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NASA New Start Inflation Index

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Commonly used Acronyms:

CPI - Consumer Price Index
GDP – Gross Domestic Product
NASA - National Aeronautics and Space Administration
NNSI - NASA New Start Inflation Index
NRO - National Reconnaissance Office
ONCE - One NASA Cost Engineering Database
OMB - Office of Management and Budget
SID – Strategic Investments Division

General Inflation Questions

What is inflation?

Inflation "is an increase in the general price level of goods and services: it represents a reduction in a dollar's purchasing power" (Fuguitt and Wilcox). More specifically, OMB Circular A-94 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" (The Office of Managment and Budget). Lastly, the NASA Cost Estimating Handbook refers to inflation adjustment of cost to "reflect the decrease in the purchasing power of money over time. The inflation factor is the "multiplier" used to account for the change in the price of a product or service over time" (NASA).

What is an inflation rate?

Inflation rate is defined as the percentage change in the price of an identical item from one period to the next. This rate is generally positive, as prices rise over time, but in some cases and for some commodities, prices could fall (negative inflation rate) or stay even (zero inflation rate).

How does NASA account for inflation?

NASA generally uses one of two methods for accounting for inflation in its cost estimates. Prior to contractor selection, the NASA New Start Inflation Index is used. After contractor selection (usually around PDR/confirmation for many projects), NASA budget submissions generally reflect the forward pricing rates of the selected contractors (i.e. the NASA new start index is no longer needed).

What is the purpose of the NASA New Start Inflation (NNSI)?

The inflation tables are provided for the purposes of estimating new efforts and for normalizing historical cost from prior missions. This index is based on forecasted price changes by the econometric firm, IHS Markit, for a market basket of goods and services that is believed to be representative of NASA work.

Where can I get the NNSI?

The NNSI can be accessed three ways. Firstly, the NNSI can be accessed via the SID website (http://www.nasa.gov/offices/ocfo/sid/publications/). The NNSI can also be accessed via ONCE database within the libraries tab (https://oncedata.msfc.nasa.gov)[1].

How often is the NNSI updated?

The NNSI is updated once annually. Annual update will be conducted in the mid-October timeframe. Less frequently, NASA conducts a more detailed analysis of actual project costs to determine if changes in the categories are necessary. NASA last conducted this detailed analysis in September 2019.

[1] ONCEdata.com is not a public website.

How is the NNSI Constructed?

NASA uses a composite index to construct the NNSI based off of benchmarking with NRO and internal analysis. The composite is a weighted average[2] of several categories. Table 1 breaks out the high-level composition of the NNSI.

Category	Percent of Total
Labor	83%
Material	12%
Other Factors	5%

Each category is composed of several indices. Table 2 breaks out each category.

Category	Indices	Percent of Category
Labor	Compensation, Professional Scientific and Technical	70%
	Aerospace Product and Parts Manufacturing	10%
	Custom Computer Programming Services	10%
	Compensation, Office and Administrative Support	10%
Material	Fabricated Structural Metal	25%
	Semiconductors & Related Deivces	33.3%
	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical Sys and Instruments	41.7%
Other Factors	CPI (all items less food & energy)	70%
	CPI Fuels & Utilities	30%

OMB Circular A-94 says to use the GDP Deflator. Why not just use that?

The GDP Deflator is an economic metric that accounts for inflation by converting output measured at current prices into constant-dollar GDP. The GDP deflator shows how much a change in the base year's GDP relies upon changes in the price level. Also known as the "GDP implicit price deflator". Because it isn't based on a fixed basket of goods and services, the GDP deflator has an advantage over the Consumer Price Index. Changes in consumption patterns or the introduction of new goods and services are automatically reflected in the deflator. (Investopedia). Per OMB Circular A-94, "When a general inflation assumption is needed, the rate of increase in the Gross Domestic Product deflator from the Administration's economic assumptions for the period of the analysis is recommended. For projects or programs that extend beyond the six-year budget horizon, the inflation assumption can be extended by using the inflation rate for the sixth year of the budget forecast. The Administration's economic forecast is updated twice annually, at the time the budget is published in January or February and at the time of the Mid-Session Review of the Budget in July. *Alternative inflation estimates, based on*

[2] Weighted geometric mean utilized.

credible private sector forecasts, may be used for sensitivity analysis.[3]" (The Office of Managment and Budget). NASA recognizes OMB Circular A-94 guidance and recommends utilizing the NASA New Start Index for inflationary assumptions for new start NASA missions. The rationale is that the NNSI better represents the "basket of goods" conducted by NASA projects.

Inflationary Terms:

Inflationary terms confuse me. Is there a glossary of commonly used terms?

Inflationary terms can be confusing. In general, it is recommend that one use the following terms (NASA)[4].

Term	Definition
Base Year (BY) Dollar	A point of reference year whose prices form the basis for adjusting costs or prices from other years
Constant Year (CY) Dollar (ConstY)	Money or prices expressed in terms of values actually observed in the economy at any given time. Constant dollars represent the purchasing power of dollars tied to a particular base year's prices; the base year must be identified, e.g., constant FY04 dollars
Current Year (CY) Dollar (CurrY)	Money or prices expressed in terms of values actually observed in the economy at any given time. Current dollars represent the purchasing power of dollars at the time they are expended. (This is what NASA Calls Real-Year dollars, though that term is counter to its usage in DOD and other Federal departments, where real dollars means constant dollars
Budget Dollar	Total Obligation Authority (TOA) inflated according to the amount of escalation used in the current budget year
Then Year (TY) Dollar	TOA that includes a slice of inflation to cover escalation of expenditures over a multiyear period
Real Year (RY)	Money expressed as spent dollars
Inflation Rate	The % change in the price of an identical item from one period to another.
Outlay Profile	In percentage terms, the rate at which dollars in each appropriation are expected to be expended based on historical experience
Raw Inflation Index	A number that represents the change in prices relative to a base period of 1.0000. Typically periods are 1 year
Weighted Inflation Rate	Combines raw inflation indices and outlay profile factors to show the amount of inflation occurring over the entire period needed to expend the TOA
Composite Inflation Index	A weighted average of the inflation indices for the applicable sub-appropriations

NNSI is a composite index. What is a composite Index?

Composite inflation indices capture in a single number the effects of different amounts of inflation varying by appropriation or commodity. Composite inflation indices are essentially a weighted average, computed as

[3] Emphasis added.

[4] The following table is taken for the NASA Cost Estimating Handbook. One area of confusion is the term "Real Year". According to the NASA CEH, Real Year dollars are defined as, "dollars expressed as spent dollars". However, in economic terms, Real Year dollars are defined very differently. In economics, a nominal value is an economic value expressed in historical nominal monetary terms. By contrast, a real value is a value that has been adjusted from a nominal value to remove the effects of general price level changes over time and is thus measured in terms of general price level in some reference year (the base year). For example, changes in the nominal value of some commodity bundle over time can happen because of a change in the quantities in the bundle or their associated prices, whereas changes in real values reflect only changes in quantities (Wikipedia). This terminology can become very confusing. It is suggested that for communication purposes analysts utilize the more common economic terminology or skip the usage of "real-year" and use "constant year" and "then year" dollars.

follows: Determine the proportion (percent) of costs associated with each inflation index, multiply each index by its corresponding percent, sum these to get the composite index.

What does it mean to escalate and de-escalate?

Escalation is adjusting a dollar amount to account for the effects of inflation. De-escalation is removing inflation effects from a dollar amount.

I see that between years 1976 and 1977 there is a TQ. What is that?

TQ stands for Transition Quarter. The 1974 Congressional Budget and Impoundment Control Act modified the role of Congress in the federal budgetary process. It created standing budget committees in both the House and the Senate, established the Congressional Budget Office, and moved the beginning of the fiscal year from July 1 to October 1. The TQ inflationary value is accounting for inflation during that transition quarter. All escalation/de-escalation calculations that encompass that time period should include TQ inflation.

What's Interest vs Inflation?

It is important to differentiate between the concepts of inflation and the time-value-of-money. They are two different effects. Inflation accounts for the loss of the purchasing power of a dollar due to the general rise of prices in the economy. NASA produces a NNSI annually that cost analysts should use in their estimates. The time-value-of-money accounts for the fact that a dollar today is worth more to us than a dollar received in the future, say, a year from now. For example, if you invest a dollar you get today in a fixed-interest account, you will have more than a dollar a year from now because you will have earned interest on the investment[5]. (NASA)

What's the difference between Inflation and Productivity?

Inflationary factors do not account for explicit productivity gains, or put another way – efficiency or improvements. Inflation and productivity are related but are different and independent economic forces. The best explanation for explaining the difference between productivity and inflation came from an excellent paper on this very subject – the paper used a metaphor to describe the difference: "Inflation is like a jet stream headwind that negatively affects the fuel economy of an airliner. The headwind is beyond the control of the airliner, but the effects can't be ignored. Likewise, the cost of engineering, labor, exotic materials, etc., is largely beyond the control of the buying agency but can't be ignored (or suppressed by political desires). Productivity is like the efficiency of an aircraft design that also affects the fuel economy of the airliner — the cleverness of the design of the airliner affects fuel economy. Just as jet stream headwind and the airplane design efficiency are two factors that affect an airplane's fuel economy, inflation and productivity are also two separate factors that affect NASA economic efficiency. Similarly, the cleverness of NASA engineering and management has an effect on NASA productivity" (Coonce, Bitten and Hamaker). Another classic example would be productivity gains in computers over the last few decades.

[5] Interest rates can be depicted in one of two forms: the nominal rate or the real rate. The nominal rate is the rate of return that is used for payments that include inflation (i.e., cash flows measured in current- or then-year dollars). Nearly all loans and returns provided by financial institutions (e.g., mutual fund companies, banks, credit card companies, mortgage companies) are communicated to the customer as nominal rates. The real rate is the nominal rate adjusted to eliminate the effect of anticipated inflation/deflation, and it is used for payments that are in terms of stable purchasing power (cash flows measured in constant- or base-year dollars). Real rates are primarily used to perform EAs with cash flows depicted in constant (base-year) dollars. (NASA)

This inflation stuff sounds awesome. Where can I learn more?

There are several available sources for more information on inflation in general. The SID would recommend:

- DoD Inflation Handbook (Wise, Lochbryn and Oprisu): https://www.ncca.navy.mil/tools/OSD_Inflation_handbook.pdf
- Consumer Price Index (CPI): http://www.bls.gov/cpi/
- Bureau of Economic Analysis (BEA) – Gross Domestic Product (GDP) deflator: http://www.bea.gov/itable/
- Wikipedia:
  - Inflation: https://en.wikipedia.org/wiki/Inflation
  - Real versus nominal value: https://en.wikipedia.org/wiki/Real_versus_nominal_value_(economics)

If you still have questions, especially with specifically the NASA New Start Inflation Index, please feel free to contact Mr. Charles Hunt (Charles.d.hunt@nasa.gov).

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