

# CBO's Economic Forecast: Understanding Productivity Growth

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# Purpose of CBO's Economic Forecast

The forecast is used primarily as an input to CBO's 10-year federal budget projections and analyses of legislative proposals.

It is a current-law forecast: It reflects the assumption that legislation will not change but that policy changes built into current legislation will occur.

For example, under current law, certain tax provisions are scheduled to expire at the end of 2025. CBO's current forecast projects the economic responses to the expiration of those provisions.

# CBO's Approach to Forecasting

CBO's approach involves projections of:

- **Potential (maximum sustainable) output** in a Solow-type growth model and
- **Actual output** in a standard macroeconomic model.

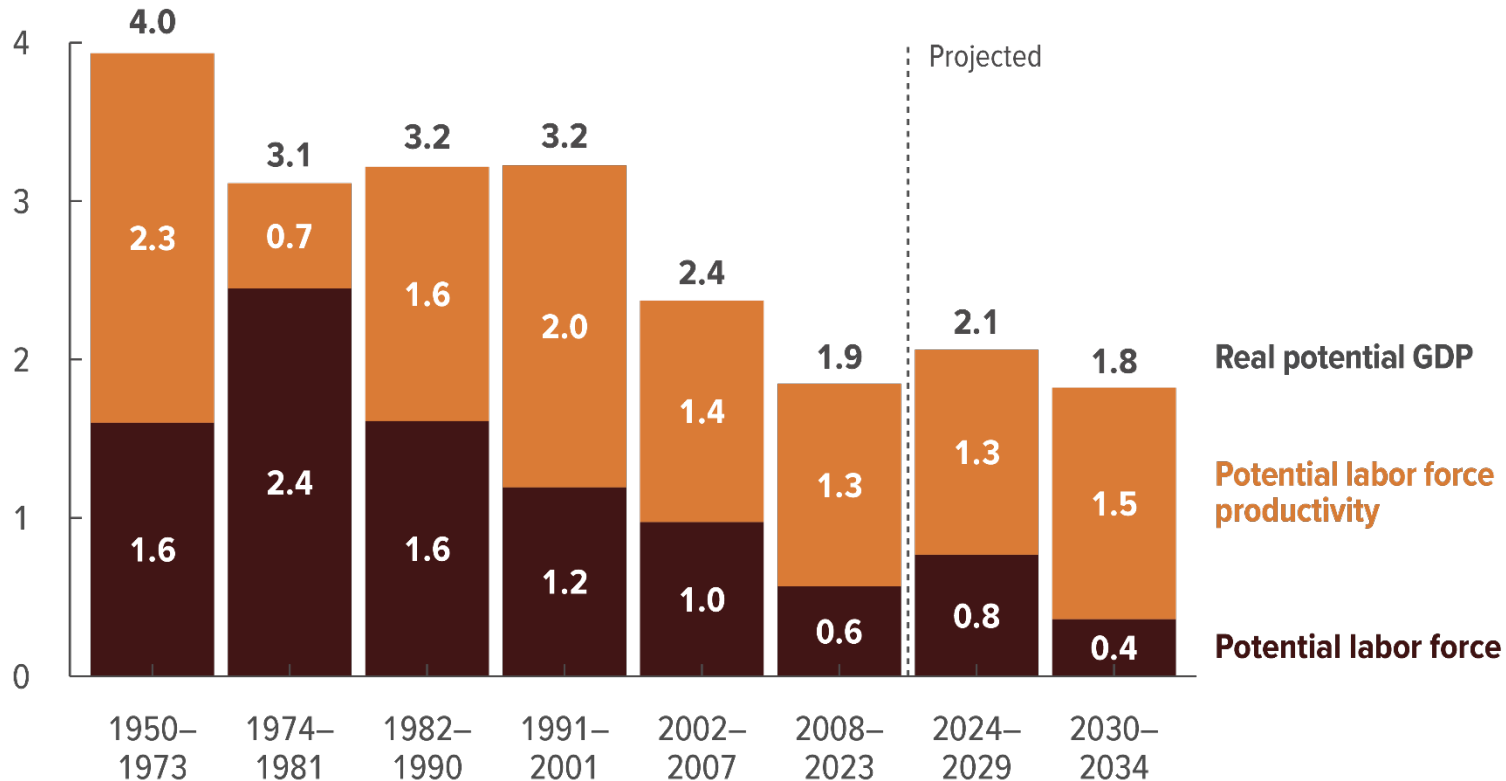
The estimate of potential output is mainly based on estimates of:

- The **potential labor force**,
- The **flow of services from the capital stock**, and
- **Potential total factor productivity (TFP)** in the nonfarm business sector.

The ratio of real potential gross domestic product (GDP) to potential labor force is known as potential labor force productivity.

# Average Annual Growth of Real Potential GDP

Percent



GDP = gross domestic product. Real values are nominal values that have been adjusted to remove the effects of changes in prices.

Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2024 to 2034* (June 2024), [www.cbo.gov/publication/60039](https://www.cbo.gov/publication/60039).

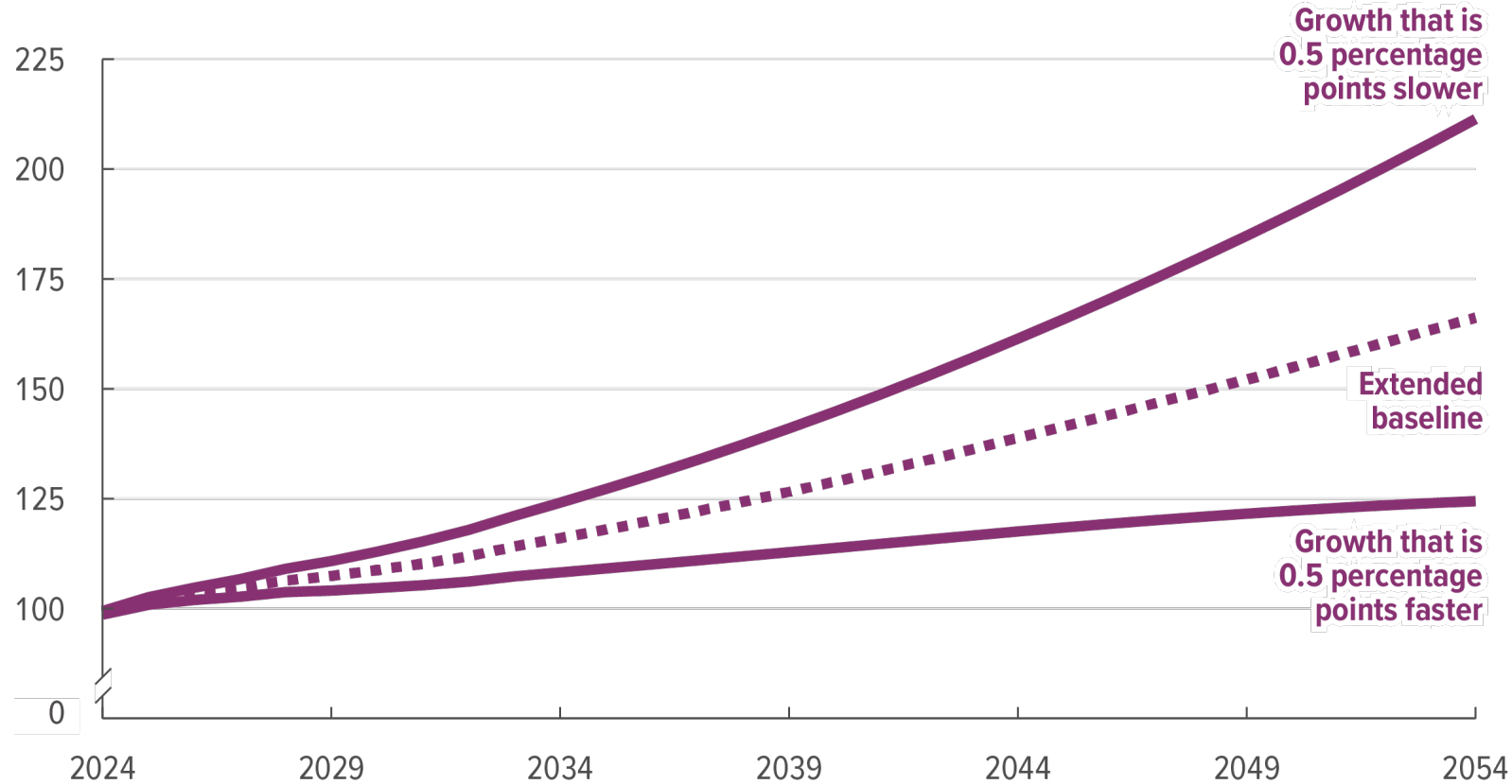


# Key Estimates in CBO's Projection of Potential GDP, February 2024

Average Annual Percentage Growth, by Calendar Year	Historical Periods							Projection
	1950–2023	1950–1973	1974–1981	1982–1990	1991–2001	2002–2007	2008–2023	2024–2034
<b>Overall Economy</b>								
Potential Output	3.1	4.0	3.1	3.2	3.3	2.4	1.9	2.0
Potential Labor Force	1.4	1.6	2.4	1.6	1.2	1.0	0.6	0.6
Potential Labor Productivity	1.7	2.3	0.7	1.6	2.0	1.4	1.3	1.4
<b>Nonfarm Business Sector</b>								
Potential Output	3.4	4.1	3.5	3.5	3.7	2.5	2.2	2.3
Potential hours	1.3	1.4	2.2	1.7	1.3	0.1	0.7	0.7
Capital services	3.4	3.8	3.7	3.5	3.9	2.8	2.5	2.3
Potential total factor productivity	1.4	1.8	0.7	1.1	1.5	1.4	0.9	1.1
Potential Labor Productivity	2.1	2.6	1.2	1.7	2.4	2.3	1.5	1.7

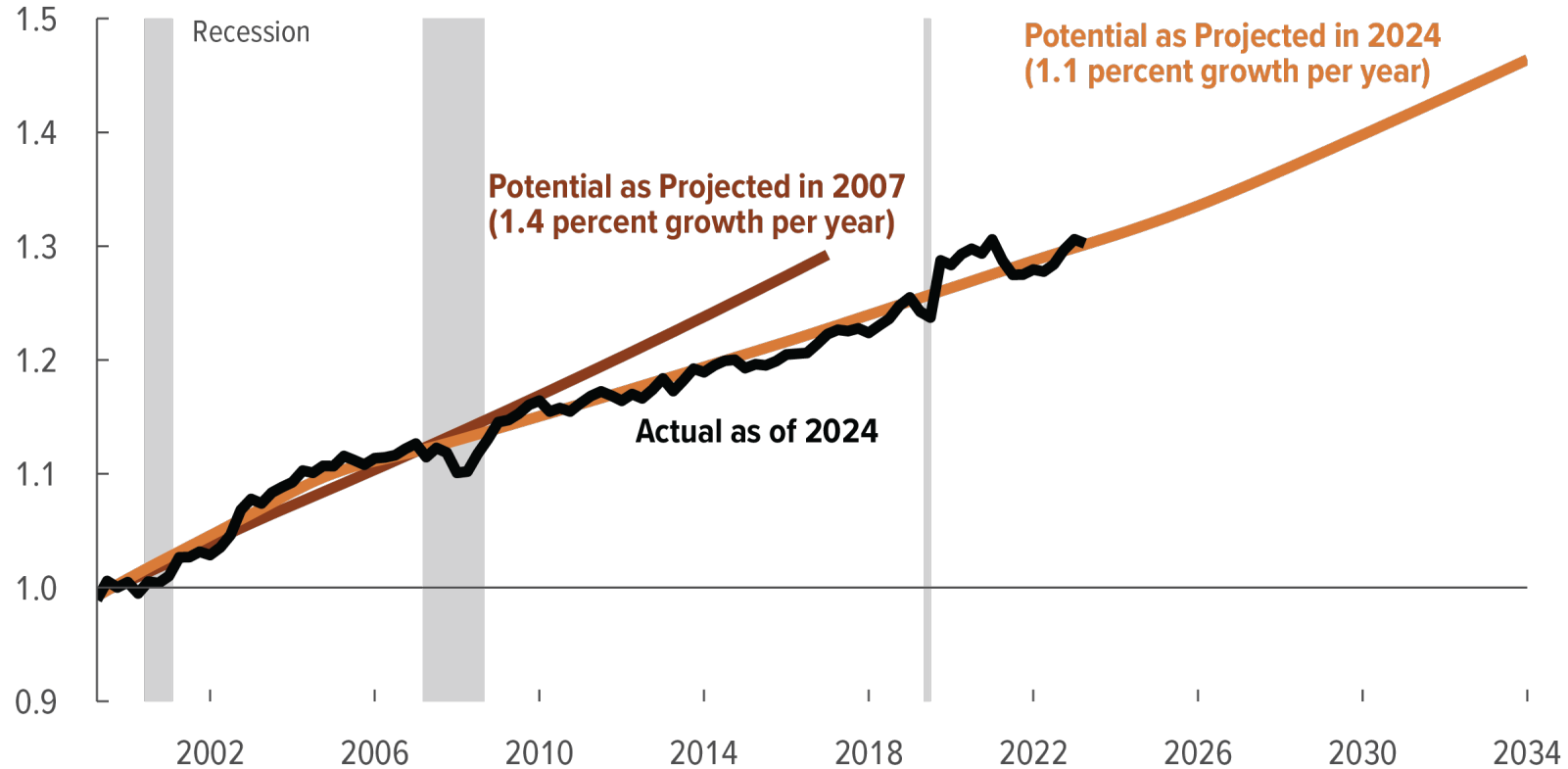
# How Does TFP Growth Affect Federal Debt Held by the Public?

Percentage of Gross Domestic Product



# Total Factor Productivity in the Nonfarm Business Sector Since 2000

2000 = 1



Vertical bars indicate the duration of recessions.

See Congressional Budget Office, *An Update to the Budget and Economic Outlook: 2024 to 2034* (June 2024), <https://www.cbo.gov/publication/60039>.

# Long-Term Slowdown of Growth in Total Factor Productivity and Possible Reasons for It

The slowdown began around 2005, before the financial crisis and the resulting recession.

It is widespread among industries and international in scope.

Five areas of inquiry might shed light on the slowdown:

- Measurement issues,
- Feedback from slower growth of other economic factors,
- Demographic effects,
- Structural issues, and
- A slowdown in basic innovation.



# Measurement Issues

Mismeasurement of inputs and outputs is persistent.

However, measurement issues account for only a small portion of the slowdown of TFP growth:

- Mismeasurement does not appear to be worse than it was in the past.
- Products no longer reflected in measures of output have relatively modest value to consumers compared with “missing” growth in TFP. An example is photographs: Digital photographs, which are not accounted for in GDP, have largely replaced printed ones, which were included in GDP.
- Measurement errors related to international supply chains are thought to explain less than 0.1 percentage point of the slowdown of TFP growth per year.

# Feedback From Slower Growth of Other Economic Factors

Growth of the labor supply has slowed dramatically since the 1960s and 1970s.

Aggregate demand recovered slowly in the aftermath of the 2007–2009 recession.

Those two developments have led to relatively modest demand for capital investment.

The net result is slower turnover of capital stock and slower introduction of new technologies (though there is little evidence of a backlog of technology).

# Structural Issues

The economy is becoming less dynamic:

- Top companies in many industries continue to have strong productivity growth, but other companies increasingly lag behind.
- Rates of companies' entry into and exit from the market have declined.
- The share of employment and output accounted for by young companies (historically a source of productivity growth) has fallen.

Economists have yet to reach a consensus about the causes:

- Are barriers to entry getting higher?
- Are product markets becoming less contestable?

Restrictive land-use regulations increasingly raise housing costs and discourage workers from migrating to denser urban areas, where most productivity growth occurs.

# Slowdown in Basic Innovation: The Pessimistic View

Innovation from the late nineteenth century through the early 1970s involved the discovery of several “general-purpose technologies” and was unique and unsustainable.

The acceleration of TFP growth during the 1990s and 2000s was a temporary deviation related to a new general-purpose technology: information technology.

We are “running out of ideas”: Research costs are rising, and new ideas are not as economically significant.

# Slowdown in Basic Innovation: The Optimistic View

The pool of potential innovators and the potential market for products are now global.

Research tools are greatly improved.

Communication of innovations is much more rapid.

Major advances in technology can be expected—information technology is the most recent example.

General-purpose technologies diffuse slowly, so it will take time for their full economic impact to be realized. The effects of general-purpose technologies, such as artificial intelligence, can be underestimated in TFP early in their development.

# The Slowdown of Growth in Total Factor Productivity: A Conceptual Error?

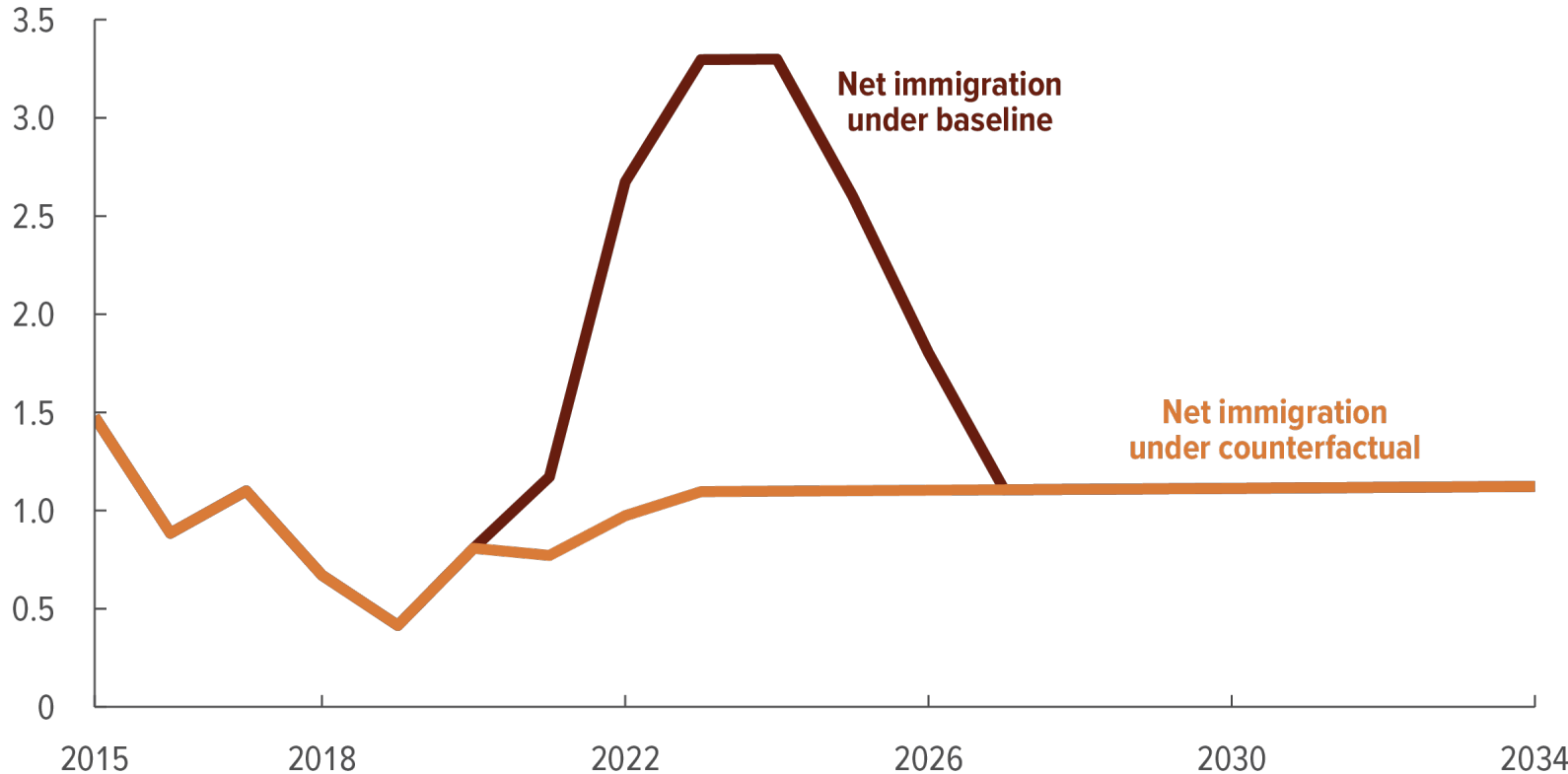
A middle view, perhaps:

- In a recent paper, Thomas Philippon argues that economists have mistakenly assumed that innovations yield a constant growth rate in TFP.
- Instead, the data suggests that innovations yield constant increments to TFP over time.
- That implies a declining growth rate in TFP over time.
- However, new general purpose technologies can change the size of increments for a period of time.

# **Accounting for Other Factors in CBO's Forecast of Total Factor Productivity**

# Net Immigration, 2015 to 2034

Millions of people



CBO's current baseline forecast accounts for the economic effects of a surge in net immigration.

The increase in the domestic population directly increases hours worked and potential output.

The additional workers, on average, are younger and have less education than the average member of the population. As a result, they tend to work in low productivity industries and occupations.



# How Additional Workers Affect CBO's Forecast of Total Factor Productivity

In CBO's assessment, the additional workers will affect potential TFP growth through two channels: **employment composition** and **innovation**.

- The **employment composition effect** accounts for changes in age, skill, educational attainment, and occupational makeup of the workforce. (Those factors are not accounted for in hours or capital services.)
  - For example, Stefania Albanesi finds that from the early 1980s on, women became increasingly more attached to the labor force. As a result, average age, work experience, and educational attainment of the workforce rose along with TFP.
  - Additional workers from the surge are younger and have less education relative to the broader labor force. That puts downward pressure on TFP, particularly over the next five years.
- The **innovation effect** accounts for the boost to innovation coming from an increase in the number of STEM workers. That effect slowly grows over the next ten years.
- After 10 years, the employment composition and innovation effects roughly offset each other, and the effect on TFP is near zero.

# Estimates of How Much Additional Workers Affect CBO's Forecast of Total Factor Productivity

Percent

