

# Background Quality Report

## Defence Inflation

The purpose of a background quality report is to inform users of the statistics about the quality of the data used to produce the publication, and any statistics derived from that data. It also discusses existing uses of the statistics and user requirements.

This assessment relates to the defence inflation statistic published by Defence Economics Price Indices branch.

### 1 Introduction

The defence inflation statistic was published for the first time in March 2010, covering estimates for 2005/06 to 2008/09. The latest estimates relate to 2015/16 and were published on 26 January 2017. The statistics were published as National Statistics, adhering to protocols on pre-release access.

**Definition** The defence inflation statistic measures the average change in pay, and prices of goods and services, making up the defence budget, with quality and quantity held constant. The estimates of defence inflation capture inflation in the inputs to defence. They reflect the mix of goods, labour and services bought each year and do not take account of productivity or efficiency improvements.

**Background** The defence inflation statistic was developed following interest from MOD policy areas and from Parliament. During CSR07 the House of Commons Defence Committee (HCDC) requested “a robust price index for defence products which will assist the MOD in its financial planning and its negotiations with the Treasury in future spending reviews”. Following this request for a defence inflation measure by the HCDC, the Price Indices team undertook a two year project to provide estimates.

**Statistical Notices** Estimates provided for defence inflation account for inflation in MOD expenditure on a financial year basis. More detailed estimates are also provided for:

- Expenditure on contracts, by contract type.
- Expenditure on labour costs, by military and civilian.
- Cash office expenditure, by currency.

**Methodology** The estimate for defence inflation is a chain-linked Laspeyres price index. For each pair of consecutive years pure price growth is estimated by holding the quality and quantity of goods, services and personnel constant, and then either directly measuring their change in price or making reference to relevant price indices. The year-on-year price growths are multiplied together to produce the chain-linked Laspeyres price index with the reference period being the financial year 2004/05.

Each component (contract, labour costs and cash office expenditure) of defence inflation is estimated using a bespoke method reflecting the different data sources. These estimates are averaged, using the expenditures for individual components (from the Department’s accounting data) as weights, to produce an overall measure of defence inflation. For a more comprehensive overview of the methodology used, refer to [Statistical Bulletin No. 10](#).

The key summary quality measures are given in the following table.

Key Quality Measure	Defence Inflation Year	Value
Response rate for census of high value contracts	2015/16	97%
Percentage of contracts, by value, where SIC was imputed	2015/16	34%
Coverage of Net Cash Requirement Expenditure	2015/16	100%
Time gap between 2015/16 publication and 1 April 2016	2015/16	10 months
Time gap between publication and availability of some key data	2015/16	2 months
Total number of unique page views on gov.uk, April 2015 - March 2016	2014/15	981 views

Defence inflation estimates are published on the [MOD Statistics](#) website.

There are nine published documents relating to the defence inflation statistic.

- Seven [Statistical Notices](#). The first of these was published in 2010 and includes a summary of results and methodology for 2005/06 through to 2008/09. Since then six more statistical notices have been published with annual inflation estimates.
- Two [Statistics Bulletins](#). Defence Statistics Bulletin no.12 presents a detailed summary of the military labour cost inflation methodology implemented from 2010/11 onwards. Defence Statistics Bulletin no.10 provides a more detailed overview of methods, history, results and analysis. It also summarises the strengths and weaknesses of the methods utilised.
- [Measuring Defence Inflation](#), a working paper for the Government Statistical Service Methodology Conference in June 2009, which outlined the planned approach for estimating defence inflation.

Related products include: the Gross Domestic Product (GDP) deflator, which is the broadest measure of inflation in the economy; the Retail Price Indices (RPI); the Consumer Price Indices (CPI); the Average Weekly Earnings (AWE) indices; and Producer Price Indices (PPI).

## 2 Relevance

**Coverage** The defence inflation statistic measures average inflation in MOD expenditure and is produced annually. The estimates tend to cover all of MOD Net Cash Requirement Expenditure, plus or minus 5%, per annum. The 2015/16 estimates account for:

- 24,050 contracts with expenditure of £24.7bn;
- Military and civilian personnel with expenditure of £11.6bn; and
- £0.6bn of expenditure through cash offices abroad.

**User needs** The main purpose of the defence inflation statistics is to provide estimates of changes in the cost of defence inputs and their major components from year to year. These estimates are available to: inform budgetary and spending review discussions with HM Treasury; inform parliamentary and public debate; and provide management information relating to price growth for MOD planning.

Following the publication of defence inflation estimates as Official Statistics, MOD finance and policy colleagues have requested forecasts to inform the planning round. Subsequently, forecasts of labour cost and contract inflation have been developed for internal use.

## 3 Accuracy

**Coverage** Approximately 100% of the MOD's Net Cash Requirement expenditure is accounted for in the estimate of defence inflation in 2015/16. For the defence inflation estimates between 2005/06 and 2015/16, on average all of the MOD's Net Cash Requirement expenditure was accounted for.

**Key Quality Measure:** Percentage coverage of Net Cash Requirement Expenditure: **100%** (2015/16 defence inflation measure).

The coverage of contract and cash office expenditure cannot be calculated because additional definitive published figures do not exist to provide a comparison. We assume 100% coverage. By contrast, labour cost expenditure (specifically on pay, national insurance and pensions) can be compared to expenditure recorded in the Department's Annual Report and Accounts, taking into account the slight definitional differences. The coverage for the 2014/15 defence inflation measure is 99% for military pay, national insurance and pensions, which is in line with previous years. The coverage for civilian pay, national insurance and pensions in 2014/15 is lower, at 88%. The main reason for this lower coverage is that the civilian pay analysis is based on a snapshot of individual pay records taken at the end of the base year 2014/15, and therefore excludes anyone who left the department during the preceding year. This effect has been consistent over the past couple of years (90% in 2013/14 and 87% in 2012/13). Civilians that do leave lower the numerator of the coverage measure whereas the denominator is the total pay to civilians over the whole year, so includes payments to people who were only employed for part of the year.

Expenditure within the Annual Report and Accounts is presented against Resource Account Codes (RAC) and based on payments made by the Department; it is not available for individuals, so can not be used to produce estimates of defence inflation.

**Contracts** Almost two thirds of the Department's expenditure is on contracts. Data on contract payments is obtained from the Department's administrative contract database, which records over 95% of all payments made by the Department (the remaining payments are made through cash offices abroad). The payments recorded on the administrative system form the basis of the Department's Annual Report and Accounts, validated by the National Audit Office. Whilst the payment information is accurate, there are some quality issues with the supporting information within the database, such as contractor name, Standard Industrial Classification, and type or length of contract.

**MOD Annual Report and Accounts:** The MOD prepares accounts for each financial year detailing the resources acquired, held, or disposed of during the year and the way in which it has used them. Accounts are prepared in accordance with directions issued by HM Treasury including the accounting instructions in the Government Financial Reporting Manual.

Further information can be found in the [Annual Report and Accounts](#) and the [Government Financial Reporting Manual](#).

The accounts are audited by the Comptroller and Auditor General who provides an opinion as to whether:

- The financial statements have been properly prepared, providing a fair and true representation;
- Expenditure and income has been applied to the purposes intended by Parliament;
- Financial transactions conform to the authorities which govern them.

Inflation in high value contracts (those with annual payments in the top 75 percentile) is based upon detailed information obtained from a census of these high value contracts. The response rate for this census for 2015/16 estimates was 97% by payment value. This is a high success rate and is comparable to the 96% achieved last year.

For fixed and firm price contracts this response rate was judged suitable as further contracts reported were not expected to alter the estimate of price changes in total contract spend at the level of one decimal place.

**Key Quality Measure:** Response rate for census of high value contracts: **97%**

For contracts where detailed information is not available, inflation is estimated based upon price indices relevant to the Standard Industrial Classification (SIC) recorded for each contract. The quality of the SIC field is variable, with invalid or missing SIC resulting in 34% of contracts, by value, having this field imputed or edited, for the purposes of estimating defence inflation.

**Key Quality Measure:** Percentage of contracts which are not fixed price, by value, where SIC is imputed or edited (2014/15 measure of defence inflation): 31%

Source for determining SIC group imputation	Proportion of contract expenditure
Imputation based on Company Information	17%
Imputation based on Accounting Codes	17%
<b>Total imputed or edited SIC groups</b>	<b>34%</b>

**Personnel** Just under one third of the Department's expenditure is on labour costs for military and civilian staff. The estimates of inflation in personnel expenditure are based upon individual civilian and military pay records which are recorded on the administrative data systems. Whilst the amounts reflect actual payments, the supporting information, such as hours worked, grade and full-time/part-time marker are less accurate and require validation and editing.

**Cash Offices** Just under 2% of the Department's expenditure is through cash offices, mainly in foreign currencies. Estimates of inflation are based upon administrative records of purchases and transfers of foreign currencies, which reflect the Department's actual transactions. However, data on the expenditure of currencies are not recorded centrally and so a number of assumptions are made in estimating the inflation in the expenditure of these currencies.

**Assumptions** See [Defence Statistics Bulletin No. 10](#) for full details of the assumptions made in producing estimates of defence inflation.

**Revisions Policy** Revisions will be made to the defence inflation measure to improve the usability and relevance when necessary. Reasons for revising figures include:

- (i) Acquiring new information relating to already published results;
- (ii) Improvements to methodology and selection of data sources;
- (iii) Identification of significant errors.

Throughout the publication, where revisions occur, they will be indicated by table footnotes.

## 4 Timeliness and Punctuality

**Timeliness** The first release of defence inflation was in March 2010. This [Statistical Notice](#) included estimates for four years from 2005/06 to 2008/09. Estimates have been published annually from 2009/10. The delay between the end of the financial year and the publication of the Defence Inflation report is due to availability of the large number of data sources required, and time for production and quality assurance. The table below shows the availability of the main data sources.

Although most data required for producing defence inflation are available prior to 1 April of the following financial year, the complete set of data for the 2015/16 defence inflation estimates was only available towards the end of July 2016. Time is also required for data collation, processing, analysis, quality assurance and final production.

The last four reports (from 2012/13 to 2015/16) were all published at the end of the subsequent January after the end of the financial year. This was later than earlier reports had been published, and was due to a mixture of staff shortages in Defence Economics Price Indices branch and availability of data. As far as we know, this timing meets user needs. However, we will continue to review the publication timetable for future years, along with other aspects of the defence inflation production process.

**Punctuality** The Defence Inflation estimates have been published to schedule. Future publication dates will be announced on the UK Statistics Authority hub at least one month in advance.

**Key Quality Measure:** Availability of data sources (2015/16 defence inflation measure)

Time gap between 1 April 2016 and 2015/16 publication date: **10 months**  
 Minimum time gap between publication and availability of key data: **3 months**

Defence Inflation Measure	Data Source (Section 11: References)	Month Available	Status of data availability: As at 1 April 2016 for 2015/16 publication
<b>Contracts</b>	Contracts Database: <i>MOD</i>	July 2015	Available
	Price Indices and Exchange Rates: <i>ONS</i>	Mid July 2016 (some provisional)	3 month wait
	Variation of Price Inflation data from project teams: <i>MOD</i>	April 2016	Available
<b>Labour Costs</b>	Armed Forces Pay Review Body 44 <sup>th</sup> annual report	March 2015	Available
	Civilian strengths data: <i>MOD ARES1 database</i>	May 2016	1 month wait
	Military pay data: <i>JPA</i>	May 2016	1 month wait
	National insurance, ERNIC: <i>HMRC</i>	February 2015	Available
	Pensions data, SCAPE: <i>HMT</i>	February 2015	Available
	Military Salaries Index: <i>MOD</i>	May 2016	1 month wait
	Resource Account Codes 14/15: <i>MOD CSOB</i>	September 2015	Available
	Resource Account Codes 15/16: <i>MOD CSOB</i>	Mid July 2016	3 month wait
<b>Cash Office Expenditure</b>	Balance of Payments and forward buy exchange rates: <i>MOD Cash &amp; Banking Services</i>	June 2016	2 month wait

## 5 Accessibility and Clarity

Users of the defence inflation statistics can access the [Statistical Notice](#) and [Defence Statistics Bulletins](#) through the MOD statistics website. They can be found under the “Finance and Economics” section of “Publications”. The [UK National Statistics Publication Hub](#) has a link to the Statistical Notice but not the Defence Statistical Bulletins.

**Key Quality Measure:** Total number of unique page views on gov.uk, April 2015-March 2016: 981 views

Since September 2012 all tables included within the Defence Inflation Estimates Statistical Notice have been published as .xls files.

## 6 Coherence and Comparability

**Coherence** There are no other estimates directly relating to UK defence inflation and so there are no direct comparisons to measure coherence against. However, the method used to measure inflation is consistent with the approach taken by the Office for National Statistics (ONS). Inflation in many MOD contracts are linked to earnings, producer price and retail price indices produced by ONS. Therefore the estimates of defence inflation are inherently broadly coherent with other official inflation estimates. Defence Inflation is compared with General Inflation in the latest [Statistical Notice](#).

**Comparability Over Time** Following publication of the 2009/10 estimates, a new method and data-source for estimating military labour cost inflation has been used, which has caused a break in the series from 2010/11 onwards. This change ensured the military and civilian pay and labour cost inflation estimates are directly comparable. Previously, different methods were used for estimating inflation in military and civilian pay, making direct comparison difficult. A summary of the previous and new methodologies, and an analysis of the differences, is outlined in the [Defence Statistics Bulletin No. 12](#).

The 2011/12 estimates used a new data source to determine total annual expenditure on contracts in foreign currencies. This new data source has resulted in a more straightforward and comprehensive collaboration of contract expenditure in foreign currencies. As a consequence, comparisons of 2011/12 contract inflation rates with historical estimates should be viewed with caution. A summary of the changes in the methodology can be found in **Chapter 5** of the [11/12 Statistical Notice](#).

There were no major methodology changes in the 2015/16 Defence Inflation estimates, though an improvement for estimating the overall inflation pressure of paying some contracts in foreign currency was made. This had an impact on the individual inflation rates for each contract type but didn't impact upon the overall contract inflation estimate or the overall defence inflation measure. Further details of the new methodology can be found in the **Methodology** section of the relevant statistical notice.

## 7 Trade-offs between Output Quality Components

Timeliness versus accuracy is the most notable trade-off for defence inflation. There are currently around 24,000 MOD contracts in payment each year. It is not possible to obtain and check the details of every contract and so resources are concentrated on those of high value. Roughly 200 contracts contribute to 75% of overall contract expenditure.

For lower value contracts a range of assumptions are made based upon Resource Accounting Codes and Standard Industrial Classification of contract payments. The timeliness versus accuracy trade-off has also impacted the level of cleansing and assumptions made for civilian and military labour costs. Automatic cleansing rules have been devised rather than examining validation failures on a case by case basis.

## 8 Assessment of User Needs and Perceptions

**The Use Made of Defence Inflation Statistics** In reference to the UK Statistics Authority report, *The Use Made of Official Statistics*, the Defence Inflation Statistics are used for the following purposes:

- (i) Government – Policy Making
- (ii) Government – Policy Monitoring
- (iii) Academia – Facilitating Research

**Description of Users and Usage of Statistics** The main motivation for the development of a measure of defence inflation was to inform parliamentary and national debate on defence expenditure. The key external users therefore include the general public, media, defence industry, academics, the National Audit Office and Parliament (in particular the House of Commons Defence Committee and Parliamentary Accounts Committee).

### Government – Policy Monitoring

Since the development of a defence inflation measure, the Department's defence inflation statistics have been used and republished by external users, including the National Audit Office within their published report 'Strategic Financial Management of the Defence Budget: Ministry of Defence' (2010), pp. 5.

### Academia – Facilitating Research

Defence Economics have also worked with academics to publish a summary of the methodology used to produce the 2005/06 - 2008/09 statistics in the book 'Handbook on the Economics of Conflict' (Davies et al (2011), pp. 399-401), demonstrating how, alongside other measures, the UK MOD pursues

#### **Academics' use of statistics:**

As an "important contribution on a relatively unknown topic", the annual Defence Inflation Statistical Notice is "valuable and important work which needs to continue." The statistics are "used to compare defence inflation with UK economy inflation to identify possible shortfalls in UK Defence spending due to relative inflation effects" and they provide "useful background for analysis...on UK defence budget trends, and in particular on helping an understanding of relationships between numerical capabilities and budgets."

effective defence resource management through the estimation of defence inflation.

Many of the key users of the defence inflation statistics are internal users within the MOD, including:

- Director General Finance and Permanent Under Secretary who can make reference to it in budget and Spending Round negotiations with HM Treasury, and in dealing with parliamentary interest in the Department's expenditure;
- Defence Equipment & Support Commercial Director who can use the information to measure the effectiveness of commercial policy and the impact of inflation on procurement projects;
- Defence Resources who can use the information to inform budget allocation within the Department, and MOD Planning Round Assumptions.

**MOD's Defence Resources Directorate's use of statistics:**

*"The contract inflation forecasts were used to calculate, based on forecasts of Departmental contract spend, an estimate of the potential financial pressure that the Department might face as a result of contractual cost growth in the budgeted programme, over and above the formally published HM Treasury and Office for Budgetary Responsibility GDP deflator figures. Where the Department has a better estimate for the likely rate of inflation – either in existing or future contracts (e.g. as a result of contractual terms or overseas purchases), these are already used for forward forecasts. We therefore make an estimate of the potential financial risk that the Department might face; and combined with the level of other financial risks that face, take account of this in the Department's decisions on its forward programme. For example, this information has been used to inform assessments in the Department's latest Planning Round."*

**Obtaining Information on User Needs** In May 2011 Defence Economics hosted a seminar which brought together experts on defence inflation and cost pressures from within Government, academia and industry. During this one day event the defence inflation estimates were appraised within the wider context of previous study and research. Each year, following publication, Defence Economics formally seek the views of this community; these are used to inform and guide changes to future publications.

A record has been kept of all queries, including parliamentary questions, that have been asked around defence inflation to help build up an understanding of user requirements. During 2010-11 there was an increase in interest from internal MOD policy teams regarding utilising defence inflation as a planning tool, with requests for consolidated labour and contract forecasts which reflect changes in the forecasts of the UK economy. This led to the development of an annual defence inflation forecast for internal planning purposes.

Government – Policy Making

Following an increasing number of requests from internal MOD policy and finance colleagues, forecasts of labour cost and contract inflation estimates have been developed. The labour cost and contract forecasts have been included within an internal consolidated report setting out assumptions for the Planning Round, with all assumptions clearly outlined.

**Strengths and Weaknesses of Defence Inflation Statistics in relation to Users** The original request from the House of Commons Defence Committee (HCDC) was for the MOD to have a defence-specific index. The final output reflects this original request. Further correspondence with the HCDC since the publication of the defence inflation statistics includes positive feedback on the statistics, alongside an interest in how the defence inflation statistics are being used to inform planning assumptions within the MOD.

In order for the defence inflation statistic to be useful for informing Planning Rounds, forecasts of the estimates are required. These forecasts have been produced for internal policy and finance colleagues alongside the assumptions underpinning them, but have not been published as an official statistic.

There is one commonly perceived weakness of the defence inflation statistics that has been highlighted by both internal and external users, which is the extent to which the statistics solely reflect defence inflation. There are many factors that may influence the average rate of increase in pay and prices of goods and services, for example changes in efficiency or

*The statistics provide "a measure of defence input inflation but that is only part of the story. It takes no account of any changes in the efficiency or productivity of the MoD and its suppliers."*

**Academic**

*"There are various elements that make up a price increase of military kit: labour rates, material rates, MOD's commercial skills, and use of defence industry monopoly power."*

**HM Treasury**



productivity. One user commented that it is important to place the estimates of defence inflation in the wider context of cost growth, optimism bias and intergenerational effects. The department recognises this perceived weakness within its discussion of the development of methods to measure defence inflation, published in Defence Statistics Bulletin No. 10. Outlined below is why some external factors make it difficult to determine the underlying impact of external economic conditions on defence expenditure.

**Cost growth** is when a MOD project suffers cost or schedule over run. This apparent cost growth is often an “accounting problem” or a failure to specify needs accurately, rather than the result of external economic conditions flowing into defence. Additionally, the Department may be over-optimistic in its initial cost estimates for equipment and support contracts; known as **optimism bias**. The subsequent changes in price reflect more realistic costs as projects progress.

As the Department moves to new platforms (for example, a new type of aircraft), there are usually step increases in unit costs, known as **intergenerational effects**. Intergenerational effects result from the Department choosing to buy more expensive platforms as they adapt to changing threats to enable better or different capability, rather than as a result of economic conditions flowing into defence. Defence Economics estimates that the average real intergenerational cost growth is between 3.5% and 6%, varying by platform type.

## 9 Performance, Cost and Respondent Burden

To develop the method and publish estimates of defence inflation for 2005/06 to 2008/09 required two full time members of staff a total of two years.

Most of the data required is obtained from existing administration systems and there is only a small marginal cost to obtaining appropriate extracts. However, the census of high value contracts does place a small burden on MOD project teams, who are required to provide copies of contract clauses or information on approaches to pricing.

## 10 Confidentiality, Transparency and Security

The raw data used for producing defence inflation includes individual contract payments and individual pay records, both of which are sensitive. The individual pay records are anonymised and kept in a password secured folder, on the MOD network, restricted to staff involved in producing the estimates. All MOD, civil service and data protection regulations are adhered to. All published outputs are at a high level of aggregation so there are no disclosure issues.



## 11 References

**Armed Forces Pay Review Body Reports**

[http://www.ome.uk.com/AFPRB\\_Reports.aspx](http://www.ome.uk.com/AFPRB_Reports.aspx)

**Handbook on the Economics of Conflict**

Braddon, D.L. and Hartley, K

**Office for National Statistics Economic Indicators**

<http://www.ons.gov.uk>

**MOD Statistics website**

<https://www.gov.uk/government/organisations/ministry-of-defence/about/statistics>

**Defence Inflation Statistical Notices**

<https://www.gov.uk/government/collections/defence-inflation-estimates-index>

**Defence Statistics Bulletin No. 10**

<http://webarchive.nationalarchives.gov.uk/20140116142443/http://www.dasa.mod.uk/publications/finance-and-economics/archive/defence-statistics-bulletins/defence-statistics-bulletin-number-10-estimating-defence-inflation-30-march-2010.pdf>

**Defence Statistics Bulletin No. 12**

<https://www.gov.uk/government/statistics/defence-statistics-finance-bulletins>

**Developing a Measure of Defence Inflation**

<http://www.ons.gov.uk/ons/about-ons/get-involved/events/events/fourteenth-gss-methodology-conference--30-june-2009/index.html>

**Strategic Financial Management of the Defence Budget: Ministry of Defence**

[National Audit Office: Report by the Comptroller and Auditor General, HC 290, Session 2010-11](#)

**UK Code of Practice for Official Statistics**

<http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html>

**UK National Statistics Publication Hub**

<http://www.statistics.gov.uk/hub/index.html>

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