-holding businesses are hiring workers with AI skills at a higher rate**

IP Australia commissioned Queensland University of Technology (QUT) to conduct a study examining the adoption of artificial intelligence (AI) within Australian and international businesses. AI technology is becoming more capable and versatile. As it transforms into a general-purpose technology, this raises key policy questions:

- Will AI develop into a new method of inventing that expands the range of possibilities for innovation and makes inventions cheaper and faster to produce? If so, what protections are needed to encourage AI-based innovation?
- Are AI developers – those creating new AI systems and components – the same or different actors to those who innovate using AI? Is IP protection needed to facilitate trade in AI technologies?
- Given AI is a black box – it can be difficult to understand and explain how it reaches outcomes – how can the IP system help spread technical knowledge in this domain?

The study by QUT forms part of a broader program of research and consultation that IP Australia is progressing.

The study measured AI adoption through LinkedIn profiles and job ads by identifying the skills businesses required for their employees and advertised positions.

The study found that small and medium enterprise are generally less focused on AI adoption than larger established businesses. However, it identified the emergence of highly specialised, technical start-ups focused on AI development in Australia.

For these businesses – as for the overall sample – having a patent was a good predictor of whether they were engaged in building AI capability: businesses with a stronger innovation and patent focus adopt AI at a higher rate. Adoption was strongly associated with patenting focused on the Physics field, which encompasses computer technologies.

This may indicate that businesses use patents to capture returns from developing AI systems.

To the extent that AI is being applied to innovate across domains, it might be expected that AI adopters will tend to patent across diverse technical fields. The QUT study found no evidence for this. Businesses appear to view AI as important for innovation across a wide range of domains, not just in niche areas. However, as currently applied, AI may be more important for automating operations than radical recombinant innovation.

Keep an eye on IP Australia's website for information about our AI consultation and research publications.

## The innovation wage premium and labour mobility endnotes

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- <sup>1</sup> Kline, P., Petkova, N., Williams, H. & Zidar, O. (2019). *Who profits from patents? Rent-sharing at innovative firms*, The Quarterly Journal of Economics, 134(3), 1343–1404.
- <sup>2</sup> Productivity Commission (2022). [5 year productivity inquiry: A more productive labour market](#) [Interim Report 6].
- <sup>3</sup> While many people may hold multiple jobs over a year, this research focuses on the outcomes and transitions in their primary job, defined as a job in which they earn at least half of their total annual earnings.
- <sup>4</sup> Hambur, J. (2022). [Product market competition and its implications for the economy](#). Economic Record. Advance online publication ; Andrews, D. & Hansell, D. (2019). *Productivity-enhancing labour reallocation in Australia* [Treasury Working Paper 2019-06]. Commonwealth of Australia; Quinn, M. (2019). [Keeping pace with technological change: The role of capabilities and dynamism](#) (Speech at OECD Global Forum on Productivity, Sydney, 20 June 2019).
- <sup>5</sup> For example, Agion et al. (2019), Cirera and Soares Martins-Neto (2020) and Kline et al. (2019).
- <sup>6</sup> Kline, P., Petkova, N., Williams, H. & Zidar, O. (2019). *Who profits from patents? Rent-sharing at innovative firms*. The Quarterly Journal of Economics, 134(3), 1343–1404.
- <sup>7</sup> Evidence for such concentration in Australia includes an overall decline in the labour share of national income. In a recent study, Hambur (2023) found that labour market concentration has negatively impacted wages in Australia and the impact has increased in severity over time. He attributes this to declining firm entry and dynamism reducing competition for labour among established businesses. See Hambur, J. (2023). [Did labour market concentration lower wages growth pre-COVID?](#) [Treasury Working Paper 2023-01]. The Treasury.
- <sup>8</sup> Yeh, C., Macaluso, C. & Hershbein, B. (2022). *Monopsony in the US labor market*. American Economic Review, 112(7), 2099-2138.
- <sup>9</sup> Gambardella, A., Harhoff, D. & Verspagen, B. (2011). *The determinants of the private value of patented inventions*. Bocconi University.
- <sup>10</sup> Kline, P., Petkova, N., Williams, H. & Zidar, O. (2019). *Who profits from patents? Rent-sharing at innovative firms*. The Quarterly Journal of Economics, 134(3), 1343–1404.
- <sup>11</sup> Aghion, P., Bergeaud, A., Blundell, R. & Griffith, R. (2017). *The innovation premium to low skill jobs*. Additional evidence has shown high-skill workers place more value in non-wage related job characteristics such as physical working conditions, training and promotion opportunities, and the opportunity to work closely to scientific and innovative pursuits. This implies that wages play a smaller role in the job decisions of high-skilled workers and gives employers greater wage-setting power for these workers.
- <sup>12</sup> For example, see Stern, S. (2004). *Do scientists pay to be scientists?* Management Science, 50(6), 709–853.
- <sup>13</sup> Melero, E., Palomeras, N. & Wehrheim, D. (2020). [The effect of patent protection on inventor mobility](#). Management Science, 66(12), 5485–5504.
- <sup>14</sup> Melero, E., Palomeras, N. & Wehrheim, D. (2020). [The effect of patent protection on inventor mobility](#). Management Science, 66(12), 5485–5504.
- <sup>15</sup> Aghion, P., Bergeaud, A., Blundell, R., Griffith, R. & Market, A. B. L. (2017). *The innovation premium to low skill jobs*.
- <sup>16</sup> Andrews, D. & Hansell, D. (2019). [Productivity-enhancing labour reallocation in Australia](#) [Treasury Working Paper 2019-06]. The Treasury.



# Research program



## Office of the Chief Economist

IP Australia's Office of the Chief Economist (OCE) produces evidence and advice to inform IP policy and develop insights into the IP system's role in addressing key economic challenges.

The OCE's research is organised into three thematic streams: productivity, equity in IP and innovation in response to shocks. In addition, the OCE conducts research to support IP Australia's operational effectiveness.

## Research themes

### Productivity

In Australia and across developed economies, the rate of productivity growth has slowed over recent decades. The OCE and our research partners are investigating how the IP system can contribute to future productivity growth. We are working to understand how the IP system functions in relation to related economic outcomes, such as economic dynamism, competition, labour mobility and wages, innovation and technology adoption.

### Equity in IP

To remain competitive, it is vital that Australia does not lose potential innovators. Positive change – through helping Australians from diverse backgrounds participate in the innovation system – begins with a common understanding of who accesses and benefits from the tools for innovation. IP data provides a powerful lens to view economic participation.

### Innovation responses to shocks

In the COVID-19 era, the global innovation system met its moment, providing innovative solutions to contain the public health crisis and stabilise the economy. The OCE is part of an international network exploring how recent shocks have affected the innovation landscape and the IP system's role in building economic resilience.



## Forthcoming publications

In 2022, the OCE exploited unique microdata on Australian workers and their employers. Initial outputs from this work have explored diversity in innovation and employee outcomes from patenting. Full research reports on these topics will be published in 2023. Ongoing work will explore the productivity implications of these innovation drivers and outcomes.

New data and methods lead to an improved understanding of the mechanisms by which the IP system impacts the economy, complementing our policy analysis. Key to the economic significance of the patent system is the scope of the patent right. If too narrow, patent rights may provide an inadequate incentive for innovation. If too broad, they may curtail follow-on innovation and competition. Also important is the timing with which IP rights are examined and granted. The OCE is exploring the characteristics of IP rights in Australia and the economic effects of various policy settings.

Frontier technologies such as AI have the potential to drive productivity improvements across sectors. In 2023–24 IP Australia will continue a research program investigating the drivers of AI development and adoption, its applications in innovation and implications for the IP system. Research outputs from this work are planned for release in 2023.

## Centre of Data Excellence

The Centre of Data Excellence (CODE) is the central point of contact for crosscutting questions requiring data and information from multiple business sources across IP Australia. CODE provides a data ‘front door’ service for external stakeholders to answer data-related queries for Australian IP rights. Users can access this service by emailing [data@ipaaustralia.gov.au](mailto:data@ipaaustralia.gov.au).

In 2022, CODE updated our open data offerings, Intellectual Property Government Open Data (IPGOD). Our open data products are available at [data.gov.au](https://data.gov.au).

IPGOD is a publicly available dataset that provides access to over 100 years of information from IP Australia on IP rights applications. Providing a ‘one-stop shop’ for administrative data allows users to research the classification of IP rights, linkages between Australian and international IP rights, and the history of IP transfers and exchanges over time.

In 2023, CODE is developing more accessible and up-to-date open data products to better inform research and analytics work.

## IPAVentures

In late 2021, IP Australia established IPAVentures, a pilot innovation capability aimed at supporting the organisation’s vision of creating a world-class IP system and promoting prosperity for Australians. IPAVentures applies a rigorous and disciplined methodology to research, ideate, prototype, validate and deliver innovative ventures.

To this end, IPAVentures conducted research in 2022 and discovered that many SMEs were either unaware, uncertain about or late in registering their trade marks, which put them at risk of incurring significant costs or risks. As a result, IPAVentures launched its first venture, the trade mark tool TM Checker, to assist small businesses in making informed decisions about trade mark registration.

In 2023 IPAVentures is undertaking a range of research to explore whether IP Australia’s purpose is fit for the ongoing technological, economic and social disruption.

## Patent Analytics Hub

IP Australia's Patent Analytics Hub uses global and Australian patent data to derive insights and business intelligence on innovation trends, market profiles, areas of competition and collaboration, and commercial opportunities in specific technology areas. This information is used by policy- and decision- makers across government, universities and publicly funded research organisations to make informed, data-driven decisions.

In 2022, the Patent Analytics Hub published [interactive visualisations of priority technology areas](#) highlighted in the [Australian Government's First Low Emissions Technology Statement](#). These visualisation reports identify the impact of low-emission technologies in achieving existing global emission targets, leading to positive environmental benefits. Analysing the global patent filing trends, innovators, countries of origin and filing jurisdictions in each of the technology areas of [carbon capture and storage](#), [grid energy storage](#), [solar photovoltaic](#), [low emissions steel, aluminium and iron ore](#), and [soil carbon measurement](#) will provide critical information for decision-makers as Australia strengthens and consolidates its national capability.

The Patent Analytics Hub's analysis of Japanese-Australian filing trends, technology strengths and collaborations assisted the Department of Industry, Science and Resources (DISR) prepare for the 17th Japan-Australia Joint Committee Meeting on Science and Technology Cooperation. We also responded to requests from federal and state departments and agencies with patent analytics on various technologies, including cancer pathology, quantum computing, quantum sensors, quantum communications, high-purity silica and silicon production, and critical mineral extraction and processing.

During 2022, we continued to support the Office of the Chief Scientist (OCS) and the DISR Critical Technologies Hub in their work to ensure that Australia's critical technology policies are balanced, effective and evidence-based as part of the [Australian Government's Action Plan for Critical Technologies](#). The Patent Analytics Hub, in collaboration with Defence Science and Technology Group, prepared an interactive visualisation that analysed patent, bibliometric, investment and social impact data across 63 critical technology areas, which the OCS and DISR will use when assessing future impacts.

### Disclaimer

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The results of the studies in this report are based, in part, on ABR data supplied by the Registrar to the ABS under A New Tax System (Australian Business Number) Act 1999 and tax data supplied by the Australian Taxation Office (ATO) to the ABS under the Taxation Administration Act 1953. These require that such data is only used to carry out functions of the ABS. No individual information collected under the Census and Statistics Act 1905 is provided to the Registrar or ATO for administrative or regulatory purposes. Any discussion of data limitations or weaknesses is in the context of using the data for statistical purposes and is not related to the ability of the data to support the ABR or ATO's core operational requirements. Legislative requirements to ensure the privacy and secrecy of this data have been followed. Only people authorised under the ABS Act 1975 have viewed data about any firm when conducting these analyses. In accordance with the Census and Statistics Act 1905, results have been confidentialised to ensure that they are not likely to enable the identification of a particular person or organisation.

