The great destruction
The great destruction

- Severe recessions intertwined with financial crises have historically been associated with lost output and slower potential growth. More than five years after the end of the global recession, we feel enough time has passed to assess the extent of the destruction of output in developed economies.

- In applying a uniform framework across seven developed economies that account for nearly half of world output, we estimate that potential growth in these economies has fallen by 1.5 pp since 1999 and, in turn, has reduced global potential growth by 0.7 pp.

- Our finding that slower growth in developed economies could slow global growth by 0.7 pp is of similar magnitude to the effect of a slowing China on global growth. Slower potential growth in developed economies and a decelerating Chinese economy have reduced global potential growth by 1.5 pp – a significant deceleration.

- We estimate that the effects of the recession accounted for about two-thirds of the 1.5 pp decline in potential growth in developed economies, with the remaining one-third pre-dating the global recession. Policymakers’ efforts to stem the tide have been effective, but we doubt policy can fully reverse the slowing in trend output growth before the end of the decade.

Financial crises destroy output

Economic downturns that coincide with severe financial crises destroy output and lower potential growth. In this chapter, we examine the experience of seven large developed economies that comprise nearly half of world GDP based on purchasing power weights – France, Germany, Italy, Japan, Spain, the UK, and the US – to estimate the damage to output and trend growth from the recent recession. The recession hit when many of these countries were already experiencing a deceleration in trend growth related to demographic factors and the fading of the effects of the technology revolution. The slowing of population growth and rising dependency ratios across much of the economically advanced world was a subject we took up in last year’s Equity Gilt Study (see “Economic implications of demographic change”, Equity Gilt Study 2014, 13 February 2014). We also take up the importance of demographic trends in boosting saving rates and asset prices in Chapter 1 of this year’s Equity Gilt Study, “Population dynamics and the (soon-to-be-disappearing) global ‘savings glut’”. As a result of inflection points in demographics and the passage of the technology boom, trend growth in the developed world is likely to have slowed significantly from the robust rates of growth.
achieved in the 1990s. Active monetary and fiscal policies may be able to mitigate or reverse some of the negative effect on trend growth, but not all. We believe potential growth in the developed world has entered a new phase. In our view, the Great Destruction of output following the recession left potential growth permanently slower.

After applying a common methodology to each country to estimate the rate of potential output growth, we find that trend growth in these seven developed economies fell by 1.5pp per year in 2000-2014, with about two-thirds of the decline occurring after 2007. Given the relative weight of each economy in world output, the slowing in developed economy growth reduced potential global growth by 0.7pp annually. We find this deceleration significant, given that real global growth averaged 3.7% annually between 1990 and 2007.

The destruction of output and slowing of potential growth in the developed world comes just as growth outside the developed world is also slowing. We do not find this surprising, given the extent of globalization and linkages among developed and emerging economies. We expect potential GDP growth in China to slow from about 9-10% in the 1990s to about 6.0% in the coming 5-10 years as it transitions from investment-led to consumption-led growth.\(^1\) If realized, this would lower the growth rate of potential global GDP by another 0.6-0.7pp, given China’s burgeoning share of world output.

Taken together, and assuming policy cannot significantly reverse the effects of the global recession, slower potential growth in developed economies and a decelerating Chinese economy could reduce global potential growth by 1.5pp annually. Growth in emerging market economies outside of China are also slowing in part because of the rebalancing of the global economy following the recession and financial crisis, which helped to narrow the current account deficit in the US. For our view on how this will impact risk premia and asset returns in emerging markets, see Chapter 3, “EM is still an attractive asset class”. Outside of India, where the growth outlook appears more promising, we see the bulk of the evidence as pointing to a significant deceleration in potential growth. Much that once was, now appears lost.

History repeats itself

History suggests that economies face deeper recessions and weaker recoveries after financial crises and credit booms. The evidence also indicates that the severity of the downturn is proportional to the size of the boom, validating the adage “the bigger they are, the harder they fall.” Examining 18 episodes of severe financial crises, Carmen Reinhart and Kenneth Rogoff find that real GDP per capita declines by an average of 9.3%, with output reaching its trough an average of 1.9 years after the prior peak.\(^2\) In these cases, unemployment rose by an average of 7%, with unemployment peaking 4.8 years after the crisis, while real home and equity prices declined by an average of 35.5% and 55.9%, respectively.

The global recession of 2008-09 is on a par with these examples. Based on the experience of seven developed market economies, Figure 1 shows that the peak-to-trough decline in real GDP ranged between 4.1% and 9.9%, with an average decline of 7.1%. The associated rise in unemployment has been more varied, ranging from very mild episodes in Germany and Japan, to the staggering 18.3% rise in unemployment in Spain (Figure 2).

The duration of the decline in real output varied substantially, with Germany and Japan experiencing relatively short four-quarter declines in output, while the downturns in Italy and Spain have lasted much longer.

\(^1\) See “China: Beyond the miracle – The complete series,” 1 March 2013.

to stage a convincing turnaround. Spain posted a similar double dip, with output falling for six quarters before staging a brief rebound, only to fall further in 2011-12. More recently, Spain has achieved five consecutive quarters of positive growth through 2014 Q3.

There are several channels through which potential output is lost following severe economic downturns. The most common include:

- **Contractions in finance, insurance, real estate, and construction.** Recessions associated with deep financial crises often cause permanent contractions in finance, insurance, and real estate. The booms in many developed economies – particularly the US, UK, and Spain – were also fuelled by housing bubbles that led to severe contractions in construction and housing-related sectors. The tighter regulatory environment likely means that potential output in these sectors is permanently lost.

- **Slower capital accumulation and distortions to the efficient allocation of capital.** Weak profitability reduced the ability of firms to self finance in an environment of tighter credit standards. Sluggish economic growth and heightened uncertainty stemming from the severity of the downturn also weighed on business sentiment and suppressed capital accumulation. Finally, tighter credit conditions and a reluctance to lend reflect increased risk aversion. We find features of this in each of the developed economies investigated.

- **A skills gap in labor markets leading to structural unemployment.** Contractions focused in certain sectors, like finance and construction, while job growth occurs in other sectors lead to a skills gap and a misallocation of labor resources. Long and deep recessions may also depress participation and raise the long-term unemployment rate. Hysteresis then leads to structural unemployment and fewer potential hours. Finally, dual labor market structures often mean the downturn is felt disproportionately by one segment of the labor force. We find evidence of this in the US and UK, but most prominently in Europe and Japan.

**Applying a business cycle framework to assess trend growth**

To estimate the degree of slowing in potential developed economy output, we apply a business cycle framework to seven economies -- France, Germany, Italy, Japan, Spain, the UK, and the US -- and break down observed output data into its cyclical and trend components. We then identify potential growth as the trend component and the difference between actual and trend, or the output gap, as the cyclical component.

Potential output and the output gap are key variables in the setting of monetary and fiscal policy and serve as anchors to economic models. However, they are also unobservable. The framework we apply in this chapter constructs estimates of these key variables using a generalized multivariate unobserved components framework; inputs on working hours, output, employment, population, and participation are used in a comprehensive framework to generate a decomposition of potential output growth into its component parts. The models are estimated using quarterly data from 1963 Q1-Q1 2014 for the US, 1975 Q1-Q1 2014 for the UK, 1975 Q1-Q1 2014 for France, 1973 Q1-Q1 2014 for Germany, 1993 Q1-Q1 2014 for Italy, 1996 Q1-Q1 2014 for Spain, and 1981 Q1-Q1 2014 for Japan.

We see several advantages to using a multivariate approach. Although it is more difficult to implement, academic research has shown that multivariate analysis improves the accuracy of cycle estimates and using a single system means the framework uniformly accounts for...
trade-offs between alternative signals. Applying the framework across countries also ensures that trade-offs between competing signals are treated in similar fashion. Our common framework makes several important assumptions. First, we assume that each measure of economic activity and labor markets can be represented as the sum of cyclical and trend components. Second, we assume that the cyclical component is common across all the inputs, with the understanding that a wider set of data should enable estimation of the trend with improved accuracy. Third, the cyclical component is allowed to have both contemporaneous and lagged effects to account for variables that may lag the cycle, yet still inform its estimation. Fourth, while each variable has a common cyclical component, we permit each variable to have its own unique trend. Finally, we allow cyclical deviations in output to affect inflation, creating a natural rate interpretation.

The benefit of the generalized unobserved components model is that it allows for dynamics in both cyclical and trend components. Many traditional frameworks assume a smooth trend and view recessions as "temporary" events that only inform the cycle. In other words, volatility in the data is restricted to inform the estimate of the cycle, but not necessarily the trend. Our methodology allows for cycles in both permanent (trend) and transitory (cycle) components. Academic research has shown that this generalized framework is more appropriate for capturing both short-term and medium-term cycles, where the latter may be more suitable when dealing with movements in technology, research and development, and efficiency of resource utilization. Our preference is to let the data speak for themselves about whether volatility is related to transitory outcomes or structural phenomenon.

Slower rates of potential growth in developed economies

We organize the results of the common business cycle framework across countries around two themes: the movement in trend variables that comprise potential growth and the estimates of the cycle. The presentation follows the traditional exposition of potential growth; namely that the growth in output depends on the growth rate of factor inputs – labor and capital – and the efficiency with which these are combined to produce output. We impose the structural relationship that

\[
\text{Potential output} = \text{Hours worked} \times \text{Productivity per hour},
\]

where the trend in hours worked comprises trend employment and the trend work week according to

\[
\text{Hours worked} = \text{Employment} \times \text{Work week}.
\]

We assume that trend employment is made up of

\[
\text{Employment} = \text{Employment rate} \times \text{participation rate}
\]

where the employment rate is assumed to be one minus the unemployment rate. The trend employment rate is therefore a transformation of the non-accelerating inflation rate of unemployment (NAIRU). Potential output and employment are scaled by population since this is a common trend in both variables.

Figure 5 presents the results of the estimation across each economy related to the estimation of the trend. Where possible, we present the results in decade-averages to smooth through the variability in annual estimates. As the figure shows, potential growth has decelerated in recent years in five of the seven economies in our sample, with Japan and Germany the exceptions to the deceleration trend.

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US potential GDP growth slowed to 2.5% in the 10 years ending 2009 and 1.2% in the post-recession period

The ageing of the population naturally reduces aggregate labor force participation, leading to a structural decline in potential growth

US: An ageing population and productivity slowdown

Beginning with the US, trend growth is estimated at 3.0-3.4% for the three decades ending in 1999, with the decades of the 1970s and 1980s buoyed by trend growth in both hours and productivity. In the 10 years ending in 2009, however, potential growth began to slow as the trend labor input slowed. This slowing was initially offset by faster productivity growth, which we attribute to the technology revolution that began in the US in the mid-1990s and supported faster rates of productivity growth (Figure 3).

We estimate that trend growth in output in the US began to slow in 2001, falling from 2.5% to 1.5% by 2009, as the benefits of technological progress began to fade and the workforce aged. Our US economics team has written frequently about US demographic trends and their contribution to slower potential growth. In our view, the decline in labor force participation since its peak in the early 2000s mainly reflects the ageing of the baby boomers. While labor force participation among the 55+ age cohort has risen during this time period, it nonetheless is half of the participation rate for the prime working age population (those aged 25-54). Therefore, the ageing of the population naturally reduces aggregate labor force participation despite the upward trend in participation among older people, leading to a structural decline in potential growth. The model estimates that the participation rate dropped 2.5pp from 2007 to 2013, accounting for around three-quarters of the 3.2pp decline in the actual participation rate (Figure 4) during the same period. This is consistent with the view that most of the decline in the participation rate is structural and unlikely to be reversed.

In addition to the above, the US has been in a gradual transition from a goods-oriented economy to a services economy, the latter of which is associated with more part-time employment and a shorter average work week. Employment in the goods sector in the US was nearly 40% of total private employment in 1965. The share has fallen to around 15% in recent years, leaving the remainder (85%) in services. Since average weekly hours in the service sector averages about 33 hours, compared to 41 hours for the goods sector, the relative shift into services has caused average weekly hours for the overall US private sector to decline from 39 in 1965 to 34 today. See “U-6 unemployment may not reach normal,” 11 July 2014.

7 See Beyond the cycle: Weaker growth, higher unemployment, 15 December 2010 and Dispelling an urban legend: US labor force participation will not stop the unemployment rate decline, 1 March 2012
8 Employment in the goods sector in the US was nearly 40% of total private employment in 1965. The share has fallen to around 15% in recent years, leaving the remainder (85%) in services. Since average weekly hours in the service sector averages about 33 hours, compared to 41 hours for the goods sector, the relative shift into services has caused average weekly hours for the overall US private sector to decline from 39 in 1965 to 34 today. See “U-6 unemployment may not reach normal,” 11 July 2014.
FIGURE 5
Potential growth and its trend components

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Potential growth and its trend components (continued)

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Note: The reunification of West and East Germany in the early 1990s is omitted since the event creates an “artificial recession” in model estimates. The population surge boosts potential GDP growth via a stronger labor contribution. The business cycle framework accounts for this by estimating a positive output gap prior to reunification and a negative output gap immediately afterward. In terms of the effect on the trend, the reunification pushes trend output per hour down discretely in 1991 and the series resumes its trend growth thereafter. We omit the 1990-93 model estimates for this reason. Source: Barclays Research

UK: A “productivity puzzle”

In the UK, the slowing in the rate of trend output is clearly related to a slowdown in trend productivity growth. We find that productivity growth in terms of output per hour grew between 2.2% and 2.7% per year in the three decades ending 1999. We then estimate that productivity growth fell steadily from 2.6% in 2002, down to zero by 2008, and has stayed near this level through Q1 2014 (Figure 6). This fall in labor productivity growth, or the “productivity puzzle,” has been heavily investigated and several factors put forward to explain the slowdown. A report from the Bank of England points to labor hoarding during the early stages of the recession, reduced investment in physical and tangible capital, and misallocation of resources in low to high productivity sectors. A higher cost of capital would encourage firms to substitute less expensive labor for capital, but this explanation is often discounted because aggressive monetary policy kept the cost of capital low for a portion of the post-recession period and modest rates of investment have meant the aggregate stock of capital has not fallen enough (as a share of GDP) to fully account for the productivity slowdown.

Broad-based capital mismatch is cited as a more likely explanatory factor. As discussed by Ben Broadbent, external member of the Monetary Policy Committee, data from the UK Office of National Statistics show that the dispersion of output and relative prices across sectors widened markedly following the recession. A reallocation of capital and labor would reduce the dispersion across sectors, but this process takes time and, in the interim,

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10 See “Productivity and the allocation of resources,” Ben Broadbent, External Member of the Monetary Policy Committee, Bank of England, 12 September 2012.
Productivity growth stalls. The financial sector is often cited as one that is likely to have persistently slower productivity growth following the recession. A tighter regulatory environment and higher capital requirements have raised the cost of capital and necessitated more spending to cover infrastructure, system, and regulatory requirements. The new regulatory environment will likely mean trend productivity growth in the financial services sector will be persistently lower relative to pre-2008 levels. Research from the Bank of England estimates that slower financial sector productivity growth could account for about half (eg, 1pp) of the decline in trend productivity.

The other piece of the “productivity puzzle,” in terms of estimating the net effect on trend potential growth, is the contribution from labor. The trend growth of hours worked in the UK has provided an important offset to the slowing in trend productivity. Growth in the labor force, due to a steady trend participation rate and growing population, along with a rapid boost in trend employment following the recession (Figure 7), has provided important support for trend output growth. In addition, trend growth in average working hours has turned positive for the first time since the mid-1970s. Together, these have caused trend hours to rise to 1.5% in the post-crisis period. However, growth in trend hours has not been enough to fully offset the sharp slowing in productivity, and trend output growth fell to 1.8% between 2000 and 2009 and to 1.6% in the post-recession period from 2010 to Q2 2014.

Germany: A decade after labor market reforms

The model results for Germany clearly show the effects of reunification in the early 1990s: data prior to 1990 are from West Germany and post-reunification data include both East and West Germany. The surge in population from reunification leads to an “artificial recession.” The burst in potential labor contribution boosts trend growth and the business cycle framework accounts for this by estimating a positive output gap prior to reunification and a negative output gap immediately afterward. In terms of the effect on the trend, reunification pushes trend output per hour down discretely in 1991 and then the series resumes its trend growth thereafter. We suggest interpreting the “artificial recession” and the results for 1990-93 with caution. We exclude these years from the data and focus our attention on the remaining sample period.

Like other countries in our developed economy sample, output per hour in Germany has slowed in recent years, but we find that trend productivity growth did not decelerate as sharply in Germany as it did in the US and UK in 2001 and 2002, respectively. Productivity growth was estimated at 1.8% annually in 1980-89, 1.2% per year from 2000-09, and 1.0% from 2010-14 Q1. Output per hour slowly accelerated from just under 1.0% per year in the...
early 1990s to 1.4% per year in 2000. Thereafter, trend productivity growth slowed and reached 0.9% y/y in recent years. Overall, the timing of the productivity slowdown matches that of the US and UK, but the amplitude of the peak to trough decline has been more muted.

As in the UK, however, the deceleration in productivity has been matched by a rise in trend employment growth (Figure 8). The trend employment rate (eg, one minus the long-run unemployment rate) has trended steadily higher since 2005 and now stands at a multi-decade high. Except for a brief period during 2009, likely an effect of the global recession, year-on-year growth in trend employment has remained in positive territory for the past decade (Figure 9). In addition, and in contrast to many of its developed economy peers, Germany’s trend labor force participation has been on a steady upward path (Figure 10), rising by just over 2pp since end-2001. Together, faster growth in trend employment and participation added about 0.6pp to potential growth in Germany over the past decade.

In our view, the model results likely reflect the Hartz reforms to the German labor market enacted between 2002 and 2005. In response to a steadily rising unemployment rate over several decades, Germany implemented a series of wide-ranging reforms to improve the efficiency of labor markets with the aim of lowering unemployment, reducing the duration of unemployment, and curbing unemployment benefits as part of an overhaul of the benefit system. The Hartz reforms are generally credited with boosting employment and participation rates, particularly among women, while leading to a reduction in long-term unemployment. Our model estimates confirm these findings. As Figures 8 and 10 show, the acceleration in the growth rates of trend employment and participation occurred after Hartz reforms were implemented. We find that, on net, long-term unemployment (NAIRU) fell by 2pp by end-2013, in line with estimates from other sources (Figure 11).\(^\text{12}\)

Labor market reform that boosted trend employment and participation, however, was unable to cause potential GDP growth to accelerate because average working hours in Germany have been on a steady decline. We find that trend working hours subtracted 0.6pp and 0.5pp from potential growth in 2000-09 and 2010-Q1 2014, respectively. This, together with a gradual slowdown in productivity, left potential GDP growth largely unchanged.

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\(^{12}\) See Tom Krebs and Martin Scheffel, “Macroeconomic Evaluation of Labor Market Reform in Germany,” IMF Working Paper 13/42, February 2013. The authors find that long-term (non-cyclical) unemployment was reduced by 1.4pp due to the Hartz IV reforms. Our results indicate that long-term unemployment initially rose in Germany after reforms were implemented, but then fell after 2005. On net, we find NAIRU fell by about 2pp relative to late 1990s levels.
France: Productivity slowing amid inflexible labor markets

The recession appeared to accentuate a trend slowing in productivity growth in France. Potential GDP growth slowed from 2.7% in 1980-89 to 2.1% in 1990-99, with the estimated rate of productivity growth falling from 3.7% to 2.6% (Figure 12). From there, potential growth slowed modestly, to 1.9% per year between 2000 and 2007, before falling below 1.0% during and after the recession. We estimate the current rate of productivity growth at just 0.8%. The gradual shift from higher productivity manufacturing to lower productivity services over time is likely a large explanatory factor behind the slowdown in productivity before the recession. Since 1980, the share of services employment to total employment (including agriculture, forestry and fishing) has risen from 69% to 86% through Q3 2014. In contrast, the share of manufacturing employment has fallen from 22% in 1981 to just under 10% currently.

Following the recession, a likely contributing factor to soft productivity growth in France has been lackluster business investment. Since 2010, gross fixed capital formation in France, which includes public, private (financial companies and nonfinancial corporations), and household entities, has grown by only 1.2% per year on average and contributed less than 0.1pp to real GDP growth. In level terms, gross fixed capital formation still stands nearly 10% below the pre-recession peak in Q4 2007. Standard economic theory suggests the behavior of business investment is influenced by long-run factors like potential GDP growth and short-run cyclical economic factors, including the rate of growth in economic activity, credit conditions, and uncertainty.¹³ The sluggish domestic economic recovery and heightened uncertainty stemming from the episodic concerns about sovereign debt sustainability in Europe are likely to have weighed on business sentiment, as have poor corporate profitability. As Figure 13 shows, corporate profitability in France has declined steadily following the recession, reducing the ability of the nonfinancial corporate sector to engage in internally financed investment. Declining corporate profitability has also been a feature of Italy’s economy in the past decade, whereas trends in corporate profitability in Germany and Spain have been more favorable.

Weak productivity growth, however, is not the sole factor behind France’s slowing in trend GDP growth. Since 1980, average working hours have been on a downward trend (Figure 14), dragging potential growth 0.8pp lower in the two decades ending 1999, and somewhat less since then. The downtrend in average working hours may also be related to the structural shift away from goods production and toward services, where part-time employment and shorter-work weeks are more prevalent. We also find that a modest increase in structural unemployment has occurred, with NAIRU rising from an average of 8.4% in 2006-07 to 10.5% now. This rise in structural employment and decline in trend working hours has, on average, offset population growth and meant that total hours have been approximately neutral in terms of contribution to GDP potential. However, we find the rise in structural unemployment in France has been much more modest than in either Spain or Italy, as discussed further below.

France also has a fairly high tax wedge, or the difference between before-tax and after-tax wages. A high tax wedge translates into high labor costs for employers and low net take-home pay for employees. High tax wedges are generally associated with higher structural rates of unemployment, lower hours worked, and lower productivity. According to OECD estimates, the tax burden in France has risen from 49.6% in 2000 to 50.1% in 2005, well above the 37.3% average for OECD countries and higher than the European average of 42.1% as of 2005. The European average, however, has drifted modestly lower in recent years.

Our estimates of potential GDP and its components in France are similar to those found elsewhere, including in two recent IMF studies that find potential output grew at an average rate of more than 2% during the 1980s and 1990s, but decelerated to around 1.7-1.8% in the 2000s before the crisis. During and after the crisis, IMF staff found that potential output fell to below 1%. Across both exercises, Fund staff use a variety of methodologies, including statistical filters, production function approaches, and a multivariate approach similar to the one used in this analysis. The authors conclude that a multivariate approach provides more robust estimates than the remaining approaches, although none of the approaches is fully robust to data revisions and uncertainty about the true level of potential output should be an accepted fact of life for policymakers and investors.

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15 See Tax wedges on earning vary sharply in OECD countries, OECD. The tax burden is measured as income tax plus employee and employer contributions, less cash benefits, as a % of labor costs. Data is for single persons without children at 100% of average earnings.
Spain and Italy: Labor market rigidities and weak productivity

Because of data restrictions on the historical capabilities of our estimation procedure, we report only the results for Italy and Spain since the 1990s and, as a result, combine the analysis into one section. As is well documented, substantial immigration, in part related to the housing boom and demand for construction labor, boosted the labor force participation rate, employment, and total hours. Employment in the construction and real estate sectors as a share of total employment rose from 8.7% in 1995 to 12.2% by 2007 (Figure 16) and the annual pace of employment growth in these sectors was several times larger than in remaining sectors (Figure 17). As a result, we estimate that potential GDP grew rapidly, exceeding 4.0% in the second half of the 1990s and 3.3% in 2000-07. Nearly all the boost to potential came in the form of the labor contribution, as we find total hours added 4.5pp and 3.6pp to potential growth, respectively, during the same periods.

Underneath, however, was an economy that experienced weak productivity growth. We estimate that productivity growth was actually negative between 1996 and 2007, subtracting between 0.3-0.4pp from potential growth (Figure 18). Our results are similar to findings by the IMF, OECD, and Eurostat that suggest trend productivity growth weakened considerably from 2-3% in the 1970s and 1980s to 0.0-0.5% in the past two decades. Some analysts argue that...
the housing boom itself is partly responsible for the weak productivity performance, while others argue that sectors outside of housing exhibited poor productivity and Spain’s rigid dual labor market limited flexibility and kept inefficiencies high.17

Following the recession, we find that potential growth has fallen to -0.3%, modestly below IMF and OECD estimates and in line with estimates from the European Commission.18 Population growth has slowed in recent years and is likely to be a feature of the Spanish economy in the years ahead, as the working age population is projected to decline. In addition, we find that NAIRU has risen substantially and, together with demographic trends, mean labor force participation and trend total hours are major constraints on potential GDP. We find that NAIRU increased sharply from just under 10% in 2008 to more than 25% currently (Figure 19). Only recently has the rise in trend structural unemployment begun to moderate. The shedding of employment, in our view, is the main reason trend productivity exhibited a medium-term bounce in 2007-13. As Figure 18 shows, productivity growth rose to 3.5% in 2010 before falling back to 0.7% in 2013.

In contrast to the more dramatic turn of events in Spain and elsewhere that reflect more of a boom-bust phenomenon, Italy shows the signs of an economy limited by structural rigidities and inefficiencies. We find that potential growth in the second half of the 1990s was a modest 2.0%, with half coming from a trend increase in labor force participation and half from productivity gains. Post-recession, we find a fairly sharp reduction in both productivity growth and hours, with productivity growth negative, on average, since the beginning of the last decade. This result is similar to estimates of trend growth in total factor productivity from the OECD, which shows productivity in Italy declining by 0.4% per year in 2001-10.19

Labor force participation has trended steadily higher throughout the sample period, rising from nearly 56% of the total population to around 63% in 2013, although most of this increase took place prior to the recession (Figure 20). Previous labor market reforms – the Treu reform in 1997 and the Biagi reform in 2003 – provided for non-standard work arrangements and part-time employment. Data indicate that these reforms were most helpful in boosting participation among workers in the 15-24 age group and among women. According to data from Eurostat, youth employment increased from 25% in 1997 to a high of 27.6% in 2004, while employment among women rose from 36.5% in 1999 to a high of 47.2% in 2008. Although the reforms boosted participation, they also tended to reduce

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average weekly hours because of the increase in temporary and part-time employment. As in Spain, Italian labor markets exhibit a dual structure, with the core of the labor market more rigid and inflexible and the margins — youth and female employment in Italy — more susceptible in downturns. As a result, we find that structural unemployment moved sharply higher beginning in 2007, more than doubling from 6.0% to 12.7% at present.

**Japan: Shaking off the effects of the recession**

Japan’s economic performance has been widely studied and our findings correspond with others, including official sources. We find that potential growth slowed significantly from nearly 4.0% in the 1980s to around 1.0-1.5% heading into the recession. In 1990-99, the slowdown in potential growth came mainly from a reduction in trend hours driven by softer participation (Figure 22) and a trend decline in average working hours (Figure 23). Demographics in Japan are a clear factor in the slowing of potential GDP as the labor force participation rate began to turn sharply lower in the mid-1990s, similar to the behavior of the labor force participation rate in the US after 2000. We find that the trend participation rate fell...

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from 63.5% in the mid-1990s to 60.5% heading into the recession, roughly in line with official Bank of Japan estimates. At the same time, Japan underwent a shift toward part-time employment, as have most developed countries in recent decades. We view demographics, the transition to a more service-based economy, and a decelerating trend in average weekly hours as explaining most of the fall in potential growth heading into the recession.

Following the recession, potential GDP growth slowed further as productivity growth fell to below 1.0%. Like many of the countries in our developed market sample, capital accumulation slowed during the recession and trend employment and participation declined for a relatively brief period between 2007 and 2009. Since then, however, we find that the trend employment rate has rebounded to pre-crisis levels (Figure 25) and, in the process, reversed the rise in NAIRU. We also find that the trend participation rate has ticked higher since late 2012. Our multivariate framework estimates structural unemployment at only 4.0%, down from a peak of 5.8% in 2009. Altogether, while we estimate that potential growth has averaged only 0.4% between 2010 and Q1 2014, there is evidence in recent years that the Japanese economy is shaking off some of the adverse effects of the recession on employment and hours, and we do not find evidence that the recession has severely affected trend productivity growth.

The growth slowdown: How large and how permanent?

The results in the previous section tell a clear story. First, potential growth in many developed economies was already slowing before the recession as workforces aged, the boost to productivity from the technology revolution faded, economies slowly transitioned away from manufacturing toward less-productive services as competitiveness worsened, and trends toward part-time work and more flexible working arrangements weighed on hours. Second, the recession has had a notable effect on potential growth in some developed economies by damaging construction and finance-related activities, distorting the efficient allocation of capital, suppressing rates of capital accumulation, and boosting structural unemployment, among other factors.

The accounting: A significant drag on global growth

The seven developed economies in our sample comprise 43% of world GDP based on purchasing power parity (PPP) weights from the IMF. Using the changes in our estimates of potential growth between 1990-99 and 2010-Q1 2014 in Figure 5, we find that potential growth in these developed economies fell by 1.5pp. Given their PPP weights, the slowing in developed economy growth subtracts about 0.7pp from potential global output growth.21 This amount of slowing is significant given IMF estimates that real global growth has averaged 3.7% annually from 1990 to 2007.

To put this number further into perspective, our finding that slower growth in developed economies could slow global growth by 0.7pp is of similar magnitude to the effect that a slowing China has on global growth. China, which accounts for 18.6% of world GDP on a PPP basis, is expected to see its potential GDP growth slow from about 9-10% in the 1990s to about 6.0% in the coming 5-10-year period as the country transitions from its previous investment-led growth strategy to a consumption-led economy. If realized, the slowing in China’s potential growth would lower the growth rate of potential global GDP by 0.6-0.7pp. The developed economies in our sample plus China account for nearly 62% of world GDP on a PPP-adjusted basis; slower potential growth in developed economies and a decelerating Chinese economy constitute a significant drag on global growth. Taken together, the two forces may slow potential global growth by 1.5pp.

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21 This implies that potential growth across the countries in our sample slowed by about 1.5pp. The five-year centered moving average IMF purchasing power parity adjusted weights in 2014 were: US: 22.3%, Japan: 6.1%, Germany: 4.2%, UK: 3.2%, France: 3.0%, Italy: 2.4%, and Spain: 1.8%. To estimate the effect on global potential, we multiply these weights by the 1990-99 estimate for potential growth in each economy less the 2010-14 period. We then sum across countries to yield the full estimate.
We compute the change in our estimate of potential growth between 1990-99 and Q4 2007 to form an estimate for the fraction of the slowdown attributable to the recession. Taking Q4 2007 as the cut-off date, we estimate that the pre-recession slowing in potential developed economy output was about 0.5pp, or one-third of the total decline over the full sample period. This represents about a 0.2pp drag on global growth based on relative PPP weights. Consequently, about two-thirds of the decline in developed market potential output growth came after the onset of the recession. Although it is difficult to fully isolate the effect of the recession on trend growth from the slowing already in place prior to the recession, we present these results as a useful starting point.

Our accounting of the slowdown in developed economy growth is somewhat mechanical since it uses the change in our estimates of potential growth and weights these changes based on the relative size of each economy. The new lower trend growth in hours and productivity, however, may not be permanent. Just as actual growth deviates from potential growth, creating a business cycle, economic shocks and reforms to the structure of the economy may also affect the trend itself. Therefore, any forward-looking assessment of developed economy growth prospects must also account for the efforts of policymakers to reverse any negative effects of the recession.

To combat the effects of the downturn, policymakers must respond along two lines: implementation of robust countercyclical monetary and fiscal policy and structural reforms to improve the efficient reallocation of capital and labor. Countercyclical policy is needed to prevent cyclical disturbances from becoming more long-lasting (eg, hysteresis from long-term unemployment to structural unemployment), while also giving structural reforms time to take effect. Here we briefly examine some of the policy actions that have been undertaken and that may mitigate the slowing in potential developed economy growth, with the understanding that a comprehensive account is beyond the scope of this paper.\(^{22}\)

Countercyclical policies work when the underlying economy is dynamic

All the countries in our developed economy sample implemented countercyclical policies, although these were mainly implemented through conventional and unconventional easing of monetary policy.\(^{23}\) Advanced economy central banks responded to the crisis by lowering target interest rates to zero (or below), providing abundant liquidity to traditional and non-traditional counterparties at various maturities, and initiating asset purchase programs in an

\(^{22}\) In addition, structural reforms intended to boost long-run potential growth often make near-term outcomes worse. The example of Germany following labor market reforms of 2002-05 illustrates how labor market outcomes initially deteriorated before later improving. Any full assessment of structural reforms must include the netting of short-term losses against long-term improvement.

\(^{23}\) For a more complete listing of the policy response by global central banks to the recession, see “Global themes: A quantum shift in central bank communication,” 12 September 2013.
effort to lower interest rate term premia on safe assets and risk premiums on risky assets. Following the ECB’s most recent announcement in late January that it would launch outright QE that included government bonds, every central bank in our sample has now engaged all three of these policy tools to a significant degree. In addition, the extensive use of unconventional policy tools required central banks to enhance their communication efforts to achieve greater transmission of monetary policy into the real economy.

Expansionary fiscal policy was used to a much lesser degree, particularly in Europe, where the rules of monetary union prohibit significant swings in the budget balance and fears over debt sustainability were more pronounced. Fiscal policy in the UK was countercyclical during 2008-09, but policy reversed course sharply in 2010 on concerns about deficits and the sustainability of government debt. Expansionary fiscal policy was used early on in the recovery in the US, but the size of the effort was relatively modest and ultimately reversed through sequestration and the expiration of some upper income tax rate cuts. In Japan, the “first arrow” of Abenomics consisted of a large fiscal stimulus bill, which policymakers described as part of an offensive strategy to boost growth. That said, the policy framework also used an increase in the consumption tax as part of a defensive strategy to preserve the medium-term sustainability of the budget. Altogether, countercyclical policies in advanced economies were generally small and front-loaded, and were either reversed or offset by other actions in later years. In our view, the lack of coordination between fiscal and monetary policy has limited the ability of policy to mitigate the effects of the recession on potential output.

Whether countercyclical policies are effective at facilitating the reallocation of labor and capital across different sectors of the economy, improving the efficiency of matching available jobs and properly skilled workers and limiting the rise in structural unemployment depends, in part, on how responsive the underlying economy is to the incentives created by accommodative policies. In the context of our analysis, economies that are more dynamic and flexible will be better able to absorb shocks and, as a result, will likely exhibit greater cyclical amplitudes and stable trends. In other words, recessions and shocks cause the economy to deviate from potential in the short run, but the rate of potential growth is generally undisturbed over the long run. In contrast, economic shocks will be transmitted to trend variables more quickly in economies that are less dynamic and inflexible. These economies will have smaller business cycles and more volatile trend variables.

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24 The fiscal tightening in the UK was later paused due to concerns that it was choking off the recovery.
In Figures 27-31, we present the estimates of the output gaps for six of the seven developed economies in our sample. We find that the amplitude of the business cycle in the US, UK, and Germany is larger than in France, Spain, and Italy, including in the most recent recession. One interpretation of these results is that the recession was characterized by large reductions in aggregate demand and smaller reductions in productive potential in the US, UK, and Germany. When applied to the other three economies, the model estimates could be interpreted as suggesting either the large cyclical shortfall in aggregate demand was quickly transmitted to trend variables and lower potential output, or the shock itself was a supply-side disturbance that could be immune to countercyclical policies.

The results have significant implications for the ability of policy to mitigate a recession-related decline in potential GDP. Conventional countercyclical monetary and fiscal policies are likely to be more effective in the US, UK, and Germany if they are successful in quickly reversing the decline in aggregate demand. Dynamic economies with more flexible labor and product markets are likely to be more responsive to activist policies. This argument has been made explicitly by the Federal Reserve to justify its aggressive policy stance as a way to limit the amount of supply side-damage that occurred initially following the downturn, and potentially to help reverse a portion of the damage at a later stage. That the output gaps in these three economies have closed suggests policy has had success in reversing the shortfall in aggregate demand and ameliorating some of the damage done to long-term productive potential.

**Structural reform is essential to mitigate any damage done to long-term productive potential**

In the remaining economies, including Japan, where the model estimates indicate a more rapid transmission of the economic downturn into trend variables, the results validate the emphasis on appropriate structural reforms to complement countercyclical policy. If successful, these policies would reduce structural unemployment, raise participation rates to boost the size of the labor force, increase hours, encourage capital accumulation, rebalance capital and labor to more efficient uses, and boost productivity. Significant reform agendas are already under way in several countries, including:

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25 Our findings for the size of the output gap in the US, UK, and Germany are similar to those of the Federal Reserve, IMF, and OECD. However, the European Commission, IMF, OECD, ECB, our Barclays European economics research team, and others find wider output gaps in France, Italy, and particularly Spain, where other studies find output gaps as large as 6% during the boom and -4% thereafter (see Borio, C., F. Disyatat, and M. Juselius, “Rethinking potential output: Embedded information about the financial cycle,” BIS Working Papers No. 404, 2013. The differences may be methodological in that traditional HP filters, bandpass filters, and other similar techniques used to estimate potential growth often assume a smooth trend, whereas the multivariate approach we apply in this chapter does not. We offer interpretations for what our findings could imply without seeking to validate one estimation approach over another.

• **Spain.** A series of structural reforms has been implemented with the goal of strengthening the financial system, increasing the efficiency of public services, improving competitiveness, and lowering regulatory barriers, among others.\(^{27}\) A highly fragmented labor market remains an issue, as does low productivity.

• **Italy.** Reforms to liberalize product markets and improve competitiveness began in 2011 and 2012 in energy, transportation, professional services, and public services.\(^{28}\) Current reform proposals are aimed at making labor markets more flexible. As in Spain, a dual labor market structure remains an obstacle.

• **France.** In 2013, France passed a labor reform law intended to improve mobility, allow for more flexibility to adjust pay and hours in response to changes in the business cycle, and streamline the dismissal procedure. In addition, pension reform is anticipated to raise labor force participation rates over the long run. If realized, it would help offset a less favorable demographic environment where growth in the labor force is expected to slow to 0.2% per year between 2021-2030.

• **Japan.** Reforms comprise the tri-arrow policies of aggressive monetary easing (1st arrow), expansionary fiscal policies (2nd arrow), and structural reforms (3rd arrow), with the last including efforts at electricity sector reform, governance and investment reforms at the Government Pension Investment Fund, coordinated wage setting, and other changes to increase participation and reduce fragmentation in labor markets.

Efforts on the structural reform front are bearing fruit, particularly in Spain, where real output grew for five consecutive quarters through Q3 2014 and the unemployment rate has fallen 2.5% from its peak. Despite this progress, the legacy of the recession persists, with the unemployment rate at 23.7% and approximately 3.5m persons (15% of the labor force) unemployed for over a year. Even under a decidedly optimistic scenario of productivity growing at twice its pre-crisis rate and NAIRU falling to 14% by 2019, the IMF finds that the unemployment rate would still be 16.0%.\(^{29}\) Turning to Italy, IMF staff estimate that a simultaneous implementation of product and labor market reforms would lift potential growth by about 0.8-9pp annually relative to baseline assumptions, recovering about half of our estimate of the decline in Italy’s potential growth since 1994-1999. Finally, IMF staff estimate that potential growth in France could rise by 0.7pp if appropriate structural reforms are enacted.

In Japan, the first and second arrows have supported economic activity and inflation, but progress on the third arrow has been slower. IMF staff estimate that potential growth is likely to remain below 1.0% through 2017. Against our estimate of potential output growth of 0.4pp per year between 2010 and Q1 2014, IMF estimates imply that full adoption of third arrow policies may improve trend growth by 0.5-0.6pp on a 5-10-year horizon.

In sum, the amount of policy accommodation and structural reforms implemented to counter the effects of the recession are unprecedented in both size and scope. We believe these policies were effective in limiting the initial declines in economic activity and distortions to capital and labor. As a result, our 1.5pp estimate of the decline in potential developed economy growth and 0.7pp decline in global growth already capture some of the effectiveness of policy in ameliorating the destruction of output from the recession; a true counterfactual is not available. Reversing more of the decline in trend growth remains a possibility, but estimates from official sources suggest that it is unlikely to be fully reversed and further progress toward this end is dependent on structural reforms, many of which are contentious. Even if successful — and history suggests these efforts often fall short — their benefit will be realized only gradually over time. As a result, we retain our view that potential growth in developed economies has slowed substantially.

\(^{27}\) See [Spain: Article IV Consultation](http://dx.doi.org/10.1007/s11107-014-0015-2), IMF Country Report No. 14/192, July 2014.

\(^{28}\) See [Italy: Selected Issues](http://dx.doi.org/10.1007/s11107-014-0015-2), IMF Country Report No. 12/168, July 2012.

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