Making Europe Great Again?

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1. Introduction

Notwithstanding a few bright spots, notably including Ireland in its Celtic Tiger years, economic growth in Western Europe has been disappointing for the last 20 years. This is a far cry from the years of rapid catch-up growth during the so-called 'Golden Age' of the period 1950 to 1973 or even the robust labor productivity growth which continued until the mid 1990s. Years of slow growth prior to the financial crisis have been followed by the stagnation of recent years. Productivity growth, especially in Southern Europe, has been weak in most countries. Projections of future growth are in some cases quite pessimistic and suggest a future in which Europe, rather than resuming its catch-up, will actually fall further behind the United States.

Table 1 reports some details of this picture. The decline over time in labor productivity growth in the EU15 from 4.9 per cent per year in 1950-1973, to 2.5 per cent in 1973-95 and 1.5 per cent in 1995-2007 is disappointing but the extrapolation of recent trends to show a further reduction to 0.8 per cent per year for the post-crisis period of 2014-23 made for the European Commission by Havik et al. (2014) is deeply unimpressive. Notably, it does not compare well with mainstream projections for the United States and would represent a return to 19th-century rates of advance.

A first step towards improving on this prognosis is to understand the reasons for the pre-crisis slowdown in productivity growth. These are not fully understood and to some extent vary across different countries. Nevertheless, it is possible to highlight some significant problems which have been important contributors to weak European performance, especially in the laggard economies. A second step is to develop a sense of what might be possible based on the future trajectory of American growth together with a resumption of European catching-up. Then, the third and crucial step is to consider what policy reforms could perhaps deliver on this potential.

It must be recognized, however, that setting out a blueprint for faster growth is one thing but implementing it is quite another. Even in normal times, the politics of improving productivity performance can be problematic but post-crisis it assumes a greater degree of difficulty. The turn towards populism which is now becoming quite prevalent is not helpful as is illustrated by Brexit and its implications. Moreover, the most obvious chance of faster technological progress based on advances in robotics is likely to intensify the tension between better productivity performance and the politics of making growth seem inclusive.

2. Why Was Pre-Crisis European Growth Disappointing?

The Golden Age was a halcyon period when Western Europe was catching up the United States. During this era of strong β-convergence, which came to an end with the first oil crisis, both real per person and real GDP per hour worked (labour productivity) grew much faster in most European countries than in the United States. Countries with relatively large scope for postwar reconstruction such as West Germany found that this stimulated their growth in the 1950s (Temin, 2002). TFP growth was very rapid during the Golden Age especially in countries with low initial productivity levels. This was based to a large extent on reductions in inefficiency (Jerzmanowski, 2007),

especially based on the structural change associated with the shift of labour out of agriculture.[1] At the same time, technology transfer speeded up as American technology became more cost effective in European conditions and obstacles to technology transfer were reduced (Nelson and Wright, 1992).

In some countries, especially in Northern Europe, catch-up during the Golden Age was promoted by the development of corporatist 'social contracts' which were based on bargaining equilibria between capital and labour that featured wage restraint in return for high investment (Eichengreen, 2007). These arrangements which also typically entailed a high level of coordination in wage bargaining, were an important stimulus to investment, which allowed new technology to be installed, and growth (Gilmore, 2009). This can be seen as an enhancement of 'social capability' under Golden-Age conditions. In other countries, for example, Italy, growth was promoted by industrialization based on elastic supplies of labour and undervalued currencies which underpinned investment and allowed the realization of internal and external economies of scale in the industrial sector (Crafts and Magnani, 2013). In both cases, there would later be difficulties arising from the institutional legacy, either of the reforms they had undertaken or of the reforms that that they had failed to make.

The evidence suggests that European economic growth was accelerated in these years by trade liberalization which acted to raise the long-run income level. The starting point was the European Payments Union which emerged from the conditionality of the Marshall Plan; a gravity-model analysis confirms that the EPU had a large positive effect on trade levels (Eichengreen, 1993). The subsequent establishment of the European Economic Community increased trade considerably. Using a gravity model, Bayoumi and Eichengreen (1995) estimated that intra-EEC trade among the original 6 members was increased by 3.2 per cent per year between 1956 and 1973 implying that membership of the EEC may have raised income levels by 4 to 8 per cent by 1970 (Eichengreen and Boltho, 2008) and the annual growth rate of real GDP per person by at most 0.5 percentage points. This was a useful bonus but quite modest (about 1/8) relative to the overall growth rate. The total long-term effect of reductions in trade protection, including reduction of external tariffs through GATT, raised European income levels by nearly 20 per cent by the mid-1970s, with a peak effect of perhaps 1 per cent per year (about ¼ overall growth), according to the estimates in Badinger (2005).

After the early 1970s, growth slowed down markedly right across Europe. The end of the Golden Age had a number of unavoidable aspects including the exhaustion of transitory components of fast growth such as post-war reconstruction, reduced opportunities to redeploy labour out of agriculture, narrowing of the technology gap, and diminishing returns to investment. Moreover, the United States itself experienced a productivity growth slowdown. All-in-all, the scope for catch-up growth was considerably reduced although by no means eliminated. There were big reductions in the contributions of capital deepening and, especially, TFP growth to labour productivity growth (Crafts and Toniolo, 2008).

Although there were unavoidable reasons why productivity growth slowed down and European countries generally continued to narrow the productivity gap with the United States, it is clear that productivity performance could have been better after the Golden Age. What accounted for this

[1] For Italy this may have contributed as much as 1.77 percentage points per year to Golden Age growth based on the decomposition proposed by Broadberry (1998). In France and West Germany, the contributions were smaller (0.52 and 0.77 percentage points, respectively) but still significant (Crafts and Toniolo, 2008).

undue slowdown in productivity growth? One very obvious point is that the fragility of the Eichengreen wage moderation/high investment equilibrium was revealed and it did not generally survive the turbulence of the 1970s, a time when union militancy and union power rose dramatically, as did labour's share of value added, and the rewards for patience fell in conditions of greater capital mobility, floating exchange rates and greater employment protection. At the same time, the corporatist model of economic growth was becoming less appropriate in economies which now needed to become more innovative and less imitative in achieving productivity growth, as Eichengreen (2007) himself has pointed out.

The period from the mid-1960s to the early 1980s was notable for a substantial increase in social protection. This took the place through a general expansion of social transfers financed to a considerable extent by 'distortionary' taxation and, in some countries, increases in employment protection. This can be seen as a legacy effect of corporatist social contracts interacting with the turbulent macroeconomic conditions of the 1970s. Financing this expansion of government outlays by a different tax mix would have been considerably better for growth (Johansson et al., 2008); the similar estimates of Kneller et al. (1999) indicate that the average 10 percentage point increase in the share of direct tax revenues in GDP between 1965 and 1995 could have entailed a fall in the growth rate of about 1 percentage point.

It is also relevant to look at the progress that European countries made in the upgrading needed as they moved closer to the frontier, in particular with regard to education and competition the areas stressed by Aghion and Howitt (2006). A measure of cognitive skills shown, based on test scores, correlates strongly with growth performance (Hanushek and Woessmann, 2009) and it is striking that even the top European countries were well behind Japan and South Korea. Woessmann et al. (2007) show that the variance in outcomes in terms of cognitive skills is explained by the way the schooling system is organized rather than educational spending.

Strict product market regulation (PMR) has raised mark-ups and lowered entry rates, thus reducing competitive pressure on managers with adverse impacts on both investment and innovation (Griffith and Harrison, 2004; Griffith et al., 2010), and reduced European TFP growth relative to the United States in the late 20th century by around 0.75 percentage points on average based on the estimates in Nicoletti and Scarpetta (2005). Similarly, in many European countries competition policy was much weaker than in the United States. The analysis in Buccirossi et al. (2013) found that this held back TFP growth.

A strong capacity for creative destruction becomes increasingly important as countries become more advanced (Acemoglu et al., 2006). However, the process of creative destruction clearly works much less well in many European countries than in the United States as is witnessed by processes of entry and exit of firms and the much stronger growth rate of successful American start-ups (Encaoua, 2009). A corollary of this is that, on average, countries in the European Union, especially in Southern Europe, are much inferior to the United States in shifting employment away from less productive towards more productive firms and this may account for as much as 20 percentage points of the labour productivity gap between the EU and the USA (see Table 2). For the EU as a whole, allocative

efficiency in services was only 0.036 in 2005 (Andrews and Cingano, 2014).[2] Barriers to entry and strict employment protection legislation disproportionately reduce the efficiency of labour allocation in high turnover and more innovative sectors.

The growth rate of real GDP per hour worked increased in the United States between 1973 to 1995 and 1995 to 2007 from 1.3 per cent per year to 2.2 per cent per year. The acceleration in American productivity growth was underpinned by ICT. For most countries, the main impact of ICT on economic growth comes through its diffusion as a new form of capital equipment rather than through total factor productivity (TFP) growth in the production of ICT equipment. This is because users get the benefit of technological progress through lower prices and as prices fall more of this type of capital is installed.[3]

The implication is that ICT has offered Europe a great opportunity to increase its productivity growth. However, the estimates of the contribution of ICT capital deepening to the growth of labour productivity in Table 3 show that European countries have been less successful than the United States in seizing this opportunity. That said, ICT production has boosted productivity growth, notably in Finland, Ireland and Sweden, and the use of ICT capital has made a strong contribution, especially in the services sector, in countries like the UK. Table 3 suggests that strong productivity performance in the recent past relied on one or both of ICT production and market services.

Restrictive regulation of labour and product markets and, in some cases, shortfalls in human capital explain Europe's sluggish take up of ICT (Cette and Lopez, 2012). Notably, employment protection has been shown to deter investment in ICT equipment (Gust and Marquez, 2004) because it increases the costs of reorganizing working practices and upgrading the labour force, which are central to realizing the productivity potential of ICT (Brynjolfsson and Hitt, 2003). Since these forms of regulation have weakened over time, the story is not that European regulation has become more stringent but rather that existing regulation became more costly in the context of a new technological era. Of course, European countries have varied a good deal in these respects; for example, the UK and Sweden have been better placed than Italy and Spain.

Italy has experienced major obstacles to the rapid diffusion of ICT for which it was not well-positioned. The effective assimilation of this new technology has been hindered by the small size of firms, oppressive regulation, and shortfalls in human capital by comparison with the European leaders in the take up of ICT, as microeconomic studies of Italian manufacturing confirm. The take-up of ICT has been strongly correlated with firm size and changes in organizational structure (Fabiani *et al.* 2005). Managerial selection processes which are insufficiently meritocratic have exacted a heavy cost in the context of the reorganization required to get the productivity payoff from ICT (Pellegrino and Zingales, 2014). Bugamelli and Pagano (2004) found that many firms appeared to be constrained in their ICT investment by the adjustment costs it entailed, especially if their workforce has relatively low levels of human capital. These reflect regulatory burdens which, because they are

[2] The OP gap is defined as the difference between the weighted and unweighted average of labor productivity across firms. A completely random allocation of employment across firms would imply that the AE = 0. A higher value connotes a greater level of allocative efficiency.

[3] In a country with no ICT production, a neoclassical growth model whose Cobb-Douglas production function has two types of capital (ICT and other) shows that the steady state rate of growth will be TFP growth plus a term denoting the rate of real price decline for ICT capital multiplied by the share of ICT capital in national income, all divided by labour's share of national income (Oulton, 2012).

fixed costs, bear very heavily on the small- and medium-size firms that have been central to Italy's distinctive variety of capitalism.

More fundamentally, Italy's very weak growth performance since 1995 (cf. Table 1) indicates an inability to make the reforms necessary to sustain catch-up growth in a close-to-frontier economy. In particular, this includes a failure to strengthen competition policy adequately (Buccirossi et al., 2013) and to improve the quality of Italian education (Bertola and Sestito, 2013) and is underlined by Italy's dismal showing in the World Bank's *Doing Business* and *Governance Matters* rankings (Crafts and Magnani, 2013). Resource misallocation has increased substantially since the mid-1990s and has undermined productivity growth (Calligaris et al., 2016). Italy epitomizes Europe's problem with expediting creative destruction; exit of low productivity firms is much too slow. Participation in the Single Market and joining the Euro were not adequate substitutes for an effective domestic supply-side policy.

From the 1970s through the 1990s, the impetus to economic growth from European integration continued, notably, through enlargements which expanded membership to 15 countries by 1995 and the inauguration of the European Single Market. The synthetic counterfactuals method suggests that the impact of EU accession on economic growth varied considerably across countries but was generally positive and, in some cases, provided a significant boost to growth (Campos et al., 2014). However, the impact of the Single Market has been underwhelming. Harrison et al. (1994), working with a CGE model that allows for increasing returns in some sectors, changes in price-cost mark-ups and capital stock adjustment projected that competition and scale effects resulting from the Single Market would raise EU GDP by 0.7 per cent and the total impact on EU GDP of the Single Market would be 2.6 per cent.[4] Ex-post studies have suggested similar effects; for example, Ilzkovitz et al. (2007) estimated GDP had been raised by 2.2 per cent by 2006.

European Monetary Union had an initial impact on growth was probably positive but much less dramatic than early estimates suggested. The currency union effect on trade volumes was initially thought to be very large but better econometrics and the opportunity to examine the actual impact of EMU now suggests that trade volumes probably were only 'mildly stimulated' (Glick and Rose, 2015) with the implication that any trade effect on GDP is likely to have been, at best, modest.[5] Overall, it seems clear that the impetus to growth from European integration has become much weaker in the recent past.

3. Could European Growth Performance Surprise on the Upside?

One way to predict future medium-term growth is to assume that recent trend growth will continue. The trend can be estimated using quite sophisticated time-series econometrics but the analysis is essentially backward-looking. Since recent European growth performance both pre- and post-crisis has generally been disappointing, approaches of this kind are pessimistic about future growth. This is not only true for Europe but also to some extent for the United States where productivity growth slowed down after the ICT boom of the late 1990s.

[4] This is well below the optimistic projections of the Cecchini Report issued by the European Commission which projected 4.8 to 6.4 per cent of GDP before any impact from capital stock adjustment but is in line with other academic ex-ante studies (Badinger and Breuss, 2011, Table 14.3).

[5] Glick and Rose (2015) conclude that results on the trade effects of the Euro are very sensitive to econometric methodology and that all estimates have to be treated with great caution.

Two methods of trend extrapolation in current use are dynamic factor models which use high-frequency data to try to identify trend and cyclical components in time series of real GDP or real GDP per worker (Antolin-Diaz et al., 2017) and production-function models which infer potential growth by estimating trends in the supply-side sources of growth including capital and labour inputs and TFP growth (Havik et al., 2014). Using the former methodology, Antolin-Diaz et al. (2017) conclude that trend growth both in the United States and also in the Euro Area has gradually declined since the end of the 20th century very largely as a result of a fall in the trend rate of growth of labour productivity.[6] They find that trend labour productivity growth and labour input in the Euro Area has fallen to below 1 per cent per year and about 0 per cent per year, respectively, while trend growth of real GDP in the United States has fallen by about 1 percentage point to about 2 per cent per year based on roughly equal contributions from labour inputs and labour productivity growth.

Using the production-function approach, Havik et al. (2014) also conclude that trend growth is now much lower than pre-crisis, as was reported in Table 1. The halving of European trend GDP growth which they report is mainly driven by reduced labour productivity growth which in turn reflects weaker trend TFP growth.[7] The results for Europe are actually quite similar to those of the dynamic factor model analysis but, while accepting a growth slowdown, the trends inferred for the United States are rather more optimistic with trend labour productivity growth at 1.5 per cent per year based on TFP growth of 1.0 per cent per year. This is similar to other mainstream analyses (Fernald, 2015; CBO, 2016). As is well-known, a different view is offered by Gordon (2016) but even he sees a long-term future in which labor productivity in the United States will grow at 1.2 per cent per year. The striking implication of this discussion is that, rather than catching up as they did for most of the postwar period, in the 'new normal' European countries will continue to fall behind the United States even in the context of pessimistic assessments of future American productivity performance.

In contrast, some forward-looking approaches to assessing the prospects for European growth are distinctly more upbeat. Table 4 reports a projection made by OECD (2014a) which uses a catch-up growth model in which growth in the leading economy (United States) depends on demography and technological progress while long-term TFP growth in (follower) European countries is based on TFP growth in the leader and a component based on reducing the productivity gap with the leader. The OECD projections for European countries in Table 2 are based on the assumptions that the crisis significantly reduced the level of potential output in the short term (Ollivaud and Turner, 2014) but has had no adverse effect on long-run trend growth and gradual return to conditional convergence towards the leading economy depending on institutions and policies.[8]

Building on this model, a really bullish forward-looking account of future European growth would be based on three assumptions, namely, that there will be a resumption of rapid technological progress in the leader which diffuses rapidly in the European followers, that recent productivity performance reflects a short-term shock from the crisis rather than a much reduced long-term trend growth rate, and that improvements in supply-side policy are not only available but will be adopted.

[6] The 'Euro Area' in this analysis is a weighted average of France, Germany and Italy.

[7] Growth of the capital stock (and thus the capital-deepening contribution to labour productivity growth) adjusts to TFP growth in this model.

[8] So the very low growth in Europe of late reflects a levels-effect adjustment resulting from the financial crisis playing out over several years rather than lower long-term trend growth.

Future technological progress is, of course, highly uncertain but techno-optimism is by no means unreasonable. It seems very likely that the impact of computerization through robotics will intensify in the near future. Frey and Osborne (2013) estimate that 47 per cent of 2010 employment in the United States has at least a 70 per cent chance of being computerized by 2035 with these probabilities being strongly negatively correlated with wages and educational attainment of workers. Tasks which will not be susceptible to computerization are those involving perception and manipulation, creative intelligence, or social intelligence. Future advances will come in machine learning which will be applied in mobile robotics as hitherto non-routine tasks are turned into well-defined problems, in particular using big data which will allow substitution of (much cheaper) robots for labour in a wide range of low-wage service occupations. Arntz et al. (2016) adapt the Frey and Osborne approach to consider tasks rather than occupations and see relatively few jobs (perhaps 9 per cent) as completely automatable but, nevertheless, estimate that between 35 and 45 per cent of tasks in European countries will be susceptible of automatibility.

If either of these estimates is correct, the upside is that this technology alone could deliver labour productivity gains equivalent to, say, 1.5 per cent per year over the next 20 years. A wider perspective which encompasses driverless cars, universal multi-jointed robots and data-driven exert systems sees labor productivity growth of 2.5 per cent per year as attainable (Bartelsman, 2013).

The persistent recent weakness of labour productivity growth has spawned a large literature on the 'productivity puzzle'. It is important to know whether the orthodox view that it basically reflects a large levels effect, resulting from the financial crisis and accruing primarily through a one-off decline in TFP, is correct. A more pessimistic interpretation would be that it is partly the result of a slowdown in trend labour productivity growth. A more optimistic interpretation would be that some of what is now counted as a permanent effect will actually be regained as the economy returns to normal.

There is still considerable uncertainty about these issues but there is quite strong evidence that the crisis had led to impairment of resource reallocation, and thus had decreased efficiency (and thus TFP) as well as holding back implementation of innovations. The strongest evidence is of misallocation of capital linked to higher barriers to entry and exit resulting from costly credit, regulations, and uncertainty (Gamberoni et al., 2016), and the delayed exit of zombie firms (McGowan et al., 2017). For the UK these problems have been significant (Riley et al., 2015) but have also been compounded by misallocation of labor as new hires have been disproportionately concentrated in low productivity sectors (Patterson et al., 2016). These types of problems can be expected to evaporate as recovery proceeds so the optimistic interpretation might be correct.

It is quite easy to think of a large menu of policy reforms which, if adopted, could return Europe to catch-up growth and validate the OECD projection. Indeed, such a list is implicit in the earlier account of pre-crisis limitations on productivity growth. Revitalizing the stalled process of European economic integration is an obvious starting point. The most obvious way to emulate the success of the early postwar decades is to complete the Single Market in particular with regard to services where barriers remain high and have not been significantly reduced in recent years (Fournier, 2014). Table 5 reports estimates from a dynamic general equilibrium model of the implications of this reform. These are, in fact, likely to be significant underestimates of the possible gains because the

model does not capture the productivity implications of greater competition. Even so, the potential impact is considerable, adding perhaps 1 per cent to the growth rate of large Eurozone economies.

Beyond this, there are a range of supply-side policy reforms that could significantly improve growth outcomes over the next 10 or 20 years according to recent quantitative estimates (Varga and in't Veld, 2014; Andrews and Cingano, 2014). These include improvements to the quantity and quality of education, strengthening competition, cutting unemployment benefits, reducing and reforming taxes, and lowering employment protection. These would either raise the growth rate or in some cases provide a transitional boost to growth as the economy moves to higher employment and output levels. OECD economists have done a great deal of research in this area and Table 6 summarizes the conclusions. The authors conclude that addressing all policy weaknesses by moving up to the OECD average level has a potential GDP gain of 10 per cent for the average country after 10 years and 25 per cent eventually (Barnes et al., 2011).[9]

One important aspect of such reforms would be to improve the diffusion of ICT in those European countries which have been lagging behind in this respect. This matters not only because there is still a backlog to be remedied but also since, contrary to some claims, the evidence is that these technologies are still advancing rapidly. Byrne et al. (2017) present evidence that the prices of computing equipment and semi-conductors are still falling very rapidly. This represents an important growth opportunity for European economies. To deal adequately with the possible impact of ICT on future growth it is useful to move beyond the one sector neoclassical growth model to a two-sector formulation where the economy has ICT and other goods production sectors and uses two types of capital, namely, ICT capital and other capital, as in Oulton (2012). Given that TFP growth in the ICT production sector is relatively fast and that this makes ICT capital relatively cheaper over time, steady-state growth will be characterized by the ICT capital stock growing faster than non-ICT capital. Growth will be positively related to TFP growth in ICT production and to both the income share of ICT capital and the output share of ICT production.[10] Reducing restrictive regulation of labour and product markets would speed up the diffusion of ICT (Cette and Lopez, 2012) and, in terms of Oulton's model, raise the value of β, the factor income share of ICT capital . Column 2 of Table 7 suggests that addressing these issues could potentially underpin a substantial future ICT contribution to growth.

Obviously, there is no way for Western Europe to return to the growth rates of the Golden Age which were based on a scope for rapid catch-up growth that no longer exists. It might, however, be possible to return to something like the labor productivity growth of the twenty years before 1995. This would require sustained technological progress and better supply-side policies which allow the opportunities generated by such advances to be exploited more effectively than in the recent past.

4. Barriers to Faster European Growth

It is well-known that supply-side policy is vulnerable to 'government failure' where the choice or implementation of policy leads to outcomes that are inefficient. The standard reasons for

[9] Some reforms, notably to educational systems, take a long time to pay off.

[10] So, technological progress in ICT raises growth in a country with no ICT production through the growth of the (imported) ICT capital stock. The rate of real price decline of ICT capital assumed by Oulton (2012) is about in the middle of the range of possibilities suggested by Byrne et al. (2013).

government failure include inadequate information, principal-agent problems (inability to incentivize officials to work effectively), inability to make credible commitments, asymmetric lobbying, and vote-seeking by politicians. Losers protest while potential gainers don't know or don't care enough to reward pro-productivity reformers with their votes. A classic example is trade liberalization and, in this context, the completion of the Single Market.

It has also been widely remarked with regard to selective industrial policy that subsidies are disproportionately given to declining rather than new industries and some economists argue that this is an inherent aspect of the political economy of industrial policy which slows down the process of creative destruction. Baldwin and Robert-Nicoud (2007) have used a variant of the well-known 'protection-for-sale' model to argue that the asymmetric appropriability of rents implies losers lobby harder while earlier explanations include the 'social insurance' explanation of Hillman (1989) and the suggestion by Krueger (1990) that known losers in ailing industries are more visible than unknown gainers in expanding industries.

Alternatively, policy choice may be constrained in a second-best situation. An important example of this relates to employment protection in Southern Europe, the reform of which would contribute significantly to strengthening the creative destruction process. As Sapir (2006) stressed, Europe has several 'social models'. At extremes of the spectrum are the 'Nordic Model', characterized by generous unemployment benefits and low employment protection, and the 'Mediterranean model' which features strict employment protection but has relatively low unemployment benefits. An important implication of this contrast has been that countries with the latter model were at a disadvantage, ceteris paribus, in the diffusion of ICT. The 'obvious' policy implication for the 'Mediterranean model' countries seems to be to reduce employment protection in return for enhanced social insurance but in fact there was no sign of this during the pre-crisis ICT revolution even though, across the world, there does seem to be a clear tendency for market regulation and social expenditures to be policy substitutes (Di Gioacchino et al., 2014). However, it would be a mistake to infer from this that there really is a policy choice. The 'Nordic model' is probably only feasible in societies with high levels of trust and a large majority of 'good citizens' – societies with low levels of trust find that regulation is the only viable option and may even be locked in to a 'low-trust/high-regulation' equilibrium (Aghion et al., 2010).

A new challenge arises from the likelihood that the impact of technological progress has become less benign than in the Golden Age with the implication that growth has become less inclusive and that the political constituency for a business-as-usual approach to pro-growth policies has shrunk. Since about 1980, it appears that the implications of technological progress have become more challenging for the labour market in OECD countries. It seems likely that in the ICT era technological progress has become capital-augmenting and the elasticity of substitution between labour and capital has become greater than 1 and this has reduced labour's share of national income by around 5 per cent (Karabarbounis and Neiman, 2014). Job polarization has been a striking feature of employment patterns in advanced economies in the last 30 years or so with the percentages of high-skilled (professional, managerial etc.) and low-skilled (labourers, low-education service sector workers) employment rising while middle-skilled (clerical, blue-collar) employment has been falling. Estimates for an aggregate of 16 European countries show a fall of 9.27 percentage points in the share of their 'middling occupations' between 1993 and 2010 against rises for 'high-paying' and 'low-paying'. This pattern is observed in most countries with 14 of the 16 having experienced a

decline in the share of middling occupations (Goos et al., 2014). The model estimated by these authors suggests that this has been almost entirely due to the factor-saving bias of technological change rather than to offshoring with the declining occupations being those which entail tasks which are routine and codifiable and thus are most amenable to computerization (Autor, 2014).

Possible developments in robotics discussed earlier could exacerbate these difficulties. It seems quite possible therefore that the issue that Europe really confronts is actually not so much slow technological progress but that the skill-bias of new technologies has a big downside in terms of a serious adjustment problem in the labour market. The data reported in Table 8 suggest that many, if not all, European countries are more vulnerable to the technology shocks associated with ICT and robotics than the United States. The symptoms are relatively high proportions of workers with less than upper-secondary education, more generous replacement rates, and higher levels of employment protection. There will be a premium on 'flexible' labor markets which are absent in much of Europe and may be harder to promote in a populist era.

If we consider the implications of the future computerization of employment as equivalent to a an increase in the dispersion of worker productivities, then in an equilibrium search and matching labour market model, the increase in equilibrium unemployment will be greater in a setting with relatively high unemployment benefit rates and employment protection since these are labour market policies which increase the convexity of the relationship between the unemployment rate and skill. In a calibrated model, Mortensen and Pissarides (1999) estimate that a common ICT technology shock which would raise unemployment in the United States by about 0.4 percentage points during 1975-1995 would have increased unemployment by 4.8 percentage points with 'European Union' labour market policies.

Over and above the familiar political economy difficulties of implementing supply-side reform, a new threat is the rise of populism and its implications for the future of European integration.[11] Here, as epitomized by Brexit, the issue is not whether economic integration can be further deepened but whether the future is one of disintegration and thus adverse impacts on trade, factor flows, and income levels. Although ultimately disintegration would translate into an effect on the level of real GDP during the transition the growth rate would be depressed.

A recent method to infer the implications of accession to the EU in the style of 'with-without' comparisons is available in the synthetic counterfactuals method of Campos et al. (2014). This compares growth in each post-EU accession country with growth in a weighted combination of other countries which did not accede and which are chosen to match the accession country before its entry to the EU as closely as possible. A difference-in-differences analysis is then performed to compare the actual and synthetic-control series for each country. The results are that EU accession typically has had a substantial and statistically significant impact on growth relative to the counterfactual of staying out. For countries which joined the EU between 1973 and 1995, the median impact of EU membership after 10 years is estimated to have been an 8.6 per cent income gain. If secession from the EU entailed the opposite impact, a similar income loss would ensue.

[11] It is worth noting that respected commentators are now discussing various forms of disintegration as a serious possibility. See, for example, Taylor (2017).

Several papers have recently estimated the long-term economic impact of Brexit in terms of a levels effect on GDP and their results are summarized in Table 9. The methodology is typically based on a gravity model estimate of the trade effects of various alternatives to EU membership ranging from remaining in the Single Market à la Norway to trade on an MFN basis as a WTO member. The trade effect is then converted into an impact on GDP using an assumed elasticity to obtain the implications for productivity (LSE) or a macroeconomic model (NIESR) or a combination of the two (HMT). NIESR's basic modelling assumes no impact via productivity but an effect of this kind is added in the case of the WTO* estimates. Not surprisingly, the impacts depend on what replaces EU membership with the smallest losses accruing if the UK stays in the Single Market and the largest in the absence of new trade agreements.[12] In every case, however, GDP is reduced by Brexit and by a quite significant amount once productivity losses are taken into account. Even though tariff levels are lower than when the UK was previously outside the EU, much of the gains that EU membership has brought might be lost.[13] This suggests that disintegration would potentially be a major headwind for European growth.

Analysis of which districts voted for Brexit is revealing. The 'Leave' vote share was positively correlated with high shares of badly educated, of elderly voters, with relatively low income and high unemployment levels, and with votes for UKIP (a populist party) in the 2014 European elections (Becker et al., 2017). Put differently, UKIP and euroskepticism find their core support among 'left-behind' voters (Goodwin and Heath, 2016). Interestingly, a further factor favouring 'Leave' was the severity of fiscal austerity affecting the district; indeed, the estimates by Becker et al. (2017) suggest that a small easing of government spending cuts would potentially have reversed the referendum result.

The implications of these findings are, first, that the a future of non-inclusive growth and increasing economic inequality is a serious threat to European integration, and, second, that there may be antidotes to euroskepticism in the form of help for the 'left-behind' possibly by a combination of active labor-market policies and a more ambitious social safety net, as might be inferred from Rodrik (1998). A large increase in the scope and volume of social transfers was indeed a key ingredient of the successful reconstruction of postwar Europe that gave rise to the Golden Age of European growth but, in ageing societies with quite limited fiscal space and expensive welfare programs to finance, the scope for a strategy of this kind quite limited (cf. Table 10).

All this suggests that implementing the supply-side reforms that could improve growth prospects will be challenging. Indeed, it even seems possible that economic policy could take a turn for the worse. The centrifugal forces assailing the European Union should not be underestimated and if there is a significant reversal of European integration this would undermine growth performance over the medium term. Making Europe great again may be a Herculean task.

5. Conclusions

[12] This matches the evidence from gravity models of the relative success of the EU and other trade agreements in increasing trade volumes.

[13] A caveat to these conclusions should be noted. First, the gravity-model evidence does not explicitly cover the case of a former EU member which means that the estimated impact on trade of leaving the EU (as opposed to joining it) is not known. History does seem to influence trade volumes and, implicitly, trade costs (Eichengreen and Irwin, 1998). This suggests that the adverse impact on trade may be lower than the conventional calculations assume.

Extrapolation of recent European growth performance suggests that future growth prospects are weak. A recent projection of this type by economists from the European Commission projected trend growth of labor productivity in the EU15 over the medium term at only 0.8 per cent per year, a rate which would probably be significantly inferior to the United States. The days when Europe posted really rapid growth are now a long time ago.

Weak pre-crisis European productivity growth signals the need for policy reform. A diagnosis that European countries generally had too much regulation, too high taxation, and too little competition is broadly correct. An important implication is that the forces of creative destruction were fairly weak in many, though not all, European economies. These handicaps meant that on average the opportunities that came along with the ICT revolution were not fully utilized.

Slow future European growth is not inevitable. A projection of much more rapid future productivity growth of around 2.5 per cent per year could be constructed if technological progress is strong and supply-side policy is reformed especially if recent weak performance is the result of temporary factors mistakenly assumed to permanent. Such a projection is by no means completely implausible even though it is not very likely. A blueprint for reform which, inter alia, would address issues of competition, regulation, and taxation is readily available, and promising technologies such as a new generation of robots can be identified. Supply-side reform is, however, politically challenging at the best of times.

European economic integration is no longer a powerful force for growth. This is epitomized by the failure to complete the Single Market. Worse still, economic integration may be under serious threat from euroskepticism and populism, as Brexit underlines. An unravelling of the European Union would have seriously adverse implications for future growth prospects even though it seems attractive to some vocal politicians.

Making Europe great again is not impossible but, at present, it looks improbable.

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Table 1. Growth Rates in Different Periods (% per year)

	United States Real GDP/Person	United States Real GDP/Hour Worked	EU 15 Real GDP/Person	EU 15 Real GDP/Hour Worked
1950-73	2.5	2.6	4.0	4.9
1973-95	1.7	1.3	1.9	2.5
1995-2007	2.2	2.2	2.0	1.5
2014-23			1.0	0.8
2016-26	1.0	1.4		

Note: EU 15 is the aggregate of the 15 EU member states prior to the 2004 expansion of the European Union.

Sources: The Conference Board (2016); Havik et al. (2014); United States Congressional Budget Office (2016)

Table 2. Allocative Efficiency Scores

	Manufacturing	***Services***	***Business Sector***
Austria	0.196	0.222	0.229
Belgium	0.205	-0.218	-0.012
Denmark	0.270	0.121	0.184
Finland	0.668	0.251	0.419
France	0.461	0.161	0.296
Germany	0.443	0.399	0.460
Greece	-0.056	-0.235	-0.240
Italy	0.141	-0.190	-0.039
Netherlands	0.043	-0.274	-0.137
Portugal	0.077	-0.069	0.020
Spain	0.465	-0.052	0.117
Sweden	0.672	0.253	0.379
UK	0.300	0.065	0.156
European Union	0.272	0.036	0.140
United States	0.473	0.358	0.394

Source: online appendix to Andrews and Cingano (2014).

Table 3. Aspects of Labour Productivity Growth in the Market Sector, 1995-2007 (% per year)

a) Growth Accounting

	Labour Quality	*Non ICT K/HW*	*ICT K/HW*	*TFP*	*Y/HW*
Austria	0.1	0.0	0.5	1.5	2.2
Belgium	0.2	0.4	0.9	0.1	1.7
Denmark	0.1	0.1	1.0	-0.1	1.0
Finland	0.1	-0.1	0.5	2.8	3.3
France	0.3	0.4	0.3	0.9	2.0
Germany	0.0	0.5	0.5	0.7	1.7
Italy	0.1	0.4	0.2	-0.4	0.4
Netherlands	0.4	0.0	0.5	1.1	2.1
Spain	0.4	0.5	0.4	-0.6	0.6
United Kingdom	0.4	0.4	0.8	1.0	2.6
EU10	0.2	0.4	0.5	0.6	1.6
USA	0.3	0.3	0.9	1.2	2.6

b) Sectoral Contributions

	ICT Production	*Goods Production*	*Market Services*	*Reallocation*	*Y/HW*
Austria	0.3	1.7	0.2	-0.1	2.2
Belgium	0.3	0.9	0.6	-0.1	1.7
Denmark	0.3	0.4	0.4	-0.1	1.0
Finland	1.7	1.3	0.5	-0.1	3.3
France	0.4	0.8	0.7	0.0	2.0
Germany	0.5	0.9	0.4	0.0	1.7
Italy	0.2	0.2	0.0	-0.1	0.4
Netherlands	0.4	0.6	1.2	-0.2	2.1
Spain	0.1	0.2	0.3	-0.1	0.6
United Kingdom	0.5	0.7	1.6	-0.2	2.6
EU10	0.4	0.7	0.6	-0.2	1.6
USA	0.8	0.3	1.8	-0.2	2.6

Source: van Ark (2011)

Table 4. OECD Future Growth Projections, 2014-2030 (% per year)

	Real GDP	*Employment*	*GDP/Worker*	*TFP*
United States	2.4	0.5	1.9	1.6
EU15	1.8	0.2	1.6	1.2
Euro Area	1.7	0.2	1.5	1.2
Austria	1.9	0.2	1.7	1.5
Belgium	2.0	0.4	1.6	1.1
Denmark	1.6	0.1	1.5	1.0
Finland	2.0	-0.1	2.1	1.9
France	2.2	0.3	1.9	1.2
Germany	1.1	-0.5	1.6	1.5
Greece	2.2	0.2	2.0	1.8
Ireland	2.3	1.2	1.1	0.8
Italy	1.5	0.3	1.2	0.7
Netherlands	2.1	0.2	1.9	1.6
Portugal	1.4	0.3	1.1	0.9
Spain	1.5	0.9	0.6	0.4
Sweden	2.6	0.5	2.1	1.8
UK	2.6	0.6	2.0	1.5

Source: OECD (2014a)

Table 5. Impact after 10 Years on Level of GDP and Exports of Full Liberalization of Single Market (%)

	GDP	***Exports***
Benelux	25.3	66.5
France	11.6	42.3
Germany	11.5	57.8
Italy	13.6	66.5
Spain	9.5	61.4
Sweden	10.2	35.9
United Kingdom	7.1	47.0
Small EU Countries	27.9	74.4

Note: 'small EU countries' is the EU27 minus Belgium, France, Germany, Italy, Luxembourg, Netherlands, Poland, Spain, Sweden, UK.

Source: Aussilloux et al. (2011)

Table 6. Potential Impact on Real GDP per Person of Supply-Side Policy Reforms (%)

	Labour Market	*Taxation*	*Product Market Regulation*	*Education*	*R & D Incentives*	*Total*
Moving to OECD Average						
United States	0.3	1.4	0.0	2.5	0.0	4.2
Austria	3.4	8.8	0.0	0.1	0.2	12.5
Belgium	5.0	14.7	0.0	0.0	0.0	19.7
Denmark	7.7	2.4	0.0	0.2	0.4	10.7
Finland	6.5	6.4	2.6	0.6	0.0	16.1
France	4.5	10.9	2.2	2.1	1.5	21.2
Germany	6.1	9.9	0.0	0.0	0.0	16.0
Greece	6.0	10.1	22.0	5.8	0.0	43.9
Ireland	6.8	0.9	9.7	0.0	0.0	17.4
Italy	0.3	10.8	0.3	5.4	0.2	17.0
Netherlands	1.8	1.3	0.0	0.0	0.1	3.2
Portugal	7.3	0.7	8.5	21.8	1.3	39.6
Spain	3.5	4.6	0.0	6.3	1.4	15.8
Sweden	6.5	6.4	0.0	0.1	0.0	13.0
Switzerland	5.0	1.1	6.2	0.0	0.9	13.2
United Kingdom	1.1	0.0	0.0	4.6	0.0	5.7

Source: Barnes et al. (2011).

Table 7. ICT and Long-Run Growth Potential (% per year)

	ICT-Use Own β	*ICT-Use Swedish β*	*ICT-Output*	*ICT Income Share (%GDP)*	*ICT Output Share (%GDP)*
United States	0.70	0.71	0.22	6.83	3.10
Austria	0.46	0.76	0.22	4.25	3.15
Belgium	0.64	0.73	0.13	6.03	1.90
Denmark	0.62	0.70	0.20	6.13	2.88
Finland	0.67	0.76	0.57	6.14	8.21
France	0.48	0.68	0.17	4.91	2.46
Germany	0.44	0.68	0.33	4.45	4.75
Ireland	0.39	0.94	0.51	2.88	7.24
Italy	0.36	0.70	0.19	3.52	2.67
Netherlands	0.51	0.71	0.10	5.36	1.36
Spain	0.53	0.76	0.10	4.83	1.39
Sweden	0.70	0.70	0.24	6.93	3.39
United Kingdom	0.60	0.66	0.16	6.34	2.26

Note: β is the factor share of ICT capital; a high value indicates relatively successful diffusion reflecting favourable supply-side policies and is conducive to a higher growth contribution.

These projections are based on a neoclassical growth model with 2 types of capital, ICT capital and other capital and 2 types of output, ICT production and other production. Each output has a similar production function $y = Ak_{NICT}^{\alpha}k_{ICT}^{\beta}$ where y is output per worker and k denotes capital per worker with α and β the same in each case but ΔA/A is bigger in the ICT sector. The relative price of ICT capital falls in line with the TFP growth differential. In the traditional model with one type of capital, steady state labour productivity growth is $(\Delta A/A)/s_L$, where s_L is labour's share of national income. In the modified model, the weighted average of TFP growth in the two sectors is augmented by an additional term $(\beta\Delta p/p)/s_L$ where Δp/p is the rate of decline of the price of ICT capital goods relative to other capital goods. The estimates assume that the real price of ICT equipment falls at 7% per year. ICT income and output shares were obtained from the EUKLEMS database.

Source: Oulton (2012)

Table 8. Exposure to Skill-Bias of Technological Change

	Low Educational Attainment (% labour force)	*Unemployment Rate of Low Educated (%)*	*Employment Protection (0-6)*	*Net Replacement Rate (%)*
Austria	17	7.7	2.37	72
Belgium	28	12.1	1.81	82
Denmark	22	9.6	2.20	87
Finland	16	11.6	2.17	69
France	28	13.8	2.38	68
Germany	13	12.8	2.87	83
Greece	32	25.3	2.12	46
Ireland	25	23.3	1.40	75
Italy	43	12.2	2.51	78
Netherlands	27	6.6	2.82	81
Portugal	63	16.0	3.18	78
Spain	46	31.2	2.05	74
Sweden	13	12.3	2.61	67
UK	22	10.5	1.03	56
USA	11	14.3	0.26	51

Notes: low educational attainment is defined as less than upper secondary for ages 25-64 in 2012; employment protection is for permanent workers in 2013; net replacement rate is for household with 1 earner and 2 children on 67% average wage at initial unemployment in 2013

Sources: OECD (2014b), OECD Benefits and Wages database and OECD Employment Protection database

Table 9. Estimates of the Long-Term Impact of Brexit (%)

	LSE	***HMT***			***NIESR***			
		EEA	FTA	WTO	EEA	FTA	WTO	WTO*
Trade	-12.6	-9.0	-16.5	-20.5	-13.5	-15.5	-25.0	-22.0
GDP	-7.9	-3.8	-6.2	-7.5	-1.8	-2.1	-3.2	-7.8

Notes: original estimates in Dingra et al. (2016), HMT (2016) and Ebell and Warren (2016). The NIESR estimates do not allow for 'dynamic effects' on productivity except in the column labelled WTO*.

Source: adapted from Ebell and Warren (2016)

Table 8. Social Transfers (%GDP)

	1930	*1960*	*1980*	*2005*	*2013*	*"2030"*
Austria	1.2	15.9	22.6	27.1	28.3	33.3
Belgium	0.6	13.1	23.5	26.5	30.7	37.0
Denmark	3.1	12.3	25.2	27.7	30.8	33.7
Finland	3.0	8.8	18.4	26.2	30.5	36.2
France	1.0	13.4	20.8	30.1	33.0	35.8
Germany	4.8	18.1	23.0	27.3	26.2	30.1
Greece	0.1	10.4	11.5	21.1	22.0	24.8
Ireland	3.7	8.7	17.4	16.0	21.6	25.3
Italy	0.1	13.1	18.0	24.9	28.4	30.4
Netherlands	1.0	11.7	24.1	18.1	24.3	29.4
Norway	2.4	7.8	16.9	21.6	22.9	28.0
Portugal	0.0		10.8	23.0	26.4	29.1
Spain	0.1		15.5	21.1	27.4	30.3
Sweden	2.6	10.8	28.6	29.1	28.6	31.2
Switzerland	1.2	4.9	13.9	20.3	19.1	23.3
UK	2.2	10.2	16.6	20.5	23.8	26.2

Note: "2030" adds to the 2013 figure increases through 2030 from health and long term care in the absence of cost containment (de la Maisonneuve and Oliveira Martins, 2013) and from pensions expenditure (OECD, 2013)

Sources: Lindert (2004), OECD (2014c)