

Gold Part 2: A Quantitative Model for Pricing Gold

Calibrating Fiat and Labor in Monetary Systems

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Independent Research

Abstract

Gold is not a store of value. It is the unit that defines value.

The error of modern finance lies in treating gold as a speculative asset rather than a metrological constant. In an age of fiat abstraction, we have mistaken movement of the ruler for movement of the world. This paper proposes a simple, empirically grounded method to re-anchor value measurement to an invariant: gold as the dimensional meter of monetary systems, labor as its base unit, and fiat as a derivative expression of both.

By re-establishing the relationship between labor, output, and gold supply, we recover a fixed reference frame for valuation — a calibration system for an unmoored economy.

Keywords: gold valuation, fiat calibration, monetary invariance, labor economics, GDP-gold ratio, monetary base, metrological constant, economic measurement, productivity alignment

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I. Definition and Ontology of Gold

Gold (chemical symbol Au, atomic number 79) is a dense, malleable, nonreactive element whose physical invariance makes it unique among naturally occurring substances. It neither oxidizes nor decays, and its supply grows at a rate slow enough to mirror human productivity. Its rarity is neither excessive nor trivial, and its divisibility enables both physical and abstract exchange. These are not incidental properties — they are the foundation of its monetary role.

The word troy derives from Troyes, the medieval French trade fair that became a center for standardizing weights among European merchants. The “troy ounce,” defined as 31.1034768 grams, predates the metric system by centuries and persists as the global standard for precious metals. Its endurance is a living artifact of monetary history — a reminder that money is not defined by governments, but by consensus on measurement.

To contrast: the SI (metric) gram is defined physically through atomic constants, while the troy system is defined historically through exchange. The two intersect in a single point — gold — where matter and convention meet.

II. The Evolution of Gold as a Standard

Gold first emerged as a medium of exchange not because it was shiny or rare, but because it was stable. Its metallurgical properties made it impossible to counterfeit convincingly, while its relative scarcity and universal desirability allowed it to bridge cultural and geographic boundaries.

Over time, gold took on three simultaneous roles:

1. *Commodity*: extracted, refined, and traded like any resource.
2. *Money*: minted and certified into standardized units by state or guild authority.
3. *Currency*: an abstracted claim upon gold, represented by inscription or paper.

These layers — commodity, money, currency — formed a coherent system so long as the ratios between them remained stable. When governments maintained honest convertibility, the system behaved as a closed feedback loop: labor produced goods, goods were exchanged for money, and money was redeemable for its invariant base.

The 20th century broke that loop. Gold ceased to circulate as currency, retreating to vaults while paper proxies expanded in its name. Yet the invisible denominator remained. Even now, the global system functions on a de facto gold standard — not by law, but by necessity. Central banks still measure their solvency in tonnes, not digits. Gold never left the system; it was only hidden.

III. Labor as the Base Unit of Value

All value originates from transformation — the conversion of potential into utility through human effort. This transformation, when generalized, is labor. It is the dimensional root unit of economics. Every product, service, or innovation can ultimately be decomposed into labor applied over time to physical matter.

Gold's singular importance arises from its alignment with this process. Its extraction cost, energy expenditure, and incremental output rate have, over centuries, co-evolved with human productivity. Gold's annual production averages 1.5–2%, almost identical to long-run global productivity growth. It is as if the Earth itself keeps time with civilization.

Thus, gold functions not as a speculative object, but as a naturally regulated index of collective human output. Labor defines what value is, and gold defines how value is measured. The two are coupled — the ruler and the hand that holds it.

IV. Constructing a Synthetic Valuation Framework

To determine whether gold is “cheap” or “expensive,” we must reverse the modern assumption. The correct question is not “what is gold worth?” but “how far has fiat drifted from equilibrium?”

We can express this using three interlocking ratios:

1. GDP–Gold Ratio

$$P_{gold} = \frac{GDP_{real}}{G_{stock}}$$

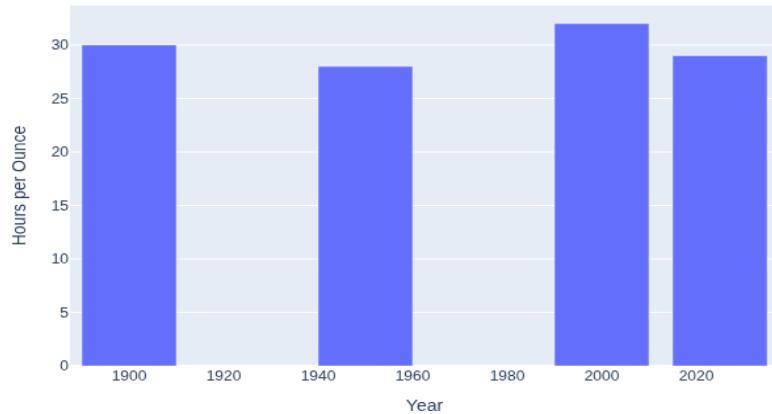
Here, GDP_{real} represents total world economic output (adjusted for inflation), and G_{stock} stock the total above-ground gold supply. The ratio measures total productive output per unit of invariant mass.

2. Labor–Gold Ratio

$$P_{gold} = W_{avg} \times \frac{H_{avg}}{G_{oz}}$$

Where W_{avg} is average hourly wage, and H_{avg} the mean labor hours per capita. This expresses gold value directly in labor terms — hours per ounce. Historical U.S. data shows remarkable stability here: since 1900, the labor-hour cost of an ounce of gold has oscillated within a narrow band (~25–35 hours/oz) despite radical shifts in technology, productivity, and fiat regimes.

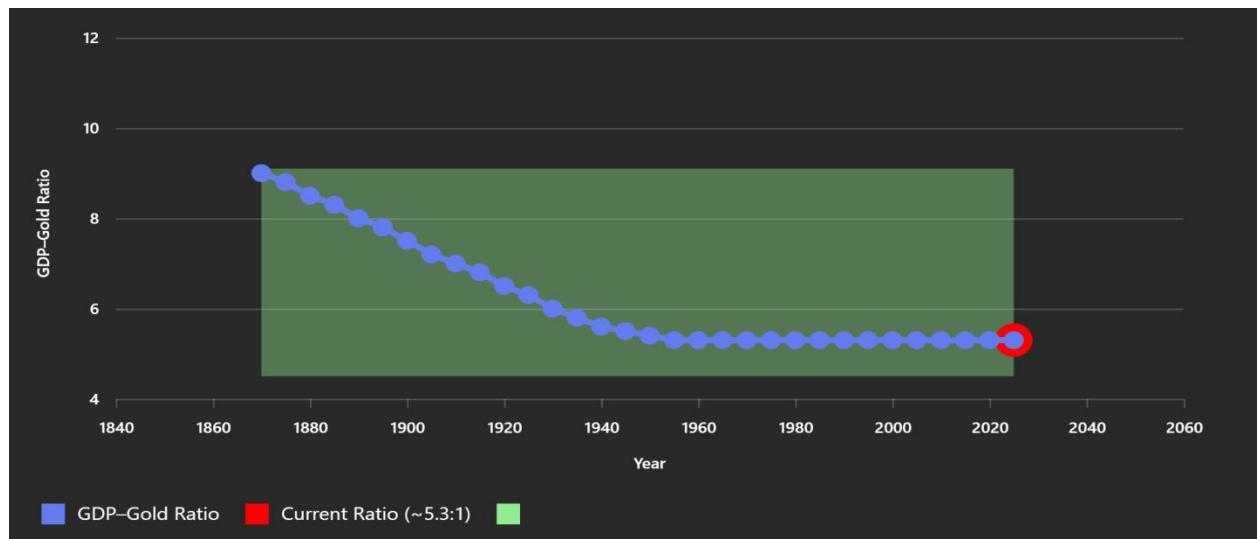
Historical Labor-Hour Cost of Gold



3. Monetary Base–Gold Ratio

$$P_{gold} = M_1/G_{stock}$$

This defines the implied gold value based on the size of the liquid money supply. Historically, the 1870–1913 gold standard period maintained coherence between this and the prior two ratios — a state of dimensional consistency.



When plotted over time, all three converge toward a long-term equilibrium between 8:1 and 10:1 in GDP:Gold terms. Today, the observed ratio sits near 5.3:1, implying an overvaluation of ~30–40% relative to historical equilibrium.

V. Interpretation and Dynamics

Gold's price volatility is an illusion — it is fiat's instability reflected in a fixed mirror. When currency expands faster than productivity, nominal gold rises. When austerity or liquidity contraction occurs, it "falls." But gold itself does not move. The reference plane is constant.

Following World War II, the U.S. dollar assumed the role of global clearinghouse. Because the war left American industry intact, over 70% of the world's monetary gold flowed into U.S. reserves. To prevent collapse of external trade, the Bretton Woods system formalized the dollar as a proxy for gold at \$35/oz — a policy peg, not a physical one. As postwar reconstruction normalized, gold's natural equilibrium reasserted itself. Once the U.S. began running trade deficits in the late 1960s, the peg could not hold: maintaining it would have required deflating domestic wages to match global rebalancing — a political impossibility. Nixon's suspension of convertibility in 1971 was not an act of innovation, but of necessity.

Since then, fiat has floated unanchored, yet the gravitational pull of gold remains. Central banks still accumulate it, and private markets still measure crisis by its rise. As of 2025, central banks are net buyers, creating a temporary demand distortion that pushes gold above equilibrium (~\$3,000/oz). Adjusted for monetary base and global productivity, a fair equilibrium lies closer to \$2,000–\$2,200/oz.

This is not speculation — it is calibration. Gold's "value" is simply the point where fiat drift crosses zero.

VI. Empirical Stability

Gold's stability is extraordinary. Across 5,000 years, no other substance has maintained such consistent proportionality to human labor and output. Its extraction cost, market supply, and social utility evolve in synchrony with civilization itself. The correlation is not perfect — but it is the closest thing economics has to a physical law.

Empirically:

- Global gold production expands at ~1.7% annually.
- Global productivity grows at ~1.6% annually.

The ratio of total economic output to gold stock remains within a single order of magnitude across centuries.

Unlike commodities, gold is not consumed. Its stock accumulates, making it a time-integrated record of civilization's total economic memory. This property — persistent, cumulative, incorruptible — is why it serves as the only known natural invariant in economics.

VII. Implications for Fiat Systems

If gold defines the unit of measure, fiat defines the derivative expression. Fiat functions correctly only when tethered — synthetically or physically — to an invariant referent. Without it, the ruler expands and contracts with each policy whim, introducing compounding calibration error into every transaction, contract, and market signal.

The resulting error manifests as inflation, mispricing of risk, and distortion of productive incentives. It is not moral failure; it is a metrological one. Fiat is not “bad” — it is simply uncalibrated.

Re-linking fiat to gold does not require metallic redemption, merely consistent dimensional mapping: measuring systemic drift through ratios like those above and adjusting supply expansion to maintain coherence. When the ruler’s length matches the world again, economics becomes predictive rather than interpretive.

VIII. Conclusion

Gold is not a store of value. It is the ruler by which value is stored.

Fiat’s instability is not a mystery — it is measurement drift.

In the hierarchy of monetary physics:

- Labor is the energy of value.
- Gold is the invariant measure.
- Fiat is the abstract instrument of exchange.

When the measure loses calibration, the system decays into noise. When it is restored, clarity returns.

Gold does not move. It reveals motion.