

TRADITIONAL APPRENTICESHIPS:

BUILDING FUTURE GROWTH

REPORT BY
ACCESS ECONOMICS PTY LIMITED

FOR

GROUP TRAINING AUSTRALIA

27 FEBRUARY 2006



**ACCESS
ECONOMICS**



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EXECUTIVE SUMMARY

With the Australian economy facing the dual pressures of an ageing population and rising skill shortages, there are clear benefits in improving skills development.

The ageing of the population, particularly the baby boomers' move into retirement, will cut into economic growth. This is likely to be most notable through the years of 2015-2030 when most boomers will retire. This, in combination with relative health cost inflation, will mean ageing has an even greater impact on the Federal Budget deficit.

The solution is to encourage faster productivity growth and higher participation through greater skills development – and the sooner the better. Federal Treasury has been urging this change since its *Intergeneration Report* of 2002.

Indeed, Treasury researchers are increasingly making the point that one way to raise both productivity and participation is to have a higher skilled workforce. Productivity rises due to increased skills, and participation rises as those increased skills lead to higher wages, a reduced likelihood of unemployment and (typically) better working conditions.

Such points have been made in the Treasury Working Paper 2003-03 *A Note on Educational Attainment and Labour Force Participation in Australia* by Steven Kennedy and David Hedley.

The analysis presented here is designed to investigate the potential for increasing the workforce skills base. By modelling the resultant impact of higher productivity and participation on the economy as a whole, the potential contribution of increased numbers of trained apprentices can now be measured in full.

THE CHALLENGE OF ADDRESSING THE SKILLS SHORTAGE

By targeting a new policy measure to attract apprentices, the broader benefits of a more highly skilled workforce in terms of improved productivity and participation will flow to the wider economy.

The New Apprenticeship program (in combination with Government subsidies for apprentice toolkits and trade learning scholarships) go some way towards addressing such issues. However, there remain good reasons to broaden subsidies to apprentices in traditional trades.

The particular policy proposal here uses direct subsidies. The latter have been calibrated to broadly match the tax take from those in the first and second years of their apprenticeships, returning net pay to the equivalent of pre-tax and pre-subsidy gross pay.

Additional subsidies of \$1,161 and \$1,974 paid to apprentices in traditional trade in their first and second years of training, respectively would boost participation in these programs and enhance the skills of Australia's workforce in years to come.

WHAT IS THE IMPACT ON THE SIZE OF THE ECONOMY?

Almost 60,000 people a year commence traditional apprenticeships.



The proposed subsidies here are the equivalent of a little over 8% of first year wages among traditional apprenticeships.

Based on Access Economics' analysis of the economic literature, that may be sufficient to induce an extra 1,480 people a year to undertake traditional apprenticeships.

In turn, that has the potential to boost both productivity and participation.

By how much? While the modelling which underlies the results in this report is complex, it is possible to view the impact of increased retention in a more intuitive way. With that in mind, it is worth considering a few simple rules of thumb.

- ❑ The modelling here allows for, roughly, an extra 1,480 people a year to enter traditional apprenticeships. Each year some 265,000 people are born, so that addition of 1,480 people per year entering traditional apprenticeships corresponds to about 0.56% of the population at a given age.
- ❑ On average, traditional apprenticeships last 3 years.
- ❑ The average increase in education of new entrants to the workforce is 0.56% having done an extra 3 years – an addition of 0.017 years.
- ❑ Of course the benefits of this boost to participation in education and training take decades to mature in full, as the extra education is only received by new workers, and it takes decades for these young Australians to work their way through the workforce, replacing those before them with lower average education levels. Average years of schooling are rising anyway, but the impact of this change to retention rates after some 30 years (that is, by the year 2040) is that average years of schooling will have risen by around 0.015 years.

That 0.015 year increase in the stock of education has two effects. The first is on **productivity**.

- ❑ Relative to a current average of 13.73 years of education and training per Australian, the additional 0.015 years represents a 0.11% increase in the stock of education over and above where it would be.
- ❑ What is the impact of that extra education on Australia-wide productivity? Think of the stock of human capital in the economy as having essentially two elements:
- ❑ There are the mental and physical endowments of the labour force combined with on-the-job training. These factors influence the productivity of the workforce, but are not a direct product of the formal education system.
- ❑ And there is the contribution made by formal education to raising skill levels.
- ❑ The contribution of each of these two components to (total) human capital formation is unknown – but both components are likely to be important.
- ❑ Assuming (for the sake of this 'everyman interpretation' of the results) that these two are of equal importance, then a 0.11% increase in formal training would result in an increase in GDP of around 0.055% arising as a result of higher productivity due to a better educated and more highly skilled workforce.
- ❑ While the production function used in the modelling here does not make this 50/50 assumption, the actual result achieved is close, at around 0.066%.

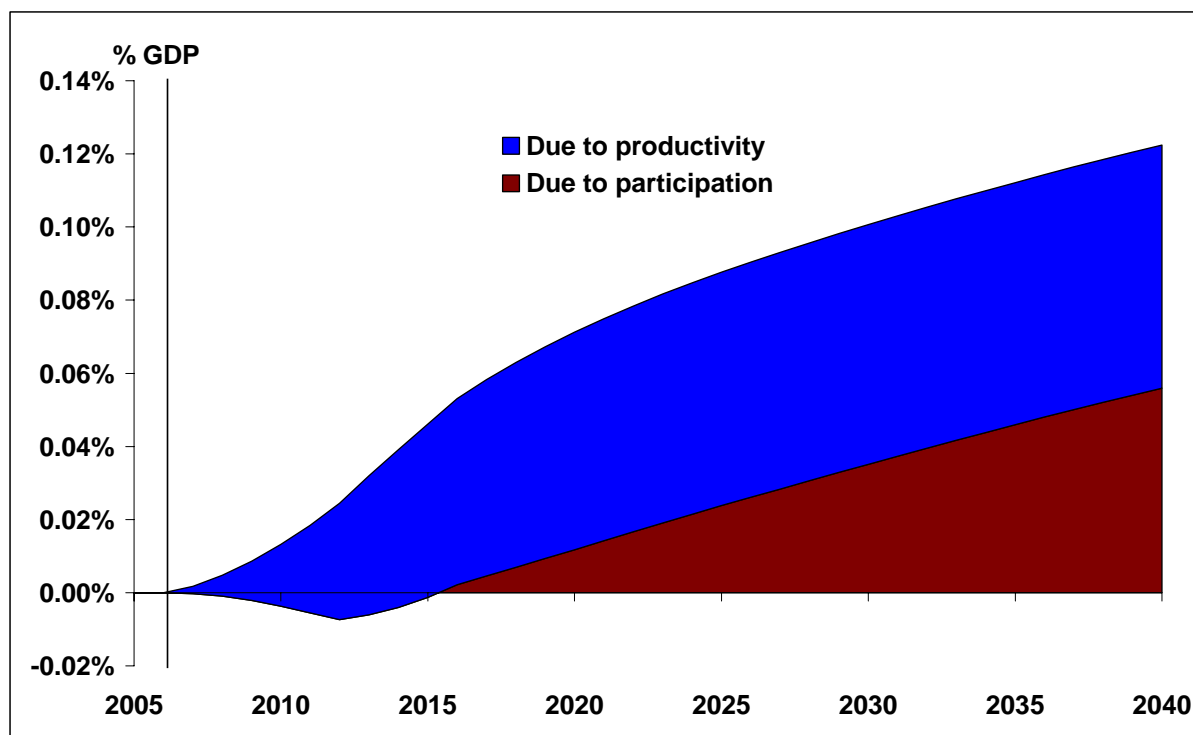


With respect to **participation**, as noted above, a more highly skilled workforce will also have higher rates of participation. Across those of working age, there is roughly a 10 percentage point differential in participation rates between those with year 10 or year 12 qualifications and those who went on to get university degrees or other tertiary qualifications.

- ❑ There is also a difference of, on average, about 4 years education between those two groups. That implies a second rule of thumb to help understand the results – that an extra 4 years of school generates an extra 10 percentage points or so on participation (or 12.5%, given average participation rates in these age cohorts).
- ❑ (Note the rule of thumb for the impact of extra education derived here is based on the participation difference accruing between high school and tertiary education – which may have a larger or smaller proportional impact than the shock here.)
- ❑ That observation implies that 4 years of education results in a 12.5% increase in participation, so that a 0.015 year increase in average length of education (as occurs here by 2040) is sufficient to boost participation by 0.046% – pretty much the same result actually generated in the modelling here (of 0.056%).

The resultant combination of the boost to both productivity and participation therefore leads to a lift in the overall size of the economic pie – GDP – of 0.122% by 2040.

THE EFFECT ON GDP



THE BOTTOM LINE

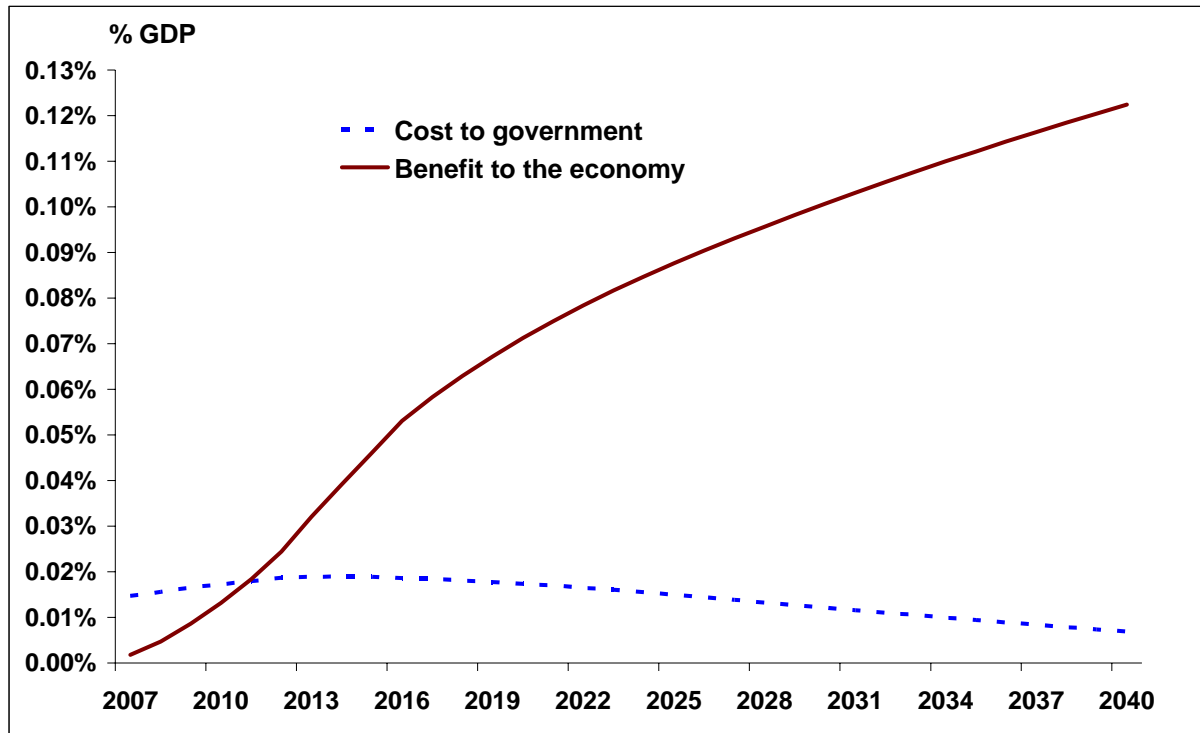
Australia faces slower economic growth and a sharp worsening in its Budget balances in response to a quantity challenge and a price challenge: a quantity challenge from the ageing of the Australian population, and a price challenge from relatively rapid health cost inflation.

Federal Treasury has noted that:



- *First*, much of the answer to this considerable challenge will lie in boosting productivity and rising participation and
- *Second*, those with higher skills have both higher productivity and higher participation.

COSTS AND BENEFITS FROM THE PROPOSED INCENTIVES



This report estimates that the impact on the size of the economy of an increase in the number of people undertaking traditional apprenticeships is notable – with GDP some 0.122% higher in 2040. That is considerably more than the cost of the subsidy – at around 0.02% of GDP.

Access Economics
27 February 2006

1. AUSTRALIA'S SKILLS CHALLENGES

Group Training Australia (GTA) has commissioned Access Economics to cost a Federal Budget proposal aimed at boosting numbers of people undertaking traditional apprenticeships.

By modelling the impact of the resultant higher productivity and participation on the Australian economy as a whole, this report measures the potential contribution of additional trained apprentices in full.

The ageing of the population, particularly the baby boomers moving into retirement, will cut into economic growth. This is likely to be most notable through the years of 2015-2030 when most boomers will retire. This, in combination with relative health cost inflation, will mean ageing has an even greater impact on the Federal Budget deficit.¹

The obvious solution is to encourage faster productivity growth and higher participation through greater skills development – and the sooner the better.

Federal Treasury has been urging this change since its *Intergeneration Report* of 2002.

And Treasury researchers are now making the point that one way to increase both productivity and participation is to have a higher skilled workforce. Productivity rises due to increased skills, and participation rises as those increased skills lead to higher wages, a reduced likelihood of unemployment and (typically) better working conditions.

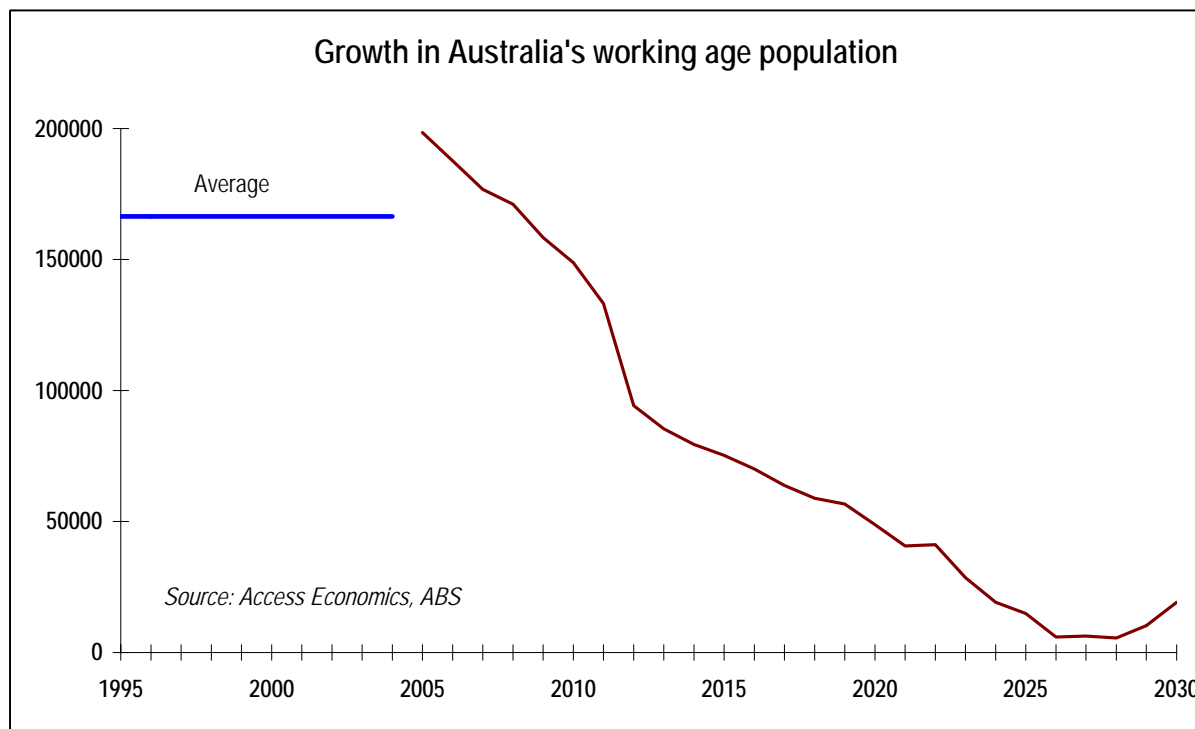
KEY CHALLENGES IN LIGHT OF THE *INTERGENERATIONAL REPORT*

Every nation has a compact with itself, taxing its workers to pay for subsidies to its young and its old. But in May 2002 the Australian Government's *Intergenerational Report* (IGR) noted that Australia's intergenerational compact with itself was at risk in coming decades:

- ❑ **First from a quantity challenge:** Australia's ageing population means there will be a big increase in numbers of the aged relative to numbers of workers, and a notable fall off in growth of those traditionally seen as being 'of working age' – see Chart 1.
- ❑ **And second from a price challenge:** As the Australian Government heavily subsidises health spending for the aged in particular, the fact that the cost of delivering health care tends to rise over time relative to other costs in the economy means an additional strain.

¹ These points are made at length in Federal Treasury's 2002 *Intergenerational Report* and the Productivity Commission's 2004 *Economic Implications of an Ageing Australia*.

CHART 1: THE DEMOGRAPHIC CHALLENGE



So the *Intergenerational Report* told Australians that, for this nation's intergenerational compact with itself to be sustained, then either tax rates on workers will have to rise, or subsidy rates to the young and the old will have to fall – or some mix of those two.

The *Intergenerational Report* said that, in the absence of action, then by 2041-42 Australia's intergenerational compact with itself would be in primary deficit ('primary' means abstracting from interest payments) to the tune of 5% of national output each year – over \$40 billion a year in today's money. However, that is a public sector deficit figure – not an estimate of lost output. The bigger picture figure is the impact on national output of ageing. By 2041-42, the figuring in the *Intergenerational Report* implies a reduction in annual national output (compared with where it would otherwise be in the absence of ageing) of 13½%.

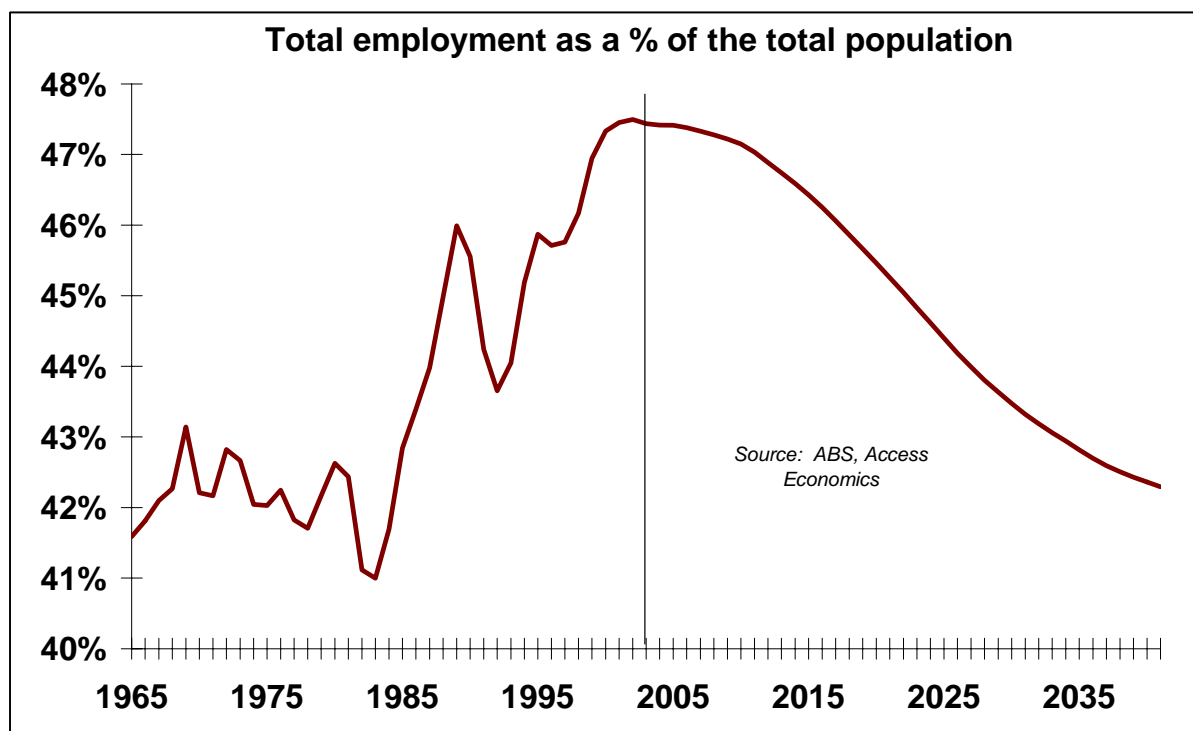
THE '3 Ps' – A RECIPE FOR FUTURE GROWTH

Alternatively, and using the analytic approach adopted in this field by Treasury, Australia's economic growth prospects in coming decades can be summarised in terms of 'the 3 Ps':

- ❑ **Population** – Those aged 15+.
- ❑ **Participation** – The proportion of that population pool who are available to work.
- ❑ **Productivity** – How productive each worker is.

The challenges put forward by an ageing population relate mainly to the **participation** component to that equation. As a larger share of Australia's adult population move into retirement, the overall ratio of employment to population is set to fall (see Chart 2).

CHART 2: THE SLIPPERY SLOPE



Note that the fall in this ratio, which is closely linked to the participation rate (the difference is that the above figure removes the unemployed, and allows for those aged under 15), explains the reduction in annual national output (compared with where it would otherwise be in the absence of ageing) by 2041-42 of 13½% noted above.

Declining birth rates over recent decades also present challenges on the **population** front. Fewer young workers will be entering the workforce over coming decades to replace the growing number of retirees.

Australia's working age population usually grows by an average of around 166,000 people every year. But trends already in place will see the working age population grow by just 190,000 for the entire decade of the 2020s – a tenth of the current pace.

With challenges ahead in two of the '3 Ps', it is clear that **productivity** growth remains a central component of growth in the Australian economy in coming decades. Many comments from the Federal Treasury on adjusting to Australia's ageing trends have focused on the need to lift productivity growth over the longer term.

But the '3 Ps' framework is not only useful for examining coming economic challenges. It also points to the nature of possible improvements to Australia's longer term growth outlook.

Policies which boost any of these three factors will increase future growth, and counter the demographic trends which threaten future prosperity and the Federal Budget balance.

Much of the discussion presented here relates directly to these three key growth drivers – population, participation and productivity.

2. MEETING THE CHALLENGE – THE ROLE OF TRAINING

2.1 THE LINKS BETWEEN SKILLS AND WORK

WHAT THE THEORY SAYS

The '3Ps' framework discussed above noted that national output was a function of population, participation and productivity.

It is however possible to look behind those proximate drivers to note that three factors determine a nation's economic potential:

- ❑ First is the quantity and quality of **natural endowments** such as mining, farming, fishing and forestry resources.
- ❑ Second is the quantity and quality of **physical capital** such as buildings, infrastructure, machinery and software.
- ❑ Taken together, these first two factors affect productivity.
- ❑ Third, and most important, is the **quantity** and, especially **quality, of the labour force** (affecting both participation and productivity).

The quality of the labour force is determined by competencies and skills of the workforce.

As Alan Greenspan has noted:

“Over the past half-century, the increase in the value of raw materials has accounted for only a fraction of the overall growth of US gross domestic product. The rest of that growth reflects the embodiment of ideas in products and services that consumers value. This shift of emphasis from physical material to ideas as the core of value creation appears to have accelerated in recent decades. Ideas are at the centre of productivity growth.”

Higher levels of education provide an economic payoff for the nation and for individuals.

For the **economy** as a whole more education means more skilled workers, which means:

- ❑ **Higher productivity.** Workers with more education bring a higher level of skills to the workplace.
- ❑ **Higher participation.** Workers with higher skill levels are more likely to work, and also tend to work for longer by choosing to delay retirement.
- ❑ **Higher employment.** Workers with more education are more employable and enjoy lower unemployment rates.

There is a clear and well-established relationship between education levels and levels of productivity.

Economists have also begun to emphasise the second and almost as well-established linkage – that those with higher levels of education also have higher rates of workforce participation, both during working age and as they approach traditional retirement age.

For **society**, higher levels of education also mean higher average incomes. That in turn means even faster growth in income tax collections because of our progressive income tax system (which applies higher average tax rates to higher earnings).

Those increased taxes may be spent for the benefit of everyone.

These increased tax collections – which can then be redistributed to everyone by the government – are perhaps the most direct economic channel by which society benefits from having a more educated workforce.

THE DIRECT EFFECT OF EDUCATION ON PRODUCTIVITY

Education is increasingly becoming the ‘engine room’ of modern economies. If we get this part of the economy right, most other things ought to fall into place (or be better placed), because increased investment in education boosts both productivity and participation.

Education has a direct effect on the level of productivity in the economy (and therefore output growth) because it increases the productivity of individuals. A more educated worker is a more productive worker, and investment in education provides a pool of more skilled labour.

Individuals benefit from investing in higher skills because they can command higher earnings in the labour market.

CHART 3: EDUCATION DELIVERS HIGHER PAY TO AUSTRALIANS

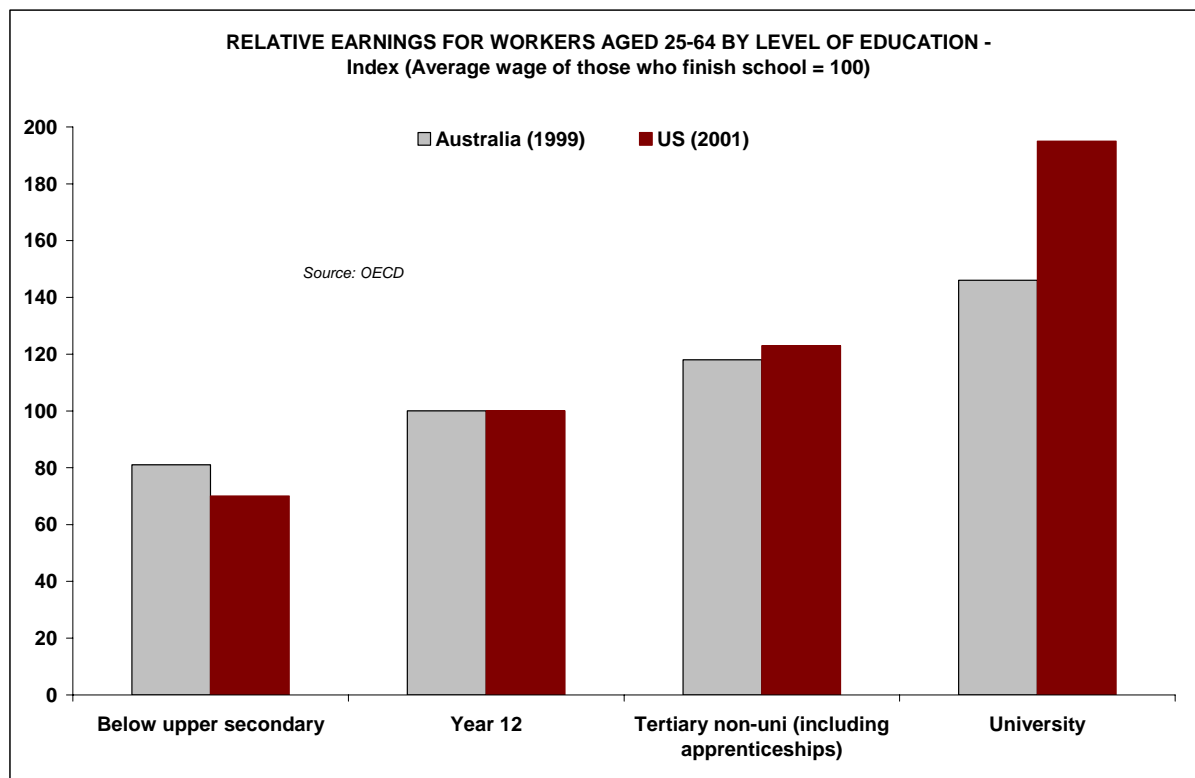


Chart 3 compares the relative earnings of workers with different levels of education.

- The index is compiled on the basis that those who completed year 12 are assumed to have an average wage of 100.



- ❑ Lesser skilled workers have relatively lower average wages. Those who had not completed Year 12 earned (in 1999) almost 20% less than those who had.
- ❑ Higher skilled workers have relatively higher average wages. University educated workers earned 40% more than those who completed Year 12, and 75% more than the least educated.
- ❑ And those with tertiary (non-university, including apprenticeships) training earn some 18% more than those who complete Year 12. (The matching premium in the United States is 23%.)

Research has attempted to measure the effect of education on productivity in two broad ways.

The first looks at relative wages across skill levels, and attempts to estimate the 'private return to education' via the increased wages received by workers who have undertaken an additional year of schooling.

- ❑ Chart 3 provides evidence of the strength of the results.
- ❑ Aschenfelter and Krueger (1993) undertook a study of wage data for a sample of twins in the US. They found that an additional year of schooling resulted in increased wages of between 12% and 16%.
- ❑ An Australian study (Miller, Mulvey and Martin (1995), using similar twins data collected in the 1980s) found a wage increment from an additional year of schooling of around 7.5%. This study ignores the effects of schooling on wages within occupations, instead focusing on the effect of education on wages through the impact on the occupation of the individual.

The second method of estimating the return to schooling looks at levels of education and income across countries.

- ❑ As with all cross-country studies, the strength of any conclusions is limited by the availability of comparable data.
- ❑ Research by Bassanini and Scarpetta of the OECD indicates that an extra year of schooling eventually – by the time the whole workforce has benefited from it – raises GDP by around 6%.
- ❑ This approach has not (as yet) incorporated the further refinement of adjusting for cross-country differences in schooling quality. Note that this figure combines the productivity and participation channels of higher education levels.

THE POSSIBLE EFFECT OF EDUCATION ON PRODUCTIVITY GROWTH

In addition, some researchers argue that a more skilled workforce is more able to adapt to new technologies in the workplace. This argument puts forth the idea that not only does education increase the *level* of productivity in the economy, it also has an effect on the *growth* of productivity over time².

Research into this 'catch up' phenomenon has produced some interesting results by comparing countries over time, but is yet to produce solid evidence for developed countries.

² This is a strand of the literature on 'endogenous growth' economic models which attempts to identify the forces underlying multifactor productivity growth rather than applying the traditional assumption of an 'exogenous' parameter.

It is perhaps too early to tell whether productivity growth is improved over and above the direct increase in worker productivity, but to the extent that there are positive ‘spillovers’ from education, there is potential for an increase in broad productivity growth.

The modelling here has therefore allowed for a linkage between skill levels and productivity levels, but *not* between skill levels and productivity growth.

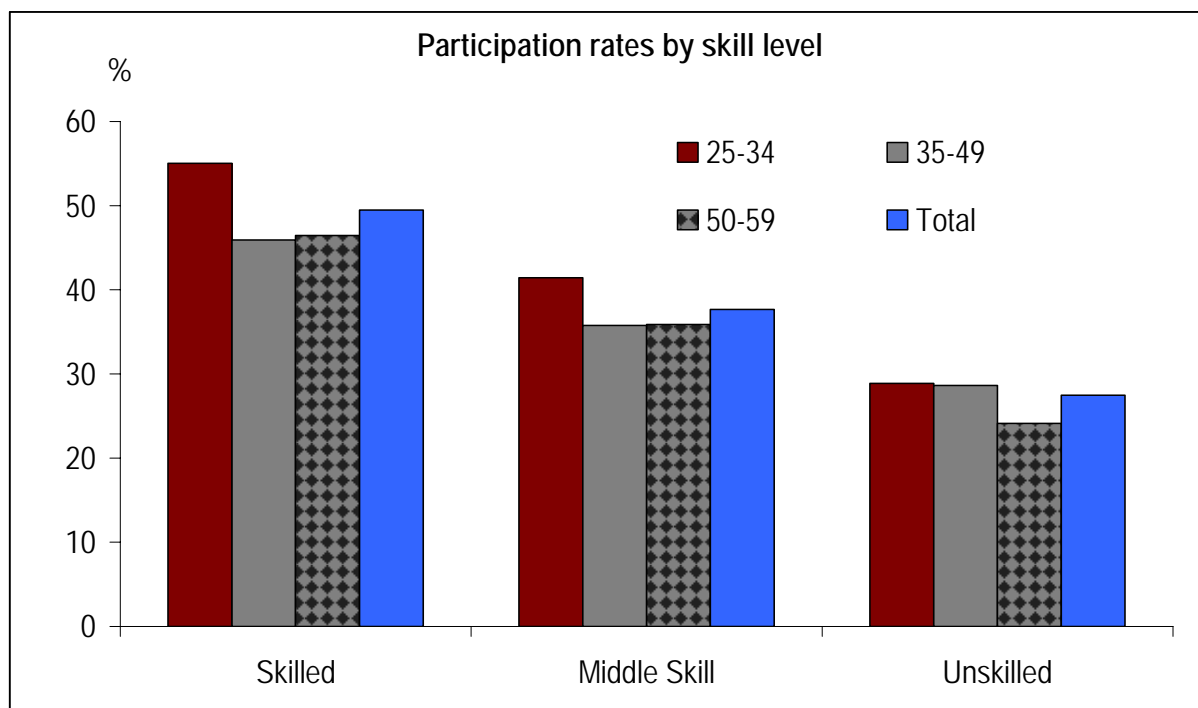
THE EFFECT OF EDUCATION ON PARTICIPATION RATES

Higher education increases the wage an individual can command, giving them a stronger incentive to work, and reduces their likelihood of any spells in unemployment.

Higher skilled workers are more likely to be willing and able to maintain a connection with the workforce than less skilled workers.

While detailed data on the effects of a small increase in education on the length of working life are not available, there is ample evidence that increased educational attainment results in increased labour force participation – see Chart 4.

CHART 4: AUSTRALIAN PARTICIPATION RATES RISE WITH SKILL LEVELS



*Where Skilled represents a bachelor degree or higher, and unskilled no qualification

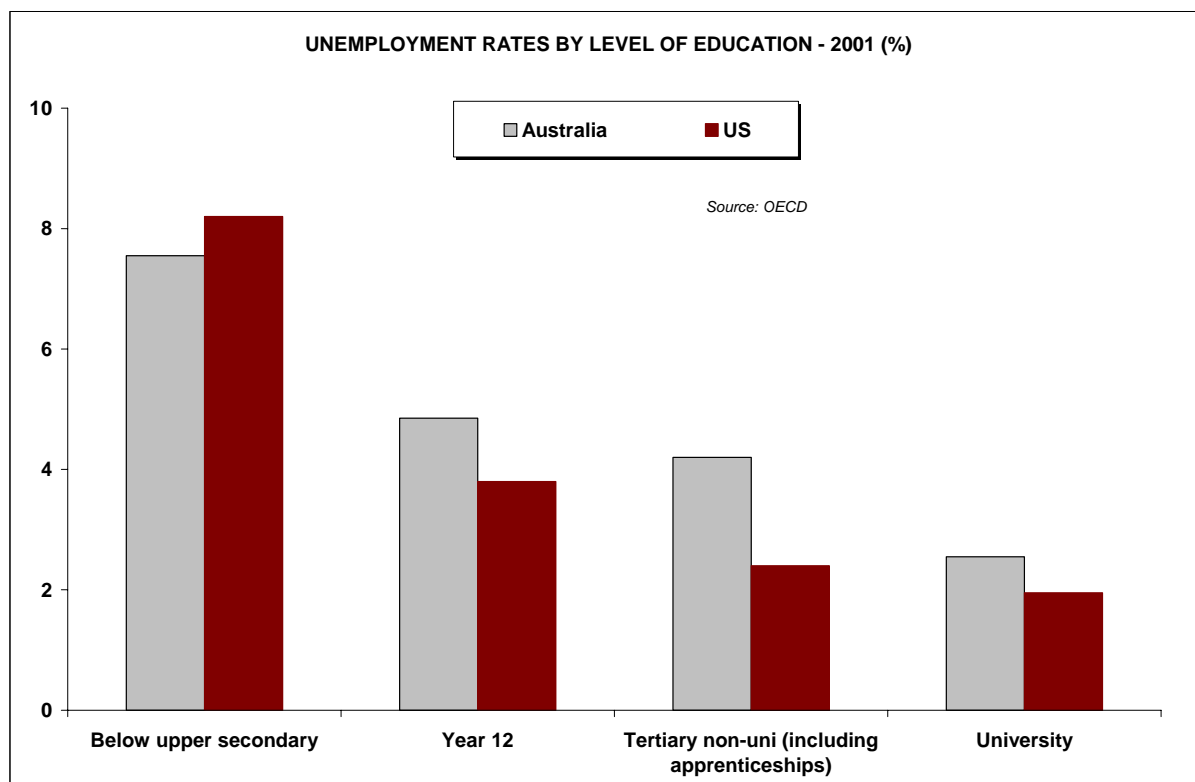
THE EFFECT OF EDUCATION ON UNEMPLOYMENT

Higher rates of education also reduce the likelihood of unemployment because the unemployment rate declines as education levels rise – see Chart 5.

- ❑ Economic growth inevitably involves a degree of disruptive change – capital and labour is made redundant in some industries at the same time that other industries are experiencing capital and labour shortages.
- ❑ Higher levels of education allow displaced workers to more easily pick up the threads of their career and take advantage of new opportunities.

- ❑ Less educated workers have greater difficulty in demonstrating the skills that would allow them to quickly find another job.
- ❑ In Australia, the chances of being unemployed are two to three times greater for those who do not go on to complete some form of tertiary training compared to those who do.

CHART 5: AND EDUCATION DELIVERS JOBS IN AUSTRALIA



2.2 IMPLICATIONS FOR POLICY

Given the evidence that skills training can improve both the overall level of productivity and of participation in the long term, the possibilities for increasing the take up of traditional apprenticeships are clearly relevant to softening the blow from an ageing population.

If declining birth rates and an ageing population means a drop in the relative **quantity** of young workers entering the labour force, increasing the take up of apprenticeships represents an increase in the relative **quality** of those workers that can help to offset the relative decline in quantity growth.

Increasing average levels of education therefore has the potential to boost two of the ‘3 Ps’ mentioned above:

- ❑ by boosting overall **productivity**, and
- ❑ by cushioning the impending decline in average **participation** rates.

Increasing apprenticeship take-up therefore represents a chance to take advantage of resources that are currently not being used to their full potential. **While much of the policy debate in recent years has focused on maximising the contribution of older workers to the economy, providing for an improvement in the quality of future workers is also an opportunity to increase future prosperity.**



As younger workers become relatively scarce, and the need for a wide range of skills more pressing, a flow of skilled workforce entrants will become crucial to future growth.

Education in skills is a prime channel through which to invest economic resources now to improve the growth prospects of the Australian economy over coming decades. As the Federal Government's *Intergenerational Report* pointed out, when ageing challenges begin to weigh on the economy, there will be many pressing spending priorities. That argues for investing in future growth now, before government finances and private pockets become too stressed.

The good news is that the potential payoff from increasing apprenticeship take-up for young Australians could come at the right time for Australia, ramping up to help boost growth in the decades where the greatest ageing challenges lie.



3. SUBSIDIES FOR TRADITIONAL APPRENTICES

Group Training Australia (GTA) is a national network of over 180 Group Training Organisations. It employs almost 40,000 apprentices and trainees, and is the largest employer of apprentices and trainees in Australia. Well over 35,000 businesses use GTA for their apprentices and trainees.

GTA has commissioned Access Economics to cost a Federal Budget proposal aimed at boosting numbers of people undertaking traditional apprenticeships.

3.1 CURRENT AUSTRALIAN GOVERNMENT INCENTIVES

The skills shortage has been the subject of debate and new policy proposals for a number of years. In 1998 the New Apprenticeships program was introduced to promote training and develop a stronger skills base for young entrants to the labour force.

The program provides opportunities for training in over 500 occupations, including:

- | | |
|---|---|
| <input type="checkbox"/> Agriculture- and horticulture-related industries | <input type="checkbox"/> Printing |
| <input type="checkbox"/> Automotive | <input type="checkbox"/> Process manufacturing |
| <input type="checkbox"/> Building and construction | <input type="checkbox"/> Property services |
| <input type="checkbox"/> Business services | <input type="checkbox"/> Retail |
| <input type="checkbox"/> Finance services | <input type="checkbox"/> Seafood |
| <input type="checkbox"/> Food | <input type="checkbox"/> Retail |
| <input type="checkbox"/> Hairdressing | <input type="checkbox"/> Sport and recreation |
| <input type="checkbox"/> Community services and health | <input type="checkbox"/> Telecommunications |
| <input type="checkbox"/> Information technology | <input type="checkbox"/> Tourism |
| <input type="checkbox"/> Local government | <input type="checkbox"/> Transport and distribution |
| <input type="checkbox"/> Metals and engineering | <input type="checkbox"/> Utilities and energy |

It is open to anyone who is 15 years or older, but preference goes to those who have completed Year 12, vocational studies at school or have work experience in the relevant industry.

3.1.1 EMPLOYER BENEFITS FROM THE PROGRAM

The current proposal is focussed on subsidies to those taking the apprenticeships. Although, as noted, the New Apprenticeship program has similar components, it is focussed on subsidies to employers rather than those to employees.

All in all, employers are eligible for up to \$4,000 as incentives to take on new apprentices as part of the New Apprenticeship program:



- ❑ Employers who take on a participant in the program (that is, an apprentice who is completing a Certificate III or above) may be eligible for an incentive payment of \$1,500 after 3 months of employment, and an additional \$1,800 upon completion.
- ❑ Employers may be eligible for an additional \$750 dollars for employing a New Apprentice in an endorsed School Based New Apprenticeship at Certificate II to IV level, and \$750 for continuing to employ the young person after the student has completed Year 12.
- ❑ An employer of a disadvantaged worker (aged 45 years or older) may receive a special \$750 Mature Aged Worker Commencement Incentive and a \$750 Mature Aged Worker Completion Incentive.

3.1.2 APPRENTICE BENEFITS FROM THE PROGRAM

The Government recently extended the Youth Allowance, Ausstudy and Abstudy programs to new apprentices in training with up to three years of support available.

Other Government initiatives have targeted certain occupations with identified skills shortages existing now and predicted for the future. These include 'traditional trades' apprenticeships such as:

- ❑ Agriculture and horticulture related industries
- ❑ Automotive
- ❑ Building and construction
- ❑ Food
- ❑ Hairdressing
- ❑ Metals and engineering
- ❑ Printing

Benefits available to apprentices entering 'traditional trades' include:

- Commonwealth Trade Learning Scholarships – a \$500 payment upon completion of each of the first and second years of an approved training program, and
- Tool kits for new apprentices payment – a one-off \$800 payment to assist in the purchase of tools related to the trade.

These initiatives were part of the May 2005 Budget process and provide for \$120.2 million to be spent over five years on toolkits and \$106.3 million to be spent over four years on Trade Learning Scholarships.

However, there remains room to encourage more people to enter New Apprenticeships in areas of skills shortage. This proposal attaches a subsidy to completion of the first two years of an apprenticeship or traineeship in a recognised skills shortage trade.

3.2 VALUE OF THE PROPOSED NEW INCENTIVES

The particular policy proposal here uses direct subsidies. The latter have been calibrated to broadly match the tax take from those in the first and second years of their apprenticeships, returning net pay to the equivalent of pre-tax and pre-subsidy gross pay.



Additional subsidies of \$1,161 and \$1,974 paid to apprentices in traditional trade in their first and second years of training, respectively would boost participation in these programs and enhance the skills of Australia's workforce in years to come.

That said, the latter is important not because it matches the net personal income tax take from the average apprentice, but because it is estimated as inducing extra apprenticeships at a rate consistent with longer term growth in the economy and the expected sectoral composition of the economy over time (and therefore the demand for labour, including traditional skills).

There is no comprehensive source which details a national average weekly wage for apprentices across a range of occupations. The best data available is *WageNet*, which is administered by the Australian Government Department of Employment and Workplace Relations.

WageNet provides details on award wages by State/Territory across a range of occupations, including those considered to be traditional trades. An Australia-wide apprentice wage in traditional trades was calculated using weightings from the NCVET New Apprentice program data.

There is also a need to allow for over-award payments as well. A 2004 Australian Chamber of Commerce and Industry Survey of Apprentice Wages notes that 38% of first and second year apprentices in traditional trades are paid on average 17.5% above the award. This loading was applied to the average national apprentice wage to estimate an above award apprentice wage.

The resultant estimate is that gross wages for the average first year apprentice in traditional trades are \$14,148 this year. The average wage for second year apprentices is \$18,750.

These results indicated that wages for the average first and second year apprentice in traditional trades are sufficiently low to be eligible for the low income tax offset of \$235, so this amount was subtracted from the calculated tax payable. Dividing this tax amount by 0.85 (to give the new tax estimate for an apprentice salary equal to the current pre-tax salary) yields the implied rate of subsidy for first and second year apprentices of \$1,161 and \$1,974 respectively.

3.3 THE DELIVERY MECHANISM

The particular policy proposal here uses direct subsidies to those who take-up traditional apprenticeships. Those subsidies would be paid quarterly, in arrears.

But how should payments be made? And through which agency?

Although the New Apprenticeships program is available across a broad range of occupations, this proposal is targeted at occupations for which there are current and anticipated skills shortages. These shortages are generally known to exist in the 'traditional trades' occupations.

The toolkit subsidy and Trades Learning Scholarships already target this group and are administered through the New Apprenticeship Centres contracted by the Australian Government Department of Education, Science and Training (DEST).

So as to limit any additional administration and compliance costs of this proposed policy change, the New Apprenticeship Centres could also be given responsibility for

administering the wages subsidy in a similar manner through lodgement of a quarterly claim form by the apprentice during the first two years of an apprenticeship.

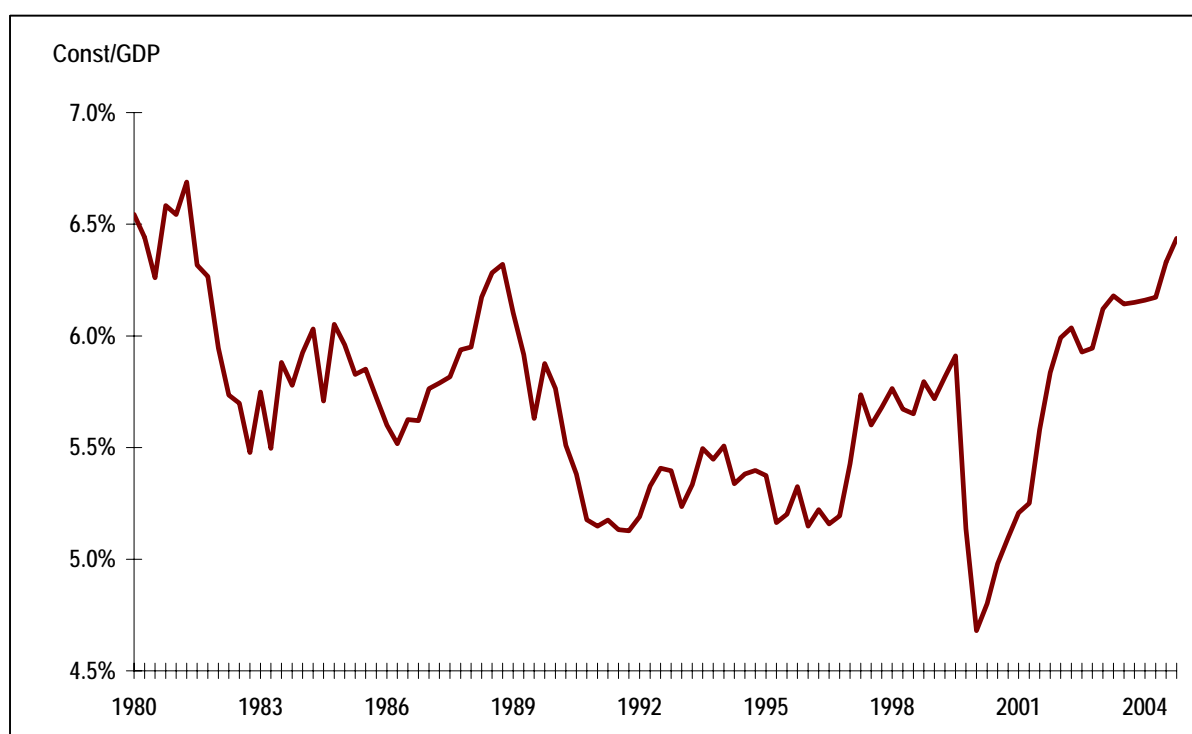
3.4 NEW DEMAND FOR APPRENTICESHIPS

All traditional apprentices will qualify for this direct subsidy. But the aim is to increase numbers. How many more people will that tempt into the apprenticeship scheme?

Right now the demand for those in traditional apprenticeships is strikingly strong. Indeed, it has been for several years, amid low interest rates, strong profits and job gains, while replacement demand is starting to catch up to years of neglect in infrastructure.

In particular, both those trends have seen engineering work take a greater share of the overall commercial construction market. And the net result of those trends has been the sharpest upswing in construction demand in three decades (see Chart 5).

CHART 6: THE CONSTRUCTION SECTOR AS A SHARE OF NATIONAL GDP



That upswing was evident in each of housing, engineering and commercial construction. And it occurred while the rest of the economy was growing rapidly (with unemployment rates at their lowest since 1976, and capacity utilisation at its highest in 15 years).

The resultant pipeline of construction work still to be done is the biggest it has ever been – swamping anything seen in the late 1980s.

Hence the considerable current demand for those with skills associated with traditional apprenticeships.

Yet, as strong as current demand is, the rationale for the policy of supporting traditional apprenticeships lies with its longer term benefits. Those are estimated in Chapter 4.



So, as noted, the question becomes the supply of and demand for those with traditional skills over the longer term.

The economic literature has a rich vein of research into such issues. This question involves not merely the impact on the supply of apprentices, but also the longer term demand for them.

The strength of the relationship invoked here between after-tax earnings, the willingness of workers to work in a given field (and therefore train to prepare for that) and job creation in that field has been the focus of considerable attention by economists over the years.

Some studies find little relationship (Card and Krueger, 1995, are often noted), while others find an almost one for one relationship (Russell and Tease, 1991).

The consensus view suggests that the linkage (or 'elasticity') here is that 3% of jobs are created as a direct impact of a 10% permanent wage subsidy:

1. The ratio of jobs created by wage subsidies is higher for low skilled workers (such as labourers) than for high skilled (such as electricians).
2. The speed of job gains is "fairly rapid, with the overwhelming majority of the adjustment completed in a year or less".
3. Adjustment is slower among the higher skilled.
4. Adjustment is asymmetric – job losses in response to wage growth skipping ahead of productivity come faster than job gains from wage restraint or wage subsidies.

3.5 COST OF THE PROPOSED INCENTIVES

A simple calculation puts the total Year 1 program cost at \$156.2 million for the current cohort of new apprentices.

When new entrants attracted to the program are also accounted for, the new subsidy would cost around \$160.7 million, plus some \$6.7 million to expand the current range of subsidies.

All in all, the program cost for 2006-07 would amount to \$167.4 million.

3.5.1 NUMBER OF ELIGIBLE APPRENTICES

Data concerning commencements of new apprentices in both the broad New Apprenticeships program as well as in the narrower, traditional trades occupations is collected by the National Centre for Vocational Education and Research (NCVER).

CHART 7: TOTAL AND TRADITIONAL APPRENTICESHIPS: COMMENCEMENTS BY FINANCIAL YEAR

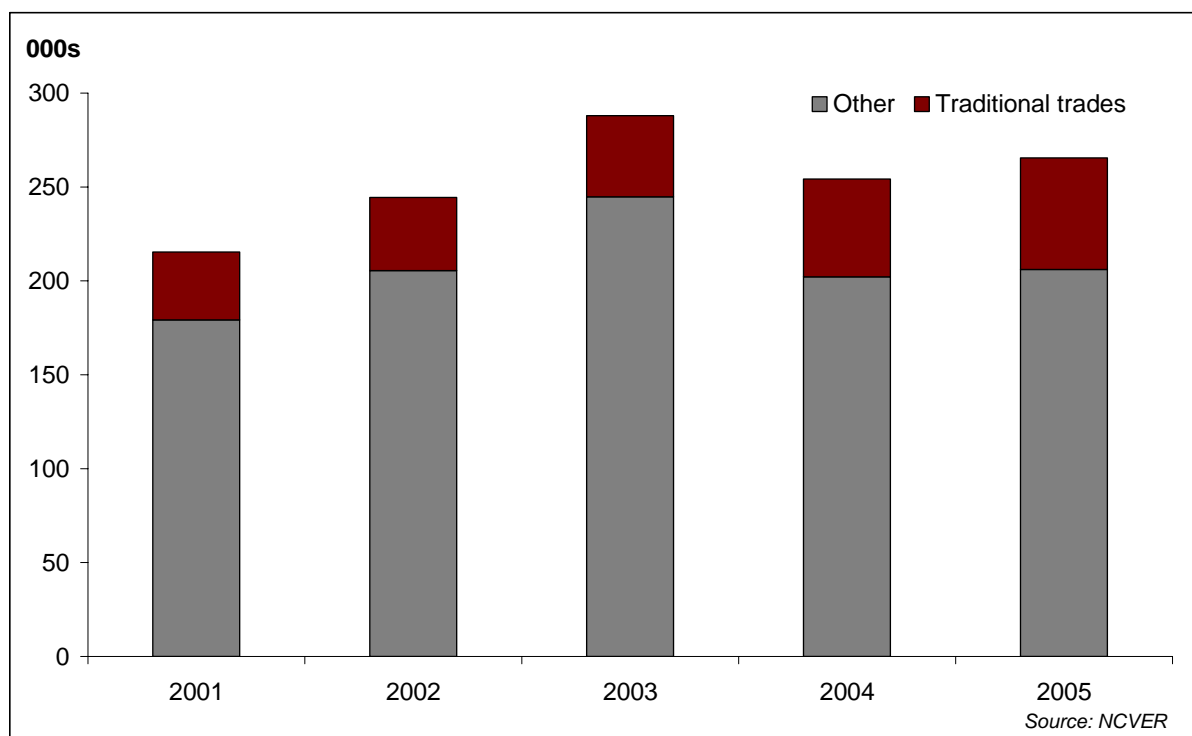


Chart 7 shows the number of people commencing New Apprenticeships each year financial year since 2000-01. Traditional trades as a share of total New Apprenticeship commencements have grown from 16.7% in 2000-01 to 22.4% in 2004-05:

- ❑ To model the impact of this policy proposal, an estimate of the number of first and second year apprentices (to whom the subsidy would be offered) is necessary.
- ❑ The number of first year apprentice is determined by the number of New Apprenticeships commenced in traditional trades. This figure was 59,400 in 2004-05.
- ❑ The number of second year apprentices in 2004-05 is the group who commenced in 2003-04 less those who have left the program. The NCVET data on withdrawals or cancellations implies an attrition rate of around 35% per year from the New Apprenticeships program. However, this data is not limited to the population cohort undertaking apprenticeships in traditional trades, which no doubt have higher retention rates owing to the benefits available. An attrition rate of 15% is used to determine a second year population undertaking apprenticeships (based on 2003-04 commencements in traditional trades) of 44,200.
- ❑ How many extra people will be tempted into traditional apprenticeships as a result?
- ❑ In the first year, the subsidy is equivalent to 8.25% of their salary. Assuming an elasticity of 0.3 and an opening number of 59,400 people (as discussed above), the increase in the number of people tempted into a traditional apprenticeship may be:

$$59,400 \text{ people times } 8.25\% \text{ subsidy times } 0.3 \text{ elasticity} = 1,480 \text{ people}$$



3.5.2 CURRENT GOVERNMENT SUBSIDY PROGRAMS WILL ALSO EXPAND

The 2003-04 Annual Report of the Department of Education, Science and Training notes that some \$508.8 million was provided in the form of subsidies to support New Apprentices in 2003-04.

Using the NCVET data on the number of apprentices in training at that time yields an estimate of Commonwealth Government support of approximately \$1,268 per apprentice, in 2003-04 dollars, or \$1,416 in 2006-07 allowing for an annual rate of 3.75% for wage inflation.

In addition, those apprentices attracted to traditional trades apprenticeships will also benefit from the new initiatives of the toolkit allowance and trades learning scholarship (totalling approximately \$1,800 per person over the two years).

The elasticity of demand above implies that around 1,480 new apprentices will be attracted to training in traditional trades per annum. Hence, there would be an extra \$6.7 million required of the government to fund existing programs in 2006-07.

4. THE ECONOMIC IMPACT OF BOOSTING INCENTIVES

4.1 MODELLING TRAINING OUTCOMES

AN ECONOMY WIDE APPROACH

In modelling the effects of a lift in apprenticeships (achieved by the year 2010), Access Economics has constructed a macro-model designed to track changes in productivity and participation through time. This approach has a number of advantages, including:

- ❑ A capacity to account for second-round participation effects as more highly skilled apprentices remain in the workforce for longer.
- ❑ An identification of the timing of costs and benefits to the economy from increased participation in apprenticeships.
- ❑ The ability to track the transition of higher skilled cohorts into the workforce.
- ❑ Results and data sources which are comparable with the Treasury's *Intergenerational Report* and a growing body of related work on Australia's future ageing challenges.

In addition to standard intergenerational modelling techniques, Access Economics has introduced the stock of education into the production function of the economy. This results in a model where productivity and participation rates – and hence economic growth – are endogenous (rather than assumed and imposed).

A TOP DOWN APPROACH

As noted above, the literature on the benefits of education is divided into two main groups:

- ❑ '**Bottom-up**' approaches use data on individual incomes to measure the benefits of increased training to the economy.
- ❑ In contrast, a '**top-down**' approach looks at evidence at the economy wide level, and relates policy changes to changes in key macroeconomic variables.

The modelling presented here falls into the latter category. Taking evidence from the OECD and other research, Access Economics has constructed parameters for use in estimating the economy wide effects of increased apprenticeship take-up.

In terms of the '3 Ps':

- ❑ The model assumes a modest **productivity** gain of 4% per person per year of education on average. This is a conservative figure, given that many studies show higher productivity gains.
- ❑ Participation rates increase by 6% (not 6 percentage points) over the long term for workers aged 25 and above, but fall 2% for 15-25 year olds. This reflects both the long term participation effects of the increased skills of those who invest in apprenticeships, and its nature as an investment period in the younger years of life. These assumptions are also consistent with OECD work in this area.

4.2 EFFECTS OF THE PROPOSAL – MODEL RESULTS

As noted above in Section 3.3, the proposed changes are expected to attract around 1,480 additional apprentices in 2006-07. With the pool of potential young apprentices expected to remain relatively stable in coming decades, that number remains little changed in the long term modelling.

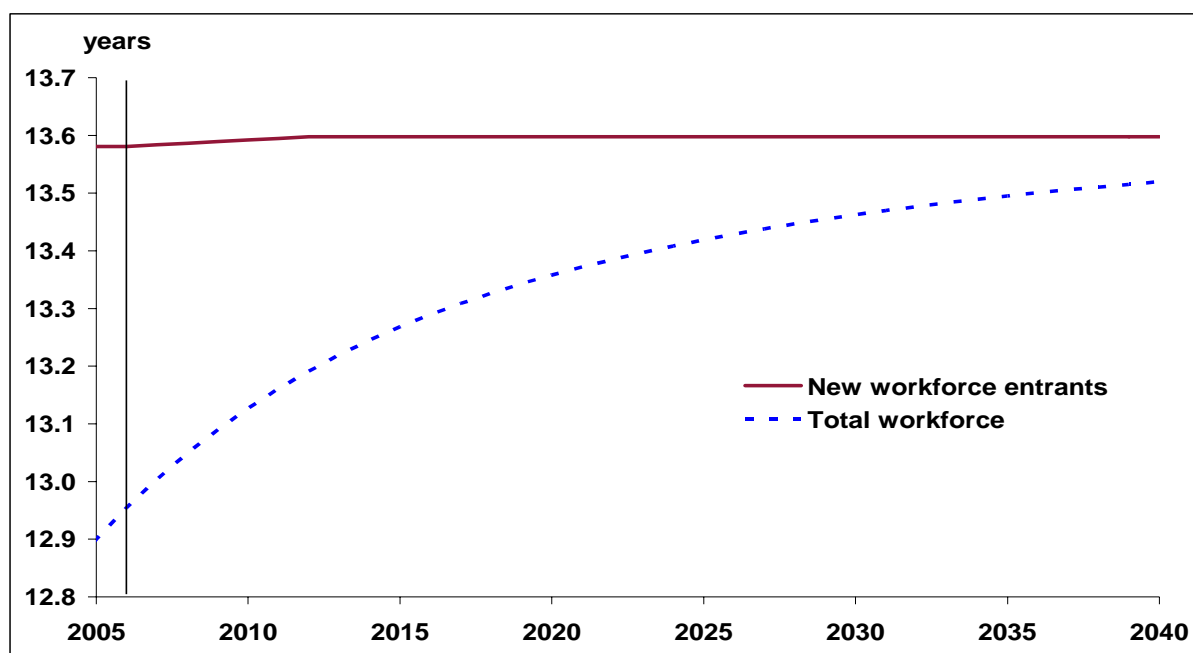
In the modelling presented here, the skills of workers are related to the time spent in education and training. By encouraging greater numbers of apprentices, the proposed changes have a direct effect on the skill level of Australian workers. **An increase in traditional apprenticeships means an increase in the average level of training for the workforce as a whole.**³

On average, Australian’s currently spend around 13.6 years in education and training:

- 11.4 years in school.
- 1.1 years of university.
- 1.1 years studying for a diploma, with 3 months of that studying a traditional trade.⁴

That average is rising anyway (see Chart 7), since today’s school leavers are better educated than their predecessors.

CHART 8: YEARS OF SCHOOLING, NEW AND EXISTING WORKERS



³ If the incentives attract individuals who would otherwise be in another form of training (such as a university degree, or a new apprenticeship outside the ‘traditional’ trades) there may be little or no net increase in skills. We have assumed that those who take advantage of the incentives do so in addition to, rather than instead of, other training.

⁴ ABS, NCVAR.



While the modelling which underlies the results in the following section is complex, it is possible to view the impact of increased retention in a more intuitive way. With that in mind, it is worth considering a few simple rules of thumb.

The modelling here allows for, roughly, an extra 1,480 people a year to enter traditional apprenticeships. Each year some 265,000 people are born, so that addition of 1,480 people per year entering traditional apprenticeships corresponds to about 0.56% of the population at a given age.

On average, traditional apprenticeships last 3 years.

The average increase in education of new entrants to the workforce is that 0.56% of them have done an extra 3 years – an addition of 0.017 years.

Of course the benefits of this boost to participation in education and training take decades to mature in full, as the extra education is only received by new workers, and it takes decades for these young Australians to work their way through the workforce, replacing those before them with lower average education levels. Average years of schooling are rising anyway (see Chart 8), but the impact of this change to retention rates after some 30 years (that is, by the year 2040) is that average years of schooling will have risen by around 0.015 years.

That 0.015 year increase in the stock of education has two effects. The first is on **productivity**.

Relative to a current average of 13.73 years of education and training per Australian, the additional 0.015 years represents a 0.11% increase in the stock of education over and above where it would be.

What is the impact of that extra education on Australia-wide productivity? Think of the stock of human capital in the economy as having essentially two elements: the mental and physical endowments of the labour force, and the contribution made by formal education to raising skill levels.

The contribution of each of these two components to (total) human capital formation is unknown – but both components are likely to be important.

Assuming (for the sake of this 'everyman interpretation' of the results) that these two are of equal importance, then a 0.11% increase in formal training would result in an increase in GDP of around 0.055% arising as a result of higher productivity due to a better educated and more highly skilled workforce.

While the production function used in the modelling here does not make this 50/50 assumption, the actual result achieved is close, at around 0.066%.

With respect to **participation**, as noted above, a more highly skilled workforce will also have higher rates of participation. Across those of working age, there is roughly a 10 percentage point differential in participation rates between those with year 10 or year 12 qualifications and those who went on to get university degrees or other tertiary qualifications.

There is also a difference of, on average, about 4 years education between those two groups. That implies a second rule of thumb to help understand the results – that an extra 4 years of school generates an extra 10 percentage points or so on



participation (or 12.5%, given average participation rates in these age cohorts).

(Note the rule of thumb for the impact of extra education derived here is based on the participation difference accruing between high school and tertiary education – which may have a larger or smaller proportional impact than the shock here.)

That observation implies that 4 years of education results in a 12.5% increase in participation, so that a 0.015 year increase in average length of education (as occurs here by 2040) is sufficient to boost participation by 0.046% – pretty much the same result actually generated in the modelling here (of 0.056%).

The combination of the boost to both productivity and participation therefore leads to a lift in the overall size of the economic pie – GDP – of 0.122% by 2040.

PRODUCTIVITY EFFECTS OF THE CHANGE

What is the impact of that extra education on Australia-wide **productivity**?

Think of the stock of human capital in the economy as having essentially two elements:

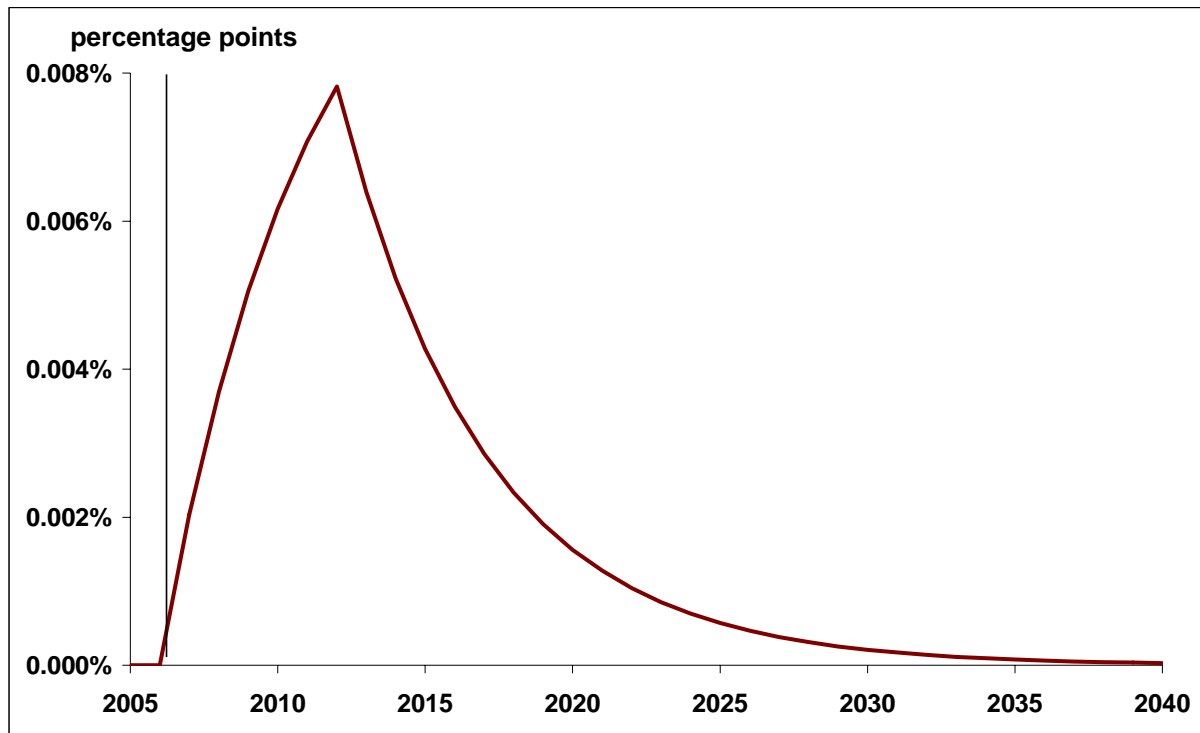
- ❑ There are the mental and physical endowments of the labour force combined with on-the-job training. These factors influence the productivity of the workforce, but are not a direct product of the formal education system.
- ❑ And there is the contribution made by formal education to raising skill levels.

The contribution of each of these two components to (total) human capital formation is unknown – but both components are likely to be important.

As new workers enter the workforce with more years of education and training, **productivity growth increases quickly** (see Chart 9), but these growth benefits are then diluted over time as more and more of the overall workforce is made up of more skilled workers.

The cumulative impact of the increase in productivity is such that, by 2040, it adds 0.066% to national income over and above where it would otherwise have been.

CHART 9: THE EFFECT ON ANNUAL PRODUCTIVITY GROWTH



PARTICIPATION EFFECTS OF THE CHANGE

With respect to **participation**, as noted above, a more highly skilled workforce will also have higher rates of participation.

Participation rates are affected in two ways:

- First, younger people are less likely to be in the labour force, as they are more likely to be gaining extra education/training.
- Second, post-school age workers are more likely to participate, as they have more years of education/training behind them.

Chart 10 shows the net result of these two effects over time, with participation falling slightly in the early years of the change, but rising strongly through the 2020s and 2030s. Importantly, those are the decades when a particular boost to the economy is most needed, as they are the years in which boomer retirement will be most affecting GDP growth rates for the economy as a whole.

Across those of working age, there is roughly a 10 percentage point differential in participation rates between those with year 10 or year 12 qualifications and those who went on to get university degrees or other tertiary qualifications.

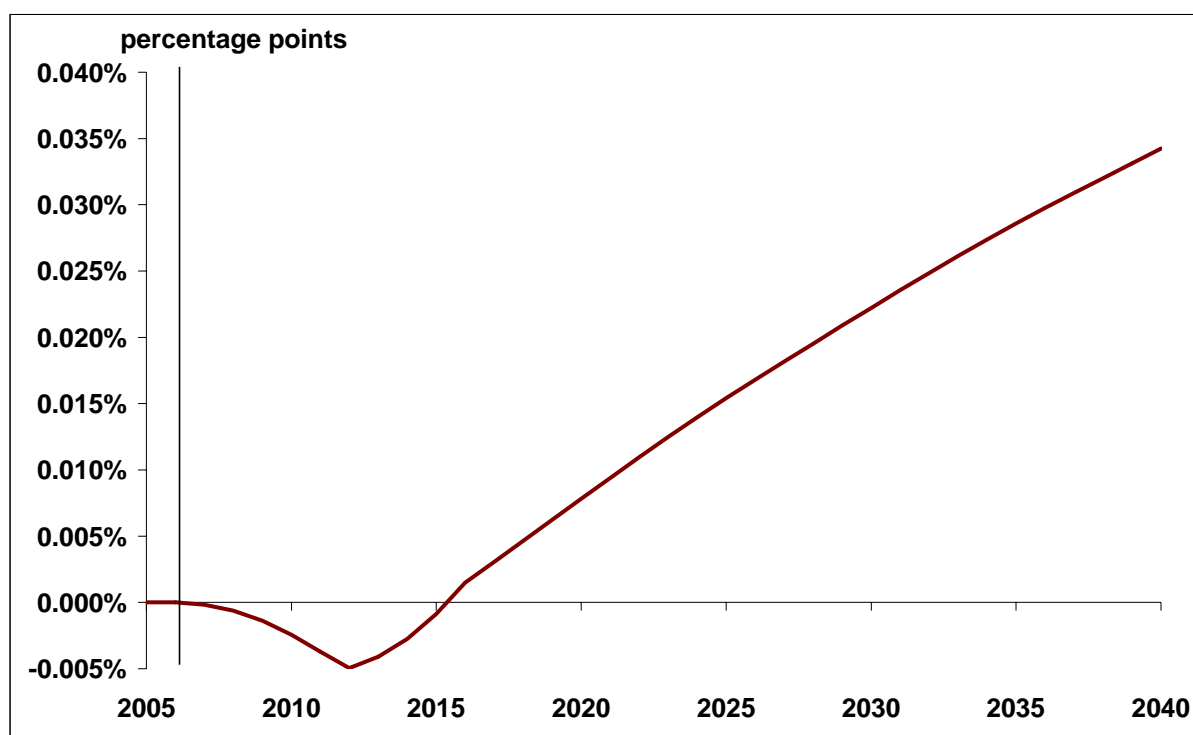
There is also a difference of, on average, about 4 years' education between those two groups. That implies a second rule of thumb to help understand the results – that an extra 4

years of school generates an extra 10 percentage points or so on participation (or 12.5%, given average participation rates in these age cohorts).⁵

That observation implies that 4 years of education results in a 12.5% increase in participation, so that a 0.015 year increase in average length of education (as occurs here by 2040) is sufficient to boost participation by 0.033 percentage points – pretty much the same result actually generated in the modelling here (of 0.34 percentage points).

As the level of participation in 2040 is otherwise around 61%, the boost to national income from the lift in participation is $0.34/61 = 0.56\%$.

CHART 10: CHANGES TO PARTICIPATION



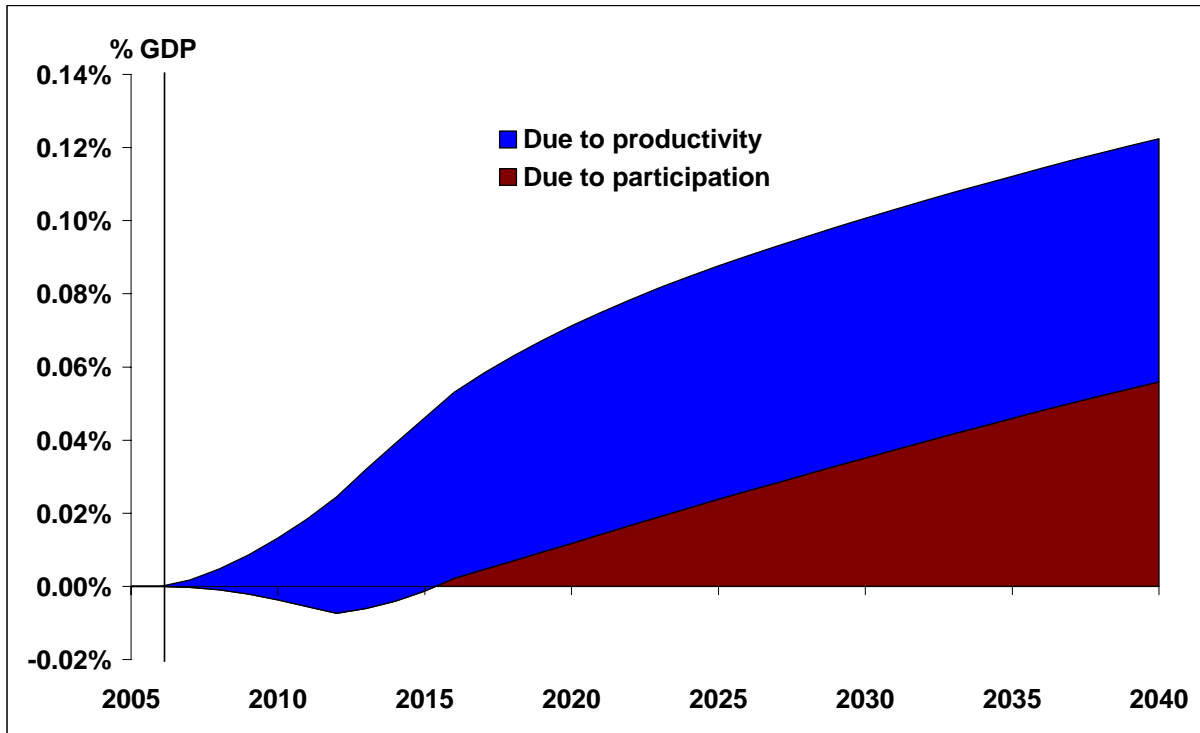
EFFECT ON OVERALL ECONOMIC GROWTH AND THE BUDGET

Chart 11 shows that both **productivity** and **participation** effects contribute to long term gains in GDP – two of the ‘3Ps’ mentioned earlier.

The combination of the boost to both productivity and participation leads to a lift in the overall size of the economic pie – GDP – of 0.122% by 2040.

⁵ Note the rule of thumb for the impact of extra education derived here is based on the participation difference accruing between high school and tertiary education – which may have a larger or smaller proportional impact than the shock here.

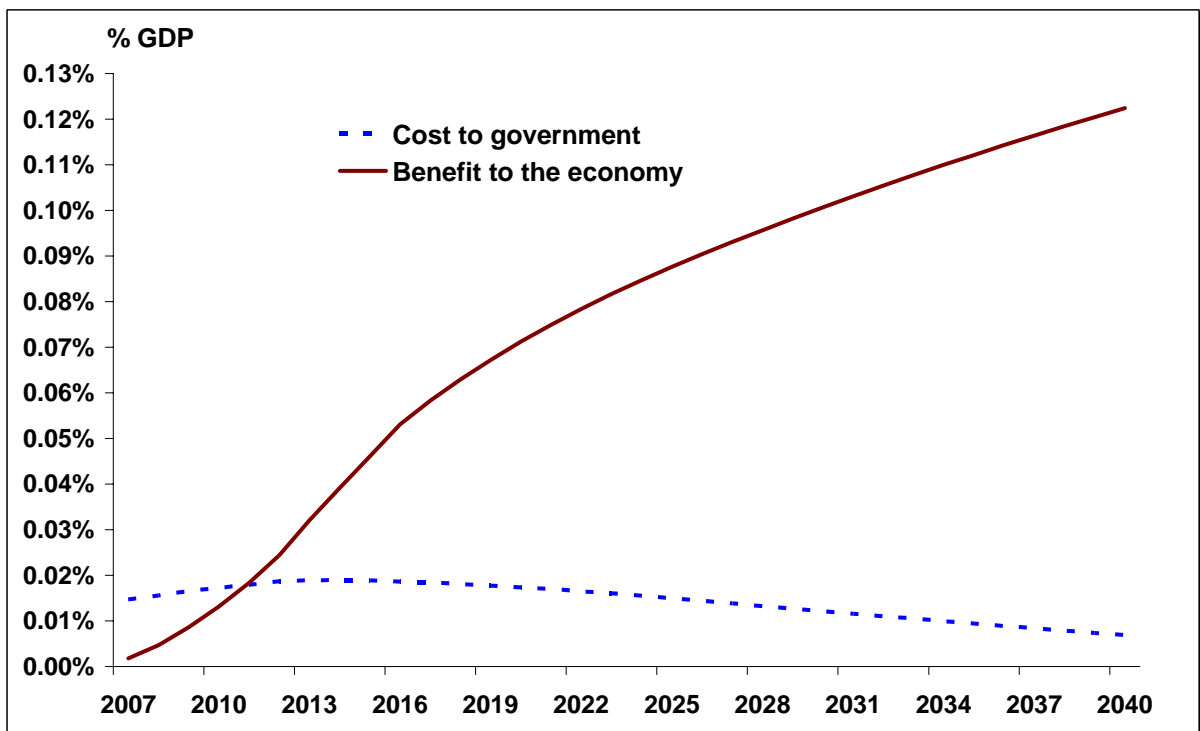
CHART 11: THE EFFECT ON GDP



It is important to note that these positive effects also continue beyond the projection period (before then levelling off), as less educated workers continue to be replaced.

Note that the benefit to the economy is considerably more than the cost of the subsidy – at around 0.02% of GDP (see Chart 12).

CHART 12: COSTS AND BENEFITS FROM PROPOSED INCENTIVES



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