AI Dark Output: The Visible Cost of Invisible Output

Why AI's increasing output is going to be one of the hardest economic measurement problems in history. AI "Dark Output" could end up being the majority of economic activity, but a challenge to measure

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MAY 30, 2026

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During the 1980s and 90s, macroeconomic data could not detect the contribution of the emerging computer revolution. Famously, Robert Solow quipped “You can see the computer age everywhere, but in the productivity statistics.” And yet, despite the dot com boom and bust the Magnificent 7 now have a market cap 1.8x that of Europe. A similar issue is arising with AI where the macroeconomic data is not yet equipped to capture the value produced by AI while the headlines, public sentiment, and governments around the world are quick to capture the costs incurred in dollars, watts, gallons and jobs. Matt Drach had an interesting take separately from us on this.

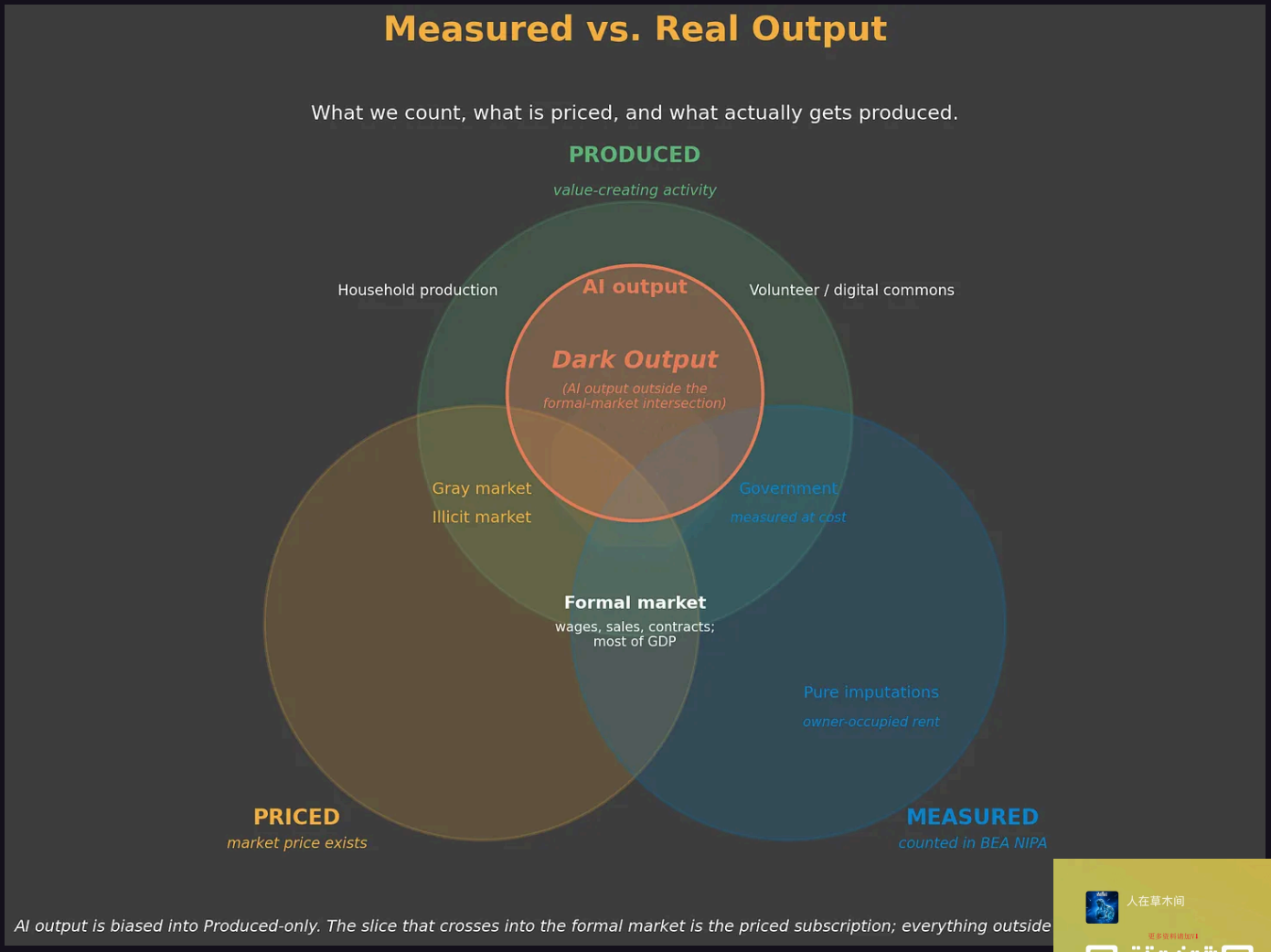
A boring 2013 methodology revision added R&D and investment in intellectual property to GDP accounting boosting total production for the 1990s by ~$3.6T. In the official accounts it was spread evenly, so the growth rate only rose marginally, but it amounted to nearly 30% of full year 2000 GDP. The magnitude of the measurement problem from AI dwarfs prior measurement issues, we call the work AI does that national accounts can’t currently see Dark Output. Even more of the new output from AI is likely to be invisible as it is clustered in the service sector where national statistics have longstanding issues with capturing productivity growth.

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Incoming Fed Chairman Kevin Warsh acknowledged as much in December 2025 “If you’re looking at the data, my view is you’re backward looking. You’re going to be late. You’re not going to realize the country is able to have non-inflationary growth faster. So you’re going to have to make a bet.” With the transition of AI growth to more active capital market

Dark Output

AI output will be real before it is measurable. We can capture token spend, and we can capture jobs lost. But unless AI's output is sold at a visible price, only token spend is captured in GDP. Normally when the price of something collapses, we can see this deflation and call the results productivity. Due to well-known difficulties in the service sector (see Appendix 1), GDP will record those as declines, and prices may even show inflation. Like the dark energy that makes up our universe, Dark Output will likely only be visible in its effects on other elements of the economy and not through direct observation. One of the most visible effects is job displacement which we are now tracking on our Dark Output Monitor.



Source: SemiAnalysis Tokenomics: Dark Output

services.

Types of Dark Output

Dark output is AI-enabled economic value that exists but is not visible, or is badly distorted, in GDP, prices, labor statistics, or industry accounts. We categorize this into two buckets:

- **Substitution dark output** is work that was previously done by humans and is now done by AI. In our Dark Output Monitor we have identified roughly $1.5T in tasks that current generation AI could substantially augment or automate.
- **New dark output** is new work done by AI that wasn't previously being done by humans (probably because it was too expensive to do until AI made it cheap). In the long run this is likely to be much larger than the substitution side.

In both cases, value exists despite the statistical system failing to see it. This is not a unique problem (see Appendix 1).

Three tests, one ledger — what GDP sees and what it doesn't

Each row is an activity in the economy. Three columns ask whether real labor produced it, whether a market price exists, and whether GDP captures it. An activity has to clear all three to land in the headline.

Activity	Produced *real labor*	Priced *market price*	Measured *captured by GDP*	Verdict
AI work inside a flat subscription	✓	—	—	*Inside the gap*
Household / unpaid care	✓	—	—	*Inside the gap*
Informal & criminal economy	✓	✓	—	*Inside the gap*
Government services (cost-based)	✓	—	✓	*Measured at cost*
Owner-occupied housing (imputed rent)	—	—	✓	*Measured by imputation*
Capital gains, transfers, asset sales	—	✓	—	*Priced but not output*
Ordinary market output	✓	✓	✓	*Captured by GDP*

Rows in orange are Dark Output candidates: real activity that doesn't clear the three-test gauntlet.

Source: SemiAnalysis Tokenomics: Dark Output