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Defence Inflation: Reality or Myth?

In last October's edition, we published a paper by Professor David Kirkpatrick on the scale of defence inflation, particularly in the field of defence acquisition. This attracted wide interest at high levels. In response, Professor Malcolm Chalmers rebuts many of Kirkpatrick's arguments and maintains that inflation in defence is little higher than in non-defence sectors. John Dowdy believes that driving productivity improvements in non-military tasks and military equipment support can reduce military inflation by half, but that it won't be banished until inter-generational cost increases are addressed. Robbin Laird provides a US view and says that inflation and the credit crunch undermine the funding of new equipment.

Our experts are: ***Professor Malcolm Chalmers; John Dowdy; Professor David Kirkpatrick and Dr Robbin Laird***

THE MYTH OF DEFENCE INFLATION

by Malcolm Chalmers

Malcolm Chalmers is Professorial Fellow in British Security Policy at RUSI, Professor of Defence and Foreign Policy at Kings College, London and Professor of International Politics at the University of Bradford. Here he examines the case, argued by Professor David Kirkpatrick, for claiming that inflation in defence is higher than the GDP deflator, and concludes that such higher inflation is mythical.

The thesis that the MoD suffers from a consistently higher rate of inflation than the rest of the economy has been a recurring feature of discussion on the economics of UK defence. Professor Kirkpatrick makes a further important contribution to this debate in the October 2008 issue of *RUSI Defence Systems*, in which he estimates that defence inflation is around 3% per annum greater than that for the economy-wide GDP deflator. Accordingly, he argues, the MoD needs to receive significant above-inflation budget increments simply in order to maintain current defence capabilities.[1]

This article, in contrast, suggests that the case for the existence of a consistently higher rate of defence inflation is weak. The MoD does face difficult times in the years ahead. Rather than being the result of a global defence inflationary phenomenon over which it has little control, however, its problems are the direct result of the mismatch between its limited resources and the ambitious commitments (to modernisation and to operations) that it has made.

What Are 'Real Terms'?

There are two main purposes for measuring defence activities in 'real' terms. The first is to provide a measure of the **opportunity cost** of defence provision, and in particular the demands that it makes on the public purse. For this purpose, the best price index to use is the GDP deflator. The second is to identify the level of **defence output**. Defence output remains difficult to measure directly.[2] One possible way of doing so, however, is to estimate the effects of the specific rate of price change in the inputs used for producing defence, and then to combine this with estimates of the efficiency with which these inputs are transformed into defence outputs. This is essentially the method employed by Kirkpatrick in his construction of the appropriate price index to be used in calculating 'real' UK defence spending.

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The Components of Defence Inflation

In order to arrive at his estimated rate of defence inflation, Kirkpatrick breaks the UK defence budget into three main components: personnel, equipment and 'other goods and services'. He estimates that prices in the last category, which accounts for 28% of the total defence budget, increase at "broadly in line with the GDP deflator".[3] The main burden of

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evidence presented to support his estimate of a high level of defence inflation, therefore, relates to spending on personnel and equipment.

Inflation in Personnel Costs

Personnel costs constitute an estimated 36% of the defence budget, and Kirkpatrick calculates that they grow at a rate that is 1.7% faster than the GDP deflator, in line with the trend growth rate for real wages in the economy as a whole. In the private sector, he argues, real wage increases do not lead to a relative price effect because "in commercial organisations progressive improvements in productivity allow their businesses to be undertaken with ever fewer staff". In the provision of defence, by contrast, he assumes that there is no increase in productivity because "MoD personnel levels are set at the level of future operational scenarios and must remain at those levels, even if its peacetime activities could be done more efficiently".

Kirkpatrick does not make clear why "future operational scenarios" make productivity improvement impossible

Yet Kirkpatrick does not make clear why "future operational scenarios" make productivity improvement impossible.[4] Over the three years to 2007/08, the MoD estimates that it has achieved cumulative annual efficiency gains totalling £3.1Bn on an annual budget of £33.5Bn, and provides details of the main areas in which these gains have been achieved.[5] This equates to an annual rate of productivity improvement of around 3%, which compares favourably to recent national productivity growth of 2.1%.[6] It is not always easy to distinguish between efficiency savings and reductions in service provision, but nor is it credible to argue that most of the claimed savings are fictitious.

It would be surprising if labour productivity in defence were not increasing. Considerable effort is devoted to improving management practices (both in the armed forces and in relation to the civilian workforce), investing in new technologies and improving training standards.[7] As in the civilian sector, defence investment often seeks to compensate for increasing real wage costs by adopting more capital-intensive working methods. This trend may be particularly evident in relation to requirements for service personnel given the difficulties, and growing costs, of recruitment and retention. Unlike commercial organisations, it is difficult to measure what difference these investments make to overall defence 'output'. But the MoD does provide specific examples of claimed efficiency improvements. The crew of a Type 45 destroyer, for example, is 190, compared with a complement of 314 for the Type 42 that it is replacing.

Kirkpatrick asserts that the average MoD employee (service or civilian) contributes no more to defence output than his or her counterpart did in the past. Yet a more plausible assumption, based on the evidence available to us, is that the productivity of these personnel is rising at a rate at least equivalent to, and possibly above, the rate of real wage growth. Even if only 60% of the claimed improvements in MoD efficiency are genuine improvements in productivity, this would still be enough to offset the costs of the growing real wages of its employees. There is therefore no strong case for arguing that the growth of defence personnel costs, adjusted for productivity growth, exceeds the level of inflation in the economy as a whole.

Inflation in Equipment Costs

The primary explanation for high levels of defence price inflation, according to Kirkpatrick, lies with the equipment budget, which accounts for an estimated 36% of total defence spending. His key assumption is that prices for "combat military equipment" rise at an average rate of 7.5% per annum in real terms faster than for "non-combat military equipment", [8] and 6.9% per annum faster than the GDP deflator.[9] This leads to an estimated rate of overall equipment inflation that is 4.4% above that of the GDP deflator. Kirkpatrick adds a further 1.8% per annum to allow for "in-project inflation" across the new equipment budget (we discuss this further below). Together, these lead him to calculate an average rate of excess inflation in equipment costs of 6.2% per annum. More than 75% of his overall estimate of defence inflation results from equipment cost escalation.

Starship Enterprise

The argument that the costs of UK defence equipment are prone to escalate rapidly was first formalised in a 1983 article, co-authored by Professor Kirkpatrick, which showed that the real unit costs of UK military aircraft had risen at an average rate of 8% since the Second World War.[10] Subsequently, in 1997, Kirkpatrick updated this estimate, and also broadened the scope of his analysis:

"In recent years the real unit production cost of tactical combat aircraft has been growing at about 10% per annum, with similar rates of growth for submarines, frigates, attack helicopters and self-propelled artillery".[11]

Most recently, Kirkpatrick's 2008 article estimated that unit cost growth for most systems is within the range of 5–10% per annum, and used the mid point of this range (7.5% per annum) for the purposes of estimating overall combat equipment inflation.[12]

All these figures refer to the trend in the unit production cost (UPC) of major weapons systems, and make no allowance for inter-generational improvements in unit performance. These improvements (rather than inherent inefficiencies

in the defence sector) are the primary explanation for the escalation of unit costs over time. But Kirkpatrick has consistently argued that no allowance should be made for qualitative improvements in the measurement of defence inflation. Since "the new combat equipment generally provides the same military capability against an enhanced threat", he argues, "it would be inappropriate to adjust the cost of the new equipment to allow for quality change".[13] In order to maintain the effectiveness of its combat equipment, the UK must steadily improve its quality at a pace comparable with that of its adversaries (potential or actual). Keeping pace with others in this way, he argues, should not be considered as an increase in 'real' output.

Conceptualising defence output in terms of a country's relative advantage in combat has considerable merit

Conceptualising defence output in terms of a country's relative advantage in combat has considerable merit. After all, the ultimate purpose of most military activity is to provide a capability to thwart the efforts of adversary forces. Yet, if the purpose is to measure the UK's capability relative to others, it is also necessary to take into account how others' capabilities are developing.

The unstated assumptions in Kirkpatrick's work appear to be that (a) adversary states are improving the quality (and presumably unit cost) of their weapon systems at a rate comparable to that of the UK; yet (b) they somehow manage to afford to maintain their previous numerical strength. On these two assumptions, the UK's defence output would indeed be falling rapidly relative to that of its adversaries.

Since Kirkpatrick's initial writings on the subject, however, international events have made both these assumptions implausible. The end of the Cold War, in particular, was associated with a sharp improvement in the UK's capability to defend itself against conventional attack. As a result, measured in relative terms, UK real defence output increased sharply in the early 1990s, even as defence spending fell in real (general-inflation-denominated) terms.

Using Kirkpatrick's methodology, UK air power capability has declined by around 40% in real terms over the last two decades, with its fleet of combat aircraft reduced from 597 in 1988 to 356 in 2008. Yet the US and France also experienced a 40% reduction in their fleets of combat aircraft during this period; China's fell by 72%, and Russia's combat aircraft numbers fell (from Soviet levels) by a massive 77%.[14] If UK air power is measured in relative (rather than absolute) numerical terms, therefore, its capability has markedly improved relative to its two most potent potential adversaries, and roughly held its own compared to its two most important allies.

Moreover, if the rate of annual cost increase has been as high as 7.5%, as Kirkpatrick suggests, the number of aircraft should have fallen much more steeply, to around 125.[15] The actual numerical trend (a fall to 356 in a period of declining budgets) is consistent with rising real unit costs for acquiring, and maintaining, combat aircraft, but at the much lower rate of around 2.0% per annum.[16]

Unit Costs: the Recent Experience

An examination of recently available data on three of the biggest current procurement programmes – Typhoon aircraft, *Astute*-class submarines and Type 45 destroyers – provides further evidence in support of an overall UPC inflation rate of around 2–3% in real terms.

The programme to purchase 232 **Typhoon aircraft for the RAF** is the largest current procurement project, and continues to consume a significant proportion of the equipment budget. The aircraft first entered service in 2003, and 57 were deployed as of late 2008. It is replacing the Tornado F3 air defence fighter, which first entered service in 1986. The UPC for Typhoon is estimated to be £69.3M in outturn prices.[17] By comparison, the UPC for Tornado F2 (soon to become F3) was £26.3M in 1990 prices – equivalent to £39.4M at 2005 prices.[18] Inter-generational cost escalation therefore amounted to an increase of 76% over 17 years – equivalent to annual real growth in UPC of 3.4%.

A comparable picture can be seen for the **Royal Navy's Type 45 destroyer**, perhaps its biggest recent project. The UPC for the six Type 45s ordered to date – the first of which is due to enter service in 2010 – is estimated to be £649M (a third of which is the cost of its main weapons system, the Principal Anti-Air Missile System).[19] It replaces the much smaller Type 42, the cost of which was estimated at £117M at 1983/84 prices – equivalent to £250M at 2003/04 prices.[20] The first Type 42 (HMS *Sheffield*) was commissioned in 1975, and subsequently lost in the 1982 Falklands war. In this case, therefore, inter-generational inflation amounts to 160% over 35 years – equivalent to real UPC growth of 2.8% per annum.

These programmes (amongst the biggest, and most troubled, of the last decade) have seen rates of cost escalation of around 2–3% per annum

The final case we examine is the acquisition of ***Astute*-class submarines**, the first of which is due to be commissioned

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in 2009 after many problems of cost overrun and delay. The total cost of the first three submarines is £3806M, implying a UPC (excluding development costs) for these boats of around £800M.[21] By comparison, the *Trafalgar*-class submarine, which was first commissioned in 1983 and which the *Astute* is replacing, had a UPC of £235M at 1986/87 prices – equivalent to £459M at 2005/06 prices.[22] Inter-generational inflation has therefore been 74% over 26 years – equivalent to annual real UPC growth of 2.2%.

Insufficient data is available to provide a complete analysis of overall unit cost inflation in the MoD. Yet, if even these programmes (amongst the biggest, and most troubled, of the last decade) have seen rates of cost escalation of around 2–3% per annum, it is reasonable to expect that unit cost growth for the major systems budget as a whole will not greatly exceed this level.

Unit Costs: the Biggest Test

The biggest MoD equipment project for the decade 2015–2025 will be the **replacement programme for Trident nuclear missile submarines**. The Government has estimated its capital cost at £15–20Bn at 2006/07 prices, largely based on an extrapolation of the £16Bn cost of acquiring the current generation of missile submarines.[23] Further design work is under way, and a more refined cost estimate should be available later in 2009.

If Trident replacement is achieved without significant cost escalation, it would cast further doubt on the defence inflation thesis

It may be possible to avoid inter-generational inflation altogether in this case. In contrast to the three major programmes discussed above, the purpose is to maintain, rather than increase, the qualitative capability of the force. Nor does the programme appear to face the prospect of technological breakthroughs that could lead to major cost escalation (the prospect of missile defences around Moscow led to major cost increases for Britain's deterrent force in the 1970s).

If Trident replacement is achieved without significant cost escalation, it would cast further doubt on the defence inflation thesis. On the other hand, if inter-generational inflation comparable to that of the three major projects discussed above (i.e. 3% per annum) were to take place, the total cost of the programme could reach around £39Bn at 2006/07 prices. Since this would place massive pressure on the rest of the defence budget, it would raise significant questions about the affordability of the programme.

Finally, in the unlikely event that it were to suffer from the rate of defence inflation predicted by Kirkpatrick (7.5% per annum), it would end up costing a massive £140Bn in capital costs – a level so high that it would be impossible to afford any other new equipment programmes without very large real budget increases.

In-Project Inflation

The last element in Kirkpatrick's calculation of defence inflation is the addition of 1.8% to the equipment budget in order to account for cost escalation during the project cycle. This is based on the National Audit Office's estimate of an average 1.1% increase in the approved budget for major projects, but with the addition of a further 1.6% to allow for factors such as specification reductions. A downward adjustment of 0.9% is then made to allow for the assumption that in-project inflation does not occur in relation to in-service support contracts.[24]

'Optimism bias' is a well-documented phenomenon, and results primarily from the shared interest between service customers and potential contractors in obtaining initial programme approval. As well as seeking mechanisms to minimise programme 'capture' of this sort, prudent planners also accept that provision needs to be made for some measure of overall in-project escalation. Provision of a contingency of 1–2% per annum for this purpose appears reasonable.

But this figure cannot be added to the inflation rate derived from calculating the average rise of unit costs between generations of equipment. The latter is based on comparisons between actual realised costs, i.e. between the end of one project cycle and the end of the next project cycle. It therefore already includes any rise in costs that take place within the project cycle. Adding intra-cycle cost increases to inter-generational inflation, therefore, is double-counting.

Explanation and Analysis

The evidence for the continuing existence of a high rate of UK defence-specific inflation is weak and unproven. The combination of increased operational commitments, ambitious equipment programmes, and slow real funding growth provides a sufficient explanation for the UK's current budget management difficulties. These problems can be resolved by tackling some, or all, of these factors. Excessive defence inflation is superfluous, both to explaining current dilemmas, and to their solution.

On an optimistic note, this article has pointed to evidence that previous rapid rates of growth in UPCs for defence equipment may have eased, perhaps reflecting the moderation of inter-state arms racing after 1990. Whether this continues to be the case will depend on both technological and geostrategic factors. There is a strong case for more detailed data analysis and research to explore whether there has indeed been a moderation of this trend. ■

NOTES

1 Professor David Kirkpatrick, 'Is Defence Inflation Really as High as Claimed?', *RUSI Defence Systems*, October 2008, pages 66–71. Also see Michael Alexander and Timothy Garden, 'The Arithmetic of Defence Policy', *International Affairs*, July 2001

2 For a recent survey of current methods for measuring UK defence through measurable activities, see Mavis Anagboso and Alison Spence, 'Measuring Defence', *Economic and Labour Market Review*, Volume 3, No. 1, January 2009, pages 44–52

3 David Kirkpatrick, op. cit., page 71. To be precise, he estimates (for reasons that are not clear) that prices for this category rise at 0.3% per annum above GDP deflator growth

4 The need to maintain a 'surge capacity' imposes additional requirements for both civilian and military personnel. But this does not mean there is no scope for improving the efficiency with which this capacity, together with normal peacetime activity, is provided

5 MoD, *Annual Reports and Accounts 2007–2008 Volume 1: Annual Performance Report*, July 2008, HC-850-1, The Stationery Office, pages 219–221

6 HM Treasury, *2008 Pre-Budget Report*, The Stationery Office, November 2008, page 163. Underlying trend growth in output per hour during 2001–2006 was 2.12% per annum

7 It is often argued that inflation may be higher in labour-intensive public sector activities (such as health care and education) where there is limited scope for productivity improvement. But the evidence for such an effect in the defence sector is more limited. Benjamin O. Fordham, 'The Political and Economic Sources of Inflation in the American Military Budget', *Journal of Conflict Resolution*, 47, 2003, pages 581–584, finds limited support for this effect (sometimes known as 'Baumol's disease') in the case of the US

8 No definition of 'non-combat military equipment' is given, although Kirkpatrick estimates it as constituting one-third of total equipment spending. I am sceptical of the value of this distinction, since presumably the vast bulk of military equipment is designed to support combat in some fashion, and might therefore be expected to be subject to the same inter-state competitive pressures which, it is claimed, drive up the unit costs of front-line weapons. Exceptions to this rule (e.g. for ceremonial functions) are relatively trivial

9 An allowance of 0.9% per annum is made for a relatively higher rate of productivity growth in the manufacturing sector, from which most equipment is purchased

10 Dr D. L. Kirkpatrick and P. G. Pugh, 'Towards the Starship Enterprise – are the current trends in defence unit costs inexorable?', *Aerospace (Journal of the Royal Aeronautical Society)*, May 1983, pages 16–22. See also David L. Kirkpatrick, 'The Rising Unit Cost of Defence Equipment – The Reasons and The Results', *Defence and Peace Economics*, Volume 6, 1995, pages 263–288; Dr David Kirkpatrick, 'Starship Enterprise Revisited – Prospects for the 21st Century', *The Hawk Journal (Journal of RAF Staff College),* 1995, pages 20–29

11 David Kirkpatrick, 'Rising costs, falling budgets and their implications for defence policy,' *Economic Affairs*, December 1997, pages 10–14

12 Kirkpatrick's source for this latest estimate is P. G. Pugh, 'Performance-based Cost Estimating', a paper presented at the 13th International Cost Engineering Congress, London, 1994

13 'Is Defence Inflation Really as High?', op. cit., page 70

14 This includes both RAF and Royal Navy combat aircraft. IISS, *Military Balance 1988–89*, and IISS, *Military Balance 2009*

15 This takes account of the 11% decline in real defence spending (calculated using general inflation) over this period, and assumes that air power maintains its share of the total defence budget

16 In principle, whole-life costs may have increased less rapidly than this, since more rapid rises in UPC may have been offset by economies in maintenance and operating costs. In practice, such fine-grain distinct–ions are not possible, due to lack of data and varying accounting practices

17 National Audit Office, *Ministry of Defence: Major Projects Report 2008*, 18 December 2008, The Stationery Office, page 151. Since Tranche 3 has not yet been ordered, this figure is for Tranches 1 and 2 only

18 David Kirkpatrick, 'Rising Costs', op. cit., page 10. Since no figures are readily available for Typhoon UPC, expressed in constant prices, we express Tornado costs in 2005 prices for the purposes of comparison. 2005/06 and 2006/07 were the peak years for Typhoon spending

19 National Audit Office, op. cit., page 167

20 Cost figure is from *House of Commons Debates*, 23 July 1984, Volume 64, column 534. The peak years for spending on the Type 45 were 2003/04 and 2004/05. Accordingly, prices for the Type 42 are converted into 2003 prices

21 National Audit Office, op. cit., page 18. In 1995, the total cost of the Trident programme was estimated to be £11,692M at 1994/95 prices: equivalent to £15.8Bn at 2006/07 prices. MoD memorandum, published in House of Commons Defence Committee, *Eighth Report of the Defence Committee: Progress of the Trident Programme*, July 1995, page 19

22 Cost estimate from MoD, *Statement on the Defence Estimates 1987,* Volume 1, HMSO, 1987, page 46. The peak years of spending on Astute were 2001/02 and 2005/06. Spending on the Trafalgar is therefore translated into 2005 prices

23 National Audit Office, Ministry of Defence: *The UK's Future Nuclear Deterrent Capability*, HC 1115 2007/08, November 2008, page 26

24 It is not clear why in-service support should not be subject to the tendency for contractors to underprice initial contracts in order to secure initial funding