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Passage of the Federal Reserve's Third Mandate

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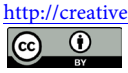

Abstract

The American Federal Reserve's Board of Governors has been negotiating with the Congress in order to add a third mandate to their longstanding missions of reducing unemployment and inflation. Chairman Powell described this mandate as the mitigation of shrinking GDP. We model this mandate by two axioms, which reveal American GDP as the sole driver of global GDP. The close fit of each model demonstrates that axiomatic venture can discover and corroborate truth via distinct pathways. In view of trade-war and pandemic shocks to GDP worldwide, this third mandate is now compelling. Congressional inaction will reduce global livelihood in a post-pandemic era (https://www.federalreserve.gov/newsevents/testimony/powell20190710a.htm).

Keywords

Axiomatic Venture, Data Science with Real (vs Random) Variables, Discovery of Alternative Truths, Goodness of Fit, Post-Pandemic Era, Shocks to Global GDP, The Livelihood of Nations

1. The Third Mandate and Keynesian GDP

In the great depression Simon Kuznetz formulated American national accounts in terms of dollars, which evaluated different commodities in a common unit. He added up various national income sources and reported his result to the United States Senate in January, 1934 (Masood, 2016) (Prologue, Chapters 2 and 3). "In 1940, six years after Simon Kuznetz had presented his national income estimates to the Senate, Keynes had written down in a table the basis for what today is the formula for GDP" (Masood, 2016: p. 26). This formula adds up three macro indicators, *household expenditure*, *domestic savings*, and *government expenditure*, which constitute Keynesian GDP (cf. Section 2).

In the preceding decades, John Maynard Keynes had deplored the vindictive Versailles Treaty ending World War I, saved the United States in the depth of the Great Depression, and constructed our gross domestic product (GDP). Following Kuznetz, Keynes introduced household expenditure and domestic savings as elements of GDP in 1936 in his *General Theory of Employment, Interest and Money* (Keynes, 1936). In 1940 he added government expenditure as GDP's final component in *How to Pay for the War* (Keynes, 1940).

Near the end of World War II in 1944, Keynes proposed "a new world currency, a system of fixed exchange rates between this world currency and the national currencies, and a world central bank that would run the whole system" (Varoufakis, 2016: p. 14). His proposal was dismissed at the Bretton Woods Conference by American planners who insisted on a *dollar-backed* fixed exchange-rate system which has since controlled the global economy (http://en.wikipedia.org/wiki/Bretton_Woods_system).

"Shortly before his death on 21 April 1946, Keynes persuaded the powers at the University of Cambridge to create a new Department of Applied Economics. […] the Cambridge department along with Harvard University's Development Advisory Service would together […] incubate the first set of ideas around what GDP would look like, and then help to export them to the four corners of the world" (Masood, 2016: p. 32). American planners then used Keynes GDP formula to measure the effect of American aid and to manage European economies. In 1999, mindful of Simon Kuznets original accounting of distinct goods like cars and cereal boxes by their dollar values (Masood, 2016) (Introduction), the United States Commerce Department proclaimed the GDP formula as the US government's greatest invention of the 20th century. The calibration of GDP's three indicators *in current US dollars for all nations* signals a continuing American control of the global economy.

2. Indicators of GDP

This paper views Keynes' three classic GDP constituents as separate time-varying indicators, which are described by the World Bank (http://beta.data.worldbank.org):

Household final consumption expenditure (current US$): "Household final consumption expenditure (formerly private consumption) is the market value of all goods and services, including durable products (such as cars, washing machines, and home computers), purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. Data are in current US dollars".

Gross domestic savings (current US$): "Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption). Data are

in current US dollars".

The World Bank's update of Keynes final indicator, added during World War II (Masood, 2016) (Chapters 2 and 3) (Keynes, 1940), is:

General government final consumption expenditure (current US$): "General government final consumption expenditure (formerly general government consumption) includes all current government expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation. Data are in current US dollars".

This dollar denomination of variables counted in different units (automobiles, cereal boxes, etc.) allows the ratio scaling of GDP up to a multiplier calibrating GDP in single, thousands, millions, billions, or trillions of current US dollars. This ratio scaling also allows daily exchange-rates to multiply one nation's currency into another's (e.g. dollars into yen).

3. Global GDP as a Linear Function of American and Chinese GDPs

A nation's dollars in household expenditure, domestic savings, and government expenditure informs its allocation of resources. For example, the Federal Reserve is guided by the datum that two thirds of American GDP is household expenditure. Conversely, the bulk of Chinese GDP is domestic savings. The International Monetary Fund (IMF), especially sensitive to China's global influence, has noted that Chinese government policy is now "designed to accelerate the transformation of the Chinese economic model, improve livelihoods, and raise domestic consumption" (Singh et al., 2013).

In the plethora of global indexes, GDP looms as the most fundamental composite. GDP is so basic, longstanding, and prestigious that market traders, analysts, and policy planners use the time series of contemporary Keynesian GDP in measuring a national economy, and the entire global economy, in trillions of current US dollars. In this section we treat American and Chinese GDPs as predictors of global GDP.

Definition: G, A, and C denote global, American, and Chinese yearly GDPs, calibrated in trillions of dollars, from 1990 through 2018. G, A, and C are *importance-weighted* by P, which denotes global yearly population size, calibrated in billions of individuals, from 1990 through 2018.

Our linear Axiom 1 is vulnerable to empirical verification. This verification rests on a linear regression of variable G on variables A and C, which are importance-weighted by variable P. Variables G, A, C, and P each contain 185 billion values.

Linear Axiom 1: $G = \alpha + \beta A + \gamma C$

Result 1: Axiom 1 is resulted by the Stata (StataCorp., 2011) command regress G A C [iweight = P], which produces **Table 1**.

The G, A, C, and P values in the 29 × 4 Stata dataset were accessed online from World Bank files (cf. url in Section 2).

The American and Chinese slopes in this simple trilinear regression are $\beta = 4.7894$ and $\gamma = .00$. Thus, a trillion dollar shrinkage in American GDP results in nearly a five trillion dollar loss in global GDP. Conversely, global GDP is unaffected by a trillion dollar loss in Chinese GDP. $R^2 = .9508$ for this trilinear regression, i.e. global GDP is *totally* accounted for by American GDP. This result, in view of the current trade war and global GDP deceleration, strongly supports Federal-Reserve testimony that worldwide well-being is threatened by shrinking American GDP (CNBC 2019, Summer).

4. Global GDP as an Iso-Elasticity Function of American and Chinese GDPs

Under the definition above, we remodel global, American, and Chinese GDPs with

$$\textbf{Iso-Elasticity Axiom 2:}\quad G = \alpha A^{\beta} C^{\gamma}$$

$$\textbf{Corollary:}\quad \log G = \log\alpha + \beta \log A + \gamma \log C$$

Result 2: Axiom 2 and its corollary are resulted by the Stata (StataCorp., 2011) command regress $\log G \log A \log C$ [iweight = P].

Table 1. Simple trilinear regression of G on A and C.

Source	SS	df	MS	R^2
Model	78,880	2	39,440	.9508
Residual	4085	183	22	
Total	82,964	185	448	
G	Coef.	Std. Err.	t	$P>\|t\|$
A	4.7894	.0824	58.10	.000
C	.0000	.0000	1.41	.160
_cons	−9.9365	1.1309	−8.79	.000

Note: The 185 degrees of freedom refers to the fact that 185 billion is the sum of 29 global population sizes from 1990 through 2018. Due to these large numbers, we ignore the last two columns of Table 1 (cf. Section 5).

Table 2. Trilinear log-log regression of G on A and C.

Source	SS	df	MS	R^2
Model	33.3129	2	16.6564	.9522
Residual	1.6710	183	.0091	
Total	34.9839	185	.1891	
$\log G$	Coef.	Std. Err.	t	$P>\|t\|$
$\log A$	1.1462	.0196	58.43	.000
$\log C$	.0074	.0031	2.40	.017
_cons	.9905	.0486	20.37	.000

Table 2 shows that the American and Chinese slopes in this trilinear log-log regression are $\beta = 1.1462$ and $\gamma = .0074$, indicating that a 1% reduction in American GDP produces a 1.1462% drop in global GDP (Johnston, 1984: pp. 518-521). Again, *no* percentage drop in global GDP is produced by a 1% shrinkage in Chinese GDP. Empirical support of axiom 2 is provided by $R^2 = .9522$ for this trilinear log-log regression, demonstrating that global GDP elasticity is driven by American GDP elasticity alone.

5. Conclusion

Data Science for the Third Mandate: Sections 3 and 4 override "The central dogma of statistical inference, that there is a component of randomness in data" (Van Dyke et al., 2015: p. 9). "Neither denying nor quantifying uncertainty, we simply ignore it." (Bechtel, 2017: p. 8). Our axiomatic approach to sequential populations brings compelling advantages to social data science. We replace probabilistic inference by parameter computation and random variables give way to real variables *G*, *A*, *C*, and *P*. This suggests further "statistical thinking and new foundational frameworks" that help sort out "the many philosophical issues data science presents" (Davidian, 2013). These "philosophical issues" in data science were broached in the last century by Tukey's *Exploratory Data Analysis* (Tukey, 1977) and Mosteller and Tukey's *Data Analysis and Regression*: *A Second Course in Statistics* (Mosteller & Tukey, 1977).

Exploration and Regression in Data Analysis: In the present paper we make an axiomatic approach to data analysis. Section 3, using a definition, axiom, and result, shows that an axiomatic venture, followed by a close model fit, can discover a particular "truth". Section 4, using an axiom, corollary, and result, illustrates that the discovery and close fit of a particular model does not imply its *uniqueness*. Thus, we find that an isoelasticity model, with a fit equally as close as its linear counterpart in Section 3, produces an alternative "truth".

The Federal Reserve and Monetary Stability: In the 21st century GDP remains the most sought-after index for measuring global and national economies (Masood, 2016: p. 101). Since 2012 the Federal Reserve's Board of Governors has been negotiating with the Congress in order to add a third mandate to their longstanding missions of reducing unemployment and inflation. Federal Reserve Chairman J. Powell described this mandate as the mitigation of shrinking GDP. We have modeled this mandate by two axioms, revealing American GDP as the sole driver of global GDP. The close fit of each model demonstrates that axiomatic venture can discover and corroborate truth via distinct pathways. These conceptual and empirical findings strongly support the Federal Reserve's unprecedented actions to slow US, and hence global, GDP contraction. In view of trade-war and pandemic shocks to GDP, the Feds third mandate is now compelling.
(https://www.federalreserve.gov/newsevents/testimony/powell20190710a.htm).
It's *passage* through the American Senate and House of Representatives will en-

hance the livelihood of all nations in our post-pandemic era.

Outlook for 2020: In his Report to the Congress on 31 March, 2020 Fed Chairman Powell noted the "shocking" first quarter drop in Chinese GDP of 36%. The drop in European GDP was 12%, and the shrinkage in non-American GDP in the first quarter of 2020 was 13% (https://www.federalreserve.gov/newsevents/testimony/powell20190710a.htm/).

Six weeks later Powell reiterated the Federal Reserve's unprecedented lending to foreign individuals, corporations, and governments to mitigate global GDP loss (https://www.cnbc.com/world/?region=world, 13 May, 2020). In normal times foreign investors purchase US Treasury assets to boost their GDP. Chairman Powell could only hope that the pandemic will abate soon enough for the US debt to GDP ratio to move from the current 110% to 100%. This would allow low pre-pandemic unemployment and inflation rates to return. Lowering unemployment and inflation are the Federal Reserve's original mandates assigned by the US Congress.

The Powell 13 May, 2020 report was watched by IMF's Chief Economist Gita Gopinath, who warned America of a drop in global economic outlook in 2020 (CNBC, 24 June, 2020). On this same day she predicted that worldwide GDP will shrink 4.9% in 2020 (Aljazeera, 24 June, 2020). In the second quarter US and German GDP then fell 10%, the largest quarterly drop for these two nations since WWII. At an annualized rate, the American Economy contracted by *one third of its value* (CNBC and Aljazeera, 30 July, 2020).

Recent Oxfam data has verified that rich-nation inaction costs, stemming from poor-nation famines, low education, and civil wars, are orders of magnitude greater than proactive prevention of these tragedies (Aljazeera, 16 July, 2020). Our results in Section 3 and 4 also demonstrate that sinking US GDP endangers global prospects as well as American livelihoods.

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Conflicts of Interest

The authors declare no conflicts of interest.

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