# TRÉSOR-ECONOMICS

Potential growth in the United States: is the weakness here to stay?

- In the United States, the financial crisis accelerated the decline in potential growth by about 0.7 points compared with 2003-2007. Most organisations estimate U.S. potential growth at 1.5-2.0% in 2016, down from a pre-crisis average of 2.5%.

- Approximately 40% of the observed decline in potential growth seems due to a lesser accumulation of capital stock. The sharp downturn in investment during the crisis and its relative weakness in the subsequent recovery have slowed capital accumulation. This impact needs to be put in perspective, however, given the recent investment rebound: the contribution of capital to potential growth should therefore return to–or even exceed–its pre-crisis level by 2016.

- Overall, the labour factor accounts for an estimated 35% or so of the decline in potential growth. The latter had begun to weaken before the crisis because of the slower increase in the working-age population-compounded by a drop in the participation rate. Studies also show that natural unemployment rose during the crisis then declined again. It should not hamper potential growth in the years ahead.

- Lastly, total factor productivity (TFP) appears to explain 25% of the slowdown in potential GDP growth during the crisis. The post-crisis TFP trend points to a sluggish recovery in productivity gains. Despite their recent acceleration, they are likely to remain weaker than the gains of the 1990s. Broadly speaking, TFP projections differ: some analysts argue that post-crisis trends will reflect the slacker growth observed since the 1970s, putting TFP growth at around 1.0%; other, more optimistic scenarios see a more vigorous recovery, consistent with the expected effects of the revolution in new information technologies, resulting in TFP growth of 1.7%.

- Some of the reforms currently being considered in the U.S. target labour supply with a view to curbing the decline in the labour force. Others aim to support innovation in order to promote productivity gains. The Administration's recent reform proposals focus on family policy (introduction of paid maternity leave and tax credits to facilitate access to childcare services), education (free tuition for community colleges), immigration and making R&D tax credits permanent. The current political context in Congress, however, limits the prospects for such reforms.

United States: decline in potential growth since the 2007 crisis
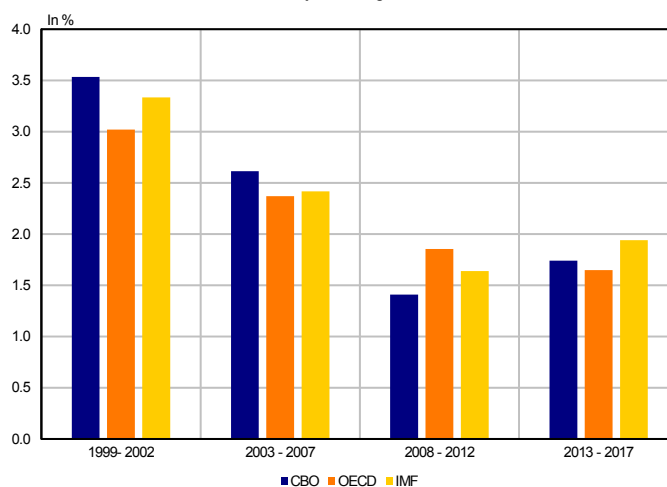
Source: CBO, OECD and IMF.

1. The crisis has caused a break in the U.S. potential GDP growth trend

The magnitude of the decline in U.S. potential growth[1] came as a surprise when compared with 2007 projections. Before the crisis, U.S. and international organisations were forecasting a mild slowdown in potential growth. In January 2007, the CBO projected a gradual easing to 2.4% by 2017 (see Chart 1). The 2008-2009 crisis led to major revisions of U.S. potential GDP estimates. Between the 2007 and 2015 forecasting exercises, the Congressional Budget Office (CBO) revised its projection for potential GDP in 2017 downwards by 9% (see Chart 2).

While part of the decline in the level of potential GDP seems definitive, the medium-term projections for potential growth are more uncertain. The CBO and the IMF see potential growth gradually returning to a pace comparable to its pre-crisis rate. The OECD, on the other hand, estimates that potential growth will remain lastingly weak at around 1.5% and will not regain its pre-crisis momentum by 2017. All these organisations stress that potential growth will likely stay below the rates observed in the late 1990s.

Chart 1: Actual and potential growth as projected in 2007 and 2015
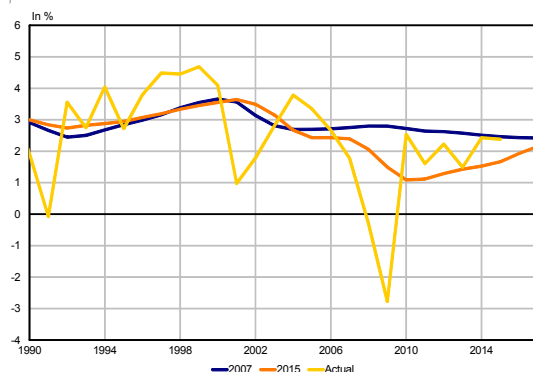
*Source: Bureau of Economic Analysis (BEA), CBO.*

Chart 2: Actual and potential GDP by projection date
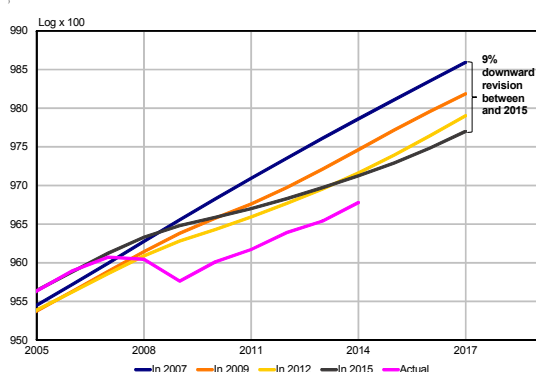
Source: BEA, CBO; calculations: DG Trésor.

The decline in U.S. potential growth is due to the decreasing contribution of all factors of production (see Box 1). The OECD estimates the decline in potential growth between 2003-2007 and 2013-2017 at around 0.7 points (see Chart 3). The largest share of the decline–0.3 points, or nearly 40%–is due to the reduced contribution of capital stock; the lower contributions of labour and TFP each account for a comparable share of approximately 0.2 points.

Chart 3: Contributions to potential growth
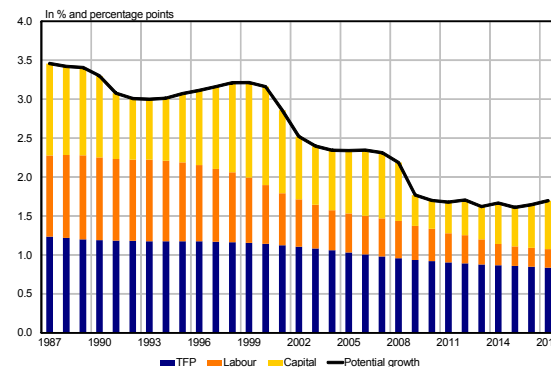
Source: OECD, DG Trésor calculations.

---

(1)   Potential GDP is defined as the maximum output generated by an economy without creating inflationary pressures. Potential growth is the growth rate of potential GDP. Potential GDP is an unobservable that needs to be estimated.

TRÉSOR
DIRECTION GÉNÉRALE

2. The relative weakness of capital accumulation explains a large share of the decline in potential growth during the crisis

The weakness of investment during the crisis and the early years of recovery has generated concerns about the pace of capital accumulation[2]. During the pre-crisis period (2003-2007), non-residential private investment grew at an average annual rate of 5.4% or so. Between Q1 2008 and Q4 2009, total investment fell 20%. After the 2010-2012 rebound, the average annual growth of total investment quickened to 6.4%, but the pace of non-residential gross fixed capital formation (GFCF) weakened to nearly 3.0% in 2013 (see Chart 4). As a result, total investment did not return to its 2007 level until 2013. However, non-residential investment growth quickened to 6.2% in 2014 and should remain relatively vigorous in the coming years.

The decline in potential growth during the crisis is largely due to a weaker contribution of capital[3]. Potential growth tends to slacken after a recession because the contraction in investment slows the growth of capital stock. The latter is expected to slip from 2.5% in 2003-2007 to 1.6% in 2013-2017 (see Chart 5). OECD data show a 0.7-points decline in potential GDP growth between the two periods, to which capital will contribute approximately 0.3 points. The OECD expects the growth rate of capital stock to stay below its estimated long-term average of 2.8%, averaging 1.8% or so in 2016-2017.

---

(2) We use the OECD definition of capital stock, which does not include residential investment.
(3) See Jacobson, M. and Occhino, F. (2013), "Behind the Slowdown of Potential GDP", Federal Reserve Bank of Cleveland.

TRÉSOR
DIRECTION GÉNÉRALE

Chart 4: Non-residential investment

In billions of chained dollars (2009)

Non-residential investment — ----- Consensus Forecasts (2007)
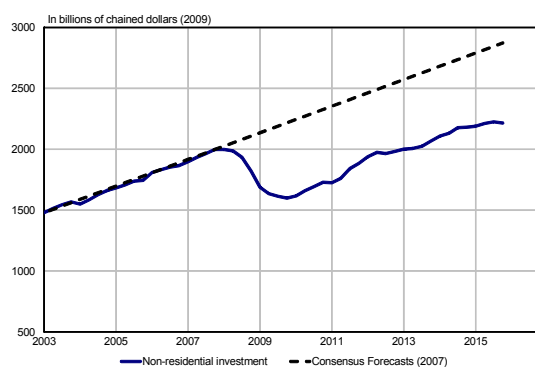
Source: OECD, Consensus Forecasts.

Chart 5: Growth in capital stock

In %

Growth in capital stock — ----- 1991-2007 Average
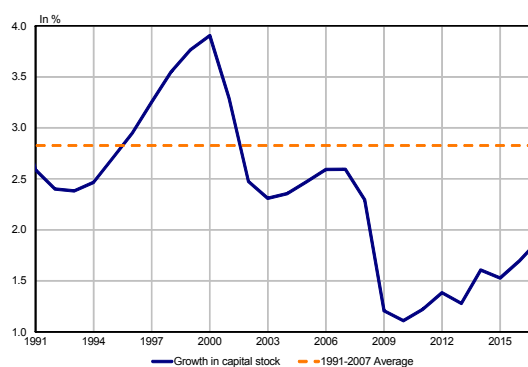
Source: OECD, DG Trésor calculations.

Table 1: Impact of changes in growth in capital stock on potential growth

	Pessimistic scnario	OECD scenario	Optimistic scenario
Growth in capital stock	+1.5%	+1.8%	+2.5%
Deviation from potential growth in OECD scenario	−0.1points	-	+0.2points

Source: OECD for the second scenario, DG Trésor calculations for the others; the scenarios apply to 2016-2017, all other things being equal.

The sensitivity of potential-growth estimates to alternative scenarios for changes in the growth of capital stock is weak. A pessimistic variant on the OECD scenario assumes that capital growth would maintain its 2015 pace of around 1.5% in 2016-2017. This persistent weakness of investment would entail a lasting 0.1-point decline in potential growth (see Table 1). An optimistic variant with capital growth of 2.5%–the rate observed in 2004-2007–raises potential growth by 0.2 points in 2016-2017. This increase seems inadequate to restore potential GDP growth to its pre-crisis pace.

3. The contribution of the labour factor to the decline in potential growth seems long-lasting

The labour factor has had a negative impact on potential growth, notably because of a lower contribution of the working-age population and the downtrend in the participation rate (see Chart 6).

Chart 6: Growth in potential employment, trend working-age population, and trend participation rate

In %

Potential employment (left scale) — Working-age population (left scale) — Trend participation (right scale)
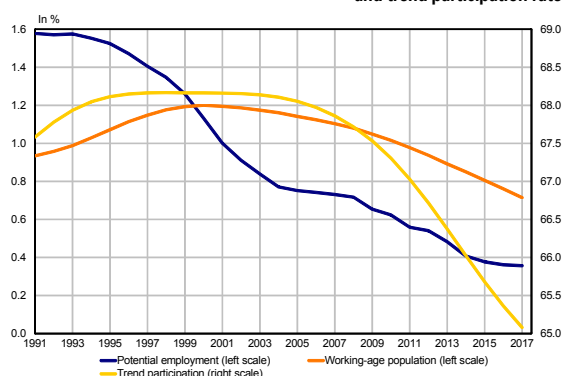
Source: OECD, DG Trésor calculations.

How to read this chart: The growth in potential employment depends on the growth in the trend working-age population, the trend participation rate and the natural unemployment rate.

The labour factor's contribution to potential growth is measured by potential employment, which comprises three factors: (1) the working-age population, determined by population growth and the age composition of the population, (2) the participation rate, which measures the percentage of people of working age who want to participate in the labour market and (3) the natural unemployment rate (see Box 1). While the first factor is not significantly affected by the business cycle[4], the other two can be impacted by the exit of discouraged unemployed workers from the labour force or by a persistent rise in long-term unemployment.

3.1 The participation rate is falling sharply in the U.S., mainly for demographic reasons

Between 2008 and 2014, the U.S. participation rate fell by 3 points from 66% to 63% (see Chart 7), chiefly because of a demographic composition effect. A large share of the population–the baby boomers–has reached or is about to reach retirement age. The age brackets over 50 have historically displayed a lower participation rate. As a result, the entry into these age brackets of large cohorts owing to the ageing of the baby-boomer generation has contributed to the steep decline in the participation rate[5].

The breakdown of the decline in the participation rate into a share due to demographic factors and another

---

(4) The working-age population can be impacted by the cycle through migration flows, as was the case recently in Germany and Spain. World Bank data on migration flows show that the number of net migrants in the U.S. has been stable since the early 2000s.

(5) See Cléaud, G. and de Charsonville, L. (2014), "What's behind the United States' falling unemployment rate?", *Trésor-Economics* no. 139, November.

due to more cyclical factors (discouraged unemployed) remains controversial. Several studies argue that demographic factors are dragging down the participation rate by an estimated 1 to 2 points. While this trend seems irreversible, the U.S. government is targeting other categories such as women and minorities in order to support the participation rate.

Chart 7: Participation rate

Participation rate (left scale)
Participation rate (adjusted for demographic composition effects) (right scale)

Source: BLS, DG Trésor calculations.
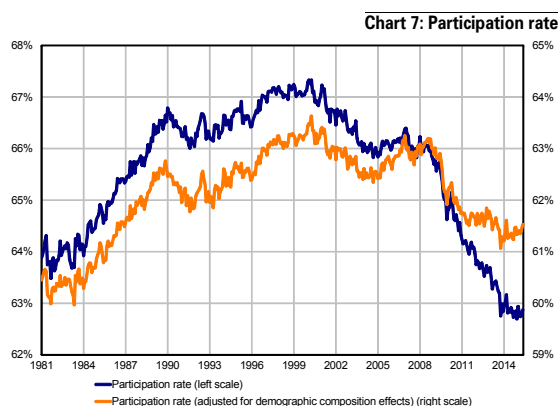
Note: The participation rate adjusted for demographic composition effects is determined by weighting age-specific participation rates assuming a constant population structure.

The CBO, IMF and OECD projections do not expect the discouraged unemployed to re-enter

the labour market in significant numbers. The participation rate is therefore likely to keep trending down but less sharply. The CBO estimates that the return of the "discouraged" to the labour force would slow the decline in the participation rate by only 0.75 points. This would, however, be offset by further demographic changes in the labour force. The CBO projects a continued decline in the participation rate to 62% in 2019 and 61% in 2025. The Bureau of Labor Statistics (BLS) sees a steeper contraction in the participation rate between 2012 and 2022, from 63.7% to 61.6%.

3.2 The natural unemployment rate has risen since the crisis

The persistence of high long-term unemployment has led several organisations to raise their estimates of natural unemployment (see Box 2). In 2007, the OECD estimated the natural unemployment rate in the U.S. economy at 4.6% for 2008-2009, revising the figure to 5.7% in 2014. The CBO as well has revised its estimates upwards: in 2007, it forecast natural unemployment at 5.0% for 2007-2017; in 2015, it estimated that the rate for the period would be closer to 5.5%.

Box 2: **Phillips curve and Non Accelerating Inflation Rate of Unemployment (NAIRU)[a]**

The natural unemployment rate, as defined by the CBO, is the sum of frictional unemployment and structural unemployment. Frictional unemployment depends on the efficiency of the matching process, while structural unemployment is caused by above-equilibrium wage levels in the labour market. Changes in natural unemployment mostly depend on microeconomic factors. The NAIRU provides an estimate of natural unemployment by removing the cyclical component of the observed unemployment rate.

The NAIRU is the equilibrium unemployment rate that does not generate inflationary pressure. It is usually calculated using an equation system that includes the Phillips curve equation, which links the change in inflation to that of the unemployment rate (expressed as a deviation from the natural unemployment rate). To this equation, the model adds Okun's equation, which links the deviation in the unemployment rate from its natural level to the output gap. These two main equations are written as follows:

$$\pi_t = \alpha \pi_t^e + \delta u_t + \varepsilon_t^\pi \quad (1) \quad \text{where} \quad u_t = (U - U^*)$$

$$u_t = \tau y_t + \varepsilon_t^u \quad (2) \quad \text{where} \quad y_t = (Y - Y^*)$$

with π_t the inflation rate in t, π_t^e expected inflation, u_t the deviation of the unemployment rate *(U)* from the natural rate *(U*)*, y_t the *output gap*, i.e., the gap between actual GDP *(Y)* and potential GDP *(Y*)*, and ε_t^π and ε_t^u the error terms for the Phillips and Okun equations respectively α, δ and τ are estimated parameters.

From the changes observed in inflation and the unemployment rate, together with changes in the output gap, we can therefore deduce the economy's equilibrium unemployment level at a given moment. The Phillips equation, which includes an expectation term, can be estimated in two ways: either by identifying a proxy to represent inflation expectations (for example, the Consensus Forecast figures, as the IMF does), or by means of an instrumental-variables approach[b].

As the NAIRU estimate is dependent on the specification of an underlying Phillips curve, R. Gordon (2013) has criticized this approach, arguing that the Phillips curve has flattened in the recent period. Indeed, despite the sharp rise in the unemployment rate during the crisis, inflation did not fall in the same proportion, for one would have expected a deflation period to reflect this cyclical trough–a phenomenon described as "missing deflation".

a. See chapter 3 of the IMF April 2015 World Economic Outlook (WEO) and Gordon, R. (2013), "The Phillips curve is alive and well: inflation and the NAIRU during the slow recovery" *NBER Working Paper* no. 19390..
b. This consists in defining another equation for inflation expectations, which are a function of past inflation rates and the unemployment rate's deviation from the natural rate.


The rise in natural unemployment observed during the crisis is attributed to the "skill mismatch" between workers and employers'

needs[6], an imbalance that in turn is due to several factors:

---

(6) See Reifschneider, D., Wascher, W. and Wilcox, D. (2013), "Aggregate Supply in the Unites States: Recent Developments and Implications for the Conduct of Monetary Policy", *FRB Finance and Economics Discussion series* 2013-77.

- First, according to some analysts, the intensity of the demand shock **has made it difficult to reallocate labour across economic sectors and geographic areas**. The impact of the real-estate crisis is seen as an obstacle to U.S. labour mobility. Moreover, the recent recession seems to have generated a greater need for inter-sectoral reallocation of workers, particularly because of its heterogeneous impact across sectors.

- Second, some studies point to **a decline in the efficiency of the matching process between job vacancies and unemployed workers** (see Chart 8). The reasons for this phenomenon may be both cyclical and structural. The persistence of high long-term unemployment may indeed be driven by temporary factors such as the adjustment of benefits to unemployment during the crisis, or structural factors such as the obsolescence of certain jobs caused by technological progress.

- Third, **the persistence of long-term unemployment may be due to hysteresis effects such as the erosion of skills among workers** who remain unemployed for a period of time. Empirically, these effects are partly visible in the stagnation of the rehiring rate for the long-term unemployed (around 10% since 2008), while, in the same period, the rate for the short-term unemployed improved from 20% in 2008 to nearly 25% in 2013.


Chart 8: Beveridge curve
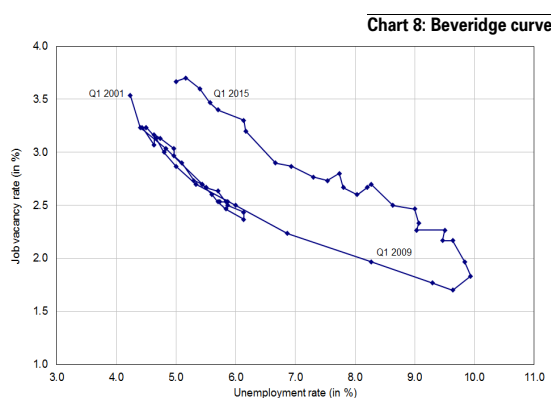
Source: BLS, DG Trésor calculations.

The natural unemployment rate is now thought to have declined. The CBO estimates the U.S. economy's current natural unemployment rate at around 4.8%, i.e., below its pre-crisis level of 5%. This estimate is consistent with a recent study by the Chicago Fed[7], which finds that the NAIRU has moved below its pre-crisis level and is now close to or even under 5%– owing to the ageing of the labour force and the negative relationship between the unemployment rate and age.

Chart 9: Unemployment rate and natural unemployment rate
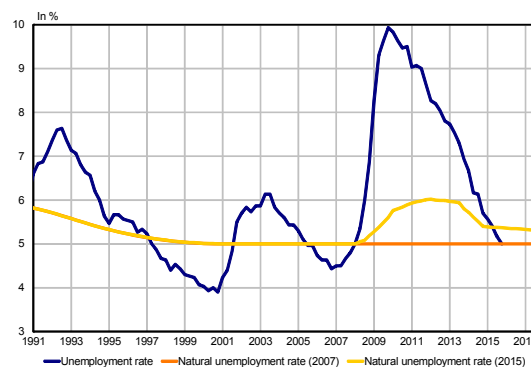
Sources: CBO, BLS.

3.3 The changes in these factors are believed to have a strong impact on potential growth

The pace of potential growth seems to be particularly sensitive to the state of the labour market (see Table 2). The CBO's central scenario includes a slow decline in the participation rate to 62% by 2020 (with an average of 62.4% for 2016-2020) and a natural unemployment rate of 4.8% (reached by Q2 2016), resulting in projected potential growth of 1.8% between 2016 and 2020[8]. Using an approach based on deviations from the CBO scenario, and in order to illustrate the sensitivity of potential growth to these two variables, we could envisage a participation rate settling at current levels (63%) rather than declining, i.e., a 0.6-point divergence from the CBO's central scenario. All other things being equal, this "optimistic" scenario would boost potential growth by 0.4 points. By contrast, in a "pessimistic" scenario, if the participation rate declined faster than the CBO expects (reaching 61% in 2020, i.e., an average of 62% for 2016-2020), and if natural unemployment was running at its pre-crisis level of 5% instead of 4.8%, potential growth would be trimmed by 0.4 points.

Table 2: Impact of changes in participation rate and structural unemployment on potential growth

	Pessimistic scenario	CBO scenario	Optimistic scenario
Participation rate	62.0%	62.4%	63.0%
Natural unemployment rate	5.0%	4.8%	4.8%
Deviation from CBO scenario	−0.4pt	-	+0.4pt

Source: CBO; calculations: DG Trésor.

Note: scenarios apply to 2016-2020, all other things being equal.

(7) See Aaronson, D., Hu, L., Seifoddini, A. and Sullivan, D.G., "Changing Labor Force Composition and the Natural Rate of Unemployment", *Chicago FedLetter* 2015-338.
(8) See CBO (2015), "*The Budget and Economic Outlook: 2015 to 2025*".

4. High uncertainty over the path of total factor productivity (TFP)

TFP growth in the United States has fluctuated sharply. Data used by J. Fernald of the Federal Reserve Bank of San Francisco indicate a drop in average annual TFP growth from close to 2.2% in 1950-1972 to 0.9% in 1973-2013 (see Chart 10). The slowdown was triggered in the 1970s by the oil shocks and the end of productivity gains procured by the industrial revolution; the decline was temporarily halted in the late 1990s and early 2000s with the rise of new information and communication technologies (NTICs). TFP growth averaged nearly 1.4% in 1996-2004, heralding a possible break from its 1970s trend. However, the changes observed since the 2008-2009 crisis show a very slow recovery in productivity gains. As a result, TFP seems to be returning to its pre-NTIC bubble trend, with average annual growth of 1.0% since 2011.

Chart 10: TFP growth (moving average)
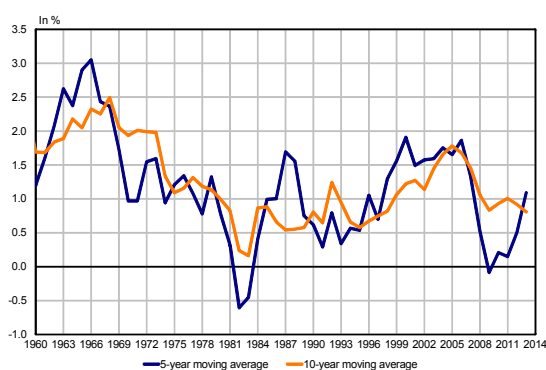

Source: Fernald; calculations: DG Trésor.

The TFP growth outlook is far from consensual. Some economists, including Gordon and Fernald[9], see the end of productivity gains stemming from the rise of the NTICs. They argue that the impact of the NTIC revolution has been partly mitigated, as many innovations since the 2000s have focused on communication and leisure, with little effect on productivity. Other observers, such as Brynjolsson and McAfee[10], suggest that the NTIC revolution has not yet had the hoped-for impact on productivity, for it has not been accompanied by the necessary increase in workers' skills and the improvement in organisational processes that would enable these technological advances to be put to greater advantage.

These debates highlight the productivity paradox, i.e., the difficulty in demonstrating a correlation between TFP and the degree of computerisation of firms. In particular, it is hard to determine whether NTICs are–like electricity–"general purpose technologies" that boost the productivity of the entire economy. An IMF study[11] does show, however, that TFP changes are determined more by the education system and R&D spending than by information technologies. Beyond these debates, the observation of recent

trends has led several public organisations such as the CBO and OECD to revise their TFP projections.

For the CBO and OECD, some of the weakness of TFP during the crisis is structural rather than cyclical. In 2015, the CBO estimated average annual TFP growth at around 1.2% for 2015-2019, versus 0.9% in 2008-2014 and 1.8% in 2002-2007 (see Chart 11). Although the decline in potential TFP predates the crisis, it may have been accelerated by the crisis through such factors as a slowdown in allocation of resources to productive purposes and the weak improvement in labour skills. The OECD projects a deceleration in TFP in 2015-2019, following the slowdown that began in 2002-2007. The OECD accordingly revised its TFP projections sharply downwards in 2015, entailing a heavy downward revision of potential growth for the recent period. **The effects of the financial crisis on firms' capacity to innovate remain uncertain.** Recent data indicate that R&D investment is still trending up: spending has increased during the recovery, albeit at a milder pace than before the crisis (see Chart 12). There is on the other hand an observable fall-off in innovation by technology-intensive industries, apparently since before the crisis.

Chart 11: TFP growth scenario
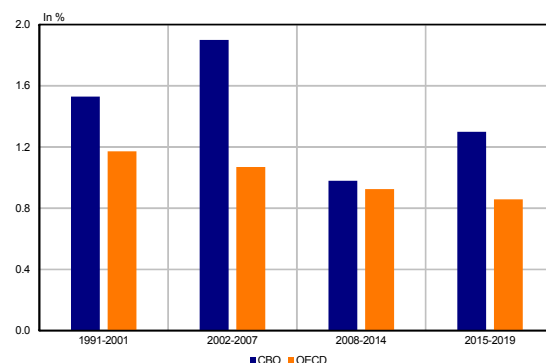
Source: CBO, OECD.

Chart 12: R&D spending
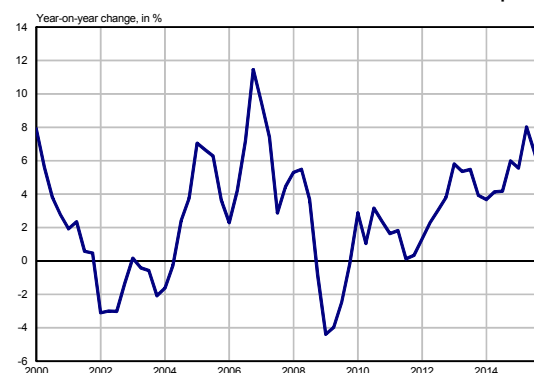
Source: BEA.

(9)   See Gordon, R.J. (2012), "Is US Economic growth over? Faltering innovation confronts the six headwinds", *CEPR Policy Insight* no. 63; and Fernald, J.G. and Jones, C.I. (2014), "The Future of U.S. Economic Growth", Federal Reserve Bank of San Francisco *Working Paper* 2014-02.

(10) See Brynjolfsson, E. and McAfee, A. (2012), "Race Against The Machine: How The Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and The Economy", MIT Sloan *Working Paper*.

(11) See "U.S. Total Factor Productivity Slowdown: Evidence from the U.S. States", IMF, *United States: Selected Issues* (IMF Country Report no. 14/222), July 2014, pp. 30-50.

TRÉSOR
DIRECTION GÉNÉRALE

Estimates of TFP growth have a major impact on those of potential GDP growth: one additional point of TFP translates into one point of potential growth. TFP projections remain highly uncertain[12] and should strongly influence future potential growth paths. According to the CBO, for example, the modest acceleration of TFP in 2015-2019 should return potential growth to its 2008 level. By contrast, the OECD expects no rise in potential growth during the same period, for it now sees TFP growth trending down.

5. The policies envisaged to support potential growth aim to increase labour supply and promote innovation

Recent proposals by the Obama administration to support the factors of production focus on the labour market. The President's reform proposals for 2016[13] notably concern family policy, to encourage greater female participation in the labour market, and education, for a better matching of labour skills to firms' needs. The President's family policy proposals include paid maternity-leave days and a tax credit to improve access to childcare services. In the field of education, he has proposed the introduction of a two-year tuition-free period in community colleges[14] along with subsidies for vocational training.

Policies to strengthen support for business productivity are also being considered. Some sectors have been targeted for the purpose. They include manufacturing, for which the President has proposed the creation of a public-private American Made Scale-Up Fund to support start-ups. The Obama Administration–like the IMF–is also advocating that the Research and Experimentation Tax Credit be made permanent to strengthen R&D investment, particularly in manufacturing. The Administration has repeatedly proposed immigration reform to facilitate integration by legalising certain categories of immigrants and making it easier to obtain work permits. Such pro-immigration policies echo IMF recommendations, for they would enable the U.S. to attract skilled labour and improve corporate productivity. However, immigration reform remains a divisive issue in Congress.

Lastly, another type of reform often mentioned–particularly as it could meet the dual objectives of supporting the job market and business productivity–is public infrastructure investment. While a certain consensus exists on the advantages of such a policy, both among public decision-makers and in international institutions (see the IMF World Economic Outlook of October 2014), the resources to fund these projects are a subject of disagreement between Republicans and Democrats.

Annabelle de GAYE, Gaëtan STÉPHAN

---

(12) In production function models, TFP is considered a "residual", as it represents the share of potential growth unexplained by labour and capital.
(13) See *Fiscal Year 2016: Budget of the U.S. Government*.
(14) Community colleges are public higher-education institutions with two-year curricula and generally lower tuition fees than those of major universities.

■

Recent Issues in English

http://www.tresor.economie.gouv.fr/tresor-economics

This study was prepared under the authority of the Directorate General of the Treasury (DG Trésor) and does not necessarily reflect the position of the Ministry for Finance and Public Accounts and Ministry for the Economy, the Industry and Digital Affairs.

TRÉSOR
DIRECTION GÉNÉRALE