

# Alternative methodologies for projecting defence spending

Christine Duke and Cameron McKean<sup>1</sup>

This paper is based on research done for the *Intergenerational Report 2007*. A brief discussion of alternative methodologies for projecting defence spending was included in the appendix of the report. This paper provides a more detailed discussion of the alternative methodologies explored and shows the projections that were done, updated for current defence spending data. Other longer-term economic projections for Australia are consistent with those used for the *Intergenerational Report 2007*.

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<sup>1</sup> The authors are or were previously from the Industry, Environment and Defence Division, of the Australian Treasury. This article has benefited from comments and suggestions provided by James Kelly, Robert Ewing, Geoff Francis, Ruth Moore, Maryanne Mrakovcic, Michelle Stone and Michael Xanthis. The views in this article are those of the authors and not necessarily those of the Australian Treasury.

## Introduction

The second intergenerational report was released in 2007. The report provides a basis for considering the fiscal outlook over the longer term and the sustainability of economic growth in light of Australia's ageing population and other factors.

In the report, several areas of Australian Government spending – including defence – were not projected separately. They were assumed to remain, as a group, constant as a share of GDP. The underlying assumption was that spending in these areas is not linked strongly with demographic change and future uncertainties make reliable projections elusive. This article explores potential projection methods for defence spending. It is based on current defence spending data but with other longer-term economic projections for Australia, consistent with those used for the intergenerational report.

## History

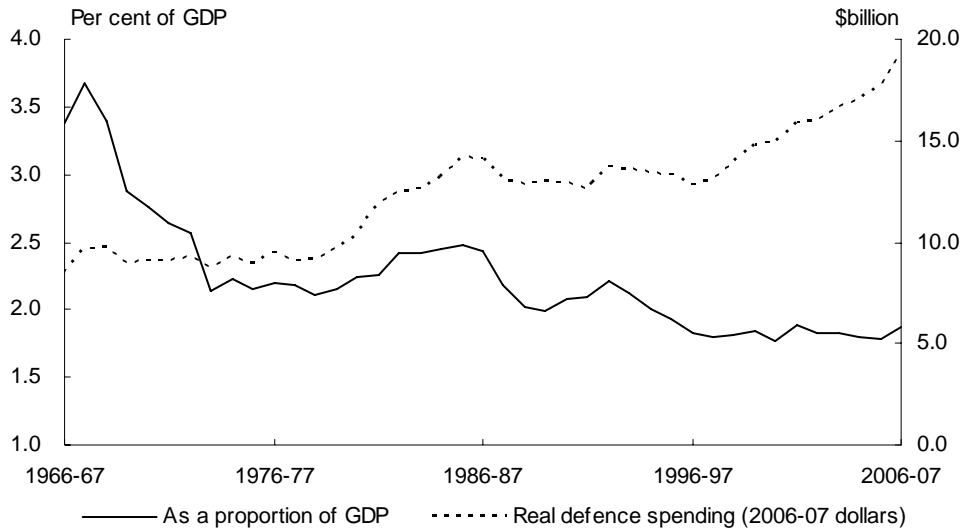
The defence of Australia and its interests is an essential function of government. In recent years, the Australian Defence Force (ADF) has been engaged in numerous commitments overseas, while continuing to invest in current and future capability. Australian Government defence spending is estimated to be 1.9 per cent of GDP in 2008-09.

The 2000 Defence White Paper, *Defence 2000 – Our Future Defence Force*, provided a funding commitment equivalent to an average 3 per cent annual real growth for the decade to 2010-11, which was subsequently extended out to 2015-16. In the 2008-09 Budget, the Government extended its commitment to growing the underlying Defence funding base on average by 3 per cent per annum in real terms beyond 2015-16 to 2017-18. Defence spending has also been supplemented above this funding envelope for some discrete measures (for example, military operations and some large capital equipment acquisitions).

## Key trends and drivers

Over most of the past four decades, while defence spending has increased in real terms, it has fallen gradually as a proportion of GDP. This is because the economy has grown at a faster rate than defence spending (Chart 1). In recent years, this declining trend has levelled out due to significant growth in defence spending accompanying the strong growth in nominal GDP over that period.

**Chart 1: Historical defence spending**



Source: Australian Bureau of Statistics data, Department of Defence annual reports, various years.

Unlike many other government functions, the demand for defence spending will not be directly influenced by domestic demographic factors. An increase in population does not increase the cost of defence directly, although it can strengthen the capacity of governments to pay for defence over time.

Future defence spending will depend on a wide range of factors, including the strategic environment, the community's tolerance of risk and the cost of inputs into defence capability. As with all government spending, these factors will be balanced against fiscal constraints. Future trends in these individual factors can be difficult to discern, as can any precise view of how they would interact.

## Future defence spending

Four methods for projecting defence spending are explored in this article.<sup>2,3</sup> Two of the projection methods assume potential trends in defence spending as a whole: continuation of the historical trend rate of real growth, and 3 per cent annual real growth to 2046-47. The other methods focus on particular factors that can be expected to influence future defence spending: the cost of inputs, and trends in international economic growth.

Only some of these factors influencing defence spending can be quantified individually. Projection methods that consider only one or a few factors will not provide for a comprehensive assessment of potential trends in defence spending.

The long-run projections apply from the end of the current forward estimates, from 2012-13 onwards. The defence spending data is current to the 2008-09 Budget. Other longer-term economic projections for Australia are those used in the intergenerational report.

A scenario that maintains defence spending as a constant share of GDP has been included, in line with the assumption used in the intergenerational report that 'other spending' (which included defence spending) remains constant as a share of GDP. This scenario is shown in each of the charts to provide a reference point when presenting the alternative scenarios.

## Trends in overall defence spending: historical decline and 3 per cent growth

A simple method for projecting future defence spending is to extend the long-run (40-year) historical trend real growth rate (around 1.7 per cent per year) beyond the forward estimates. If this historical trend continued, defence would fall as a share of GDP in the long term, ending the projection period at around 1.6 per cent. This is because the historical trend growth in defence spending of 1.7 per cent is smaller than the projected average GDP growth in the second intergenerational report, of

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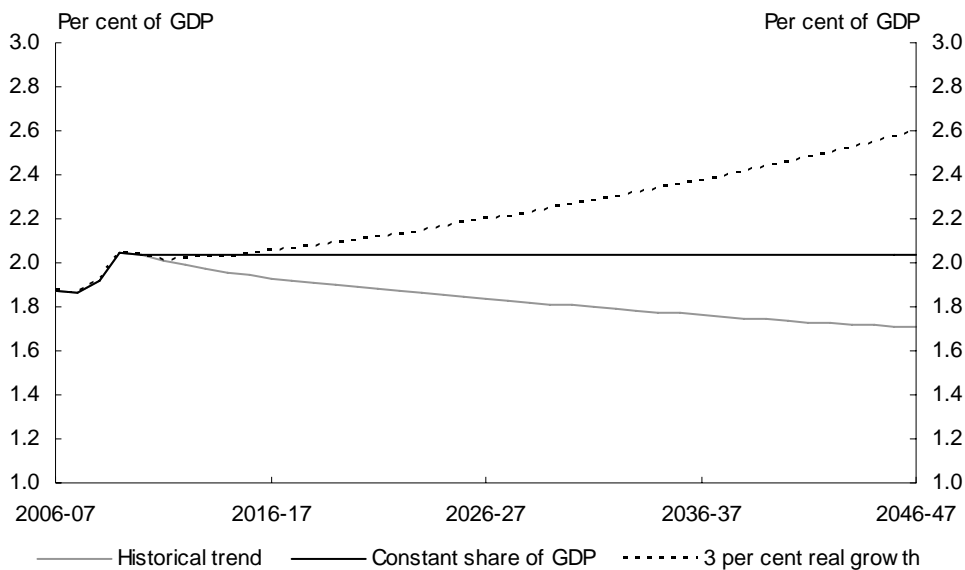
2 The projections are based on the revenue from Government received by Defence, which is a measure of the resources provided to Defence.

3 The projections are not directly comparable with those presented in the *Intergenerational Report 2007*. Furthermore, a number of factors add together to present defence spending as a higher proportion of GDP. The defence spending data has been updated for decisions up to and including the 2008-09 Budget. In the intergenerational report, military superannuation was modelled separately from defence spending. However, this article includes superannuation as part of defence spending in line with the usual aggregate amounts presented by Defence. Last, GDP data has not been updated, which further increases defence spending as a proportion of GDP.

2.4 per cent over the projection period. The pace of economic growth is a critical driver of the overall movement in defence spending as a share of GDP.

Alternatively, the Government’s commitment to 3 per cent real growth in base funding could be assumed to extend beyond its current expiry in 2017-18. Extending 3 per cent real defence spending growth throughout the projection period would put defence spending as a share of GDP on an expanding path (Chart 2). This would provide an additional pressure to add to the demographic-related pressures affecting the budget in the longer run.

**Chart 2: Defence projections — historical decline and 3 per cent growth**



### Maintaining the current force structure

An alternative projection method is to extrapolate the cost of maintaining the current force structure. This method takes given quantities of military equipment, personnel and other inputs and applies assumed rates of cost growth to each. This follows the approach taken by the Australian Strategic Policy Institute (ASPI) in its projections of long-term defence spending (Thomson 2004).

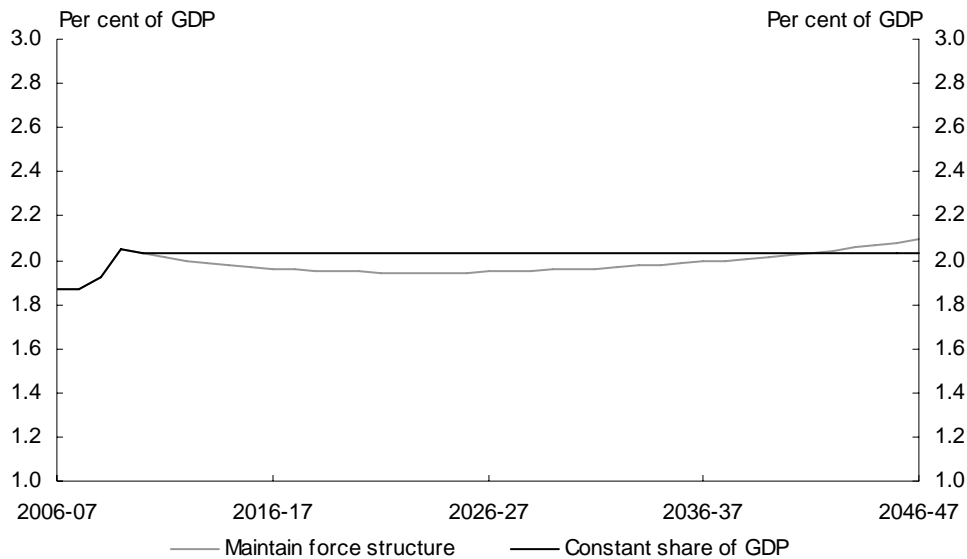
Under reasonable assumptions, such a projection sees little change in defence spending as a share of GDP over the next forty years (Chart 3). The assumed underlying annual rates of real cost growth are:

- 4 per cent for acquiring new military equipment (following ASPI’s assumption based on research by the Department of Defence – see also Box 1);
- 3 per cent for sustaining equipment in service (following ASPI’s assumption);

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- 1¾ per cent for personnel expenses, reflecting projected productivity and hence wage growth in the general economy; and
- zero for other inputs (including property expenditure, garrison support and other supplies). These expenses would grow in line with general inflation.

**Chart 3: Defence projections — maintaining the current force structure**



A projection based on maintaining the current force structure assumes a continuation of historical per-unit growth in costs of successive generations of military equipment (see Box 1). In the past, Australia and other countries have reduced their physical stock of military equipment to offset this cost trend. The projection assumes no further reduction. This allows for the possibility that Australia may have reached a natural limit in reducing equipment numbers; and for the likelihood that new types of equipment will be introduced. If equipment stocks were reduced, projected spending growth would be lower than otherwise.

This method also assumes that sustainment costs (the cost of operating equipment once it enters service) will grow at 75 per cent of the rate of growth in acquisition costs, in line with a study by ASPI (Thomson 2004, p 22). There is some debate about the appropriate correlation between acquisition and sustainment costs. Research into the relationship has been limited. A United States Congressional Budget Office (2003) study also supports an outcome of less than a one-to-one correlation. Furthermore, some recent acquisition trends in Australia would support a less than one-for-one relationship, for example sustainment cost reduction is increasingly a capability objective at acquisition, and possible reduced costs from economies of scale in global

partnership support arrangements. While it seems a correlation of less than 100 per cent is appropriate, it is not possible to be definitive.

### **Box 1: Cost growth in military equipment**

Historical trends show that the per-unit costs of successive generations of military equipment have been rising in real terms. A range of research, including recent studies by the Defence Materiel Organisation, indicates this growth translates to annualised real cost increases of at least 4 per cent per year across a range of equipment types. However, the analysis of cost trends has shown that the increased cost also reflects an improvement in capability (Kirkpatrick 2004, p 261).

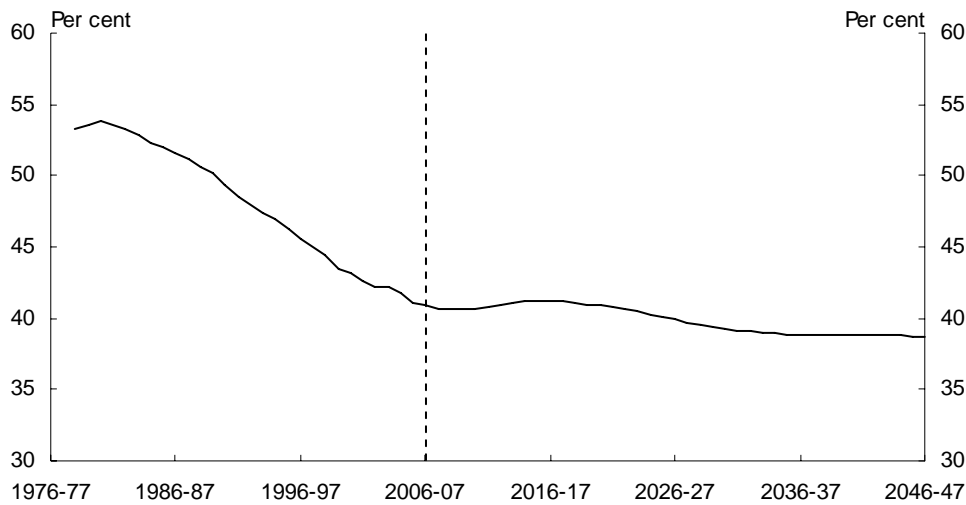
Technological advancements and productivity reduce the cost of a given good over time. In the civilian sector, the cost of high-technology products tends to fall over time as underlying technology matures. However, in the case of military equipment, such savings tend to be re-invested into capability improvements, as nations seek the decisive military advantage over their rivals that technology can provide. The overall effect has been increased per-unit costs (Kirkpatrick 2004, p 259).

It is not clear what drives the rate of capability growth. Strategic developments that raised the intensity of international military competition might be expected to increase the rate of capability growth, but it is difficult to find evidence that this has occurred. Similarly, economic conditions should have an impact, as the rate of economic growth influences the rate at which governments can afford to invest in new capabilities. For Australia, retaining interoperability with the United States and maintaining existing capability relative to other countries are important factors.

For military and civilian personnel, the assumed rate of expenditure growth conforms to the standard assumption in the intergenerational report for wage growth in the economy as a whole. This approach discounts possible arguments that Defence's personnel costs will rise relative to general wages as the proportion of the workforce in the military's preferred younger age cohort declines; or as Defence's military and civilian workforce becomes more skilled relative to the general workforce.

Around 75 per cent of the permanent ADF is aged 35 or less. However, the ADF's natural preference for relatively young recruits does not provide a basis for assuming faster growth in the ADF's labour costs relative to the rest of the economy, even as the overall population ages. First, the proportion of the workforce aged less than 35 will decline slowly, if at all, compared to its decline in the past three decades (Chart 4). If this past trend had created any youth-related wage premium, it should already be built into the ADF's labour costs.

**Chart 4: Workforce aged 15 to 34 as a share of total workforce**



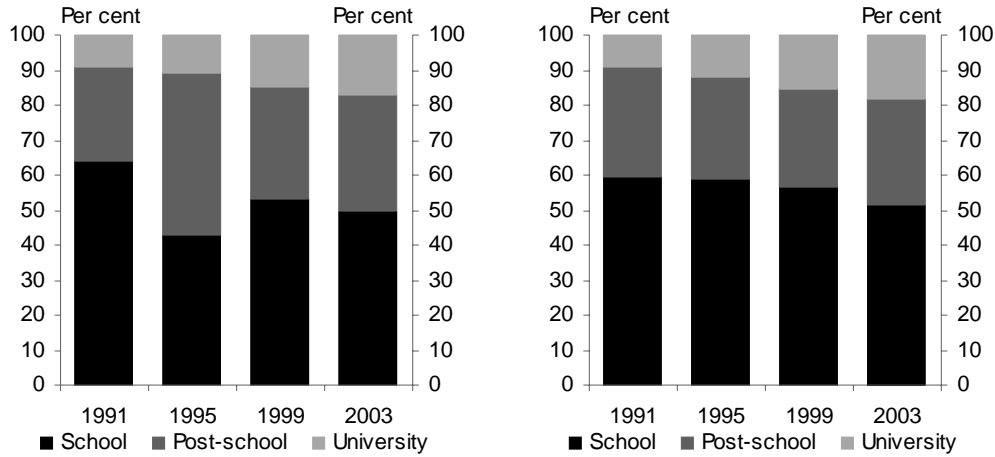
Source: Treasury projections for the second intergenerational report.

Furthermore, even if a wage premium for younger workers began to arise, it would prompt a demand response in the labour market as employers substituted older workers for younger ones. Some employers, such as the ADF, may have a constrained ability to make this substitution. However, the ADF workforce is relatively small compared to the overall size of the workforce aged 15 to 34 (which should reach 5½ million people by 2046-47) and would benefit from adjustments made by other employers.

For any skills-related premium to increase the growth in Defence's personnel costs, it would be necessary for the skill base in Defence to grow more quickly than in the general workforce. Although Defence's military and civilian workforce appears to have become more skilled in recent years (Chart 5), the available evidence does not suggest this trend has been stronger than the corresponding trend in the Australian workforce as a whole, or is likely to be so over the next 40 years.



**Chart 5: Education levels of the ADF and the total labour forces**



Source: Australian Bureau of Statistics data, Defence Census, various years.

Future labour costs will also be influenced by the ability of Australia to access the growing global labour market in various ways. Given the increasing freedom of international flows of capital and labour, developments in the global labour market may have more impact on Australian wage outcomes than demographic changes (Freeman 2006).

### Maintaining relative capability

Military capability is best understood, in many respects, as relative rather than absolute. The capability required to achieve given defence goals will depend on the capabilities of allies and potential adversaries. Focusing on the cost of maintaining a fixed force structure ignores the prevalence of similar input cost pressures in other countries.

To the extent that relative capabilities matter, input cost pressures felt by all countries are less relevant. Rather, changes in relative capabilities will depend on relative changes in total military spending (assuming the relative cost efficiency of spending between countries remains constant).

Global GDP is projected to grow more strongly than Australian GDP over the next four decades, primarily as a result of the emergence of developing countries. (In contrast, in the last four decades Australia has grown at roughly the same rate as global GDP.) If both we and other countries were to maintain military spending as a constant share of GDP, other countries' higher growth rates would lead their military capability to grow more rapidly than our own. However, balanced against this is that Australia has the advantage of starting from a relatively higher starting position, in

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terms of military capability. In practice, relative capability will be dependent upon the decisions made by national governments about the allocation of scarce budgetary resources between defence and other competing priorities.

## Conclusion

It is difficult to project defence spending over the long term, given the influence of unpredictable factors such as the strategic environment, the community's tolerance to risk and the cost of inputs into defence capability. Our alternative methods provide some different ways of thinking about future defence spending trends.

The forthcoming Defence White Paper will consider a range of strategic drivers of the defence force to be used to protect Australia. Underpinning these will be the ability of the economy to fund defence spending into the future. This article provides some insights into the future affordability of, and trends in, defence spending.

## References

Australian Government 2007, *Intergenerational Report 2007*, Commonwealth of Australia, Canberra.

Congressional Budget Office 2003, *The Long-Term Implications of Current Budget Plans*, Congressional Budget Office, Washington.

Freeman, R 2006, 'Is a great Labour Shortage Coming? Replacement Demand in the Global Economy', *National Bureau of Economic Research Working Paper* 12541.

International Institute of Strategic Studies 2008, *The Military Balance 2008*, Routledge, London.

Kirkpatrick, D 2004, 'Trends in the Costs of Weapon Systems and the Consequences', *Defence and Peace Economics*, volume 15, no. 3, pp 259-273.

Thomson, M 2004, *A Trillion Dollars and Counting: Paying for Defence to 2050*, Australian Strategic Policy Institute, Canberra.

