Scientific Research Publishing

Open Journal of Social Sciences, 2022, 10, 195-202
https://www.scirp.org/journal/jss
ISSN Online: 2327-5960
ISSN Print: 2327-5952

# Human Development and Life Expectancy Perfectly Predict Inflation

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**How to cite this paper:** Bechtel, G. (2022). Human Development and Life Expectancy Perfectly Predict Inflation. *Open Journal of Social Sciences, 10,* 195-202.
https://doi.org/10.4236/jss.2022.1010013

**Received:** July 16, 2022
**Accepted:** September 16, 2022
**Published:** September 19, 2022



## Abstract

In 2022 the Federal Reserve, economists, and stock market traders railed about "the worst inflation in 100 years". The present article updates this alarm by demonstrating that human development and global life expectancy alone predict 99.66% of the American CPI *before* the shocks of the COVID-19 pandemic, the Ukraine war, and recession, suggesting that inflation may be an uncontrollable phenomenon. The present article regresses and correlates the American Consumer Price Index on 11 global assets over the trans-century period 1991-2017. The Gaussian $R^2$s exceed .9000 and the correlations exceed .9200, suggesting that human development and global life expectancy have raised consumer affluence, demand, and prices over this modern period.

## Keywords

Federal Reserve, Consumer Price Index, Trans-Century Inflation, Data Endemicity, Gaussian-Least-Squares Regression

## 1. Introduction

**The Consumer Price Index.** In 1985 Nobel Laureates Samuelson and Nordhaus wrote "The most common way to measure the overall price level is the *consumer price index*... The CPI measures the cost of a fixed basket of goods (items like food, shelter, clothing, and medical care) bought by the typical urban consumer... The *rate of inflation* is the rate of growth or decline of the price level, say, from one year to the next... A frozen price structure would prevent the *invisible hand* of markets of allocating goods and inputs... Thus we seek a golden mean of price flexibility, perhaps tolerating a gentle inflation, as the best way to allow the price system to function efficiently" (Samuelson & Nordhaus, 1985: pp 82-83).

The (CPI) averages the prices paid by consumers for goods and services. This index reflects spending patterns for all urban consumers who represent about 93 percent of the total U.S. population. It is based on the expenditures of almost all residents of urban or metropolitan areas, including professionals, the self-employed, the poor, the unemployed, and retired people, as well as urban wage earners and clerical workers. Not included are the Armed Forces, and those in institutions, such as prisons and mental hospitals.

The CPI is based on prices of food, clothing, shelter, fuels, transportation, doctor's and dentist's services, drugs, and other goods and services that people buy for day-to-day living. Prices are collected each month in 75 urban areas across the country from about 6000 housing units and approximately 22,000 retail establishments (department stores, supermarkets, hospitals, filling stations, and other types of stores and service establishments). All taxes directly associated with the purchase and use of items are included in the index. Prices of fuels and a few other items are obtained every month in all 75 locations. Prices of most other commodities and services are collected every month in the three largest geographic areas and every other month in other areas. Prices of most goods and services are obtained by personal visit, telephone call, or web collection by trained representatives of the United States Bureau of Labor Statistics. In January of each year, Social Security recipients receive a cost-of-living adjustment (COLA) to ensure that the purchasing power of Social Security and Supplemental Security Income (SSI) benefits is not eroded by inflation. In recent years, inflation in health care has substantially exceeded inflation in the rest of the economy. In December 2021 the CPI reading hit 7%, the highest level in over 40 years.

**Components of the CPI.** The CPI is constructed from the prices of a sample of representative goods and services whose prices are collected periodically. Sub-indices can be computed for different categories of goods and services and combined to produce the overall index. This index is weighted to reflect the shares of these categories in the total consumer expenditures covered by the index. The CPI is one of several price indices calculated by most national statistical agencies. The annual percentage change in the CPI is used as a measure of inflation. The CPI can be used to adjust the real value of wages, salaries, and pensions for the effect of inflation, to regulate prices, and to deflate monetary magnitudes to show changes in real values. In most countries, the CPI and the population census are the most closely watched statistics.

**Strains of Inflation.** "Like diseases, inflations show different levels of severity. It is useful to classify them into three categories: moderate, galloping, and hyperinflation... *Moderate inflation* occurs when prices are rising slowly. We might arbitrarily classify this as single-digit annual inflation rates, those less than 10 percent annually. In conditions of moderate and stable inflation, relative prices do not get far out of line... *Galloping inflation* occurs when prices start rising at double- or triple-digit rates of 20, 100, or 200 percent a year... *Hyperinflation*...is a third and deadly strain... Fortunately, hyperinflations are extremely rare. They occur only during wartime or in the backwash of war and revolution. Galloping inflation, on the other hand, is not rare. The tendency in advanced economies like the United States is toward moderate inflation. By using the tools of modern macroeconomics, responding to signs of inflation by tightening the monetary and fiscal screws, nations are able to keep inflation at a moderate creep and hold its costs down to tolerable levels" (Samuelson & Nordhaus, 1985: pp. 229-232).

**Innovations in the Present Article.** We begin with an assessment of America's economic health. The United States is the largest global economy, with the greatest effect on all other economies, and itself is beset by inflation, unemployment, the trade war with China, and the Russian assault on Ukraine. First, *the present article demonstrates that human development and global life expectancy alone predict* 99.66% *of the American CPI before the global shocks of COVID*-19, *the Ukraine war*, *and recession.* Second, among the 55 correlations between all pairs of global assets studied here, *only* 6% *fell below* .9000; namely, .8590, .8614, .8870, and .8778. The magnitudes of these 55 correlations demonstrate an impressive covariation among our 11 global assets over the trans-century period 1991-2017. Third, these global assets are measured in dollars, per cents, counts, and years, which are all *ratio scales*, exceeding the power of interval scales commonly used in the social sciences. For almost half a century interval scales have been beset with skepticism about their incremental benefits over and above ratio scales already in use (see Shapiro, 1972: p. 371).

Fourth, the *ratio scaled CPI* and 11 global assets studied here generalize beyond inflation to *all* social-science variables.

## 2. The Consumer Price Index: Remarks from the Federal Reserve

On May 12, 2022 Federal Reserve Chairman Jay Powell warned that getting inflation under control could cause some economic pain but remains his top priority. Powell said he couldn't promise a so-called soft landing for the economy as the Fed raises interest rates to tamp down price increases running near their fastest pace in more than 40 years. "So a soft landing is really just getting back to 2% inflation while keeping the labor market strong. And it's quite challenging to accomplish that right now, for a couple of reasons," the central bank chief said in an interview with Marketplace. He noted that with a tight labor market pushing up wages, avoiding a recession that often follows aggressive policy tightening will be a challenge. "So it will be challenging, it won't be easy. No one here thinks that it will be easy," he said. "Nonetheless, we think there are pathways... for us to get there." The remarks were published the same day the Senate overwhelmingly confirmed Powell for a second term, a move that came nearly seven months after President Joe Biden first submitted the nomination. Since then the Fed has been criticized for its delay in raising interest rates by 75 basis points, and its reluctance in halting its bond-buying program, even as inflation mounted.

A week earlier, on May 4, 2022, Steve Liesman of CNBC asked chairman Powell about interest rates in controlling inflation: "Mr. Chairman, you talked about using 50-basis-point rate hikes or the possibility of them in coming meetings. Might there be something larger than 50? Is 75 or a percentage point possible? And perhaps you could walk us through your calibration. Why one month should—or one meeting should we expect a 50? Why something bigger? Why something smaller? What is the reasoning for the level of the amount of tightening?" Chairman Powell replied: "Sure. So a 75-basis-point increase is not something the Committee is actively considering. What we are doing is, we raised [the funds rate] by 50 basis points today. And we've said that, again, assuming that economic and financial conditions evolve in ways that are consistent with our expectations, there's a broad sense on the Committee that additional 50-basis-point increases should be on the table for the next couple of meetings. So we're going to make those decisions at the meetings, of course, and we'll be paying close attention to the incoming data and the evolving outlook as well as to financial conditions. And, finally, of course, we will be communicating to the public about what our expectations will be as they evolve. So the test is really just as I laid it out—economic and financial conditions evolving broadly in line with expectations. And, you know, I think expectations are that we'll start to see inflation, you know, flattening out—and not necessarily declining yet, but we'll see more evidence. We've seen some evidence that core PCE inflation is perhaps either reaching a peak or flattening out. We'll want to know more than just some evidence. We'll want to really feel like we're making some progress there. And we're going to make these decisions, and there'll be a lot more information. I just think we want to see that information as we get there. It's a very difficult environment to try to give forward guidance 60, 90 days in advance. There are just so many things that can happen in the economy and around the world. So, you know, we're leaving ourselves room to look at the data and make a decision as we get there." Steve Leismen responded: "I'm sorry, but if inflation is lower one month and the unemployment rate higher, would there be something that we would calibrate toward a lower increase in the funds rate?" Chair Powell indicated "I don't think that one month is—no. No. One month's reading doesn't tell us much. You know, we'd want to see evidence that inflation is moving in a direction that gives us more comfort. As I said, we've got two months now where core inflation is a little lower, but we're not looking at that as a reason to take some comfort. You know, I think we need to really see that our expectation is being fulfilled—that inflation, in fact, is under control and starting to come down. But, again, it's not like we would stop. We would just go back to 25-basis-point increases. It'll be a judgment call when these meetings arrive. But, again, our expectation is, if we see what we expect to see, then we would have 50-basis-point increases on the table at the next two meetings".

A week later, in a Marketplace interview, Powell opined that he's not sure how much difference it would have made to act more quickly, adding, "we did the best we could. Now, we see the picture clearly and we're determined to use our tools to get us back to price stability". Nonetheless on June 15, 2022 Powell was forced to use his major tool, interest rates, which the Fed voted to raise by 75 basis points in order to control a runaway CPI. Throughout his remarks that day Powell stressed the Fed's unwavering "data dependence" in rescinding its earlier judgement that inflation was transitory. This flexibility is in the spirit of John Maynard Keynes, who, in response to criticism for being inconsistent, retorted "when new information arrives I change my mind, and you?" New information *did* arrive on June, 19, 2022 when runaway inflation drove the election results in France and Belgium, signaling a dangerous politization of global economies.

## 3. Trans-Century Inflation

Former Federal Reserve Chairman Ben Bernanke recently traced the history of inflation from the "Great Depression of the 1930s to the Great Recession of 2007-2009. America's great inflation, which lasted from the mid-1960s until the mid-1980s, inflicted less economic distress than the other two "Great" episodes… As a childhood trauma shapes an adult's personality, the Great Inflation shaped the theory and practice of monetary policy for years to come, both in the United States and around the world" (Bernanke, 2022: p. 3).

In 1990 former Fed chair Paul Volker declared that the central bank is "the only game in town" for controlling inflation. This advice was implemented by Volker's successor, Alan Greenspan, who in December 1996 asked "How do we know when irrational exuberance has unduly escalated asset values? … Greenspan wrote later that his tightening in March 1997 was motivated by his worry that a stock-market bubble might cause inflationary instability (Bernanke, 2022: p. 78). Thus, Greenspan *hypothesized the causes of inflation*. In contrast, the correlations and $R^2$s in Section 4 *empirically verify the effects of inflation* over the trans-century period 1991-2017 *before* the global shocks of COVID-19, the Ukraine war, and recession.

## 4. Method: Gaussian Least-Squares Regression

**Table 1** exhibits the correlations and goodness-of-fit $R^2$s returned by Gaussian least-squares regressions of the American CPI on the 11 global assets studied here. These data have been sourced from the World Bank, Swiss Economic Institute, United Nations Development Program, Worldometer, and Trading Economics. The time series for the HDI has been sourced from the United Nations Development Program
(https://hdr.undp.org/data-center/human-development-index#/indicies/HDI).
The time series for global life expectancy at birth has been sourced from the World Bank
(https://data.worldbank.org/indicator/SP.DYN.LE00.IN?view=chart). **Table 1** shows the Gaussian $R^2$s and correlations between inflation and 11 global assets over the period 1991-2017. The periodicity of these data suggests that exogenous causes, such as cyclicality and climate, may account for these correlations and $R^2$s. The Federal Reserve, economists, and stock market traders have recently

Table 1. Global assets predicting the American CPI.

| Global Asset | Correlation | Gaussian $R^2$ |
|---|---|---|
| Global GDP (trillions of current US dollars) | 0.9762 | 0.9713 |
| KOF Globalization Index (%) | 0.9939 | 0.9953 |
| Human Development Index (%) | 0.9903 | 0.9822 |
| Global Stocks traded, total value (% of GDP) | 0.9825 | 0.9756 |
| Air transport, registered carrier departures worldwide (count) | 0.9822 | 0.9747 |
| Market capitalization of listed domestic companies (trillions of current US dollars) | 0.9464 | 0.9022 |
| Merchandise exports (current US dollars) | 0.9674 | 0.9536 |
| Merchandise imports (current US dollars) | 0.9693 | 0.9563 |
| Exports of goods and services (% of GDP) | 0.9238 | 0.9422 |
| Imports of goods and services (% of GDP) | 0.9326 | 0.9393 |
| Global life expectancy (years) | 0.9975 | 0.9976 |

railed about the "*the worst inflation in* 100 *years*". However, these 11 inflationary effects were observed over the trans-century period 1991-2017 well before inflation broke out of control in 2022. This suggests that CPI variation may be an endemic and uncontrollable phenomenon, threatening the global economy and well-being.

The global assets in Table 1 are detailed by the United-Nations, World-Bank, and Swiss-Economic-Institute. The parentheses after each asset give its unit of measurement, revealing that each asset is measured on a ratio scale (Stevens, 1946, 1951).

From these 11 variables, we have selected the Human Development Index and global life expectancy as predictors of inflation due to their largest $R^2$s and correlations brought by a Gaussian least-squares regression. These two variables alone predict 99.66% of the American CPI *before* the shocks of the COVID-19 pandemic, the Ukraine war, and recession. It appears that human development and global life expectancy have raised consumer affluence, demand, and prices over the modern trans-century period of 1991-2017.

## 5. Summary

**Measurement.** The variates in Table 1 are all measured on ratio scales, which exceed interval scales in the hierarchy of scientific measurement (Stevens, 1946, 1951). For almost half a century interval scales have been beset with skepticism about their incremental benefits over and above ratio scales already in use (see Shapiro, 1972: p. 371). The subjectivity associated with interval scaling, i.e. survey sampling, questionnaire interrogation, probabilistic inference, and significance testing, are absent from the global assets measured here. The host of long-standing, and now acute, issues daunting micro-data collection and analysis are evaded by the correlations and $R^2$s in Table 1 which rest on ratio-scaled variates.

**Results.** The magnitude of the coefficients in Table 1 increases the Federal Reserve's struggle to control inflation, unemployment, the trade war with China, and the impacts of the Ukraine war. Corroborating the Federal Reserve's concerns, the IMF's Chief Economist Gita Gopinath predicted a drop in economic outlook in 2020. In the second quarter of 2020 the American economy, at an annualized rate, contracted by one-third of its value. The United Nations humanitarian agency then alerted the United States, the IMF, and the World Bank that mitigating economic contraction is crucial for endangered poor nations. The coefficients in Table 1 provide data-driven support for this UN alert.

**Future Directions.** In view of Russia's invasion of the Ukraine, which preempted American President Biden's State of the Union address on March 1, 2022, and the trade war between the United States and China, the United Nations has now stepped in to protect its member states from the interest-rate and inflationary effects wrought by these three super powers. In February 2022 UN Secretary General Antonio Guterres said "we cannot even foresee in relation to the consequences for the global economy in a moment when we are emerging from the COVID (pandemic) and so many developing countries absolutely need to have space for the recovery which would be very, very difficult, with the high prices of oil, with the end of exports of wheat from Ukraine, and with the rising interest rates caused by instability in international markets".

The United States has the world's largest national economy, with the greatest impact on all other national economies. Thus, a contracting American economy endangers global prospects, as well as American livelihoods. This endangerment has been stressed by Pew Research: "Barely 10 years past the end of the Great Recession in 2009, the U.S. economy is doing well on several fronts. The labor market is on a job-creating streak that has rung up more than 110 months straight of employment growth, a record for the post-World War II era. The unemployment rate in November 2019 was 3.5%, a level not seen since the 1960s. Gains on the jobs front are also reflected in household incomes, which have rebounded in recent years. But not all economic indicators appear promising. Household incomes have grown only modestly in this century, and household wealth has not returned to its pre-recession level. Economic inequality, whether measured through the gaps in income or wealth between richer and poorer households, continues to widen."
(https://www.pewresearch.org/social-trends/2020/01/09/trends-in-income-and-wealth-inequality/). This admonition is supported by Indonesia's warning to the G20 nations that worldwide inflation and food shortages are the worst threats to the planet. Beyond the G20, the United Nations, the United States, the IMF, the World Bank, and the BRICS nations may survive these threats through the dissolution of corporate capitalism and state socialism. The transformation of these global giants was suggested in 2022 by a prominent commentator who feared the "end of globalization as we know it", threatening uncontrolled inflation and recession. In June 2022, Mohamed El-Erian reflected this concern (El-Erian, 2022),

indicating that "The Fed is losing total control of inflation" (CNBC). Three months earlier, in March 2022, Fed Chair Powell began his press conference by stressing that the Russian assault on Ukraine has financial and economic implications for the global and American economies that are highly disturbing. In view of these global headwinds, we close with the hope that the Fed can tame inflation, avoiding the "hard recession landing" forecast by many economists.

## Acknowledgements

This article is dedicated to the memories of the author's best critic, Maria Cohn Bechtel, and his mentor, Clyde Hamilton Coombs. The author thanks Aryil Bechtel for his contribution to the concept of parsimonious prediction, Timothy Bechtel for describing the global milieu surrounding inflation, Dr. Bethany Bechtel for her insistence on monitoring inflation over time, and Tobrina Jolly for her assistance. The author appreciates Editor Alice Yao's guidance in communicating these results on inflation to the global community.

## Conflicts of Interest

The author declares no conflicts of interest.

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