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Date: / / 2025

Ministerial Submission

MS25-000803

FOR INFORMATION – Update on recent microdata analysis of industry composition and programs

TO: Minister for Industry and Innovation; Minister for Science

CC: Assistant Minister for Science, Technology and the Digital Economy

KEY POINTS

- DISR has conducted a substantive program analysis and is investing in two microdata assets, which will expand our capacity to analyse Departmental priorities using administrative data:
 - A quantitative impact analysis of the Entrepreneurs' Programme, the predecessor to the Industry Growth Program.
 - The development of an Emerging Industries Database, a detailed business-level database to uncover new insights on emerging sectors relevant to the portfolio.
 - The Wealth and Housing Assets Module (WHAM), developed with a consortium of agencies (Treasury, Department of Social Services, Reserve Bank of Australia, ABS, ATO and ASIC).
- Analytic work on the Entrepreneurs' Programme and Emerging Industries Database will be turned into research reports that will be published on the department's website later in the year. In finalising this work, we are undertaking quality assurance and testing the methods and findings with a range of academic and government experts.
 - This includes the Australian Conference of Economists (ACE) on 7-8 July, where short outline of the methodology and results are being presented. While this is a conference primarily attended by academia and public servants, it is possible that members of the media will be present at the conference.
 - The ACE presentation slides are contained in Attachments A and B.
 - Detailed briefing will be provided on both reports ahead of publication.
- The Entrepreneurs' Programme impact analysis examined how participation in the program affected business performance relative to similar non-participants.
 - The analysis found that participants had faster growth in turnover, wages, exports and employment compared with a similar group of non-participants. However, there was not a measured increase in capital expenditure or labour productivity.

- Outcomes were strongest for businesses where advisory services were paired with grants, relative to those that only accessed advisory services. This pairing helped businesses overcome access barriers to finance and address capability gaps.
- While the results suggest the program supported businesses to grow, it is difficult to fully attribute these effects to the program as participants grew faster than non-participants even prior to joining the program.
- We have previously presented this analysis to the Industry, Innovation and Science Australia (IISA) Board.
- The Emerging Industries Database analysis provides preliminary insights on the economic contribution, performance and workforce characteristics of emerging industries.
 - The analysis is based on a new, artificial intelligence-generated database that has been combined with administrative microdata and focuses on businesses in seven emerging industries: artificial intelligence; quantum technologies; robotics; biotechnologies; space; clean energy generation and storage; and pre-fabricated construction.
 - The collection method identifies businesses based on their web presence, and businesses in the sample are typically larger and more mature. As a result, the Emerging Industries Database analysis presents descriptive relationships rather than drawing out causal inferences.
 - **Economic contribution:** The database records approximately 3,500 businesses with a presence in emerging industries (i.e. as developers or adopters of emerging technologies). They account for a large share of the Australian economy: around 25 per cent of the Australian economy and 22 per cent of the labour force in 2023-24. Firms engaging with artificial intelligence are the largest contributor to these statistics.
 - However, not all activity of identified businesses is devoted to these technologies. Preliminary estimates suggest that 2-4 per cent of activity in emerging industry businesses can be attributed to emerging industry technologies.
 - We have developed a novel approach to modelling technology penetration rates given the lack of other similar research and analysis.
 - **Cohort demographics:** Emerging industry activity is clustered around major capital cities. These businesses contribute to and across traditional industry classes such as manufacturing, construction and professional industries and activity covering a wide range of specialisations.
 - **Performance:** single-year measures of labour productivity indicate higher productivity among businesses with a presence in emerging industries than other businesses. Among emerging industries, productivity performance varies with clean technology, robotics and AI comparatively higher.

- **Workforce:** jobs in emerging industries have higher pay, reflecting a more skilled workforce and a greater share of workers employed in the professional occupation class. Migration appears to play an important role in the composition of Australia's emerging industry workforce.
- The WHAM represents a significant new expansion in Commonwealth microdata capabilities.
 - The WHAM will bring together information on major household asset classes (housing, business ownership, trust and partnerships and superannuation) into the ABS's secure microdata ecosystem.
 - A pilot build is expected to add, or substantially expand, approximately 15 distinct data assets by March 2026.
 - The pilot WHAM will enable us to analyse:
 - How industry support affects business owners
 - Common ownership trends among businesses
 - The relationship between wealth, entrepreneurship and investment
 - Interactions between trust and partnership use and business outcomes
 - We are expecting to present on the WHAM pilot and progress to date at the ANU's Australian Workshop on Public Finance on 31 July.
 - We are also investing in a new Company Director Capability Database which will use similar AI techniques to the Emerging Industry Database to create overview of the qualifications and experience of directors of ASX-listed companies. This will facilitate further analysis of Australia's managerial capability.

CONSULTATION

- The Entrepreneurs' Programme analysis was conducted by AID in close collaboration with AusIndustry, Business Grants Hub, and Commercialisation Division.
- The Emerging Industries Database was developed by AID in consultation with Technology and Digital Division, Science Division, Industry & Manufacturing Division, and the Australian Space Agency. A limited, early version of the analysis has been presented to the Critical Technology Hub, a grouping that includes representatives from the Departments of: Defence; Treasury; Home Affairs; Climate Change, Environment, Energy and Water; Prime Minister and Cabinet; Foreign Affairs and Trade; and the Office of National Intelligence.
- AID is working closely with the Treasury, the Department of Social Services, the Reserve Bank of Australia, Australian Bureau of Statistics, the Australian Taxation Office and the Australian Securities and Investment Commission on the WHAM.

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8/7/2025

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ATTACHMENTS

- A: Entrepreneurs' Programme conference slides
- B: Emerging Industries Database conference slides



Australian Government
Department of Industry,
Science and Resources

Office of the
Chief Economist

Economic impact analysis of the Entrepreneurs' Programme

Analysis of the government's biggest business advisory program

Presented by ^{s22} | Australian Conference of Economists | July 2025
Analysis by ^{s22}

| industry.gov.au

DISR analysed the effects of a large business advisory program, the Entrepreneurs' Programme (EP)



What we did

- Impact analysis to quantify effectiveness of business advisory and grants program
- DISR program microdata integrated with BLADE
- Step 1: propensity score matching
- Step 2: difference-in-differences



What we found

- Participants experienced faster growth in turnover, exports, wages, and employment
- Less noticeable impacts on productivity and capital expenditure
- Pairing advice with grants was particularly effective

* BLADE: Business Longitudinal Analysis Data Environment

The Entrepreneurs' Programme used a combination of advice and grants to enhance business performance

Sub-program	Objective
Accelerating Commercialisation (AC) 2014 - 2023	Early-stage businesses getting novel products, processes or services to market
Growth Services (GR) 2014 - 2023	Business growth and improved competitiveness in global markets
Innovation Connections (IC) 2014 - 2023	Establishing and accelerating research projects
Incubator Support Initiative (ISI) 2016 - 2023	Building start-up capability to succeed in international markets
Strengthening Business (SB) 2020 - 2023	Bushfire and flood support

Excluded from sub-program analysis

- Program active from 2014 to 2023
- \$947 million total expenditure for 16,120 businesses
- 65% of expenditure as grants
- 35% of expenditure as advisory services

Participants experienced faster growth in turnover, exports, and employment

5 years post participation, compared to counterfactual participants had on average:

- \$885,000 additional turnover per year
- \$505,000 additional merchandise trade
- 2.5 additional FTE

Can't rule out selection effects

Figure: Impact on turnover and exports

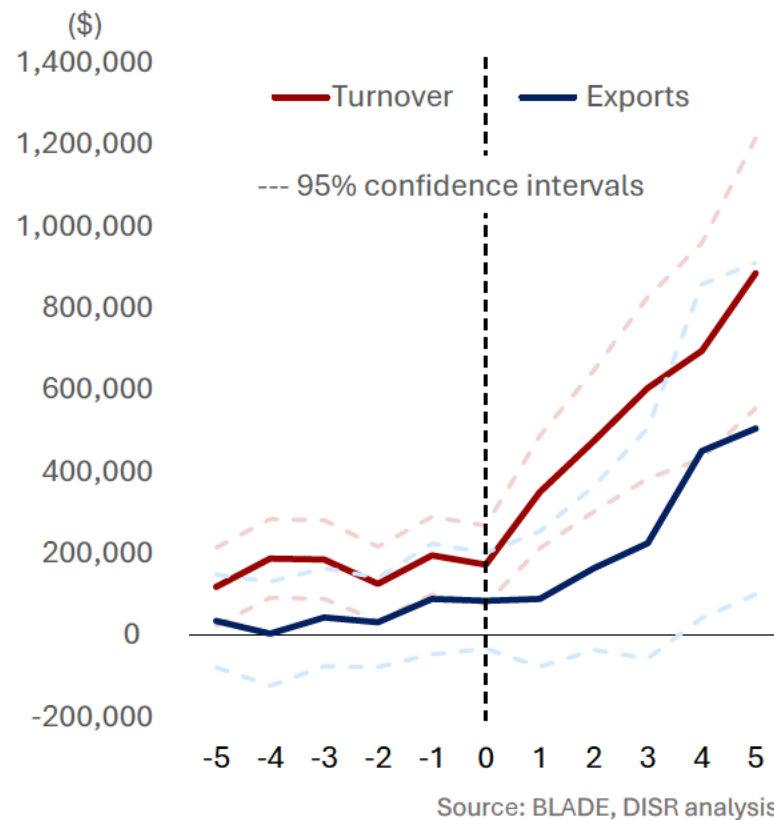
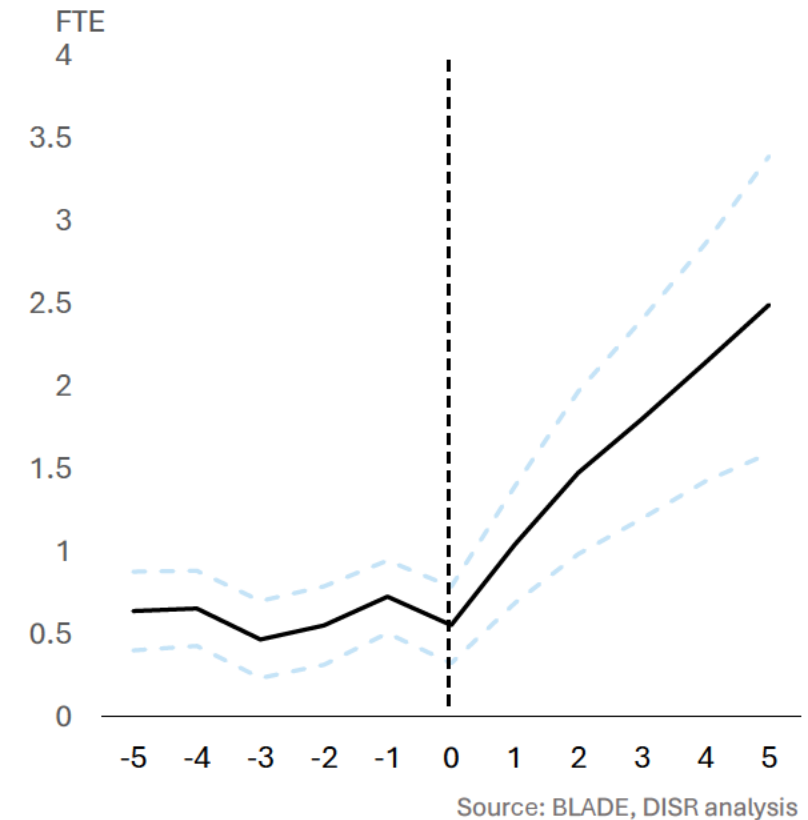


Figure: Impact on employment



But we did not detect an effect on capital expenditure or productivity

No observed causal effect on capital expenditure or productivity

But even prior to participating, EP participants were more productive on average compared to non-participants

Program may still have contributed to increased economy-wide productivity through a reallocation effect

Figure: Impact on capital expenditure

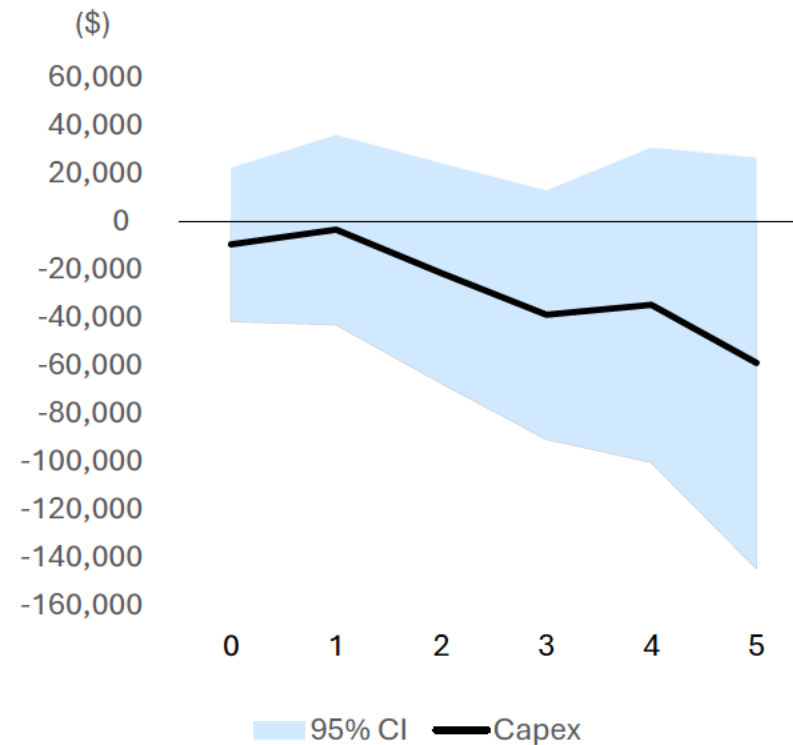
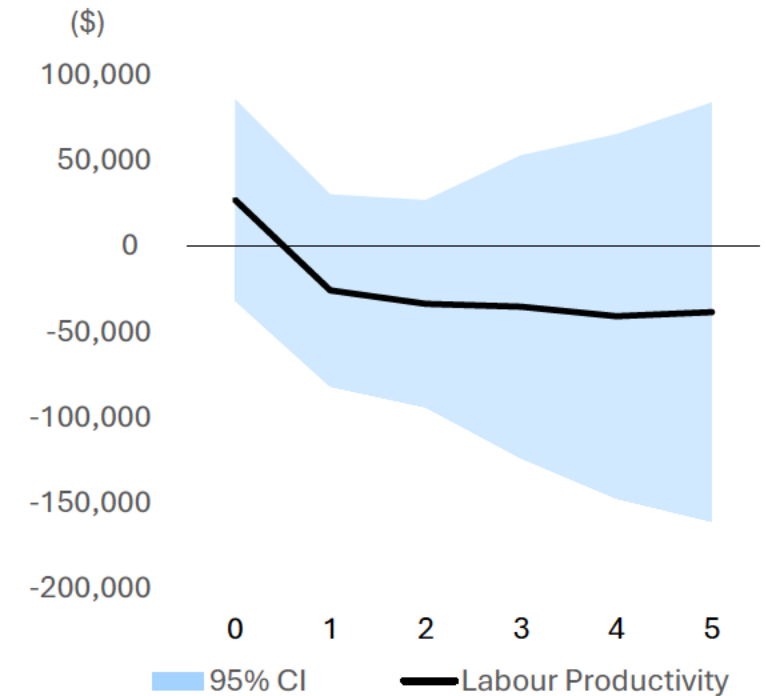


Figure: Impact on labour productivity

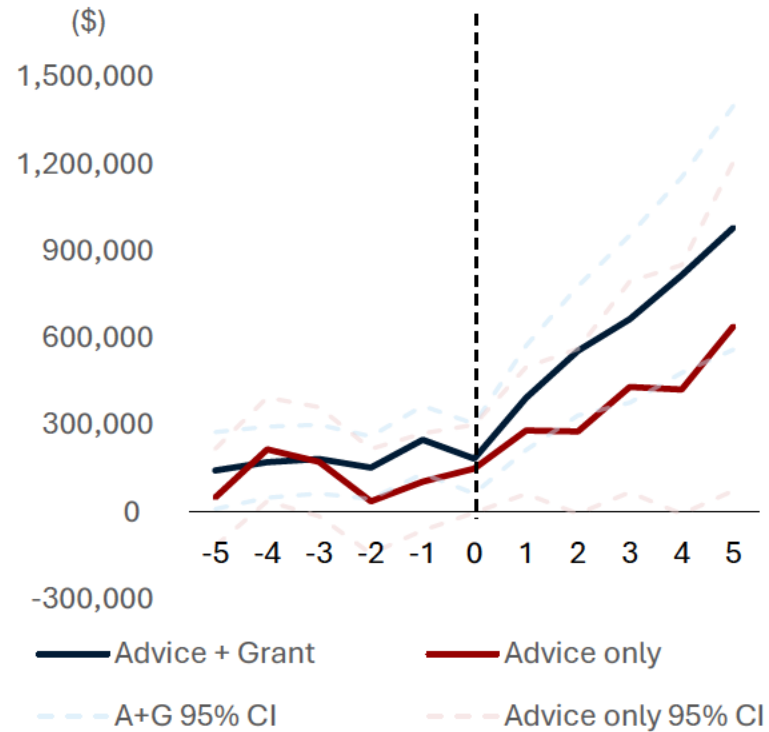


Advice paired with grants was particularly effective in improving outcomes

Turnover and employment grew faster for businesses who received advice and services:

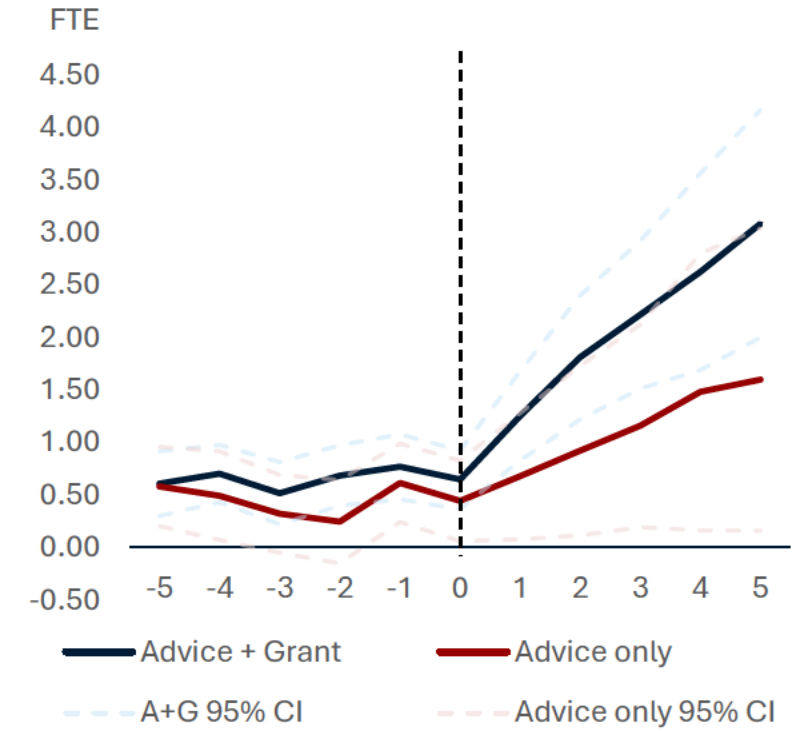
- *Innovation Connections* \$50,000 matched funding for research staff
- *Accelerating Commercialisation* grants could be used by business to employ senior executives to drive commercialisation outcomes

Figure: Impact on turnover, by type of support



Source: BLADE, DISR analysis

Figure: Impact on employment, by type of support



Source: BLADE, DISR analysis

Turnover growth was similar for Manufacturing and PST, but employment growth was stronger in PST businesses

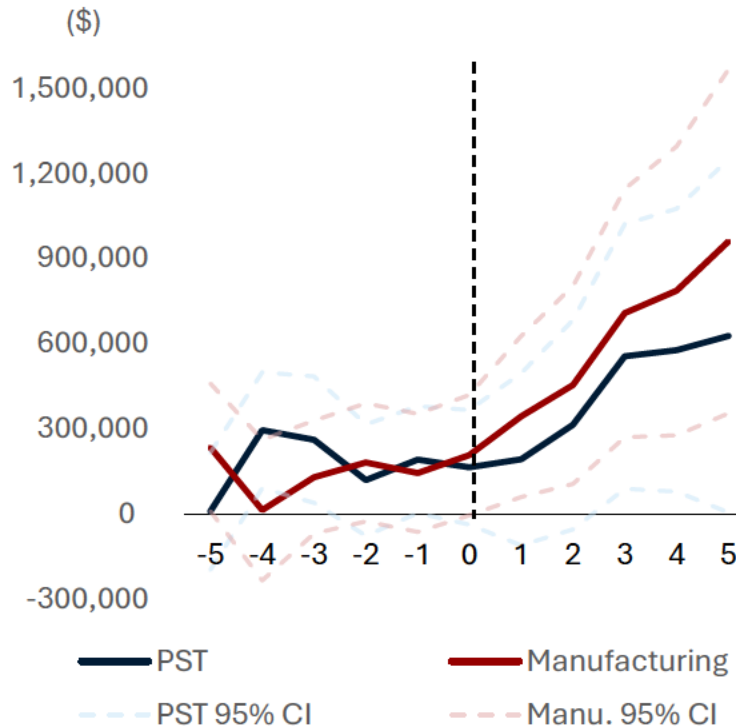
Both PST and Manufacturing participants had strong turnover and employment outcomes

Turnover for both PST and Manufacturing grew by 18% in fifth year post-participation

Employment growth was relatively stronger for PST compared to Manufacturing businesses

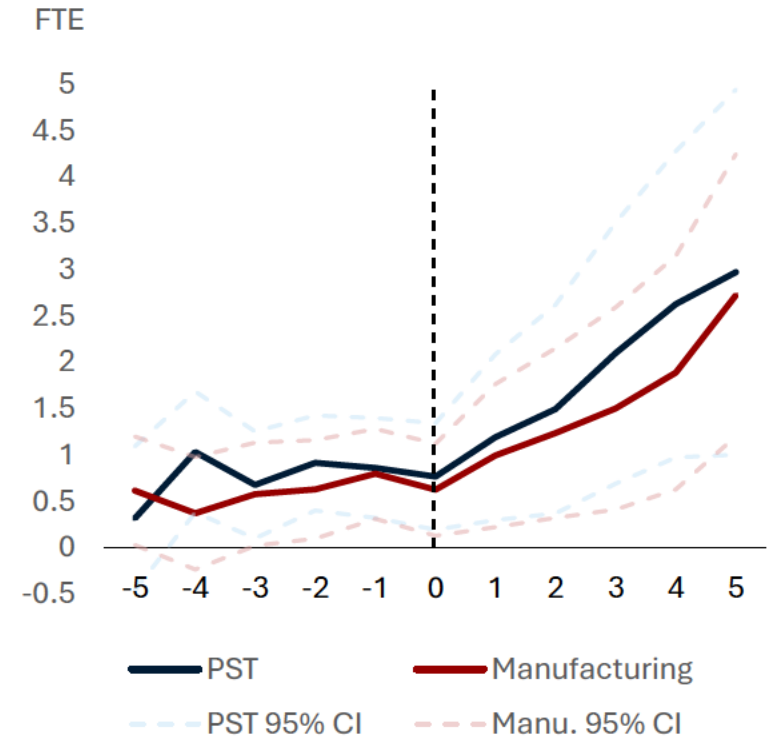
- This may reflect that PST is relatively more labour intensive

Figure: Impact on turnover, by sector



Source: BLADE, DISR analysis

Figure: Impact on employment, by sector



Source: BLADE, DISR analysis

Conclusions

- Suggestive evidence that EP improved business growth
 - Results are not causal: evidence of better performance among participants prior to the program
- While EP supported business growth, it didn't improve capex or productivity
 - May still have enhanced economy-wide productivity through reallocation
- Findings emphasise the importance of grant funding in addition to advice
 - Grants can facilitate implementation of advice and certify business' quality to banks, which can make it easier to obtain credit
 - Grant funding in absence of expert advice is not a solution to address market failures related to business capabilities
- We plan to publish the full analysis as a Research Paper soon, stay tuned!

BLADE Disclaimer

The results of these studies are based, in part, on data supplied to the ABS under the Taxation Administration Act 1953, A New Tax System (Australian Business Number) Act 1999, Australian Border Force Act 2015, Social Security (Administration) Act 1999, A New Tax System (Family Assistance) (Administration) Act 1999, Paid Parental Leave Act 2010 and/or the Student Assistance Act 1973. Such data may only be used for the purpose of administering the Census and Statistics Act 1905 or performance of functions of the ABS as set out in section 6 of the Australian Bureau of Statistics Act 1975. No individual information collected under the Census and Statistics Act 1905 is provided back to custodians 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 Australian Taxation Office, Australian Business Register, Department of Social Services and/or Department of Home Affairs' core operational requirements.

Legislative requirements to ensure privacy and secrecy of these data have been followed. For access to PLIDA and/or BLADE data under Section 16A of the ABS Act 1975 or enabled by section 15 of the Census and Statistics (Information Release and Access) Determination 2018, source data are de-identified and so data about specific individuals has not been viewed in conducting this analysis. In accordance with the Census and Statistics Act 1905, results have been treated where necessary to ensure that they are not likely to enable identification of a particular person or organisation.



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Emerging industries in Australia

Preliminary insights from microdata

Presented by s22 | Australian Conference of Economists | July 2025

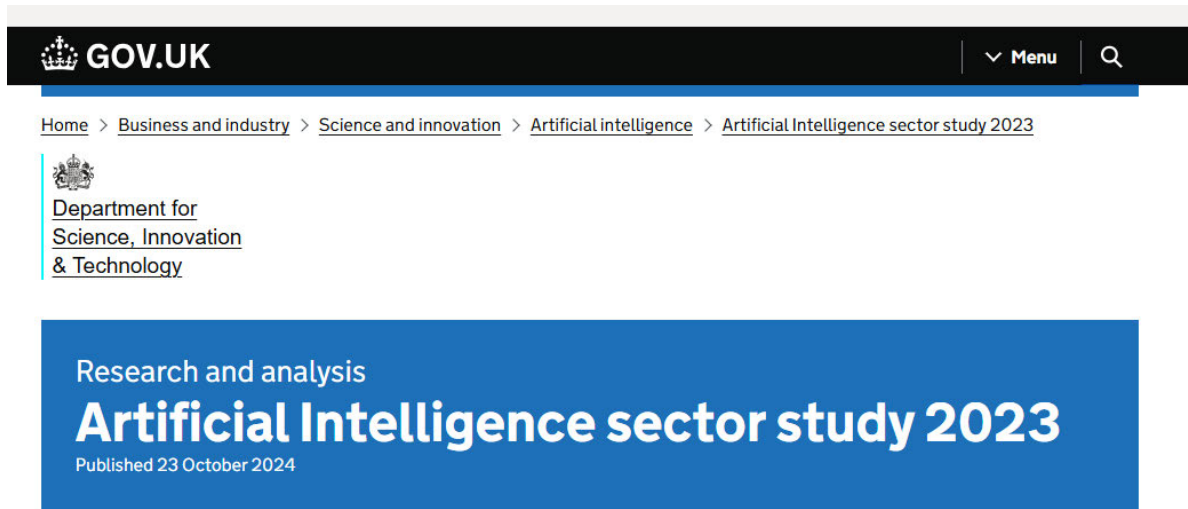
Analysis by s22

The emerging industries database can provide interesting insight into the Australian economy

- There are 7 critical technologies in the national interest, including AI technologies, quantum technologies, clean technologies, and space.
- A common question: How big is fast-growing emerging industry X and what's driving its growth?
 - Regular demand for “state of” reporting across each emerging industry.
- ANZSIC codes don't map very well to emerging industries
 - Modernisation efforts around codes not expected until 2030s.
- Want to bring the power of administrative microdata to analysis.
 - Well suited to estimates of industry extent, contribution to productivity and firm performance.



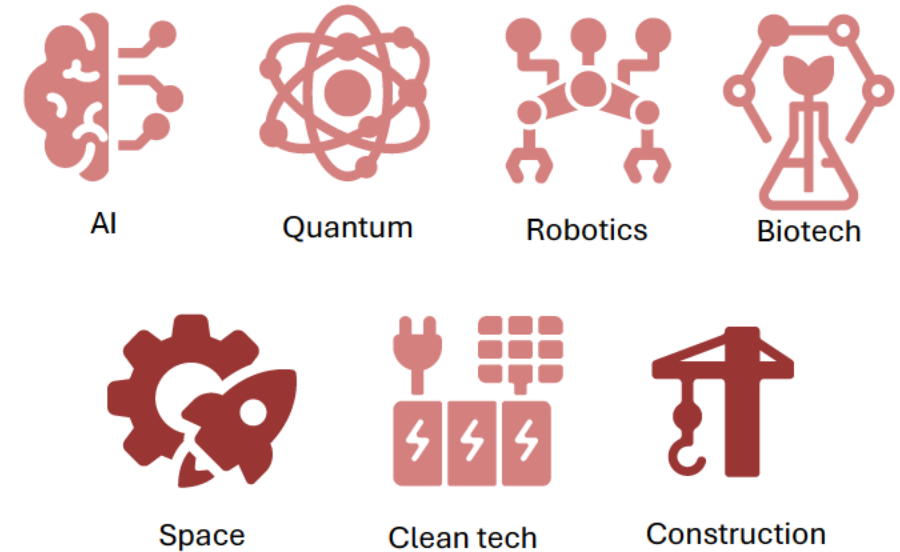
Enter an UK AI firm examining the UK AI sector



- The UK Department for Science, Innovation and Technology has published a state of AI report for past three years
- They commissioned Glass.AI which uses a proprietary artificial intelligence application to measure “impossible sectors”:
 - Looked at virtual and augmented reality adoption rates
 - Compared scale-ups in the UK, US and Germany
 - Compared the AI sector in the US, UK and China,
 - Measured the UK’s nuclear supply chain
 - Compared AI capabilities across countries for the OECD
- Can we apply their method to emerging industries in Australia? And combine with admin data?

What are the emerging industries?

1. Artificial Intelligence
2. Quantum technologies
3. Robotics
4. Biotechnologies
5. Space
6. Clean energy generation and storage
7. Pre-fabrication (modularisation) in construction



Pink icons represent Critical Technologies in the National Interest

Defining an emerging industry

Sample taxonomy for artificial intelligence

Specialisation (5)	Related themes (31)	Keywords (~300)
AI infrastructure	<ul style="list-style-type: none"> • Cloud Services • Edge AI • Hardware • ... 	<ul style="list-style-type: none"> • Action recognition • Adaptive boosting • Agent-based modelling • Ambient intelligence • Cloud infrastructure • Construction robot • Neutral network • Chatbot • ...
AI development tools	<ul style="list-style-type: none"> • Smart energy/grid management • Consulting • Business transformation • ... 	
AI Technology	<ul style="list-style-type: none"> • Machine learning • Natural language processing • Speech and Audio Processing • ... 	

Artificial intelligence: an industry (not a personal laptop).

Glass.AI suggested **taxonomies for each industry**, developed through their exercises in other contexts (US, UK, Germany, Canada, OECD, etc)

For AI, terms included a wide range of applications including cloud computing and infrastructure, chatbots, and neural networks.

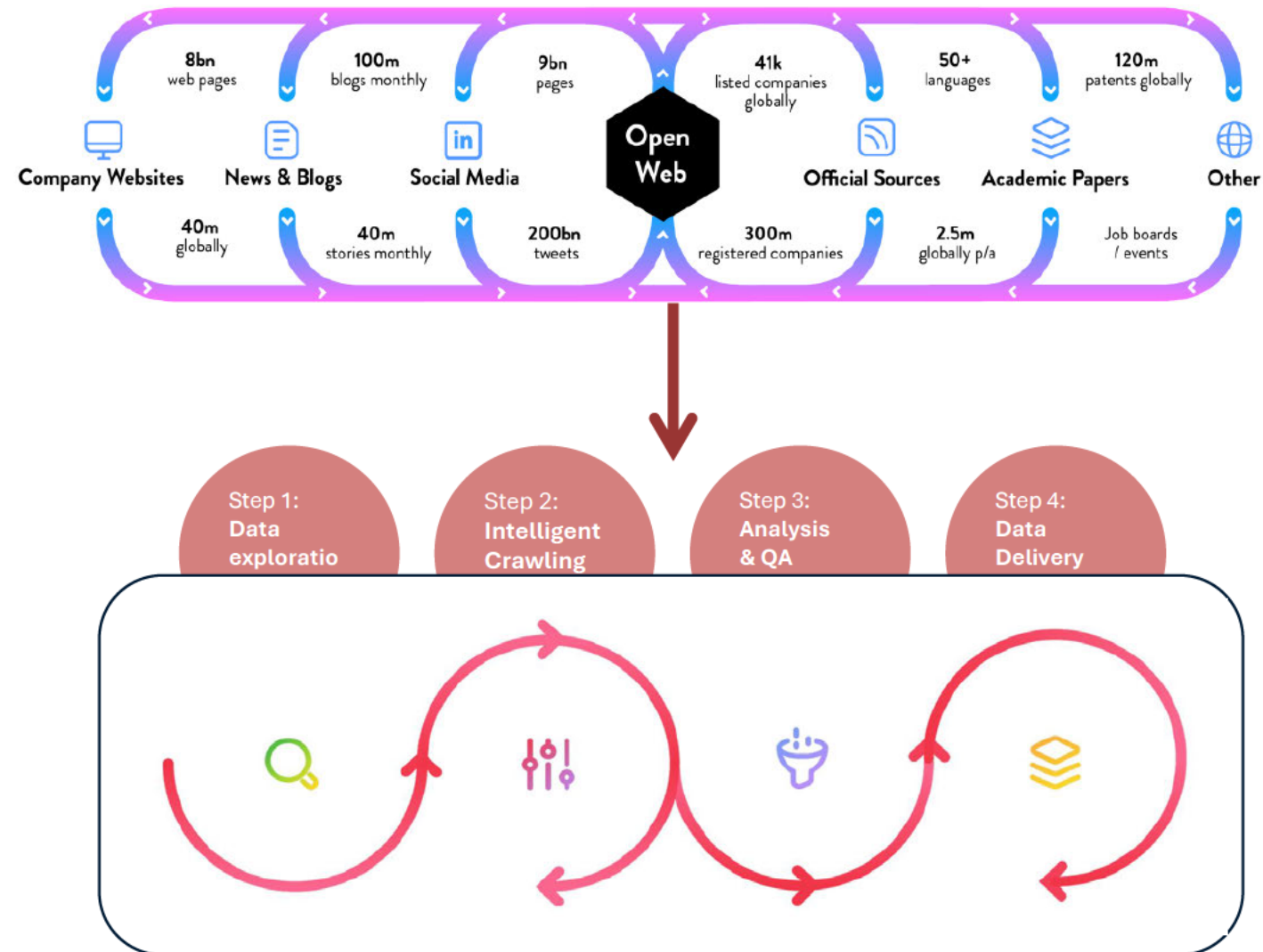
DISR's policy and analysis areas reviewed keyword list for suitability in the Australian context.

DISR also suggested some examples of firms in each industry to train the algorithm.

Looking for multiple sources of evidence rather than passing references.

Glass.AI then searched across the web

- Web reading to find firms with an online presence (that aligns with the taxonomies).
- Draws on a broad range of open sources of data incl. websites, news, social media, reports, academic papers
- Also assigns firms into developers (knowledge creators), adopters (knowledge diffusers) or both.
- DISR underwent a privacy assessment process. Data collection is consistent with website terms of service and Australian laws
- DISR worked with Glass.AI to quality assure datasets
- ABS integrated final dataset into administrative micro datasets (on ABN basis with BLADE)



Going from micro to macro: a partnership of government and private sector capabilities



What are we doing

- Partner with Glass.AI to generate database.
- Partner with ABS to integrate database with BLADE.



Government alternatives

- 'Manual' exercises (e.g. by DISR on space sector)
- Arbitrary categorisation of ANZSICs
- Create a new ABS satellite account (as for tourism, or creative/cultural industries).
- Government surveys (e.g. AI Adoption Tracker)
- Reports (e.g. CSIRO AI Ecosystem Reporting)



Private sector alternatives

- Job ad (e.g. Lightcast) or entrepreneurship (e.g. Dealroom) datasets
- Consultant reports (McKinsey/Brookings etc)
- Private surveys (e.g. Macquarie University BOSS survey)

Going from micro to macro: requires us to attribute activity to emerging technologies

- Creating a flag for emerging industries means picking up some very large firms with a small presence in industries of interest
- We trial a transparent approach to simulating *technology penetration rates* based on type of business activity or innovation model.
 - A repeatable and contestable improvement on past exercises (analysts attributing a share of each tech to each organisation).
- Survey-based estimates of emerging technology uptake vary widely; generally considered to be a small fraction of businesses.
 - US Congressional Research Service estimates 5% of US businesses use AI (as at Feb 2024).
 - Other surveys are more optimistic. E.g. AI Adoption Tracker in which 40% of surveyed SMEs were adopting AI in Q4 2024.
- Two findings anchoring our approach:
 - Glass.AI estimates that 3% of (FTE) employees within Australian AI adopters have an AI role/background, based on criteria they use in UK.
 - Previous DISR estimates for space industry that attribute 1% of government activity, 5% of complex firms and 30% of specialised firms.

Share of firm activity (turnover, employment) that is related to an emerging industry	Method 1: by type of business activity			Method 2: By type of innovation			
	Firm type (identified through microdata)			Firm type (assigned by glass.ai)			
	Government	Complex business groups	Specialised firms	Adopters (knowledge diffusers)	Complex innovators (developers and adopters)	Developers	
	Lower estimate	0.5%	2.5%	15%	1%	2%	3%
	Central estimate	1%	5%	30%	2%	4%	6%
Upper estimate	2%	10%	60%	4%	8%	12%	

A relatively small number of firms, further reduced by linkage processes

Initial selection

The emerging industries database contains approximately 3,500 employing firms and a further 1,300 non-employing firms.

These employing firms are large - employ an average of just under 800 workers each.

AI is largest by count, quantum is smallest.

Technology Developers were more likely to make it into the dataset than Adopters

Linkage

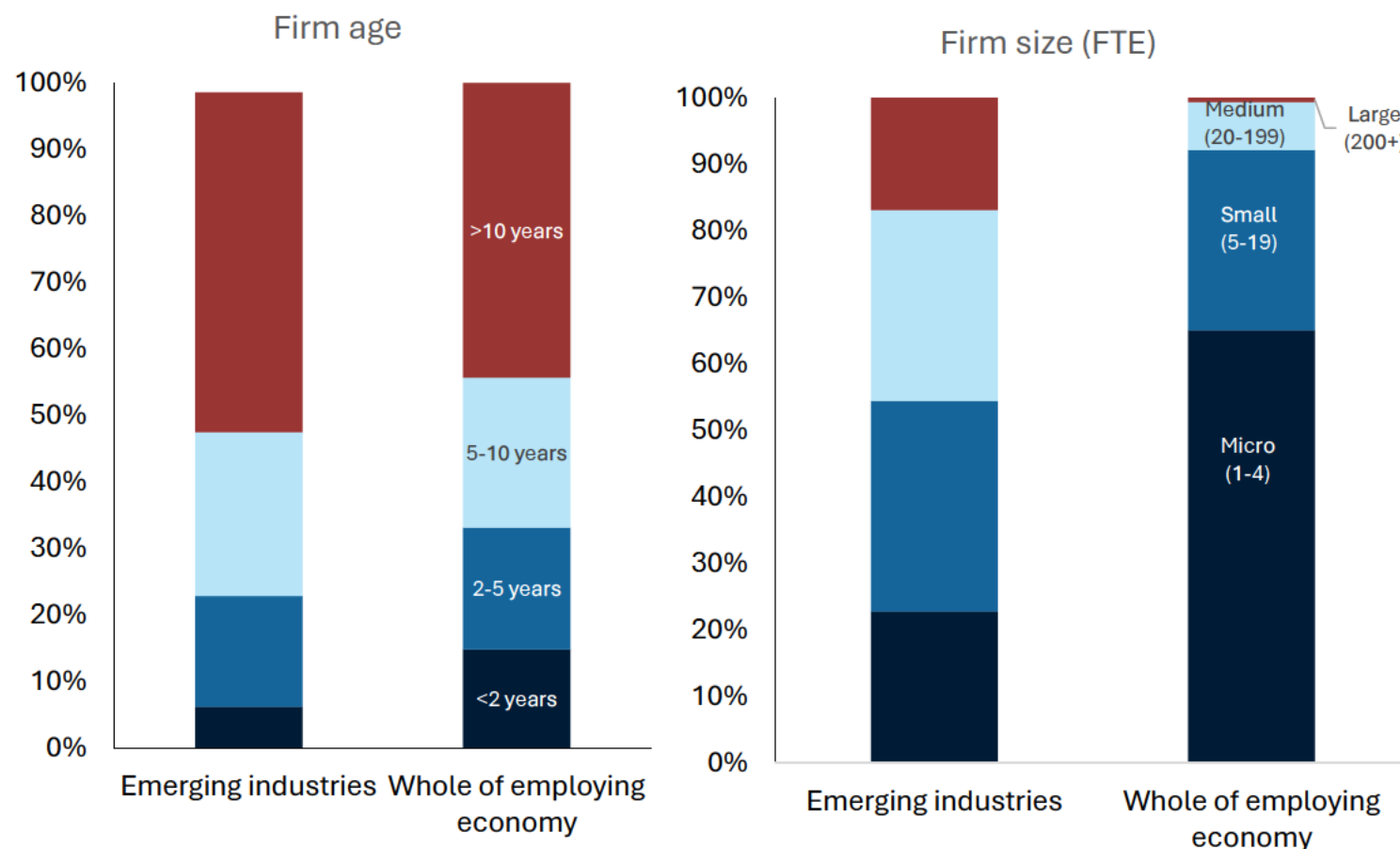
Not all of (approx. 5,500) firms Glass.AI detected could be ingested into the DataLab (3%) or linked to BLADE data (a further 13%).

Firms may not be linked because the ABNs are new and have not yet engaged with the data sources that make up BLADE.

Small, selective sample

Industry	EID firms		Employing firms	Firms without observed employment
	Base data (glass.AI)	Ingested in DataLab (rounded)	BLADE-linked (rounded)	
Artificial intelligence	1,609	1530	1,030	330
Space	789	790	580	180
Clean Technologies	1,528	1480	850	450
Robotics	574	540	220	80
Quantum	100	90	60	20
Prefabricated construction	356	350	230	120
Biotechnologies	900	860	550	160
		Total	3,470	1,310

A selected sample



Firms in the Emerging Industries Database are large and old

Some key stats

- 52% of firms aged over 10 years in emerging vs 44% for whole of economy
- 16% of large firms in emerging industries vs 1% for whole of economy.

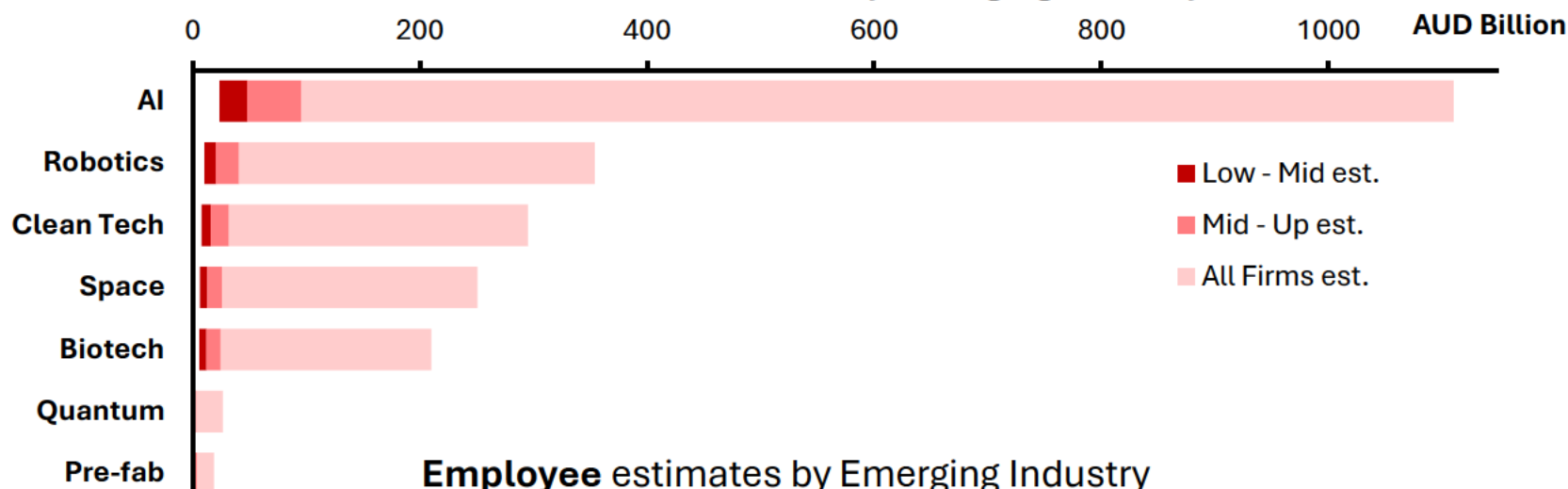
Some reason why

- Excluded ~ 400 sole traders in collection for privacy reasons.
- Developers are more of a census but adopters are more of a sample (limits to compute for first run of it)
- Larger firms are easier to detect through their web presence.
- Certain types of firms (defence/security applications) linked with critical technologies are less likely to have a well-publicised presence.

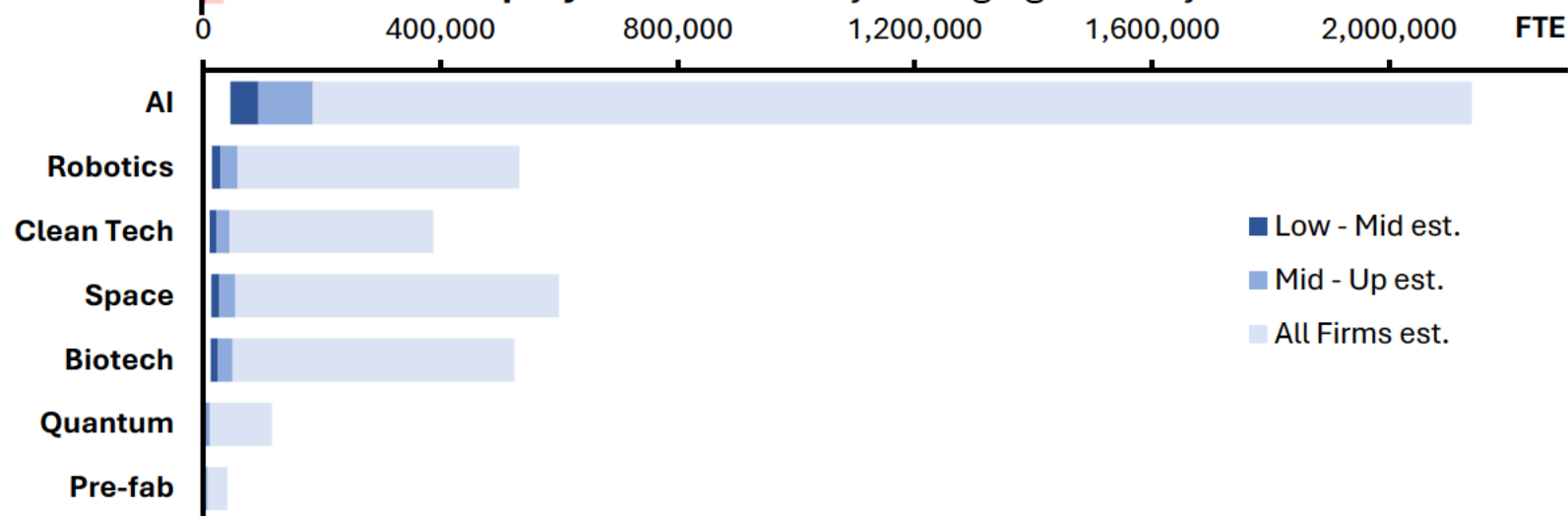
Scope of emerging industries

A large economic contribution

Turnover estimates by Emerging Industry



Employee estimates by Emerging Industry



Emerging industries in Australia: Preliminary insights from microdata

Economy-wide presence

Microdata reveals that firms with a **presence** in emerging industries account for a large share of the Australian economy: 25% of turnover and 22% of the labour force.

- 2.1 million workers in 2023-24 are in firms that use some form of AI.

Emerging technology penetration

Not all EI firm activity is associated with the technology it is involved with.

- Taxonomies pick up large conglomerates (incl. banks and supermarkets)

We show a lower, middle and upper bounds of the contribution of technologies (within identified firms)

- “AI jobs” closer to 90k (range 40k –180k) in 2023-24.

How many jobs in emerging industry firms are actually linked to their emerging technologies?

The chart presents:

- Weightings by business type (in bold colour).
- Weightings by innovation type (in pastels).

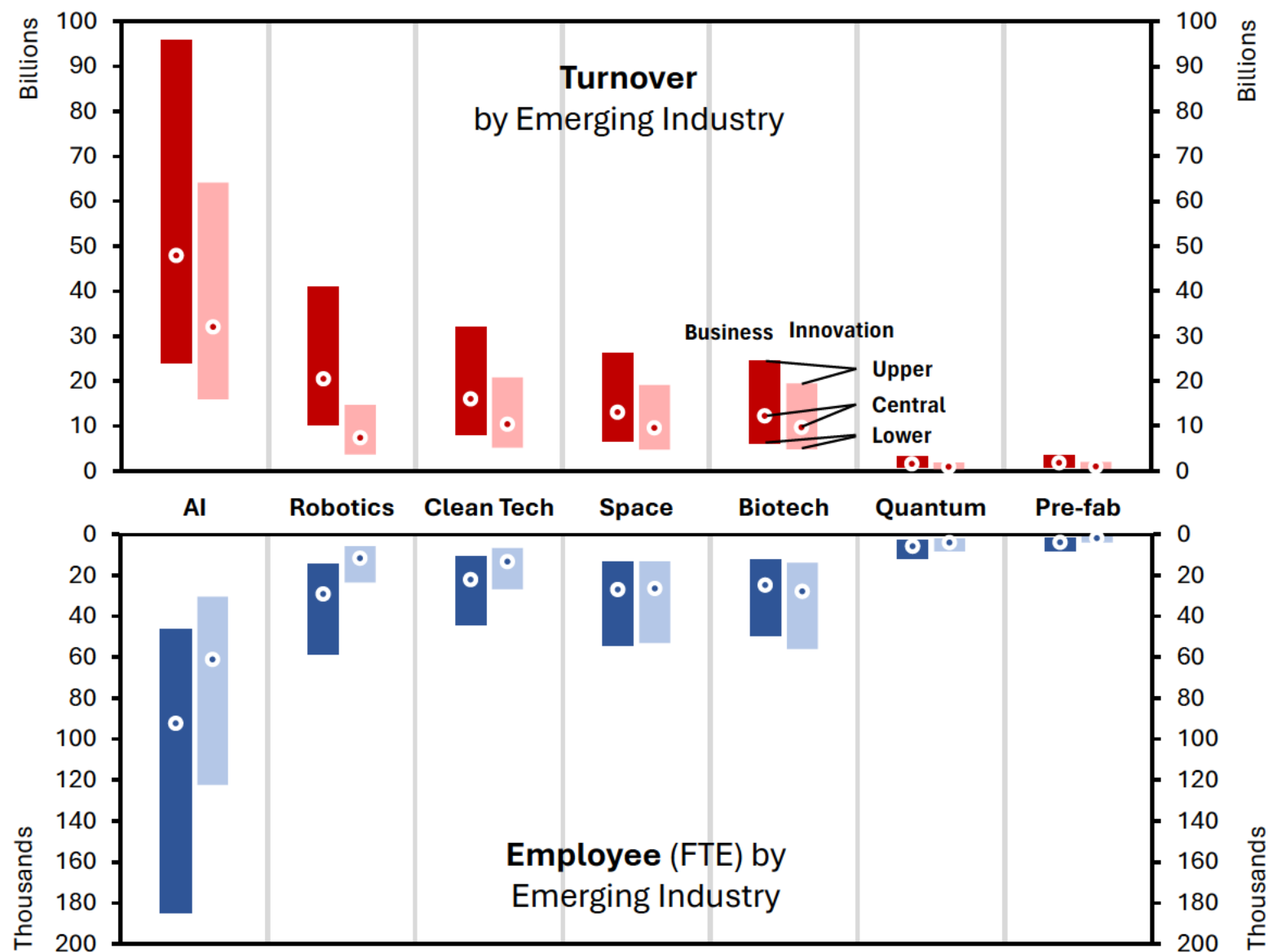
Business type assumptions: ~4% penetration rate in AI industries and ~5% penetration rates for other emerging industries.

Innovation-type estimates are generally about 1/3 more conservative than business-type estimates

Turnover and jobs rates are similar for each range

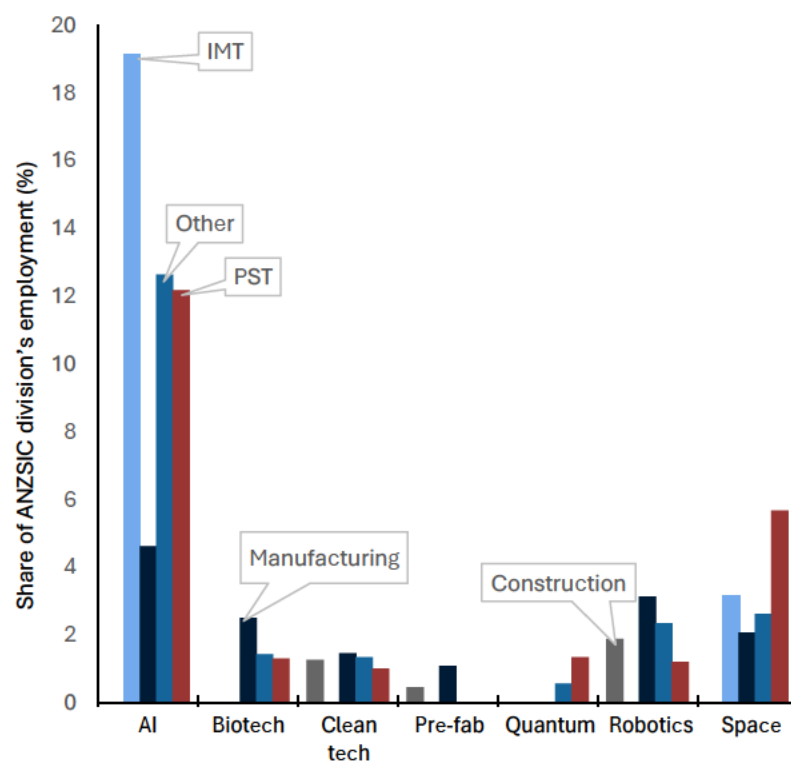
No firm answer to technology penetration rates

FOI 300200 Document 3



A large share of traditional industries

Contribution to ANZSIC Division jobs



Firms are connecting different technologies

Links across emerging industries (min 10 firms)

Core Industry	Additional focus
AI adopter	Space developer Biotech developer Clean tech developer Robotics adopter
AI developer	Robotics developer Space developer
Clean tech developer	Biotech developer
Space adopter	Robotics adopter

El firms contribute to and across traditional industry classes

Some noteworthy presences to ANSZIC Divisions:

- Firms with some presence in AI industry employed 19% IMT and 12% PST jobs in 2023-24
- Firms with some presence in AI and robotics comprise a similar share of manufacturing employment (approx. 3% of each industry division).

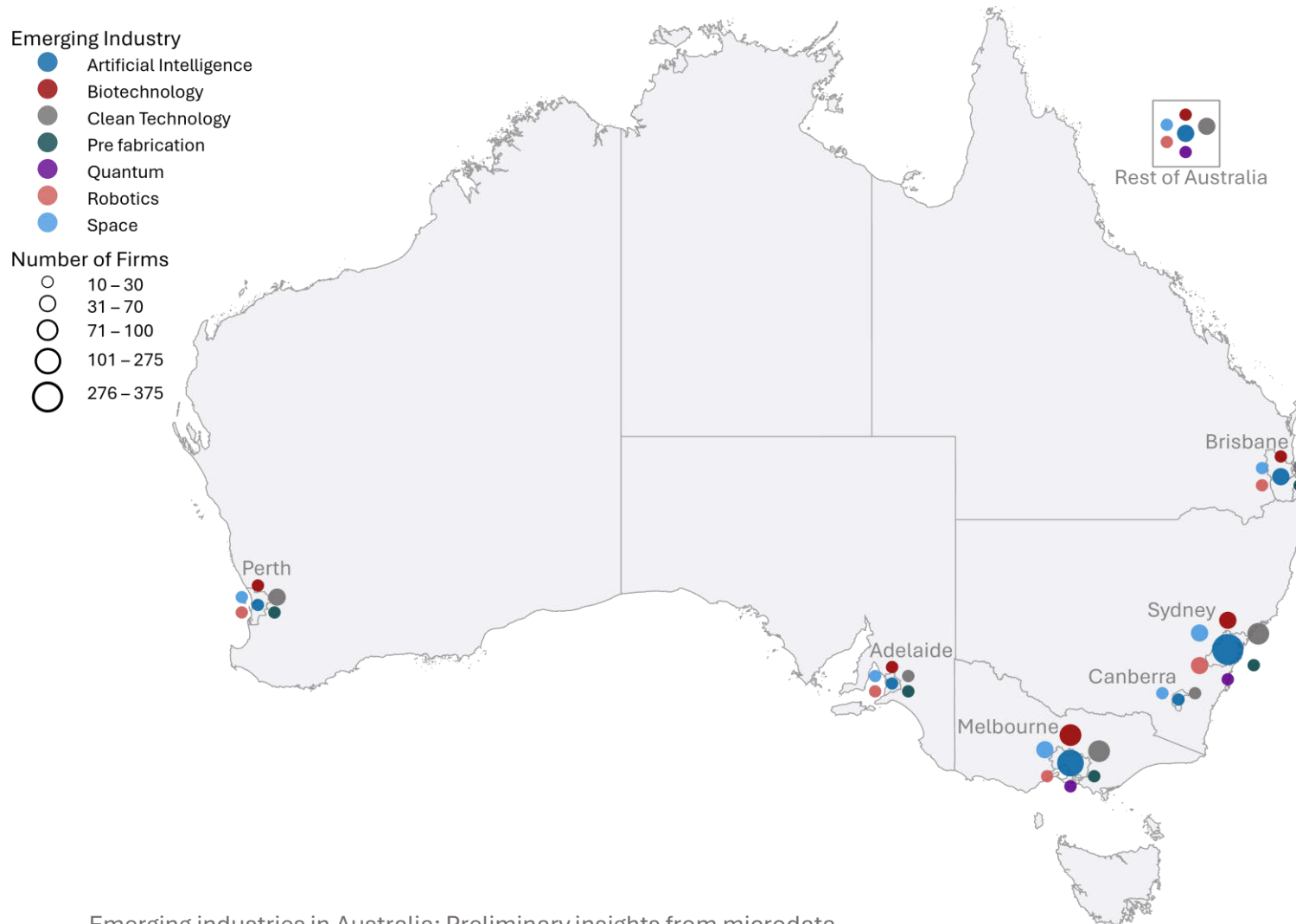
El firms stretch across industries:

Pre-fab is a mix of manufacturing and construction sectors.

Approximately 10% of firms in emerging industries are flagged in multiple emerging industries.

- AI adopters focussing on bio/clean tech
- Space robots.

Activity is clustered around 6 capital cities



Geographically clustered

- around 6 major cities: Sydney, Melbourne, Brisbane, Perth, Adelaide and Canberra.

Rest of Australia is mostly an east coast story:

- spread across mainland east coast (regional Victoria, NSW and Queensland)

Under-representation of firms with a limited, or no, web presence

The modal specialisation is 'uncategorised'

Most firms in most industries weren't assigned a clear specialisation category.

- Can be hard to detect specialisation from public sources (but expect the AI to get better over repeat samples).

While defence/security specialisations are particularly likely to be absent from list, noteworthy applications include:

- Space Defence
- Drones and unmanned aerial vehicles
- Quantum cryptography and security
- Quantum sensing and metrology

A wide range of specialisations

Emerging industry	Top specialisations (share of firms)
Artificial intelligence (1609 firms)	Uncategorised (41%) Enterprise AI (13%) AI platforms (12%) Industry-specific (9%)
Prefabricated construction (354 firms)	Modular buildings (24%) Construction innovation (21%) Concrete modular construction (18%) Uncategorised (12%)
Quantum (100 firms)	Uncategorised (24%) Quantum cryptography and security (14%) Quantum sensing and metrology (12%) Quantum computing (10%)
Biotechnology (900 firms)	Uncategorised (18%) Biopharmaceuticals (10%) Pharmaceuticals (8%) Bioproducts (7%)
Robotics (574 firms)	Uncategorised (53%) Robotics (15%) Industrial automation (7%) Drones/unmanned aerial vehicles (6%)
Clean technology (1528 firms)	Uncategorised (29%) Solar power systems (28%) Batteries (8%) Grid-scale energy storage (7%)
Space (789 firms)	Uncategorised (57%) Space communications (8%) Remote sensing and earth observation (5%) Space Defence (5%)

Performance of emerging industries

Emerging industries are 17% more productive than the rest of the economy

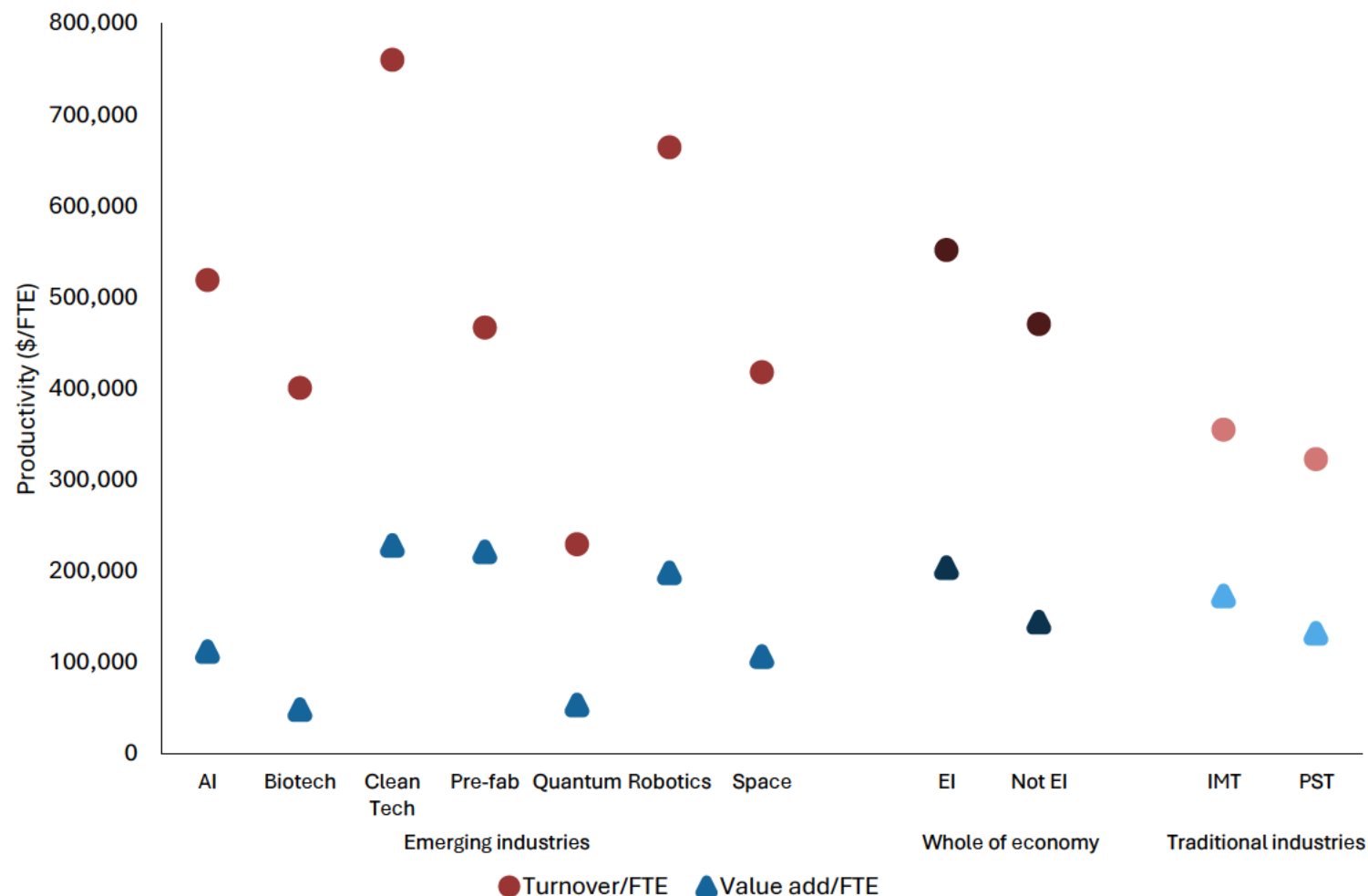
Within emerging industries:

- Clean Technology, Robotics and AI comparatively higher productivity
- Biotechnologies and space are below average.
- Quantum very low; likely to be explained by being earlier in industry life course.

Similar conclusions when looking at turnover and value-add measures of output.

Care warning is warranted when looking at static point-in-time estimates of productivity

Labour productivity is stronger than other parts of the economy



Developers are smaller and more productive than adopters

In firm counts, the emerging industries database has more AI developers (knowledge creators) than:

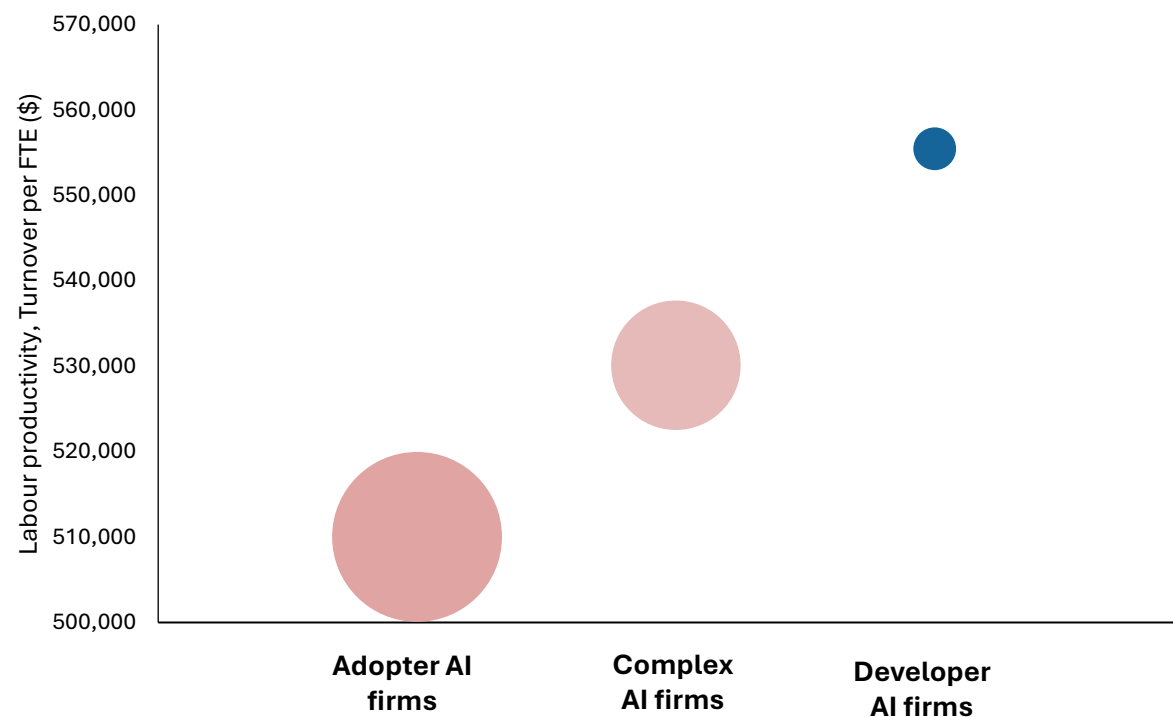
- AI adopters (knowledge diffusers)
- AI complex firms (both developer and adopter).

However developers are smaller and collectively employ only ~80k workers, compared to ~ 1.3m in adopters.

Developers have approximately 9% higher labour productivity than adopters.

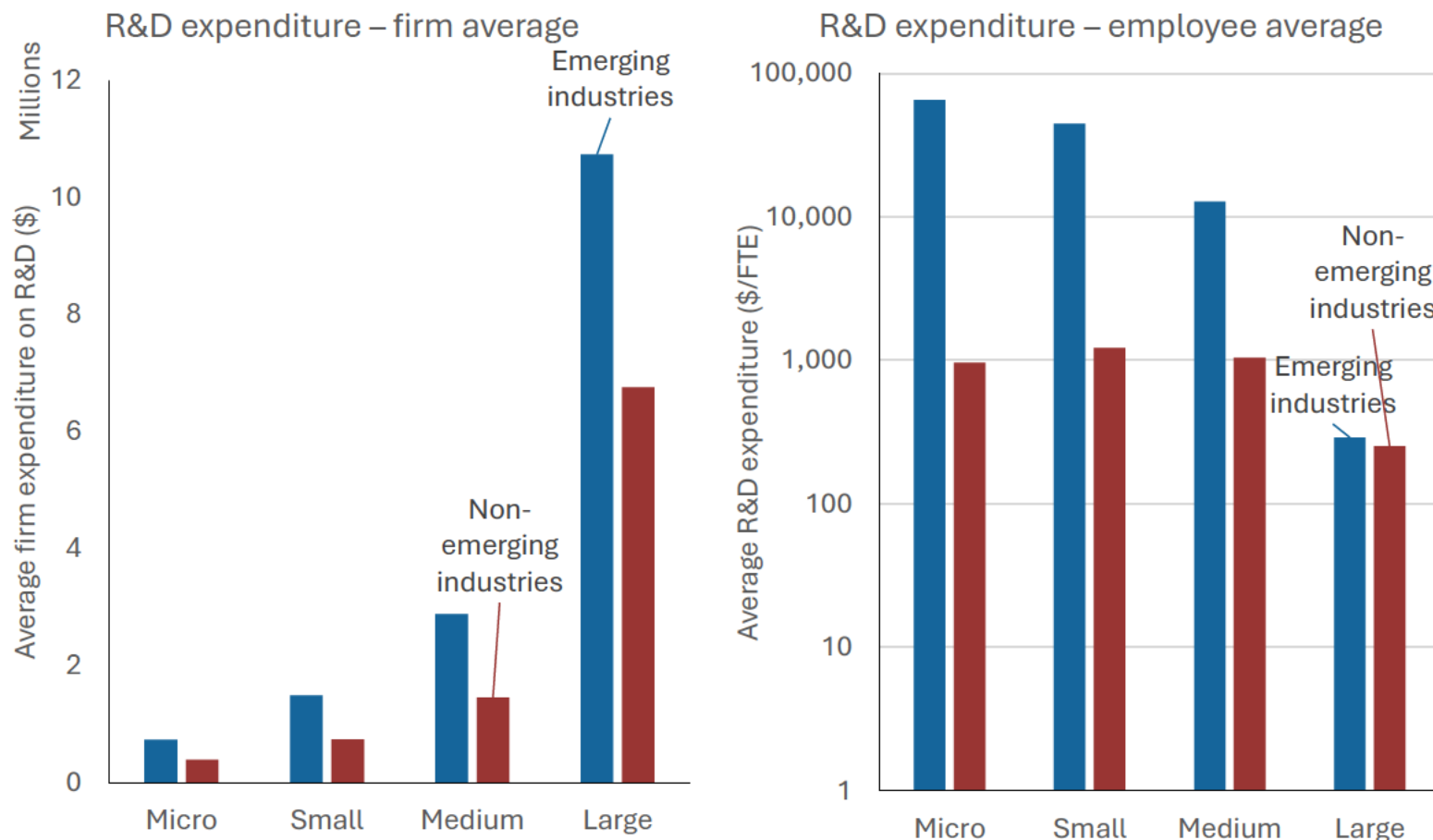
Knowledge creators as a growth engine?

Labour productivity in 2023-24



Bubbles represent the number of employees (FTE) per firm

Emerging industries are R&D active



Firm sizes are calculated by FTE, with Micro (1-4), Small (5-19), Medium (20-100), Large (200+)

Emerging industries in Australia: Preliminary insights from microdata

Emerging industry firms spend more on R&D

Emerging industry firms at all size levels spend on average more on R&D per firm.

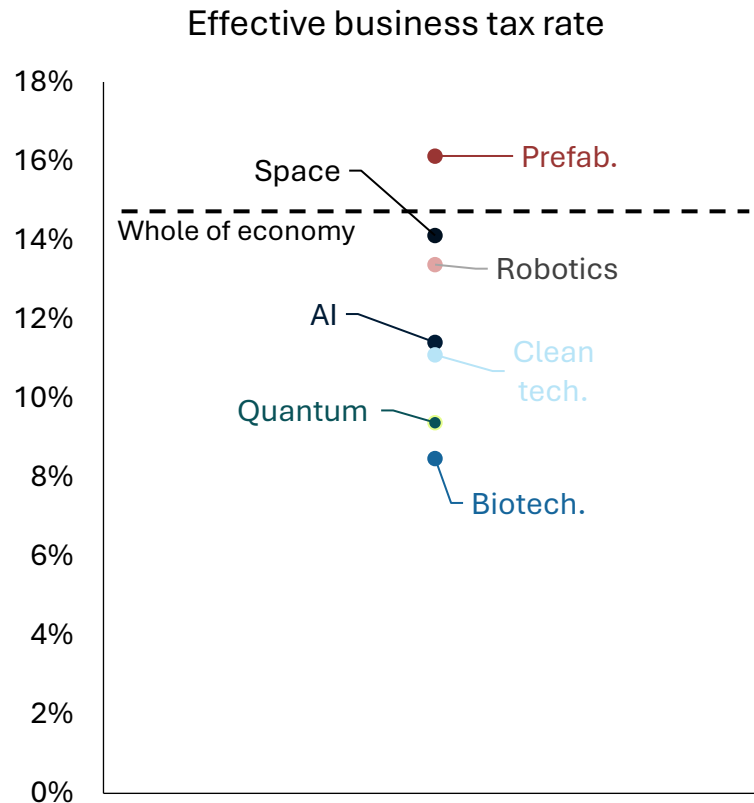
- Micro and small firms in emerging industries spent almost 100 times more on R&D *per employee* than non-emerging industries firms in 2022.
- Medium-size firms also spend about 10 times more on R&D per worker than non-emerging industries

Explained partly by sample selection (algorithm finding active participants)

Could also be explained as:

- Micro and small emerging industry firms may be R&D-intensive start ups (the firms often associated as emerging industries).
- Larger emerging industries might be adopters who have a relatively small R&D or technology area.

Emerging industries pay lower average tax rates



The Australian tax system supports emerging industries

Calculation is effective business income tax rates (tax paid divided by gross revenues).

- All 'technology intensive' emerging industries (i.e. not prefab) are below average.
- Biotech is particularly low.

Low effective tax rates could reflect:

- Tax concessions (for example as a result of higher R&D spend by firms)
- A higher share of complex business groups among emerging industries (income taxes might be paid by other parts of groups).
- Higher cost bases/low profitability
- Firm losses, and their position in the product cycle

Workforce in emerging industries

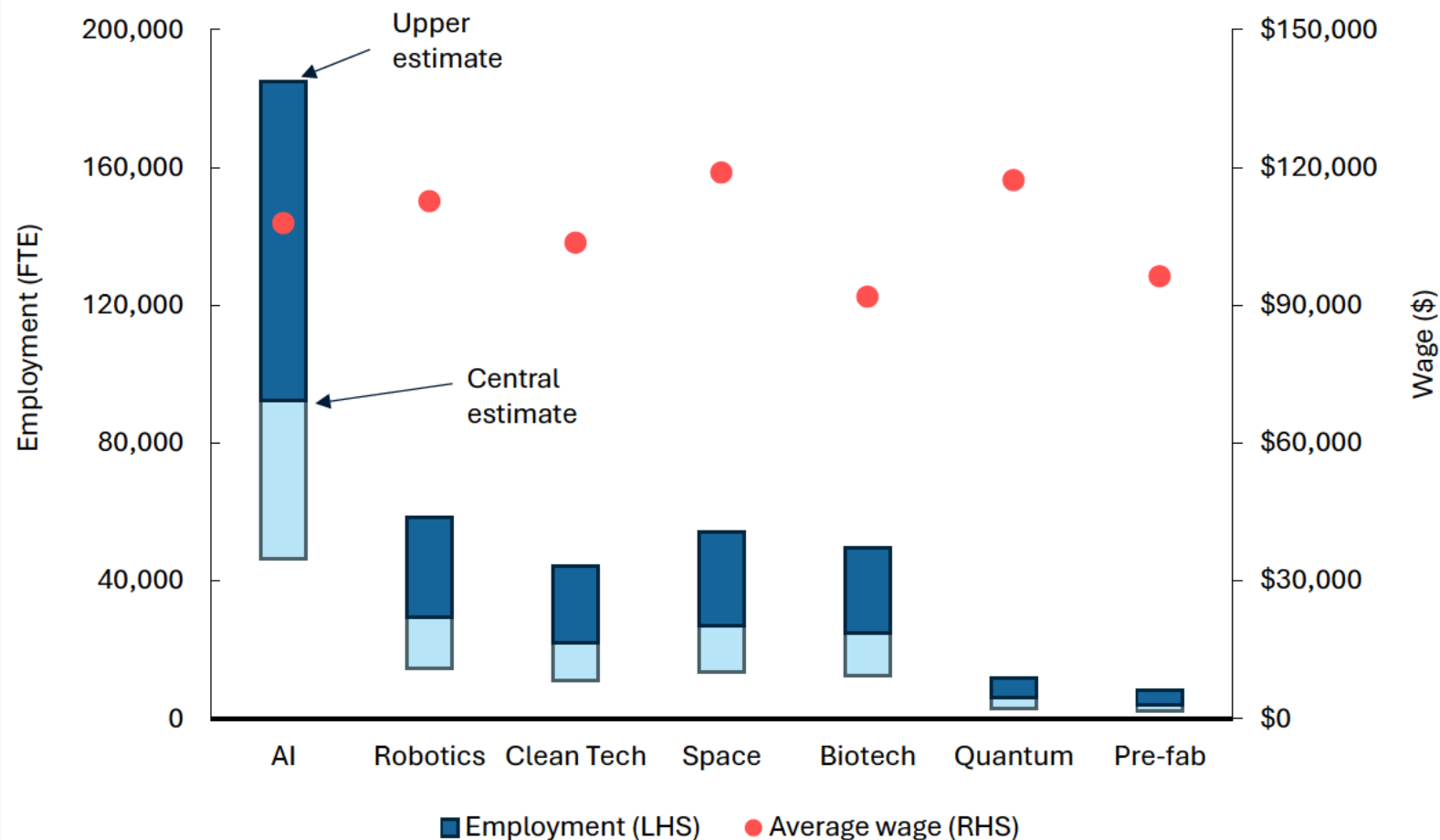
Are emerging industry jobs good?

Approx. 2.7 million jobs in emerging industries pay an average of \$106k

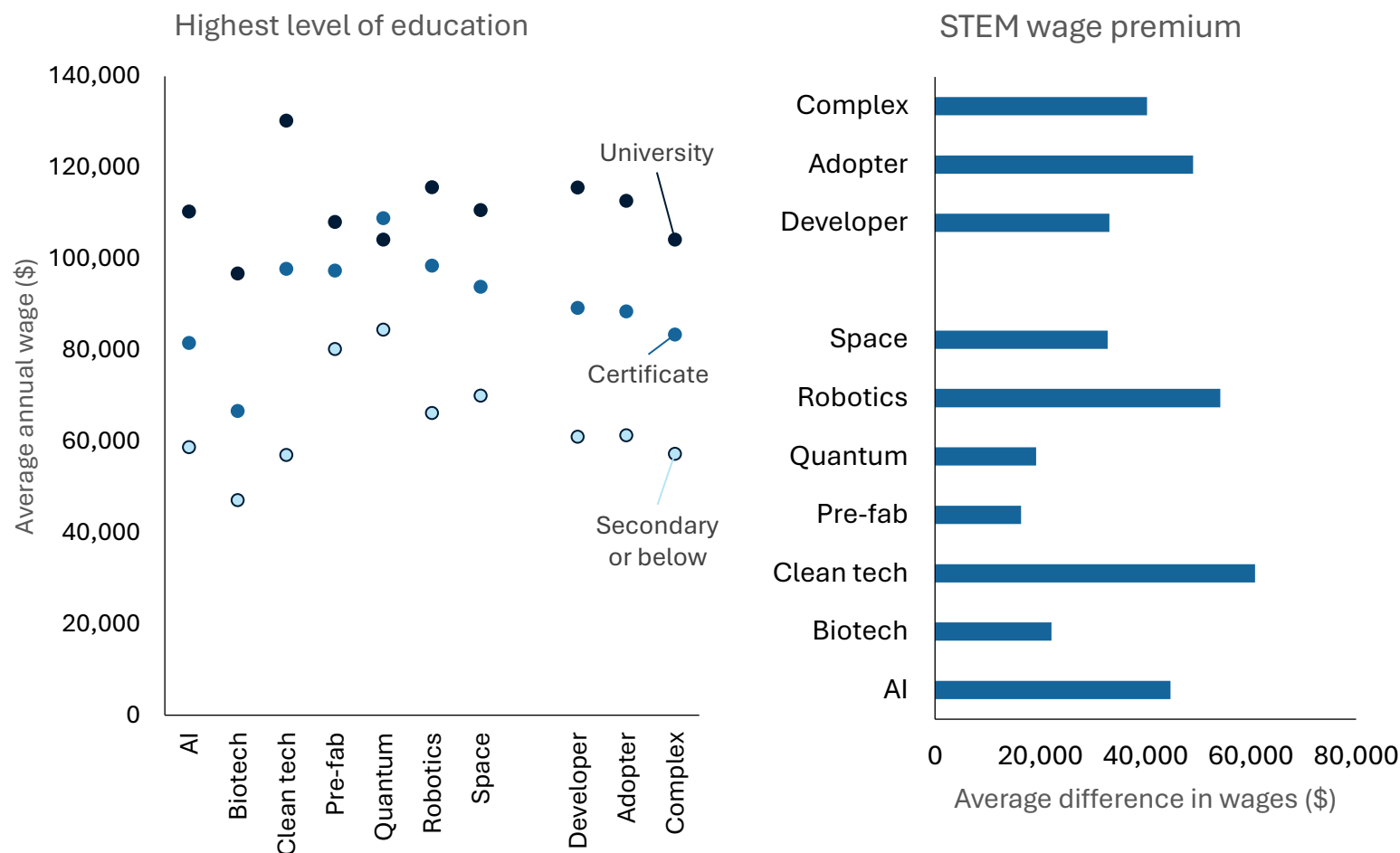
Jobs in emerging industries pay an average of \$107,000 per FTE, 19% higher than non-emerging industries.

Space and quantum firms have the highest pay rates among emerging industries.

Jobs in emerging industries are high pay



A (strong) skill and STEM premium



Emerging industry pay is responsive to skills

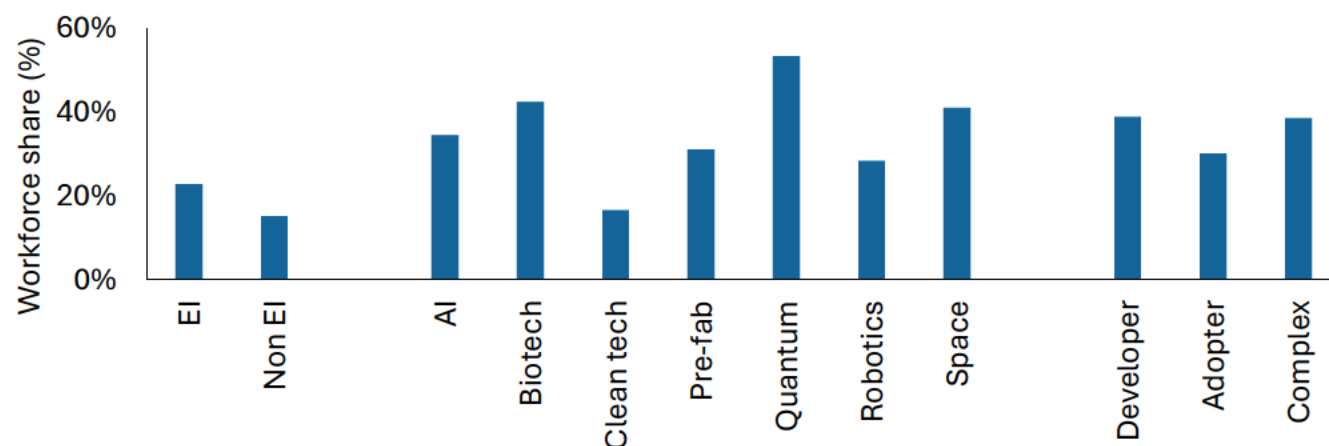
Emerging industry workers with university qualifications earn on average:

- 25% more than those with certificate level qualifications
- almost double those with high school education or below

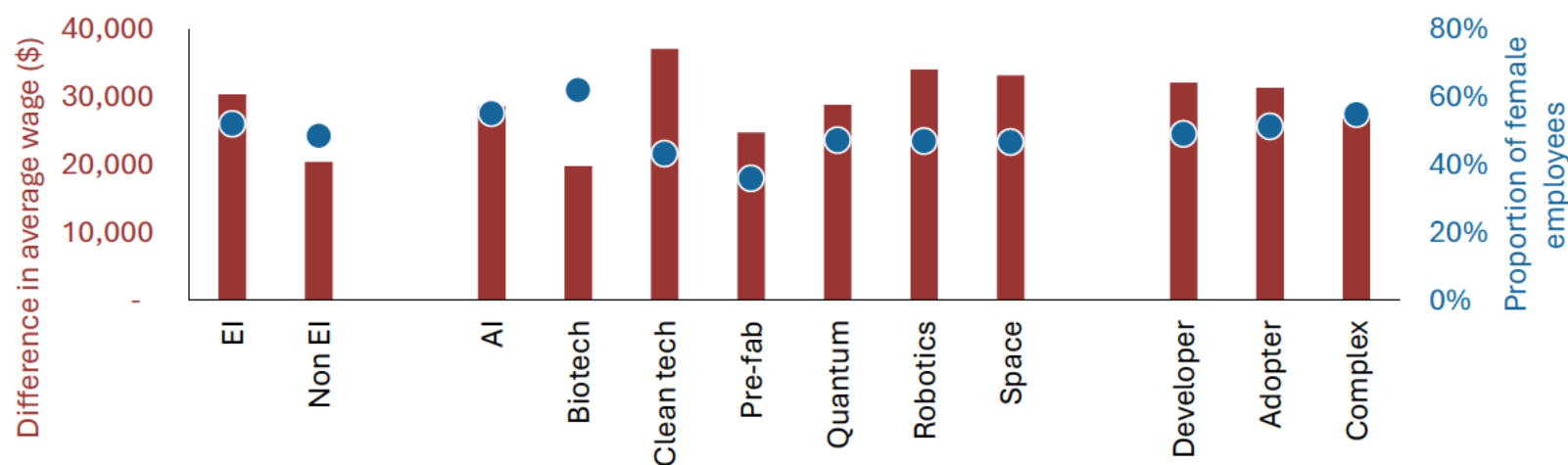
There is a clear and strong wage premium for STEM (relative to non-STEM) qualifications as well.

More professionals – and a gender pay gap

Percentage of professionals



Gender pay gap in emerging industries



Emerging industries employ more professionals

Top chart shows that among occupation classes

- developers are 39% professionals;
- adopters are 30% professionals.

This compares with 15% professionals in non-emerging industry firms.

Firms involved in quantum, biotech and space are more likely to employ professionals.

Gender pay gap across emerging industries

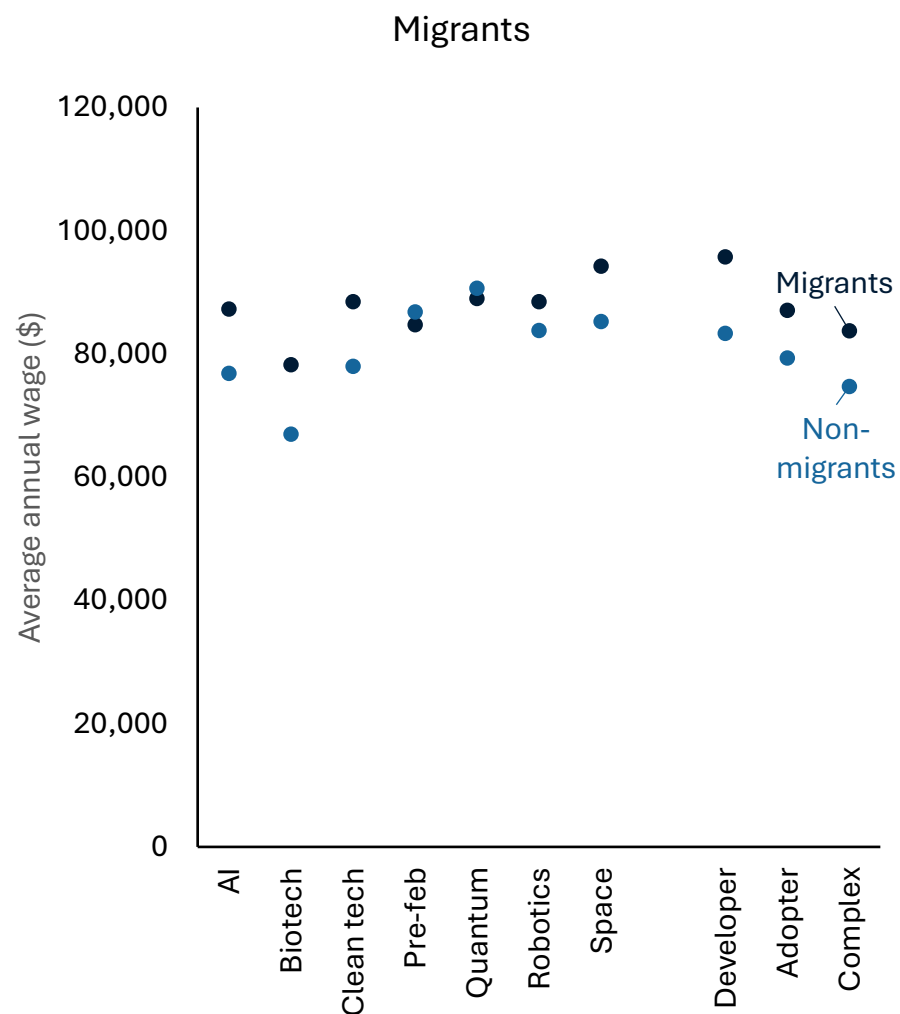
Both developers and adopters employ the same share of males and females.

There is a gender pay gap across all emerging industries

- Higher for developers than adopters
- Space and biotech gaps are largest

A future area of work in deconstructing and explaining this gap (occupations, part time, etc).

Migrants play an important role



Emerging industry	Proportion Migrants in industry	Top 3 source jurisdiction
Artificial intelligence	27.5%	India (18.0%) UK (13.5%) NZ (11.9%)
Prefabricated construction	29.0%	NZ (15.8%) UK (12.0%) Europe excl. UK (11.0%)
Quantum	37.8%	India (15.0%) China (14.6%) Europe excl. UK (11.3%)
Biotechnology	28.4%	India (13.5%) UK (12.7%) NZ (10.1%)
Robotics	27.6%	India (15.9%) NZ (15.8%) UK (15.2%)
Clean technology	26.9%	India (19.7%) NZ (13.8%) UK (11.8%)
Space	27.8%	UK (16.2%) India (16.0%) Europe excl. UK (9.4%)
Whole of economy	26.3%	India (13.5%) NZ (12.8%) UK (12.3%)

Australia's open stance on migration in recent decades has contributed to today's outcomes

Firms with a presence in quantum (38%) industries have significantly higher share of migrants than the economy as a whole.

The Indian workforce stands out

Compared to a 13.5% overall share of visa holders, Indian visa holders are much more likely to participate in firms that have a presence in emerging industries, particularly clean tech (20%) and AI (18%).

New Zealand and the UK are the second and third highest source countries for emerging industry talent.

The tech boom in both US and Indian tech workers outlined in [Khanna and Morales \(2021\)](#) may have had an additional channel in contributing to Australian emerging industries – another interesting avenue for future work.

Summary of findings

Extent of emerging industries

- Firms with a presence in emerging industries stretch across approximately ¼ of Australian economy.
 - AI particularly large presence.
- We have provided an initial attempt to estimate technology penetration, suggesting around 5% of economic activity.
 - Will be important to refine in the future.

Performance of emerging industries

- Productivity is higher among firms with a presence in emerging industries than other firms.
- Productivity performance varies across industries; quantum and biotech particularly low.

Workforce of emerging industries:

- Jobs in emerging industries are higher pay
- There is a clear skill and STEM premium
- Migration pathways appear to be playing an important role.

Lots more work to do! Welcome thoughts, comments and collaborative offers.

- Part of DISR's ongoing work to build out business data sets.

Contact us

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