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Small Business White Paper

Efficacy of Australian Commonwealth Business Grants

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We acknowledge and celebrate the First Nations people on whose traditional lands we meet and work, and whose cultures are among the oldest in human history.

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Foreword

The publication of this second edition Small Business White Paper related to Commonwealth business grants represents a significant milestone for the IPA Deakin SME Research Centre and the policy dialogue surrounding business grants in Australia. Given the extent and value of direct public financial assistant packages that the Australian commonwealth government offers to business, the IPA and authors of this publication both feel it is vital to bring insights into the Australian Commonwealth government's grant selection processes and to evaluate the effects of business grants with respect to both business performance and government objectives to gauge whether these direct public financial assistant packages are indeed meeting the key policy objectives.

For all their positive intentions and outcomes, business grants have been the focus of increasing criticism in recent years. While grants are an important source of financial assistance for businesses in Australia and, more than ever, our economy and governments today need to use taxpayer monies more wisely, this suggests we must encourage, at every junction, policy makers to have the courage to develop policies that deliver 'real' value for money for taxpayers. Indeed, little attention has been directed towards the selection processes that underlie decisions by governments to allocate grants to businesses, given that incentive structures are central to our understanding of economic policy. As the very nature of grants is essentially discretionary, non-recoverable one-off subsidies or payments to firms, with no requirement for repayment or returns of any financial costs to the public sector, one of the main criticisms of the business grants program is that grants can lead to 'moral hazard' and/or 'adverse selection' problems, which require better oversight and control.

There is also great difficulty in establishing the level of additional benefit that business grants can provide to businesses and to the community. As demonstrated in this White Paper publication, receiving grants can also lead to a 'grant mentality' or 'grant culture' within individual businesses, which can negatively impact on the self-resilience of business owners, producing adverse selection problems by awarding grants to the wrong type of firm or owner. Further, significant grant support provided over an extended period can have unintended consequences, such as altering the innovative behaviour of firms and their ability to generate their own revenue streams.

This document has been prepared with numerous inputs and I would like to especially acknowledge and thank the Deakin Business School researchers for their hard work, devotion, and time they spent on analysing large samples of data from GrantsConnect and the Australian Bureau of Statistics (ABS).

Andrew Conway
CEO, Institute of Public Accountants (IPA)

Executive summary

The Australian Government spends more than $800 million annually on financial grants to businesses, with thousands of local companies benefitting from individually targeted taxpayer support. But how much of this money is spent wisely?

In recent years, researchers have increasingly questioned the value of business grant programs, particularly in major developed economies where governments typically hand over large sums to private firms with little or no control over how the money is spent, no repayment obligations, and no objective way of measuring the public benefit — if any.

For this report, the second in a series of three White Papers, we have investigated the efficacy of business grants programs in Australia, where more than $4 billion in taxpayer funds was handed over to local businesses in the five years to the end of 2022. Drawing on government databases that hold information on business grant programs, and on the finances and activities of Australian companies, we cross-matched the data to measure the effects of grants on business employment, performance and efficiency. We also evaluated impacts of grants for different types of companies, and between different grant selection procedures, to gain further insights into whether these generous assistance programs are providing value for taxpayers' money.

The results provide grounds for considerable concern. While we found that grant programs generate significant benefits for some types of companies, we also uncovered evidence of widespread waste, with many grants generating no significant improvements in the performance of recipient companies on a range of measures, including employment, turnover and productivity.

Our findings suggest a worrying lack of rigor in the Australian government's grant selection processes, with public funds going to many companies that ultimately fail to convert taxpayer support into positive results for themselves — or for the wider economy. Of particular concern, we found a large majority of Australian businesses (63%) that received more than one grant during our study period exhibited low efficiency and productivity characteristics — suggesting that the current grants system might be propping up and sustaining an entire cohort of underperforming Australian 'subsidy businesses'. This finding lends weight to predictions of global studies that have found receiving grants can lead to a 'grant mentality' or 'grant culture' within individual businesses (Gustafsson, Tingvall & Halvarsson, 2020; Brown & Lee, 2018). Our results also reinforce concerns raised in our previous White Paper, published in January 2024, which exposed a lack of openness and competitiveness in the selection procedures for Australian government business grant programs.

The potential waste of public money is not insignificant, with an average of $834 million handed out in grants to Australian companies in each of the five years from 2018 to 2022 — for a total of almost $4.2 billion. The low-performing multiple grant recipient companies referred to above shared more than $1.3 billion of that total. Despite the evidence consistent with extensive waste in business grants programs, the results of our study were not entirely negative. When we measured the *average* effects of business grants across our entire study sample, we found overall improvements in the employment levels, business performance and human capital efficiency of companies that received grants.

Problematically, however, the government continues to hand out billions in business grants to Australian companies with often vague stated objectives and without, in most cases, clear and objective criteria to measure whether grants are meeting their aims. Scrutiny of how grant recipients spend the money is also conducted entirely out of public view, with no publicly available records of outcomes. With such lax and opaque administrative oversight, we believe it is inevitable that a large (though incalculable) amount of the hundreds of millions devoted to Australia's business grant system every year is being wasted.

For the analysis in this report, we obtained our primary data from GrantConnect, an online platform that holds information on Australian government

grant programs and recipients — including breakdowns of different types of grants, their dollar values and their stated purposes. We then matched the grants data to information about individual companies, including their financial and taxation records, held in Australian Bureau of Statistics and the Australian Taxation Office databases.

Using the matched data to analyse the performance characteristics of companies that attracted grants in comparison to those that didn't, we found:

- Grants had the strongest impact on employment in micro businesses and small businesses (3.63% increase) compared to large companies (2.96% increase).
- Grants had a larger impact on human capital efficiency in micro and small businesses (2.21%) than in large companies (1.81%). But the greatest positive effects of grants on financial performance (measured by return on assets) was in large companies (4.96%), with non-significant effects for medium, small and micro businesses.
- Older businesses (10+ years) yielded greater benefits from grants than younger businesses, increasing return on assets by an average 3.46 per cent, compared to startups (2.73%), young (2.59%) and mature businesses (1.89%).
- Grants had highest average employment benefit for startups (5.10%) and young businesses (3.80%), followed by mature (2.08%) and old (1.30%) businesses.

We also broke down and compared the effects of Australian government support to businesses between the two major grant categories — Industry Innovation grants and Small Business grants. We found:

- Industry Innovation grants were associated with significant performance benefits for large businesses (increases in ROA of 9.53 per cent), along with single-digit percentage increases in full-time employee numbers, turnover and human capital efficiency across firms in various size and age categories.
- Small Business grants were associated with significant increases in full-time employment (8.15%) for micro businesses and small businesses and increases in sales turnover for startups and young businesses (5.84% and 7.82% respectively).

These comparative scheme results suggest that the efficacy of grants is highest when direct financial assistance is judiciously targeted towards a certain size and type of business. We also investigated how different selection procedures for grant recipients might affect outcomes. We found that, on average, business grants only significantly improved full-time employment (6.70%) in recipient firms when both open and competitive selection procedures were used.

By contrast, we found that grants awarded under open and competitive selection procedures were typically associated with little, if any benefit in business performance, sales turnover and efficiency. Open selection processes, where applicants did not

have to compete for grants, were associated with even worse outcomes, including declines in return on assets (-4.87%) and sales turnover (-6.57%).

These results show that openness and competitiveness in business grant selection procedures, though objectively desirable, do not on their own guarantee good outcomes. Rather, it is likely that other serious problems in the selection processes are leading to indifferent and sometimes egregiously poor outcomes for Australian taxpayers.

Based on our findings for this White Paper, we provide the following five recommendations aimed at improving the effectiveness of Australian government business grant programs in achieving their policy objectives:

Recommendation 1

Review and overhaul business grant selection processes to make them merit-based

In our first edition White Paper in 2024, we identified a preponderance of non-competitive processes being used to award grants to Australian businesses. We also found a broad and systemic lack of transparency across most grants programs.

However, our findings in this study suggest that openness and competitiveness in grants selection procedures — though essential for the integrity of the system — do not on their own guarantee good outcomes. This suggests that other aspects of the system need major remedial action.

Nevertheless, our results in this study do show that open and competitive grants are associated with *better* outcomes than other selection procedures. Accordingly, and in line with the Australian National Audit Office's previous conclusions about "shortcomings in the design and operation" of grant programs (ANAO, 2022, p. 8), we recommend that all commonwealth business grant selection procedures be comprehensively reviewed and, where appropriate, replaced with open, competitive and merit-based processes by default.

Recommendation 2

Clearly identify criteria and benchmarks for success in grant programs

Measuring the success of business grant programs, and evaluating whether they have effectively used taxpayer funds, is inherently challenging and problematic. Yet, for the sake of accountability in the spending of billions in taxpayer funds, it is vital that systematic and rigorous assessment of the efficacy of grant programs be continuously undertaken.

A conspicuous current problem with the Commonwealth grants programs is that they seldom provide criteria on which to assess their outcomes. Nor, typically, does the government provide comprehensive information on the purposes of individual grants. This adds to the difficulty of measuring the success or otherwise of grant programs. As we highlighted in our first edition White Paper, publicly available information on the purposes of grant programs is limited. In that report, we recommended that the government mandate more extensive descriptions of the purposes for which grants are provided. However, augmented purpose statements, while important, do not provide sufficient information to measure the ultimate effectiveness of grants. Accordingly, we now recommend that the government additionally require business grant providers to publish specific criteria by which the success of programs can be evaluated and measured.

Extended disclosure of grant purposes and success criteria are particularly important for general-purpose business grants, which tend to be more nebulous and difficult to scrutinise than more specifically targeted grants. Importantly, such increased disclosure will be relatively costless — both for grant program administrators and applicants.

Recommendation 3

Conduct impact evaluations on each grant program

We urge the Australian government to carry out impact evaluations on each grant scheme, distinguishing between businesses by size, age and strategic objectives. Given the heterogeneous nature of business, our research suggests that policies for direct assistance to micro and small businesses should be implemented differently to policies for larger businesses. Accordingly, the government should set up a working committee to find ways to evaluate grant programs so that each scheme is optimised and in synch with the policy issues it seeks to address and the objectives it aims to deliver.

Another key objective of the working committee should be to find common methods and platforms for different government departments to produce data to inform policy. For example, the government should consider collecting data on grant recipients biannually and using a control group of non-grant recipients. Before implementing or launching the policy initiative, the government should begin collecting data on non-grant recipients based on size, age and strategic objectives of business at least a year before launch of the policy initiative, providing a rare opportunity to implement evidence-based policies.

Business grants have been the focus of increasing criticism in recent years precisely because of the very nature of grants as essentially discretionary, non-recoverable one-off subsidies or payments to firms (Wren, 2005), with no requirement for repayment or returns of any financial costs to the public sector. One of the main criticisms is that one-off subsidies or payments can lead to 'moral hazard' and/or 'adverse selection' problems (Wren, 2005). Grant expenditures undertaken by the owner-manager of a business can be subject to the 'principal-agent' problem and government departments have little or no control over the expenditure of the grant funding and how the owner-manager deploys these expenditures. The business owner-manager also is less inclined to maximise the return from the expenditure than if it was drawn from internal firm resources (Brown & Lee, 2018). There is also great difficulty in establishing

the level of additional benefit that these grants can provide to the business community. Receiving grants can also lead to a 'grant mentality' or 'grant culture' within individual businesses, which can negatively impact on the self-resilience of business owners, producing adverse selection problems by awarding grants to the wrong type of firm or owner (Gustafsson et al., 2020; Brown & Lee, 2018). Further, significant grant support provided over an extended period can have unintended consequences, such as altering the innovative behaviour of firms and their ability to generate their own revenue streams (Brown & Mawson, 2016).

So, when considering the conditions that will influence the structure, conduct and performance of grants, evaluators and policy makers need to also take into consideration institutional and regulatory context and the timing and targeting of certain sectors, stage(s) of business development, company growth orientation and export orientation. As funding requirements of SMEs is not homogenous, evaluators and policy makers should pay considerable attention to the precise issues within the intended target market for different grants, as poorly designed financial assistance to SMEs is often distortive.

Recommendation 4

Grant reporting requirements

Publicly available information about grant programs is excessively restricted, with only limited details about grant programs and the identities of recipients currently provided. In some cases, even the recipient's name is not provided on the GrantConnect portal. While many grants come with reporting processes for recipients — and some of these processes can be onerous and may disincentivise potential applicants from seeking grant assistance — there is no publicly available information on the success or otherwise of individual applications. Given the interest that taxpayers have in ensuring effective use of the substantial funding provided by government grant programs, it seems not unreasonable to expect disclosure to the public about the outcomes of grant provision.

Accordingly, we recommend that the government require grant recipients to report on the success (or otherwise) of their use of taxpayer funding, with disclosure publicly released on GrantConnect. Such disclosures would provide *verifiable* information for the public to cross-check via alternative channels, and therefore stronger overall accountability for grant programs. We note that such requirements may not be suitable for some grant recipients, including where there are multiple recipients, or where the grant values are relatively small. For all other grants, we suggest the government could require disclosure with minimal burden relative to the value of the grant. Administratively, any burden on government agencies would be restricted to ensuring that the submitted review of a grant's success was sufficiently detailed. Further, we suggest the government not be required to verify the information provided by recipients. But disclosures should be made with legally enforceable requirements for truth. Grants in sensitive industries may have access to confidentiality exceptions.

Recommendation 5

Multiple grant recipients

Our research indicates that around 63 per cent of businesses that received multiple grants in the four years between 2018 and 2021 exhibited low levels of efficiency and productivity.[1] While the government might be able to resolve some market failures and improve equilibrium outcomes with interventions such as grant programs, there is a risk that grants are directed toward the wrong businesses and produce unintended outcomes. In this context, our results suggest that the current system might be creating incentives for some companies to become 'subsidy businesses' which do not provide satisfactory returns on the investment of scarce taxpayer funds. Accordingly, policy evaluators should review and assess the effects of providing multiple grants to single recipients, to ensure taxpayer funds are not wasted from year to year on subsidy-dependent businesses.

[1] *A total of 141,831 business grant year recipients obtained from GrantConnect for the period 2018 to 2021 were matched to the BLADE data. Around 52,519 of these business grant year recipients were awarded only one grant.*

1. Introduction

1.1 Description of the problem

Governments around the world provide substantial taxpayer-funded support to businesses to address a wide range of market failures and to support key policy objectives. This taxpayer-funded support can be distributed through various channels such as soft loans, credit guarantees, subsidies, tax incentives, and through non-repayable capital transfers known as business grants. The Australian government spends billions of dollars of taxpayers' money annually on direct financial assistance via grants to community organisations and businesses. Between 2018 and 2022, the government handed out an average of about $14 billion annually on 29,000 grants — with total expenditure of around $70 billion over the five years. Approximately 9 per cent of all commonwealth grants — about 2,600 annually — were provided for business purposes from 2018 to 2022. Average annual expenditure on business grants was around $600 million, or more than $3 billion in total over the five years. Given the extent and the value of direct public financial assistant packages that the government offers, it is important to assess the efficacy of these grants with respect to both business performance and government objectives. Further, it is important to evaluate the effects of business grants across different firm size and age groups to gauge whether these assistant packages are indeed meeting the key policy objectives of remedying market failures for a particular type of business or pursuing strategic economic goals such as promoting economic development and increasing productivity and competitiveness.

Grants are an important source of financial assistance for businesses in Australia. More than 86 per cent of business grants are awarded to micro, small and medium-size businesses, and around 81 per cent to businesses with less than $20 million in revenue. For more established businesses, grants provide support for projects that can improve competitiveness, productivity and performance, with businesses commonly seeking support for a range of activities, such as research and development (R&D), delivery of certain types of services, infrastructure, or building capacity. For small businesses (SMEs), grants enable owners to overcome the financial constraints that typically restrict SMEs from reaching their full potential (Beck, 2013), as financial institutions typically regard SMEs as riskier borrowers, requiring a greater return on lending and additional measures of security or collateral from owners.

Accordingly, efficient and effective business grant programs can support activities in both large businesses and SMEs, ultimately leading to desirable policy outcomes of greater employment and more robust business growth, exports, investment and innovation. As grants are an important source of finance, especially for small businesses — and they can act as an important policy instrument to address market failures such as asymmetric information, high transaction costs, and realising positive externalities — it is timely to explore the evidence about the effects of these grants (policies) and the extent to which they are meeting their intended outcomes. Grant programs can be rendered ineffective if either poorly constructed or public policy objectives do not align with the incentives of the business, resulting in less-qualified businesses receiving grants. Recent reviews of Australian grant programs have criticised governments for low-quality processes and political motivations (Kavourakis et al., 2024; Joint Committee of Public Accounts and Audit (JCPAA), 2023; Australian National Audit Office (ANAO), 2022, 2021) and for failing to target grants at businesses that will deliver the most the most positive effects. Hence, these reviews raise the valid concern that taxpayer funding might be wasted through grant programs. A principal aim of this report is to investigate these concerns — to assess whether business grants are effective at achieving economic policy objectives, or whether they are simply a wealth transfer from taxpayers to private businesses.

1.2. Purposes and scope of the report

This report has three primary purposes: (1) to provide a deeper understanding of the characteristics of businesses that apply for and receive discretionary grants from the Australian government; (2) to assess whether these taxpayer-funded grants are effective in increasing the productivity, performance and growth of recipient businesses; and (3) given the policy assumptions behind business grants, we examine whether discretionary grants that involve direct financial assistance are more likely to be provided to smaller businesses, which are more resource constrained, rather than larger businesses.

The analysis in this report is based on data obtained from the GrantConnect online platform between the years 2018 and 2022. Most of the business grants reported in GrantConnect are provided to SMEs.

A plethora of different types of commonwealth support schemes are primarily aimed at supporting SMEs in Australia. More broadly, in the OECD, significant public policy experimentation aimed at alleviating resource constraints within SMEs has been reported in the past two decades (Fraser, Bhaumik and Wright, 2015; Bellavitis et al., 2017; OECD, 2017). Hence, most of the research literature synthesised in this report is focused on SME grants rather than on public support for all businesses in general. Notwithstanding this selection bias in GrantConnect and in the research literature, our empirical models examine all private non-listed for-profit companies in Australia regardless of size and assess how performance, productivity and employment for single and multiple commonwealth grant recipient businesses differ from non-recipients of business grants. Accordingly, this report contributes to the debate in Australia on the effectiveness of using taxpayer-funded policy support to both large and small businesses by providing a comprehensive review of counterfactual evaluations.

This report is the second in a three-part series focusing on the efficacy of Australian government business grants. Part I provided a detailed descriptive analysis of business grants with reference to the selection and allocation processes, the value of grants, the government agencies/departments associated with these grants, and characteristics of firms that use these grants. Part II examines both the productivity and performance of companies that have received Commonwealth grants. Part III, to be released in late 2024, will investigate non-business (public good) community grants in Australia.

The structure of Part II is as follows: Section 2 provides context and a worldwide literature review of public grants. Section 3 explains the data, methods and analytical techniques used in the analyses of the data. Section 4 provides a detailed analysis of the efficacy of grants, followed by conclusions in Sections 5.

2. Context and literature review

2.1 Australian government financial assistance to SMEs

The Australian government uses grants to achieve policy outcomes such as employment creation and business growth, and to enhance innovation and business competitiveness. SMEs in Australia receive a range of direct financial assistance packages from the commonwealth, state and territory governments, as well as from local government. These financial assistance programs can include grants[2], subsidies and tax benefits such as tax rebates and deductions. For example, the Australian government's Research & Development Tax Incentive scheme (R&DTI) is the primary mechanism for encouraging Australian companies to engage in R&D. Under the scheme, launched in 2011, companies can reduce their R&D costs by accessing tax offsets for eligible R&D expenditures. The R&DTI has two core components: a 43.5 per cent refundable tax offset for eligible entities whose aggregated turnover is less than $20 million, and a 38.5 per cent non-refundable tax offset for all other eligible entities. Unused offset amounts may be carried forward to future income years. Initially, the Tax Laws Amendment (Research and Development) Act 2011 legislated higher tax offset rates of 45 per cent and 40 per cent. Changes to the R&DTI in July 2021 also introduced a variable intensity premium that enables access to higher R&D tax offsets for larger companies incurring R&D expenditure that is equal to or greater than 2 per cent of the company's total expenditure, whereas the R&D premium for smaller companies (with turnover under $20 million) changed to 18.5 per cent above the corporate tax rate for such companies. As such, the R&DTI scheme alone entails a very substantial annual financial burden on taxpayers (and benefit to companies), but due to its indirect nature is not included in the scope of this study.

Commonwealth subsidies and grants target businesses in particular fields and aspects of business, such as exporting, innovation, start-up and commercialisation. These grants are primarily used to achieve government policy outcomes such as increased employment, business growth and enhanced innovation — while also helping grant recipients achieve their own objectives. Government policies aimed at assisting the business community may also target activities such as training and education, advisory services, counselling and direct financial support. This support can be distributed through various financial instruments such as soft loans, credit guarantees, subsidies and tax incentives — as well as grants. Business grant applicants can seek funding for a range of different types of activities, such as research and development (R&D), delivery of certain types of services, infrastructure, or building capacity. The primary intention of these policies is to address market failures, particularly related to small business.

The government encourages small businesses to apply for public grants which provide financial assistance and support for specific projects, initiatives or operational needs. These grants also serve as a catalyst for growth and help small businesses achieve their strategic goals. Grants providing access to financial resources usually offer a source of non-repayable funding, which can be particularly attractive for small businesses with limited capital. Grants that address operational needs can be used for capacity building to support training and skill development initiatives within a small business, leading to improved productivity and competitiveness. These grants can also be used to help small businesses adopt new technologies or upgrade their existing systems, leading to increased efficiency and better service delivery. Small businesses can also use these grants to diversify their product or service offerings, reducing their dependence on a single revenue stream and enhancing resilience. Governments can also provide risk mitigation grants to act as a safety net during economic downturns or in the face of unexpected challenges, such as the

[2] *The term grant is used to describe funding linked to short-term project funding or the one-off provision of money, whereas funding, by contrast, is a broader term (grants are just one type of funding) and is sometimes used to describe longer-term agreements (see Kavourakis, J., Tanewski, G. and Zaman, M.,2024).*

JobKeeper grant during the COVID-19 pandemic.

'Industry Innovation' grants targeted at businesses include the sub-category of 'Product Innovation & Research' grants, which provide businesses up to three years old and with turnover of less than $1.5 million in the year of application, with matching funding of up to $50,000 to hire research experts to assist them to expand their businesses. Other grants allow businesses to claim up to $1 million in matching funds to help them bear commercialisation costs and expenditures involved in bringing an innovative product or process to the market. Grants in the 'Business Development' category are specifically targeted at small business growth and expansion and aim to stimulate the Australian economy. One type of 'Business Development' grant allows target small businesses to write off up to $30,000 in assets for properties bought and used in the year of application. Another grant type in this category allows small businesses to claim up to $2,100 to improve their cyber security measures. By contrast, grants provided under the 'Small Business' category are to encourage growth of startups and to assist small businesses affected by the COVID pandemic.

2.2 Policy assumptions

Governments around the world recognise the importance of SMEs to national economic success and allocate considerable sums of public capital to financial assistance programs that support SMEs. This is because SMEs are not only constrained by their own human capital limitations and the 'liability of smallness' (Aldrich & Auster, 1986), but are also hampered by institutional and market failures (Beck, 2013) that lead them to being denied adequate access to finance. Small businesses are generally perceived to be inherently more risky targets for investment or lending than large businesses, contributing to a general reluctance by financial institutions to provide sufficient loan funds to them, or to demand higher rates of return on any funds advanced. Credit rationing can also result in banks allocating loan funds to industries (not explicitly entities) with the greatest profit potential (Lown and Morgan, 2006; Hanousek and Filer, 2004). Market failures associated with credit rationing are primarily due to information symmetries such as adverse selection and moral hazard.

While these market failures provide a theoretical justification for governments to use taxpayer-funded grants to support SMEs, there are similarly strong theoretical arguments to interrogate the validity of government business support policies and highlight their problems. Some authors (e.g., Bravo-Biosca, 2013) use the term 'government failure' to describe various government policy problems associated with grants such as lack of effective policy implementation, misaligned incentives, political capture by lobbyists, and crowding out. Further, the research literature (e.g., Nightingale and Coad, 2016) has begun to question some of the theoretical and methodological assumptions that underpin entrepreneurship research. For example, this research has begun to question whether all SMEs should be supported via broad range policies or objectives, or whether only specific groups such as entrepreneurs and SMEs with high growth potential should be allocated public resources via a narrower range of policies or objectives.

2.3 Impact of R&D grants/subsidies

An extensive body of literature has focused on investigating the impact of grants and grant-seeking behaviours, especially the impact of research and development (R&D) subsidies and grants on firms and firm behaviour. Public funding is commonly used to subsidise private company R&D activities in many countries. The public share of R&D activity spending ranges between 18% and 30% in many OECD countries, and a sizeable proportion of these public funds is used to subsidise private company R&D. A common public policy justification for providing R&D grants to private companies is that they support only projects that are socially desirable and would not otherwise be undertaken. However, identifying target R&D projects that are socially desirable and to which public effort should be devoted is not a simple task.

In an extensive review of 77 studies that examined the use of different publicly funded R&D grant schemes, Zúñiga-Vicente et al. (2014) found that while results from many studies support the 'additionality' or 'crowding-in' hypothesis (according to which public R&D subsidies tend to stimulate additional company-financed R&D), other studies found extensive evidence for the so-called 'crowding-out' hypothesis, which holds that public R&D subsidies tend to offset or substitute for private R&D. Zúñiga-Vicente et al. (2014) also reported that a number of studies found insignificant or mixed effects for both 'crowding-in' and 'crowding-out' hypotheses, showing that the net effect of public subsidies on the level of company financed R&D is ambiguous. However, in a significant finding, Zúñiga-Vicente et al. (2014) also reported that the impact of R&D grants is larger for smaller firms than for larger firms. Similar results have been reported by González et al. (2005), Bronzini and Iachini (2010), and Criscuolo et al. (2012).

In other studies, Blanes and Isabel (2004) and Afcha (2012) found that technological co-operation, previous R&D experience, and high firm-skill intensity are positively correlated with participation in publicly sponsored R&D programs. Similar results were reported by Cerulli and Poti (2008), who analysed public R&D subsidies using Italian data, and Czarnitzki and Delanote (2014), who used German data. In addition, Loof and Hesmati (2004) found that firms that received public R&D support could be characterised as R&D intensive and credit constrained. Catozzella and Vivarelli (2011) showed that the probability of obtaining a subsidy was higher for firms with a track record of conducting export-oriented product and process innovations and that cooperated with universities and/or research institutes.

2.4 Impact of grants on employment and other macro-economic factors

In addition to assisting individual firms, government interventions aim broadly to enhance economic competitiveness, stimulate job creation and reduce unemployment. Policy instruments can be targeted at

either the macro-economic level, where governments fund infrastructure, education and labour flexibility, or at the micro-economic level, with assistance programs to alleviate individual businesses' problems. Programs targeting individual businesses generally fall into two categories: those that aim to promote entrepreneurship and/or assist individuals with startups or early-stage ventures such as start-up support for unemployed individuals (e.g., Zoellner et al. 2018; Caliendo, 2016; Dvoulety and Lukes, 2016), and those that assist established SMEs, such as for business development (e.g., Piza et al., 2016), access to debt and equity finance (Kersten et al., 2017), stimulating innovation and creation of new technologies (e.g., Testa et al., 2019; Dimos and Pugh, 2016; Zúñiga-Vicente et al., 2014) and enhancing market access (Bennet, 2014; Lundström et al., 2014).

While the evidence of the impact of grants on employment has been largely positive (e.g., Piza et al., 2016), a systematic review of job creation in micro and small firms in low- and middle-income countries by Grimm and Paffhausen (2015) showed that empirical evidence on the effect of policies on enhancing employment and job creation was modest and somewhat negative. Kersten et al., (2017) show that grants have a non-significant effect on the profitability and the wages of SME firms, whereas grants are positively associated with firm performance, capital investment and employment in SMEs. Meanwhile, Gustafsson et al., (2020) demonstrate that low-productivity firms allocate most of their resources to seeking grants compared to high-productivity firms, and that low productivity firms have a relatively high probability of receiving grants compared to high productivity firms.

2.5 The effectiveness of grants

Research literature on the effectiveness of grants is limited but growing (Brown & Lee, 2018). Among several studies that have examined the selection of firms for subsidy programs, Silva et al. (2017) using R&D subsidy data from Portugal, found that large firms with previous R&D experience were more likely than others to obtain subsidies. Aschhoff (2010) similarly found that past participation in public support programs was a key determinant in the awarding of R&D subsidies in Germany, which in turn may be attributed to learning by experience in the grant-seeking process. Several papers that examined selection of firms for R&D subsidies in Spain (Heijs 2005; Huergo and Trenado 2010; Arqu´e-Castells and Mohnen 2015) found government grants were often directed at relatively large firms with high potential, and that the responsible agencies tried to pick national champions. Takalo et al. (2013) used Finnish data to model the costs of application for firms. They found that that the more profitable a project was for a firm, the less likely it was to apply for funding due to opportunity costs. Taken together, these results suggest that in addition to firm characteristics, the probability of receiving a grant is also affected by earlier experiences in public financial support programs and innovation behaviour. Public agencies also often try to "pick winners" for their funding. A report by Feldman and Kelley (2001) on the winners of awards from the Advanced Technology Program in the USA found evidence suggesting that the number of business and university linkages held by a firm positively affected the probability of winning a contest. Similarly, Hussinger (2008) found that the probability of receiving R&D subsidies was positively correlated with previously having received subsidies, as well as with past patenting experience.

Areas in which grants have been shown to be effective and to perform reasonably well on different criteria — such as cost per job, levels of additionality and spillover — are capital expenditure and tax credits to facilitate R&D (Devereux et al., 2007; Harris & Robinson, 2005; Wren, 2005). Tax credits and capital-related grants are used to assist small businesses to meet the upfront costs of R&D and to enable the purchase of capital equipment and/or premises, enabling policy makers to assess the tangible differences grants can make to the expansion of target firms (Becker, 2015; Brown & Mason, 2017).

Prior research has found that some grants are deemed unsuitable for certain types of activities, especially on the grounds of their inferior cost-effectiveness

(Bondonio & Greenbaum, 2014). However, other types of grants such as capital grants are increasingly viewed as appropriate in certain areas, including in less well-developed regions (such as remote areas of northern Queensland and the Northern Territory) where there is a poorly endowed SME sector and poorly developed financial institutions (Devereux et al., 2007; Harris & Robinson, 2005; Wren, 2005). A move away from grant-based assistance has been most apparent within innovation policy (Martin, 2016), where tax credits have become more prevalent. But this often favours larger and medium-sized firms, whereas smaller companies are often less able to fund innovation and have greater difficulties raising finance within credit markets.

2.6 Outcomes associated with discretionary grants

In this section, we briefly summarise empirical evidence about the effects of discretionary grants with outcomes such as performance, productivity and job creation. Studies by Srhoj et al. (2019) and Pellegrini and Muccigrosso (2017) found that SME firms that have been awarded discretionary grants demonstrated higher survival rates compared to matched SME firms that did not receive grants. Research generally demonstrates positive effects between discretionary grants to SMEs and employment (e.g., Criscuolo et al., 2019; Srhoj et al., 2019; Brachert et al., 2018), while studies examining firm growth also generally show positive effects on tangible or fixed assets (e.g., Srhoj et al., 2019; Banai et al., 2017; Cerqua and Pellegrini, 2014; 2017). Investigations by Srhoj et al. (2019) Banai et al. (2017) and Decramer and Vanormeligen (2016) also found that discretionary grants have a positive effect on SME firms' financial performances (proxied by sales or turnover), whereas effects on firm productivity (measured by the efficient use of inputs and resources) show mixed results. For example, while discretionary grants showed positive effects on SMEs' labour productivity (e.g., Srhoj et al., 2019; Benkovskis et al., 2018; Decramer and Vanormeligen, 2016), an equal number of studies show negative effects or non-significant effects on labour productivity (e.g., Brachert et al., 2018; Banai et al., 2017; Cerqua and Pellegrini, 2014; 2017). However, results on the effects of discretionary grants on total factor productivity are generally negative or non-significant (e.g., Criscuolo et al., 2019; Banai et al., 2017; Cerqua and Pellegrini, 2014; 2017).

Discretionary grants awarded to SME firms in less developed regions appear to have a positive effect on firm performance (e.g., Criscuolo et al., 2019; Banai et al., 2017; Cerqua and Pellegrini, 2014; 2017). Most studies examining discretionary grants have focused on SME firms operating in manufacturing. Most of these have shown a positive relationship between discretionary grants and firm performance (e.g., Cerqua and Pellegrini, 2014; 2017; Bondonio and Greenbaum, 2014; Bernini and Pellegrini, 2011). Studies comparing effects of discretionary grants between smaller and larger firms report evidence of positive effects in smaller firms, indicating substitution of private for public funds when larger firms are beneficiaries (Dvoulety et al., 2021). Further, Bia and Mattei (2012) who investigated the intensity of public support for SMES, found that discretionary grant amounts averaging up to €150,000 had increasing positive effects on smaller firms, whereas for larger firms these increasing positive effects averaged up to the amount of €300,000.

In summary, most studies report positive effects of discretionary grants on firm survival, employment, tangible or fixed assets, sales or turnover and labour productivity. However, results related to firm total factor productivity are unclear. Positive effects of discretionary grants on SME firm outcomes are also more likely to be observed in less well-developed regions, in the manufacturing sector and among smaller firms.

2.7 Concluding comments

In conclusion, our review of the extant literature highlights the importance of developing reliable evaluations of the impact of discretionary grants that target SMEs and entrepreneurs (OECD, 2023). The literature shows that systematic and reliable evaluations are essential for justifying the use of public resources for community and business support and for steering those resources to the measures that deliver the greatest benefits against government objectives (OECD, 2023). Hence, "context matters" (Brown & Lee, 2018). When considering the conditions that will influence the structure, conduct and performance of grants, policy makers need to take into consideration three main issues: institutional and regulatory context, timing and targeting (normal SMEs versus high-growth firms) (Brown & Lee, 2018, pp. 28–29). This is because governments generally adopt a relatively wide-ranging 'broad brush' approach when designing systems for the provision of grants. Grants can be targeted at certain sectors, stage(s) of business development, company growth orientation and export orientation. However, the funding requirements of SMEs are not homogenous, and policy makers should therefore pay considerable attention to the precise issues within the intended target market for different grants, as poorly designed financial assistance to SMEs is often distortive — arguably even more so than no assistance (Brown & Lee, 2018).

3. Data and methods

3.1 Business grants data and BLADE

Our primary business grants data were retrieved in November 2022 from GrantConnect[3], a centralised online platform that provides information on current Australian government grant opportunities. The retrieved business grants data provided information on the types of grants awarded, the socio-economic categories of the grants (i.e., Business Development, Industry Innovation, Small Business)[4], purpose (objective) of grants, and other details including recipients' names, ABNs and postcodes, value of grants, variations to grants, and start and end dates of grants. The primary business grants data was then matched to the Australian Bureau of Statistics' (ABS) Business Longitudinal Analysis Data Environment (BLADE).

The ABS BLADE datasets contain anonymised firm-level longitudinal data from tax filings, business registrations, customs and excise, intellectual property data on patents, trademarks and designs, and various ABS surveys between the financial years 2001-02 and 2020-21. Accordingly, our available dataset of grants is reduced by the removal of the 2022 financial year. Financial data were derived from the Australian Tax Office's (ATO) Business Income Tax (BIT) and where BIT data were missing, we supplemented these with data obtained from the ATO's Business Activity Statement (BAS) and from the ABS' Business Characteristics Survey (BCS) dataset.

3.2 Measures to assess grant efficacy

We used several measures to assess the efficacy of business grants awarded to companies. First, we used the companies' annual aggregated turnover, which is the gross income or proceeds for a given financial year, to gauge the effect of grants on companies' sales and/or growth. Second, we estimated several efficiency scores of private companies by utilising a Cobb-Douglas production stochastic frontier model to create relative productivity measures of each private company within its respective industry for each respective year. We estimated an efficient frontier for all private companies across 20 industries over the 13-year period by assessing the amount and mix of resources used by companies to generate output, measured by total income, within the companies' industry. The inputs for each company were measured by capital expenditure, labour, R&D expenditure and human capital. We expect companies that operate on the frontier are the most efficient and, hence, assigned these companies a score of one. In contrast, companies assigned lower scores (less than one) were deemed inefficient relative to companies operating on the frontier. Hence, the further the score is away from unity, the lower its efficiency. Third, we used return on assets (ROA) (i.e., net Income/total assets) as an outcome variable to assess company performance and to measure how efficient a firm's management is in generating profit from their total assets on their balance sheet. A higher ROA ratio indicates greater asset efficiency in a company. Fourth, we used headcount, which is a variable from the ATO's PAYG dataset in BLADE that contains the total number of employees in a company, including full-time, part-time, and casual employees, and the number of full-time equivalent (FTE) employee's variable, to assess the effect of grants on employment.

[3] *https://www.grants.gov.au/*

[4] *See Appendix A in Small Business White Paper Commonwealth Government Grants: 2018 to 2022, for a full list of grants that appear under the socio-economic category.*

3.3 Productivity (efficiency) measures

Productivity growth in Australia is measured by the ABS and others using one or two interrelated measures. The first is *labour productivity*, which is defined as output per unit of labour input (typically measured in terms of hours worked). The second is *multifactor productivity* (MFP), which is a residual measure after taking out the contribution made by the increased use of capital inputs per unit of labour input in production (termed 'capital deepening'). MFP is generally interpreted as a measure of the efficiency with which labour and capital inputs combined are used in productivity. Most analysis typically assesses changes in productivity growth rates over time rather than focusing on the underlying level of productivity.

The starting point in terms of generating an efficiency measure is the Cobb-Douglas stochastic frontier model. The specification of the model is represented as:

$$Y_{it} = exp(X_{it}\beta + \varepsilon_{it} - U_{it})$$

Where subscripts denote the $_i$th firm in the $_t$th year respectively.

X is a vector of inputs.

β is the set of parameters to be estimate.

ε is assumed to be independent and identically distributed random error which have normal distribution with mean zero and unknown variance.

U is the non-negative unobservable random variable associated with the technical efficiency of production.

The functional form of the Cobb-Douglas stochastic frontier production is thus converted for estimation as:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln K_{it} + \beta_2 \ln L_{it} + \beta_3 H_{it} + \beta_4 \ln R_{it} + \varepsilon_{it} + U_{it}$$

Where Y, the dependent variable is represented as total income.

The inputs for each firm are capital expenditure (K), labour (L), a measure of human capital (H) and R &D expenditure (R).

We estimated the efficiency of private companies by using the above functional form to generate a measure of relative efficiency of each private company within its respective industry for each year. We estimated an efficient frontier for all private companies across 20 industries over the years by assessing the above inputs used by the company to generate the output.

We used Human Capital Value Added (HCVA) as our human capital index. HCVA is calculated by subtracting all corporate expenses except for pay and benefits from the revenue generated and dividing the adjusted profit by number of full-time employees (FTE). Total costs are the difference between revenue and profit before taxes, employee costs are pay and benefits, and FTE is the average number of full-time employees. The human capital index is estimated as follows:

$$\text{HCVA} = \frac{(\text{Revenue} - (\text{Total Costs} - \text{Employment Cost}))}{\text{FTE}}$$

We generated technical efficiency scores based on separate stochastic frontier models for all private companies across 20 industries over 13-years: one model includes both R&D and human capital, one only R&D and one with human capital only.

3.4 Explanatory variables

The primary explanatory variables for our models derive from the delivery of one or more business grants to a business in our data. Businesses that received at least one grant in a financial year were denoted as grant receiving. Evidently, the quantum of money received from a commonwealth grant is likely to substantially affect the ability of a business to generate tangible business outcomes. Accordingly, we allowed for the measure to identify the recipient of a grant *and* the quantum of funding received. This measure includes the total value of grant funding received by the businesses within the financial year.

To properly address the policy objectives of specific grant programs, we also altered the construction of the measures of grant receipt by separately identifying amounts received for grants of different socio-economic categories. Specifically, we separated

our measure by focusing on those grants specifically related to promoting business activities and those specifically related to increasing innovation and research. This approach allowed for more closely matching potential business responses to receiving grants with the intended grant outcomes.

3.5 Control variables

Our estimation includes a set of relevant covariates that affect the outcome variables and have been considered important in the literature. We controlled for firm age and size (measured in the number of employees). Other firm characteristic covariates include average wage expenditure as firms that pay higher average wages tend to have on average larger capital and cash reserves and are more likely to be financially stronger. To indicate efficient generation of sales or revenues from the businesses pool of assets and to reflect the resources that the business owns, we added total assets as a control. We also included the debt ratio (total assets/total liabilities) to reflect the financial constraints of the firms as firms with higher constraints are considered more vulnerable (Stucki, 2014). A dummy variable for export is included as a control, as firms that are exporters tend to be more productive (Costa et al. 2017). As is common in the literature (for example, Srhoj et al., 2021; Takahashi & Hashimoto,2023), we also controlled for industry and state as relevant firm characteristics.

Table 3.1. Coarsened exact (one-to-one) matching: number of grant and non-grant recipients

	Number of Total grants value	Number of non-grant recipients
Population of companies in BLADE	32,590	3,409,020
Matched	31,005	31,005
Unmatched	1,585	3,378,015

We used logistic regression modelling to estimate the propensity scores of the two matched groups of companies — that is, grant recipient companies (i.e., the Treatment Group) and non-grant recipient companies (i.e., the Control Group). Thereafter, we used coarsened exact (one to one) matching (CEM) for our sample and we matched grant recipient and non-grant recipient firms on the basis of the following attributes: firm size, firm age, firm's profit margin, value of total assets, wage expense, debt ratio (leverage), export or non-export status, industry sector, firm's state of residence, and year of grant awarding (see Table 3.2). Relevant firm characteristics are selected that not only affect selection into treatment but the outcome as well. For example, firms that pay higher average wages have on average larger capital and cash reserves and are more likely to be financially stronger. We also included debt ratio (leverage) to reflect financial constraints, as firms with higher constraints are more vulnerable (Stucki, 2014). An export dummy variable was included in the pre-treatment variables as a control as firms that export tend to be more productive (Costa et al. 2017). As is common in the literature (for example, Srhoj et al., 2021; Takahashi & Hashimoto,2023), we also controlled for industry and state as relevant firm characteristics.

Table 3.2. provides an assessment of the quality of the CEM matching based on seven of the 10 company attributes' mean values between grant recipient and non-grant recipient companies. Panel A illustrates that prior to using the CEM matching technique, six of the seven company attributes between grant recipient and non-grant recipient companies had statistically and significantly different mean values, suggesting that grant recipient companies have higher wage expenses, are older, more likely to export, are larger in terms of total assets, and are more profitable. In contrast, Panel B shows that after applying the CEM matching technique, only one of the company attributes — wage expenses - between grant recipient and non-grant recipient companies had mean values that were statistically and significantly different, suggesting that the CEM adequately matched the companies on the seven attributes. As size of company, industry sector, state in which firm resides, and year in which grant was awarded to the recipient are categorical

or dichotomous variables, these attributes were assessed using chi-square tests. The chi-square test, which fundamentally assesses differences in the expected and actual frequency counts among the size, industry, state and year categories, showed that post-treatment there were no statistically and significantly different frequency counts on these four variables between grant recipient and non-grant recipient companies. Indeed, all four attributes showed the exact same frequency counts between grant recipient and non-grant recipient companies.

3.6 Matching strategy

Empirical studies have assessed the effects of grants (i.e., grants that are discretionary instruments based on firm and project characteristics) in a particular region (e.g., Bia and Mattei, 2012), in a selected industry (e.g., Dvoulety and Blazkova, 2019), on selected firm size (e.g., Srhoj et al., 2019), and on new firms (e.g., Söderblom et al., 2015). However, the main difficulty in evaluating business grants and their respective grant policies is the non-random nature of awarding grants to grant recipients. In the absence of randomisation and natural experiments, use of matching methods such as propensity score matching is a valid alternative method of improving the estimation of causal effects (see Piza et al., 2016). Furthermore, in observational studies such as this one, where grant recipient firms will likely have different firm characteristics (e.g., size of firm, age of firm, profitability) compared to non-grant recipient firms, and some of these characteristics are unobservable (e.g., managerial skills, firm strategy, quality of decision-making), it is important to control for selection bias (see Cerqua and Pellegrini, 2017).

Given the importance of documenting counterfactual impact evaluations of grants (as a public intervention), many empirical studies have used propensity score matching techniques such as coarsened exact matching (CEM) or Mahalanobis distance (e.g., Srhoj et al., 2019; Cerqua and Pellegrini, 2017) to improve the estimation of causal effects. Furthermore, matching methods that utilise nonparametric procedures, such as the CEM technique, require no assumptions to be made on the functional form of the error term. So, to achieve our objective of assessing the efficacy of business grants at the firm-level, we used a CEM technique where we matched a grant recipient company to a non-grant recipient company in the BLADE environment on similar characteristics for a given set of pre-treatment covariates. Indeed, the key goal of CEM is to prune observations from the data so that the empirical distributions of the covariates in the two groups are as similar as possible.

As CEM matching only controls for differences between grant recipient and non-grant recipient firms that are captured in the observed attributes, the CEM model reduces imbalances in covariates between two groups. CEM is faster, easier to implement, requires fewer assumptions, and possesses more useable statistical properties for many applications than do other matching methods. Table 3.1 (below) shows the number of grant recipients versus non-grant recipients in the ABS BLADE environment.

We used logistic regression modelling to estimate the propensity scores of the two matched groups of companies — that is, grant recipient companies (i.e., the Treatment Group) and non-grant recipient companies (i.e., the Control Group). Thereafter, we used coarsened exact (one to one) matching (CEM) for our sample and we matched grant recipient and non-grant recipient firms on the basis of the following attributes: firm size, firm age, firm's profit margin, value of total assets, wage expense, debt ratio (leverage), export or non-export status, industry sector, firm's state of residence, and year of grant awarding (see Table 3.2). Relevant firm characteristics are selected that not only affect selection into treatment but the outcome as well. For example, firms that pay higher average wages have on average larger capital and cash reserves and are more likely to be financially stronger. We also included debt ratio (leverage) to reflect financial constraints, as firms with higher constraints are more vulnerable (Stucki, 2014). An export dummy variable was included in the pre-treatment variables as a control as firms that export tend to be more productive (Costa et al. 2017). As is common in the

literature (for example, Srhoj et al., 2021; Takahashi & Hashimoto, 2023), we also controlled for industry and state as relevant firm characteristics.

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[6] *See Blackwell et al. (2009) for more details.*

Table 3.2. Mean Values of pre-treatment and post-treatment attributes

Panel A: Pre-Treatment Attributes	Grant Recipients Mean Value	Non-Grant Recipients Mean Value	t-statistic	p-value
Wages	16,100,000	789,207	-93	0.00
Age	14.72	10.20	-110	0.00
Export	0.056	0.023	-39	0.00
Export Sales	2,475,413	389,862	-5	0.00
Profit Loss	28,300,000	2,340,220	-16.29	0.00
Leverage	4.62	85.4	0.30	0.62
Total Assets	**78,800,000**	**21,100,000**	**-1.75**	**0.04**
Panel B: Post-Treatment Attributes	**Grant Recipients Mean Value**	**Non-Grant Recipients Mean Value**	**t-statistic**	**p-value**
Wages	13.814	12.216	-98.50	0.00
Age	14.66	14.66	-0.08	0.47
Export	0.425	0.425	0.00	0.50
Export Sales	1,266,291	2,109,543	0.56	0.71
Profit Loss	4,924,672	4,903,055	-0.05	0.48
Leverage	4.11	11.35	3.01	1.00
Total Assets	**7,552,075**	**7,720,185**	**0.20**	**0.58**

3.7 Determinants of business grants

One aim of this study is to investigate what types of firms apply for commonwealth business grants. In this context, a particularly important objective is the identification of determinants of grant recipient companies, controlling for the probability that grant recipient companies apply for such business grants, rather than being chosen randomly. Our logistic regression modelling estimates the determinants of success in obtaining business grants — comparing data on grant recipient and non-grant recipient companies. The strongest determinants of funding success in rank order appear to be size of company (number of FTE and total assets), followed by whether the company exports, the age of the company, turnover, and efficiency of human capital. It appears that companies residing in Victoria are most likely to be successful in obtaining commonwealth business grants, followed by companies in Western Australia, Queensland, South Australia and New South Wales. In terms of industry, it appears that companies in the manufacturing sector account for the highest value of grants, followed by the Professional, Scientific and Technical Services and Wholesale Trade.

Table 3.3. Determinants of business grants

Determinants of grants in rank order	Standardised b-coefficient
1) Number of full-time employees (FTE)	0.07
2) Exporter	0.04
3) Total assets (proxy for size)	0.04
4) Age of firm	0.03
5) Turnover	0.02
6) Wage expenses	0.02
7) Human capital & R&D efficiency	0.02
8) Headcount	0.02
9) R&D efficiency	0.01
10) Human capital efficiency	0.01
11) Profitability	0.00
12) Return on assets (ROA)	0.00
13) Leverage	0.00
Determinants of grants in rank order by state	**Standardised b-coefficient**
1) Victoria	0.13
2) Western Australia	0.08
3) Queensland	0.07
4) South Australia	0.06
5) New South Wales	0.04
6) Northern Territory	0.03
7) Australian Capital Territory (ACT)	0.03
Determinants of grants in rank order	**Standardised b-coefficient**
1) Manufacturing	0.09
2) Professional, scientific and technical services	0.04
3) Wholesale trade	0.02
4) Other Services	0.02
5) Financial and Insurance Services	0.01
6) Rental Hiring and real estate services	0.01
7) Retail trade	0.01
8) Information, media and telecommunications	0.01
9) Health care and social assistance	0.01
10) Undefined	0.01
11) Public administration and safety	0.01
12) Mining	0.01
13) Construction	0.01
14) Accommodation and food services	0.00
15) Arts and recreation services	0.00
16) Administrative and support services	0.00
17) Electricity, gas, water and waste services	0.00
18) Transport, postal and warehousing	0.00
19) Education and training	0.00

4. Results for coarsened matched companies

We use firm-level data that have a large cross-sectional dimension (N) and a relatively small-time dimension (T).

To analyse the impact of business grants on different measures of efficacy, we estimate a two-way fixed effect model using industry and year to the matched data as follows:

$$Y_{it+1} = \beta_0 + \beta_1 \ln Grants_{it} + \beta_j X_{it} + \varepsilon_{it}$$

Where i and t represent the cross-sectional firms and years, respectively.

β_1 reflects the effect of grants on the outcome variable. X_{it} are the control variables with their corresponding regression parameters (β_j), and ε_{it} is the residual.

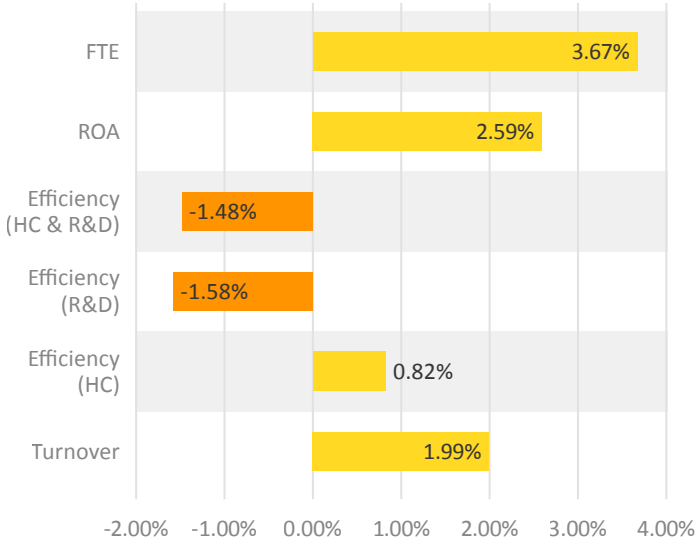
4.1 Results for all business grant categories

As mentioned in Section 3.4, the primary explanatory variable for our models is derived from companies receiving one or more business grants in our data, obtained from GrantConnect. Companies receiving at least one grant in a financial year are considered grant recipients, regardless of the grant amount or category (type) of grant the company has received (e.g., Industry Innovation grant, Business Development grant, Small Business grant, etc.). These grants are summed together and given equal weighting on the outcome variable.

In this section, we estimate the general effect for the total sample of companies receiving business grants and explore the heterogeneous impacts on recipient companies across different business characteristics based on company size and age and the government's selection procedures. As the effect of business grant value on the outcome variable may not be immediately contemporaneous, we regress the outcome variable with a one-year lead (i.e., $t+1$) on the value of grants received by private companies.

The coarsened exact matching (CEM) dataset demonstrates that compared to non-grant recipient companies, grant recipients are positively and significantly associated with performance, turnover, human capital efficiency improvements and full-time employment (FTE). Regression model results indicate that doubling of grant value amount from the average $200,000[6], a private company's FTE increases by 3.67 per cent, return on assets (ROA) by 2.59 per cent, turnover by 2 per cent and human capital efficiency by 0.82 per cent. In European studies on the effects of direct financial assistance/subsidies on SMEs, Decramer and Vanormelingen (2016) found positive effects on ROA, employment, sales and labour productivity for very small enterprises, but not for larger firms in Belgium, while Srhoj, Lapinski and Walde (2019) similarly found that ROA, employment, sales, and labour productivity were positively associated with enterprises that had less than 20 employees, but not for firms with more than 20 employees in Croatia. Meanwhile, Criscuolo et al. (2019) provided evidence that industry grants in the UK have positive effects on employment and investments in small firms but no such effects in large firms.

Figure 4.1 Effect of business grants on private company employment, performance, turnover and efficiency



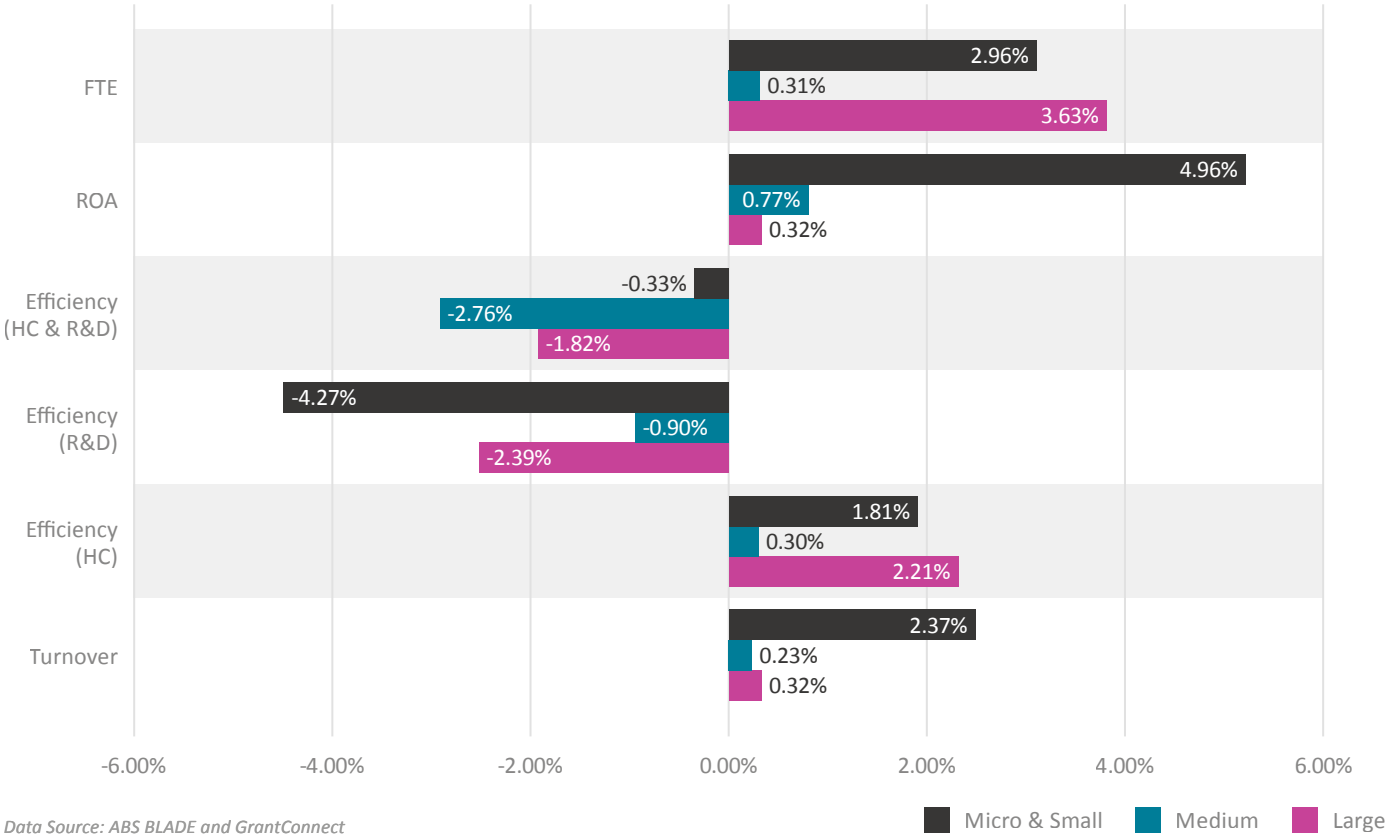
Data Source: ABS BLADE and GrantConnect
Note: Yellow represents statistically significant results, whereas Orange represents statically insignificant results

[6] *The average value of business grants received by grant recipients between 2018 and 2021 is around $200,000.*

However, the above-mentioned regression results do not consider that the effect of grant value amount on private company employment, performance, turnover and efficiency is dependent on the size of the business and on the age of the business. When we re-estimated the regression models on each of the three size categories of businesses — that is, only on the sample of micro and small, medium, and large size businesses, respectively — and compared the CEM dataset results of non-grant recipient companies with grant recipients by size, we found that doubling of grant value amount significantly increased FTE by 3.63 per cent only in micro and small businesses (1 to 19 employees), and it had the largest effect compared to medium (20 to 199 employees) and large size businesses (200+ employees), which showed non-significant effects. These results are contrary to studies by Bia and Mattei (2012) and Biagi, Bondonio and Martini (2015) on the effects of direct financial assistance on employment among Italian SMEs.

Bia and Mattei (2012) found that direct financial assistance had the largest impact on employment in medium-size and large firms compared to small businesses, while Biagi et al. (2015) found that direct financial assistance had the highest effect on medium-size firms compared to small and micro enterprises, and a negative impact on large firms in Italy. We found that doubling of grant value amount significantly increased turnover by 2.37 per cent in large businesses and by 0.32 per cent in micro and small businesses but had no significant effect on turnover in medium-size businesses. Similarly, grant value amount significantly increased human capital efficiency by 2.21 per cent in micro and small firms and 1.81 per cent in large businesses but had no significant effect on human capital efficiency in medium businesses. Indeed, grant value amount had no significant effect on the performance of companies, regardless of size, R&D efficiency and on the combined R&D and human capital efficiencies in all size businesses.

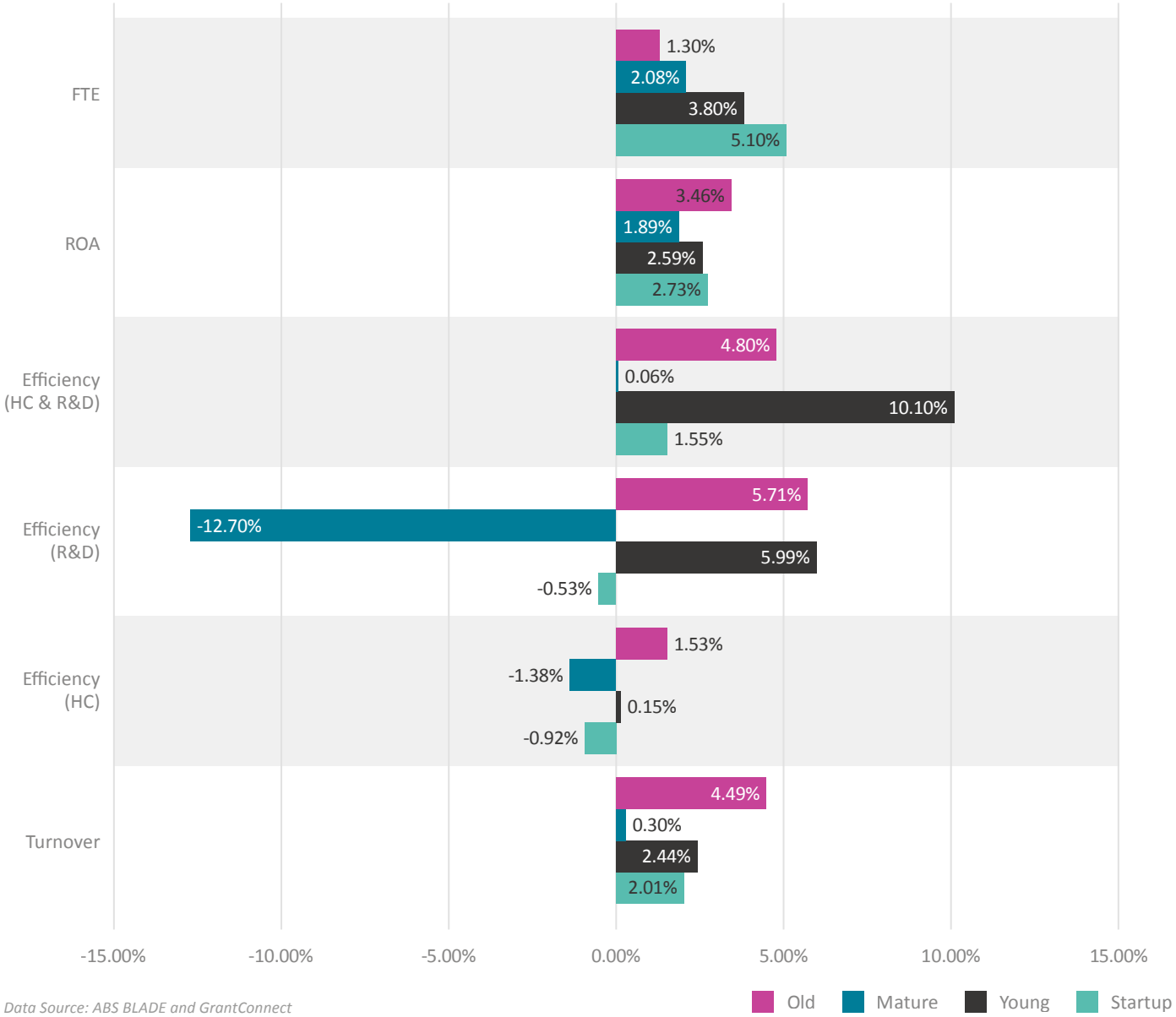
Figure 4.2 Effect of business grants on private company employment, performance, turnover and efficiency by size of business



Data Source: ABS BLADE and GrantConnect

We now turn to the effects of grant value amount on private company employment, performance, turnover and efficiency, and by business age. We found that grant value amount significantly affected FTE and ROA in startup (0 to <2 years), young (2 to <5 years), mature(5 to <10) and old (10+ years) firms, with FTE increased by 5.10 per cent and ROA by 2.73 per cent in startups, FTE by 3.80 per cent and ROA by 2.59 per cent in young firms, and FTE by 1.30 per cent and ROA by 3.46 per cent in old firms for a 100 percent increase in grants amount. Interestingly, grant value amount was only significantly associated with an FTE increase of 2.08 per cent in mature firms. Grant value was significantly associated with increased turnover in startups (2.01%) and old (4.50%) firms, while combined R&D and human capital efficiencies was significantly associated with provision of grants in young (10.10%) and old (4.80%) firms. R&D efficiency and human capital efficiency changes were non-significant among all company age categories.

Figure 4.3 Effect of business grants on private company employment, performance, turnover and efficiency by age of business

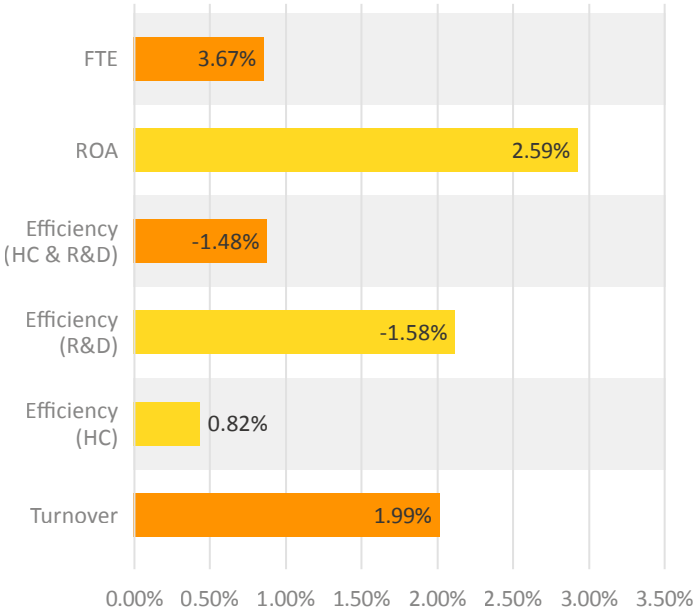


Data Source: ABS BLADE and GrantConnect

4.2 Results for Industry Innovation business grants

We now consider empirical results for 'Industry Innovation' grants, which made up almost 68 per cent of the total number of business grants awarded in the period 2018-2022, followed by 'Business Development' and 'Small Business' (32%) grants. Within the 'Industry Innovation' category, a wide variety of grants are offered to businesses of all sizes to meet various government and business industry innovation objectives. Many 'Industry Innovation' grants are specifically targeted at small businesses — including, for example, the 'Product Innovation & Research' sub-category, which provides small businesses up to three years old and with turnover of less than $1.5 million in the year of application, with matching funding of up to $50,000 to hire research experts to assist them to grow. Other grants allow small businesses to claim up to $1 million in matching funds to help them bear commercialisation costs and expenditures involved in bringing an innovative product or process to the market.

Figure 4.4 Effect of Industry Innovation grants on private company employment, performance, turnover and efficiency



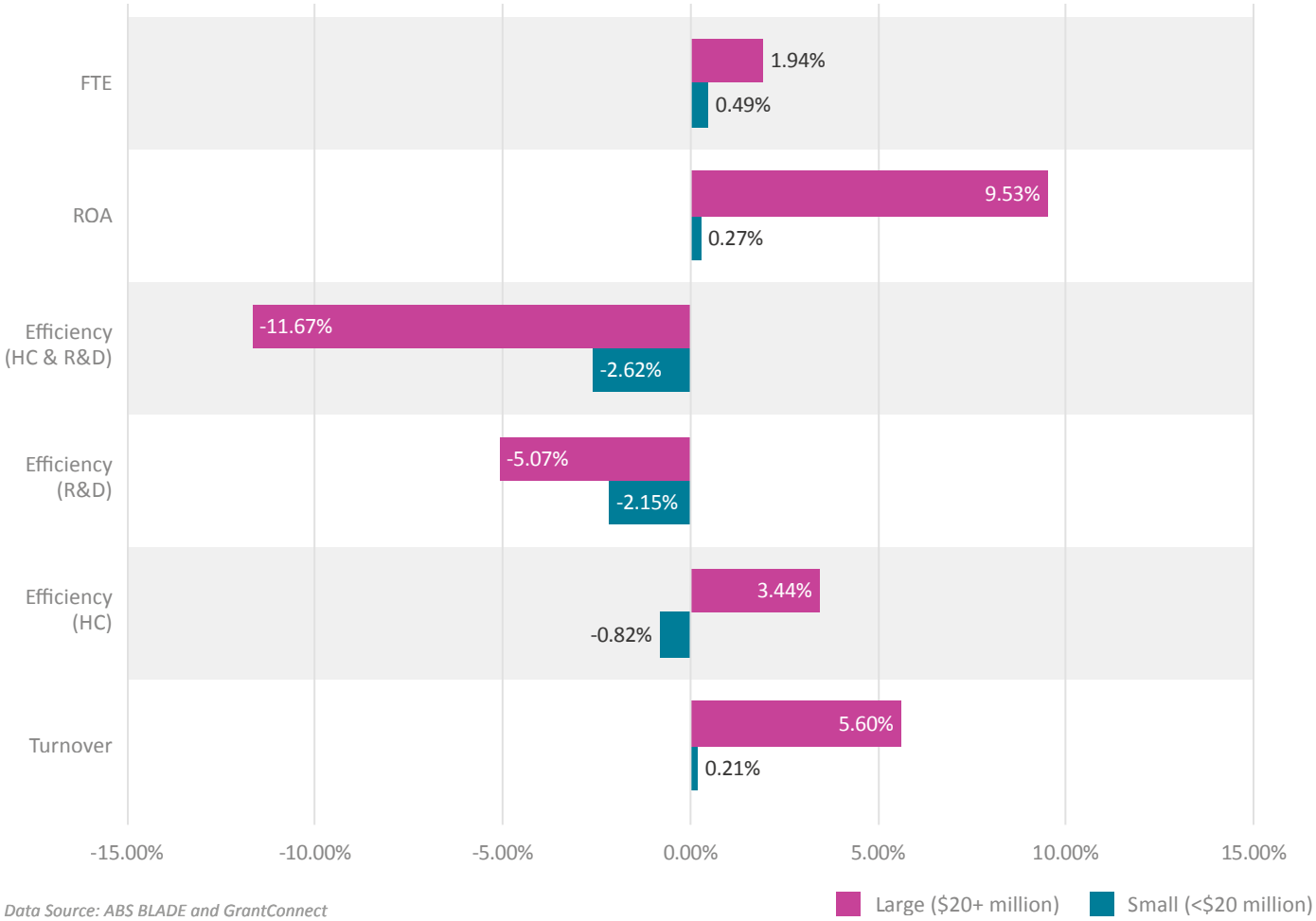
Data Source: ABS BLADE and GrantConnect
Note: Yellow represents statistically significant results, whereas Orange represents statically insignificant results

Regression model results indicate that for a 100 per cent increase in Industry Innovation grant value amount, private companies' average return on assets (ROA) increased by 2.93 per cent, R&D efficiency by 2.12 per cent and human capital efficiency by 0.44 per cent. However, Industry Innovation grant value did not significantly affect FTE, turnover or combined R&D and human capital efficiency.

When we re-estimated the regression models on the turnovers of small businesses (less than $20 million) and large businesses (more than $20 million) and compared the CEM dataset results of non-grant recipient companies with grant recipients by size of business in sales turnover, we found that Industry Innovation grant value amount was non-significant in small businesses, whereas Industry Innovation grants on average significantly increased FTE in large businesses by 1.94 per cent, ROA by 9.53 per cent, turnover by 5.60 per cent and human capital efficiency by 3.44 per cent when grants value increased by 100 per cent from the average.

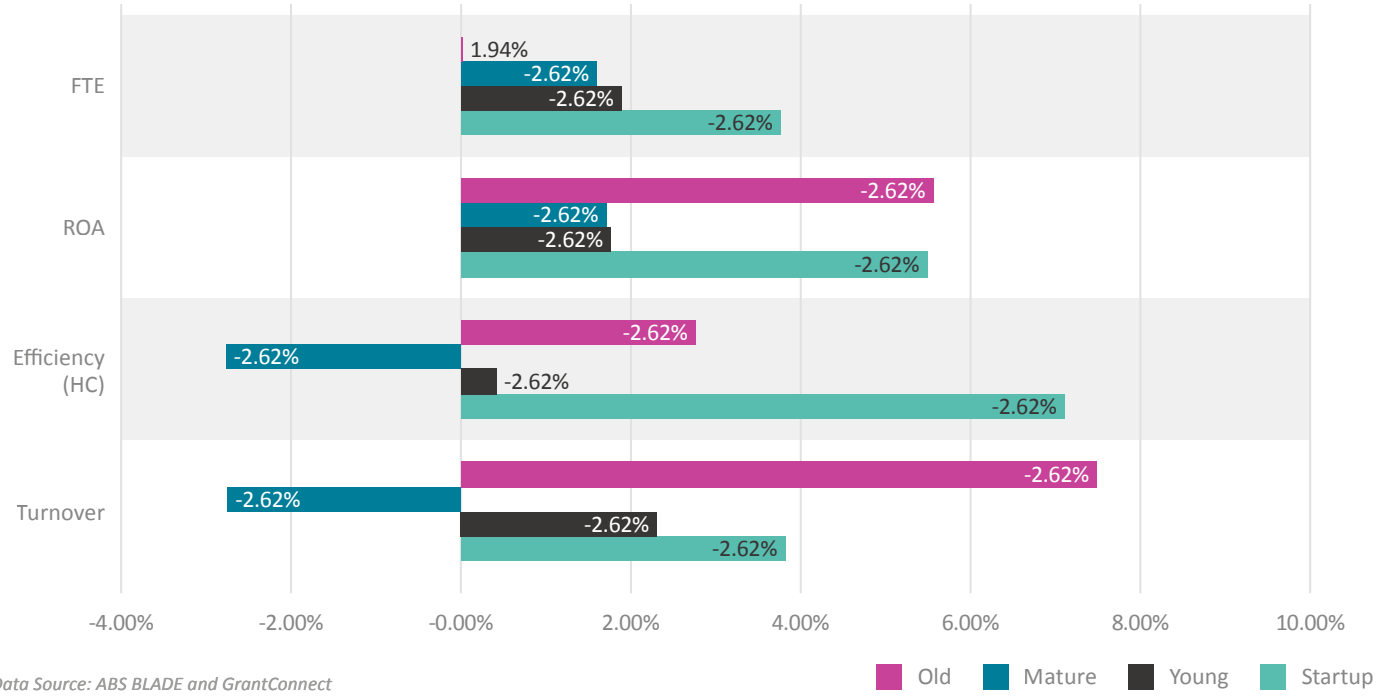
An examination of the effect of Industry Innovation grant value amount on private company employment (FTE), performance, turnover and efficiency and age of business, shows that old companies receive the highest performance (ROA), turnover, and human capital benefits of Industry Innovation grants (5.57 per cent, 7.50 per cent, and 2.76 per cent, respectively), whereas startups receive performance (ROA) benefits of 5.50 per cent and FTE benefits of 3.76 per cent, while young companies only receive FTE benefits of 1.89 per cent.

Figure 4.5 Effect of Industry Innovation grants on private company employment, performance, turnover and efficiency by size of business



Data Source: ABS BLADE and GrantConnect

Figure 4.6 Effect of Industry Innovation grants on private company employment, performance, turnover and efficiency by age of business



Data Source: ABS BLADE and GrantConnect

4.3 Results for Small Business grants

Grants provided under the 'Small Business' category aim to encourage growth of startups and to assist businesses adversely affected by the COVID pandemic, whereas grants under the 'Business Development' category are specifically targeted at small business growth and expansion and aim to stimulate the Australian economy. One type of 'Business Development' grant allows target small businesses to write off up to $30,000 in assets for properties bought and used in the year of application. Another grant type in this category allows small businesses to claim up to $2,100 for improving their cyber security measures.

Regression model results show that for a 100 per cent increase in Small Business grant value amount, small private companies' average return on assets (ROA) increased by 16.8 per cent, turnover by 16.6 per cent, and FTE by 8.3 per cent. However, grant value amounts provided under the 'Small Business' category did not have a significant effect on human capital efficiency.

When we re-estimated the regression models on sales turnover of small businesses (less than $20 million) and large businesses (more than $20 million), we found that doubling of Small Business grant value amount significantly increased employment by 8.15 per cent, turnover by 8.60 percent and human capital efficiency by 1.72 per cent in small businesses. As expected, all measured effects were non-significant in large businesses except for employment, which increased by 2.69 per cent in large businesses.

An examination of the effects of Industry Innovation grant value amount on private company employment (FTE), performance, turnover and efficiency by age of business, showed that all age categories of small businesses received significant FTE benefits from Small Business grants, with young businesses receiving on average the highest FTE benefit (7.60%), followed by startups (4.09%), old (3.62%) and mature (3.48%) companies. Small businesses also received significant turnover benefits, headed by young businesses (up 7.82%) and followed by startups

(5.84%), mature (4.71%) and old (3.28%) companies. While mature companies received significant performance (ROA) and human capital efficiency benefits from Small Business grants (5.16% and 3.63% respectively), startups, young and old businesses were not significantly associated with performance (ROA) and human capital efficiency effects.

4.4 Results for grant selection procedures

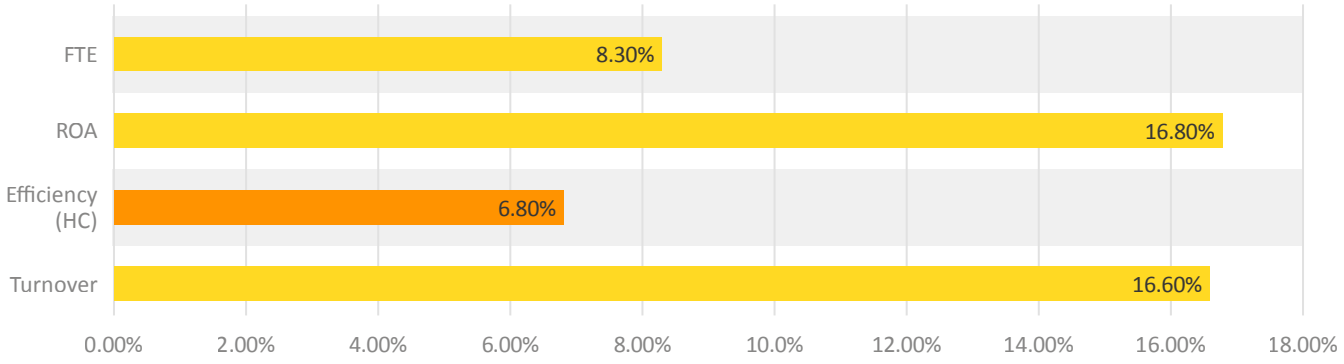
In our first edition White Paper, we noted that the Commonwealth Grants Rules and Guidelines (CGRGs, 2017) emphasised that grants should achieve value for money, be cost effective, and deliver good outcomes and policy objectives. It follows that grant selection processes should be open and competitive and, if not open and competitive, then at least administered fairly, consistently and transparently. Accordingly, the CGRG guidelines state a preference for open and competitive merit-based processes to allocate funding with a view to achieving better outcomes and value for taxpayers' money.

We also detailed a unique measure of competitiveness and openness that we constructed — coarsened exact matching (COM) - for grants administered by the Australian government. The underlying assumption of the COM measure is that more open, competitive processes provide greater levels of scrutiny, probity and accountability. Hence, we define an open application process as one that is publicly advertised and open to any applicants that meet the stated eligibility criteria, while a competitive selection process is defined by multiple applicants competing for a single grant (or for a limited number of grants) with final selection based on merit, in accordance with advertised selection criteria.

Calculation of COM scores was subject to some discretion in the treatment of demand driven and ad-hoc selection processes. As the potential pool of applicants for a demand-driven grant program is not selected by the grant provider, we consider these processes to be akin to open processes. However, they are non-competitive as demand driven grants are provided on an eligibility basis, not on a competitive merit-based assessment. Ad-hoc grants have the greatest use of discretion by government, and specifically ministers. Ad-hoc grants are generally provided directly to recipients to undertake actions of public interest, sometimes with some level of urgency. This process is 'closed', as potential recipients (or organisations that would wish to receive the grant) cannot apply through a formal grant process. Ad-hoc grants are also considered to be non-competitive. While there may be competition that exists informally in the allocation of the grant by government, the fact that this competition does not play out in the grant process itself (and therefore is not subject to the recording requirements of other grant processes) reduces the level of public scrutiny that can apply to the process. Accordingly, they are considered in COM to be non-competitive.

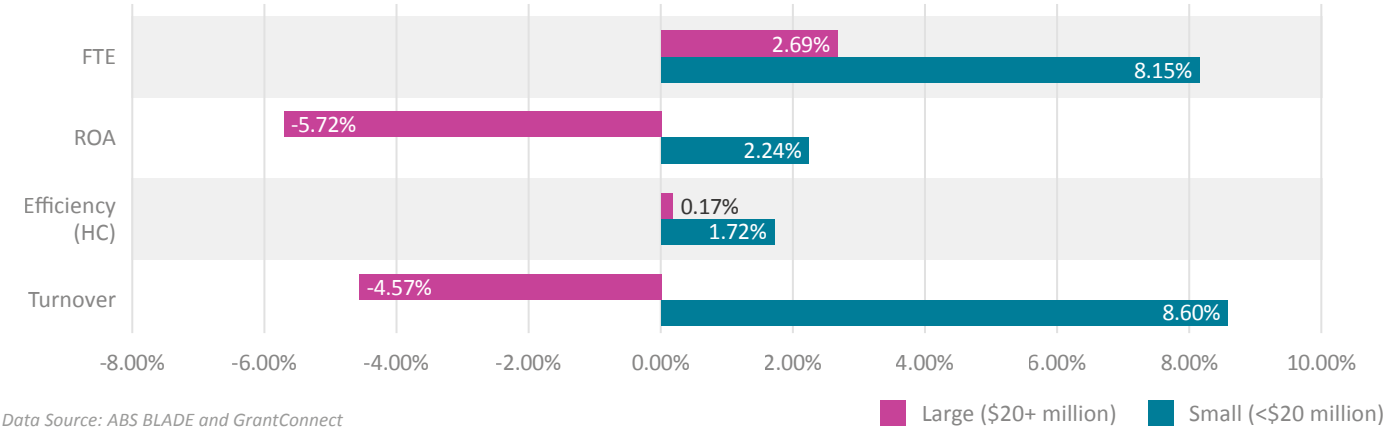
Our CEM matched data demonstrates that direct

Figure 4.7. Effect of small business grants on private company employment, performance, turnover and efficiency



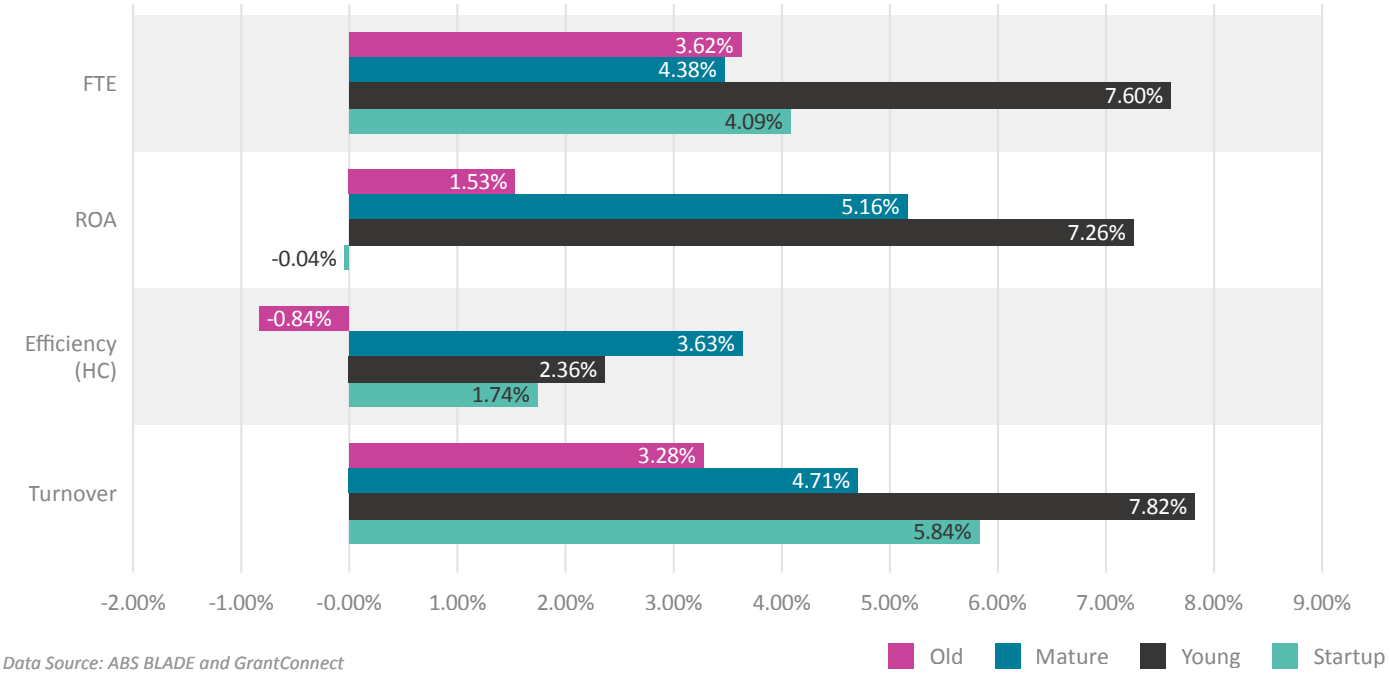
Data Source: ABS BLADE and GrantConnect
Note: Yellow represents statistically significant results, whereas Orange represents statically insignificant results

Figure 4.8. Effects of small business grants on private company employment, performance, turnover and efficiency by size of business



Data Source: ABS BLADE and GrantConnect

Figure 4.9 Effect of small business grants on private company employment, performance, turnover and efficiency by age of business



Data Source: ABS BLADE and GrantConnect

Table 4.1. Impact of business grant selection procedures on grant efficiency

	FTE	ROA	Turnover	Efficiency (HC)	Efficiency (R&D)	Efficiency (HC & R&D)
Grant Competitive	73.10%	2.64%	2.90%	-4.43%	2.89%	-1.78%
Grant Open	9.70%	-4.87%	-6.57%	-5.36%	9.02%	-2.24%
Grant Competitive Open	6.70%	-2.30%	-3.45%	-8.57%	1.43%	-2.54%

Yellow Highlight = significant at the 5 per cent level or lower.

5. Conclusions

financial assistance in the form of business grants is only significantly effective, in improving employment (FTE) when both open and competitive (6.70%) selection procedures are used, whereas both open and competitive selection procedures are not significantly associated with businesses performance (ROA), sales turnover and any of the three efficiency measures. While open selection procedures are also positively and significantly associated with FTE (9.70%), they are negatively and significantly associated with ROA (-4.87%) and sales turnover (-6.57%). Competitive selection procedures are also not significantly associated with any of the efficacy outcome measures used in this study. As stated elsewhere in this report, these results suggest that openness and competitiveness in business grant selection procedures, though objectively desirable, do not on their own guarantee good outcomes. Rather, it is likely that other problems in the selection processes are leading to indifferent and sometimes poor outcomes for Australian taxpayers.

When considering the heterogenous effects of size and age of company on open selection procedures, competitive selection procedures, and on procedures that are both open and competitive, we found that there were no significant differences in outcomes and efficacy between the different selection procedures, as defined by levels of competitiveness and openness. Again, if we accept that openness and competitiveness are likely to positively affect grant outcomes, these results suggest other factors surrounding the selection of grant recipients must be negatively influencing outcomes.

Several key conclusions can be drawn from our empirical results.

First, the evidence indicates that the efficacy of grants is highest when the direct financial assistance package is well targeted towards a certain size and type of business, suggesting each individual grant scheme needs to be optimised and synchronised to the policy objectives it addresses. Second, the majority of businesses (63%) that receive multiple grants can be characterised as having low efficiency and productivity, suggesting that current methods of supporting businesses with direct financial assistance might be problematic because it appears it can create incentives for companies to become 'subsidy businesses' and that providing grants to these businesses could be an unproductive form of support for businesses overall in the Australian economy. Third, direct financial assistance in the form of business grants is on average only significantly effective in improving employment (FTE) when both open and competitive selection procedures are used, whereas open and competitive selection procedures are not significantly associated with any of the other efficacy measures used in this study. This suggests open and competitive processes are not in themselves sufficient to ensure good outcomes, and that other problems with selection procedures are negatively affecting outcomes. Overall, it appears current commonwealth grants selection procedures on average are neither achieving value for money for taxpayers, nor significantly positive results for recipient businesses. Major changes will be required to turn this concerning situation around.

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Appendix A

Key Variable Mean Values

Table A.1. Mean Value of Key Variables by Firm Size

	Mean Total Headcount	Std. dev.	Freq.
Micro (1 – 4 employees)	1.9909279	1.0376078	1,684,177
Small (5 – 19 employees)	9.488123	3.9935828	968,676
Medium (20 – 199 employees)	47.029727	34.042748	368,515
Large (200+ employees)	1,040.6838	4,633.2733	28,505
Total	**19.522073**	**459.14789**	**3,049,873**
	Mean FTE	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	1.2432633	0.88029227	1,684,177
Small (5 – 19 employees)	5.2305542	3.3359363	968,676
Medium (20 – 199 employees)	26.291371	25.601139	368,515
Large (200+ employees)	676.20897	3375.1971	28,505
Total	**11.844654**	**332.83393**	**3,049,873**
	Mean Total Headcount Less FTE	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	0.747665	0.157316	1,684,177
Small (5 – 19 employees)	4.257569	0.657647	968,676
Medium (20 – 199 employees)	20.73836	8.441609	368,515
Large (200+ employees)	364.4748	1258.076	28,505
Total	**7.677419**	**126.314**	**3,049,873**
	Mean Turnover	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	$707,881	139,200,000	1,684,177
Small (5 – 19 employees)	$2,077,147	63,520,568	968,676
Medium (20 – 199 employees)	$11,295,288	199,400,000	368,515
Large (200+ employees)	$409,600,000	12,170,000,000	28,505
Total	**$6,243,347**	**1,185,000,000**	**3,049,873**
	Mean Labour[a] Efficiency	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	0.417672	0.21660108	1,617,404
Small (5 – 19 employees)	0.424395	0.20046729	953,300
Medium (20 – 199 employees)	0.431576	0.19975362	366,341
Large (200+ employees)	0.424977	0.22588209	28,475
Total	**0.421621**	**0.20964049**	**2,965,520**
	Mean R&D Efficiency	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	0.2437195	0.24385237	8,755
Small (5 – 19 employees)	0.2829302	0.21594315	11,440
Medium (20 – 199 employees)	0.2929529	0.18823142	8,836
Large (200+ employees)	0.2230044	0.19615469	967
Total	**0.2725069**	**0.21747569**	**29,998**

	Mean Labour[a] and R&D Efficiency	Std. dev.	Freq.
Micro (1 – 4 employees)	0.38616867	0.33397443	8,447
Small (5 – 19 employees)	0.42477935	0.30524161	11,283
Medium (20 – 199 employees)	0.43263787	0.28351227	8,807
Large (200+ employees)	0.35171491	0.29548567	967
Total	**0.41367619**	**0.30807046**	**29,504**
	Mean Headcount	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	1.9909279	1.0376078	1,684,177
Small (5 – 19 employees)	9.488123	3.9935828	968,676
Medium (20 – 199 employees)	47.029727	34.042748	368,515
Large (200+ employees)	1,040.6838	4,633.2733	28,505
Total	**19.522073**	**459.14789**	**3,049,873**
	Mean ROA	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	93.269276	9674.4496	484,991
Small (5 – 19 employees)	96.912251	14471.046	368,075
Medium (20 – 199 employees)	133.03227	19059.693	153,857
Large (200+ employees)	Suppressed	Suppressed	Suppressed
Total			
	Mean Profit[b]	**Std. dev.**	**Freq.**
Micro (1 – 4 employees)	$265,942	$8,030,072	526,038
Small (5 – 19 employees)	$1,086,775	$47,644,493	389,355
Medium (20 – 199 employees)	$5,625,188	$62,368,025	159,700
Large (200+ employees)	$159,500,000	$1,477,000,000	8,045
Total	**$2,533,778**	**$133,400,000**	**1,083,138**

[a] Labour efficiency is based on headcount (i.e., Full Time Equivalent + Casual)
[b] Profit is calculated as turnover less cost of sales.

Appendix B

Industry Mean Values

Table B.1. Mean Turnover by Industry

	Mean Turnover	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	$1,892,379	$16,348,359	163,193
2. Mining	$51,062,951	$521,000,000	11,052
3. Manufacturing	$10,023,702	$297,000,000	162,236
4. Electricity, Gas, Water and Waste Services	$32,250,336	$411,000,000	10,961
5. Construction	$2,068,791	$23,678,666	528,058
6. Wholesale Trade	$13,752,135	$166,000,000	138,851
7. Retail Trade	$6,668,257	$291,000,000	252,842
8. Accommodation and Food Services	$1,477,588	$20,138,588	235,157
9. Transport, Postal and Warehousing	$4,540,186	$101,000,000	129,646
10. Information, Media & Telecommunications	$9,481,551	$346,000,000	28,465
11. Financial & Insurance Services	$62,630,182	$6,310,000,000	105,797
12. Rental Hiring & Real Estate Services	$3,036,081	$150,000,000	118,379
13. Professional, Scientific & Technical Services	$2,803,894	$147,000,000	431,942
14. Administrative & Support Services	$3,328,094	$65,734,538	136,122
15. Public Administration & Safety	$24,922,338	$433,000,000	15,957
16. Education & Training	$4,172,658	$48,866,983	65,694
17. Health Care & Social Assistance	$2,324,240	$28,403,647	222,941
18. Arts and Recreation Services	$2,702,438	$49,406,849	47,081
19. Other Services	$1,332,300	$25,135,439	231,482
Undefined	$3,164,825	$28,096,719	5,733
Total	**$6,259,950**	**$1,186,000,000**	**3,041,589**

Table B.2. Mean Labour Efficiency by Industry

	Mean Labour Efficiency	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	0.41502582	0.24287696	160823
2. Mining	0.86624795	0.06571072	10959
3. Manufacturing	0.45322572	0.20041007	158630
4. Electricity, Gas, Water and Waste Services	0.60564027	0.21569352	10814
5. Construction	0.41391115	0.18683704	516026
6. Wholesale Trade	0.56666776	0.19455733	136116
7. Retail Trade	0.39975471	0.20691956	247532
8. Accommodation and Food Services	0.43344892	0.19592273	228468
9. Transport, Postal and Warehousing	0.40678347	0.18675891	125948
10. Information, Media & Telecommunications	0.30540991	0.21518583	27627
11. Financial & Insurance Services	0.33179205	0.18804486	102167
12. Rental Hiring & Real Estate Services	0.40050674	0.22011191	114741
13. Professional, Scientific & Technical Services	0.39276812	0.19735204	416814
14. Administrative & Support Services	0.43169867	0.21096144	132167
15. Public Administration & Safety	0.70061476	0.11910107	15667
16. Education & Training	0.43639001	0.23063597	64198
17. Health Care & Social Assistance	0.46641679	0.20177559	219229
18. Arts and Recreation Services	0.43516424	0.20143064	46203
19. Other Services	0.36986121	0.21063759	225771
Undefined	0.31927222	0.21116653	5620
Total	**0.4216211**	**0.20964049**	**2965520**

Table B.3. Mean R&D Efficiency by Industry

	Mean R&D Efficiency	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	0.29241039	0.23978046	669
2. Mining	0.19509583	0.21377703	763
3. Manufacturing	0.30423927	0.19727927	5,931
4. Electricity, Gas, Water and Waste Services	0.26565646	0.25319203	246
5. Construction	0.3359267	0.23267421	1,019
6. Wholesale Trade	0.30897942	0.20747487	2,568
7. Retail Trade	0.28277874	0.21940333	1,165
8. Accommodation and Food Services	0.39193247	0.30746385	198
9. Transport, Postal and Warehousing	0.27192132	0.26747979	267
10. Information, Media & Telecommunications	0.26377087	0.23411849	1,244
11. Financial & Insurance Services	0.19748725	0.19994498	1,149
12. Rental Hiring & Real Estate Services	0.21552452	0.23972883	573
13. Professional, Scientific & Technical Services	0.24629892	0.20314871	11,669
14. Administrative & Support Services	0.26890067	0.24353547	686
15. Public Administration & Safety	0.42212409	0.34833662	80
16. Education & Training	0.30014463	0.26746325	339
17. Health Care & Social Assistance	0.30419132	0.23010409	637
18. Arts and Recreation Services	0.32103834	0.33131667	137
19. Other Services	0.36653668	0.24540158	589
Undefined	0.27170777	0.31902417	69
Total	**0.27250693**	**0.21747569**	**29,998**

Table B.4. Mean R&D and Labour Efficiency by Industry

	Mean R&D and Labour Efficiency	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	0.32527228	0.25845091	668
2. Mining	0.17346562	0.227579	758
3. Manufacturing	0.54840498	0.2889372	5,874
4. Electricity, Gas, Water and Waste Services	0.34729916	0.28566151	242
5. Construction	0.58992655	0.31093268	1,009
6. Wholesale Trade	0.31905699	0.20389281	2,542
7. Retail Trade	0.44631819	0.31504859	1,150
8. Accommodation and Food Services	0.44048298	0.31552009	193
9. Transport, Postal and Warehousing	0.30356513	0.29144357	265
10. Information, Media & Telecommunications	0.31340484	0.25204106	1,209
11. Financial & Insurance Services	0.19842132	0.21966186	1,131
12. Rental Hiring & Real Estate Services	0.31733184	0.27462898	563
13. Professional, Scientific & Technical Services	0.4151498	0.32226489	11,401
14. Administrative & Support Services	0.32290934	0.27613179	678
15. Public Administration & Safety	0.60651462	0.30551795	80
16. Education & Training	0.36738738	0.26908301	330
17. Health Care & Social Assistance	0.33748059	0.26104556	624
18. Arts and Recreation Services	0.60500118	0.35992125	137
19. Other Services	0.41356566	0.25257481	588
Undefined	0.41146299	0.3309259	62
Total	**0.41367619**	**0.30807046**	**29,504**

Appendix B

Industry Mean Values

Table B.5. Mean Headcount by Industry

	Mean Headcount Efficiency	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	8.1371995	46.441156	163,193
2. Mining	42.871697	226.19716	11,052
3. Manufacturing	21.205392	108.75846	162,236
4. Electricity, Gas, Water and Waste Services	37.177903	268.18315	10,961
5. Construction	7.5616144	37.909274	528,058
6. Wholesale Trade	18.542942	199.59509	138,851
7. Retail Trade	22.679614	897.45866	252,842
8. Accommodation and Food Services	21.81426	122.09886	235,157
9. Transport, Postal and Warehousing	14.855591	265.13846	129,646
10. Information, Media & Telecommunications	26.103601	365.57155	28,465
11. Financial & Insurance Services	23.009556	473.82733	105,797
12. Rental Hiring & Real Estate Services	11.074937	142.11402	118,379
13. Professional, Scientific & Technical Services	10.643779	97.771985	431,942
14. Administrative & Support Services	37.59911	419.23767	136,122
15. Public Administration & Safety	383.66147	4385.5048	15,957
16. Education & Training	60.237054	585.44428	65,694
17. Health Care & Social Assistance	30.02498	331.0924	222,941
18. Arts and Recreation Services	22.156156	134.42768	47,081
19. Other Services	10.297163	81.854376	231,482
Undefined	15.817548	113.38168	5,733
Total	**19.562742**	**459.77155**	**3,041,589**

Table B.6. Mean ROA by Industry

	Mean ROA	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	*	*	*
2. Mining	*	*	*
3. Manufacturing	22.78686	1533.865	84,889
4. Electricity, Gas, Water and Waste Services	*	*	*
5. Construction	112.3584	13069.5	214,211
6. Wholesale Trade	*	*	*
7. Retail Trade	39.22231	4039.293	112,087
8. Accommodation and Food Services	107.399	5950.338	87,791
9. Transport, Postal and Warehousing	264.1031	17389.89	33,009
10. Information, Media & Telecommunications	24.11508	1212.636	11,514
11. Financial & Insurance Services	*	*	*
12. Rental Hiring & Real Estate Services	169.8526	20058.52	25,982
13. Professional, Scientific & Technical Services	49.82304	3057.363	134,132
14. Administrative & Support Services	150.902	13207.2	37,489
15. Public Administration & Safety	6.864795	89.68999	3,921
16. Education & Training	27.62877	791.3808	12,806
17. Health Care & Social Assistance	223.3763	19481.63	37,685
18. Arts and Recreation Services	35.36811	1178.577	12,037
19. Other Services	52.50252	2946.311	67,126
Undefined	1.899164	44.37298	1,478
Total[#]	**1288.202137**	**104050.5618**	**876157**

[*] Indicates data is suppressed by ABS DataLab. Totals including this data cell exclude grants that are suppressed.
[#] Total affected by suppression of data from ABS DataLab. Totals and averages are only for observable sample of grants.

Table B.7. Mean Profit by Industry

	Mean Profit	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	$1,820,092	$11,659,067	21,014
2. Mining	$52,112,278	$589,900,000	3,697
3. Manufacturing	$5,431,775	$262,900,000	89,179
4. Electricity, Gas, Water and Waste Services	$5,252,008	$55,104,894	4,257
5. Construction	$1,112,712	$9,852,798	229,887
6. Wholesale Trade	$4,719,185	$107,600,000	89,357
7. Retail Trade	$1,732,945	$233,900,000	119,741
8. Accommodation and Food Services	$1,067,836	$12,423,472	96,187
9. Transport, Postal and Warehousing	$4,222,417	$104,900,000	35,579
10. Information, Media & Telecommunications	$9,829,109	$414,300,000	12,105
11. Financial & Insurance Services	$9,016,382	$213,800,000	25,682
12. Rental Hiring & Real Estate Services	$2,460,572	$87,348,646	27,474
13. Professional, Scientific & Technical Services	$1,585,028	$36,609,418	142,497
14. Administrative & Support Services	$1,282,322	$29,733,864	40,338
15. Public Administration & Safety	$2,338,238	$21,156,854	4,202
16. Education & Training	$1,004,460	$10,930,888	13,625
17. Health Care & Social Assistance	$1,167,692	$10,902,492	40,092
18. Arts and Recreation Services	$2,803,290	$81,303,479	12,565
19. Other Services	$862,185	$12,257,814	72,182
Undefined	$3,248,315	$35,149,671	1,593
Total	**$2,538,064**	**$133,600,000**	**1,081,253**

Table B.8. Mean FTE by Industry

	Mean FTE	Std.dev.	Freq
1. Agriculture, Forestry & Fishing	3.9692123	39.064841	163,193
2. Mining	37.095408	214.2411	11,052
3. Manufacturing	16.1929	97.487813	162,236
4. Electricity, Gas, Water and Waste Services	32.292959	256.71618	10,961
5. Construction	5.4509471	33.650912	528,058
6. Wholesale Trade	14.073921	151.75778	138,851
7. Retail Trade	11.847306	495.60812	252,842
8. Accommodation and Food Services	7.4002635	54.693692	235,157
9. Transport, Postal and Warehousing	11.198974	240.04297	129,646
10. Information, Media & Telecommunications	16.513656	332.09426	28,465
11. Financial & Insurance Services	16.816606	375.74559	105,797
12. Rental Hiring & Real Estate Services	6.9836277	59.057866	118,379
13. Professional, Scientific & Technical Services	7.7429228	84.147548	431,942
14. Administrative & Support Services	14.609415	175.8347	136,122
15. Public Administration & Safety	308.23569	3653.0971	15,957
16. Education & Training	28.712905	328.20774	65,694
17. Health Care & Social Assistance	17.202041	235.49314	222,941
18. Arts and Recreation Services	7.7098138	69.780877	47,081
19. Other Services	6.8548283	61.354286	231,482
Undefined	9.9322182	76.475453	5,733
Total	**11.873588**	**333.28635**	**3,041,589**

Appendix C

Grant Scheme Comparisons

Table C.1. Grant Scheme Comparisons (All Businesses)

		FTE	ROA	Turnover	Efficiency (HC)	Efficiency (R&D)	Efficiency (HC & R&D)
All Grants	Impact	3.67%	2.59%	1.99%	0.82%	-1.58%	-1.48%
Industry Innovation	Impact	0.86%	2.93%	2.02%	0.44%	2.12%	0.88%
Small Business	Impact	8.30%	16.80%	16.60%	6.80%		

Table C.2. Grant Scheme Comparisons by Size of Business

		FTE	ROA	Turnover	Efficiency (HC)	Efficiency (R&D)	Efficiency (HC & R&D)
All Grants	Small	3.63%	0.32%	0.32%	2.21%	-2.39%	-1.82%
	Medium	0.31%	0.77%	0.23%	0.30%	-0.90%	-2.76%
	Large	2.96%	4.96%	2.37%	1.81%	-4.27%	-0.33%
Industry Innovation	Small	0.49%	0.27%	0.21%	-0.82%	-2.15%	-2.62%
	Large	1.94%	9.53%	5.60%	3.44%	-5.07%	-11.67%
Small Business	Small	8.15%	2.24%	8.60%	1.72%		
	Large	2.69%	-5.72%	-4.57%	0.17%		

Table C.3. Grant Scheme Comparisons by Age of Business

		FTE	ROA	Turnover	Efficiency (HC)	Efficiency (R&D)	Efficiency (HC & R&D)
All Grants	Startup	5.10%	2.73%	2.01%	-0.92%	-0.53%	1.55%
	Young	3.80%	2.59%	2.44%	0.15%	5.99%	10.10%
	Mature	2.08%	1.89%	0.30%	-1.38%	-12.70%	0.06%
	Old	1.30%	3.46%	4.49%	1.53%	5.71%	4.80%
Industry Innovation	Startup	3.76%	5.50%	3.82%	7.11%		
	Young	1.89%	1.77%	2.31%	0.41%		
	Mature	1.60%	1.71%	-2.74%	-2.76%		
	Old	0.02%	5.57%	7.50%	2.76%		
Small Business	Startup	4.09%	-0.04%	5.84%	1.74%		
	Young	7.60%	7.26%	7.82%	2.36%		
	Mature	3.48%	5.16%	4.71%	3.63%		
	Old	3.62%	1.53%	3.28%	-0.84%		

Yellow Highlight = significant at the 5 per cent level or lower.

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