An Analysis of Historical and Projected Cost Deflators for Budget Components

Douglas Meade and Ron Lile

Paper Presented at the Western Economic Association Conference
San Francisco, July 8, 2001

1 Introduction

There has long been a need for defense budget planners to understand the effects of inflation on the ultimate cost of a given budget. In particular, what price deflators should the Department of Defense (DoD) use to capture historical inflation and to budget for projected inflation? Since the DoD buys a mix of goods and services that is quite different from that of the overall economy, general measures of inflation, such as the GDP deflator, may not be appropriate for defense budgeting. Are the historical deflators developed by the Bureau of Economic Analysis (BEA) a better measure than those currently employed by the DoD? Furthermore, are the adjustments for quality change incorporated in the BEA estimates appropriate as a metric for changes in the cost of a budget? Such adjustments may overestimate the amount of cost savings implied by quality change. The aim of this paper is to explore these questions.

In this paper three measures of price change for defense goods are compared, with the ultimate aim of suggesting a method for forecasting prices relevant for defense budget planning. This comparison shows, for the period from 1987 to 1999, that the rate of inflation measured at the total defense budget level varies by an average growth rate of 0.4 percent among the three measures. At the budget category level and the DoD commodity level, however, the differences in inflation are significant among the three measures. This paper focuses on the procurement appropriation and the "other purchases" commodity and leaves the other unexplained differences for future research.

The paper is structured as follows. Section 2 provides some background information regarding federal budget terminology and funding polices. In section 3.1, the BEA defense deflators and those deflators used by the DoD are described. Section 3.2 explains the DoD planning programming and budgeting system (PPBS), and describes how inflation projections are used in that system. This discussion focuses on outlay deflators given that they are the closest in concept to the BEA's purchases deflators. Section 3.3 develops a separate set of deflators derived using a vector of industry prices multiplied by a defense expenditures bridge matrix. Section 4 compares the different measures. Differences are examined and possible reasons for the differences are considered. The paper concludes with a discussion of the DoD deflator for projecting the "other purchases" inflation.

2 Background

The federal budget is divided into a number of sections called "functional categories," each containing programs serving a common purpose. National security-related programs are grouped into Functional Category 050 (National Defense). This category includes all of the Defense Department's military programs and the national security programs administered by other federal departments, such as

the Department of Energy. It excludes nonmilitary programs managed by the DoD (for example, highway bridge inspection projects conducted by the Army Corps of Engineers). DoD projections are based on a narrower budget grouping, Functional Category 051 (Department of Defense, Military). This subset of 050 funds includes all of the DoD's military programs, but excludes the national security programs administered by other agencies and DoD programs serving civil functions (principally public works projects of the US Army Corps of Engineers).

The defense budget (defined for this paper to include only those programs falling within Functional Category 051) is partitioned into six major appropriations: military personnel; operations and maintenance (O&M); procurement; research, development, test, and evaluation (RDT&E); military construction; and, family housing. The titles of these appropriations are reasonably descriptive of the types of expenses they cover:

- The military personnel appropriation pays the active-duty service members and reservists, as well as some other personnel-related expenses such as permanent change-of-station (PCS) travel and purchases of military uniforms. Also included in this appropriation is the DoD's share of the government's annual payments into the Military Retirement Fund.
- The O&M appropriation funds the day-to-day operations of the defense establishment. Money from this appropriation goes to purchase fuel and other consumable items and to pay all but a small share of the DoD's civilian work force.
- The procurement appropriation covers purchases of weapons, equipment, and other military capital goods.
- The RDT&E appropriation finances the development and testing of new military systems and for other research activities and associated civilian pay.
- The military construction appropriation covers the cost of constructing military facilities.
- The family housing appropriation supports the cost of providing housing for military personnel and their dependents.

2.1 Appropriations versus Outlays

An appropriation is the means by which the Congress provides budget authority for a program. Budget authority, in turn, is the authority, available during the fiscal year, given to a federal agency, for instance the DoD, to obligate the government to make immediate or future outlays of Government funds. Budget authority is recorded as a dollar amount in the year that it first becomes available. Congress provides Department of Defense Budget Authority in the form of the six appropriations discussed above.

Outlays, on the other hand, reflect the liquidation, generally in cash payments, of the Government's obligations. They are recorded when obligations are paid, in the amount that is paid. Outlays during a fiscal year may be for the payment of obligations incurred in the same year or in prior years. Outlays, therefore, flow in part from unexpended balances of prior year budget authority and in part from budget authority provided for the year in which the money is spent. The ratio of the outlays resulting from budget authority enacted in any year to the amount of that budget authority is referred to as the spendout rate for that year. Spendout rates (also called outlay or expenditure rates) are the expected cash flow for given appropriations expressed as the percent expected to be spent in a given year. These rates are unique by appropriation.

2.2 Funding Policies

Congress specifies funding policies or rules for each particular appropriation including annual, incremental, and full funding. The annual funding policy applies to the military personnel and O&M appropriations. Under annual funding, Congress approves funding to cover all expenses for goods and services for that fiscal year. The incremental funding policy governs the RDT&E appropriation. Under incremental funding, only the funds necessary to cover all costs expected to be incurred to support work to be performed during the fiscal year are approved. For procurement (including shipbuilding and conversion, for the Navy), military construction, and family housing programs, the Department operates under a "full funding" policy. Under full funding, Congress approves, in the year of the request, sufficient funds to complete a given quantity of items, although it may take a number of years to actually build and deliver these items. Thus, in extreme cases (such as building an aircraft carrier), final outlays may be recorded a decade after the budget authority for the program is approved.

3 Review of Alternative Defense Deflators and Projections

Three alternative defense deflators are examined in this paper. The BEA deflators, described in section 3.1, are for historical data on purchases and are available from 1972 to 1998. The BEA does not make forecasts or projections of these deflators. The DoD deflators are available historically from 1955 to 1999 and are currently projected from 1999 to 2005. Section 3.2 describes the context in which those deflators are developed and presented. Finally, section 3.3 describes the method used to develop a deflator based on the distribution of purchases to detailed industries. This method can be used to forecast a defense-specific deflator, if forecasts of prices by industry are available.

3.1 BEA Defense Deflators for the National Income and Product Accounts

In the mid 1970s, the BEA was tasked by the DoD and other federal agencies to develop deflators for various components of defense expenditures (US Dept. of Commerce, 1975, 1979). In close cooperation with the DoD, the BEA developed a methodology to develop price indexes for defense purchases at a detailed level, using data provided by the DoD. Beginning in 1980, the BEA presented detailed components of national defense purchases in both current and constant dollars in the National Income and Product Accounts. Historical data was developed for the period beginning in 1972. The methodology is fully described in *Government Transactions* (BEA, 1988).[1]

The BEA methodology uses a combination of methods to develop the defense deflators. The preferred method is the *directly priced method*. Under this method, the BEA uses DoD-supplied quantity and price data. The two main data sources from within the DoD are Contract Control Documentation Reports (CCDR's) and Production Control Reports (PCR's), both of which are available monthly.

When data on prices and quantities are not directly available, the BEA derives current dollar purchases from DoD financial reports and from budget outlays using the *ratio method*.[2] The data sources used in this case consist of the Contract Awards (CA) and DoD Financial Reports (FR). For several defense goods, BEA implicit price deflators (IPD's) or Bureau of Labor Statistics (BLS) producer price indexes (PPI's) for similar goods are used as proxies to estimate prices changes. For some producer price indexes, such as those for computers, are constructed using the hedonic pricing method (discussed in section 5). In addition, the DoD Inventory Control System (ICS) can be used for many items that are purchased and stocked by government supply centers. Items in the ICS are coded by a 13-digit National Stock Number (NSN), based on extremely detailed specifications. This data is available quarterly.

In the case of goods whose characteristics or quality is changing over time, the *specification pricing method* is used. The purpose of using this method is to define the price-determining characteristics for a given item, and to develop a price for a good with identical characteristics over time. Price-determining characteristics for an aircraft would consist of features that affect the price and contribute to the ability of the aircraft to perform its function. This method is more conservative than the hedonic method, in that improvements in quality or efficiency are only valued at their production cost. For example, if

[1] The BEA methodology has undergone some modifications since 1988 including: (1) The adoption of chain-weighting techniques for the calculation of aggregate prices and quantities (Landefeld and Parker, 1995); (2) The distinction between government consumption and investment, along with the corresponding introduction of the consumption of fixed capital (Parker, 1995); and (3) The redefinition of software as investment (Moulton, Parker and Seskin, 1999).

[2] The ratio method consists of first deriving an indirect pricing factor (IPF), which is the ratio of directly priced items to the total funds available to be spent for a major group. Then, the IPF is applied to quarterly disbursements from DoD Financial Reports to obtain estimates of current price expenditures.

specification pricing were used for computers, an increase in computing power from one period to the next, achieved at no increase in production cost, would not affect the price at all, whereas the hedonic method would yield a falling price. For many of the procurement categories, quality adjustments reduce the amount of apparent price inflation. In fact, for several categories the BEA price measures have been falling in the last few years.

Table 1 contains a summary of the BEA defense deflators for selected years, and shows the categories for which they are compiled. As Table 1 makes evident, the classification scheme used by BEA does not match the division into six major budget categories described in section 2.[3] Table 2 lists the methods and sources of data for the major components compiled by the BEA.

3.2 DoD Outlays Deflators

Each year the DoD Comptroller publishes the *National Defense Budget Estimates,* known colloquially as the Green Book. The most current edition is for Fiscal Year (FY) 2001and provides both current and constant dollar historical time series and projections for the various components of the budget. Historical data is available from 1955 to 1998 while projections currently extend from FY 1999 to FY 2005. The Green Book contains DoD deflators for three standard budget measures: budget authority (BA), total obligational authority (TOA) and outlays.[4]

3.2.1 The Planning Programming and Budgeting System

The Green Book is the culmination of a long process known as the planning, programming, and budgeting system (PPBS). Each phase of the process receives top-level guidance and seeks consensus among senior civilian and military personnel. The Department of Defense's budget submission to the President is the final output of the PPBS, after which the Administration forwards the proposed budget to the Congress and the DoD Comptroller publishes the Green Book.

The planning phase sets objectives for the Defense program. During this phase the national defense strategy, the force structures required to implement it, and the policies required to support, sustain, and modernize those force structures are defined. There are two relevant outputs from this phase. The Defense Planning Guidance (DPG) translates strategic goals into precise and definite mid-term goal for developing the Future Years Defense Program (FYDP). Fiscal constraints are identified in the Fiscal Guidance (FG).

---

[3] A description of how the BEA categories were grouped to obtain an approximate match to the six budget categories is in the appendix.

[4] Budget Authority and Outlays were discussed in Section 2.1. Total obligational authority (TOA) is the sum of the current years BA and the remaining BA from previous fiscal years.

In the programming phase, the DoD develops its proposed programs. Using priorities developed in DPG, the Services/Defense Agencies submit their FYDP programs, as Program Objectives Memoranda (POMs). The Office of the Secretary of Defense reviews the POMs, identifies funding shortfalls, and develops alternatives within FG. The Secretary of Defense reviews alternatives and renders decisions in Program Decision Memoranda (PDMs).

During the budgeting phase, a detailed budget submission is developed. The Services/Defense Agencies make Budget Estimate Submissions (BES) to the Comptroller. These are reviewed and analyzed to ensure that programs are adequately funded and in compliance with the PDMs. The Office of Management and Budget (OMB) participates in this phase.[5] At the end of this phase, the DoD submits its budget to the President.

3.2.2 DoD Commodities and Appropriations

The DoD Comptroller has identified four "commodities" that make up the Defense budget: Military Pay, Civilian Pay, Fuel, and Other Purchases. Each commodity is associated with a separate inflation assumption, a funding policy, and, consequently, a spendout rate. Civilian and military pay makes up about 45 percent of the DoD budget, while other purchases and fuel account for 53 percent and 2 percent, respectively.

All six appropriations categories in the DoD's budget are a linear combination of these four commodities. Most DoD appropriations combine two or more commodities. For example, the military personnel appropriation includes military pay and other purchases for moving expenses. The O&M appropriation includes civilian pay, fuel, and other purchases. The procurement appropriation, on the other hand, is made up entirely of the other purchases commodity. Appropriations with more than one commodity have a composite weighted-average price index.

3.2.3 Generating the DoD Deflators and Projections

The OMB issues inflation guidance to all government agencies based on the "Troika's" forecasts and assumptions. This "Troika" consists of the director of OMB, the secretary of the Treasury, and the chair of the Council of Economic Advisors. It makes 5-year projections on a limited number of economic statistics including the employment cost index (ECI), the GDP deflator, fuel prices, and interest rates. The OMB incorporates the Troika's forecasts into its annual defense guidance memorandum. The DoD

[5] OMB also participates in the Program Review, but to a lesser degree.

Comptroller, in turn, issues its annual "Revised Inflation Guidance" memorandum.[6] This guidance is used for the upcoming Programming Phase.

Civilian and military pay assumptions reflect the Troika's forecast of the Employment Cost Index (ECI) for wages & salaries. Projected civilian and military pay raises are equal to the ECI.[7] Fuel inflation is based on the administration's estimate of Refiner's Acquisition Cost (RAC)--the average price oil refiners pay for crude oil inputs, including transportation from well to refinery. The "Other purchases" inflation is based on the Troika's forecast of the GDP deflator. The DoD, after determining the commodity mix for each appropriation, uses these assumptions and projections, the OMB-supplied DoD topline, and the projected spendout rates to calculate the outlay deflators for each appropriation and commodity.

3.3 Deflators Constructed Using the Defense Translator and Output Prices

The third set of defense deflators, referred to here as the input-output (I-O) based deflators, used in this paper makes use of a database integral to the Defense Employment and Purchases Projections System (DEPPS).[8] The industry component of DEPPS (IDEPPS) projects industrial requirements of defense purchases using a detailed 320-sector input-output model, developed by Interindustry Forecasting at the University of Maryland (Inforum).[9] The Inforum model makes forecasts of both outputs and prices by commodity. The I-O database is comprised of historical data from 1972 through 1999, as well as projections through the last year of the FYDP--2005 for the Fiscal Year 2001 edition of the *National Defense Budget Estimates*.

IDEPPS also makes use of a matrix known as the *defense translator*, which is a bridge matrix showing the distribution of defense expenditures by 11 major categories to the 320 Inforum sectors. Using detailed commodity output prices from the 320 sectors, a set of 11 defense deflators can be constructed as:

$$\mathbf{d}_t = \mathbf{p}_t' \mathbf{T}$$

[6] As part of the budgeting phase discussed in Section 3.2.2, the DoD Comptroller uses the economic forecast to make adjustments (in the form of three President Budget Decisions) to the DoD's budget submission to the President. Revisions to inflation and pay policy projections may lead to changes in the topline. OMB is not, however, obliged to compensate DoD's topline for adverse changes in inflation projections.

[7] The DoD pay policy, with respect to projecting civilian and military pay, changes periodically. The most recent change occurred in 2001 when projected civilian and military pay raises became equal to the ECI.

[8] See *Projected Defense Purchases: Detail by Industry and State: Calendar Years 2000 Through 2005* (DoD, July 2000), for a full description of DEPPS.

[9] See *US Defense Purchases: A Guide to IDEPPS* (DoD, December 2000), for a full description of IDEPPS, as well as the industry concordance.

where:

d is the vector of defense deflators for major budget categories;

p is the 320-order vector of commodity output prices; and

T is the 320 by 11 defense translator matrix, showing the commodity distribution of defense purchases from 12 budget categories to 320 commodity level goods and services.[10]

Certain caveats must be kept in mind when using the I-O based deflators. No special attention is given to differences in the prices of defense versus non-defense goods. The vector p applies to all domestic output, regardless of its final destination. The matrix T does not change over time. The bridge matrix is an estimate for the 2000 distribution of defense expenditures. Despite these caveats, this deflator is useful as a benchmark, for it provides a simple estimate of what the defense budget cost growth would be if the price of output by commodity sold to defense were to grow like the total output price, which includes nondefense sales.[11] Furthermore, by using the I-O price forecasts, projections of this deflator can be made, which could provide an alternative to GDP deflator projections.

4 How well do the BEA, DoD, and Input-Output Based Historical Deflators Compare?

As noted above, this paper focuses on the outlays deflators for they are the closest in concept to BEA's purchases deflators. The difference between the BEA concept of purchases and the DoD concept of outlays is one of either timing or coverage. For all purchases except for construction and ships, the BEA counts the product in private business inventories until it is delivered to the DoD, at which time it is recorded as a purchase. The DoD, on the other hand, counts progress payments as outlays, so that outlays are recorded before a good is actually delivered. For military construction and ships, the BEA follows the DoD in allocating purchases over multiple years, before the item is delivered.

As for coverage, the BEA makes the distinction between government consumption and investment, and imputes a separate line item for government capital consumption. Capital consumption is not part of the defense budget but is considered as a component of federal defense spending in the NIPA. The DoD

[10] The 11 budget categories in the defense translator consist of the 5 major categories except procurement, plus six detailed procurement categories. These are aircraft procurement; missiles procurement; weapons and tracked vehicles; ammunition; ships and conversions; and other procurement.

[11] This assumption is not as far-fetched as it first sounds. In many industries, such as food, apparel, leather goods and personal computers, the defense purchase is much like or identical to the non-defense counterpart. For other goods, such as ships, tanks, missiles and much ammunition, the defense department is the primary buyer, so the total output price is the correct one. It is mainly in the aircraft, communications equipment, and motor vehicles industries that an argument can be made for the development of special defense deflators.

includes military retirement expenditures in total outlays, while the BEA does not include these expenditures in federal defense consumption and investment.

In this section, two comparisons are conducted. The first comparison involves the six major appropriations. As part of this comparison, major differences among the three sets of deflators are noted while simultaneously offering insights to possible explanations. The second comparison involves the four DoD commodities. When military and civilian pay are compared, only the BEA and DoD deflators are used.

4.1 Comparing Appropriations Deflators

Deflators from all three sources were compiled for the total defense outlays and the six appropriations listed in section 2.1.[12] This compilation is summarized in Table 3 and in Figures 1 through 7. Table 3 presents three types of data: total spending, deflators, and growth rates. The first column shows total spending for fiscal year 1999 in billions of current dollars as reflected in the *National Defense Budget Estimates for Fiscal Year 2001*. The next seven columns present deflators for selected years. The last three columns present the average exponential growth rates for the periods 1987 to 1995, 1995 to 1999 and for 1987 to 1999, respectively.

With regard to the total defense outlays and the period 1987 to 1999, the NIPA shows the slowest price growth, averaging 2.6 percent, followed by the Green Book and the I-O based deflator at 2.8 and 3.0 percent, respectively. This is shown in the first block of Table 3 and in Figure 1. Although these growth rates do not appear to be vastly different, keep in mind that a difference of 0.2 percent represents about 550 million dollars at 1999 spending levels. When comparing the deflators for the six defense appropriations, however, the differences are much more dramatic. The remainder of this section briefly discusses these differences.

4.1.1 Operations and Maintenance (O&M)

Table 3 shows that the operations and maintenance (O&M) appropriation is the largest category of defense spending at 101.8 billion dollars in fiscal year 1999. Figure 2 illustrates the range in price growth for 1987 to 1999. The I-O based deflator experiences the slowest growth at 2.8 percent while the NIPA deflator reflects the fastest growth at 3.9 percent. The Green Book deflator falls in between at 3.0 percent. The NIPA's O&M price inflation is more than offset, however, by the slower price growth of the NIPA in the procurement and research, development, test, & evaluation (RDT&E) appropriations.

[12] The DoD and I-O based deflators were re-indexed to a base year of 1996 so as to be consistent with the current presentation in the NIPA.

4.1.2 Military Personnel

The Military personnel account is the second largest defense appropriation at 74.7 billion dollars. For the period 1987 through 1999, its growth rate is similar to that of total spending. Specifically, Figure 3 reflects average growth rates of 2.9 percent, 3.1 percent, and 3.2 percent for the NIPA, Green Book, and I-O based deflators, respectively. The NIPA deflator, however, is almost flat from 1992 to 1995 and then catches up with the other measures in 1996. After 1996, the NIPA deflator again grows more slowly than the other two measures. This uneven growth pattern is reflected in the graph for total spending, since military personnel spending comprises over a quarter of total spending.

4.1.3 Procurement

The procurement appropriation is the first to show a NIPA price growth consistently slower than the other two measures. The average NIPA price growth for procurement is only 0.7 percent, with the I-O based deflator at 2.2 percent, and the Green Book deflator at 2.5 percent. For the period 1995 to 1999, the NIPA deflator for procurement is falling at a rate of -0.7 percent, whereas the Green Book deflator is rising at 1.3 percent, a difference of 2.0 percent

4.1.4 Research, Development, Test, & Evaluation

For the period 1987 to 1996, the NIPA deflator for RDT&E resembles that of the NIPA deflator for procurement. For the 1996 to 1999 period, however, the NIPA deflator for RDT&E does not turn negative. The average values for RDT&E deflators are 1.3 percent, 2.6 percent, and 3.0 percent for NIPA, Green Book, and the I-O based, respectively. Since the NIPA deflators for procurement and RDT&E are substantially smaller than the same Green Book deflators, the NIPA shows a slower growing deflator for the total defense outlays.

4.1.5 Military Construction and Family Housing

Unlike the previous appropriations, the NIPA does not have separate categories for military construction and family housing (see Table 1). There is, however, a category for "structures investment" that is comparable. At a growth rate of 3.9 percent, the NIPA price deflator for structures investment grows much faster over the 1987 to 1999 period than both the Green Book and the I-O based deflators (see Figures 6 and 7 for Military Construction and Family Housing, respectively). Since military construction and family housing are the two smallest appropriations, their effect on the total defense deflator is negligible.

4.1.6 Summary

The NIPA, Green Book, and I-O based measures are roughly comparable at the level of total spending, although the differences that appear at this level could lead to large differences in real spending over time. The differences in the individual appropriations, however, are more dramatic. The O&M and military construction/family housing appropriations show faster price growth in the NIPA, whereas the Green Book deflators reflect faster growth for the procurement and RDT&E appropriations. The NIPA price growth for the military personnel appropriation, while similar in terms of the average growth rate, is quite different from the Green Book in terms of the pattern of growth over the 1990s. If the defense budget were to become more concentrated in procurement and RDT&E, as it did during the Reagan administration, significant differences between the NIPA and Green Book inflation measures for total defense spending would appear.

4.2 Comparing DoD Commodities

Since each of the four “commodities” that make up the Defense budget (Military Pay, Civilian Pay, Fuel, and Other Purchases) is associated with a separate inflation assumption and each appropriation is a linear combination of the commodities, this section compares the historical deflators for the four commodities. In the case of the "Other Purchases" deflator the NIPA GDP deflator is also used. The predictability and control of price growth of these four categories by the DoD varies significantly. The growth of military pay and civilian pay are subject to policy targets. The fuel component is volatile and unpredictable. The "other purchases" component is the largest, not subject to DoD policy, but fairly predictable, although there is some room for interpretation as to what is the appropriate deflator.

Table 4 is similar in format to Table 3, except now the sections contain military pay, civilian pay, fuel, and other purchases. Figures 8 to 11 are the corresponding comparison graphs. There is no independent I-O based deflator for pay, as the I-O based deflator uses the Green Book pay deflator in the DEPPS database. The I-O based deflators for fuel and other purchases were derived using the defense translator to weight detailed commodity prices. Since each DoD appropriation is a linear combination of these commodities, similarities between commodities and appropriations may appear.

4.2.1 Military Pay

Figure 8 shows the military pay price growth for both the NIPA and Green Book deflators. The average growth rates are 2.9 percent for NIPA and 3.1 percent for the Green Book. The figure is almost identical to that for military personnel (Figure 3). This is due to military pay accounting for approximately 90 percent of the military personnel appropriation. As in the case of the military personnel

appropriation, the NIPA deflator is almost flat from 1992 to 1995, and then catches up with the Green Book deflator in 1996. After 1996, the NIPA deflator again grows slower than the Green Book deflator.

4.2.2 Civilian Pay

As Figure 9 illustrates, the NIPA deflator for civilian pay grows faster (5.1 percent) than the Green Book deflator (3.8 percent) throughout the whole period. The reasons for this large difference are not entirely clear. The BEA adjusts for skill levels and education when deriving the NIPA pay deflator while the DoD does not. Consequently, the faster pay growth in the NIPA would suggest that the average skill level in the civilian DoD workforce is falling, which is not consistent with other findings.

4.2.3 Fuel

As Figure 10 depicts, the I-O based deflator tracks the NIPA deflator closely. The growth pattern of the Green Book deflator, however, is quite different. Upon closer review, it appears that the Green Book deflator lags the other two deflators. This might be due to the nature in which the DoD purchases fuel. Presumably the BEA is using actual data on fuel purchases from the Petroleum Product Reports, which should reflect the prices actually paid. Nonetheless, the differences in the fuel deflators are puzzling.

4.2.4 Other Purchases

For the other (non-pay, non-fuel) purchases commodity, the Green Book and I-O based deflators are fairly close, while the NIPA deflator grows much more slowly. For the period 1987 to 1999, the DoD Green Book and I-O based deflators grow at an average rate of 2.4 percent and 2.5 percent, respectively. The NIPA deflator grows at an average 1.7 percent. Since the DoD uses the Troika's projected GDP deflator for this category in the process of developing the DoD budget, the GDP deflator is included in section 4 of Table 3 for comparison. Over the 1987 to 1999 period, the GDP deflator grows at 2.5 percent, like the I-O based deflator. During the period 1995 to 1999, however, at a growth rate of 1.6 percent the actual GDP deflator grew faster than each of the other deflators (1.4 percent for the I-O based, 1.3 percent for the DoD and 0.9 percent for the NIPA).

4.2.5 Summary

Four "commodities" make up the DoD budget, each commodity is associated with a separate inflation assumption, and each appropriation is a linear combination of the commodities. Using the three different price measures, the historical deflators for the commodities were compared. This comparison showed that the price growth of the fuel commodity varied significantly as did the price growth of the two pay commodities. The "other purchases" component, on the other hand, was relatively consistent among the different deflators. Three questions result from our commodity comparison: (1) What possible

differences in measurement could lead to such different pay deflators in the NIPA and the Green Book?, (2) How is the Green Book fuel price derived?, and (3) Is the GDP deflator a good rule of thumb for predicting price change in the other purchases commodity? The first two questions will be left for future research. Instead, this paper now turns to answering the third question, where the relevance of the NIPA deflator concept for DoD budgeting is discussed.

5 "Other Purchases" Deflator Projections

In sections 3 and 4, we compared three price measures from an historical perspective and from this comparison we found some differences--some currently unexplained. We now turn to evaluating how well the DoD deflators project future price growth. As we discussed earlier, the DoD deflators are based on the OMB's inflation, which in turn reflects the "Troika's" forecasts and assumptions. For this discussion, we concentrate on the "other purchases" deflator--the Troika's forecast of the GDP deflator. We focus on this deflator primarily due to the other purchases commodity representing more than half of total spending.

As described above, forecasts of the GDP deflator are used to anticipate cost increases in this commodity. However, the mix of goods and services purchased by defense is different from the composition of GDP. As we saw in the previous section, the GDP deflator grew faster than each of the other deflators. The NIPA deflator, in turn, grows much more slowly than the other two measures. The reasons for this seem to lie in the adjustments that BEA makes for quality change.

In the case of computers, semiconductors, and some electronic equipment, the BEA uses the producer price indexes (PPI's) from the BLS, which are derived using hedonic techniques. The hedonic method attempts to represent a good as a bundle of characteristics, and then derive a price for each characteristic. For example, a computer is comprised of a central processing unit (CPU)--of a certain speed and power, memory size (in megabytes or gigabytes) of, data storage capacity, graphics capability, and a multitude of other features. In the case of aircraft and some other defense goods, the BEA uses the specification pricing method to adjust for such items as better fire and navigation control or more sophisticated electronics. The specification pricing technique is more conservative than the hedonic deflation technique, in that it prices a quality change at its cost of production, not as a linear function of characteristics. The reason the NIPA defense deflator rises more slowly than the GDP deflator may be due in part as a result of the defense bundle of goods being more concentrated in computers and other high-tech durable goods. Pricing for high-tech durable goods are either rising or declining slowly when measured using either the hedonic or specification techniques.

The use of hedonic indexes and specification pricing to adjust for quality change may be appropriate for some uses, such as measuring the real computer power delivered on a desktop, or the speed of transmission of a communications system. The hedonic method probably may not be appropriate, however, from either a budgeting standpoint or for measuring how much a good contributes to national defense. The quality change measured in aircraft may suggest that the same mission can be accomplished with less aircraft and perhaps included as part the planning phase of the DoD PPBS.

5.1 Green Book Deflator Projections

How have estimated cost increases from previous budgets compared to actual rates of cost increase, as published in the Green Book? Table 5 is a compilation of projected and actual deflator series from various issues of the Green Book. In this table we have compiled historical and projected values of the other purchases deflator from the Green Book volumes from FY 1994 through FY 2001.[13] The top part of Table 5 presents the deflators as presented in each issue of the Green Book. Note that the deflator is set equal to 100 for the fiscal year of each issue. The bottom part of Table 5 shows the implied inflation rates, and compares those with historical NIPA GDP inflation rates from 1995 to 2000 and the projected GDP inflation from the Inforum Spring 2001 Forecast from 2001 to 2005. The shaded section in the bottom half of the table indicates historical deflators whose growth rates are now "frozen", and do not change from issue to issue.

The first estimate of inflation for a future budget year may be revised several times before it is frozen. Even then, the rate shown in the Green Book may not agree with the NIPA GDP inflation rate for that year.[14] For example, the deflator for 1994 to 1995 was first estimated to grow at 2.3 percent in fiscal year 1994, then revised upward during the next two fiscal years, and finally fixed at 1.9 percent. Although the NIPA's GDP deflator also undergoes revisions, the NIPA's GDP deflator for 1994 is 2.2 percent. Green Book deflators for 1998 and 1999 are frozen at low inflation levels of 0.7 percent and 0.8 percent respectively while the actual historical deflators from the NIPA are 1.2 percent and 1.5 percent.

Figure 12 shows, from 1995 through 2005, the other purchases deflator, in terms of year-on increase, for the FY 1995 through FY 2001 Green Books, and the GDP deflator. The GDP deflator for the years 1995 through 1999 reflect actual values, while the deflator for years 2000 through 2005 are projected values. When looking at the Green Book values, it is important to keep in mind that they too include historical and projected values. For example, for the FY 2001 Green Book, the Green Book Deflator for years 1995 through 1998 reflect historical values, while the deflators for years 1999 through 2005 are

[13] The deflator shown is from Table 5-9 "Total Non-Pay" under the section "Excluding Pay and Fuel". It also happens to be the same deflator used for Procurement, listed in Table 5-8.

[14] We are currently investigating why this would be the case.

projected values. As Figure 12 illustrates, the FY 1995 and FY 1996 Green Book deflators underestimated inflation. This has not been the case, in general, since the FY 1999 Green Book was published. For the years 2000 through 2003, the inflation projections in the latest version (FY 2001) of the Green Book call for inflation rate of 1.5 percent, not unlike the GDP inflation of the past several years. This is consistent with the projected GDP deflator.

6 Summary and Conclusions

Three measures of inflation for defense goods have been compared: the NIPA defense deflators, the DoD Green Book outlays deflators, and I-O based deflators constructed using the defense translator. The rate of inflation measured at the aggregate level only varies by an average growth rate of 0.4 percent between the three measures over the period from 1987 to 1999. However, at the budget category level, the differences in inflation are significant between the three measures, especially for Procurement.

The NIPA defense deflator is the result of considerable thought, planning, and effort. The development of the methodology alone involved several man-years of effort, and was partially funded by the DoD. It seems to us that the DoD should look skeptically on the application of hedonic measures and specification pricing when gauging the level of inflation relevant to defense budgeting needs. These deflators can tell us how much better the aircraft purchased by the DoD in 2001 are much more sophisticated and capable than similar aircraft produced ten years ago. The defense budget process, however, requires an estimate of how many aircraft of each type must be available to accomplish specified strategy and missions, and the required numbers of these aircraft probably do not fall in step with the NIPA deflator.

We conclude that the GDP deflator is a good approximation of price change for the "other purchases" commodity. In the absence of better information, it provides a conservative measure of the overall price change. It is worth noting, however, that the GDP deflator itself includes goods that are deflated using hedonic techniques. The rate of GDP deflation may be as much as 0.5 percent higher were it not for falling prices for computers and other high tech goods. Two other questions, however, still remain: (1) What possible differences in measurement could lead to such different pay deflators in the NIPA and the Green Book? and (2) How is the Green Book fuel price derived? These questions are left to future research.

References

Landefeld, J. Steven and Robert Parker, "Preview of the Comprehensive Revision of the National Income and Product Accounts: BEA's New Featured Measures of Output and Prices," *Survey of Current Business*, July, 1995, pp. 31-38.

Moulton, Brent, Robert Parker and Eugene Seskin, "A Preview of the 1999 Comprehensive Revision of the National Income and Product Accounts: Definitional and Classification Changes," *Survey of Current Business*, August, 1999, pp. 7-20.

Parker, Robert, "Preview of the Comprehensive Revision of the National Income and Product Accounts: Recognition of Government Investment and Incorporation of a New Methodology for Calculating Depreciation," *Survey of Current Business*, July, 1995, pp. 33-41.

Sachs, Abner and Richard C. Ziemer, "Implicit Price Deflators for Military Construction", *Survey of Current Business,* 63(11), November 1983: 14-18.

Ziemer, Richard C. and Karl D. Galbraith, "Deflation of Defense Purchases," in *The U.S. National Income and Product Accounts: Selected Topics*, Studies in Income and Wealth, Vol. 47, University of Chicago Press: Chicago, 1983, pp. 147-204.

Ziemer, Richard C. and Pamela A. Kelly, "The Deflation of Military Aircraft," in *Price Measurements and Their Uses*, Studies in Income and Wealth, Vol. 57. University of Chicago Press: Chicago, 1993, pp. 307-343

U.S. Department of Commerce, *Measuring Price Changes of Military Expenditures*, Washington, D.C., Government Printing Office, 1975

U.S. Department of Commerce, *Price Changes of Defense Purchases in the United States*, Washington, D.C., Government Printing Office, 1979.

U.S. Department of Commerce, *Government Transactions*, Methodology Papers: U.S. National Income and Product Accounts, U.S. Government Printing Office, 1988.

U.S. Department of Defense, Assistant Secretary of Defense (Comptroller), "Contract Cost Data Reports", DD Form 1921-1, Washington, D.C., monthly, unpublished.

U.S. Department of Defense, Assistant Secretary of Defense (Comptroller), "Cost Performance Report", DD Form 1921-1, Washington, D.C., monthly, unpublished.

U.S. Department of Defense, Assistant Secretary of Defense (Comptroller), *National Defense Budget Estimates for Fiscal Year 2001 (Green Book)*, March, 2000, available at: http://www.dtic.mil/comptroller/fy2001budget/fy2001grbk.pdf

U.S. Department of Defense, *Department of Defense Prime Contract Awards*, Washington, D.C., National Technical Information Service, annually.

U.S. Department of Defense, *Program Acquisition Cost by Weapon System*, Washington, D.C., Government Printing Office, 1988.

U.S. Department of Defense, Office of the Director, Program Analysis and Evaluation, *U.S. Defense Purchases: An Introduction to IDEPPS,* December, 2000, http://www.ra.pae.osd.mil/depps/files/IDEPPS_Primer.pdf

Appendix. The Correspondence Between NIPA Defense Spending Categories and DoD Green Book Categories

The NIPA deflators used in this exercise are from table 7.12 *Price Indexes for Defense Consumption and Investment*.

Military personnel. This is formed as a simple weighted average of the deflators for Military Compensation, line 52 (.87) and Other nondurable goods (.13). A rule of thumb used by DoD budget analysts is that the Military personnel category consists of roughly these ratios of direct pay and payment in kind. We judged that most of the payment in kind would come from Other nondurable goods. We did not bother to chain weight the components in this calculation, since we assumed the weights were constant.

Operations and Maintenance. The NIPA deflator was formed as a chained aggregate of the following categories: Petroleum products (line 47), Civilian compensation (53), Installation support (57), Weapons support (58), Personnel support (59), Transportation of materiel (60), Travel of persons (61) and Other services (62).

Procurement. The NIPA deflator was formed as a chained aggregate of the following categories: Aircraft consumption (40), Missiles consumption (41), Ships consumption (42), Vehicles consumption (43), Electronics consumption (44), Other durable goods (45), Ammunition (48), Aircraft investment (66), Missiles investment (67), Ships investment (68), Vehicles investment (69), Electronics and software investment (70) and Other equipment investment (71).

Research, Development, Test and Evaluation. The NIPA deflator for Research and development (line 56) was used.

Military Construction and Family Housing. There is only one category in the NIPA table for construction, labeled simply Structures (line 64).

The other comparisons in the paper, such as for Military pay, Civilian pay and Fuel, were straightforward.

Tables and Figures

Table 1. BEA Price Indexes for Defense Consumption & Investment

	[Index numbers, 1996=100]								Growth rates		
	1972	*1987*	*1992*	*1995*	*1996*	*1997*	*1998*	*1999*	*72-99*	*72-95*	*95-99*
National defense total	30.6	78.0	90.7	96.9	100.0	101.4	102.2	104.7	4.6	5.0	2.0
Consumption expenditures	28.0	76.3	90.4	96.4	100.0	101.9	103.1	105.9	4.9	5.4	2.4
Durable goods	35.0	89.0	97.0	99.7	100.0	99.7	98.7	98.7	3.8	4.5	-0.3
Aircraft	32.5	87.1	96.8	99.4	100.0	99.0	98.1	98.3	4.1	4.9	-0.3
Missiles	32.9	96.5	101.2	100.6	100.0	99.9	98.4	99.8	4.1	4.9	-0.2
Ships	37.2	84.4	97.0	99.7	100.0	99.6	98.9	95.7	3.5	4.3	-1.0
Vehicles	27.9	81.8	85.1	96.5	100.0	110.6	111.2	119.5	5.4	5.4	5.3
Electronics	50.7	97.4	102.8	102.4	100.0	97.0	93.5	90.6	2.2	3.1	-3.1
Other durable goods	20.5	82.7	94.1	98.8	100.0	100.2	100.1	99.8	5.9	6.8	0.2
Nondurable goods	21.5	79.1	93.6	91.4	100.0	97.7	87.0	91.3	5.3	6.3	0.0
Petroleum products	14.6	77.9	92.3	81.4	100.0	94.8	67.9	78.8	6.2	7.5	-0.8
Ammunition	32.2	81.6	94.7	101.4	100.0	99.6	97.6	96.9	4.1	5.0	-1.1
Other nondurable goods	33.9	80.0	97.3	99.5	100.0	100.0	100.6	101.5	4.1	4.7	0.5
Services	28.1	75.0	89.8	96.2	100.0	102.2	103.9	106.9	5.0	5.4	2.6
Compensation	23.1	69.9	87.9	93.8	100.0	103.3	105.5	110.1	5.8	6.1	4.0
Military	23.0	75.0	91.2	93.2	100.0	102.5	104.4	108.3	5.7	6.1	3.8
Civilian	23.2	61.1	82.2	95.0	100.0	104.8	107.5	113.3	5.9	6.1	4.4
Consumption of general government fixed capital	37.9	82.0	90.7	99.4	100.0	100.1	99.8	100.7	3.6	4.2	0.3
Other services	33.0	79.7	92.2	97.8	100.0	102.0	104.5	106.9	4.4	4.7	2.2
Research and development	46.2	90.1	97.1	99.7	100.0	102.5	104.3	106.0	3.1	3.3	1.5
Installation support	29.8	80.0	91.0	98.7	100.0	100.8	103.0	105.0	4.7	5.2	1.6
Weapons support	28.8	74.7	90.6	96.6	100.0	102.8	105.2	108.5	4.9	5.3	2.9
Personnel support	19.9	63.0	90.6	95.5	100.0	103.6	108.0	112.6	6.4	6.8	4.1
Transportation of material	39.4	86.2	89.6	92.3	100.0	99.2	100.6	99.9	3.5	3.7	2.0
Travel of persons	29.0	76.6	89.1	99.9	100.0	100.9	104.0	102.8	4.7	5.4	0.7
Other	24.6	65.6	90.8	93.7	100.0	104.1	108.1	112.3	5.6	5.8	4.5
Gross investment	48.1	87.0	92.7	99.8	100.0	98.5	97.0	98.0	2.6	3.2	-0.5
Structures	23.0	68.3	82.9	97.2	100.0	103.3	106.2	110.1	5.8	6.3	3.1
Equipment and software	53.7	89.5	93.9	100.1	100.0	97.9	95.8	96.5	2.2	2.7	-0.9
Aircraft	66.0	72.7	79.9	97.4	100.0	94.2	90.6	98.5	1.5	1.7	0.3
Missiles	106.1	122.3	108.1	103.1	100.0	95.1	94.6	94.3	-0.4	-0.1	-2.2
Ships	28.1	75.1	89.4	100.0	100.0	101.7	99.8	100.0	4.7	5.5	0.0
Vehicles	31.6	82.4	90.5	98.7	100.0	100.4	98.4	99.2	4.2	5.0	0.1
Electronics and software	82.7	113.2	107.2	103.9	100.0	95.9	92.2	90.9	0.3	1.0	-3.3
Other equipment	34.8	80.8	93.2	98.5	100.0	100.2	100.2	100.1	3.9	4.5	0.4

Table 2. BEA Sources of Estimates for Constant-Dollar Federal Defense Purchases

Category	*Method*	*Source*
Durable Goods		
Aircraft	Directly priced	CCDR's
	Deflation: DoD prices	ICS and Aircraft IPD's
Missiles	Directly priced	CCDR's
	Deflation: DoD prices	ICS and Missiles IPD's
Ships	Deflation: Shipyard prices for "frozen ship"	Shipyard prices
	Directly priced	CCDR's
	Deflation: proxy prices	PPI's
Vehicles	Directly priced	CCDR's
	Deflation: DoD prices	ICS and vehicles IPD's
Electronic Equipment	Deflation: DoD prices	ICS
	Deflation: Proxy prices	PPI's
Other Equipment	Deflation: DoD prices	ICS
	Deflation: Proxy prices	PPI's
Other Durable Goods	Deflation: DoD prices	ICS
	Deflation: Proxy prices	PPI's/BEA computer price index
Nondurable Goods		
Petroleum Products	Directly priced	PPR's
	Deflation: DoD prices	Petroleum IPD's
Ammunition	Directly priced	CCDR's
	Deflation: DoD prices	ICS
	Deflation: Proxy prices	PPI's
Other Nondurables	Deflation: DoD prices	ICS
	Deflation: Proxy prices	PPI's
Compensation		
Military Compensation	Extrapolation	Employment by rank and length of service from MR
	Deflation: DoD prices	Compensation report
Civilian Compensation	Extrapolation	OPM employment (by grade and step) and average hours worked
Services		
Contractual Research and Development	Deflation: DoD and proxy prices	R&D contractor prices/3 mos. PPI's
Installation Support	Deflation: DoD prices	Contracts
	Deflation: Proxy prices	3 mos. CPI's,PPI's,AHE's,ER's
Weapons Support	Deflation: DoD prices	Contracts
	Deflation: Proxy prices	AHE's
Personnel Support	Deflation: DoD prices	Contracts/ER's
	Deflation: Proxy prices	AHE
Transportation of Materiel	Deflation: DoD prices	MSC/MTMC
Travel of Persons	Deflation: DoD and proxy prices	MMTC, GSA, CPI's
Other	Deflation: Proxy prices	3 mos. AHE's
Structures		
Military Facilities	Directly priced	CPR's
	Deflation: DoD prices	Military facility IPD, ER's
Other Structures	Deflation: proxy prices	Private sector cost indexes, FHA, ER's

Table 3. Comparison of Green Book, NIPA, and Inforum (I-O) Derived Defense Deflators for Outlays

		[Index numbers, 1996=100]							Growth rates		
	FY99 Level ($ Billions)	1987	1992	1995	1996	1997	1998	1999	87-95	95-99	87-99
Total defense budget											
Green Book	274.4	76.2	91.0	97.9	100.0	102.5	104.5	106.4	3.1	2.1	2.8
NIPA		77.3	90.7	96.3	100.0	101.7	102.7	105.7	2.7	2.3	2.6
I-O Based		74.7	89.1	97.3	100.0	102.8	104.6	106.6	3.3	2.3	3.0
Operations & maintenance											
Green Book	101.8	74.5	91.1	97.8	100.0	102.7	105.1	106.8	3.4	2.2	3.0
NIPA		68.4	86.5	95.7	100.0	102.9	104.8	109.0	4.2	3.3	3.9
I-O Based		75.3	89.0	97.0	100.0	102.5	103.4	105.4	3.2	2.1	2.8
Military personnel											
Green Book	74.7	76.0	89.6	98.3	100.0	103.3	106.6	109.8	3.2	2.8	3.1
NIPA		75.6	92.0	94.0	100.0	102.2	103.9	107.4	2.7	3.3	2.9
I-O Based		74.3	89.1	97.5	100.0	102.8	105.5	109.2	3.4	2.8	3.2
Procurement											
Green Book	50.1	76.7	92.1	98.0	100.0	101.8	102.5	103.3	3.1	1.3	2.5
NIPA		89.0	94.9	100.0	100.0	98.5	96.8	97.2	1.5	-0.7	0.7
I-O Based		77.8	90.2	98.2	100.0	101.7	100.4	101.0	2.9	0.7	2.2
Research, development, test & evaluation											
Green Book	38.5	76.5	92.2	97.9	100.0	101.9	102.9	103.9	3.1	1.5	2.6
NIPA		90.3	96.7	99.5	100.0	102.2	104.5	106.1	1.2	1.6	1.3
I-O Based		73.9	88.9	97.1	100.0	103.7	106.0	105.6	3.4	2.1	3.0
Military construction											
Green Book	5.7	76.0	91.6	98.1	100.0	101.9	102.7	103.8	3.2	1.4	2.6
NIPA		68.8	82.5	96.9	100.0	103.6	105.9	110.4	4.3	3.3	3.9
I-O Based		77.6	90.5	98.0	100.0	102.2	103.5	104.1	2.9	1.5	2.5
Family housing											
Green Book	3.8	76.7	91.9	97.9	100.0	101.9	102.7	103.5	3.1	1.4	2.5
NIPA		68.8	82.5	96.9	100.0	103.6	105.9	110.4	4.3	3.3	3.9
I-O Based		76.7	88.6	96.8	100.0	102.3	104.6	105.7	2.9	2.2	2.7

Figure 1. Total defense budget

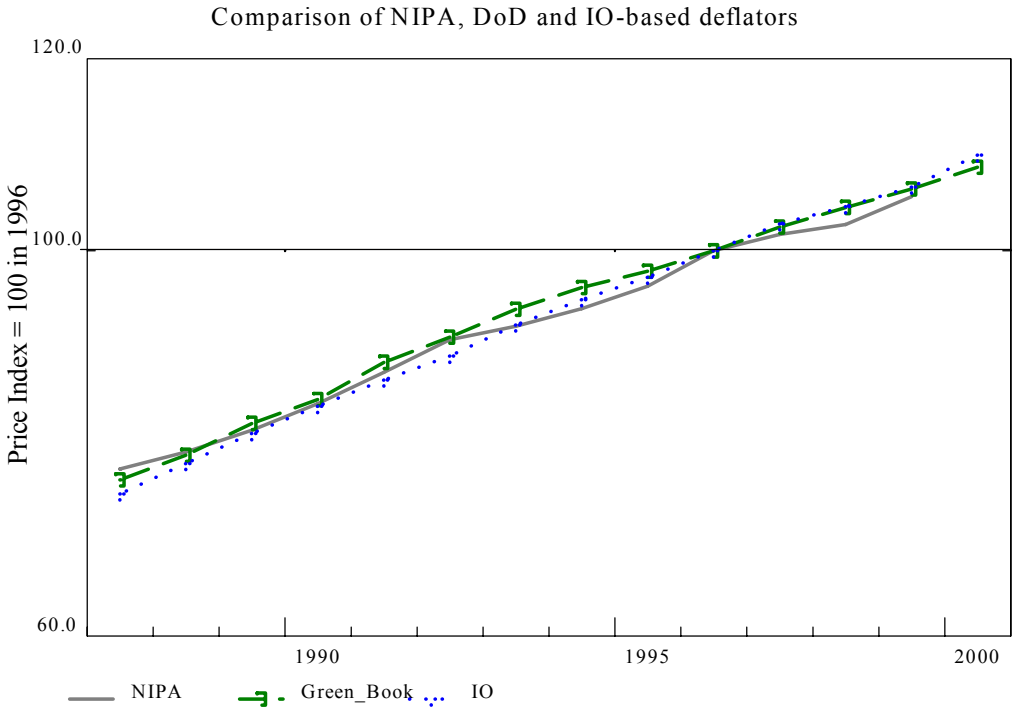


Figure 2. Operations & maintenance

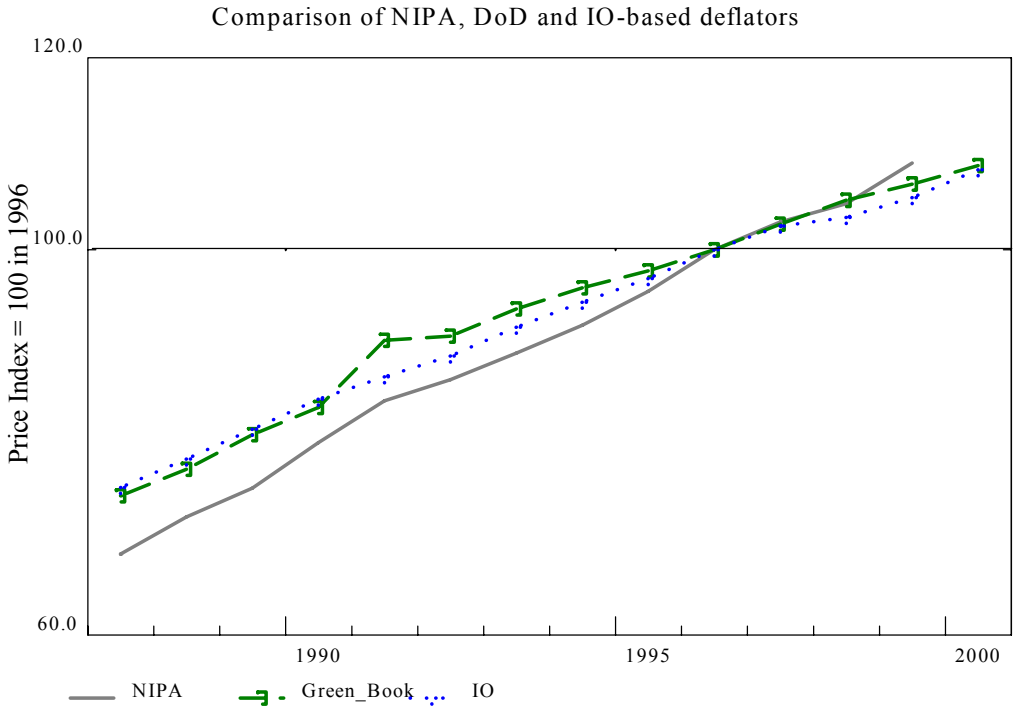


Figure 3. Military personnel

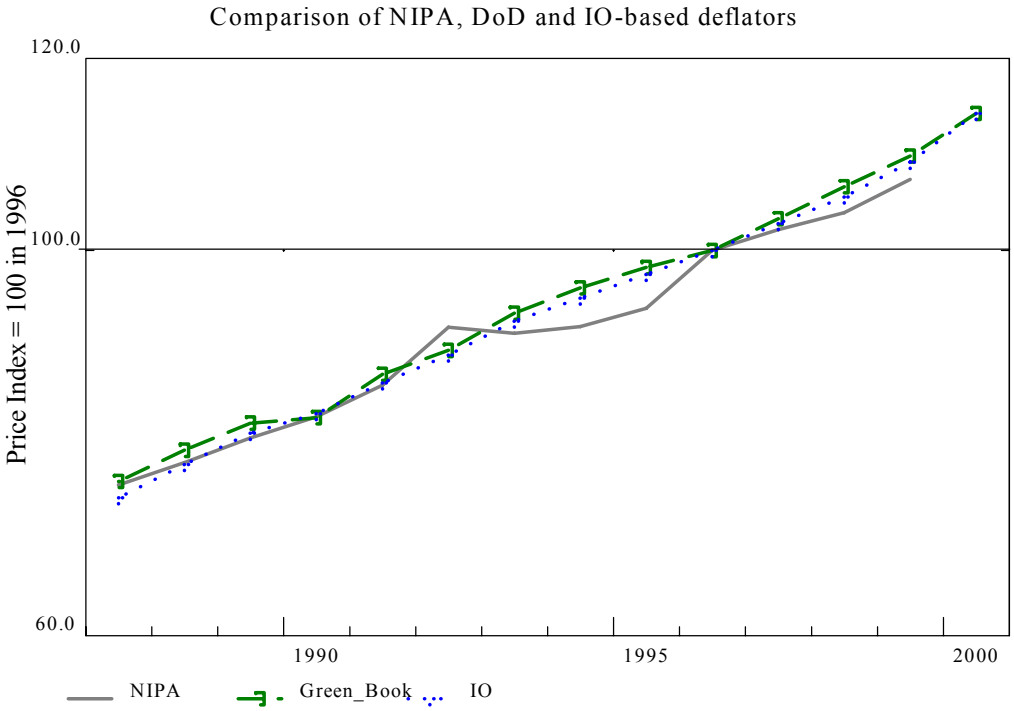
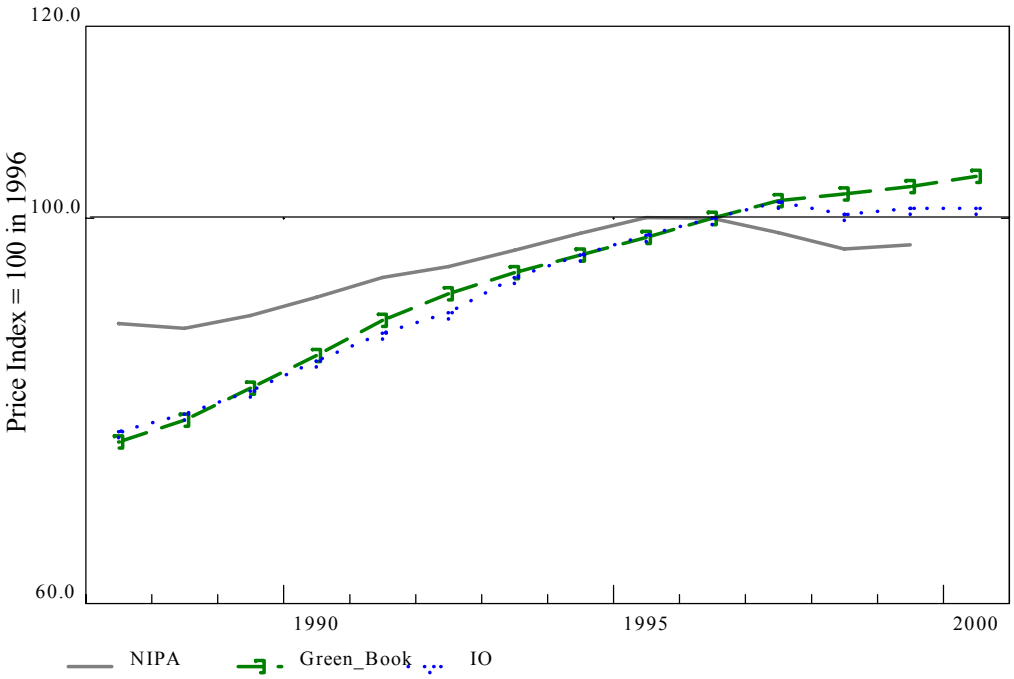


Figure 4. Total procurement



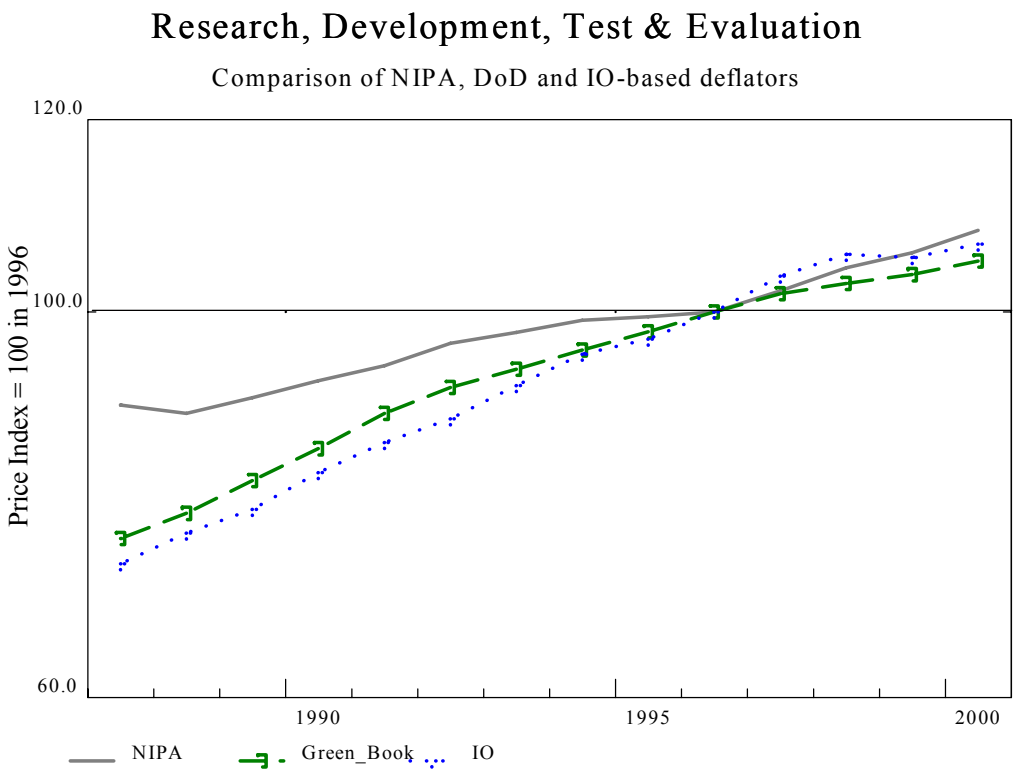


Figure 6. Military Construction

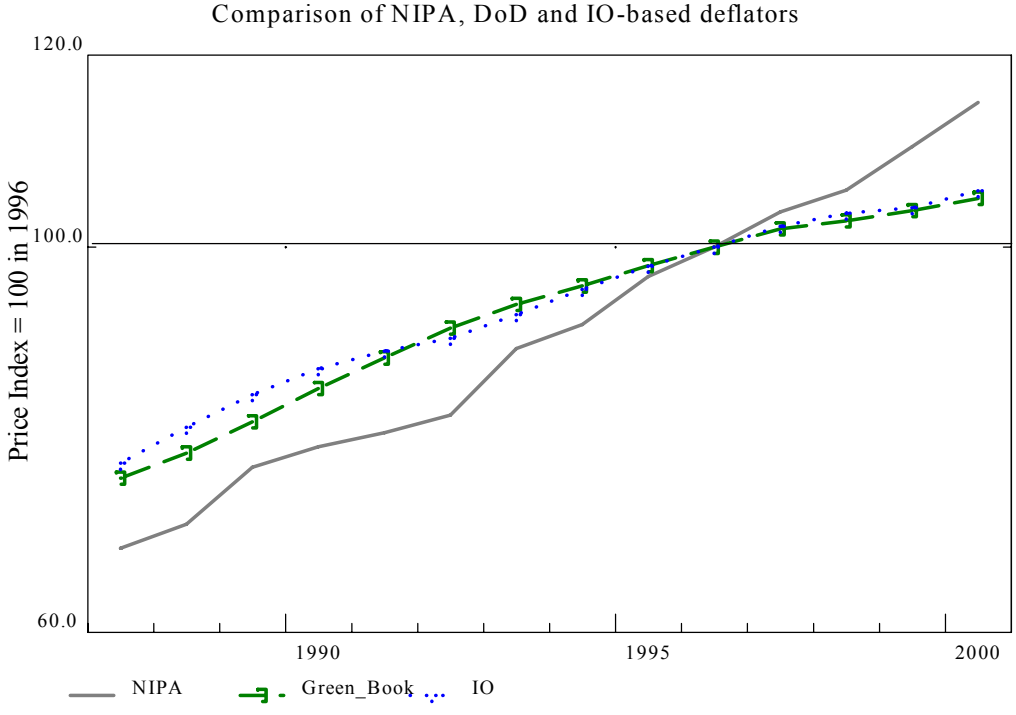


Figure 7. Family Housing

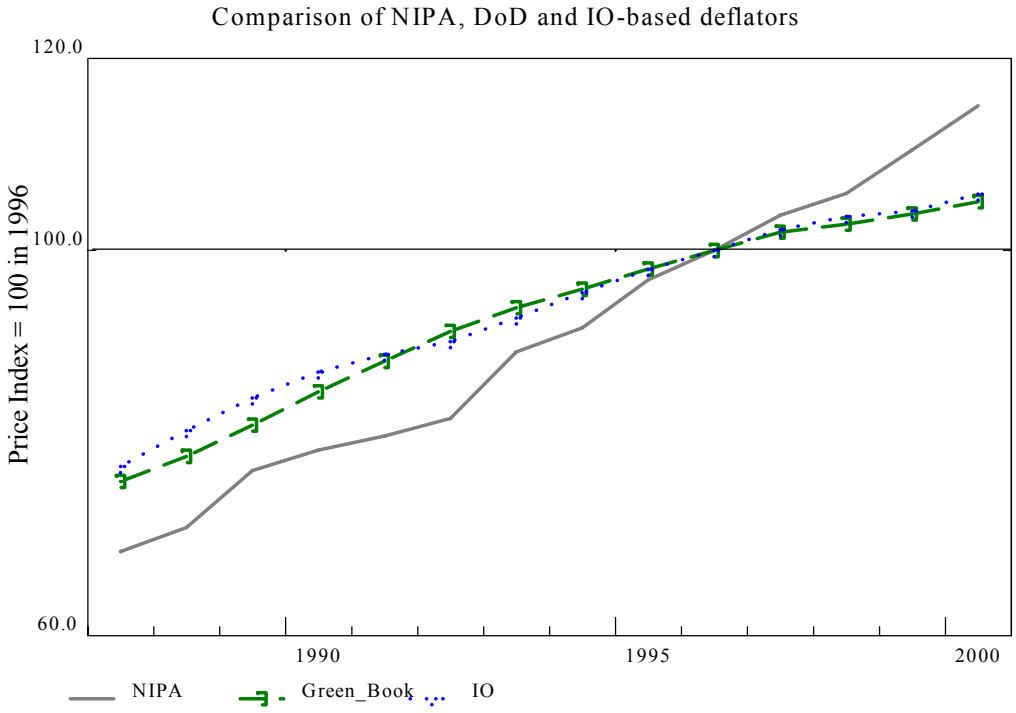


Table 4. Comparison of Deflators Used for Budget Guidance

	[Index numbers, 1996=100]							Growth rates		
	1987	1992	1995	1996	1997	1998	1999	87-95	95-99	87-99
Military pay										
Green Book	76.0	88.8	97.7	100.0	103.0	105.9	109.7	3.1	2.9	3.1
NIPA	75.0	91.2	93.2	100.0	102.4	104.4	108.3	2.7	3.7	3.1
Civilian pay										
Green Book	69.7	89.5	97.7	100.0	103.0	105.9	109.7	4.2	2.9	3.8
NIPA	61.1	82.3	95.0	100.0	104.8	107.5	113.4	5.5	4.4	5.1
Fuel										
Green Book	100.0	93.4	94.7	100.0	101.3	121.3	110.6	-0.7	3.9	0.8
NIPA	78.0	92.1	82.4	100.0	93.5	70.0	78.8	0.7	-1.1	0.1
I-O Based	84.9	87.9	79.2	100.0	93.4	58.9	84.3	-0.9	1.6	-0.1
Other purchases										
Green Book	77.0	92.3	98.1	100.0	101.5	102.2	103.1	3.0	1.3	2.4
NIPA	83.7	93.2	98.8	100.0	100.4	101.1	102.6	2.1	0.9	1.7
I-O Based	76.4	89.4	97.2	100.0	102.3	102.3	102.7	3.0	1.4	2.5
GDP Deflator	77.6	91.8	98.1	100.0	101.9	103.2	104.8	2.9	1.6	2.5

Figure 8. Military Pay

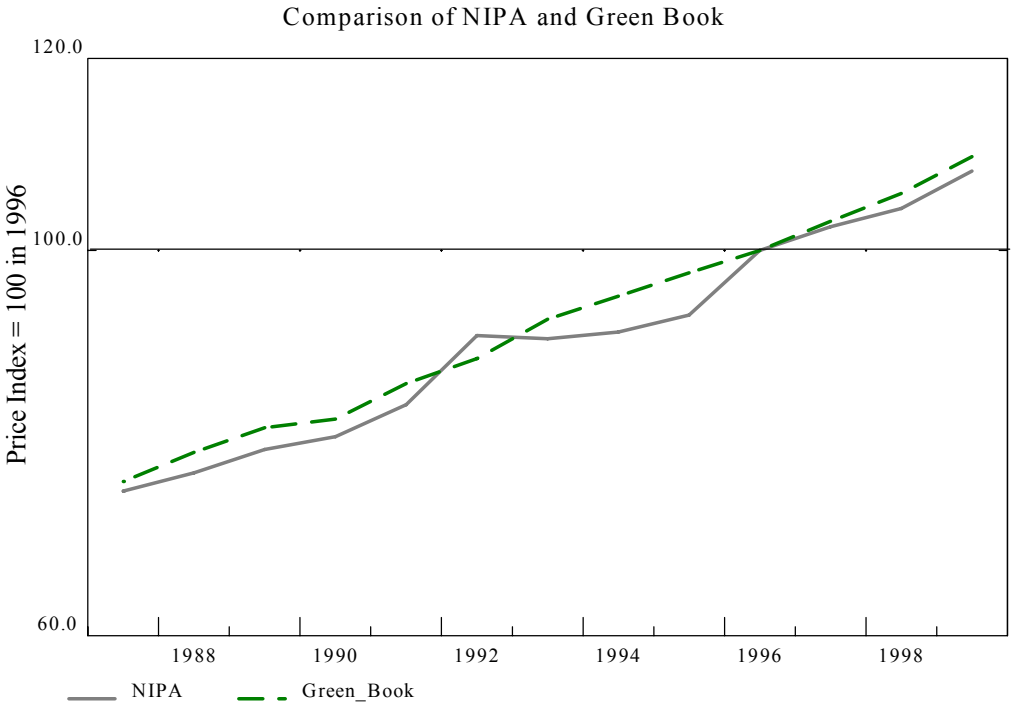


Figure 9. Civilian Pay

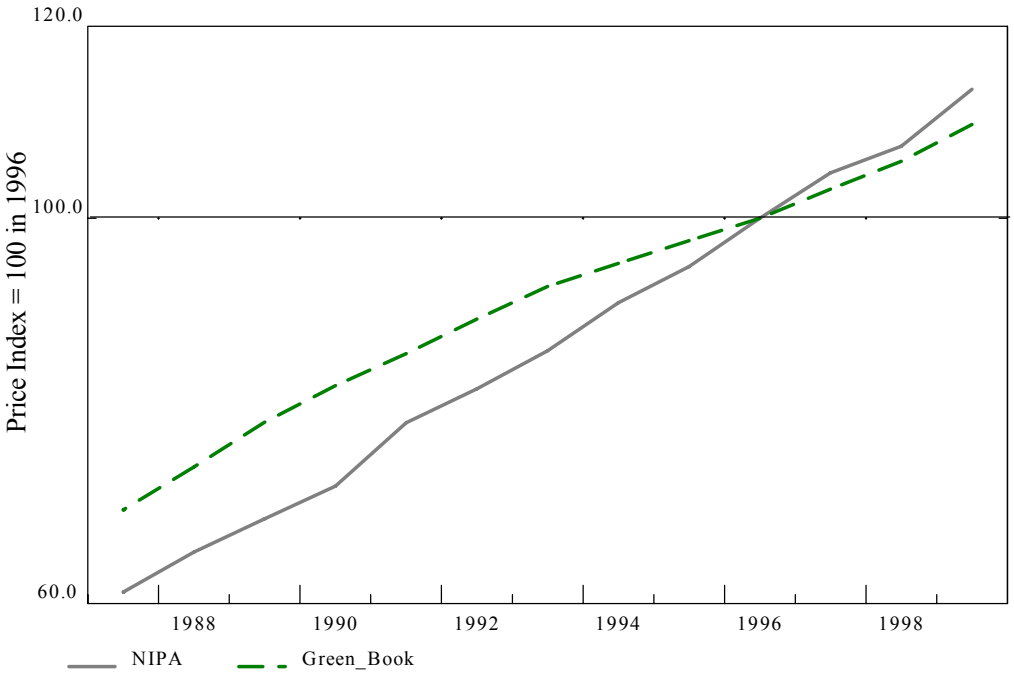


Figure 10. Fuel

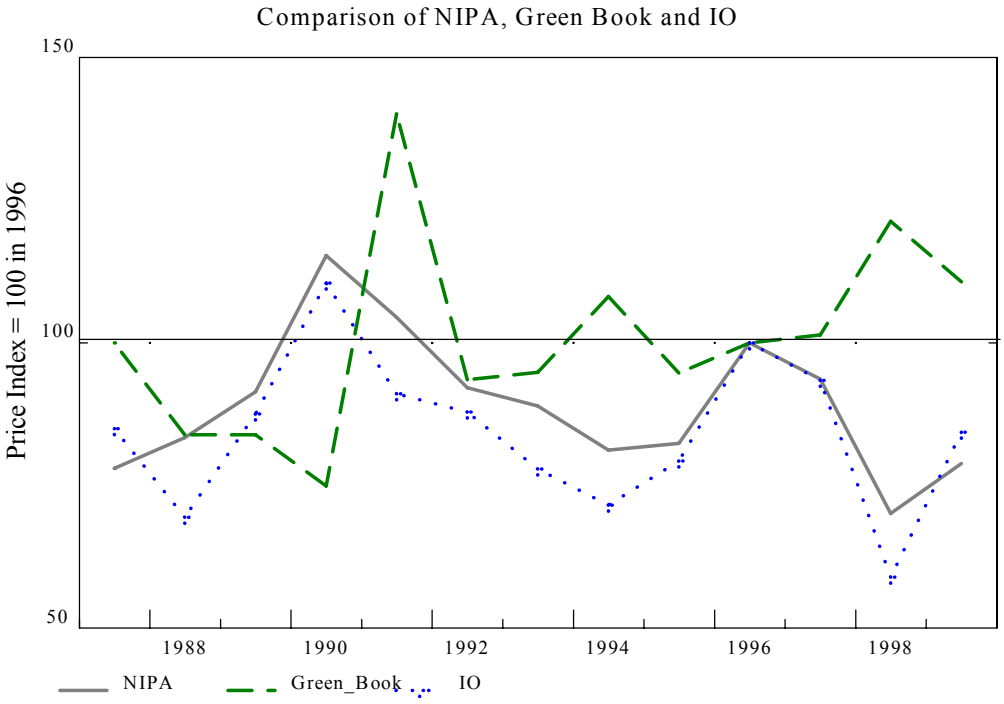


Figure 11. Non-pay, non-fuel defense budget

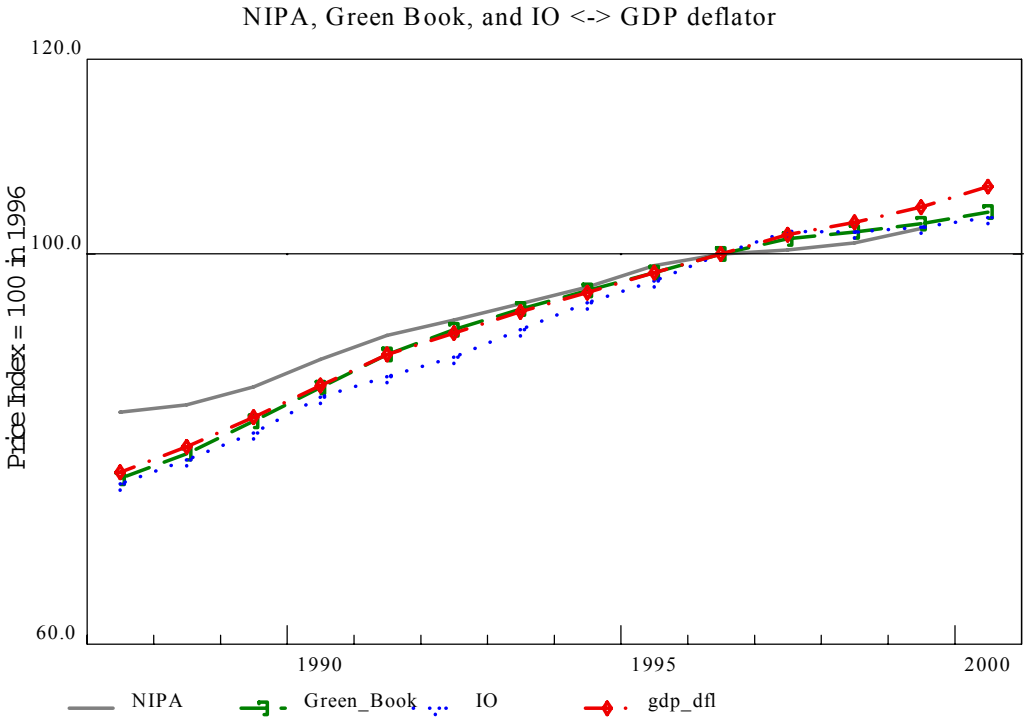


Table 5. Green Book Deflators and Inflation Rates for the"Other Purchases" Commodity, Compared with the GDP Deflator

DoD Outlays Deflators

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
FY01 Green Book	90.82	92.55	94.40	96.10	96.77	97.55	98.52	100.00	101.50	103.02	105.08	107.18
FY00 Green Book	91.73	93.48	95.34	97.06	97.74	98.52	100.00	101.60	103.23	104.88	107.08	109.33
FY99 Green Book	91.83	93.57	95.44	97.16	98.52	100.00	101.60	103.33	105.08	106.87		
FY98 Green Book	92.29	94.05	95.93	97.94	100.00	102.10	104.24	106.43	108.67	110.95		
FY97 Green Book	94.14	95.93	97.85	100.00	102.20	104.55	106.85	109.20				
FY96 Green Book	94.53	97.09	100.00	103.00	106.09	109.27	112.55	115.93				
FY95 Green Book	97.28	100.00	102.90	105.99	109.17	112.44						
FY94 Green Book	100.00	102.30	104.65	106.96	109.31	111.71						

Inflation Rates

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
GDP Deflator	**2.2**	**1.9**	**1.9**	**1.2**	**1.5**	**1.4**	**2.5**	**1.8**	**2.3**	**2.0**	**1.9**
FY01 Green Book	1.9	2.0	1.8	0.7	0.8	1.0	1.5	1.5	1.5	2.0	2.0
FY00 Green Book	1.9	2.0	1.8	0.7	0.8	1.5	1.6	1.6	1.6	2.1	2.1
FY99 Green Book	1.9	2.0	1.8	1.4	1.5	1.6	1.7	1.7	1.7		
FY98 Green Book	1.9	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1		
FY97 Green Book	1.9	2.0	2.2	2.2	2.3	2.2	2.2				
FY96 Green Book	2.7	3.0	3.0	3.0	3.0	3.0	3.0				
FY95 Green Book	2.8	2.9	3.0	3.0	3.0						
FY94 Green Book	2.3	2.3	2.2	2.2	2.2						

Figure 12. DoD "Other Purchases" Deflator: History and Projections