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GRADUATE CONTRIBUTIONS AND THE IMPACTS OF THE FUNDING FREEZE

BRIEFING REPORT - SUMMARY OF SOURCES, METHODS AND RESULTS

MAY 2018

1 INTRODUCTION

In December 2017, the Australian Government announced measures in Mid-Year Economic and Fiscal Outlook to freeze per-student funding to universities at 2017 levels. This would reduce funding to Australian universities by $2.1 billion over the forward estimates.

Analysis by Universities Australia estimates that, even without any growth in commencements, the effect of the freeze will mean thousands of student places will receive no Government funding from 2018 onwards. UA estimates the number of unfunded places will be around 10,000 in 2018, rising to 19,500 in 2019 and 23,000 in 2020.

Against this backdrop, Cadence Economics has been commissioned by UA to investigate the potential impact on both the economy and taxation revenue if fewer university graduates enter the workforce as a result of the funding freeze. Our assessment relies on data from the 2017-18 Budget and MYEFO documents combined with the 2016 Census, and application of Cadence Economics' in-house Computable General Equilibrium model.

Our analysis models the impact on GDP and tax revenue from the reduction in the productivity of the workforce due to fewer workers having degrees. We do not model the impacts of lower degree attainment on the proportion of people that participate in the labour force.

The assessment only considers the potential reduction in labour productivity of a reduced number of graduates entering the workforce. The labour productivity loss is calculated as the effective difference in wage rates of university graduates compared with those obtaining Certificate III or IV training. These figures are derived from the 2016 Census, and do not account for any changes in labour force participation rates, nor any other improved social or welfare outcomes for graduates.

Under the worst-case scenario, the reduction in places comes at **a present-day GDP cost of $12.3 billion and a tax revenue cost of $3.9 billion over the next 20 years**. Under a more conservative scenario, the cost to GDP would be $6.9 billion to GDP and $2.2 billion to tax revenue.

We find that **for every Australian who misses out on a university qualification as a consequence of the funding freeze, the cost to the economy is approximately $471,000 in GDP and $152,000 in tax revenue, in present day terms.**

These findings demonstrate that, even in the most conservative scenario, the short term fiscal savings to Government are offset by the long run cost of reduced tax receipts — and are substantially less than the long run cost to the economy.

It is important to note the Government's Budget projections are expressed in nominal, undiscounted terms — they don't allow for inflation. As a result, Budget projections overstate the value of savings over time. In contrast, the results of this study are discounted to present value terms.

2 DETAILED APPROACH

Estimation of the foregone economic activity (measured through GDP) and tax receipts are undertaken using the 2017-18 Federal Budget, the 2017-18 Mid-Year Economic and Fiscal Outlook, and the most recent Census data to estimate the direct impacts of reduced student places. These direct impacts are then used in conjunction with Cadence Economics' Computable General Equilibrium model to translate these direct impacts into economy wide impacts.

The estimates in this work rely only on increased labour productivity as a result of university education. They do not include the impacts of, for example, higher labour force participation of university graduates, the operations of universities as business entities, or any other improved welfare outcomes of university graduates that are often reported.

First, we estimate the improvement in labour productivity due to completing a Bachelor level qualification.

The difference in wages paid to university graduates versus non-university graduates reflects — in large part — differences in labour productivity. This is also called the wage premium of university education.

The 2016 Census allows us to estimate the average wages paid by a range of indicators. For our purposes we rely on the highest level of educational detail available, which includes the classifications of:

- Postgraduate Degree Level;
- Graduate Diploma and Graduate Certificate Level;
- Bachelor Degree Level;
- Advanced Diploma and Diploma Level;
- Certificate III and IV level;
- Secondary Educations – Years 10 and above;
- Certificate I and II level;
- Secondary Education – Years 9 and below;
- Supplementary Codes;
- Not stated; and
- Not applicable

To estimate a wage premium, we need to choose an alternate level of qualification to compare. Comparing the average wages of people with Bachelor degree level qualification to those with Certificate III and IV level qualification, we find an average wage premium of 31%. Factors other than the level of education can influence an individual's level of income, particularly their industry of

employment. This effect has been taken into account when estimating the wage premium of a Bachelor level degree[1].

Second, we estimate the change in enrolments and completions due to changes in funded places.

UA estimates a reduction in the number of Government-funded places of around 10,000 in 2018, 19,500 in 2019 and 23,000 in 2020. This estimate uses assumptions of zero growth in commencing load from 2018 onwards, and all universities receiving the maximum increase in funding by meeting performance criteria when performance funding starts in 2020.

This reduction in Government-funded places influences the places offered and thus the number of enrolments. However, ultimately the number of places offered is a decision for individual universities, taken in light of their local circumstances.

To test this level of uncertainty, we have run two scenarios — a low scenario with 2,000, 10,000 and 15,000 fewer enrolments over 2018, 2019 and 2020 respectively, and a high scenario with 5000, 19,500 and 23,000 fewer enrolments in each of those years.

Third, we account for annual completion rates.

Not every person who commences a degree will ultimately graduate. After four years, approximately 45% of students have completed their degree, after six years 66% complete, and after nine years 74% complete. We assume for the purposes of this modelling that anyone who hasn't completed in nine years will never complete.

Using this data, we build a time profile for the proportion of each university intake that enters the workforce on a year by year basis. This ensures that we account for the delay between funding a university place and that person entering the workforce with a higher level of qualification.

Fourth, we estimate the aggregate impact on labour force productivity, and the flow on economic impacts.

The 31% wage premium estimated in step two is combined with the two scenarios of Bachelor level completions in step three to determine the aggregate change in labour force productivity due to reduced student places over the period 2018, 2019 and 2020.

These labour force productivity profiles are used to build economic shocks for the Cadence Economics' in-house Computable General Equilibrium model. CGE models are a class of economic model widely used both by the Australian Government and by private providers when estimating the economic consequences of (for example) changes in public policy settings. A description of the CEGEM model is provided in Attachment A.

[1] Specifically, we have estimated the average wage premium by 1 digit ANZSIC industry of employment.

Fifth, we derive summary economic statistics.

Finally, we draw out of the CGE model the differences in GDP and tax revenue over a modelling period from 2018 to 2040. Based on the estimates above, we find that in today's terms a graduate contributes $471,000[2] to Australian GDP over a 20-year period and $152,000[2] in tax revenue both directly and indirectly.

Each extra graduate pays more personal income tax, compared to what he or she would pay with a highest qualification of Certificate III or IV. Furthermore, an extra degree drives a wider increase in economic activity and earnings across the economy, increasing the tax take across the board. The combined impact of these two effects on tax receipts in 2020 of $13,800[3] exceeds the cost to Government of a university place $11,780[4].

Table 1 shows the aggregate impact of reduced place funding over the modelling period to 2040 in today's terms. Under the high scenario, we find foregone tax revenues of nearly $4 billion and foregone GDP of over $12 billion in today's terms[2].

Table 1: Impacts on GDP and tax revenue of reduced place funding

	Low scenario	*High scenario*
GDP - $m 2017/18, NPV	-$6,922	-$12,307
Tax - $m 2017/18, NPV	-$2,201	-$3,912

[2] Net present value, discounted using a 7% real discount rate over the modelling period to 2040.

[3] In nominal terms, that is, before adjusting for inflation. We choose to use nominal figures for this number to ease the comparison to the budget.

[4] The estimated average cost to Government of CGS funding per place in 2020

ATTACHMENT A - THE CEGEM MODEL – ADDITIONAL DETAIL

CEGEM is a multi-commodity, multi-region, dynamic model of the world economy. Like all economic models, CEGEM is a based on a range of assumptions, parameters and data that constitute an approximation to the working structure of an economy. Its construction has drawn on the key features of other economic models such as the global economic framework underpinning models such as GTAP and GTEM, with state and regional modelling frameworks such as Monash-MMRF and TERM.

Labour, capital, land and a natural resource comprise the four factors of production. On a year-by-year basis, capital and labour are mobile between sectors, while land is mobile across agriculture. The natural resource is specific to mining and is not mobile. A representative household in each region owns all factors of production. This representative household receives all factor payments, tax revenue and interregional transfers. The household also determines the allocation of income between household consumption, government consumption and savings.

Capital in each region of the model accumulates by investment less depreciation in each period. Capital is mobile internationally in CEGEM where global investment equals global savings. Global savings are made available to invest across regions. Rates of return can differ to reflect region specific differences in risk premiums.

The model assumes regional labour markets operate in a model where employment and wages adjust in each year so that, for example, in the case of an increase in the demand for labour, the real wage rate increases in proportion to the increase in employment from its base case forecast level. The coefficient of adjustment is chosen so that the employment effects of a shock are largely eliminated after about ten years. Labour supply is determined by demographic factors.

CEGEM determines regional supplies and demands of commodities through optimising behaviour of agents in perfectly competitive markets using constant returns to scale technologies. Under these assumptions, prices are set to cover costs and firms earn zero pure profits, with all returns paid to primary factors. This implies that changes in output prices are determined by changes in input prices of materials and primary factors.

The advantage of a global model such as CEGEM is that it accounts for bilateral trade flows of all commodities between regions. Goods are imperfect substitutes, implemented through the Armington assumption. The model does not require the regional current account to be in balance as the capital account can adjust to maintain balance of payments equilibrium.

Base data

The starting point for the base data in CEGEM is the global database produced by the Global Trade Analysis Project (GTAP). This database is comprised of 140 country and regional groups and 57

production sectors. The Australian component of this database was supplied by the Productivity Commission, and is based on Australian input-output tables produced by the Australian Bureau of Statistics (ABS).

Dynamics

CEGEM is a recursive dynamic model that solves year-on-year over a specified timeframe. The model is then used to project the relationship between variables under different scenarios, or states, over a predefined period. This is illustrated in Figure A1. This shows the reference case scenario forms the basis of the analysis. The model is solved year-by-year from time 0, which reflects the base year of the model, to a predetermined end year (in this case 2030).

The variable represented on the vertical axis of Figure A1 could be one of the hundreds of thousands represented in the model ranging from macroeconomic indicators such as real GRP to sectoral variables such as the exports of thermal coal. In the figure, the percentage changes in the variables have been converted to an index (= 1.0 in 2005) and are projected to increase by 2030.

Set against the reference case scenario is a 'scenario projection'. This scenario represents the impacts of imposing a policy shock. That results in a new projection of the path of the variable over the simulation time period. The impacts of the policy change are reflected in the differences in the variable at time T. It is important to note that the differences between the reference case and policy intervention scenario are tracked over the entire timeframe of the simulation.

Figure A1: Dynamic simulation using CEGEM