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SECRETARY OF THE AIR FORCE

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Financial Management

INFLATION

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This instruction implements AFPD 65-5, *Cost and Economics*, by setting guidelines for inflation adjustments in the Air Force Planning, Programming, Budgeting and Execution System (PPBES) and other Air Force analysis/reporting. It applies to individuals/organizations at all levels who apply inflation as described in this instruction, including Air Force Reserve and Air National Guard (ANG) units, except where noted otherwise. This instruction dictates how to apply the inflation rates provided by the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)) and describes how the Deputy Assistant Secretary of the Air Force for Cost and Economics (SAF/FMC) generates inflation indices and distributes them to the field for converting both constant and then-year dollars. Attachment 1 defines key terms used in this instruction. Attachment 2 provides updated detailed instructions on the use of inflation indices. Attachment 3 addresses advanced topics in inflation. Attachment 4 highlights information on major Air Force appropriations used for Air Force inflation indices. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at **https://www.my.af.mil/afrims/afrims/afrims/rims.cfm**. Refer recommended changes and questions about this publication to the Economics and Business Management Directorate (SAF/FMCE) using AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional chain of command. This publication may be supplemented at any level, but all direct Supplements must be routed to the OPR of this publication for coordination prior to certification and approval. The

use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

SUMMARY OF CHANGES

This document includes the following modifications: (1) clarifies the inflation index development process; (2) defines inflation and distinguishes it from other causes of price change (e.g., market forces); (3) clarifies that analysts are not required to use the inflation index as their forecasting method. Instead, when developing then-year cost estimates, analysts should use information and methodologies that have the highest probability of accurately estimating the budget authority that will be required. Subsequent to developing the then-year cost estimates, conversion between then-year and constant-year dollars will be performed using the current Air Force inflation indices (unless an exception is approved by OUSD(C)); (4) includes Attachments 2 and 3 highlighting significant changes to the explanation of inflation and its uses; and (5) deletes references to AFMC/FMC inflation data sheets and AFMC exemption routing.

1. Introduction. Inflation is an often discussed topic which, in practice, can cause much confusion. In simplest terms, inflation is the increase in the *general* price level over time. It is an average, which means that while most individual prices may rise (e.g., labor, cars, food, etc.), they may rise at different rates, and some prices may actually fall (e.g., technology). Since not all prices increase at the same rate, there are clearly different reasons for prices to change. Inflation is only one of these reasons. Other reasons prices may change include competition, the cost of factors of production, changes in quality, and changes in taxes and regulations. These other variables also alter a product's supply and/or demand curves. In this paragraph and throughout this instruction, price is generically referred to as the payment (typically considered dollars) made in exchange for goods and services.

1.1. **Definition.** Inflation is defined as a sustained rise in the general price level, or the proportionate rate of increase in the general price level per unit of time.[1] The opposite of inflation is deflation, which is a decrease in the general price level.

1.2. **Background.** Inflation refers to the change in value of the currency (e.g., the dollar) relative to all other goods. If the general price level is rising, then the same number of dollars buys fewer goods; therefore, the value of the dollar is decreasing. The inflation index is intended to measure the decrease in the value of the dollar … nothing else. Since the value of the dollar decreases from year to year, a dollar in one year is not the same as the dollar in another year. "Normalizing" for inflation means applying the inflation index to cost data in order to remove the effect of inflation. The result of normalizing is that all dollars, regardless of the year, will have the same value.

1.2.1. Causes of Price Changes. The price of a good or service can change for two broad categories of reasons: (1) inflation (i.e., changes in the value of the dollar) and (2) changes in the market (i.e., supply and demand) for the good or service. For this instruction, "Market changes" are changes in value that would occur even if all trade was done by barter (i.e., without the benefit of dollars or other currency).

1.2.1.1. Cause of Inflation. Inflation is usually caused by an increase in the money supply. More specifically, inflation is caused by an increase in the volume of money and credit relative to available goods[2] resulting in a rise in the general price level. When the money supply increases at a faster rate than the number of goods and services available for purchase in the economy, the result is usually inflation. Attachment 3, section A3.1, provides a more detailed explanation of the cause of inflation.

1.2.1.2. Market Changes (Supply and Demand). Anything that moves the supply and/or demand curve for a good or service will change the equilibrium price for that good or service. Examples of things that move these curves include, but are not limited to: productivity increases; technological advances; quality changes; cost of inputs; customer preferences; prices of complementary or substitute goods; patent expirations; taxes and regulations. Market changes are important since they can create changes in individual prices that are above or below the level of inflation.

1.2.1.2.1. After prices are normalized (i.e., adjusted) to remove inflation, there may still be a change in price from one year to the next. This price change that is not due to inflation is referred to as the "real" change in price, because it no longer includes the distortion caused by the devaluation of the dollar. Real price changes are caused by changes in the market for a good/service (i.e., actual, or real, changes in the economy).

1.2.2. Effect of Inflation and Why It's Important. Changes in the value of the dollar (i.e., inflation) distort comparisons of prices and expenditures over time. By obscuring patterns and causes of cost increases, inflation increases the difficulty of making

[1] The MIT Dictionary of Modern Economics, Fourth Edition, edited by David Pearce, The MIT Press, Cambridge MA, 1992, p. 205.

[2] For the purpose of this instruction, the term "available goods" refers to all goods and services for sale in the economy and, therefore, all the goods and services for which currency is demanded to purchase.

appropriate decisions. Also, planning and executing programs become more difficult when inflation is higher, less anticipated, and/or more volatile.

1.2.2.1. Two examples of why considering inflation is important:

1.2.2.1.1. Dollars spent in different years have different purchasing power due to inflation. This makes it difficult to compare the cost of competing weapon system investments (with different obligation profiles) over time.

1.2.2.1.2. Inflation raises the difficulty in determining the cause of increasing costs and, consequently, in managing organizations and resources. For example, when a commander sees supply costs increase from $100K to $110K in one year, he or she will likely inquire into the cause. There are at least four possible reasons for cost growth, each requiring different corrective action: (1) was inflation 10 percent, (2) did the unit use 10 percent more supplies because of mission growth, (3) did the unit use 10% more supplies because they were less efficient, or (4) did the price of specific supplies (e.g., oil) increase? Furthermore, the $10K increase could be a combination of reasons. Clearly, the difficulty of the management process can be greatly affected by the amount and volatility of inflation.

1.2.3. How the U.S. Government Sets Inflation Rates. Three Executive Branch offices work together to develop economic forecasts for the current presidential administration to include a forecast of the Gross Domestic Product (GDP) price index: the Office of Management and Budget (OMB), the Department of the Treasury, and the Chairman of the Council of Economic Advisers (CEA). Federal agencies, including the Department of Defense, use the GDP price index forecast as the inflation forecast for planning purposes and when preparing budget documents.

1.2.3.1. After the economic forecasts are complete, OMB provides the inflation forecast to the Office of the Under Secretary of Defense (Comptroller) (OUSD(C)). OUSD(C) then passes the inflation rates to the Deputy Assistant Secretary of the Air Force for Cost and Economics (SAF/FMC), who in-turn uses the inflation rates to calculate the Air Force inflation indices. SAF/FMC converts the OSD provided inflation *rates* to Air Force inflation *indices* using a standard mathematical procedure. Therefore, compliance with Air Force inflation indices is equivalent to complying with the OUSD(C) inflation rates. The Air Force inflation indices are produced and disseminated via the Air Force Portal for use by Air Force personnel.

2. Inflation Adjustment Requirements. OMB Circular A-11 requires inflation to be considered in resource planning activities such as budget preparation, life-cycle cost estimates, etc. OMB Circular A-94 provides specific guidance on inflation assumptions. It defines inflation as "The proportionate rate of change in the general price level, as opposed to the proportionate increase in a specific price. Inflation is usually measured by a broad-based price index, such as the implicit deflator for Gross Domestic Product or the Consumer Price Index."

In accordance with the OMB circulars, AFPD 65-5 mandates that SAF/FMC develop Air Force inflation indices.

2.1. OUSD(C) provides three things to SAF/FMC: (1) inflation rates (rates of change in the general price level), (2) appropriation-specific outlay rates[3], and (3) specific price escalation rates for military pay, civilian pay, fuel, and medical. SAF/FMC uses the inflation rates to produce the "raw" inflation indices. Further, SAF/FMC uses the inflation rates and the appropriation-specific outlay rates to produce the "weighted" inflation indices. Additionally, SAF/FMC uses the specific price escalation rates to produce the specific price indices for military pay, civilian pay, fuel, and medical expenses. Normally, OUSD(C) revises and publishes inflation and specific price escalation rates annually. When the rates are published, they typically include a brief statement of instruction on where they must be used. For example, the OUSD(C) Inflation Guidance as of December 2010[4] stated that "these rates are to be reflected in the FY2012 President's Budget submission, as well as supporting congressional justification materials."

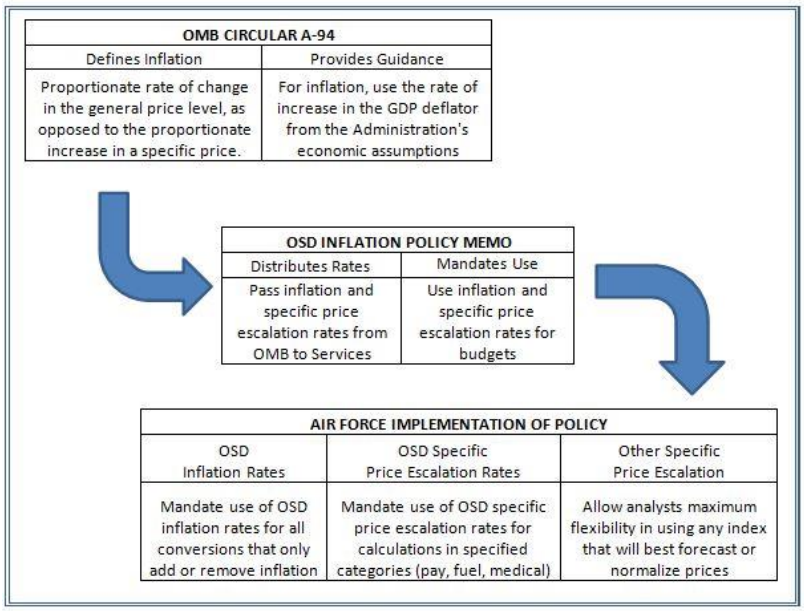
2.1.1. An organization can request an exemption from using the OUSD(C) inflation rate. The exemption process is described in paragraph 5 below. Since the OUSD(C) inflation rate accounts for the change in the value of the dollar, an exemption request should show that the currency the organization uses is devaluing at a different rate than the dollar. If the organization uses the dollar for all transactions, then an exemption will not likely be granted.

2.1.2. An organization may not request an exemption from using the OUSD(C) specific price escalation rates for military pay, civilian pay, fuel and medical expenses. However, the use of different specific price escalation assumptions for these categories is encouraged when performing sensitivity analyses. Additionally, it should be noted that price escalation rates for military pay and civilian pay are for US military personnel and US Government civilians only and not intended to account for contracted labor.

[3] Outlay Profiles are disseminated within DoD by OUSD(C) and are used in developing weighted indices. See Appendix A2.2.2. for more details.

[4] https://guidanceweb.ousdc.osd.mil/documents/current/01_Budget%20Guidance%20-%20Current/FY%202012%20Inflation%20Guidance%20FINAL.pdf

Figure 2.1. Chart 1 - Chain of Policy.



2.2. SAF/FMC develops Air Force "weighted" inflation indices based on OUSD(C) inflation rates and outlay patterns. Analysts must use these indices when normalizing for inflation (e.g., when converting then-year dollars to base-year or constant year dollars) unless an exemption has been approved as described in paragraph 2.1.1. When performing cost estimates, analysts should forecast costs as accurately as possible by including all causes of price change, not just inflation. Therefore, analysts should use a specific price index (or whatever methodology provides the best forecast) to estimate future costs. The specific price index includes both real price changes and inflation-based changes. As a result, the inflation-based price change is implicitly included in a specific price index.

2.3. OUSD(C) prescribes price escalation rates for a few specific expense categories such as military pay, civilian pay, fuel and medical. SAF/FMC uses these prescribed rates to produce specific price indices. As specific price indices, they should not be confused with inflation indices. These specific price indices are to be used in forecasting. For other categories of expenditures (e.g., aircraft parts, contract labor, etc.), the analyst must either choose or develop the price index that will most accurately forecast future requirements. After building a then-year estimate with an appropriate price index, the analyst may need to calculate a corresponding constant-year cost estimate. When removing the effects of inflation (normalizing to a constant-year dollar), the Air Force inflation indices should be used.

2.3.1. Historically, fuel and pay accounts have been converted to what was called a "constant-year dollar" using the same price index that was used to forecast. This is inconsistent with the term "constant-year dollar" because it normalizes for more than just inflation. Instead, this technique is more consistent with the term "constant price" (see Attachment 1, Terms). To maintain consistency throughout the DoD, this "constant price" technique will continue to be used for fuel, military pay civilian pay and medical only for reporting purposes until updated by a subsequent change to this AFI. As a result,

fuel, military pay civilian pay and medical are exceptions (for now) to the practice prescribed in the last sentence of paragraph 2.3.

3. Responsibilities.

3.1. SAF/FMC is the Air Force office of primary responsibility (OPR) for inflation matters. SAF/ FMC:

3.1.1. Prepares inflation and specific price indices based on guidelines provided by OMB via OUSD(C), who then pass them on to SAF/FMC.

3.1.2. Makes appropriation-specific inflation and specific price indices available for all Secretariat and Air Staff offices (e.g., Deputy Assistant Secretary of the Air Force for Budget (SAF/FMB)), major commands (MAJCOM), Field Operating Agencies (FOA), and Direct Reporting Units (DRU).

3.1.3. Loads the inflation and specific price indices onto the Air Force Portal. SAF/FMC recommends using the Air Force Inflation Calculator, an Excel© add-in, for inflation conversions. SAF/FMC updates this program annually. The program is located on SAF/FMC's site on the Air Force Portal.

4. Index Use and Documentation.

4.1. Apply the following when using specific price indices and inflation indices:

4.1.1. Cite the source and date of the inflation indices and specific price indices used. If the index was developed by an in-house analyst, explain the methodology.

4.1.2. Use the current SAF/FMC indices for the most relevant appropriation category for the program (or program element). SAF/FMC provides inflation for the major appropriation categories (listed in Attachment 4) and specific price indices for fuel, military pay and civilian pay.

4.1.2.1. If the program (or element of a program) does not exactly match one of the appropriation categories listed in Attachment 4, select an appropriation category that would be expected to have a similar outlay profile as the program under consideration.

4.1.2.2. The inflation and specific price indices currently in effect are posted on the Air Force Portal. They will remain in effect until superseded by a subsequent SAF/FMC publication.

4.1.3. The use of different inflation and specific price escalation assumptions is encouraged when performing sensitivity analyses.

4.1.4. When developing then-year cost estimates, analysts should use information and methodologies with the highest probability of accurately estimating the budget authority that will be required. Subsequent to developing the then-year cost estimates, conversion between then-year and constant-year dollars will be performed using the current Air Force inflation indices (unless an exception is approved by OUSD(C)).

4.2. **Specific Price Indices.**

4.2.1. A specific price index measures the total change in price of a good or service (or a basket of goods or services) over a period of time. As such, it includes both real price

changes and changes due to inflation. As mentioned earlier, the prices of goods rise and fall at different rates. Consequently, specific price indices tend to be narrowly focused on a specific good or industry. Specific price indices are used to make then-year to then-year price conversions. For example, a price index conversion from FY2000 to FY2010 takes the price of an item in FY2000 and converts it to the price one would expect to pay for that same item in FY2010.

4.2.2. Finding or developing and then applying specific price indices requires analyst judgment. There is no index that will be applicable in all situations.

4.2.3. When selecting a specific price index, the analyst should choose the index that will most accurately predict the future cost behavior of the program under consideration. Some ideas that may be useful when forecasting program costs using specific price indices are mentioned below.

4.2.3.1. If possible, the analyst may want to develop a specific price index based on information from the program under consideration. Examples include specific price indices derived from the program's historical data (where the historic data is an indicator of future cost behavior), or a forward pricing rate agreement (FPRA) from the program.

4.2.3.2. Specific price indices are developed by companies who forecast economic trends and conditions. Companies may forecast specific commodity price indices (e.g., Global Insight© Titanium Index) or specific price indices that are an industry-level composite (e.g., Global Insight© Aircraft Engine and Engine Parts Index).

4.2.3.3. US Government agencies, to include organizations within the DoD, produce specific price indices. For example, the Bureau of Labor Statistics develops Producer Price Indices (PPI) for many goods and services.

4.2.4. Price data exists in many different forms. Some examples are: raw prices for each year, rate of change from one year to the next, prices indexed to a base year, and a total price for a project across many years.[5] When analyzing the historical data, the analyst needs to carefully consider the form of the data (e.g, constant year dollar, constant price, then year dollar).

4.2.5. The analyst will need to determine whether or not to weight a specific price index using outlays. When using historical obligation data to build a price index, the outlay profile is already included in the data. In this case, the resulting price index is already weighted and no further weighting is necessary. (Historical data may be used for items such as parts and supplies that are purchased frequently over many years). Otherwise, the analyst will need to use judgment to determine if the index requires weighting. For example, Bureau of Labor Statistics Producer Price Indices (and Global Insight forecasts) should be weighted because of the form of the data collected for the index.

4.2.6. When developing estimates of the annual budget authority required on a specific program, the analyst is encouraged to use the appropriate price escalation coupled with

[5] The term base year here should not be confused with "base-year dollar." In this context, the base year of an index refers to the year of the index from which the percent change in price is calculated. "Base-year dollar" refers to dollars that have been normalized for inflation to a particular year of significance (e.g., program start date). Paragraphs A3.3 through A3.3.1.2 of this instruction provides additional information.

appropriate outlay rates. Outlay rates can be determined by examining such things as: the unique contract terms (e.g., spend plan), commodity specific outlays (e.g., space vs. aircraft), or outlay rates provided by OUSD(C). Subsequent to developing the time-phased budget estimate, use current Air Force inflation indices to convert between then-year and constant-year dollars, (unless an exception is approved by OUSD(C)).

4.3. When using a Cost Estimating Relationship (CER) or historical analogy, the analyst should evaluate the data to determine whether constant-year data or then-year data will ultimately yield the most accurate price forecast. Any price adjustment from one then-year to another then-year should carefully consider the most applicable specific price index.

4.3.1. When receiving data, ensure the data owner clarifies how the data has been normalized. Data received may be characterized as constant year, but the data may not have been normalized in a way that is consistent with the definition in this AFI. Whenever receiving data, the analyst should also obtain information on how the data was normalized.

5. Exemption Process.

5.1. When requesting an exemption from OSD inflation rates for calculating constant-year dollars, apply the following guidance.

5.1.1. Forward a request for exemption to the MAJCOM-level Financial Management office (FM). The MAJCOM/FM must concur with the request. Headquarters Air Force organizations will submit directly to SAF/FMC.

5.1.2. MAJCOM/FMs will forward to SAF/FMC if they concur with the request

5.1.3. SAF/FMC coordinates and obtains appropriate Secretariat and Air Staff coordination.

5.1.4. SAF/FMC forwards the request to OUSD(C) for approval.

5.2. The request should include the following items:

5.2.1. Proposed rates, sources, methodologies and justification for why the rates are more appropriate.

5.2.2. Comparison between OUSD(C) rates (or SAF/FMC indices) and the proposed rates, with an indication of the impact on the program.

6. Adopted Forms:

AF Form 847, *Recommendation for Change of Publication*.

LISA S. DISBROW
Assistant Secretary of the Air Force
(Financial Management and Comptroller)

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

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AFPD 65-5, Cost and Economics, 5 August 2008

DoD FMR 7000.19, Glossary, December 2008

Friedman, M. Wincott Memorial Lecture. London. 16 September, 1970

Mankiw, N. G. *Macroeconomics.* New York: Worth Publishers, 2007

OMB Circular A-11, Preparation, Submission, and Execution of the Budget, 18 Aug 2011

Abbreviations and Acronyms

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFPD—Air Force Policy Directive

AFRIMS—Air Force Records Information Management System

BY—Base-Year

CEA—Council of Economic Advisors

CER—Cost Estimating Relationship

CY—Constant-Year

DRU—Direct Reporting Unit

FM—Financial Management

FOA—Forward Operating Agency

FYDP—Future Years Defense Plan

GDP—Gross Domestic Product

M—Money Supply

MAJCOM—Major Command

MRE—Meal, Ready to Eat

O&M—Operations and Maintenance

OPR—Office of Primary Responsibility

OUSD(C)—Office of the Under Secretary of Defense (Comptroller)

P—Prices

PPBES—Planning Programing Budgeting and Execution System

RDS—Records Disposition Schedule

RDT&E—Research Development Test and Evaluation

SAF/FMB—Deputy Assistant Secretary of the Air Force for Budget

SAF/FMBO—Budget Operations Directorate

SAF/FMC—Deputy Assistant Secretary of the Air Force for Cost and Economics

SAF/FMCE—Economics and Business Management Directorate

SAR—Selected Acquisition Reports

TOA—Total Obligation Authority

TY—Then-Year

V—Velocity of Money

Y—Real Gross Domestic Product

Terms

Base Year—a point of reference representing a fixed price level; usually defined as the fiscal year in which a program was initially funded. The notion of expressing program costs in a specified Base-Year is equivalent to expressing those costs in Constant-Year Dollars of the same year.

Base-Year Dollar—the dollar's value at the midpoint (April 1) of a Base Year and implies this value throughout the Base Year. When cost estimates are stated in Base-Year Dollars, it is implicit that the overall purchasing power of the dollar has remained constant over the time period being costed.

Constant Prices— expressing the value of an item in the price of a particular year by normalizing for market changes applicable to that price. Note that constant prices are different from constant-year dollars. With constant-year dollars, the dollars are adjusted only for inflation. With constant prices, market price changes over time (including, but not limited to inflation) are normalized. Constant price adjustments are made using a specific price index whereas constant-year dollar adjustments are made using the inflation index. Constant prices can be expressed as (CPXX) where XX is the year in which the prices are being expressed. Also, for any value expressed in constant prices, the analyst must document the index used to normalize the prices (e.g., Global Insight, PPI 3364, updated 11 Dec 2013). Constant Prices may be used for cost estimating and analysis (e.g., CER development).

Constant—Year Dollar[6]—the value or purchasing power of a dollar in any specific year, which may or may not be the Base Year. Constant-Year dollars do not contain any adjustments for inflationary changes that occurred or are forecast to occur outside of the Base Year. Constant-Year Dollars are not influenced by Outlay Profiles (Expenditure Patterns). Also known as Real Dollars.

[6] The Air Force definition for constant-year dollars is consistent with definitions of constant-year dollars in both the economics and finance communities (sources: Farlex Financial Dictionary, Wall Street Words, Investopedia, Minneapolis Federal Reserve Bank http://www.minneapolisfed.org/glossary.cfm#i, Macroeconomics textbook by Mankiw).

Cost Estimating Relationship (CER)—"an equation used to estimate a given cost element using an established relationship with one or more independent variables. The relationship may be mathematically simple or it may involve a complex equation (often derived from regression analysis of historical systems or subsystems). CERs should be current, applicable to the system or subsystem in question, and appropriate for the range of data being considered."[7]

Equilibrium Price—the price at which the supply of a good equals the demand for that same good.

Escalate—generally means to increase. Costs can escalate for reasons other than inflation (e.g., increase in a building's maintenance costs due to age).

Inflation—a rise in the general price level caused by an increase in the volume of money and credit relative to the available goods. Inflation is usually measured by a broad-based (general) price index such as the implicit deflator for Gross Domestic Product.

Nominal Growth—refers to the year-to-year change in program funding as expressed in then-year dollars. Nominal growth includes both real growth and inflation.

Nominal Price—the price of a good or service expressed in Then-Year Dollars.

Normalization—when applied to inflation, it is the elimination of inflationary or deflationary impacts contained within historical cost data. Inflation normalization means conversion of Then-Year dollar amounts to program Base-Year Dollar amounts or Constant-Year Dollar amounts.

Outlay—"the amount of checks issued or other payments made (including advances to others), net of refunds and reimbursements. The terms 'expenditure' and 'net disbursement' are frequently used interchangeably with the term 'outlay.' Gross outlays are disbursements and net outlays are disbursements (net of refunds) minus reimbursements collected."[8] There is a time lag between budgeting funds (congressional appropriations), contracting for goods and services, the receipt of the goods and services and payment for the goods and services. This time lag often results in payments of monies over several fiscal years, with each year's cost influenced by inflation specific to that year. Each major appropriation has a distinct outlay profile (expenditure pattern), based upon historical obligation to outlay experience by fiscal year.

Outlay Profile—reflects the rate at which funds in each appropriation are expected to be expended based on historical experience. Outlay Profiles are implicitly considered in the budgetary concept of Then-Year Dollars. Outlay Profiles are disseminated within DoD by OUSD(C) and are used in developing Weighted (Composite) Inflation Indices. Also known as Spendout Rate or Expenditure Profile.

Outyears—the years after the first year of a budget or analysis.

Raw Inflation Indices—are used to convert from Base-Year (Constant-Year) Dollars in one fiscal year to Base-Year (Constant-Year) Dollars in another fiscal year. Raw Inflation Indices are not influenced by Outlay Profiles.

Raw Inflation Rate—reflects the relative change in general price level occurring from the mid-point of one fiscal year (April 1) to the mid-point of the next fiscal year.

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[7] DAU Principles for Life Cycle Cost Estimates https://acc.dau.mil/CommunityBrowser.aspx?id=314773#3.7.2.1.1
[8] DoD FMR 7000.19, Glossary

Real Growth—refers to the year-to-year change in program funding as expressed in Constant-Year Dollars. Since real growth is expressed in Constant-Year Dollars, it excludes inflation. It is usually displayed as a percentage and is computed by dividing the Constant-Year Dollars in one year by that of the previous year and subtracting 1.000.

Specific Price Escalation—the change in the nominal price of a good or service (i.e., the total change in price) over a period of time. It includes the effects of inflation and the market, and is measured by a specific price index.

Specific Price Index—measures changes in the price of a precisely defined good/service or a basket of goods/services over time. For example, a price index conversion from FY2000 to FY2010 will yield the price one could expect to pay in 2010 for a good originally purchased in 2000. Price indices are used to make then-year to then-year conversions.

Then-Year Dollar—reflects the amount of funding needed (expected to be needed) when the expenditure for goods and services were (are expected to be) made. All PPBES documents use Then-Year Dollars to properly reflect the Total Obligation Authority (TOA) that must be appropriated during a specific fiscal year if sufficient funds are to be available to pay for the goods and services when received. For AF Comptroller purposes, Then-Year Dollars are identical to current dollars; they are known as nominal or budget dollars. If Then-Year Dollars are written with a specific year (e.g. TY11$), then those dollars reflect the amount of funding needed if the funds for all goods and services were obligated in the year used (e.g. FY 2011 for TY11$).

Total Obligation Authority (TOA)—the financial requirement of the Future Years Defense Plan (FYDP), or any component thereof, necessary to support the approved program. The total budget authority received and posted in the accounting system supporting an organization's approved program. TOA includes the anticipated reimbursements an organization expects to earn plus the organization's direct budget authority.

Weighted Inflation Indices—inflation indices computed by combining Outlay Profiles with Raw Inflation Indices to include the lag effect on inflation of expending funds over a multi-year period. (Note: Expenses for personnel and fuel are generally either not outlayed in subsequent years, or are not inflated when outlayed beyond the fiscal year of obligation. Therefore, these expenses do not use weighted inflation indices.)

Attachment 2

USING INFLATION INDICES

A2.1. Selecting the appropriate index.

A2.1.1. Raw inflation indices would be used to make the following conversions:

Table A2.1. Raw Index Uses.

FROM	TO	POSSIBLE REASON FOR CONVERSION
Base-Year (BY)	Base-Year	When re-baselining a program or to isolate changes in a program solely due to inflation
Constant-Year (CY)	Constant-Year	
Base-Year	Constant-Year	
Constant-Year	Base-Year	

A2.1.2. Weighted inflation indices would be used to make the following conversions:

Table A2.2. Weighted Index Uses.

FROM	TO	POSSIBLE REASON FOR CONVERSION
Base-Year*	Then-Year* (TY)	To convert a real-dollar analysis into a budget request
Constant-Year*	Then-Year*	
Then-Year	Base-Year	To convert historic budget data into constant dollars for analysis
Then-Year	Constant-Year	

<< **CAUTION** * See paragraph A2.1.2.2. **CAUTION** >>

A2.1.2.1. Then-Year to Then-Year conversion is purposely omitted from Table A2.6. Inflation indices only adjust for inflation. To adjust for any and all other potential changes in a then-year dollar to then-year dollar conversion (such as real economic price changes as discussed in section 1 of this AFI), a specific price index (not an inflation index) should be used[9].

A2.1.2.2. Caution should be exercised when using a weighted index to convert from Base-Year or Constant-Year Dollars to Then-Year Dollars. As stated above, inflation indices only adjust for inflation. As such, the analyst must separately account for all other potential causes for changes in price that could occur over time (such as real economic price changes as discussed in section 1 of this AFI).

A2.1.2.2.1. If converting expenditure data from the year of expenditure to a base year, raw indices should be used even though the expenditure data is then-year. The

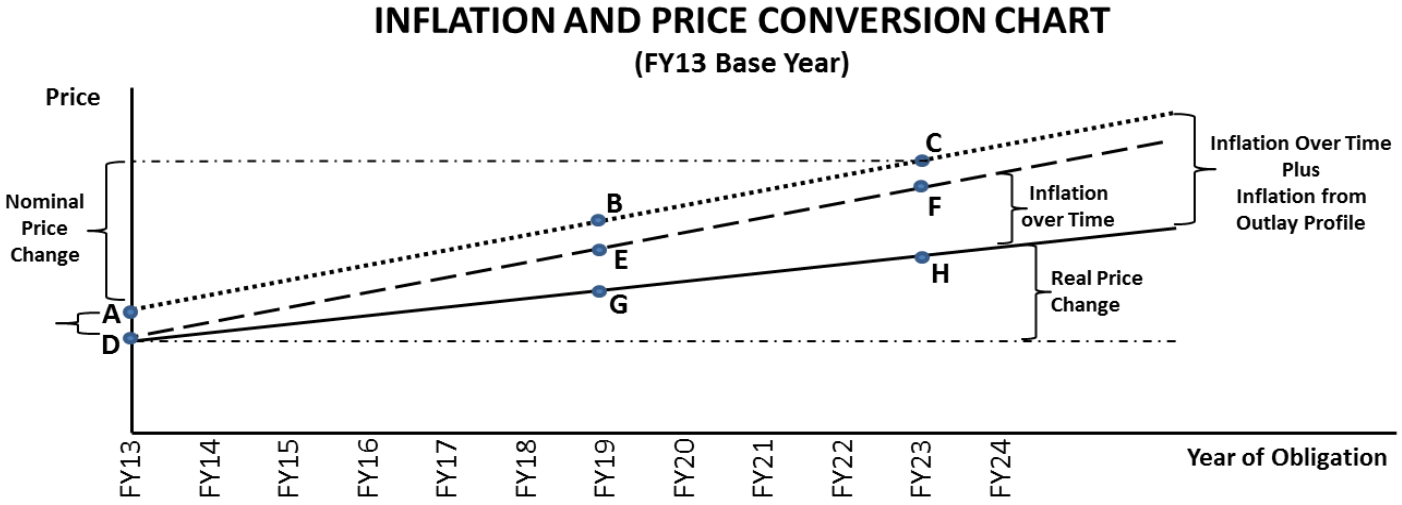
[9] An inflation index would only be appropriate for TY to TY conversion if there were no real economic price changes in the item over time. It is highly unusual for a good's price changes to exactly match the OSD inflation index.

expenditure is in the year the expenditure/outlay occurred and does not have a subsequent outlay profile.

A2.1.2.3. Outlay rates make the indices service unique. A Service's indices should be applied only to expenses within that Service (e.g., do not use AF indices to normalize Navy funding).

A2.1.2.4. Chart A2.1 illustrates when to use a raw index, a weighted index, or a price index.

Figure A2.1. Chart Inflation and Price Index Use.



..... $TYXX (All obligations on this line are TY$ (they include the outlay profile) expressed in the year of the obligation)

— – $CYXX (All obligations on this line are CY$ expressed in the year of obligation; inflation in outlay profile was removed)

—— $CY13 (All obligations on this line are expressed in $CY13 … the dollars are normalized to CY13)

Point A – represents an FY13 obligation expressed in $TY13
Point B – represents an FY19 obligation expressed in $TY19
Point E – represents an FY19 obligation expressed in $CY19
Point G – represents an FY19 obligation expressed in $BY13

Year of Obligation	To Convert:		Represented on the Graph as Moving:		Use a:	Base Year o Inflation Ind
	From:	To:	From:	To:		
FY13	Base-Year FY13	Then-Year FY13	D	A	Weighted Inflation Index	Year D (FY1
FY23	Then-Year FY23	Base-Year FY13	C	H	Weighted Inflation Index	Year D (FY1
FY23	Then-Year FY23	Constant-Year FY23	C	F	Weighted Inflation Index	Year F (FY2
FY13 or FY19	Then-Year FY13	Then-Year FY19	A	B	Price Index	Any
FY19 or FY23	Then-Year FY19	Then-Year FY23	B	C	Price Index	Any
FY23 or FY13	Then-Year FY23	Then-Year FY13	C	A	Price Index	Any
FY23	Base-Year FY13	Constant-Year FY23	H	F	Raw Inflation Index	Any
FY19	Constant-Year FY19	Base-Year FY13	E	G	Raw Inflation Index	Any

A2.2. Examples of Dollar Conversions Using the Inflation Indices.

A2.2.1. Dollar Conversions Using Raw Inflation Indices. Converting constant dollars from one year into constant dollars of another year is a two-step process. The first step is to convert your dollar value to the base year of the inflation index. This is done by dividing the dollar value by the index value that corresponds to the year in which the dollar is currently expressed. The second step is to convert that newly acquired inflation indexed base-year dollar value into the year in which the dollar needs to be expressed. To do this, simply multiply the newly computed base-year dollar value times the index value for the year into which you want to convert.

A2.2.1.1. General formula for converting dollars using raw inflation indices (The variables "i" and "j" represent fiscal years, e.g., FY05 and FY10):

$$CY\ i\ Dollars = CY\ j\ Dollars * \frac{Year\ i\ raw\ Inflation\ Index}{Year\ j\ raw\ Inflation\ Index}$$

A2.2.1.2. Dollar conversion examples using raw inflation indices are below:

Table A2.3. Raw Inflation Conversions.

RAW INFLATION CONVERSIONS (BY2000)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Raw Index	0.978	0.986	1.000	1.016	1.032	1.049	1.071	1.093	1.116	1.140	1.164

Convert BY2000 $500 to CY2004*	BY2000 $500	X	2004 Index 1.071	=	CY2004 $535.50
Convert CY2005 $500 to CY2002*	CY2005 $500	/	2005 Index 1.093	=	CY2000 $457.46
	CY2000 $457.46	X	2002 Index 1.032	=	CY2002 $472.10

* CY is Constant Year

A2.2.2. Dollar Conversions Using Weighted Inflation Indices.

A2.2.2.1. In order to convert Constant-Year Dollars of one year into Then-Year Dollars of the same or another year, use a weighted inflation index with a base year that is the same as the year FROM which you are converting. Then multiply the constant-dollar amount by the weighted index for the desired then-year.

A2.2.2.2. As noted in paragraph A2.1.2.2, exercise caution when using a weighted index to convert from a constant-dollar of one year to a then-year dollar of another year. Since inflation indices only adjust for inflation, the analyst using this approach is only adding

inflation (to include inflation in the outlay profile) to the constant-year dollar. Any other market changes in price that occur between the initial year and the year to which the analyst is converting are not included in this calculation. As a result, if the price of the estimated product grows faster than inflation, the estimate will be understated.

A2.2.2.3. There are three scenarios when using an inflation index to convert from Constant-Year Dollars to Then-Year Dollars is applicable. The first scenario is when inflation (to include the outlay profile) is the only change in price between the initial year and the year to which the analyst is converting. (In this scenario, the price change over the time period is expected to exactly mirror inflation). The second scenario is when the Constant-Year Dollar was previously converted from the same Then-Year Dollar to which the analyst is now converting. In this case, the same inflation index must be used in the conversion from the Constant-Year Dollars to Then-Year Dollars as was originally used to convert from the same Then-Year Dollars to Constant-Year Dollars. The third scenario is when converting from Constant-Year Dollars to Then-Year Dollars of the same year. In this case, the conversion is only accounting for the obligation profile.

$$TY\ i\ dollars = CY\ j\ dollars * Year\ i\ value\ of\ the\ Inflation\ Index\ with\ Base\ Year\ j$$

A2.2.2.4. In order to convert Then-Year Dollars into Constant-Year Dollars of the same or other year, use a weighted inflation index with a base year that is the same as the year TO which you are converting. Then, divide the Then-Year Dollar amount by the weighted index value for the then-year.

$$CY\ j\ dollars = \frac{TY\ i\ dollars}{Year\ i\ value\ of\ the\ Inflation\ Index\ with\ Base\ Year\ j}$$

A2.2.2.5. Dollar conversion examples using weighted inflation indices are below:

Table A2.4. Weighted Inflation Conversions.**

WEIGHTED INFLATION CONVERSIONS (Base Year of Index is BY2000)											
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Weighted Index	0.983	0.994	1.008	1.024	1.041	1.060	1.082	1.105	1.128	1.152	1.176
	Convert BY2000 $500 to TY2004***						BY2000 Dollars		2004 Index Value		TY2004 Dollars
							$500	X	1.082	=	$541.00
	Convert TY2004 $541 to CY2000*						TY2004 Dollars		2004 Index Value		CY2000 Dollars
							$541	/	1.082	=	$500
	Convert TY2005 $500 to CY2000*						TY2005 Dollars		2005 Index Value		CY2000 Dollars
							$500	/	1.105	=	$452.49

* CY is Constant Year

** << **CAUTION** >> After converting a dollar figure from a Then-Year Dollar to a Constant-Year Dollar, the inflation indices should not be used to convert that Constant-Year Dollar to a different Then-Year Dollar. See paragraph A2.1.2.1 for information on then-year to then-year conversions.

*** << **CAUTION** >> See paragraph A2.1.2.2 for a caution on BY to TY conversions.

A2.3. Examples of Dollar Conversions Using Specific Price Indices.

A2.3.1. Specific price indices are used to make TY to TY conversions. Making a TY to TY conversion is a two-step process. The first step is to divide the dollar amount by the price index value for the year from which you want to convert. The second step is to multiply the result from step 1 by the price index value for the year to which you want to convert.

Table A2.5. Price Index Conversions.

PRICE INDEX (TY to TY) CONVERSIONS (BY2000)

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Price Index	0.978	0.986	1.000	1.016	1.032	1.049	1.071	1.093	1.116	1.140	1.164

Convert TY2005 $500 to TY2002*	TY2005 $500	/	2005 Index 1.093	=	TY2000 $457.46
	TY2000 $457.46	X	2002 Index 1.032	=	TY2002 $472.10

Attachment 3

ADVANCED TOPICS IN INFLATION

A3.1. Explaining Inflation. Inflation can be defined as an increase in the general level of prices. For there to be an increase in the general level of prices, there must be an item that is used to measure the value of all other goods and services (i.e., a common item by which prices are measured). The item used to measure the value of all other goods and services is commonly called money. Simply stated, inflation occurs when the money supply increases at a faster rate than the number of goods and services available in the economy[10]. This can be demonstrated with the relationship known as the equation of exchange. The equation of exchange is as follows:

$$M * V = P * y$$

Where:

M represents the money supply,
V represents the velocity of money (or "the rate at which money circulates through the economy"[11]),
P represents the average price level, and
y represents real Gross Domestic Product (GDP)

A3.1.1. For now assume y and V are constant. Consequently, if M suddenly increases (e.g., the government prints a lot of money), P would have to increase, as well, in order to maintain the relationship. This insight is referred to as the quantity theory of money and assumes that the increase in the money supply is not accompanied by a similarly large increase in the real GDP (y) or a similarly large decrease in the velocity of money (V). Particularly in the short-term, an increase in the money supply may have some impact on y and V that would dampen the effect on prices. That being said, the equation of exchange helps us to understand that money is similar to other goods. With a significant increase in the supply of money, the value of money relative to other goods will decrease; stated another way, with an increase in the supply of money, the general level of prices will rise.

A3.1.2. Just as the equation of exchange is an economy-wide relationship, inflation should be thought of as an economy-wide (i.e., macroeconomic) phenomena, not a microeconomic (i.e., related to a subset of the economy, like a single company or industry) phenomena. As such, during inflationary periods, it is quite possible that some prices will fall. For example, a decline in computer prices should not necessarily be considered the result of deflation, particularly when other prices rise. Rather, the decline in computer prices are more likely the

[10] A slightly more sophisticated view is that inflation occurs when the relationship between the supply and demand for money are changing in a way that is causing the value of the money to decline when compared with all other goods. In addition to an increase in the money supply, this could also happen if, over time, the people of a country stop using the local currency in favor of a foreign currency.

[11] Mankiw, N. G. (2007). *Macroeconomics.* New York: Worth Publishers. The velocity of money can be viewed as the number of times a dollar changes hands (i.e., is spent on a good or service) in a specified period of time. The quicker people spend the money they earn, the higher the velocity of money. Conversely, the longer people hold onto the dollars they get, the slower the velocity of money.

result of market changes in the computer industry (e.g., technological advancements, new products making current products less desirable, patent expirations, etc.).

A3.1.3. The existence of inflation does not mean that the prices of all goods and services will rise evenly. Differences in the supply and demand for different goods in the economy cause the prices of some goods to rise faster than others. As a result, price changes in a particular program (such as those seen in forward pricing rate agreements) are unlikely to be solely due to inflation, but rather they are a combination of inflation and other market forces.

A3.1.4. If a program has reliable/accurate information on future price changes, for example escalation clauses in a contract, that information should be used to build the then-year cost estimate. In order to obtain the base-year cost, inflation should be backed out using the SAF/FMC inflation indices. This method should produce both the most accurate then-year cost estimate possible and a base-year cost estimate that includes only "real" price changes resulting from other market forces.

A3.2. Measuring Inflation. There are several methods of measuring inflation. A simplified example of one method is described below. (Other methods use a geometric mean which will not be discussed in this AFI).

A3.2.1. Assume our economy contains only three commodities: Meals, Ready to Eat (MRE); bullets; and combat boots. Further assume that: (1) these commodities account for 70, 20, and 10 percent of expenditures, respectively, (2) these proportions are stable over time, and (3) the quality of the three items is constant. Finally, assume Year 1 in Table A3.1 below is the base year, 2000. Table A3.1 provides additional information:

Table A3.1. Raw Inflation Example.

Year	Price per MRE	Price per Package of Bullets	Price per pair of Boots	Aggregate (i.e., Wtd Average) Price	Annual Inflation (Yr-to-Yr Change)	Compound Inflation (Cumulative Change)	Raw (i.e., Compound) Inflation Index
1-2000	$2.00	$5.00	$20.00	$4.40	---	---	---
2-2001	$2.05	$5.10	$20.35	$4.49	2.05%	2.05%	1.0205
3-2002	$2.15	$5.35	$20.50	$4.625*	3.01%	5.11%	1.0511
4-2003	$2.25	$5.45	$20.65	$4.73	2.27%	7.50%	1.0750
5-2004	$2.30	$5.50	$21.25	$4.835*	2.22%	9.89%	1.0989

* For calculation purposes, fractional cents were shown in the table.

A3.2.2. **Calculating inflation rates.**

A3.2.2.1. **The Aggregate Price (i.e., the "General Price Level").** Raw inflation rates measure changes in the general price level from year to year. Theoretically, the aggregate price is the weighted average price of all goods and services sold in the economy. In practice, it is generally the weighted average price of a representative basket of goods purchased by the "average" consumer. In our rather limited economy of

three commodities, it is the weighted average of the prices of our three commodities. The weights are provided in paragraph A3.2.1. The aggregate, or weighted average, price is calculated as follows:

$$Aggregate\ Price = price\ of\ MREs * .7 + price\ of\ Bullets * .2 + price\ of\ Boots * .1$$

So, for Year 1 (the year 2000 in Table A2.1), the calculation is:

$$Aggregate\ Price = \$2.00 * .7 + \$5.00 * .2 + \$20.00 * .1 = \$4.40$$

A3.2.2.2. **Calculating Annual Raw Inflation Rates.** Inflation is an economy-wide measure of the general change in price level, which in our very limited economy is the percent change in aggregate price from year to year. The inflation rate for a given year, say year *i*, is calculated by a 2-step process: (1) subtract the aggregate price in the prior year (i.e., year *i*-1) from the aggregate price in year *i* (the year for which inflation is being calculated), then (2) divide the resulting number by the previous year's (i.e., year *i*-1) aggregate price. Example calculations using numbers from the table are:

$$Annual\ Inflation\ Rate\ from\ Year\ 1\ to\ Year\ 2 \Rightarrow \frac{\$4.49-\$4.40}{\$4.40} = 2.05\%$$

$$Annual\ Inflation\ Rate\ from\ Year\ 2\ to\ Year\ 3 \Rightarrow \frac{\$4.625-\$4.49}{\$4.49} = 3.01\%$$

$$Annual\ Inflation\ Rate\ from\ Year\ 3\ to\ Year\ 4 \Rightarrow \frac{\$4.73-\$4.625}{\$4.625} = 2.27\%$$

A3.2.2.3. **Calculating Compound Raw Inflation Rates.** While an annual inflation rate measures the percent change in aggregate price from year to year, a compound inflation rate measures the cumulative percent change in aggregate price for a time period generally longer than one year. The compound inflation rate is calculated by subtracting the aggregate price at the beginning of the period from the aggregate price at the end of the period. The resulting number is then divided by the aggregate price at the beginning of the period. Example calculations using numbers from the table are:

$$Compound\ Inflation\ Rate\ from\ Year\ 1\ to\ Year\ 2 \Rightarrow \frac{\$4.49-\$4.40}{\$4.40} = 2.05\%$$

$$Compound\ Inflation\ Rate\ from\ Year\ 1\ to\ Year\ 3 \Rightarrow \frac{\$4.625-\$4.40}{\$4.40} = 5.11\%$$

$$Compound\ Inflation\ Rate\ from\ Year\ 1\ to\ Year\ 4 \Rightarrow \frac{\$4.73-\$4.40}{\$4.40} = 7.50\%$$

A3.3. Calculating inflation indices. The first step in building an inflation index is to establish a base year. The base year will be the point of reference from which inflation to all other years is measured.

A3.3.1. Base Year. Using inflation indices requires an understanding of the term "base year." There are two base years to consider: (1) the inflation index's base year, and (2) the program's base year.

A3.3.1.1. The base year in an inflation index (or a price index) is the year in which the value (i.e., purchasing power) of the dollar is set. The base year in a raw index will

always have an index value of one (i.e., 1.0000) because 1.0000 dollar will buy one dollar's worth of goods/services in that year. It is the year by which all index values for other years in the index are measured. The base year for a weighted index will *not* have a value of 1.0000 because the outlay profile is considered when calculating the index. (Theoretically, it is possible for the weighted index in the base year to be 1.0000, but it can only happen if the raw inflation indices for all years in the outlay profile are 1.0000 [i.e., there has been no inflation in all years in the outlay profile.])

A3.3.1.2. The base year for a program is usually defined as the fiscal year in which a program was initially funded or re-baselined. It is a point of reference representing a fixed price level for the program.

A3.3.2. **Calculating a raw (compound) inflation index.** A raw inflation index measures compound inflation, and as such may also be referred to as a compound inflation index. This index measures inflation from the base year to the year of interest and provides a simple way to calculate changes in cost due to inflation. The raw inflation index is calculated by dividing the aggregate price in the year for which inflation is being calculated by the aggregate price in the base year.[12] Example calculations using numbers from the table are:

$$Inflation\ Index\ for\ Year\ 2 \Rightarrow \frac{\$4.49}{\$4.40} = 1.0205$$

$$Inflation\ Index\ for\ Year\ 3 \Rightarrow \frac{\$4.625}{\$4.40} = 1.0511$$

$$Inflation\ Index\ for\ Year\ 4 \Rightarrow \frac{\$4.73}{\$4.40} = 1.0750$$

A3.3.2.1. The inflation index provides a simple way to calculate changes in cost due to inflation. For example, given the base-year price, to estimate the price of a good at some point in the future, say Year 4, simply multiply the price of the good in the base year by the inflation index for the desired year (i.e., year 4).

$$Estimated\ Price\ in\ Year\ 4\ due\ to\ inflation = Base\ Year\ Price * Year\ 4\ Index$$

Applying this formula to estimate the price of bullets in Year 4 due to inflation:

$$Estimated\ Price\ of\ Bullets\ in\ Year\ 4\ due\ to\ inflation = \$5.00 * 1.0750 = \$5.375$$

However, when looking in Table A2.1 above, the price of bullets in Year 4 was $5.45, not $5.375. How can that be? This means that of the 45 cent increase in price over the three years from Year 1 to Year 4, $0.375 was due to inflation and $0.075 was due to other market related causes (e.g., shortage of supply of bullets, increase in demand, increase in cost of inputs, etc.).

A3.3.2.2. The inflation index also provides a simple way to convert a future-year cost estimate (CE), say in Year 5, to a base-year cost estimate. To estimate the base-year price of a good given the future-year CE, simply multiply the price of the good in the future year (i.e., Year 5) by the

[12] You may notice that you will get the same answer if you calculate the compound inflation rate for the period from the base year to the year of interest and add 1.0.

inflation index for the base year, then divide by the inflation index for the future year (i.e., Year 5). For example:

$$Base\ Year\ CE\ from\ Year\ 5\ CE\ = Year\ 5\ CE * \frac{Base\ Year\ Inflation\ Index}{Year\ 5\ Inflation\ Index}$$

Applying this formula to estimate the base-year price of boots given a Year 5 cost estimate:

$$Base\ Year\ CE\ of\ Boots\ from\ Year\ 5\ CE\ for\ Boots = \$21.25 * \frac{1.0000}{1.0989} = \$19.34$$

However, when looking in Table A3.1 above, the price of boots in the base year was $20.00, not $19.34. How can that be? This means that if inflation were the only thing affecting the price of boots, we would expect the base year price to be $19.34. That is, inflation alone would have caused the price of boots to rise $1.89 over the four-year period. But in reality, since the price actually only increased $1.25, ($21.25 - $20.00), or $0.64 less than what would have been caused by inflation alone, there were other market forces at work that prevented the price from rising the full $1.89. Some possible reasons are weakening demand for boots, productivity increases, reduction in the number of production regulations, patent expirations, lower producer taxes, etc. All of these would decrease upward pressure on the price of boots over the four years from Year 1 to Year 5.

A3.3.2.3. This concludes the methodology used to calculate a raw (compound) inflation index.

A3.3.3. **Developing a weighted inflation index.** The weighted inflation index differs from the raw inflation index in that it takes into account when the funds leave the Treasury (when the outlay occurs). For example, an organization is provided a certain amount of funding in its Operations and Maintenance (O&M) account each fiscal year. These O&M funds must either be obligated by the end of the fiscal year or returned to the Treasury. While the funds must be *obligated* in that fiscal year, the funds do not have to be *outlayed* (i.e., *expended*, or leave the Treasury) within the fiscal year. The outlay can, and many times does, occur after the close of the fiscal year. It is similar to a credit card purchase where the purchase obligating payment is made during the fiscal year, but the check actually paying the bill and settling the debt occurs after the fiscal year ends. With the nature of government purchases, though, sometimes projects implemented take several years to complete and are committed to without knowing the exact cost. As a result, sometimes funds are obligated in one fiscal year, but don't actually pay (outlay) until several years later.

A3.3.3.1. Due to the fact that outlays often occur in a different year than obligations, the Air Force produces and uses weighted inflation indices. The theory behind a weighted index is that contractors determine the funding needed for a project knowing that part of the project accomplishment will happen in a subsequent year and as a result, will require more funding due to inflation. The government, in turn, looks at previous outlay rates to determine historically what percentage of the outlay occurred in the year the funding was appropriated and what percentage belongs in each subsequent year. While the O&M appropriation will be used as an example, all appropriations are handled the same way, although they each have their own unique outlay profile. These outlay profiles are then

used to create the weighted inflation indices. A set of notional outlay rates can be seen in Table A3.2. Each number is a percentage. Notice that each row in the table adds up to 100 percent.

Table A3.2. Notional Outlay Rates.

OUSD(C) Outlay Rates (Notional)							
Budget Account	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
3400 O&M	59.81	32.15	5.25	2.79			
3600 RDT&E	58.15	34.53	4.55	1.04	1.73		
3300 MILCON AF	14.00	47.40	30.50	4.00	1.50	2.60	
3830 MILCON ANG	8.80	50.70	23.40	10.00	4.00	3.10	
3730 MILCON AFR	8.50	55.00	27.50	5.30	2.00	1.70	
3010 Aircraft Procurement Special	82.18	17.82					
3010 Aircraft Procurement Other	20.00	40.00	18.30	10.60	5.30	5.80	
3020 Missile Procurement Special	19.91	57.21	22.88				
3020 Missile Procurement Other	28.21	33.54	24.34	7.25	3.99	2.67	
3080 Other Procurement Special	57.05	34.57	8.38				
3080 Other Procurement Other	23.66	22.23	21.21	19.46	7.97	3.71	1.76

A3.3.3.2. Using the outlay table and the raw inflation indices above, we can develop a weighted index for the O&M appropriation (as well as all other appropriation categories listed). Because the weighted index accounts for expenditures occurring in years after the obligation, the weighted index value for FY2000 allows calculation of the actual amount of funding required to pay for obligations occurring in FY2000. Table A3.3 contains the basic information that is needed to calculate the weighted index for the year 2000.

Table A3.3. Information Needed to Calculate a Weighted Index.

YEAR	YEAR	OUTLAY	INDEX
1	2000	59.81%	1.0000
2	2001	32.15%	1.0205
3	2002	5.25%	1.0511
4	2003	2.79%	1.0750

A3.3.3.3. The first step in developing a weighted inflation index is to divide the outlay percentage by the raw inflation index. This converts the funding spent in years subsequent to the appropriation year to a base year ("Year 1") value.

A3.3.3.4. The second step is to add the base year values just calculated. This provides the true value of $1 that will be obligated in "Year 1" and outlayed according to the outlay profile. As seen in Table A3.4 below, the dollar obligated in "Year 1" is really only worth 98.90 cents (in "Year 1" BY dollars) because the value of that dollar was eroded by inflation during the time represented by the outlay profile.

A3.3.3.5. Performing this drill provides a ratio used to perform the third and final step in calculating the weighted index value for "Year 1." Knowing that $1 budgeted for "Year

1" only has the spending power of 98.90 cents, we can determine how much we need to budget in "Year 1" to have $1 spending power. As a result, for the third step use the relationship that $1 is to .9890 as the variable X is to $1. Putting that in a formula yields:

$$\frac{1}{.9890} = \frac{X}{1}$$

Algebraic manipulation yields:

$$X = \frac{1}{.9890} = 1.0111$$

A3.3.3.6. This means the weighted inflation index for Operations and Maintenance (3400) for the year 2000 is 1.0111. The calculations can be seen in Table A3.4 below.

Table A3.4. Weighted Index Calculation.

	3400 Outlay Profile	Divided By	Raw Inflation Index	Equals	$1 in BY 2000 Terms		Weighted Inflation Index
1	59.81%	/	1	=	0.5981		1.0111
2	32.15%	/	1.0205	=	0.3150		
3	5.25%	/	1.0511	=	0.0499		
4	2.79%	/	1.0750	=	0.0260		
	1		Divided By		0.9890	Equals	

A3.3.3.7. Generalized formula for converting between then year and constant year. With the conversion formulas in paragraphs A2.2.2.3 and A2.2.2.4, the analyst had to use the weighted inflation index with a base year that was the same as the Constant-Year Dollar. The formulas below are more generic in that they allow the analyst to use any weighted inflation index, but also require the use of a raw inflation index when converting between TY and CY dollars. The first formula shows the conversion from Then-Year Dollars to Constant-Year Dollars.

$$CY\ j\ Dollars = TY\ i\ Dollars * \frac{Year\ j\ raw\ Inflation\ Index\ /\ Year\ x\ raw\ Inflation\ Index}{Year\ i\ value\ of\ Year\ x\ weighted\ index}$$

With a simple algebraic manipulation, we can also generically show the formula for converting Constant-Year Dollars to Then-Year Dollars.

$$TY\ i\ Dollars = CY\ j\ Dollars * \frac{Year\ i\ value\ of\ Year\ x\ weighted\ index}{Year\ j\ raw\ Inflation\ Index\ /\ Year\ x\ raw\ Inflation\ Index}$$

A3.4. The difference between Inflation and The Time Value of Money.

A3.4.1. Discount rates and inflation rates are often a source of confusion. Discount rates (or interest rates that are greater than zero) exist because people prefer to have something today as opposed to waiting to have the item. To get the item earlier, people have to borrow against future income and are willing to pay a positive interest rate in order to obtain the item.

A3.4.2. Discount rates and the Air Force. The Air Force corporately prefers consumption today in that it would rather have a capability today than to wait. The market mechanism that measures the value of money over time is the interest rate. A positive interest rate indicates that people (and the Air Force) value consumption today more than future consumption. Looking at this relationship in reverse, having $100 today is more valuable than having $100 one year from now because earning interest on the $100 now will yield more than $100 a year from now. The discount rate dictated by OMB Circular A94 is the treasury rates of various maturity lengths. The reason the treasury rates are used is that if the funding is not spent, the Federal deficit will be lower and some interest payments will not be incurred.

A3.4.3. Inflation however, is not concerned with investments. As described in this instruction, inflation rates are the result of changes in the general price level over time.

A3.4.4. Three terms that explain common ways of expressing funds are as follows:

A3.4.4.1. Then-Year Dollars - These are dollars that reflect inflation from year to year. These are the type of dollars you would expect to see in a budget.

A3.4.4.2. Constant-Year Dollars - These are dollars that are expressed in terms of a particular year (i.e. base year). These dollars do not reflect changes due to inflation. They are also called real dollars.

A3.4.4.3. Constant-Year Dollars Discounted - These dollars are similar to the constant year dollars in that they do not reflect changes in inflation. In addition, these dollars are discounted to better make a comparison of dollars from different years, noting that a dollar today is worth more than a dollar in the future because today's dollar can be invested for a return in excess of the dollar.

A3.4.4.4. For additional information on discount rates and discounting, see AFMAN 65-506.

A3.5. Contrasting Inflation and Specific Price changes

A3.5.1. Types of Indices: Inflation Index and Specific Price Index. An inflation index measures the general change in price level for all goods and services (i.e., from the growth in the money supply relative to goods and services). A common general price index measurement is the GDP deflator. Conversely, a specific price index measures changes in the *nominal price* of a good or service over a time period. It accounts for the *entire* change in the price of a particular good, regardless of the cause (inflation and/or market).

A3.5.2. Specific Price Escalation vs. Inflation: Specific price escalation is an increase in the price of a particular good or service (or sub-group of goods and services) over time. Specific price escalation is distinct from inflation in that inflation is intended to measure the average change in price across all goods and services.

A3.5.3. Rates vs. Indices: The Services receive rates from OSD and turn those rates into indices. The indices have a benchmark year against which all other years are measured. As such, the indices measure change from that benchmark year. The rates received from OSD measure change from one year to the next instead of being benchmarked to a certain year.

Attachment 4

MAJOR AIR FORCE APPROPRIATIONS

3010 – Aircraft Procurement: Provides for fabricating and procuring aircraft weapon systems, modifications, direct ground support equipment, aircraft industrial facilities, investment-type spares, war consumables, miscellaneous aircraft requirements, and technical data.

3020 – Missile Procurement: Provides for fabricating and procuring missile weapon systems, operational space systems, modifications, investment-type spares, component improvements, missile industrial facilities, miscellaneous missile requirements, site activation, and technical data.

3080 – Other Procurement: Provides for procurement of direct and indirect ground weapon support material (vehicular equipment; electronic and telecommunications equipment, including cryptologic equipment; other installation maintenance and support equipment), installation-procured local purchase equipment industrial preparedness measures, equipment modifications, and spares and repair parts. Includes installation and emplacement of equipment, testing of production items, and technical data and handbooks procured with end item equipment.

3300 – Military Construction: Provides for acquiring, constructing, installing, and equipping temporary or permanent public works, military installations, and facilities for the regular Air Force. Includes planning and design, major construction inside and outside the U.S., minor construction, and support activities.

3400 – Operations and Maintenance: Provides for financing day-to-day operations and maintenance costs of AF activities. These funds include monies for civilian pay, contract services for maintenance of equipment and facilities, fuel, supplies, modification kit installation, and repair of parts for weapon systems and equipment. NOTE: The Inflation Calculator separates out the Fuel and Civilian Pay portions of the O&M appropriation.

3500 – Military Personnel Appropriation: Provides for military personnel costs, such as pay and allowances; retired pay accrual of officers, enlisted personnel and cadets; subsistence of enlisted personnel; permanent change of station; unemployment benefits; and survivor benefits. Military pay does have an outlay profile, but it is not used to develop weighted indices because military member pay is generally not adjusted for inflation when pay is distributed in a subsequent year from the year the obligation to the government was incurred.

3600 – Research, Development, Test, and Evaluation: Provide RDT&E for advanced technology development, strategic programs, tactical programs, intelligence and communications programs, and Defense-wide mission support; and for operating and maintaining research and development (R&D) facilities and a technology base.

3730 – Military Construction Air Force Reserve: Provides for the acquisition, construction, expansion, rehabilitation, and conversion of facilities for the training and administration of the Air Force Reserve. Its sub-elements include planning and design, major construction, minor construction, and support activities.

3830 – Military Construction Air National Guard (ANG): Provides for the acquisition, construction, expansion, rehabilitation, and conversion of facilities for the training and administration of the ANG. Its sub-elements include planning and design, major construction, minor construction, and support activities.