

Role of small businesses in Australia's oil and gas industry: Methodology note

Oil and gas companies rely on various Australian businesses to provide goods and services that support their operations across the supply chain, and many of these are small businesses. The Australian Petroleum Production & Exploration Association (APPEA) has commissioned Deloitte Access Economics to examine the role and economic contribution of small business suppliers to Australia's oil and gas industry, focusing on inputs to exploration, extraction and processing activities. This note summarises the research and modelling methodology applied in this project, with a focus on the economic contribution analysis that was undertaken.

High-level overview of methodology

Economic contribution modelling captures the contribution of a given business or sector to the economy at a particular point in time in terms of value added (the contribution of a sector to GDP) and employment. Small business suppliers to the oil and gas sector directly and indirectly support a range of economic activity in Australia, both as a result of the activities of the businesses themselves and their demand for inputs from upstream suppliers. Deloitte Access Economics estimated the economic contribution of small business suppliers to the Australian oil and gas industry in the financial year 2017-18.

The analysis includes estimates of both the direct and indirect economic contribution:

- The **direct contribution** of businesses captures the value of output (i.e. goods and services) generated by the sector's factors of production (i.e. labour and capital) as measured by the income to those factors of production. In this case, the direct contribution provides a snapshot of the value added of the small business suppliers to the oil and gas industry, which consists of the wages and salaries they pay their employees (the return to labour) and their gross operating surplus (GOS) (the returns to capital). The direct contribution provides us with the ability to compare the results to other sectors, with the sum of direct value added over all sectors (plus net taxes and subsidies) equal to national GDP.
- The **indirect contribution** or flow-on effects of businesses captures the value added that results from the demand for intermediate inputs by small business suppliers.
- The contribution of businesses to **direct employment** captures those employed by small business suppliers themselves as a result of their operations.
- The contribution of businesses to **indirect employment** captures those employed in upstream industries who experience an increase in demand as a result of direct economic activity by small business suppliers.

The **total contribution** is calculated as the sum of both direct and indirect contributions, for both value added and employment.

Deloitte Access Economics conducted a survey of oil and gas companies in order to gather data inputs for modelling the economic contribution of small business suppliers to Australia's oil and gas industry. The 15 oil and gas companies in Australia that were surveyed represented approximately 50 percent of the industry's total supplier expenditures in 2017-18, and include oil and gas companies of various sizes.¹ These companies were surveyed on their:

¹ The oil and gas industry's total supplier expenditures in 2017-18 is estimated by assuming the 2016-17 industry expenditure of \$27 billion based on APPEA member survey data (APPEA, 2018) increased at the same growth rate as overall oil and gas industry gross value added (9.9 percent in the year to 2017-18). This implies

- Total expenditure / revenue for the most recent financial year (2017-18)
- Operational and capital expenditure by industry of use / expenditure category
- Supplier size (consistent with ABS definitions, small business were defined as those employing 1-19 employees)
- Regional information on spend (where available).

The survey results indicate that almost half (47 percent) of suppliers engaged by oil and gas companies are small businesses. In 2017-18, the oil and gas industry spent nearly \$1.6 billion on Australian small business suppliers across a range of industries, which represented approximately 5 percent of total spend on suppliers. Note this represents a conservative estimate of small businesses' contribution to oil and gas supply chains, as it does not capture how small businesses contribute to larger companies that supply the oil and gas industry.

The surveyed spend on small business suppliers has been scaled up to an industry level to determine the aggregate spend by industry, and the economic contribution of these small business suppliers across the industry is estimated using the 2015-16 Australian Bureau of Statistics (ABS) Input-Output tables.

Detailed explanation of modelling concepts and approach

Economic contribution studies are intended to quantify measures such as value added, exports, imports and employment associated with a given industry or firm, in a historical reference year. The economic contribution is a measure of the value of production by a firm or industry.

Overview of estimates reported

All direct, indirect and total contributions are reported as gross operating surplus (GOS), labour income, value add and employment (with these terms defined in Table 1).

Table 1: Definitions of economic contribution estimates

Estimate	Definition
Gross operating surplus (GOS)	GOS represents the value of income generated by the entity's direct capital inputs, generally measured as the earnings before interest, tax, depreciation, and amortisation (EBITDA).
Labour income	Labour income is a subcomponent of value add. It represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.
Value add	Value add measures the value of output (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value add across all entities in the economy equals gross domestic product. Given the relationship to GDP, the value add measure can be thought of as the increased contribution to welfare.
Employment (FTE)	Employment is a fundamentally different measure of activity to those above. It measures the number of workers (measured in full-time equivalent terms) that are employed by the entity, rather than the value of the workers' output.
Direct economic contribution	The direct economic contribution is a representation of the flow from labour and capital committed in the economic activity.
Indirect economic contribution	The indirect contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by economic activity.
Total economic contribution	The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

an estimated \$29.7 billion in total industry spend in 2017-18, of which our 15 surveyed companies comprised \$14.96 billion.

Source: Deloitte Access Economics

Definitional notes

When calculating the GOS for a typical for-profit firm or industry, income streams from government (such as transfers or production subsidies) are excluded as they are a transfer of public funds, not reflective of income generated by the activities of the firm or industry.

Similarly, value added is typically calculated as GOS plus labour income net of subsidies; under the ABS Australian System of National Accounts (2013):

A subsidy on a product is a subsidy payable per unit of a good or service. An enterprise may regard a subsidy as little different from sales proceeds. However, in the national accounts, subsidies are regarded as transfer payments from general government, enabling enterprises to sell their output for less than would otherwise be the case.

Value added

The measures of economic activity provided by this contribution study are consistent with those provided by the Australian Bureau of Statistics. For example, value added is the contribution the sector makes to total factor income and gross domestic product (GDP).

There are a number of ways to measure GDP, including:

- **expenditure approach** – measures expenditure: of households, on investment, government and net exports; and
- **income approach** – measures the income in an economy by measuring the payments of wages and profits to workers and owners.

Below is a discussion measuring the value added by an industry using the income approach.

Measuring the economic contribution – income approach

There are several commonly used measures of economic activity, each of which describes a different aspect of an industry's economic contribution.

Value added measures the value of output (i.e. goods and services) generated by the entity's factors of production (i.e. labour and capital) as measured in the income to those factors of production. The sum of value added across all entities in the economy equals gross domestic product. Given the relationship to GDP, the value added measure can be thought of as the increased contribution to welfare.

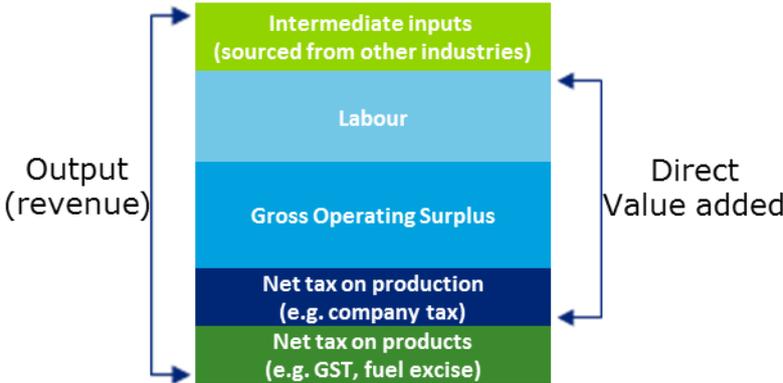
Value added is the sum of:

- Gross operating surplus (GOS), which represents the value of income generated by the entity's capital inputs, generally measured as the earnings before interest, tax, depreciation and amortisation (EBITDA).
- Tax on production less subsidy provided for production. Note: given the manner in which returns to capital before tax are calculated, company tax is not included or this would double-count that tax. In addition, it excludes goods and services tax, which is a tax on consumption (i.e. levied on households).
- Labour income, which represents the value of output generated by the entity's direct labour inputs, as measured by the income to labour.

Figure 1 shows the accounting framework used to evaluate economic activity, along with the components that make up *output*. Output is the sum of value added and the value of intermediate inputs used by the firm or industry.

The value of intermediate inputs can also be calculated directly by summing up expenses related to non-primary factor inputs.

Figure 1: Economic activity accounting framework



Source: Deloitte Access Economics.

Contribution studies also generally outline employment generated by a sector. Employment is a fundamentally different measure of activity to those above. It measures the number of workers that are employed by the entity, rather than the value of the workers' output.

Direct and indirect contributions

The **direct** economic contribution is a representation of the flow of labour and capital in the sector.

The **indirect** contribution is a measure of the demand for goods and services produced in other sectors as a result of demand generated by the direct economic activity of philanthropy in Australia. Estimation of the indirect economic contribution is undertaken in an input-output (IO) framework using Australian Bureau of Statistics IO tables which report the inputs and outputs of specific sectors of the economy (ABS 2018).

The total economic contribution to the economy is the sum of the direct and indirect economic contributions.

Other measures, such as total income or total exports are useful measures of economic activity, but these measures alone cannot account for the contribution made to GDP. Such measures overstate the contribution to value added because they include activity by external firms supplying inputs. In addition, they do not discount the inputs supplied from outside Australia.

Input-output analysis

Input-output tables are required to account for the intermediate flows between sectors. These tables measure the direct economic activity of every sector in the economy at the national level. Importantly, these tables allow intermediate inputs to be further broken down by source. These detailed intermediate flows can be used to derive the total change in economic activity associated with a given direct change in activity for a given sector.

A widely used measure of the spill-over of activity from one sector to another is captured by the ratio of the total to direct change in economic activity. The resulting estimate is typically referred to as 'the multiplier'. A multiplier greater than one implies some indirect activity, with higher multipliers indicating relatively larger indirect and total activity flowing from a given level of direct activity.

The IO matrix used for Australia is derived from the ABS 2014-15 IO tables, the latest available IO data at the time of the analysis. The industry classification used for IO tables is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC), with 114 sectors in the modelling framework.

Estimating the direct and indirect contributions

To estimate the economic contribution of small business suppliers to oil and gas, Deloitte Access Economics undertook a survey of APPEA member companies. This survey requested detailed data on company expenditure and suppliers, specifically:

- Total expenditure / revenue for the most recent financial year (2017-18)
- Operational and capital expenditure by industry of use / expenditure category
- Supplier size (consistent with ABS definitions, small business were defined as those employing 1-19 employees)
- Regional information on spend (where available).

Where this data was not available, it was requested that they provide the total expenditure by industry and an estimation of the proportion of this expenditure which flowed to small business suppliers. In total, five companies provided data in this format. In addition, a number of internal data management inconsistencies meant varied approaches had to be applied in some circumstances:

1. One company was not able to identify small businesses directly, and therefore their small business spend was estimated using other internal data. This was undertaken by assuming that all regional spend in regions where total spend was less than a minimum threshold, were attributable to small business. This was then strengthened through the ability to identify indigenous business spend, which are also typically small businesses.
2. One company defined small business spend as spend on companies that had less than \$10 million total revenue. This definition was adopted and assumed comparable in identifying the small business spend for this company.

In total, 15 companies were surveyed, capturing an estimated 50.4 percent of the industry expenditure, based on an overall industry expenditure of \$29.7 billion in 2017-18.² The surveyed companies were also various sizes, with:

- 5 companies recording total expenditure of \$1 billion or more in 2017-18
- 3 companies recording total expenditure of \$0.2-1 billion in 2017-18
- 7 companies recording total expenditure of less than \$0.2 billion in 2017-18

This data is then scaled up to an industry level to determine the aggregate spend on small business suppliers by industry. This is undertaken based the assumption that the spend data, and its profile across industry, is representative of all small business supplier spend. The economic contribution of small business suppliers is then estimated using the most recent 2015-16 Australian Bureau of Statistics (ABS) Input-Output tables described in the previous sections.

Limitation of economic contribution studies

While describing the geographic origin of production inputs may be a guide to a firm or industry's linkages with the local economy, it should be recognised that these are the type of normal industry linkages that characterise all economic activities.

Unless there is unused capacity in the economy (such as unemployed labour) there may not be a strong relationship between a firm's economic contribution as measured by value added (or other static aggregates) and the welfare or living standard of the community. The use of labour and capital by demand created from the industry comes at an opportunity cost as it may reduce the amount of resources available to spend on other economic activities.

² The total industry expenditure is calculated using the APPEA Member Survey Data from 2018, to provide an industry expenditure amount of \$27 billion for the 2016-17 financial year. This is then grown in line with the industry gross value added amount (9.86 percent) to an estimated \$29.7 billion industry spend in 2017-18.

In a fundamental sense, economic contribution studies are simply historical accounting exercises. No 'what-if', or counterfactual inferences – such as 'what would happen to living standards if the firm or industry disappeared?' – should be drawn from them.

The analysis – as discussed in the report – relies on a national IO table modelling framework and there are some limitations to this modelling framework. The analysis assumes that goods and services provided to the sector are produced by factors of production that are located completely within the state or region defined and that income flows do not leak to other states.

The IO framework and the derivation of the multipliers also assume that the relevant economic activity takes place within an unconstrained environment. That is, an increase in economic activity in one area of the economy does not increase prices and subsequently crowd out economic activity in another area of the economy. As a result, the modelled total and indirect contribution can be regarded as an upper-bound estimate of the contribution made by the supply of intermediate inputs.

Similarly, the IO framework does not account for further flow-on benefits as captured in a more dynamic modelling environment like a Computerised General Equilibrium (CGE) model.

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