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Impact of Austrade Tailored Services 2012-16

A Report prepared for
Australian Government
Australian Trade and Investment Commission

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Executive Summary

Introduction

The Australian Trade and Investment Commission (Austrade) commissioned the Centre for Transformative Innovation, at Swinburne University of Technology in partnership with the Australian Bureau of Statistics (ABS) in December 2018 to evaluate and quantify the impact their tailored services provided to Australian organisations have on export outcomes. We utilised the Business Longitudinal Analytical Data Environment (BLADE) at the ABS and linked program participants via their Australian Business Number (ABN) to the ABS Business Activity Statement (BAS) in the ABS' BLADE database.

The primary objective of this evaluation was to estimate the impacts on exports and employment of firms receiving tailored services from Austrade over the period of 2 July 2012 to 30 June 2016.

1. Tailored services offered by Austrade provides customised information to firms based on their requirements. Austrade uses their external network of industry players to facilitate easier networking opportunities.
2. Services also include market research, potential customer or partner identification, market visits and trade missions.
3. The evaluation comprised 2,842 organisations which had sufficient information on business performance characteristics in the BLADE database to include in the analysis.
4. The method employed was a robust quasi-experimental method known as matched difference-in-differences analysis which compared the change in export and employment performance before and after program participation of the 2,842 organisations receiving tailored services to the change in the performance of matched/similar firms. We compared these firms to a control group drawn from 5,880 firms who engaged with Austrade to receive general information and advice on exporting with the restriction that were also in existence by the 2011-12 fiscal year.¹

¹ A second control group was drawn from the 1,272,655 economically active firms across Australia that were in existence by 2011-12. However, these firms are less likely to have the same export intentions as firms seeking general information from Austrade.

Key finding 1

The Austrade tailored services have a positive and significant (statistically and in terms of magnitude) impact on firms using these services.

These estimates are robust to variation in the main assumptions underlying the empirical model, particularly on how the control groups are defined. The key findings are:

- Export sales increase between 26 to 31 per cent in the (first three) fiscal year(s) following obtaining tailored services when compared to the counterfactual of not obtaining such services. This equates to A\$8.1 to A\$9.6 million per annum per firm or an estimated A\$23 to A\$27 billion in additional annual exports.
- Tailored service participation is followed in the subsequent three fiscal years by an increase in employment of 3 to 4 per cent. This equates to 21 to 28 jobs per firm.
- The proportion of tailored service recipients who are exporting rose from 57.8 per cent (before using tailored services) to an estimated 66.8 to 67.8 per cent in the following three years.

Key finding 2

- Small to Medium Enterprises (SMEs) experience significant benefits from the tailored services. The average export sales increased by 60 to 64 per cent, the average share of export participation increased 14 percentage points, and employment increased 8 to 9 per cent. Tailored services are estimated to help SMEs create an additional A\$2.3 to A\$2.4 million per year.

Key finding 3

- Firms in the resource and manufacturing sectors have benefited largely from Austrade in regards to increases in export sales. On average, firms in resources increased exports by 118 to 123 per cent in the first three fiscal years after receiving tailored services. This translates into an additional A\$281 to A\$292 million per year for firms in the sector.
- Manufacturing firms experienced increased export sales on average of 60 to 65 per cent in the first three fiscal years following the completion of the tailored services. The impact of tailored services is estimated to generate an average increase of A\$20.1 to A\$21.8 million in additional export sales for manufacturing firms.

- Service sector firms experienced positive increase in export sales of between 27 and 28 per cent for firms in health and education and 23 and 37 per cent for all other service sector firms in the up to three subsequent fiscal years after receiving tailored services. This translates into an average additional A\$14.3 to A\$14.9 million of exports for firms in the health and education sector and an additional A\$1.2 to \$1.9 million in exports for all other service sector.

Recommendations

1. A continuation and expanded promotion of the tailored services offered by Austrade is strongly recommended for firms with similar characteristics to those which have received services.
2. Continued review of the results for the resource sector are strongly recommended to confirm the robustness of the findings given the continued volatility in resource prices.
3. A further exploration of 3rd party effects of Austrade services can help capture the full impact of tailored services. These effects can be generated in two ways:
 - Spillovers (eg. firms share information and technology within their industry due to employment turnover)
 - External economies (eg. suppliers for exporting firms benefit due to increased demand for their own goods and services)
4. Given that Austrade is providing a subsidised service to firms, a creation of a system or process for firms to pass information back to Austrade such as information on new industry contacts will allow the services to have the maximum benefit to the Australian economy.
5. The impact evaluation framework can be improved by:
 - Maintaining records of the type(s) of activities firms engaged in for the tailored service. This would allow for an evaluation of the impact of individual activities given a sufficiently large sample size.
 - Surveying firms on their perceptions of the success of the services can provide a benchmark in which to compare the statistical findings.
 - Continuing to collect information on firm participation into the tailored services will provide larger samples and thus more nuanced analyses such as more disaggregated industry divisions

within sectors (education, wholesale trade, etc.) and export market destinations (Asia, Europe, Other) can be more accurately assessed.

- Combining the evaluation with data on other business programs offered either by the Commonwealth Government or various state agencies. This will test whether the programs are complements or substitutes. These could include state-level trade missions, training, innovation, networking, and infrastructure programs.
- Collecting information on export destination. Export destination data collected from the trade mission and expo participants, or Australian Customs database can provide further evidence of the tailored service impact.
- Implementation of a true randomised experimental design by randomising which firms receive services.

1. Introduction

1.1 Objective, scope and deliverables

The key objective of the evaluation study detailed in this report is to assess the impact that tailored services provided by the Australian Trade and Investment Commission (Austrade) has on firms' export revenues and employment. The impact covers the period from 2 July 2012 through 30 June 2016.

Austrade has engaged the Centre for Transformative Innovation (CTI) at Swinburne University of Technology in partnership with the Australian Bureau of Statistics (ABS) to develop a framework to assess the effect of tailored services. This framework allows us to quantify the effect by linking the firms using both the tailored and general services into the ABS's Business Longitudinal Analytical Data Environment (BLADE). Specifically, business performance information within the Business Activity (BAS) database is linked with the service participation using firms' Australian Business Number (ABN) and financial year of participation as the key linking variables. The linked Austrade participation data and BLADE databases provide objective information on sales, wages, exports and assets of both participants and non-participants collected from businesses' taxation records. The objective nature of the information is critical for obtaining robust and unbiased estimates of the effects. The BLADE BAS data held by the ABS are brought into the ABS under the Census and Statistics Act 1905 and are subject to the same confidentiality requirements as directly collected ABS data.

The impact evaluation study utilises difference-in-differences analysis with unmatched and matched non-participating firms in Australia as the control group. The analysis uses two different control groups in the study. The preferred control group are firms who have signalled a potential interest in exporting or expanding their export market by obtaining general services from Austrade, but not undertaking any tailored services. The second control group is the total pool of economically active firms in Australia which did not receive any tailored services from Austrade.²

The study exploits linked business level records in the Australian Trade and Investment Commission database and Australian Bureau of Statistics (ABS) Business Longitudinal Analysis Data Environment (BLADE). The BLADE data used for the current study is based on a consolidated ABS business unit³ that takes into account two different scenarios⁴:

² The use of different types of control groups and, for each type, matched and unmatched, allows us to assess the significance of any selection bias to the impact estimates.

³ Also called the Type of Activity Unit. In theory, the consolidated business unit more accurately measures business performance and hence provides a more accurate estimate of the impact of the tailored services.

⁴ Due to simultaneous combining and splitting of ABNs to Type of Activity Units as well as non-matches, the number of firms obtaining tailored services represented in BLADE will not match the number of firms found in the Austrade administrative database.

1. Multiple ABNs belonging to the same business activity.
2. Single ABNs that need to be apportioned over several business activity units for the underlying Business Activity Statement and Business Income Tax measures that we used in the analysis.

Although the sample size of firms receiving tailored services from Austrade is sufficient for an overall impact as well as extensions that look at broad industry sectors (i.e. manufacturing, resources and services), the sample size for certain industries at this time limits the scope of the report. Further as some firm characteristics such as firm age are not fully reported within the BLADE dataset, these remain outside the scope of the report.

This evaluation is amongst the first attempts in Australia to evaluate the impact of a government fee-for-service program using large-scale administrative data. The access to previously unavailable unit record tax information within BLADE represents a unique opportunity to further refine and improve existing government services.

1.2 Report outline

The remainder of this report is structured as follows. Section 2 provides a brief overview of the tailored and general services that Austrade provides to organisations. Section 3 introduces the difference-in-differences methodology and describes the primary database, the ABS BAS database, to measure export performance and evaluate the tailored services impacts. A summary of select economic characteristics of firms who received and those not receiving tailored services is provided. Section 4 presents the key empirical findings. Section 5 concludes with the key findings and detailed recommendations. Also included are three technical appendices. Appendix 1 provides background on the project. Technical discussions of the methodology are provided in Appendix 2. Detailed empirical results are shown in Appendix 3.

2. Austrade Tailored and General Services

2.1 Austrade Tailored Services

Austrade provides tailored services to Australian organisations that need support to either begin exporting or expanding their export markets in new markets. This support can be as simple as business intelligence research such as providing data on market trends, but can involve developing overseas partnerships and facilitating offshore trade missions. Austrade provides these services at a uniform fee of A\$275 per hour.

The evaluation aims to estimate the impact of tailored services taken by organisations and completed between 2012-13 and 2015-16 fiscal years. The impact measure is based on the export performance of participating organisations.

Tailored services offered by Austrade are categorised into five general areas⁵:

- Market or country research which will help with specific exporting issues including gathering data on market trends, identifying market barriers and regulations, assessing market potential or gathering information and advice on the suitability of a product or service.
- Potential partner and customer identification which will help with identifying local contacts in international markets to assist with importing, distributing and supporting Australian products or services in the foreign market.
- Creating appointments during market visits with potential partners or customers that will maximise the value of Australian firms when overseas.
- Follow-up to initial introductions which Austrade uses to gather information from potential customers or partners on their assessment of the Australian organisations product or service.
- Market promotions which allow organisations to travel overseas that can facilitate introductions to new partners or customers.

Table 2.1 lists examples of destination of market promotions, as of March 2019, that could be captured in any future updates to this report.

⁵ Compiled from <https://www.austrade.gov.au/Australian/How-Austrade-can-help/trade-services>

Table 2.1: Examples of international events offered by Austrade

Period	Destination	Description
February 2019	Mexico, Brazil, Colombia, Peru and Chile	Australia Future Unlimited mission to the FPP Eduexpos Latin America 2019 showcases the opportunities Australian education brings to Latin America.
March 2019	China	Austrade China International School Outreach Program. Series of half day educational events co-hosted with Austrade in which Australian universities meet with school counsellors and prospective students.
March 2019	Korea and Taiwan	Australian Premium Food & Beverage Showcase. Austrade invites new and existing exporters to the showcase which is designed to create new business opportunities through in-depth market briefing, site visits, meetings and industry networking.
March 2019	Poland	Wine Tasting in Poland allows businesses to grow brand awareness in Poland.
March 2019	Singapore	Australian Fintech Mission to Money 20/20. An opportunity to connect with industry leaders in Asia Pacific's financial technology ecosystem.

Source: Compiled from <https://www.austrade.gov.au/Events/events> (checked as of 08-Mar-2019)

2.2 Austrade General Services

In addition to the tailored services, Austrade provides organisations general market tips for exporting and how to do business in international market. These services can include general market briefings, cultural tips on conducting overseas business, information on local practices and requirements, referrals to specialist business services, strategic advice, and assistance for setting up a business in an international market.

2.3 Participants between 2012-13 and 2015-16

This evaluation utilises the Austrade's administrative data of tailored and general service participants. The Austrade database provides participant-level details of the participating organisations. Specifically, the database contains:

- Organisation names and ABNs
- The industry sector of the participants
- Type of request (general or tailored)

Table 2.2 Number of organisations engaged with Austrade between 2012-13 and 2015-16 in administrative data

	General Services	Tailored Services	Total
Firms Accessing Austrade Services			
Resources	685	208	893
Manufacturing	1,640	464	2,104
Services	4,996	1,847	6,843
Total	7,321	2,519	9,840

Notes: Computed based on Austrade administrative data merged by ABN to the Australian Business Register. General Services lists firms receiving only general services. Tailored Services includes firms receiving at least one tailored service. Excludes 124 firms with an unknown industry in the ABR.

Table 2.2 provides a table of organisations that were engaged with Austrade between 2012-13 through 2015-16. The table provides a breakdown of the firms both by the type of services they received and the type of operations of their primary ANZSIC sector. Based on the administrative data from Austrade, the table shows that 9,840 firms have engaged with Austrade to receive either general or tailored services in the 2012-13 through 2015-16 fiscal years. Of these firms, 2,546 received at least one tailored service and the remaining 7,418 firms received at least one general service offered by Austrade.⁶ Looking at the firms receiving tailored services, 208 were in resource extraction, 464 in manufacturing, and 1,847 in services. Likewise for firms receiving only general services, 685 were in the resource sector, 1,640 in manufacturing, and 4,996 in services.

The number of services provided by Austrade has risen 30.8 per cent between 2012-13 and 2015-16 financial years. Table 2.3 lists the number of Austrade services that have been provided to firms in the administration dataset. The table shows the upward trend in both tailored and general services provided. Within the broad industry sectors, firms in the Service Industry seeking services grew faster than those in resources and manufacturing. The number of services provided exceeds the number of firms receiving services as organisations may receive multiple services over the period. However, the count is below the total number of tailored services provided by Austrade. This is due to the fact that several firms received multiple services within a year. In those situations, we count having received multiple services within a fiscal year equivalent to having received one service only.

⁶ 2,046 of the organisations receiving tailored services also received general services during the period.

Table 2.3 Number of Austrade services provided between 2012-13 and 2015-16 in administrative data

	2012-13	2013-14	2014-15	2015-16	2012-2013 to 2015-16
Austrade Services per year					
Only tailored services	303	304	297	318	1,222
Both tailored and general services	452	756	676	648	2,532
Only general services	2,654	3,570	3,035	3,495	12,754
Total	3,409	4,630	4,008	4,461	16,508
...in Resources					
Only tailored services	31	26	31	20	108
Both tailored and general services	32	55	57	57	201
Only general services	262	361	274	324	893
Total	325	442	362	401	1530
...in Manufacturing					
Only tailored services	48	40	36	51	175
Both tailored and general services	84	138	109	132	463
Only general services	695	839	725	819	3,078
Total	827	1,017	870	1,002	3,716
...in Services					
Only tailored services	222	231	226	246	925
Both tailored and general services	335	559	500	453	1,847
Only general services	1,671	2,327	2,009	2,309	8,316
Total	2,228	3,117	2,735	3,008	11,088

Notes: Computed based on Austrade administrative data merged by ABN to the Australian Business Register. Industry numbers may differ from industry classification in the Austrade database due to differences in industry classification in the Australian Business Register.

3. Evaluation method and data

3.1 Difference-in-differences analysis with matching

We implement difference-in-differences (DID) analysis with a further refinement that the control group is selected by matching the economic characteristics of participant and non-participants.⁷ The basic idea is to compare the business performance of participants to their pre-service performance. We normalise this change in performance by comparing it to the change in performance of non-participants. In this manner, we compare firm performance to a simulated situation in which they had not received a tailored service.

As firms who use Austrade services are not randomly selected, it is not feasible to observe the true change in firm performance by comparing the results to a random selection of firms not using services. A control group needs to be constructed using the characteristics of non-participating firms that is as closely matched to the characteristics of participating firms as possible prior to accessing Austrade tailored services. We use two pools of firms as potential control groups. The first group are firms who have received general services from Austrade, but had not subsequently engaged with Austrade for tailored services. The second control group is the pool of all economically active firms in Australia.⁸ The first pool is our preferred comparison group as these firms accessing general services from Austrade signal a potential willingness to export or expand their goods and services. This signal is otherwise not fully captured in the ABS BLADE database.

We consider three measures of performance: Export Sales, Export Participation, and Employment.

3.2 Data

From the discussion above, to solve the problem above and obtain unbiased estimates of the impacts of tailored services, we need financial performance data on firms seeking tailored and general services as well as all firms more broadly. This allows us to explore the outcomes of firms receiving tailored services compared to both control groups. To construct the above measures, we use business performance measures available from Business Activity Statement (BAS) database within the Australian Bureau of Statistics' Business Longitudinal Analytical Data Environment (BLADE). The BAS component contains all annual tax records provided by businesses with Australian Business Numbers (ABN) in Australia since 2001-02 to comply with their GST obligations.^{9 10}

⁷ A more technical discussion of the method and its implementation is provided in Appendices 2 and 3

⁸ Economically active firms are defined as firms which have sales turnover or a non-zero headcount in a given fiscal year. This is similar to the ABS definition used in the Business Characteristics Survey which defines economically active firms as those that have a registered ABN and an active tax role.

⁹ We begin the analysis with the 2004-2005 fiscal year due to the start of the tailored service data in the 2012-2013 fiscal year.

¹⁰ Note that the ABS BLADE and its component BAS database is large and complex and can only be accessed by approved researchers indirectly via staff from within the ABS. The database is confidential and non-ABS analysts cannot see the data.

BLADE provides several indicators of business performance derived from Business Activities Statements (BAS) such as value of exports of goods and services from Australia that are GST-free; and sales and turnover for more than 2 million active businesses in Australia based on linked databases such as the Australian Taxation Office (BIT and BAS), ABS Business Characteristics Survey database and the IP Australia intellectual property rights protection data. Sales and turnover information are particularly valuable for small firms that are heavily reliant on export revenues.

For the evaluation, the identified GST-free export sales¹¹ from the BAS is the most direct measure of export performance.¹² Exported goods are GST-free if they are exported from Australia within 60 days of one of the following, whichever occurs first: the supplier receives payment for the goods and services or the supplier issues an invoice for the goods and services. Other exports generally include supplies of things other than goods or real property for consumption outside Australia, such as services, various rights, recreational boats, financial supplies and other professional services.

The data also provides good coverage for a large class of service exports. Generally a supply of a services is GST-free if the recipient of the service is outside Australia and the use of the service is outside Australia. Examples include any consultancy services, contract research or business services undertaken in Australia, but paid for by an overseas company. Exceptions include health, tourism and education services consumed in Australia.¹³ While these services can be GST-free, they would be recorded in those in cases as “Other GST-Free Sales” or if they charge GST, would not be included in the BAS database under export sales.

In summary, export sales on the BAS statement for services include:

- The free on-board value of exported goods that meet the GST-free export rules such as consulting services
- Payments for the repairs of goods from overseas that are to be exported, and
- Payments for goods used in the repair of goods from overseas that are to be exported

Results are only released to non-ABS people after careful scrutiny of the output to ensure no confidential business records can be identified. These access limitations do not affect the quality of the empirical analysis due to our detailed and thorough analysis. They do however make the estimation process more costly both financially and in terms of time.

¹¹ GST-free means the business does not include GST in the price of its product or service. The business can also claim credits for the GST included in the price of purchases it used to make its GST-free sales.

¹² The Business Income Tax (BIT) component of BLADE also includes net foreign income. However, the measurement mixes both sales and investment income which makes it more difficult to disentangle how much the net foreign income represents export performance. Due to this complication, we do not use net foreign income for this evaluation.

¹³ These sectors are still included in the current analysis, but with health and education services, we use an outcome measure for sales that includes sales from other GST-free services.

Export Sales in the BAS statement does not include:

- Amounts for GST-free services (such as health and education) unless they relate to the repair, renovation, modification or treatment of goods from overseas whose destination is outside Australia.
- Amounts for freight and insurance for transport of the goods outside Australia, or other charges imposed outside Australia in the free on-board value.
- Amounts for international transport of goods or international transport of passengers.

The points above suggest that the measured export sales for the service sector can be underestimated relative to measured goods export sales. However, the fact that the service export sales is underestimated does not guarantee that the impact of tailored services is also underestimated. If the extent of underestimation remains constant before and after receiving tailored services or does not vary by participation in the services, the evaluation will still produce unbiased estimates (especially when expressed as a relative change) of the program impact.

As discussed earlier, the BAS component of the BLADE dataset contains information from all tax records provided by businesses with ABNs within Australia. However, firms and organisations can use one or multiple ABNs to conduct business across multiple industries. To standardise their analysis, the ABS uses an “Economic Units Model” that attempts to classify organisations across several “type of activity units” (TAUs).¹⁴ This model is both complicated and confidential. Situations can arise where financial data from several ABNs are aggregated into one TAU as well as cases where the economic activity in one ABN is split across several TAUs. This relationship is not publicly available to researchers outside of the ABS and can result in differences in the number of organisations in summary statistics between the administrative data and the BLADE dataset.¹⁵

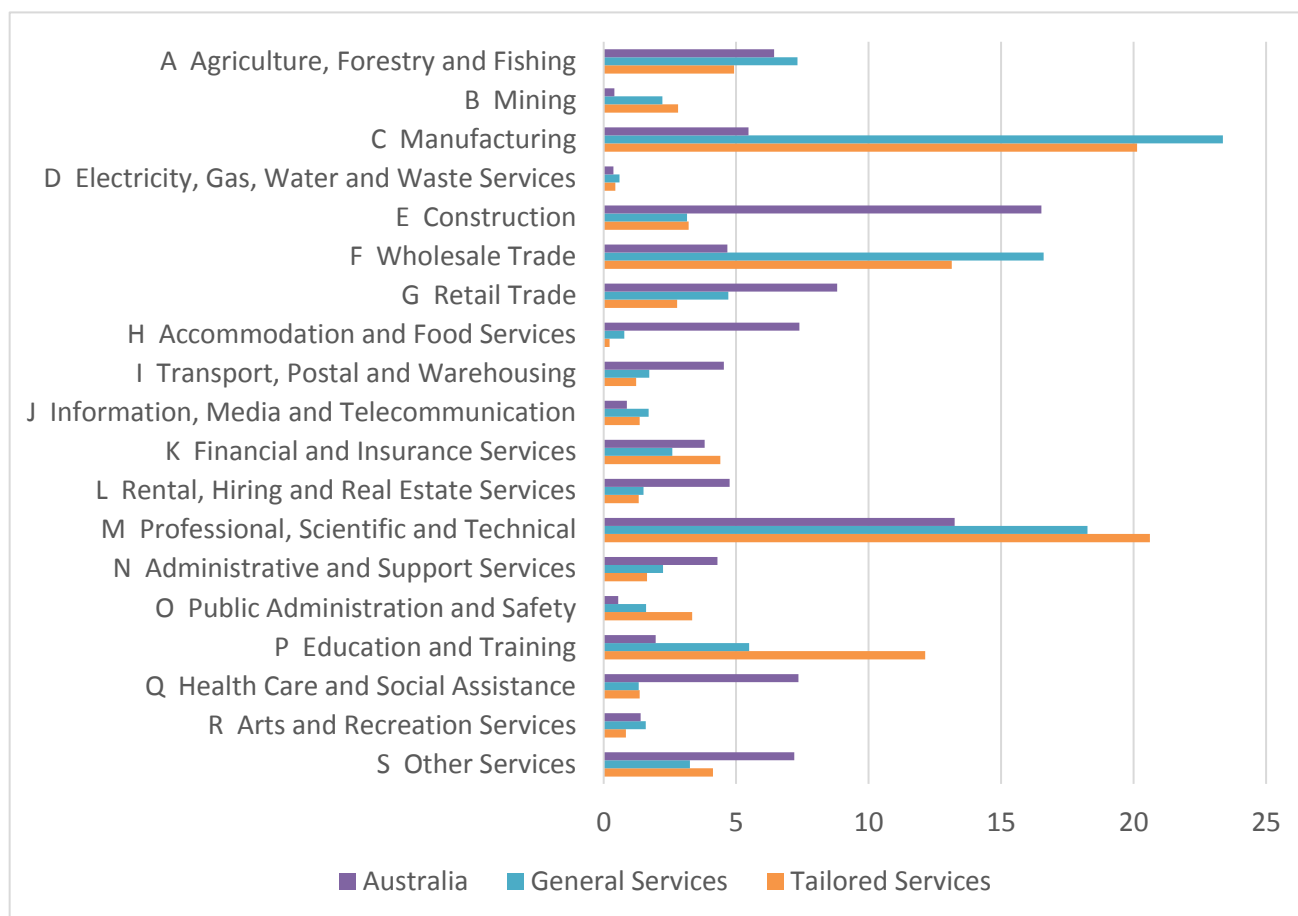
We merge the Austrade administration data for both tailored and general service participation into BLADE’s business records. When comparing the treated firms to the remaining set of Australian firms, we exclude businesses with no sales revenues, business income, total expenses, or salary and wage expenses as well as those missing values in any of the matching variables. We refer to this set of firms as those that are economically active.

¹⁴ A Type of Activity Unit attempts to be homogenous within a two-digit ANZSIC subdivision.

¹⁵ A more detailed explanation of the Economic Units model can be found in Appendix 1 of the “Australian Bureau of Statistics Business Register,
<http://www.abs.gov.au/ausstats/abs@.nsf/dossbytitle/AC79D33ED6045E88CA25706E0074E77A?OpenDocument>

The 2,546 unique ABNs identified in the Austrade administrative data which were recipients of tailored services were mapped onto 2,842 activity units within the BLADE dataset. Likewise, the 7,418 unique ABNs which received general services were mapped onto 6,637 activity units.

Figure 3.1: Distribution of organisations by ANZSIC Sector (%), Australia and Austrade Service Recipients, 2015-16



Notes: Constructed based on merged Austrade program administrative database and cleaned version of BAS data in the ABS BLADE database. Australia distribution based on all economically active firms in the data. Australia's industry distribution may not be identical to the official ABS' estimate of industry distribution.

Figure 3.1 above shows the industry distribution of organisations in the financial year 2015-16 of the merged databases for all economically businesses in Australia compared to the distribution of firms receiving general and tailored services. From the figure, it is clear that differences occur not only from firms seeking tailored services compared to the distribution of Australian firms, they differ from firms seeking general services. Nearly a quarter of firms receiving tailored services from Austrade are in professional, scientific and technical services, while the next largest sector is in manufacturing. Both sectors are over-represented relative to all Australian firms, although a higher relative share of manufacturing firms receive general services compared to tailored services. Wholesale trade and the education sector are also more likely to seek Austrade tailored services than the general population of firms.

**Table 3.1: Number of businesses and average firm characteristics 2004-05 to 2015-16,
by Austrade service participation status ¹⁶**

(T = Tailored Services; G = General Services; N = Non-participants)

Year	Sample size			Sales revenues			Exporters (%)			Exports sales			Export intensity		
	Firms with sales data			(\$ millions)						(\$ thousands)			(% of sales)		
	T	G	N	T	G	N	T	G	N	T	G	N	T	G	N
2004-05	1,676	4,040	650,994	165.1	43.6	2.8	59.4	48.5	7.5	14,864.5	3,550.7	161.0	9.0	8.1	5.8
2005-06	1,748	4,276	677,386	183.2	46.1	3.0	59.5	48.6	7.4	17,408.0	3,370.3	188.0	9.5	7.3	6.3
2006-07	1,848	4,514	652,281	297.9	47.7	3.7	59.6	47.6	7.5	33,573.2	4,096.6	260.8	11.3	8.6	7.0
2007-08	1,930	4,757	700,611	416.2	48.7	4.0	58.1	46.6	7.1	19,294.0	3,952.5	225.1	4.6	8.1	5.6
2008-09	1,969	4,948	700,443	1,028.0	49.2	4.1	57.4	45.9	6.7	27,054.7	4,700.4	297.9	2.6	9.6	7.3
2009-10	2,063	5,217	702,305	1,643.4	99.4	4.2	57.1	47.1	6.6	22,894.9	4,325.0	246.8	1.4	4.4	5.9
2010-11	2,151	5,406	705,641	1,538.1	138.8	4.6	57.7	47.0	6.5	29,382.2	4,906.4	299.6	1.9	3.5	6.5
2011-12	2,201	5,674	705,976	560.5	150.5	6.3	58.5	46.2	6.5	31,024.9	4,864.7	318.6	5.5	3.2	5.1
2012-13	2,263	5,867	707,962	240.0	145.9	6.4	57.3	44.8	6.5	29,177.8	4,562.1	295.5	12.2	3.1	4.6
2013-14	2,287	6,032	725,276	243.9	170.5	4.6	58.0	45.5	6.6	34,324.4	4,702.8	288.9	14.1	2.8	6.3
2014-15	2,304	6,129	744,996	241.6	192.6	4.9	58.1	44.6	6.7	20,502.4	5,881.4	264.3	8.5	3.1	5.4
2015-16	2,291	6,061	726,743	247.9	201.9	5.4	57.8	45.4	6.8	20,163.2	6,665.8	265.2	8.1	3.3	4.9

Notes: Constructed based on merged Austrade administrative database and cleaned version of BAS database in the BLADE for Australia. The total number of businesses may not be identical to the official ABS' estimate of number of businesses in Australia in each financial year and further may not coincide with firm participation in Austrade general and tailored services due to the splitting and combining of ABN into type of activity units. We have checked the large sales revenue figures in column 4 for years 2008-09 to 2010-11 and according to the ABS they are correct. Given the data are for time periods before the matching is done, they should not affect the estimates but to the extent they do, they will underestimate the treatment effects.

¹⁶ In this table, "T" organisations are those firms that have received tailored services between the 2012 and 2016 fiscal years, while "G" are those that have received general services. The latter excludes any firms that have also received tailored services. However, some of the businesses may not exist prior to 2011-12 or they may exist under different ABNs. As a result, the figures reported in the columns with the "T" and "G" headings (that is, the number of participants) decrease prior to the years in which Austrade services in the current format were provided (2012-13 to 2015-16).

**Table 3.2: Number of businesses and average employment size 2004-5 to 2015-16,
by Austrade service participation status ¹⁷**

(T = Tailored Services; G = General Services; N = Non-participants)

Year	Sample firms with employment data			Employment (persons)		
	T	G	N	T	G	N
2004-05	1,410	3,074	650,994	732	253	17
2005-06	1,499	3,341	677,386	663	224	17
2006-07	1,564	3,440	652,281	692	224	18
2007-08	1,644	3,697	700,611	703	218	18
2008-09	1,674	3,800	700,443	724	228	17
2009-10	1,751	4,000	702,305	694	217	17
2010-11	1,822	4,173	705,641	691	216	18
2011-12	1,860	4,319	705,976	695	218	18
2012-13	1,922	4,441	707,962	670	220	18
2013-14	1,961	4,631	725,276	681	216	18
2014-15	1,982	4,796	744,996	674	218	17
2015-16	1,936	4,644	726,743	704	236	18

Notes: Constructed based on merged Austrade administrative database and cleaned version of BAS database in the BLADE for Australia.

Tables 3.1 and 3.2 presents the average characteristics of firms from 2004-05 through 2015-16, the last available year current in BLADE. These tables are broken down by firms receiving tailored services, general services (and no tailored services), and all other non-participating firms. Sales revenue, export sales, and export intensity are reported in Table 3.1, while Table 3.2 reports employment headcount.

Table 3.1 shows that recipients of tailored services are much larger and much more likely to be an exporter and export more than both recipients of general services and all other non-participants.¹⁸ However, the magnitude of the difference is smaller between firms receiving tailored services and general services. These differences indicate potential endogenous selection into a program and the need for the common trend assumption in the evaluation.¹⁹ The difference in magnitude between groups are also mirrored in Table 3.2.

¹⁷ In this table, “T” organisations are those firms that have received tailored services between the 2012 and 2016 fiscal years, while “G” are those that have received general services. The latter excludes any firms that have also received tailored services. However, some of the businesses may not exist prior to 2011-12 or they may exist under different ABNs. As a result, the figures reported in the columns with the “T” and “G” headings (that is, the number of participants) decrease prior to the years in which Austrade services in the current format were provided (2011-12 to 2015-16).

¹⁸ The large spike in sales revenue for tailored firms from 2008-09 through 2011-12 appears to be attributed to a spike in turnover by a small number of large firms.

¹⁹ The matching process helps to control for some endogenous selection into the model. However, modelling the treatment as an “event study” suggests that firms begin to increase employment at a faster rate faster than the control group for three fiscal years prior to receiving the first treatment, with increased sales and exporter status within one fiscal

Firms receiving tailored services are on average larger than those receiving general services even in the years prior to engaging with Austrade, but both set of firms are several magnitudes larger than the average firm in Australia.

Table 3.3 provides a broad sector breakdown of average firm characteristics for firms receiving tailored services in the 2010-2011 fiscal years. In the sample, we see that the average firm in the primary resources sector had nearly \$238 million in annual exports in 2010-11 and employed an average of 365 people. The manufacturing sector employed the least amount of employees by broad sector at 331 people and on average exported \$34 million per year. Services had an average of 839 employees and when excluding health and education firms, exported over \$5 million per year. The export sales measure for health and education services includes other GST-free sales as export services are not reported in the same method as other services. As domestic services in these sectors also include GST-free sales, this measure will be an overestimate of exports, but the impact analysis in Section 4 will still be unbiased conditional on firms not changing the relative share of their accounting between Export Sales and Other GST-free Sales does not change due to receiving tailored services from Austrade.

**Table 3.3: Average firm characteristics of tailored service firms in 2010-11,
by broad ANZSIC sectors**

Sector	Export Sales (\$ thousands)	Employment
Resources	237,758	365
Manufacturing	33,569	331
Services (Excluding Health and Education)	5,361	839
Health and Education Services	52,986	---

Notes: Constructed based on merged Austrade administrative database and cleaned version of BAS database in the BLADE for Australia. Employment for services includes Health and Education Services. Firms are included Resources if they are listed as “A” or “B” in the ANZSIC (2006) classifications, Manufacturing if they are listed as “C” in the classifications, Health and Education if they are listed in “P” and “Q” respectively. The remainder of Services includes all other ANZSIC sectors. Export sales for health and education services includes both export sales and Other GST-free sales.

year prior to the first treatment. This may result in an upward bias of the results, but it is unlikely that the results are being fully driven by self-selection.

4. Results

4.1 Primary Results

We implemented five difference-in-differences models which varied depending on the control group. For Models 1 through 3, the control group is based on organisations that received general services, but no tailored services. With Models 4 through 5, the control group was constructed from a base of all economically active firms in Australia in which also matched using propensity score matching.

In Model 1, we did not perform any further propensity-score matching, thus all available firms receiving general services, but not tailored services were used as the control group. In Models 2 and 3, we created a matched control group from the pool of firms which received general services and were in business by 2011-12. The matching was based on nearest-neighbour propensity score matching.²⁰ We matched on the nearest neighbour and five nearest neighbours respectively. Models 2 and 3 are our preferred models as they control for selection.

For Models 4 and 5, we used nearest-neighbour propensity score matching to create a matched control group based on all available economically active firms in 2011-12. Model 4 results use the single closest neighbour, while Model 5 is based on the five nearest neighbours.

Table 4.1 summarises the estimated immediate impacts for each of the three outcome measures and the models. The Immediate Impact is defined as the fiscal year in which the tailored service was completed. This allows us to look at the relationship between receiving the tailored service and outcomes only in the fiscal year in which the firm received the service. Table 4.2 provides a summary of the estimated average annual export increment (relative to exports before treatment) of the three outcome measures. In this scenario, we define the treatment as the first and every subsequent fiscal years that a firm first received tailored services from Austrade. We refer to these results as the Cumulative Impact. This estimates the change in the outcome variable comparing the first and subsequent fiscal years that a firm received tailored services to the fiscal years prior to receiving tailored services. Thus the estimates are not annual increases, but rather the per cent increase of the average value of export sales after receiving tailored services when compared to the average export sales prior to receiving tailored services. These results allow us to explore whether there is any cumulative and persistent effects of the tailored service on trade.

²⁰ See the discussions in Appendix 2 and 3 for more details.

Table 4.1: Estimated immediate impacts of Tailored Services 2012-13 to 2015-16 on firm performance

	General Services Control			Full Control	
	Model 1	Model 2	Model 3	Model 4	Model 5
Export sales (%)					
Average	4	15	15	36	66
Lower bound	-10	0	1	21	52
Upper bound	17	30	29	51	80
Export participation (% points)					
Average	3	5	6	10	16
Lower bound	0	2	3	6	13
Upper bound	7	9	9	13	20
Employment (%)					
Average	5	5	5	11	17
Lower bound	2	2	3	8	15
Upper bound	7	8	8	14	20

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Models 4 and 5 uses all non-participating firms as control group. Model 4 uses one propensity score matched non-participating firm for each treated firm as control and Model 5 uses five propensity score matched non-participating firms. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is an immediate effect where the binary variable is equal to one in the fiscal year(s) that the firm received tailored services and zero otherwise.

Table 4.2: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance

	General Services Control			Full Control	
	Model 1	Model 2	Model 3	Model 4	Model 5
Export sales (%)					
Average	1	31	26	64	93
Lower bound	-10	16	13	49	80
Upper bound	13	45	39	79	105
Export participation (% points)					
Average	3	10	9	16	22
Lower bound	0	6	6	13	19
Upper bound	6	13	12	20	25
Employment (%)					
Average	2	3	4	15	22
Lower bound	-0	1	2	12	19
Upper bound	4	6	6	18	24

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Models 4 and 5 uses all non-participating firms as control group. Model 4 uses one propensity score matched non-participating firm for each treated firm as control and Model 5 uses five propensity score matched non-participating firms. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise.

Table 4.1 shows that when compared to the general services, Austrade tailored services do not appear to have a statistically significant impact on export sales or the likelihood to export when matching is not performed (Model 1), but are statistically significant for both matching models. The point estimates suggest an average 15 per cent increase in export sales and as the 95% confidence interval is just above zero, the estimates are statistically different from zero. The point estimates for export participation suggest that on average, using tailored services result in a 3 to 6 percentage point increase in the likelihood for an organisation to begin exporting. The lower bound of the 95% confidence interval ranges to just above 0 to 3 percentage points and the upper bound ranges from 7 to 9 percentage points.

The results for employment headcount suggest that firms receiving tailored services increase their employment by 5 per cent on average, while the lower bound range from the confidence interval suggests 2 to 3 per cent growth and the upper bound interval suggest up to 7 or 8 per cent growth.

Models 4 through 5 of Table 4.1 compare firms which received tailored services to a set of matched firms that was constructed against the full set of non-participating Australian firms which are economically active. These results suggest much stronger, and immediate, performance gains relative to the results that compare the firms receiving tailored services relative to firms receiving general services (Models 1 through 3). The results suggest that on average, firms receiving tailored services increase export sales by 36 to 66 per cent. The 95% confidence intervals estimate a lower bound range of between 21 and 52 per cent, while the upper bound range estimate the effect to be between 51 and 80 per cent.

Likewise, the estimates for export participation and employment are larger when comparing to the control group of all economically active firms. On average, firms which received tailored services were 10 to 16 percentage points more likely to export with the lower bound of the 95% confidence interval ranging from 6 to 13 percentage points, and the upper bound ranging between 13 and 20 percentage points. The average increase in employment is estimated to be between 11 and 17 percentage points.

As discussed above, Table 4.2 shows the results for the cumulative impacts of tailored services when compared to organisations matched against firms using general services (Models 1 through 3) and matched against all economically active firms in Australia (Models 4 through 5). When compared to the results in Table 4.1, the magnitude of the effects is typically larger, which is consistent in that organisations may not fully implement the training or integrate their network contacts that were developed from the tailored services provided by Austrade.

For firms receiving tailored services, the average cumulative impact on export sales is only 1 per cent when compared to the whole set firms receiving general services, although this result is not statically significant. However, the average cumulative impact on export sales ranges between 26 and 31 per cent when we restrict

the control sample to general service firms that were matched to the tailored service recipients based on their pre-treatment characteristics. These results are also statistically significant. The lower bound range (lower 95% confidence interval) varies from 13 to 16 per cent increase, while the upper bound range varies from 39 to 45 per cent.

To put these estimates in perspective, firms receiving tailored services had average export sales of \$31.02 million in the 2011-12 fiscal year. Using our preferred estimates from Models 2 and 3 in Table 4.2, the estimates suggest that tailored services would create, on average, an additional \$8.1 to \$9.6 million in annual export sales for firms receiving tailored services. Based on the 95% confidence intervals, the true average impact could vary between \$4.0 million and \$14.0 million additional annual export sales.

In terms of a change in the propensity to export, the cumulative effects suggest that on average, an additional 9 to 10 percentage point increase in the share of firms receiving tailored services begin to export. The 95% confidence interval lower band is 6 percentage points, while the upper band ranges from 12 to 13 percentage points. As seen in Section 3, only 58.5 percent of firms who ultimately received tailored services were exporters in the fiscal year prior to the tailored services being offered. Therefore, the point estimates suggest that the share of firms exporting rose 8.5 to 17.1 per cent.

The cumulative effect of tailored services on employment has a similar magnitude when compared to the immediate effects. The estimates suggest that on average, the increase in employment increases between 3 and 4 per cent, while the 95% confidence interval band suggests that the lower bound ranges between 1 and 2 per cent with the upper bound estimated to be 6 per cent.

Placing these results in a larger context, the average firm receiving tailored services employed 695 people during the 2011-12 fiscal year. The estimates suggest that on average, a firm hired an additional 21 to 28 people. This suggests that the services helped create between 59,250 and 79,000 jobs across the economy.

Models 4 through 5 in Table 4.2 report the estimated cumulative impacts of tailored services compared to the control group built from the full set of economically active firms found in the ABS BLADE database. As compared to the immediate effects, the magnitude of the impacts are higher than compared to the general service control group.

Table 4.2 estimates find that the average increase in export sales increases 64 to 93 per cent when compared to the full control group. These results are statistically significant and the 95% confidence interval lower bound ranges from 49 to 80 per cent, while the upper bound ranges from 79 to 105 per cent. The models also predict that on average, the increase in exports will increase between 16 and 22 percentage points with the lower bound range between 13 and 19 percentage points and the upper bound ranges from 20 to 25 percentage

points (based on the 95% confidence interval). Lastly, the estimates suggest a 15 to 22 per cent increase in employment on average with the 95% confidence interval bounds ranging from 12 to 19 per cent on the lower bound and 18 to 24 per cent on the upper bound.

As evidenced in the previous section, organisations self-select into the Austrade tailored services. In particular, businesses which are likely to enter the export market or expand their existing exports are much more likely to seek the services of Austrade. This is largely confirmed by the economics literature which has established evidence that businesses self-select into the export market: exporters are more likely to be larger and have better business performance than non-exporters.

Such self-selection has important implication on a program impact evaluation with observational data such as reported here. Because the analyst had no direct control on the data generation process (i.e. Real-world data is not simulated) or on how the samples whose data being observed were selected, the estimates are likely to suffer from potential selection bias due to observed and unobserved factors that affect both decision to participate in the program and the intended outcomes from the program.

In addition to businesses self-selecting into participation, features related to service eligibility requires organisations to conduct activities overseas that either bring economic benefits to the economy or improve the reputation of Australia. Eligibility also requires Australian organisations to be in compliance with both the laws of Australia and the foreign nations of the markets they enter. These characteristics were not observable in our database, but they determined program participation and are likely correlated with outcomes.

The method we developed is based on difference-in-differences (DID) analysis. DID can reduce selection bias arising from unobserved and time invariant factors (factors which do not change over time but determine whether or not a firm participated in the program and correlate with the outcomes being evaluated) by comparing the change in the performance of the participant before and after the program to the change in the performance of non-participants. Effectively, we differenced out any time-invariant confounding effects that could lead to biased estimates.

Implicit in the DID analysis is a common trend assumption that the changes in the performance of both participants and non-participants are the same in the absence of the program intervention. We ensured that the common trend assumption was not violated by selecting only “similar” non-participants as the control group by employing propensity score matching based on observed pre-program businesses characteristics that were likely to be related to decision to participate in the program. We believe our estimates were robust to different potential bias sources: observed or unobserved and time-varying or time-invariant.

4.2 Results for Small and Medium Enterprises

To further disambiguate the results, we have estimated the impact of exports through the interaction of the treatment variable and firm characteristics. This allows us to better understand how the average impact may vary across firm size. The caveat is that these sub-categories have a smaller number of organisations and can increase the noise in the data. Therefore we tried to look at breakdowns in which there is sufficient information in which we can safely estimate the impacts that minimises the risk of biased estimates.

The first breakdown explores firm performance for Small and Medium Enterprise (SME). A firm is defined as an SME if their average headcount prior to receiving services from Austrade was under 200 people. Otherwise, the organisation was classified as a large firm. We exclude an analysis of large firms as the results are driven largely by the presence of firms in the health and education sectors. The results of those sectors are reported in Section 4.4 due to differences in reporting exports in the BLADE database. As discussed above, health and education services are GST exempt and therefore firms in these sectors have little incentive to report the export component explicitly.

The estimates for the cumulative impacts for SMEs are reported in Table 4.3 which compare firms against those receiving general services. The cumulative impacts that use the full control set of economically active firms is found in Appendix 3. The cumulative impacts are provided as these should provide better guidance on the average long-run impact of the services on firm performance. As in the previous sub-section, Model 1 is the case in which the control group is all firms receiving general services, but not tailored services. In this model, we do not use propensity score matching. For Models 2 and 3, we further restrict the control group to firms matching the pre-treatment firm characteristics. In Model 2, each firm receiving tailored services is matched to one firm, while in Model 3, each tailored service firm is matched to five firms.

Within that context, we find that on average, the cumulative impact of tailored services predicts that on average, a 38 per cent increase in exports of small firms when we do not do any additional matching. We find that the average impact for SMEs increases to 60 and 64 per cent when we use only those firms receiving general services that matched to firms receiving tailored services.

Additionally, we find that on average, treated SMEs have a 14 percentage point increase in the likelihood to export, with the 95% confidence interval ranging from 11 percentage points on the lower bound and from 16 to 17 percentage points for the upper bound. Likewise, we see on average that small treated firms see an average employment increase of 8 to 9 per cent compared to the general service control group.

Table 4.3: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 for SMEs

	SMEs		
	Model 1	Model 2	Model 3
Export sales (%)			
Average	38	64	60
Lower bound	25	49	45
Upper bound	52	80	74
Export participation (% points)			
Average	9	14	14
Lower bound	6	11	11
Upper bound	12	17	16
Employment (%)			
Average	7	8	9
Lower bound	4	5	6
Upper bound	9	11	11

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as SMEs if their headcount is less than 200 on average prior to the 2012-13 fiscal year. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise.

4.3 Results by ANZSIC Sector: Resources and Manufacturing

In addition to a breakdown by firm size, we have also estimated how the impact of tailored services can vary across three broad economic sectors: Resources, Manufacturing and Services. Due to accounting differences, we report the impact of services in Section 4.4. Organisations in Resources are any firms which has an ANZSIC one-digit classification, “A” or “B”, while organisations in Manufacturing are any firms with a classification in “C”. Models 1 through 3 in Table 4.4 contain the same control groups as found in Models 1 through 3 in Table 4.3. Similarly to the breakdown for SMEs, we report only the estimates of the cumulative impact of tailored services compared to the general services for the breakdown by sector. The impacts when compared to the full set of economically active firms can be found in Appendix 3.

Beginning with the Resource sector, tailored services are estimated, on average, to increase export sales by 118 to 123 per cent, depending on the individual model which incorporates matching. For the matched models, the lower bounds of the 95% confidence interval ranges from 77 to 81 per cent and from 159 to 165 per cent on the upper bound. This suggests a very strong increase in the impact of tailored services for firms in the resource industry. While the industry experienced volatility in prices, given that resource prices remain highly volatile in a period of weakening demand from China, caution should be maintained when extrapolating these results to any future firms in the sector.

The likelihood that treated firms in the Resource sector begin to export was also estimated to increase. On average, the probability to export increased between 21 to 22 percentage points for the matched models. The lower bound of the 95% confidence interval ranges from 14 to 15 percentage points and the upper bound ranging from 28 to 29 percentage points.

Although export sales and the likelihood to export both increased, the models suggest that average employment slightly increased. However, the confidence intervals suggest that none of the results are statistically different from zero. This could be consistent if firms that developed a new market largely substituted their output away from current foreign or domestic market to a more lucrative foreign market.

In regards to Manufacturing, the average impact of tailored services ranges between 60 and 65 per cent for the matched models. These results are all statistically significant with the lower bound of the 95% confidence interval ranging from 35 to 39 per cent and the upper bound ranging from 85 to 92 per cent. Furthermore, we estimate that treated firms in Manufacturing increased the probability of exporting by an additional 20 to 21 percentage points for the matched models. The lower bound of the 95% confidence interval was estimated to be 15 percentage points, while the upper bound ranges from 26 to 27 percentage points.

Although the estimated impact on export sales is positive, our models suggest that average employment fell in the Manufacturing sector for firms receiving tailored services, although they are not statistically significant for the matched models. We are not able to disentangle the results further, however, it is plausible that firms receiving tailored services were introducing automation at a faster rate than the General Services group of manufacturers.

Table 4.4: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

	General Services Control					
	Resources			Manufacturing		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	93	123	118	37	65	60
Lower bound	54	81	77	13	39	35
Upper bound	132	165	159	61	92	85
Export participation (% points)						
Average	17	22	21	16	21	20
Lower bound	10	15	14	10	15	15
Upper bound	25	29	28	22	27	26
Employment (%)						
Average	-0	1	1	-5	-4	-3
Lower bound	-8	-7	-6	-9	-9	-8
Upper bound	7	9	9	-0	1	1

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as resources if they are classified as “A” or “B” in the ANZSIC (2006) classifications and manufacturing if they are classified as “C” in the classifications. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise.

4.4 Results by ANZSIC Sector: Services

Due to accounting differences in the BAS statements, we have further broken down the evaluation of the Service Sector into two broad categories:

- Health and Education Services
- All Other Services

As discussed above, export sales of services in the Health and Education sectors are not typically reported within the export sales portion of the Business Activity Statements provided to the Australian Taxation Office (ATO). Instead, these services are largely reported as “other GST-free sales”. To accommodate those differences within Health and Education, we explore how tailored services impacts the sum of both export sales and other GST-free sales. The cumulative impact results compared to firms receiving general services

are reported in Table 4.5 while a comparison against the full set of economically active firms can be found in Appendix 3.

Focusing first on Service Sector firms excluding Health and Education, we find that the average impact varies from 23 to 37 per cent for the matched models with the 95% confidence intervals ranging on the lower bound from 5 to 17 per cent and the upper bound ranging from 41 to 57 per cent. In addition, we see an increased likelihood for service firms to export. The average increase ranges between 8 to 11 percentage points with the 95% confidence ranging from 4 to 6 percentage points on the lower bound and 11 to 15 percentage points on the upper bound. The average cumulative impact on employment ranges from 1 to 2 per cent in the matched models, but the results are not statistically different from zero.

When looking at the impact on export sales for the Health and Education sectors, the average impact has a similar magnitude to the remainder of the Service Sector. The average impact of tailored services ranges from 27 to 28 per cent. However unlike the remainder of the Service Sector, the confidence interval suggests that only Model 3 is statistically significant. Similarly, the probability of exporting on average ranges from 9 to 10 percentage points for the matched models, but neither result is statistically different from zero. Lastly, we estimate the average impact on employment to be 5 per cent, but these results are again not statistically significant.

Table 4.5: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

	General Services Control					
	Services excluding Health and Education			Health and Education Services		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	-2	37	23	20	27	28
Lower bound	-18	17	5	-6	-1	3
Upper bound	14	57	41	45	54	54
Export participation (% points)						
Average	2	11	8	1	10	9
Lower bound	-1	6	4	-11	-4	-5
Upper bound	6	15	11	14	24	23
Employment (%)						
Average	-1	2	1	3	5	5
Lower bound	-4	-2	-2	-3	-2	-1
Upper bound	2	5	4	9	11	11

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as service sectors if their ANZSIC classification is "D" or higher. Health and Education sectors are represented by firms with an ANZSIC classification of "P" and "Q" respectively. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise. Export sales for Health and Education sectors is measured as the sum of export sales and other GST-free sales. Export participation for Health and Education sectors is likewise defined as firms that have non-zero export sales or other GST-free sales.

5. Conclusions

Organisations face many challenges when making the decision on entering the export market. One of the most substantial barriers are barriers to information. The firms need to collect information in order to identify potential export markets and partners as well as the characteristics of consumers, market entry procedures and marketing channels. Markets can fail if the signals are hard to interpret. The Australian economy misses out on many opportunities from specialisation and economies of scale due to the challenges facing firms entering new markets. Given the distance of the Australian market, it is critical that these barriers fall.

Various formal and informal solutions to reduce the cost of information and the development of networks have been proposed. Institutions such as embassies and consulates and trade promotion organisations are part of the solution to the market failure, yet existing evidence is not yet robust in regards to the effectiveness of these solutions.

This report summarises the impacts on export sales, likelihood to export and employment for organisations receiving tailored services from Austrade over the period of 2 July 2012 through 30 June 2016. The analysis is based on linked administrative data of service recipients and the ABS BLADE database. The results are compared first to firms receiving general services from Austrade during the same period as well as against the full population of Australian firms.

Key finding 1

The Austrade tailored services have a positive and significant (statistically and in terms of magnitude) impact on firms using these services.

These estimates are robust to variation in the main assumptions underlying the empirical model, particularly on how the control groups are defined. The key findings are:

- Export sales increase between 26 to 31 per cent in the (first three) fiscal year(s) following obtaining tailored services when compared to the counterfactual of not obtaining such services. This equates to A\$8.1 to A\$9.6 million per annum per firm or an estimated A\$23 to A\$27 billion in additional annual exports.
- Tailored service participation is followed in the subsequent three fiscal years by an increase in employment of 3 to 4 per cent. This equates to 21 to 28 jobs per firm.
- The proportion of tailored service recipients who are exporting rose from 57.8 per cent (before using tailored services) to an estimated 66.8 to 67.8 per cent in the following three years.

Key finding 2

- Small to Medium Enterprises (SMEs) experience significant benefits from the tailored services. The average export sales increased by 60 to 64 per cent, the average share of export participation increased 14 percentage points, and employment increased 8 to 9 per cent. Tailored services are estimated to help SMEs create an additional A\$2.3 to A\$2.4 million per year.

Key finding 3

- Firms in the resource and manufacturing sectors have benefited largely from Austrade in regards to increases in export sales. On average, firms in resources increased exports by 118 to 123 per cent in the first three fiscal years after receiving tailored services. This translates into an additional A\$281 to A\$292 million per year for firms in the sector.
- Manufacturing firms experienced increased export sales on average of 60 to 65 per cent in the first three fiscal years following the completion of the tailored services. The impact of tailored services is estimated to generate an average increase of A\$20.1 to A\$21.8 million in additional export sales for manufacturing firms.
- Service sector firms experienced positive increase in export sales of between 27 and 28 per cent for firms in health and education and 23 and 37 per cent for all other service sector firms in the up to three subsequent fiscal years after receiving tailored services. This translates into an average additional A\$14.3 to A\$14.9 million of exports for firms in the health and education sector and an additional A\$1.2 to \$1.9 million in exports for all other service sector.

Recommendations

1. A continuation and expanded promotion of the tailored services offered by Austrade is strongly recommended for firms with similar characteristics to those which have received services.
2. Continued review of the results for the resource sector are strongly recommended to confirm the robustness of the findings given the continued volatility in resource prices.
3. A further exploration of 3rd party effects of Austrade services can help capture the full impact of tailored services. These effects can be generated in two ways:
 - Spillovers (e.g. firms share information and technology within their industry due to employment turnover)

- External economies (e.g. suppliers for exporting firms benefit due to increased demand for their own goods and services)
4. Given that Austrade is providing a subsidised service to firms, a creation of a system or process for firms to pass information back to Austrade such as information on new industry contacts will allow the services to have the maximum benefit to the Australian economy.
 5. The impact evaluation framework can be improved by:
 - Maintaining records of the type(s) of activities firms engaged in for the tailored service. This would allow for an evaluation of the impact of individual activities given a sufficiently large sample size.
 - Surveying firms on their perceptions of the success of the services can provide a benchmark in which to compare the statistical findings.
 - Continuing to collect information on firm participation into the tailored services will provide larger samples and thus more nuanced analyses such as more disaggregated industry divisions within sectors (education, wholesale trade, etc.) and export market destinations (Asia, Europe, Other) can be more accurately assessed.
 - Combining the evaluation with data on other business programs offered either by the Commonwealth Government or various state agencies. This will test whether the programs are complements or substitutes. These could include state-level trade missions, training, innovation, networking, and infrastructure programs.
 - Collecting information on export destination. Export destination data collected from the trade mission and expo participants, or Australian Customs database can provide further evidence of the tailored service impact.
 - Implementation of a true randomised experimental design by randomising which firms receive services.

Acknowledgement

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Appendix 1 Project Background

In December 2018, the Australian Trade and Investment Commission (Austrade) commissioned the Centre for Transformation Innovation, at Swinburne University of Technology (in partnership with the Australian Bureau of Statistics, ABS) to develop a method to evaluate and quantify the effect of trade promotion programs on export outcomes. Our method utilises the Business Longitudinal Analytical Data Environment (BLADE) at the ABS and links program participants via their Australian Business Number (ABN) to the ABS Business Activity Statement (BAS) and Business Income Tax (BIT) information in the ABS' BLADE database. The ABS held BLADE BAS-BIT data are brought into the ABS under the Census and Statistics Act 1905 and are subject to the same confidentiality requirements as directly collected ABS data.

The evaluation method developed was based a robust quasi-experimental method known as matched difference-in-differences analysis which compared the change in export performance before and after program participation. Different matched control groups from two main pools were considered. The first was drawn from the population of 5,880 organisations that engaged Austrade for general services on exports and were active by the 2011-12 financial year. The second control group was drawn from a population of around 1.3 million Australian firms who were economically active by 2011-12.

This evaluation is one of the first attempts in Australia for evaluating the impacts of a government fee-for-service using a large-scale administrative data such as the BLADE linked to program administrative data. The access to previously unavailable unit record tax information within the BLADE represents a watershed moment for empirical research into Australian firm performance and policy evaluation. Without the newly linked, longitudinal administrative databases, it is virtually impossible to obtain robust and unbiased estimates with clear inference on the direction of causality of the impacts of government policies. The time dimension of the longitudinal data set panel data allows for the identification factors that precede others in time; and the cross-sectional dimension allows the identification of factors that are associated with one unit and not another. Past policy evaluation studies often had to rely on small databases, typically containing only a single cross-section and collected from subjective reports of the respondents. Thus, they rarely produced results with high degree of robustness demanded by policy makers.

Appendix 2 Method

A2.1 Difference-in-differences (DID) analysis

We derived average treatment effects on the treated as our estimate of the impact of the tailored services on participants' export performance using a quasi-experimental method known as difference-in-differences (DID). To implement the method, we required observable data on the export performance of participating and non-participating firms before and after receiving tailored services. In the stylised diagram in Figure A.2 below, the observed data are labelled with "green" coloured labels T0 and C0 (corresponding to the average performance of participants and non-participants before receiving tailored services, respectively) and T1 and C1 (corresponding to the average performance of participants and non-participants after receiving tailored services, respectively).

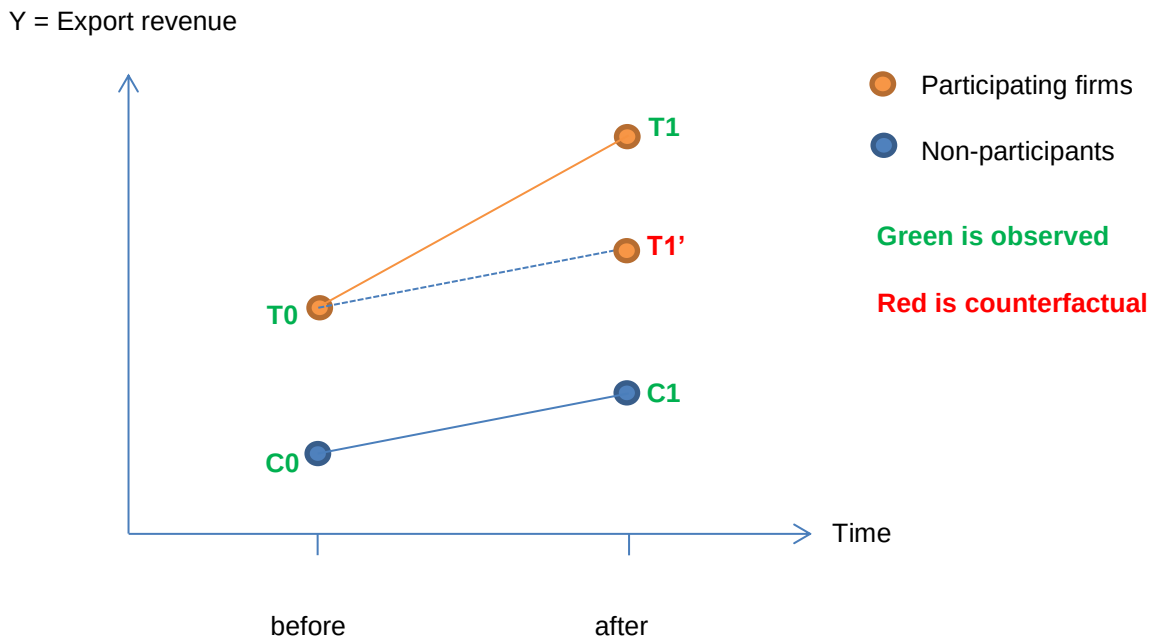


Figure A.2: Impact evaluation with before and after data

Naïve impact estimates

Given the observed data as defined above, one naïve estimate of the impact is to compare the difference in average export performance (Y) at points T1 and C1 (that is, $Impact_{Naive1} = Y_{T1} - Y_{C1}$). This naïve estimate is usually produced when we do not observe before and after data. The problem with this naïve estimate is we do not know whether participating firms are always superior to non-participating firms. Note that Figure A.1 is drawn such that $Y_{T0} > Y_{C0}$ to illustrate the possibility that participating firms may in fact have better export performance even before the program.

Another slightly less naïve estimation method that people can use when before and after data are available is to measure impact as: $Impact_{Naive2} = Y_{T1} - Y_{T0}$. This estimate is an improvement over the previous one

since it does not suffer from the “upward bias” from any pre-existing superior performance of the participating firms. That problem is avoided by making a comparison based only on the performance of the participating firms. However, there is still another problem in terms of completely attributing the change in the performance of participants ($Y_{T1} - Y_{T0}$) to the tailored services. It is plausible that some of the measured improvement in participating firms’ performance comes from other unobserved reasons unrelated to tailored service participation. In Figure A.1, this possibility is illustrated by the counterfactual point T1’ to denote the average export performance ($Y_{T1'}$) had there be no tailored services provided by Austrade. The closer T1’ is to T1, that is as $Y_{T1'}$ closer to Y_{T1} , then the more severe the misattribution problem from using $Impact_{Naive2}$ measure.

DID impact estimate

To address the attribution bias problem of $Impact_{Naive2}$, we can redefine the impact measure as:

$$Impact = Y_{T1} - Y_{T1'} \quad (A2.1)$$

The problem with implementing the measure $Impact$ in (A2.1) is that it involves $Y_{T1'}$ which is an unobserved counterfactual. The difference-in-differences approach solves this problem by making a reasonable assumption that whatever unobserved factors there are which are unrelated to tailored service participation, they affect performance before and after the program for both participants and non-participants in a similar way. This assumption is also known as the common trend assumption as shown in Figure A.1 above by the common slopes of the lines C0-C1 and T0-T1’.

Under the common trend assumption, we can estimate $Y_{T1'} - Y_{C1}$ as $Y_{T0} - Y_{C0}$ such that the impact of tailored services can be measured as:

$$\begin{aligned} Impact_{DID} &= Y_{T1} - Y_{T1'} \\ &= (Y_{T1} - Y_{C1}) - (Y_{T1'} - Y_{C1}) \\ &= (Y_{T1} - Y_{C1}) - (Y_{T0} - Y_{C0}) \\ &= (Y_{T1} - Y_{T0}) - (Y_{C1} - Y_{C0}) \end{aligned} \quad (A2.2)$$

where in the third line we substitute $Y_{T0} - Y_{C0}$, which is observable, for $Y_{T1'} - Y_{C1}$ which is unobserved. Thus, $Impact_{DID}$ is essentially computed based on the difference of two observed differences and hence where the difference-in-differences term comes from.

A2.2. Basic DID

This and subsequent sections and Appendix 3 provide a more technical discussion of the implementation of the DID method in this report. Denote program participation status as D_{it} where $D_{it} = 1$ if firm i receives tailored services in financial year t and $D_{it} = 0$ otherwise. Denote X_{it} as the corresponding vector of observed covariates of firm and program characteristics. Denote Y_{it}^1 as the observed outcome (say, export revenues) and Y_{it}^0 as the unobserved (counterfactual) outcome.

Hence, $E[Y_{it}^1|X_{it}, D_{it} = 1]$ is the observed average outcome of participating firms conditional on X_{it} and $E(Y_{it}^0|X_{it}, D_{it} = 1)$ is the counterfactual average outcome of participating firms had they not participated. The impact of trade promotion program is measured by the average treatment effect on the treated (ATT) denoted by τ :

$$\tau = E(Y_{it}^1|X_{it}, D_{it} = 1) - E(Y_{it}^0|X_{it}, D_{it} = 1) \quad (\text{A2.3})$$

In equation (A1.3), τ measures the average change in the outcomes of participating firms as the difference between observed average outcomes after treatment and counterfactual average outcomes had the firms not received the treatments. It is clear that to obtain an unbiased estimate of τ we need an unbiased estimate of $E(Y_{it}^0|X_{it}, D_{it} = 1)$, the counterfactual average outcome. An obvious candidate is to use the average outcome of a selected group of non-participants, which we call the control group. This control group would need to be identified by taking into account any potential non-randomness or endogenous selection in program participation.

In other words, we need to select the control group such that relevant firm characteristics are comparable in both groups. We look at two different potential pools for control groups. The first is the pool of all economically active firms in the ABS BLADE database. The second is the pool of organisations that have accessed general services from Austrade, but have not subsequently received tailored services. The latter allows us to select on otherwise unobserved characteristics such as the signal to expand an export market which is not captured in the BLADE Database.

For both control groups, we further controlled for the characteristics in two ways. First, we implemented the basic difference-in-differences method. The main idea was to use the longitudinal nature of our linked Austrade administrative data and the ABS BAS databases. Specifically, we used the repeated observations of the same firms across the years in order to control for time invariant and unobserved characteristics that lead to systematic selection to exporting and to the Austrade tailored services. Using difference-in-differences, we estimated τ by comparing the change in the export outcomes of participants before and after the treatment

to the change in the export outcomes of non-participant before and after the treatment. This is shown in equation (A2.4) below:

$$Y_{it} = X_{it}\beta + \tau D_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (\text{A2.4})$$

Note that in specifying equation (A2.4), we assume the conditional expectation function $E(Y|X, D)$ is linear and any unobserved firm characteristics is decomposable into a time-invariant firm specific fixed effects (μ_i), common across firms year effect (λ_t) and a random component (ε_{it}). The introduction of the covariates (X) linearly may lead to inconsistent estimate of τ due to potential misspecification (Meyer, 1995; Abadie, 2005). In order to avoid this problem, we followed Volpe Martincus, and Carballo (2008) and augment the difference-in-differences analysis with a matching analysis as described below.

A2.3 Matched DID

As discussed above, a key identification assumption of the DID method is the common trend assumption. To minimize the possibility that this assumption is violated, we needed to make sure that the control group, that is the set of non-participants, are as “similar” as possible to the participants. This is particularly important when we know that program participation is not random, that is when there is any systematic selection bias into receiving tailored services. The matched-DID impact measure aims to address the problem by making a slightly weaker assumption that there is a common trend once participants and non-participants are matched on observable characteristics.

The matched difference-in-differences method can estimate treatment effects without imposing the linear functional form restriction in the conditional expectation of the outcome variable is (Arnold and Javorcik, 2005; Gorg et al., 2008). The matching method part controls for any endogenous selection into programs based on observables (Heckman and Robb, 1985; Heckman et al., 1998). The difference-in-differences part of the method controls for endogenous selection into programs based on time invariant unobservables. Therefore, the matched difference-in-differences estimate of the treatment effects (τ) is the difference between the change in the outcomes before and after program participation of treated firms and that of matched non-participating firms. Any imbalance between the treated and control groups in the distribution of covariates and time-invariant effects is controlled for. Note however that we still need to assume that there are no time-varying unobserved effects influencing selection into treatment and treatment outcomes (see Heckman et al., 1997; Blundell and Costa Dias, 2002).

In practice, the estimation of τ (treatment effects) was conducted in two stages. First, control group members were identified using a matching method such as the propensity score matching (explained below). Second,

equation (A2.4), without the X covariates, was estimated using the treated group and matched control group as the sample.

Propensity score matching

The basic idea here is to pair participating firms to most similar non-participating firms using propensity score. The propensity score was estimated as the predicted probability of a firm to participate in the program based on observed covariates, $P(X)$, which do not include the outcome measures. By doing this, we control for observable sources of bias in the estimation of the treatment effect (selection on observables bias). In order to estimate, $P(X)$, we controlled for observed factors that determine firms selection into the programmes and export performance, so that programme participation and programme outcomes are independent. The similarity of two given firms was then assessed by how close their propensity scores are.

In this report, we use the following similarity criteria to select the participants and non-participants in computing the $Impact_{DID}$:

1. The nearest neighbour (NN1): For each participant, select one non-participant with the most similar propensity score.
2. The five nearest neighbours (NN5): For each participant, select five non-participants with the most similar propensity scores.

To produce relatively reliable estimates of the propensity scores, Volpe Martincus and Carballo (2008) and the literature they cite²¹ suggest that we take into account factors that are correlated with different stage internationalisation. Firms at different level of internationalisation appear to have different level of awareness of available promotion programs. In addition, their needs and obstacles also vary by their degree of internationalisation, implying different requirements and expectations from export promotion participation.

In practice, our choice of matching variables was limited by how rich the database we worked with. For this report, we estimated the propensity score as the predicted probability of engaging with Austrade's tailored service program conditional on:

- Total sales revenue
- Imports
- Share of foreign ownership
- Industry

²¹ See, as cited in Volpe Martincus and Carballo 2008, Kedia and Chhokar 1986; Naidu and Rao 1993; Diamantopoulos et al. 1993; Naidu and Rao 1993; Czinkota 1996; Moini 1998; Ogram 1982; Seringhaus 1986; Cavusgil 1990; Kotabe and Czinkota 1992; Francis and Collins-Dodd 2004.

where we used of past values (pre-2012-13 financial year) in order to avoid endogeneity problem in the matching process.

The propensity matching approach was implemented using the *psmatch2* command in Stata software based on the following constructed variables:

1. Identify treated and non-treated firms. $D_i = 1$ if $D_{it} = 1$ at any year t . Otherwise, $D_i = 0$. The variable D_i is the dependent variable for *psmatch2*.
2. For each year, the covariates vector X_{it} consists of total sales revenues, whether or not an exporter (if the outcome being considered is export sales revenue), import values, share of foreign ownership and one-digit industry code. Thus, X_{it} measure size and the extent of international engagement of the firms within each broad industry.
3. Using only the years before Austrade's tailored service program begun (that is, data from 2011-12 or earlier), compute the pre-2011-12 average values of each components in X_{it} across the years for each firm. Denote this average values as X_{ipre} ; this covariate vectors is the independent variables for *psmatch2*.
4. The control group is defined as the nearest neighbour matched by *psmatch2* using the variables in steps 1 and 3.

Appendix 3 Matching analysis results

A3.1 Propensity score matching

As discussed in Appendix 2, to account for possible systematic selection into participation in the tailored services, we implemented propensity score matching that is subsequently used to produce difference-in-differences (DID) estimates of the program impacts on both the general and then economically active matched control groups. For the matching variables we included the averages of pre-2012-13 (that is pre-Austrade tailored services) of output, import, foreign ownership and employment. In addition, we also performed propensity matching using pre-2012-13 average of export status.²² Table A3.1 summarises the coefficient estimates of the propensity equations. Tables A3.2 and A3.3 summarises the matching results for general services and all non-participant control groups respectively.

Table A3.1: Propensity score matching coefficient estimates

Dependent variable D_i : Program participation status over 2012-13 to 2015-16

($D_i = 1$ if business i participated in any year in the period)

Independent variable	General Services	All Firms
	PSM	PSM
Mean pre-2010 output	1.79e-11 (1.78e-11)	5.00e-11*** (1.46e-11)
Mean pre-2010 import	-7.62e-09 (6.68e-09)	-1.91e-09 (4.97e-09)
Mean pre-2010 foreign ownership share	0.668*** (0.102)	1.028*** (0.078)
Mean pre-2010 employment	0.00007*** (0.00002)	0.000136*** (0.0000142)
Mean pre-2010 export status	0.688*** (0.060)	2.950*** (0.051)
Constant	-4.791*** (0.139)	-6.923*** (0.156)
Industry fixed effects	Yes	Yes
Sample size	7593	1,274,217
Pseudo-R2	0.0533	0.2258

Notes: Estimated using matched Austrade Administrative Data and ABS BAS-BIT databases. The notations *, **, *** denote statistically significant estimate at 10, 5, and 1% level. Standard errors are in parentheses. Estimates are the same for both 1 and 5 neighbours.

First, regarding sample size, the original data for matching contain over 1.7 million firms. However, due to missing values in one or more covariates, only 1,272,655 firms were included in the propensity score estimation. Second, the coefficient estimates of export status, foreign ownership share and employment and export status are statistically significant and of the expected sign. To some extent, these seem to suggest that

²² These two additional variables were excluded from the first specification since they are the outcome variables. Their inclusions here assume that the pre-2011-12 averages can be treated as “exogenous”.

past international engagement and productivity (wages effect is positive once output is controlled for) are important predictors of program participation and potentially exports.

Then, based on the estimated coefficients summarised in Table A3.1, we computed the predicted propensity scores, which we used, for each treated firm, to identify the most similar non-participants as the matched control group. We identified the nearest neighbour and five nearest neighbours from the pool of non-participants as the control group. Table A3.2 provides a summary of t-tests of differences in the means in average export performance before program participation (that is, pre-2010) between participants and non-participants matched using the second propensity matching model for the general service control group.

Table A3.2: Differences in pre-program participation average exports sales and export probability of tailored service recipients (T) and general service recipients (G), before and after matching; PSM2

	Nearest neighbour (NN1)			Five nearest neighbours (NN5)		
	T	G	T – G	T	G	T – G
Before matching						
Sample size	2,842	5,880		2,842	5,880	
Mean (export) (\$)	21,485,647	4,056,580	17,429,067	21,485,647	4,056,580	17,429,067
t-stat (Ho: T – G = 0)			4.64***			4.64***
Mean (Probability[export])	0.752	0.624	0.128	0.752	0.624	0.128
t-stat (Ho: T – G = 0)			11.99***			11.99***
After matching						
Sample size	2,579	1,677		2,579	4,138	
Mean (export) (\$)	22,570,005	7,677,338	14,892,667	22,570,005	5,290,857	17,279,148
t-stat (Ho: T – G = 0)			2.05**			3.71***
Mean (Probability[export])	0.778	0.737	0.041	0.778	0.705	0.073
t-stat (Ho: T – G = 0)			3.05***			6.57***

Notes: *, **, *** denotes statistically significant estimate at 10, 5, and 1% level.

From Table A3.2, the t-statistics for the null hypothesis that the average export of the two comparison groups is not different from zero is 4.64 prior to matching. Thus, the null hypothesis was rejected and thus we conclude that the mean export sales for tailored and general services are statistically different prior to matching. After matching, the t-statistic is 2.05 for NN1 matching and 3.71 for NN5 matching. Thus, in this case, the one-nearest neighbours matching performed better in eliminating pre-program differentials in average export sales between tailored and general services, yet both differences remain statistically significant. In regards to export status, again we see that neither NN1 matching nor NN5 matching eliminated the pre-program differentials in terms of export probability. Also in this case, NN1 appears to have performed better.

Table A3.3: Differences in pre-program participation average exports sales and export probability of tailored service recipients (T) and all non-participants (N), before and after matching; PSM2

	Nearest neighbour (NN1)			Five nearest neighbours (NN5)		
	T	N	T – N	T	N	T – N
Before matching						
Sample size	2,694	1,272,665		2,694	1,272,665	
Mean (export) (\$)	20,521,853	184,135	20,337,718	20,521,853	184,135	20,337,718
t-stat (Ho: T – G = 0)			51.17***			51.17***
Mean (Probability[export])	0.747	0.104	0.644	0.747	0.104	0.644
t-stat (Ho: T – G = 0)			110.02***			110.02***
After matching						
Sample size	2,442	2,350		2,442	10,873	
Mean (export) (\$)	22,591,498	7,782,422	14,809,076	22,591,498	7,181,388	15,410,110
t-stat (Ho: T – G = 0)			2.35**			4.36***
Mean (Probability[export])	0.775	0.768	0.007	0.775	0.753	0.022
t-stat (Ho: T – G = 0)			0.55			2.24**

Notes: *, **, *** denotes statistically significant estimate at 10, 5, and 1% level.

Table A3.3 provides the matching statistics for the tailored service recipients as compared to the full set of economically active firms in the BLADE database. As can be seen in the table, the full set of active firms have substantially lower mean exports when compared to the general service control group as well as only 10 per cent of the firms being classified as exporters. The t-statistics for the null hypothesis that the average export of the two comparison groups is not different from zero is 110.02 prior to matching. Thus, the null hypothesis was easily rejected and thus we conclude that the mean export sales for tailored and the full control group are statistically different prior to matching. After matching, the t-statistic is 2.35 for NN1 matching and 4.36 for NN5 matching. Thus, again in this case, the one-nearest neighbours matching performed better in eliminating pre-program differentials in average export sales between tailored and general services. Similar to the case for the general services, both differences remain statistically significant. The t test for the difference in mean export status indicates that NN1 matching eliminated the pre-program difference, while NN5 matching did not fully eliminate the pre-program differentials.

A3.2 Additional Results

Table A3.4: Estimated immediate impacts of Tailored Services 2012-13 to 2015-16 on firm performance by firm size

General Services Control			
Small Firms			
	Model 1	Model 2	Model 3
Export sales (%)			
Average	36	47	47
Lower bound	20	30	31
Upper bound	52	64	63
Export participation (% points)			
Average	9	10	11
Lower bound	5	7	8
Upper bound	12	14	14
Employment (%)			
Average	10	10	10
Lower bound	7	7	7
Upper bound	12	13	13

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as small if their headcount is less than 200 on average prior to the 2012-13 fiscal year. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is an immediate effect where the binary variable is equal to one for each financial year that the firm received tailored services and zero otherwise.

Table A3.5: Estimated immediate impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

General Services Control						
	Resources			Manufacturing		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	65	75	75	44	58	58
Lower bound	19	26	27	15	27	28
Upper bound	111	124	124	74	89	88
Export participation (% points)						
Average	13	14	15	16	19	20
Lower bound	3	4	5	9	12	13
Upper bound	23	24	25	23	26	26
Employment (%)						
Average	2	2	2	-0	-0	-0
Lower bound	-7	-7	-7	-6	-6	-6
Upper bound	10	11	11	5	5	5

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as resources if they are classified as "A" or "B" in the ANZSIC (2006) classifications and manufacturing if they are classified as "C" in the classifications. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is an immediate effect where the binary variable is equal to one for each financial year that the firm received tailored services and zero otherwise.

Table A3.6: Estimated immediate impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

General Services Control						
Services excluding Health and Education				Health and Education Services		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	8	27	21	20	22	26
Lower bound	-10	6	2	-6	-5	0
Upper bound	27	47	41	46	49	53
Export participation (% points)						
Average	4	7	7	2	8	9
Lower bound	-0	3	2	-11	-7	-6
Upper bound	8	12	11	15	22	24
Employment (%)						
Average	4	5	4	2	2	4
Lower bound	0	1	1	-4	-3	-2
Upper bound	7	9	8	8	9	10

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as service sectors if their ANZSIC classification is "D" or higher. Health and Education sectors are represented by firms with an ANZSIC classification of "P" and "Q" respectively. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is an immediate effect where the binary variable is equal to one for each financial year that the firm received tailored services and zero otherwise. Export sales for Health and Education sectors is measured as the sum of export sales and other GST-free sales. Export participation for Health and Education sectors is likewise defined as firms that have non-zero export sales or other GST-free sales.

Table A3.7: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance by firm size

	Full Control		
	Small Firms		
	Model 1	Model 2	Model 3
Export sales (%)			
Average	87	98	125
Lower bound	81	82	111
Upper bound	93	114	139
Export participation (% points)			
Average	15	21	26
Lower bound	12	18	23
Upper bound	18	24	28
Employment (%)			
Average	20	20	26
Lower bound	18	17	23
Upper bound	22	23	29

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as small if their headcount is less than 200 on average prior to the 2012-13 fiscal year. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise.

Table A3.8: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

	Full Control					
	Resources			Manufacturing		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	138	123	173	86	65	130
Lower bound	121	81	132	75	39	105
Upper bound	156	165	214	97	92	155
Export participation (% points)						
Average	24	27	32	22	28	32
Lower bound	16	20	25	15	22	26
Upper bound	33	35	39	29	34	37
Employment (%)						
Average	13	11	16	10	9	15
Lower bound	7	3	8	7	4	11
Upper bound	19	19	24	14	14	20

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as resources if they are classified as "A" or "B" in the ANZSIC (2006) classifications, manufacturing if they are classified as "C" in the classifications, and services for all other classifications. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise.

Table A3.9: Estimated cumulative impacts of Tailored Services 2012-13 to 2015-16 on firm performance by sector

Full Control						
Services excluding Health and Education				Health and Education Services		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Export sales (%)						
Average	61	56	106	48	23	38
Lower bound	55	36	89	27	-2	19
Upper bound	68	76	122	69	47	57
Export participation (% points)						
Average	10	14	24	0	1	7
Lower bound	7	9	20	-10	-15	-6
Upper bound	14	18	28	11	17	20
Employment (%)						
Average	17	13	20	19	12	18
Lower bound	15	9	17	16	6	14
Upper bound	19	17	23	23	18	23

Notes: Estimates are based on difference-in-differences analysis of participating firms compared to different sets of non-participating firms. Model 1 uses all firms seeking general services, excluding those also receiving tailored services. Model 2 uses one nearest neighbour propensity score matched general service firms as a control for each firm receiving tailored services, while Model 3 uses five nearest neighbour propensity score matched firms. Firms are classified as service sectors if their ANZSIC classification is "D" or higher. Health and Education sectors are represented by firms with an ANZSIC classification of "P" and "Q" respectively. Lower and upper bounds (Lower 95%-CI and Upper 95%-CI) are estimated 95% confidence intervals. Treatment is a cumulative effect where the binary variable is equal to one in the first fiscal year that the firm received tailored services and every financial year afterwards and zero otherwise. Export sales for Health and Education sectors is measured as the sum of export sales and other GST-free sales. Export participation for Health and Education sectors is likewise defined as firms that have non-zero export sales or other GST-free sales.

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Glossary

Confidence interval	A 95% confidence interval means that if the analysis is replicated with 100 times with possibly different samples, the true value of the population parameter of interest (the impact of tailored services) will be observed in the interval 95 times.
Control group	The control group consists of firms who did not participate in the program, but are otherwise similar to the participating firms. To obtain unbiased impact estimates, the average change in the relevant outcomes of participating firms is compared to the average change in the same outcomes of the firms in the control group. There are two control groups in this study. The first are firms that have received general services from Austrade, but have otherwise have not received any tailored services. The second control group is built from all economically active firms.
Counterfactual	In program impact evaluation with observational data, the counterfactuals refer to the unobserved outcomes of participants had they not participated in the programs.
Cumulative Impact	The estimated change in the outcome variable comparing the first and subsequent fiscal years that a firm received tailored services to the fiscal years prior to receiving tailored services.
Difference-in-differences	An empirical technique to account for potential selection into treatment bias when treatment effect is to be estimated with non-experimental data. Instead of taking average difference in outcomes of treatment and control groups to measure treatment effect, difference-in-differences (also known as DID) takes the difference between the average change in outcomes of the treatment group and the average change in outcomes of the control group.
Economically Active Firm	Defined by CTI as firms that have non-zero sales or non-zero employee headcount.
Economically significant	This concept concerns with the magnitude of the impacts and to be contrasted with the concept of statistical significance. An estimated impact may be statistically significantly different from zero. However, the magnitude of the impact may be too small to be

	considered as significant in economic terms. This is also known as importance measure.
Export Intensity	The ratio of aggregated export sales to total firm sales.
Immediate Impact	The estimated change in the outcome variable comparing only the fiscal year in which the firm received tailored services compared to the performance of the firm in all other fiscal years.
Impact	In this evaluation, impact is defined as the change in the export performance (export revenue and export status) of tailored service recipients.
Lower bound	Lower bound refers to the lower limit of any reported 95% confidence intervals.
Matching	In this evaluation, matching is a data driven approach to ensure two given firms are “similar” to each other in the matching characteristics or in terms of the probability to be in the treatment group.
Naïve estimate	In this evaluation, naïve estimate refers to impact estimates derived from a simple difference between export performance before and after program participation or between export performance of participants and non-participants.
Probability of export	This evaluation defines a firm as an exporter in a given financial year if it reports a positive export value in its Business Activity Statement. The probability of export is probability of a firm in the sample has positive export. Empirically, this probability is approximated by the proportion of firms who are exporters.
Propensity score	Propensity score in this evaluation refers to the predicted probability of a given firm is receiving Austrade tailored services, conditional on firms observed characteristics.
Propensity score matching	This refers to matching based on a comparison of the propensity score defined above. Two firms are matched if their propensity scores match.
Robust estimate	This concept refers that the estimates are robust to variation in model specifications.
Treatment group	In this evaluation, treatment group refers to participating organisations receiving tailored services.

Time invariant factors

Factors which values are fixed/constant across time.

Unobserved factors

In this evaluation, they refer to factors which are not recorded in the data but they determine whether or not a firm participated in the program and are correlated with the outcomes being evaluated.