

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:

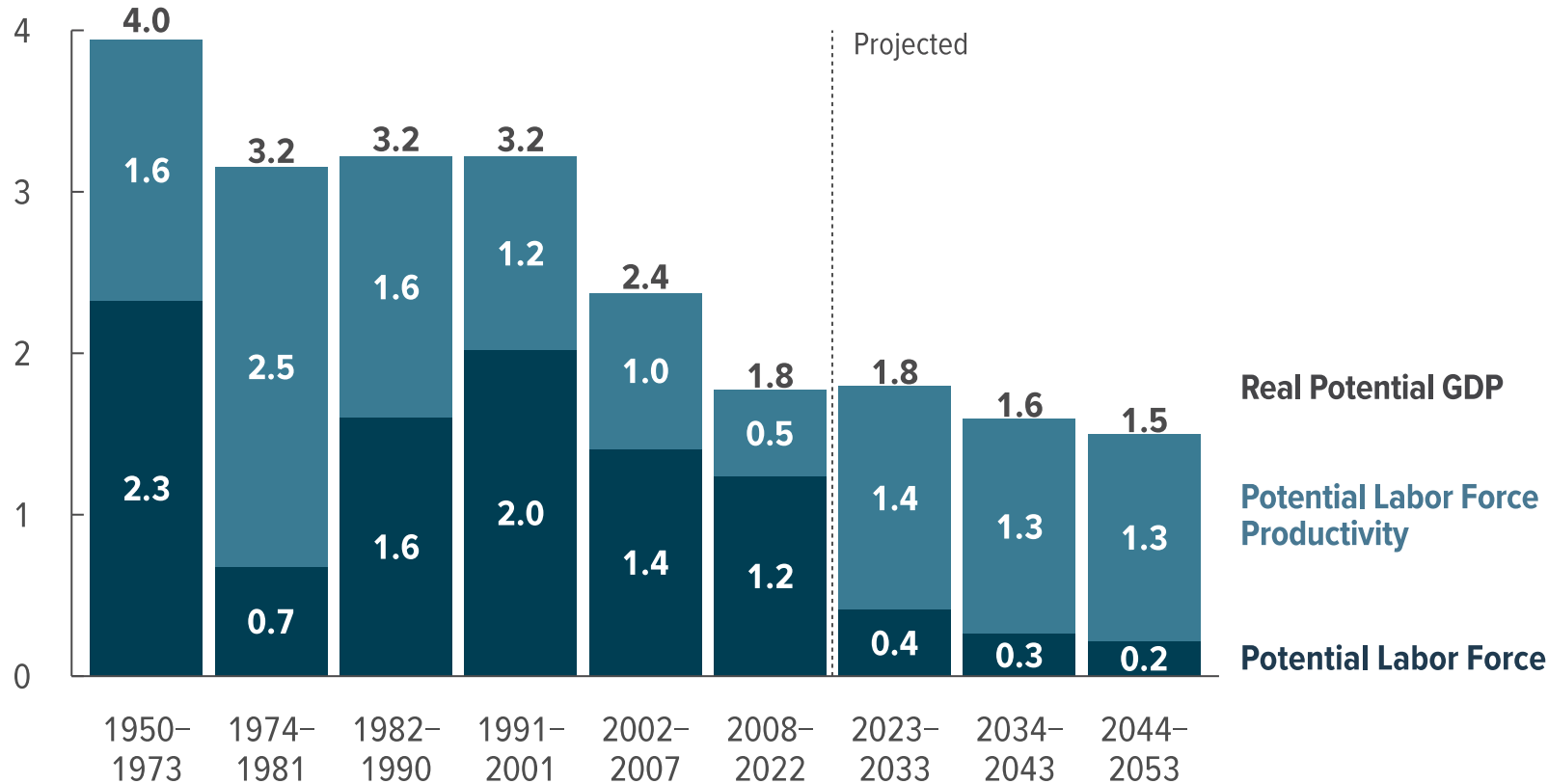
- **Potential (maximum sustainable) output** in a Solow-type growth model and
- **Actual output** in a standard macroeconometric model.

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.

Average Annual Growth of Real Potential GDP and Its Components

Percent



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

See Congressional Budget Office, *The 2023 Long-Term Budget Outlook* (June 2023), www.cbo.gov/publication/59014.



Key Estimates in CBO's Projection of Potential GDP, February 2023

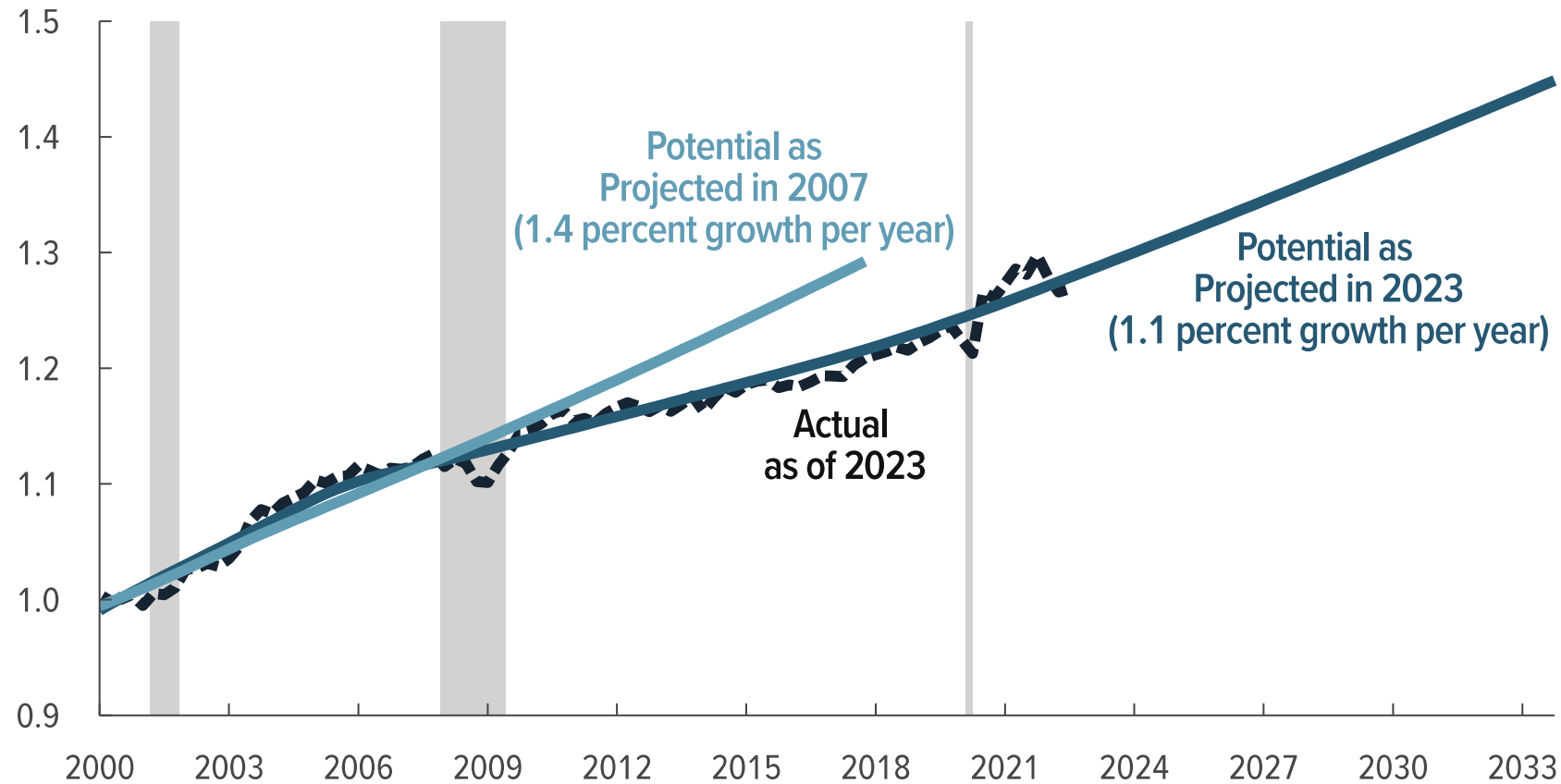
Average Annual Percentage Growth,
by Calendar Year

	Historical Periods						Projection	
	1950– 2022	1950– 1973	1974– 1981	1982– 1990	1991– 2001	2002– 2007	2008– 2022	2023– 2032
Overall Economy								
Real Potential Output	3.1	4.0	3.2	3.2	3.3	2.4	1.8	1.8
Potential Labor Force	1.4	1.6	2.5	1.6	1.2	1.0	0.5	0.4
Potential Labor Productivity	1.7	2.3	0.7	1.6	2.0	1.4	1.2	1.4
Nonfarm Business Sector								
Real Potential Output	3.4	4.1	3.5	3.5	3.7	2.6	2.1	2.1
Potential hours worked	1.3	1.4	2.3	1.7	1.2	0.3	0.6	0.4
Capital services	3.4	3.8	3.7	3.5	3.9	2.8	2.4	2.2
Potential total factor productivity	1.4	1.9	0.8	1.1	1.5	1.5	0.9	1.1
Potential Labor Productivity	2.1	2.6	1.2	1.7	2.4	2.4	1.5	1.7



Total Factor Productivity in the Nonfarm Business Sector Since 2000

2000 = 1



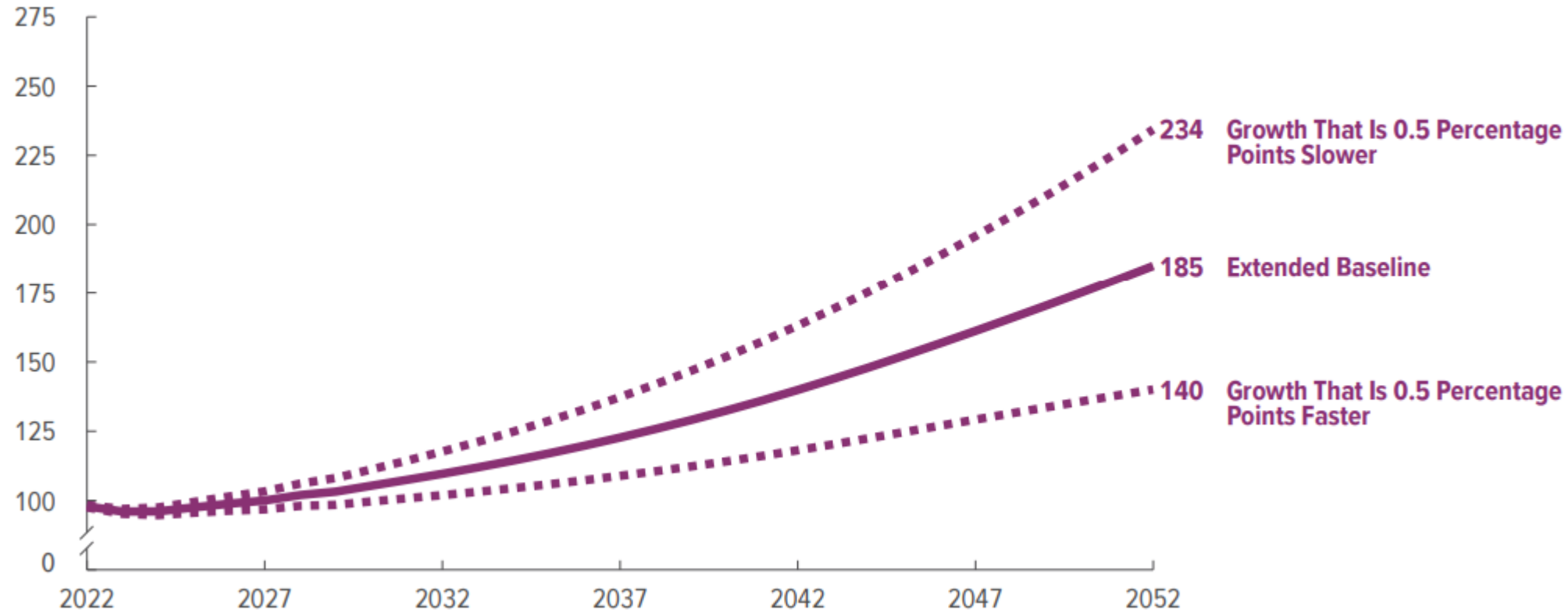
Vertical bars indicate the duration of recessions.

See Congressional Budget Office, *The Budget and Economic Outlook: 2023 to 2033* (February 2023), www.cbo.gov/publication/58848.



Federal Debt Held by the Public If Total Factor Productivity Growth Differed From the Growth Underlying CBO's Extended Baseline

Percentage of Gross Domestic Product



Effects of the Pandemic on Total Factor Productivity

The longer-term effects of the coronavirus pandemic on TFP are unclear:

- Innovations associated with working from home could lead to substantial reductions in costs and improvements in productivity in some sectors.
- Productivity improvements could lead to a decline in GDP (because of the reduction in commuting and consumption associated with office work).
- Disruptions to the education system could have lasting effects that reduce the productivity of workers in the future.
- Fernald and Li (2022) found that as of the middle of 2022, TFP was only modestly affected, and they suggest that the long-term effects may be small.

Long-Term Slowdown of Growth of 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 the capital stock and slower introduction of new technologies (though there is little evidence of a backlog of technology).

Demographic Effects

Highly skilled and well-educated baby boomers are retiring, lowering the aggregate level of human capital, . . .

. . . but skilled and experienced workers tend to stay in the labor force longer, pushing up the average skill level.

Educational attainment has grown more slowly than in previous generations because it is already at a high level, . . .

. . . but educational attainment among younger cohorts has continued to improve, especially during the 2007–2009 recession and its slow recovery.

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. Brynjolfsson, Rock, and Syverson (2021) suggest that the effects of general-purpose technologies such as artificial intelligence can be underestimated in TFP early on.

Slowdown in Basic Innovation: A Conceptual Error? (A Middle View)

Philippon (2022) argues that economists have mistakenly assumed that innovations yield a *constant growth rate* for TFP.

Instead, the data suggest that innovations yield constant *increments* to TFP over time.

That linear model of how innovation contributes to TFP implies a *declining (but positive) growth rate* for TFP over time.

New general-purpose technologies can *temporarily* change the size of the increments.